

Title: The influence of social factors and personality constructs on drink driving among young licenced drivers

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Abstract

Young adults continue to be overrepresented in alcohol-related crashes on Australian roads. Social factors are important factors associated with drink driving behaviours among young adults and have been the focus of several intervention efforts. However, research also demonstrates that personality constructs are associated with an increased likelihood of engaging in harmful drinking and risky driving behaviours. To better understand the influence of both social and personality constructs with drink driving, 390 male and female licenced drivers aged 18–24 years completed a questionnaire that assessed Akers' social learning theory constructs and the personality constructs of Behavioural Inhibition System (BIS) and Behavioural Approach System (BAS) for their association with drink driving in the past 12 months. Result indicated that a relatively large proportion (36.67%) of participants engaged in drink driving. A sequential logistic regression analysis further found that several social and personality variables were associated with drink driving. Specifically, the Akers' social learning theory constructs of Personal Definitions, Differential Reinforcement–Punishment (High), Differential Association Drink Driving–Friends, and Imitation–Friends variables and the BAS constructs of Fun Seeking and Drive were associated with drink driving. While these findings highlight the importance of targeting the social context around drink driving, the impact of personality constructs also warrants consideration with intervention efforts.

Key words: Drink driving, Young drivers, Social influences, Personality, Akers' social learning theory, Gray's Behavioral Inhibition System and Behavioral Approach System

1. Introduction

Alcohol is a major contributor of serious road crashes resulting in significant injuries, fatalities and property damages (Connelly & Supangan, 2006; Department Transport and Main Roads, 2012). In Australia alone, the costs of drink driving is an estimated 3.66 billion dollars (AU) per annum (Manning et al., 2013). Young drivers are found to be at an increased risk of crash involvement, with those aged 17–25 years making up 25% of all drivers seriously injured or killed as a result of risky driving behaviour (Australian Transport Council, 2011). The Graduated Driver Licensing (GDL) system and other initiatives have been introduced in Australia in an attempt to reduce the high incidence of crashes involving young drivers (Bates et al., 2008). Despite intervention attempts, however, research shows that the high prevalence of driving over the legal Blood Alcohol Concentration (BAC) remains an issue among young people (Australian Transport Council, 2011).

Given the high involvement in drink driving among young people, it is necessary to understand the specific factors linked to increases in this behaviour. Research suggests that there are a number of drink driving risk factors that are more common among young drivers than among other age groups of drivers. These factors include risky drinking, favourable attitudes toward risky driving behaviour, disregard for traffic rules, and general inclination toward high-risk activities (Australian Bureau of Statistics, 2012; Palamara et al., 2001; Steinberg, 2004; Watling & Watling, 2015). Further investigations of these influences on drink driving among young drivers are therefore necessary to develop a sound knowledge base for interventions targeting young drivers. Akers' social learning theory and Gray's Behavioural Inhibition System (BIS) and Behavioural Approach System (BAS), two theories that capture many of the above construct, may be of particular use in understanding drink driving among young people.

1.1 Akers' Social Learning Theory

Akers' (1970) social learning theory is a psychosocial-based perspective that focuses on factors that motivate or inhibit behaviour in order to explain deviant and criminal activity (Akers et al., 1979; Akers & Sellers, 2009). Akers' social learning theory is comprised of four inter-linked theoretical constructs: Differential Association (Behaviour/Normative), Personal Definitions, Differential Reinforcement (Punishment/Reward), and Imitation. Social learning perspectives (e.g., Akers & Sellers, 2009) posit that a person will learn behaviour through their own experiences, and importantly, through differential association with significant others (e.g., family, friends) or distant reference groups (e.g., school, church). Young adults

may construct beliefs about drink driving and its potential consequences both through personal experiences as well as observation of others' drink driving behaviour and their normative approval or disapproval of this behaviour. Differential association with others thus consists of both a behavioural and normative aspect which can be measured for groups of decreasing proximity (e.g., family, friends, others). Personal experiences and differential association, in turn, shape a person's personal definitions (i.e., attitudes), creates expectancies of social reinforcement or punishment for behaviour and provides behavioural models (of decreasing proximity) to imitate. Together these constructs can form a "high risk" social environment where drink driving is approved of and modelled by significant others, and where in turn, expectations of social punishment are low, expectations of social reward are high, and attitudes are positive.

A number of studies have used Akers' social learning theory or similar constructs to examine risky driving behaviour including drink driving, speeding, drug driving, sleepy driving and unlicensed driving (Armstrong et al., 2005; Chen et al., 2008; Davey et al., 2005; Fleiter et al., 2010; Watling, 2014; Watson, 2004). These studies have identified perceived engagement in and approval/disapproval of others, positive personal definitions (attitudes), perceived social and nonsocial punishment and rewards, and parental/peer modelling (a concept related to imitation) as risk factors to the engagement in these risky driving behaviour. Overall, this literature indicates that social learning variables are important predictors of risky driving. However, research that investigates the combined impact of all Akers' social learning constructs on drink driving is largely lacking. Additionally, Akers' social learning constructs, although important predictors of risky and delinquent behaviour, largely ignore the impact of personality traits. Personality traits such as those that sensitise individuals to either punishments or rewards have however been shown to influence risk taking behaviours (Franken & Muris, 2006; Harbeck & Glendon, 2013; Voigt, et al., 2009) and are of particular importance as they, unlike social influences, are regarded as non-modifiable.

1.2 BIS/BAS

One theoretical model that measure individuals' sensitivity toward reward or punishment are the BIS and BAS personality constructs proposed by Carver and White's (1994). This model is based on the premises of Gray's (1970) sensitivity theory which postulates that an individual's behaviour can be explained in terms of two separate neuropsychological systems: BIS and BAS. BIS refers to punishment sensitivity, a tendency toward anxiety or concern regarding anticipated punishment. BAS refers to reward

sensitivity, which is demonstrated through an orientation toward rewarding experiences. The latter system includes three separate subsystems: Drive, Reward Responsiveness, and Fun Seeking (Carver & White, 1994). Drive refers to persistence in pursuing desired goals, Reward Responsiveness the degree to which positive responses to rewards are experienced, and Fun Seeking to the desire for rewards and willingness to seek them out on the spur of the moment. Higher levels of BIS are linked with anticipation of negative or painful consequences and may also be responsible for feelings of anxiety, frustration, and sadness. In contrast, higher levels of BAS are linked to heightened levels of reward sensitivity, sensation seeking, and risk-taking behaviour (Carver & White, 1994; Smillie et al., 2006).

The extant literature demonstrates the importance of individual factors such as sensitivity to reward and punishment with consuming alcohol and its abuse. For instance, lower scores on the BIS and higher scores on the BAS were predictive of drinking behaviours and risky drinking levels (Franken & Muris, 2006; Loxton & Dawe, 2001; Pardo, Aguilar, Molinuevo, & Torrubia, 2007). An Australia study by Jorm et al. (1998) found the BAS Fun Seeking and Drive scales to be correlated with AUDIT scores. The association between BIS/BAS constructs with alcohol use is consistent with findings of the interplay of alcohol dependence and misuse, disinhibition, and gratification of impulses (Addolorato, Leggio, Abenavoli, & Gasbarrini, 2005). Other evidence that demonstrates the links between the BIS/BAS with alcohol use included the association between reward sensitivity and responsiveness as measures by the BAS, with alcohol-related cognitions (Kambouropoulos & Staiger, 2001; Palfai & Ostafin, 2003). These findings when considered together, demonstrates the utility of the BIS/BAS to be related with alcohol use and potentially has some utility with drink driving behaviours.

The BIS/BAS personality characteristics has been used as a conceptual basis for exploring a range of risky health behaviours, including risky driving and substance use (Franken & Muris, 2006; Franken et al., 2006; Harbeck & Glendon, 2013; Voigt, et al., 2009). The research findings on the BIS/BAS personality dimensions for composite measures of risky driving behaviours have been mixed, particularly for BIS. For instance, while one study (Harbeck & Glendon, 2006) has found that higher levels of BIS are indirectly associated (via increase risk perception) with reduced risky driving behaviour, another study (Voigt et al, 2009¹) found it to be positively associated with risky driving. However, there is a general consensus that heightened levels of the BAS constructs Drive and Fun Seeking are

¹ Risky driving is measured as part of a subscale tapping safety behaviour in general

associated with increased risky health behaviours, including substance abuse and risky driving (Franken & Muris, 2006; Franken, et al., 2006; Voigt et al., 2009). In addition to the inconsistent finding regarding BIS, much of the research that focus on risky driving specifically (e.g., Harbeck & Glendon, 2013; Voigt et al., 2009) does not explore drink driving by itself. This may explain inconsistencies in the findings as it has been shown that different risky driving behaviour are explained by different set of predictors (Fernandes Soames, & Hatfield, 2007).

1.3 The Current Study

In the current study Akers' social learning constructs were used in combination with the BIS/BAS model to predict drink driving among young Australian drivers. The inclusion of these factors represented an opportunity to address current gaps in the literature by testing the combined predictive ability of Akers' constructs on drink driving and the predictive ability of BIS/BAS for drink driving outcomes specifically (rather than an outcome measure composed of a range of risky driving behaviours). Additionally, and importantly, it also enabled an estimation of the relative importance of personality and social factor for drink driving outcomes. In the larger literature, personality is regarded as distal predictor of risky or delinquent behaviour mediated by more proximal factors such as attitudes and risk perception (Constantinou, Panayiotou, Konstantinou, Loutsiou-Ladd, & Kapardis, 2011; Machin & Sankey, 2008; Ulleberg & Rundmo, 2003). However, in the context of drink driving it is unclear whether the BIS/BAS constructs will predict drink driving independently of whether the behaviour takes place in a high or low risk social environment. An increased understanding of the relative contribution of each set of factor is of importance as drink driving that is influenced by unmodifiable personality constructs require different intervention strategies compared to those that are influenced by modifiable social factors. Based on the reviewed literature on the relationship between social learning constructs and the BIS/BAS, consequently, the current study has three main research questions:

- RQ1: What Akers' social learning constructs are associated with drink driving?
- RQ2: What personality constructs from the BIS/BAS are associated with drink driving?
- RQ3: Will personality constructs continue to be associated with drink driving after the addition of social learning constructs?

2. Method

2.1 Participants

A convenience sample comprised of 390 participants was recruited from an Australian university ($n = 31$) as well as from the Australian driving population ($n = 359$). The inclusion criteria was that participants held an Australian Learner, Provisional (P1 or P2), or Open Driver's Licence. Participants were recruited through the university setting, email, and social media (e.g., Facebook) posts. Ethics' approval was obtained prior to recruitment.

2.2 Measures and Procedure

Data was collected via an online questionnaire which took approximately 30 minutes to complete. Participants were required to first complete socio-demographic and control items regarding, sex, age, employment status, education level, household income, marital status, licence status, and postcode. Participants were then asked to complete the Alcohol Use Disorders Identification Test (AUDIT). This scale was designed by World Health Organisation as a brief screening tool to identify Risky Drinking (Babor et al., 2001). The AUDIT consists of 10 items, scored from zero to four on three-point and four-point scales, giving a maximum score of 40. A score of > 6 for female and > 7 for male participants was used to identify harmful alcohol use (Babor et al., 2001). The AUDIT is a well-established measure, with strong psychometric properties (Reinert & Allen, 2007). Cronbach's alpha in the current study was .86.

Drink driving was defined exceeding the legal limit according to licence type. Participants were asked the number of times they had driven after drinking in three different ways: "In the past 12 months, how many times have you driven when you thought you could possibly have been over the legal limit for your licence type?" The levels were collapsed into one dichotomised drink driving measure, intending to maximise instances of where a driver could have driven with an excess BAC for their licence type. The variable was recoded to a dichotomous variable for a logistic regression analysis to those who have and have not drink driving in the past 12 months.

Akers' social learning constructs were measured on a number of seven-point Likert scales (1 = strongly disagree/not at all, 7 = strongly agree/all the time). The included constructs and their Cronbach's alpha levels in the current study were: Personal Definition (13 items, e.g., "It is OK to drive over the legal BAC for your licence type as long as you do not get caught", $\alpha = .68$); Differential Reinforcement–Punishment (nine items, e.g., "My

family would be disappointed with me if I drove while over the legal BAC limit for my licence type", $\alpha = .88$); Differential Reinforcement–Rewards (six items, e.g., "Most of my friends would respect me for driving while over the legal BAC limit for my licence type", $\alpha = .78$); Differential Association Normative–Friends (two items, e.g., "My friends think there is nothing wrong with anyone driving while over the legal BAC for their licence type", $\alpha = .83$); Differential Association Normative–Family (two items, e.g., "My family think there is nothing wrong with anyone driving while over the legal BAC for their licence type", $\alpha = .82$); Differential Association Drink Driving–Friends/Family /Other People (one item for each group, e.g., "My friends drive after drinking alcohol when they might have been over the legal BAC limit for their licence type") and; Imitation–Friends/Family/Important Others (one item for each group, e.g., "Think back to when you first started driving solo (unaccompanied). Back then, how much did you base your decision of whether to drive after drinking alcohol or not on the behaviour of your family members?").

The BIS/BAS constructs were measured using Carver and White's (1994) 24-item BIS/BAS inventory. The inventory includes one subscale measuring BIS and three subscales measuring the BAS subsystems BAS Drive, BAS Fun Seeking, and BAS Reward Responsiveness. Example items for each scale and Cronbach's alpha levels for this study were: BIS (seven items, e.g., "Criticism or scolding hurts me quite a bit", $\alpha = .82$), BAS Drive (four items, e.g., "I go out of my way to get things I want", $\alpha = .79$), BAS Fun Seeking (four items, e.g., "I often act on the spur of the moment", $\alpha = .70$), and BAS Reward Responsiveness (five items, e.g., "When I get something I want, I feel excited and energized", $\alpha = .74$), and four standard filler items. The response categories in the present study were increased from the original 4-point Likert scale to seven-point scale (1 = strongly disagree, 7 = strongly agree) in order to increase the internal reliability and to make the scale format compatible with the remaining scales.

2.3 Design and Analyses

The design of this study was cross-sectional and correlational. The statistical analyses included: descriptive statistics and univariate comparisons; bivariate correlations; and a sequential logistic regression. Prior to conducting analyses, a missing values analysis was conducted and revealed no systematic patterns of missing data. It was found that the variable of Differential Reinforcement–Punishment breached the assumption of linearity for regressions. This issue was dealt with by dichotomising the Differential Reinforcement–Punishment variable via a median split. The social learning constructs of Imitation of Family and Imitation of Important Others breached the assumption of multicollinearity ($r_{rho} = .82, p$

< .001) and these two variables were averaged together (e.g., Midi, Sarkar, & Rana, 2010) to create the variable Imitation–Family and Important Others Scale.

3. Results

3.1 Demographics and drink driving involvement

The sample was predominantly female, comprising of 279 (71.54%) women and 111 (28.46%) men. Overall, the mean age of the sample was 20.19 years ($SD = 1.71$), ranging between 18 and 24 years. Just over half (52.31%) of the participants were single and a majority (71.79%) of participants were students and lived in an area with a Socio-Economic Status (SES) ranking of 6² or above (79.74%). The most common annual household income was AUD 0–20,000 (37.69%), followed by 20,001–40,000 (13.33%). In terms of licence type held, 8.46% of participants held a Learner licence, 14.87% were in the first stage of provisional licensure (i.e., Provisional 1) and 41.03% in the second stage (i.e., Provisional 2), and 35.64% held an Open licences. Tests of mean differences were conducted on the university subsample and those recruited from the general driving population subsample was conducted. It was found that the university subsample was significantly younger ($M = 18.81$, $SD = 0.20$), than the driving population subsample ($M = 20.31$, $SD = 0.09$), $t(388) = 6.91$, $p < .001$. Due to sampling constraints it was not possible to obtain accurate mean difference statistics for the remaining demographics.

Overall, the total samples mean AUDIT score was $M = 7.03$; $SD = 5.02$; 45.38% of the total sample was classified as having risky drinking behaviours via the cut offs used for the AUDIT (> 6 for female and > 7 for male; Babor et al., 2001). Significant differences were found between men ($M = 7.99$; $SD = 5.20$) and women ($M = 6.65$; $SD = 4.91$) on the mean AUDIT scores, $t(386) = 2.39$, $p < 0.05$). Those reporting drink driving in the last 12 months also scored significantly higher on the AUDIT ($M = 9.78$; $SD = 5.32$) than those who did not drink drive in the last 12 months ($M = 5.43$; $SD = 4.07$), $t(239.34) = -8.43$, $p < 0.001$ with equal variances not assumed. A significantly higher percentage of men (47.75%) reported drink driving than women (32.26%), $\chi^2(1, 1) = 8.20$, $p < .01$. Finally, of the total sample, 143 (36.67%) participants reported drink driving on at least one occasion in the last 12 months.

3.2 Bivariate relationships

A number of the study variables were significantly correlated with drink driving, as seen in Table 1. Sex (being male) and Licence type were positively correlated with Drink Driving. Regarding the BIS/BAS personality constructs, small correlations were observed

² SES was ranked on a 10 point scale

between drink driving and the BIS (negative correlation) as well as the BAS Fun Seeking (positive correlation) variables. A number of the Akers' social learning variables were correlated with drink driving – these variables included, Personal Definitions, Differential reinforcement–Punishment (High), Differential Reinforcement–Rewards, Differential Association Normative–Friends, Differential Association Normative–Family, Differential Association Drink Driving–Friends, Differential Association Drink Driving–Family, and Imitation–Friends. The two largest correlations with drink driving were with Personal Definitions and Differential reinforcement–Punishment (High) variables.

Table 1: Bivariate correlations between demographic, licence types, BIS/BAS constructs, and Akers' social learning theory constructs with previous drink driving.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1. Drink driving	-																	
2. Age	.06	-																
3. Sex (male) ^a	.15**	.21**	-															
4. Licence Type	.17**	.53**	.17**	-														
5. BIS	-.14**	-.13*	-.36**	-.16**	-													
6. BAS D	.01	.14**	.08	.08	-.04	-												
7. BAS FS	.14**	.05	.05	.00	-.08	.52**	-											
8. BAS RR	-.09	.05	-.08	-.04	.32**	.41**	.38**	-										
9. PD	.34**	.03	.07	-.01	-.15**	.01	.11*	-.16**	-									
10. DR–Pun (High) ^a	-.32**	-.10	-.19**	-.09	.25**	.07	.03	.27**	-.39**	-								
11. DR–Rewards ^b	.28**	-.07	.10*	-.02	-.09	-.01	.01	-.11*	.46**	-.44**	-							
12. DAN–Fr	.21**	.02	.07	.00	-.07	-.07	-.06	-.20**	.39**	-.37**	.47**	-						
13. DAN–Fam ^b	.13*	-.06	.10*	-.06	-.13*	-.09	-.09	-.24**	.30**	-.29**	.35**	.38**	-					
14. DADDrv–Fr	.24**	.07	.06	.12*	-.03	.14**	.04	-.08	.25**	-.19**	.22**	.44**	.21**	-				
15. DADDrv–Fam	.18**	-.07	-.08	-.07	.02	-.01	-.02	-.09	.14**	-.13*	.22**	.17**	.28**	.36**	-			
16. DADDrv–Oth	.10	-.02	-.06	.01	.12*	.03	.02	.06	.08	.01	.04	.12*	.09	.36**	.25**	-		
17. I–Fr ^b	.16**	.02	-.06	.10*	.09	.03	.09	.00	.06	.02	.14**	.03	.02	.07	-.02	.05	-	
18. I–Fam & ImOth Scale ^b	.08	-.07	.01	.04	.08	.01	.02	.03	-.06	.05	.01	.06	-.07	.15**	-.01	.05	.71**	-

Note: BIS = Behavioural Inhibition System; BAS D = Behavioural Approach System Drive; BAS FS = Behavioural Approach System Fun Seeking; BAS RR = Behavioural Approach System Reward Responsiveness; PD = Personal Definitions; DR–Pun (High) = Differential Reinforcement–Punishment (High); DR–Rewards = Differential Reinforcement–Rewards; DAN–Fr = Differential Association Normative–Friends; DAN–Fam = Differential Association Normative–Family; DADDrv–Fr = Differential Association Drink Driving–Friends; DADDrv–Fam = Differential Association Drink Driving–Family; DADDrv–Oth = Differential Association Drink Driving–Other People; I–Fr = Imitation–Friends; I–Fam & ImOth Scale = Imitation–Family and Important Others Scale.

^aDichotomous variables have the criterion category displayed between the brackets – a point Biserial for correlations coefficient was performed between dichotomous and continuous variables with a Phi coefficient (ϕ) was performed for correlations between categorical variables; ^bSpearman's Rho correlations performed.

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

3.3 Multivariate analyses

The sequential logistic analysis examined the relationship between demographic, licence types, BIS/BAS constructs, and Akers' social learning theory constructs with previous drink driving (see Table 2). The first step included the demographic and licence types variables, which were significantly associated with the outcome variable ($\chi^2(1, 5) = 27.71, p < .001$) and accounted for 10.85% of the variance. At the first step being male was associated with an increased likelihood of drink driving (OR = 1.96) and whereas holding a Learner licence decreased the likelihood of drink driving (OR = 0.08).

The second step included adding the BIS/BAS constructs. The second step was significantly associated with the drink driving variable ($\chi^2(1, 4) = 17.27, p < .01$) and the overall model was still significantly associated with the outcome variable ($\chi^2(1, 9) = 44.67, p < .001$) and accounted for 17.24% of the variance, an additional 6.39%. At this step, the BAS Fun Seeking variable was significantly associated with drink driving (OR = 1.16), with being male (OR = 1.91) and holding a Learner licence (OR = 0.07) still significant in the model.

The third step included the addition of the Akers' social learning theory constructs, to examine if the Akers' constructs could account for additional variance over that of the BIS/BAS constructs. The third step was significantly associated with the drink driving variable ($\chi^2(1, 10) = 69.32, p < .001$) and the overall model was still significantly associated with the outcome variable ($\chi^2(1, 19) = 113.99, p < .001$) and accounted for 39.80% of the variance, an additional 22.56% from step two. A number of Akers' social learning theory variables, being Personal Definitions (OR = 1.07), Differential Reinforcement–Punishment (High) (OR = 2.89), Differential Association Drink Driving–Friends (OR = 1.41), and Imitation–Friends (OR = 1.21) were significantly associated with the drink driving variable. Being male (OR = 2.07), holding a Learner licence (OR = 0.04) continued to be significant in the model with the addition of the Akers' social learning theory constructs. At this final step the BAS Drive variable was significantly associated (OR = 0.91) with a decrease in the likelihood of drink driving. It must be noted that BAS Drive was not significantly associated with drink driving on a bivariate level (see Table 1), thus being significantly associated with the outcome variable with the inclusion of the Akers' social learning theory variables suggests an interaction effect, and inferences regarding BAS Drive should be made with caution.

Table 2: Sequential logistic regression analysis examining the associations of demographic, licence types, BIS/BAS constructs, and Akers' social learning theory constructs with previous drink driving ($N = 390$).

Variables	B	S.E.	Wald	OR	95% CI for OR
Step 1					
Age	0.04	0.09	0.20	1.04	0.87-1.24
Sex (male)	0.67**	0.25	7.02	1.96	1.19-3.21
Licence type: Open (Reference)			9.15	1.00	
Learners	-2.59*	1.06	5.96	0.08	0.01-0.60
Provisional 1	-0.15	0.42	0.14	0.86	0.38-1.94
Provisional 2	0.31	0.33	0.86	1.36	0.71-2.59
Constant	-1.54	1.95	0.62	0.22	
Step 2					
Age	0.05	0.09	0.25	1.05	0.87-1.26
Sex (male)	0.65*	0.28	5.39	1.91	1.11-3.29
Licence type: Open (Ref)			8.93	1.00	
Learners	-2.61*	1.07	5.90	0.07	0.01-0.61
Provisional 1	-0.20	0.43	0.21	0.82	0.35-1.92
Provisional 2	0.28	0.34	0.68	1.33	0.68-2.58
BIS	-0.01	0.02	0.09	0.99	0.96-1.03
BAS D	-0.06	0.04	3.28	0.94	0.88-1.01
BAS FS	0.15**	0.04	14.31	1.16	1.07-1.25
BAS RR	-0.06	0.04	2.27	0.94	0.87-1.02
Constant	-1.45	2.21	0.43	0.24	
Step 3					
Age	0.06	0.11	0.33	1.06	0.86-1.31
Sex (male) ^a	0.73*	0.32	5.22	2.07	1.11-3.86
Licence type: Open (Ref)			12.78	1.00	
Learners	-3.34**	1.17	8.13	0.04	0.00-0.35
Provisional 1	0.23	0.50	0.20	1.25	0.47-3.34
Provisional 2	0.60	0.41	2.15	1.81	0.82-4.02
BIS	0.01	0.02	0.09	1.01	0.96-1.05
BAS D	-0.09*	0.04	5.26	0.91	0.84-0.99
BAS FS	0.13**	0.05	8.11	1.14	1.04-1.24
BAS RR	0.02	0.05	0.26	1.02	0.93-1.12
PD	0.07**	0.02	8.50	1.07	1.02-1.12
DR–Pun (High) ^a	1.09**	0.33	11.21	2.98	1.57-5.64
DR–Rewards	0.04	0.04	1.03	1.04	0.96-1.13
DAN–Fr	-0.14	0.09	2.62	0.87	0.73-1.03
DAN–Fam	0.01	0.11	0.00	1.01	0.80-1.26
DADDrv–Fr	0.34**	0.12	8.51	1.41	1.12-1.78
DADDrv–Fam	0.20	0.12	3.15	1.23	0.98-1.54
DADDrv–Oth	-0.09	0.09	0.94	0.91	0.76-1.10
I–Fr	0.19*	0.09	4.27	1.21	1.01-1.45
I–Fam & ImOth Scale	-0.04	0.09	0.18	0.96	0.81-1.14
Constant	-7.36**	2.72	7.32		

Note: BIS = Behavioural Inhibition System; BAS D = Behavioural Approach System Drive; BAS FS = Behavioural Approach System Fun Seeking; BAS RR = Behavioural Approach System Reward Responsiveness; PD = Personal Definitions; DR–Pun (High) = Differential Reinforcement–Punishment (High); DR–Rewards = Differential Reinforcement–Rewards; DAN–Fr = Differential Association Normative–Friends; DAN–Fam = Differential Association Normative–Family; DADDrv–Fr = Differential Association Drink Driving–Friends; DADDrv–Fam = Differential Association Drink Driving–Family; DADDrv–Oth = Differential Association Drink Driving–Other People; I–Fr = Imitation–Friends; I–Fam & ImOth Scale = Imitation–Family and Important Others Scale.

^aDichotomous variables have the criterion category is displayed in the brackets.

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

4. Discussion

The current cross-sectional study sought to determine the influence of social learning and personality factors on drink driving among a sample of young Australian adults. It was found that just under half of the participants in the study had engaged in drink driving in the past 12 months. Although this is higher than in some previous research (e.g., Davey et al., 2005; Evans–Whipp et al., 2013), this finding supports the notion that drink driving is a prevalent problem among young drivers. Increased alcohol consumption, as measured by the AUDIT was associated with an increased likelihood of drink driving. The link between harmful alcohol use and drink driving is well-established (Flowers et al., 2008; Naimi et al., 2003) and the current results support this finding in a sample of younger drivers.

Younger persons with a Learner licence were less likely than those with an Open licence to drink drive in the logistic regression analysis. There are two factors that could contribute to these findings. The first being, in Australia, drivers progressing through the GDL system cannot have any alcohol in their system when driving. The second factor being, learner drivers are required by law to be accompanied by a supervising driver, which most likely act as a further buffer against drink driving (i.e., M.-J. Chen, Grube, Nygaard, & Miller, 2008). Being male was associated with an increased likelihood of drink driving and correspondingly, the mean scores for men on the AUDIT were significantly higher than women. These two findings suggest that drink driving is still a prevalent issue with younger persons, but that the GDL system affords at the Learners level of licensure, a degree of protection against drink driving with younger persons.

4.1 Social Learning Constructs

A number of Akers' social learning constructs were associated with drink driving and include, Personal Definitions, Differential Reinforcement–Punishment (High), Differential Association Drink Driving–Friends, and Imitation–Friends. The association of Personal Definitions (i.e., attitudes) with drink driving is consistent with previous research examining risky driving behaviours and social learning constructs (Fleiter et al., 2010; MacKenzie, Watling, & Leal, 2015; Watson, 2004). While attitudes have been demonstrated to be an influential factor with drink driving likelihood (Freeman and Watson, 2009; MacKenzie, 2015), and are typically the variable with the strongest association with drink driving, this was not the case in the current study with a number of social learning constructs associated with drink driving.

The Differential Reinforcement–Punishment (High) variable had the strongest association with drink driving. It was found that even when taking into account other key variables, there was an increase in the likelihood of drink driving of over 198% if the anticipated punishment was low. This is a key finding as it demonstrates the importance of anticipated punishment on drink driving among younger drivers. In Australia, substantial resources are committed to educating the public about the dangers of drink driving as well as operating enforcement methods to detect and deter drink drivers (Homel, Carseldine, & Kearns, 1988; Watson, Leal, & Soole, 2013) and it is likely these efforts influence the current results. Differential Reinforcement–Punishment (High) also had a moderate and negative bivariate correlation with Personal Definitions. It is likely that the influence of GDL restrictions and supervised driving when on a learner licence, influences younger drivers’ attitudes towards the acceptability of drink driving. In a similar manner, perceptions of increased certainty of apprehension for drink driving leads to attitudes that drink driving is unacceptable, which indirectly leads to decreased drink driving occurrences (Davey, et al., 2005). Considered together, maintaining negative perceptions of the acceptability of drink driving, in combination with stringent licence restrictions can reduce the likelihood of drink driving in younger persons.

The social impact of alcohol consumption and subsequent drink driving were apparent in the obtained results. That is, the variables Differential Association Drink Driving–Friends and Imitation–Friends were both associated with drink driving in the logistic regression analysis. The social aspects of alcohol consumption are well established (Scarscelli, 2007; Szmigin et al., 2008) and importantly, peer approval of drink driving is associated with a greater likelihood of the individual drink driving (Baum, 1999; Davey et al., 2005). It is worth noting none of the Family level constructs were associated with drink driving. Certainty, family alcohol use is an important factor that influences an individual’s own alcohol use and drinking patterns (Abar, Abar, & Turrisi, 2009; White, Johnson, & Buyske, 2000), however during early adulthood, peer influences can be more influential than the influence from parents (Arata, Stafford, & Tims, 2003; Beck & Treiman, 1996). Thus, the influence of friends/peers with drink driving can be prominent during young adulthood.

4.2 Personality Constructs

The finding that BAS Fun Seeking, a constructs that taps novelty seeking and instant gratification, was positively associated with drink driving was consistent with previous research. That is, several studies have found BAS Fun Seeking to be strongly associated with other risky behaviours (e.g., Franken & Muris, 2006; Franken et al., 2006; Voigt et al., 2009).

In the current study BAS Fun Seeking increased the likelihood of young adults engaging in drink driving by more than 14% at the final step of the model. This suggests that past and anticipated future positive experiences associated with drink driving (e.g., finding the illegal aspect exciting) may contribute to increased involvement in drink driving.

Unexpectedly, BAS Drive (a higher desire to attain a goal) had a negative association with drink driving. BAS Drive was not significant on a bivariate level nor was it significant when the BIS/BAS constructs were entered at the second step of the model. However, when social learning theory variables were entered into the model BAS Drive was significantly and negatively associated with drink driving. This finding is inconsistent with the notion that the BAS subsystems moves a person toward something desired, such as easily getting home by driving while intoxicated. Moreover, in previous studies, BAS Drive has been linked to increased delinquent behaviour (e.g., Franken & Muris, 2006) and traffic violations (Constantinou et al., 2011). Yet, an alternative interpretation could focus on the individual's desire to not be apprehended for drink driving or having a crash and potentially being injured. That is, the negative relationship between BAS Drive and drink driving could be reflectively of safety promoting behaviours. Nonetheless, as this variable was not significant at the bivariate level, its significant relationship with the outcome variable in the multivariate analysis could be considered a statistical artefact or an interaction effect with the social learning variables, and thus should be interpreted with caution.

When considering research question three, the finding indicated that the BAS Fun Seeking variable continued to be associated with drink driving after the inclusion of the social learning constructs. In the initial step, the BAS Fun Seeking increased the likelihood of young adults engaging in drink driving by more than 16% which was only reduced by 2% when the social learning constructs were included in the model. The small size of this reduction is noteworthy, particularly when consideration is given to the number of social learning constructs that were associated with drink driving. Given the importance of social aspects and behaviours with alcohol consumption (Scarscelli, 2007; Szmigin et al., 2008) and the fact that Aker's social learning theory is heavily focused on the social context of behaviour initiation, the continued association of the BAS Fun Seeking variable with drink driving is notable.

The continuing significance of BAS Fun Seeking also has implications for the conceptualisation and design of drink driving reduction efforts. In past decades, Australia has witnessed a substantial reduction in drink driving rates, which has partly been driven by a significant shift in social attitudes toward and acceptance of drink driving (Homel, et al,

1988; Watson, et al., 2013). However, while the effectiveness of social factors in drink driving reduction have been demonstrated on the population level, the current findings suggest that for those individuals who are high on fun seeking, interventions targeting social factors will be less effective. Instead, a number of studies have demonstrated that targeted interventions, or personality-targeted interventions, are effective with reducing adolescents who are high on specific personality constructs drinking behaviours (Conrod, Castellanos-Ryan, & Mackie, 2011; O'Leary-Barrett, Mackie, Castellanos-Ryan, Al-Khudhairy, & Conrod, 2010) and thus, personality-targeted campaigns for drink driving could be worth pursuing.

4.3 Practical Implications

As evidenced by moderate drink driving involvement in this sample, road safety efforts targeting drink driving among young people should continue. As indicated by the current findings, any efforts resulting in reduced harmful alcohol use among young people is likely to reduce the overall prevalence of drink driving. In addition to this, efforts that target low perceived punishments associated with drink driving itself could result in reduced incidents drink driving. Programs such as the GDL system as well as anti-drink driving campaigns have been employed in Australia with demonstrated reductions in drink driving crashes (H. Y. Chen et al., 2010; Henstridge, Homel, & Mackay, 1997). While anticipated legal punishments have been incorporated in the GDL system, educational programs could work to complement this by emphasising the added importance of social punishments. Given the finding that low perceived social punishment is associated with increases in drink driving, the importance of clear renunciations (rather than approval) of drink driving from friends and family should be highlighted.

The findings that novelty seeking (via the BAS Fun Seeking) influences drink driving is also of theoretical importance; however, the significant contribution of the BAS to drink driving further suggest that understanding and counteracting the aspects of drink driving that appeal to the fun seeking personality type might be an area for potential future research and policy development. Based on the current findings, campaigns might focus on reducing the perceived thrilling or novel aspects of drink driving by highlighting negative consequences to peers who are passengers (e.g. injuring passengers during a crash). However, the relatively small increase in drink driving as a result the BAS constructs, after the addition of social factors, should be taken into consideration.

4.4 Strengths and Limitations

A particular strength of the current study is that it considered the impact of a several social influences and personality factors on drink driving among young adults. Previous behaviour models commonly applied in this area, such as the Theory of Planned Behaviour (Ajzen, 1991), include measurement of perceived social norms as well as personally held beliefs (e.g., self-efficacy beliefs). However, these models do not reflect the multitude of social factors (e.g., influence of participants' important others, imitation, as well as reinforcement of punishments and rewards) that may impact on behaviour and do not include any personality factors. As such, the current study employed both a novel and comprehensive approach to understanding drink driving.

The research project also had a number of limitations. The recruitment of participants was conducted using a convenience sampling method, thus limiting the representativeness of the sample and conclusions regarding the prevalence of these constructs in the broader population of young drivers should be constrained. Further, the sample lacked diversity in socio-economic rating of residential areas and in education levels, factors that predict drink driving among young adults (Morrison et al., 2002). The study may, moreover, have been limited by the reliance on self-report data and participants' ability to accurately recall information (e.g., imitating significant others in first driving experience). This, in conjunction with the non-representative nature of the sample, should be taken into consideration when interpreting the findings.

4.5 Conclusion

The present study found that higher levels of BAS Fun Seeking and lower levels of Differential Reinforcement–Punishment and BAS Drive predicted increased involvement in drink driving. A novel contribution to road safety research was that the BAS constructs explained drink driving over and above social learning alone, which suggests that this behaviour cannot be completely explained without inclusion of personality characteristics. Road safety interventions that focus on the perceived punishing consequences and reducing “fun” associated with drink driving, could lead to reductions in drink driving. While there is a necessity to continue researching drink driving, the current study may have contributed valuable information about the factors that predict this behaviour and provide guidance for future road safety research, interventions, and education.

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7. Appendix

Personal Definition

1. It is OK to drive after drinking one or more alcoholic drinks, but remain under the legal BAC limit
2. It is OK to drive over the legal BAC for your licence type as long as you do not get caught
3. The police spend too much time hassling those who drive while over the legal BAC limit
4. Driving while over the legal BAC for your licence type is part of my normal driving routine
5. It is OK to drive while over the legal BAC for your licence type as long as you do not do it too much
6. Drink drivers generally drive more carefully on the road
7. Everybody drives while over the legal BAC for their licence type once in a while
8. There is no excuse for driving while over the legal BAC for your licence type (*reverse scored*)
9. I believe that driving over the legal BAC for your licence type is dangerous (*reverse scored*)
10. We need harsher penalties for people who drive over the legal BAC limit for their licence type (*reverse scored*)
11. I would find it inconvenient to catch public transport after drinking alcohol
12. I would find it too expensive to catch a taxi after drinking alcohol
13. I would feel unsafe catching public transport after drinking alcohol

Differential Reinforcement–Punishment

1. I would feel bad driving over the legal BAC limit for my licence type
2. I would feel anxious driving over the legal BAC limit for my licence type
3. I would feel guilty about driving over the legal BAC limit for my licence type
4. My friends would think of me as an idiot if I drove while over the legal BAC limit for my licence type
5. My family would be disappointed with me if I drove while over the legal BAC limit for my licence type

6. I could lose my current job or I could potentially have trouble finding a job if my current/future employer knew I had driven while over the legal BAC for my licence type
7. I would not like my workmates or university friends to know I had driven while over the legal BAC limit for my licence type
8. Driving over the legal BAC limit for my licence type is generally not worth the risk of being caught and punished
9. Overall, there are more bad things than good things that are likely to result from driving over the legal BAC limit for my licence type

Differential Reinforcement–Rewards

1. I think it would be more convenient to drive while over the legal BAC limit for my licence type than to use other forms of transport
2. I would get a thrill driving while over the legal BAC limit for my licence type
3. I would get a great sense of achievement from being able to control the vehicle while over the legal BAC limit for my licence type
4. I would feel good driving while over the legal BAC limit for my licence type
5. Most of my friends would respect me for driving while over the legal BAC limit for my licence type
6. Most of my family would respect me for driving while over the legal BAC limit for my licence type

Differential Association Normative–Friends

1. My friends think there is nothing wrong with anyone driving while over the legal BAC for their licence type
2. My friends do not care if I drive over the legal BAC for my licence type, so long as I do not get caught

Differential Association Normative–Family

1. My family think there is nothing wrong with anyone driving while over the legal BAC for their licence type
2. My family do not care if I drive while over the legal BAC for my licence type, so long as I do not get caught

Differential Association Drink Driving–Friends/Family/Other People

1. My friends drive after drinking alcohol when they might have been over the legal BAC limit for their licence type
2. My family drive after drinking alcohol when they might have been over the legal BAC limit for their licence type
3. Other people drive after drinking alcohol when they might have been over the legal BAC limit for their licence type

Imitation–Friends/Family/Important Others

Think back to when you first started to driving solo (unaccompanied). Back then, how much did you base your decision of whether to drive after drinking alcohol or not on the behaviour of...

1. ...your friends?
2. ...your family members?
3. ...the person closest to you?