

## **PREDICTORS OF DRINKING BEHAVIOUR AMONG ADOLESCENTS AND YOUNG ADULTS: A NEW PSYCHOSOCIAL CONTROL PERSPECTIVE**

**Angela L. Curcio, Anita S. Mak, and Amanda M. George**

**Abstract:** Based on common cause conceptualisations of problem behaviour, we examined whether a revised psychosocial control theory of adolescent delinquency could explain problem drinking among a non-clinical convenience sample of adolescents and young adults. A sample of 329 Australian secondary school students (adolescent age groups 13–14 and 15–17, 50.6% female) and 334 Australian university students (age groups 18–20 and 21–24, 68.4% female) in Canberra, Australia participated in an online survey comprising self-reported problem drinking and psychosocial control measures. The revised psychosocial model explained variance in problem drinking with large effect sizes in all four age cohorts. Peer risk-taking behaviours significantly predicted problem drinking across all age cohorts, and impulsivity was more influential than sensation seeking. While the findings partially support a revised psychosocial control model, psychosocial control risk factors need to be considered along with the broader sociocultural context. This is particularly important in Australia where drinking is often considered normative within universities and the general community.

**Keywords:** Problem drinking, adolescence, young adulthood, development, psychosocial risk factors, theory development

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This article, based on common cause conceptualisations of youth problem behaviours, is concerned with testing the applicability of a model of delinquency in explaining problematic alcohol use among a non-clinical sample of Australian adolescents and young adults. For the purposes of this article, the term *problem drinking* will encompass drinking styles that reflect excessive and hazardous consumption, or result in alcohol-related problems including dependence.

Problematic alcohol use is a ubiquitous health problem and is especially common among Western communities. Australian adolescents in particular drink earlier and at higher rates than matched samples in the United States and Europe (Jonkman, Steketee, Toumbourou, Cini, & Williams, 2012; Toumbourou, Hemphill, McMorris, Catalano, & Patton, 2009). This trend appears to extend into young adulthood, with Australians aged 18–24 more likely to drink at harmful levels than older adults (Australian National Preventive Health Agency, 2014). Emerging research indicates that Australian and New Zealand university students are more likely to consume alcohol at risky levels than their non-university counterparts (Gilchrist, Smith, Magee, & Jones, 2012; Kypri, Cronin, & Wright, 2005).

Among studies that use an integrated theoretical approach there are more focusing on other problem behaviours, such as delinquency, than there are on alcohol misuse, despite the extent of youth problem drinking (Ennett et al., 2008; Petraitis, Flay, & Miller, 1995). Common cause conceptualisations of a general deviance orientation, such as problem behaviour theory (Jessor & Jessor, 1977) and the deviance proneness model (Sher, 1991), suggest that shared causes account for youth participation in a range of risk-taking, often illegal, activities. Given shared etiological risk factors, it is reasonable to assume that well-established theories of delinquency, which consider both psychological and social causes of the phenomenon, could also be useful for explaining problem drinking behaviours among adolescents and young adults.

For example, the social development model (Hawkins & Weis, 1985), initially designed to explain juvenile delinquency and antisocial behaviour, has been successfully applied to adolescent substance use and drinking behaviours (Catalano, Kosterman, Hawkins, Newcomb, & Abbott, 1996). The social development model combines elements of control theory, social learning theory, and differential association theory to suggest that family, school, peer, and community factors impact upon a trajectory of either prosocial or antisocial behaviour. While there is well-established evidence for the utility of the social development model across ethnic, gender, and regional differences in the United States, the social development model neglects the influence of specific psychological or personality variables in the initiation of delinquency and drinking behaviour.

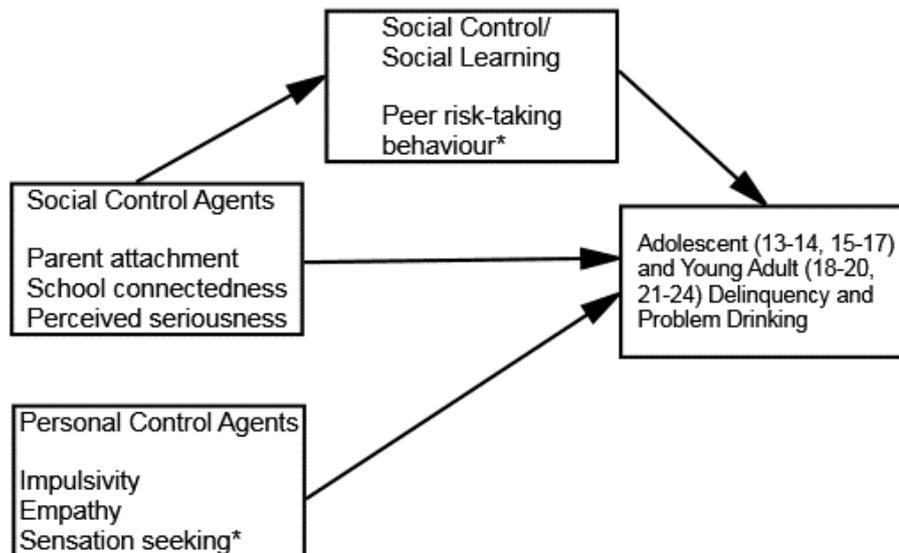
To address these limitations, Curcio, Mak, and George (2013) and Curcio, Knott, and Mak (2015) identified shared psychological and social risk factors for adolescent delinquency and problem drinking among an Australian sample. Risk factors included high levels of impulsivity, sensation seeking, and peer risk-taking behaviours, and low levels of empathy, parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours. Mak's (1990) psychosocial control theory of adolescent delinquency comprises most of these factors (sensation seeking and peer risk-taking are the exceptions). Curcio, Mak and George (2016) subsequently tested, and found support for, a revised psychosocial control

theory of delinquency among a non-clinical sample of Australian adolescents, and successfully applied the adolescent model to young adult cohorts (aged 18–20 and 21–24).

An advantage of the revised psychosocial control model of delinquency is that it distinguishes between impulsivity and sensation seeking. Impulsivity, or low self-control (Duckworth & Kern, 2011), comprises ill-considered and rash actions, and often leads to alcohol-related problems by impairing forethought (Magid, MacLean, & Colder, 2007). Sensation seeking is different from more traditional conceptions of “rash impulsivity” (Dawe, Gullo, & Loxton, 2004), which is typified by a lack of planning and impulse control. Sensation seekers are often able to limit alcohol-related problems by planning ahead and by ceasing to drink once an optimal level of arousal has been achieved (Curcio & George, 2011; Magid et al., 2007). Despite these conceptual differences, impulsivity and sensation seeking are rarely considered separately (Curcio et al., 2013; Steinberg et al., 2008). This makes interpreting relevant literature on drinking behaviours more difficult as existing measures often reflect both traits when attempting to assess only one (Magid et al., 2007).

Advancing upon the original model, the revised psychosocial control model of delinquency additionally considers the role of peer risk-taking behaviours and its potentially mediating effects. Social learning theories suggest that individuals model the behaviours of significant others, often peers (Akers, 2009), and social control theories suggest that individuals are likely to attach to similarly risk-prone peers (Britt & Gottfredson, 2011). Over time, young people become increasingly susceptible to peer influence (Benson, 2013; Curcio et al., 2016; Ohannessian, 2011), and those individuals with weakened attachments to traditional social controls, such as parents and school, and those who are less averse to risk, may be more likely to associate with risk-taking peers and adopt deviant behaviours.

Accordingly, Curcio et al. (2016) found peer risk-taking behaviours partially mediated the effects of conventional social control variables of parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours with delinquency. Whether such a relationship is also found for problem drinking remains to be tested. Given shared etiological causes (Curcio et al., 2013; Jessor & Jessor, 1977), the revised psychosocial control model has potential to explain problem drinking behaviours. Figure 1 depicts the proposed revised psychosocial control theory of delinquency and problem drinking.



*Figure 1.* Visual representation of proposed revisions to Mak’s (1990) psychosocial control theory of adolescent delinquency, including the two additional variables (sensation seeking and peer risk-taking behaviour), an additional dependent variable (problem drinking), and four new developmental cohorts (13–14, 15–17, 18–20, and 21–24 year age groups). The variables that are new to the model are marked with an asterisk.

### The Present Study

While Curcio et al. (2016) applied the revised psychosocial control theory to delinquency, it is not yet known whether the new model can explain problem drinking behaviours among a non-clinical sample of adolescents and young adults. Age cohorts match those described in Curcio et al. (2016) and closely reflect reported trajectories of problem drinking in Australia described by Roche et al. (2007), beginning around ages 13 to 14, increasing during mid-adolescence (ages 15–17), and peaking in young adulthood (ages 18–20), before gradually declining (21–24). It is plausible that the revised psychosocial control model would furnish useful insights into problem drinking for all four age cohorts.

We set out to test three hypotheses related to problem drinking for various age cohorts of Australian youth within the 13 to 24 age range. Based on common cause conceptualisations of problem behaviours, we tested the hypothesis that the revised psychosocial control theory would explain a significant portion of variance in youth problem drinking. We further hypothesised that the added psychosocial control variables (i.e., levels of sensation seeking and peer risk-taking behaviours) would explain variance in problem drinking more satisfactorily than do the original psychosocial control variables (i.e., impulsivity, empathy, parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours). Based on Curcio et al.’s (2016) findings, we additionally explored whether peer risk-taking behaviours mediate the relationships between conventional social controls (parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours) with problem drinking among different developmental stages ranging from early adolescence to emerging young adulthood.

## Method

### *Design and Procedure*

Adolescent participants were approached through government and independent high schools and colleges in Canberra, Australia, whereas young adult students were recruited from a small metropolitan university located in Canberra. Ethical protocols required opt-in parental consent for government students less than 18 years of age. Utilising a cross-sectional convenience sample, voluntary participants aged 13 to 24 completed an online survey. Computerised surveys have been shown to limit socially desirable responses by ensuring anonymity (Grimm, 2010). Participants were offered either 30 minutes research credit (psychology students only) or entry into a draw to win a \$150 gift voucher. The study received ethics approval from the appropriate ethical boards prior to commencing. For a detailed overview of the procedure, refer to Curcio et al. (2016).

### *Participants*

**Adolescents.** Of the 356 adolescents who initiated the online survey, 334 (93.8%) completed it. Their ages ranged from 13 to 17 ( $M = 14.17$ ,  $SD = 1.30$ ); 50.6% were female. The adolescent sample was further divided into two age groups: 13 to 14 ( $n = 208$ ) and 15 to 17 ( $n = 126$ ) to reflect adolescent trajectories of drinking behaviour.

**Young adults.** A total of 346 university students aged 18 to 24 ( $M = 19.92$ ,  $SD = 1.68$ ) completed the online survey (68.4% female). To reflect trajectories of drinking behaviour common in young adults, the university sample was further divided into two age groups: 18 to 20 ( $n = 228$ ) and 21 to 24 ( $n = 118$ ).

### *Measures*

**Problem drinking.** Problematic drinking styles were assessed with the 10-item Alcohol Use Disorders Identification Test (AUDIT; Babor, de la Fuente, Saunders, & Grant, 1992). The AUDIT comprises three subscales measuring quantity and frequency of alcohol consumption, possible alcohol dependence, and problems resulting from alcohol use. Total AUDIT scores range from 0 to 40, with higher scores reflecting a greater likelihood of hazardous or harmful drinking and possible dependence; a cut-off score of 8 or higher is generally recommended as a classification for hazardous or harmful drinkers (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001; Pengpid, Peltzer, van der Heever, & Skaal, 2013). The AUDIT is useful for assessing hazardous and problematic forms of drinking among adolescents (Rumpf, Wohlert, Frever-Adam, Grothues, & Bischof, 2013) and university students (Kypri et al., 2005). Table 1 presents descriptive and reliability statistics for the AUDIT total and its subscales.

Given that participants in the current study were from a general population sample, and many were under the legal age of alcohol consumption in Australia, few would reach the recommended cut-off criterion (a score of 8 or higher) for hazardous or harmful drinking (Babor et al., 2001; Bergman & Källmén, 2002). As a result, the AUDIT was calculated as a summed value for hierarchical regression analyses, as used elsewhere (e.g., Karyadi & Cyders, 2015; Krenek, Maisto, Funderburk, & Drayer, 2011; Osterman, Ribak, Bohn, Fargo, & Sommers, 2009; Skule et al., 2014). While the term hazardous (or harmful) drinking is often used in association with the AUDIT, we view total AUDIT scores as reflecting increased likelihood of problem drinking.

**Psychosocial control variables.** Original psychosocial control variables comprised impulsivity, empathy, parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours. As indicators of low self-control are thought to highlight trait impulsivity (Duckworth & Kern, 2011), we assessed impulsivity using the 13-item Brief Self-Control Scale (Tangney, Baumeister, & Boone, 2004). Empathy was measured by the 6-item Empathic Concern subscale of the Interpersonal Reactivity Index (Davis, 1980, 1983). Parent attachment was assessed by the 8-item Brief Current version of the Parental Bonding Instrument (Klimidis, Minas, & Ata, 1992), which reflects perceived parental care versus rejection, and control versus autonomy. School connectedness was measured by the 5-item School Connectedness Scale (McNeely, Nonnemaker, & Blum, 2002; Resnick et al., 1997). Perceived seriousness of risk-taking behaviours was assessed by a 10-item scale based on Curcio, Mak, and Knott's (2015) Delinquency Checklist.

Revised psychosocial control variables included sensation seeking and peer risk-taking behaviour. We assessed sensation seeking using a subset of six items designed to classify the core aspects of sensation seeking from the Zuckerman-Kuhlman Personality Questionnaire (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). Finally, the same 10 categories of risk-taking behaviours were adapted from the Delinquency Checklist (Curcio, Mak, et al., 2015) to assess peer risk-taking behaviours. More details regarding the psychosocial control measures are provided in Curcio et al. (2016).

### **Statistical Analysis**

**Missing data.** Data analysis was conducted using PASW Version 22.0 for Windows. Analyses were conducted at a significance level of  $\alpha = .05$ , unless otherwise specified. Missing data were under 10% for adolescent samples and 13% for university samples, levels generally considered acceptable in psychological studies (Enders, 2003). Little's multivariate test (Little & Schenker, 1995) indicated that data were not missing completely at random. Data were likely missing at random by design (Dong & Peng, 2013), with variables measured towards the latter end of the online survey missing slightly more data. Missing data were treated with direct proration, an imputation method, by calculating the average valid item response for each participant (Orr, 1995) where there were no more than 20% of items with missing values for a scaled score.

**Descriptive statistics.** Table 1 presents descriptive statistics for continuous variables for the four age cohorts, including the AUDIT total score and three subscales (Consumption, Dependence, and Problems). Distributions for total AUDIT scores (adolescents only) and for peer risk-taking behaviours were highly positively skewed. Research using the AUDIT and its subscales in general populations often results in positively skewed data, as many participants report few alcohol-related problems (Bergman & Källmén, 2002). For such distributions, it is often suggested to use transformed scores rather than raw data (Bergman & Källmén, 2002). Square root transformations resulted in appropriate skewness statistics for peer risk-taking behaviours, and inverse transformations were used for adolescent AUDIT scores (Tabachnick & Fidell, 2001). Although the AUDIT total is inversely transformed for the adolescent groups, for reporting purposes directions associated with the AUDIT total are not inverse to allow for comparison with obtained results from the young adult groups.

Table 1 additionally presents Cronbach alpha coefficients, which indicated satisfactory internal consistency reliabilities with the exception of school connectedness among the young adults, especially the 21 to 24 age group ( $\alpha < .60$ ). These measures were retained despite lower than preferred reliabilities to explore influences of school connectedness on university students' drinking behaviours.

Table 1

*Descriptive and Reliability Statistics for Continuous Survey Scales across Age Groups*

Scale	Possible Range	Age Group: 13-14 (N = 208)				Age Group: 15-17 (N =126)				Age Group: 18-20 (N =228 )				Age Group: 21-24 (N = 118)			
		M	SD	S	Cronbach's $\alpha$	M	SD	S	Cronbach's $\alpha$	M	SD	S	Cronbach's $\alpha$	M	SD	S	Cronbach's $\alpha$
AUDIT total	0-40	.96	4.76	6.71	.97	2.82	6.30	3.53	.93	7.47	6.25	1.23	.85	7.70	7.18	1.33	.88
SQRT AUDIT total	0-7	.28	.94.	4.46		.93	1.40	1.65									
Inverse AUDIT total	0-1	.91	.24	-2.58		.69	.38	-.60									
AUDIT-C	0-12	.40	1.63	5.76	.92	1.44	2.48	1.97	.88	4.41	2.94	.31	.82	4.16	2.85	.34	.77
AUDIT-D	0-12	.23	1.51	7.4	.99	.40	1.60	5.20	.92	.80	1.49	2.8	.67	1.00	1.94	2.84	.82
AUDIT-P	0-16	.34	1.87	6.87	.93	.93	2.57	3.86	.84	2.24	2.82	2.10	.62	2.50	3.33	2.76	.73
Impulsivity	13-65	35.48	8.15	.18	.77	37.82	10.05	.22	.86	34.82	8.91	.32	.83	35.47	9.76	.45	.86
Empathy	6-30	22.41	4.26	-.30	.68	22.26	4.72	-.60	.79	23.99	4.51	-.74	.82	24.08	4.52	-.78	.80
Parent attachment	16-48	37.77	5.60	-.84	.83	36.66	5.65	-.28	.80	37.61	6.03	-.70	.82	37.91	5.87	-.36	.81
School connectedness	5-25	18.12	3.50	-.70	.71	17.05	3.82	-.38	.74	18.76	2.91	-.66	.66	18.79	2.84	-.34	.59
Perceived seriousness	10-50	35.95	13.43	-1.03	.98	35.93	10.89	-.77	.96	39.23	7.99	-1.59	.91	40.61	6.63	-1.29	.84
Sensation seeking	0-6	3.47	1.70	-.22	.72	3.40	2.06	-.36	.83	3.04	1.89	-.11	.75	3.32	1.77	-.25	.69
Peer risk-taking behaviour	0-20	1.40	3.11	4.26	.93	2.96	3.88	1.64	.90	3.21	3.48	1.58	.86	2.62	2.73	1.39	.76

*Note.* SQRT AUDIT = AUDIT Total with Square Root Transformation; Inverse AUDIT = AUDIT Total with Inverse Transformation; AUDIT-C = AUDIT Consumption Subscale; AUDIT-D = AUDIT Dependence Subscale; AUDIT-P = AUDIT Problems Subscale; SQRT Peer Risk-Taking Behaviour = Peer Risk-Taking Behaviour with Square Root Transformation.

**Hierarchical linear regression analyses.** We conducted separate inter-item correlation and hierarchical linear regression analyses across the four age groups to examine the suitability of the revised psychosocial control framework in predicting problem drinking. A sample size of 112 was required to detect medium-size relationships, based upon Green's (1991) recommendation,  $N \geq 104 + m$  (where  $m$  equals the number of independent variables). The recommended sample size requirement was met for 13 to 14 ( $n = 208$ ), 15 to 17 ( $n = 126$ ), 18 to 20 ( $n = 228$ ), and 21 to 24 ( $n = 118$ ) age groups, suggesting adequate power.

For all models, gender was considered in Step 1. Step 2 comprised variables identified in the original psychosocial control theory, including the personality variables impulsivity and empathy, and the social control variables parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours. To determine whether the revised psychosocial control framework could explain variance in problem drinking beyond that of the original model, the additional variables proposed by the revised psychosocial control framework were added at Step 3. These were sensation seeking and peer risk-taking behaviour.

**Mediation analyses.** To test whether peer risk-taking behaviours mediated the effects of social control variables (parent attachment, school connectedness, and perceived seriousness of risk-taking behaviour) on self-reported problem drinking, we performed mediation analyses using Preacher and Hayes' (2008) bootstrapping method for each of the four age groups. Bootstrapping, a non-parametric resampling procedure, repeatedly samples from the data set and provides a more powerful and accurate empirical estimation of the sampling distribution, from which confidence intervals for the indirect effect are constructed (Preacher & Hayes, 2008). The subsequent mediation analyses are based on 5,000 samples, within a 95% bias-corrected bootstrap confidence interval, as recommended by Preacher and Hayes (2008). In each set of analyses, gender, impulsivity, empathy, and sensation seeking were included as covariates, as many of these variables showed effects on problem drinking in the aforementioned regression analyses.

## Results

### *Descriptive Statistics*

For the current sample, approximately 3.4% of 13 to 14 year olds, 11.9% of 15 to 17 year olds, 39.5% of 18 to 20 year olds, and 36.4% of 21 to 24 year olds were classified as hazardous or harmful drinkers as determined by an 8 or higher cut-off score (Babor et al., 2001; Pengpid et al., 2013). Relative to scale mid-points, participants generally reported lower levels of problem drinking (as reflected by the AUDIT total score) and peer risk-taking behaviours, and higher levels of impulsivity, empathy, parent attachment, school connectedness, perceived seriousness of risk-taking behaviours, and sensation seeking.

### *Correlations*

Table 2 presents the correlations for the total AUDIT and indicators of psychological and social control for adolescent samples aged 13 to 14 and 15 to 17 separately. For the 13 to 14 age cohort, the AUDIT total was significantly correlated with higher levels of impulsivity, empathy, sensation seeking, and peer risk-taking behaviours, and lower levels of parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours. Similar relationships were found among the 15 to 17 age cohort, except empathy and school connectedness were not significantly associated with problem drinking. Peer risk-taking scores maintained significant inverse relationships with each of the conventional social control variables of parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours.

Table 2

*Correlations among Continuous Variables for 13–14 and 15–17 age groups*

	1	2	3	4	5	6	7	8
1. AUDIT total	-	.36**	.23**	-.16*	-.36**	-.26**	.24**	.51**
2. Impulsivity	.32**	-	-.25**	-.40**	-.46**	-.21**	.44**	.49**
3. Empathy	-.12	-.30**	-	.07	.15*	.32**	-.17*	-.14*
4. Parent attachment	-.29**	-.38**	.13	-	.51**	.18*	-.16*	-.19*
5. School connectedness	-.17	-.42**	.21*	.47**	-	.21**	-.19*	-.42**
6. Perceived seriousness	-.24**	-.28**	.19*	.25**	.29**	-	-.23**	-.23**
7. Sensation seeking	.40**	.32**	-.22*	-.28**	-.25**	-.40**	-	.38**
8. Peer risk-taking behaviour	.61**	.29**	-.20*	-.38**	-.27**	-.31**	.41**	-

*Note.* The results for 13–14 age group are represented in the top right corner above the diagonal, and the results for 15–17 age group are represented in the bottom left corner below the diagonal.

\* $p < .05$ ; \*\* $p < .01$ .

Table 3 presents the correlations for the AUDIT total and psychosocial control variables for the young adult samples aged 18 to 20 and 21 to 24 separately. For both these age cohorts, the AUDIT total was significantly correlated with higher levels of impulsivity, sensation seeking, and peer risk-taking behaviours, and lower levels of perceived seriousness. Empathy, parent attachment, and school connectedness were not found to significantly correlate with problem drinking for either of the young adult age groups.

Table 3

*Correlations among Continuous Variables for 18–20 and 21–24 age groups*

	1	2	3	4	5	6	7	8
1. AUDIT total	-	.45**	-.01	.00	-.06	-.28**	.36**	.41**
2. Impulsivity	.57**	-	-.16*	-.20**	-.46**	-.25**	.27**	.34**
3. Empathy	.07	-.20*	-	.07	.09	.06	.08	.04
4. Parent attachment	-.03	-.25**	-.04	-	.27**	.09	-.09	-.01
5. School connectedness	-.03	-.46**	.07	.26**	-	.15*	-.05	-.14*
6. Perceived seriousness	-.26**	-.16	.16	.00	.01	-	-.18**	-.24**
7. Sensation seeking	.40**	.42**	-.08	.01	-.05	-.27**	-	.30**
8. Peer risk-taking behaviour	.44**	.30**	-.02	-.10	.04	-.17	.08	-

*Note.* The results for the 18–20 age group are represented in the top right corner above the diagonal, and the results for the 21–24 age group are represented in the bottom left corner below the diagonal.

\* $p < .05$ ; \*\* $p < .01$ .

### ***Hierarchical Regression Analyses Predicting Problem Drinking***

Table 4 presents summaries of hierarchical regression analyses predicting problem drinking for adolescents aged 13 to 14 and 15 to 17, and young adults aged 18 to 20 and 21 to 24. Note that gender, entered in Step 1, did not significantly predict problem drinking for any of the age groups. For the 13 to 14 age group, the original psychosocial control variables explained a medium to large effect size ( $f^2 = 0.27$ ), with impulsivity, parent attachment, school connectedness, and perceived seriousness significantly predicting problem drinking. The revised psychosocial control variables significantly explained an additional 8% of the variance in problem drinking, a large effect ( $f^2 = 0.41$ ). School connectedness and peer risk-taking behaviours were significant predictors in the final model.

For the 15 to 17 age group, original psychosocial control variables explained a medium to large effect size ( $f^2 = 0.22$ ) with impulsivity and parent attachment significantly predicting problem drinking. The revised psychosocial control model significantly explained an additional 22% of the variance in problem drinking, a large effect ( $f^2 = 0.64$ ). Peer risk-taking behaviours was the only significant predictor in the final model.

For the 18 to 20 age group, the original psychosocial control variables explained a large effect size ( $f^2 = 0.39$ ), with impulsivity, school connectedness, and perceived seriousness of risk-taking behaviours significantly predicting problem drinking. The revised psychosocial control model significantly explained an additional 8% of the variance in problem drinking, a large effect ( $f^2 = 0.56$ ). Impulsivity, school connectedness, perceived seriousness of risk-taking behaviours, sensation seeking, and peer risk-taking behaviours were significant predictors in the final model.

For the 21 to 24 age group, the original psychosocial control variables explained a large effect size ( $f^2 = 0.89$ ), with impulsivity, empathy, school connectedness, and perceived seriousness of risk-taking behaviours significantly predicting problem drinking. The revised psychosocial model significantly explained an additional 6% of variance in delinquency, a large effect ( $f^2 = 1.13$ ). Impulsivity, empathy, school connectedness, and peer risk-taking behaviours were significant predictors in the final model.

Contrary to Mak's (1990) original psychosocial control conceptualisation, and despite non-significant bivariate correlations with problem drinking, a test of suppressor effects revealed that high levels of school connectedness (18–20 and 21–24 year olds) and empathy (21–24 year olds) became significant when considered in conjunction with impulsivity. Overall, the additional psychosocial control variables (sensation seeking and peer risk-taking behaviours) significantly predicted added variance in problem drinking across all four age cohorts to a small to medium effect. In terms of total variance, the revised psychosocial model explained substantially more variance among the 21 to 24 age cohort (53%), followed by the 15 to 17 (39%), 18 to 20 (36%), and 13 to 14 (29%) age cohorts.

Table 4

*Hierarchical Regression Analysis Predicting Problem Drinking for Adolescent and Young Adult Age Groups*

	Age Group: 13-14 (N = 208)					Age Group: 15-17 (N = 126)				
	B	$\beta$	$sr^2$	$R^2$	$\Delta R^2$	B	$\beta$	$sr^2$	$R^2$	$\Delta R^2$
<b>Step 1</b>				.01					.01	
Gender										
<b>Step 2</b>				.21***	.20***				.18**	.17**
Impulsivity	.01	.21**	.03			.01	.31***	.06		
Parent attachment	.01	-.16*	.02			-.01	-.21*	.03		
School connectedness	-.02	-.32***	.07							
Perceived seriousness	-.00	-.17*	.02							
<b>Step 3</b>				.29***	.08***				.39***	.22***
School connectedness	-.01	-.22**	.03							
Peer risk-taking behaviour	.07	.32***	.07			.15	.46***	.15		
	Age Group: 18-20 (N = 288)					Age Group: 21-24 (N = 118)				
	B	$\beta$	$sr^2$	$R^2$	$\Delta R^2$	B	$\beta$	$sr^2$	$R^2$	$\Delta R^2$
<b>Step 1</b>				.01					.01	
Gender										
<b>Step 2</b>				.28***	.27***				.47***	.46***
Impulsivity	.34	.49***	.17			.54	.74***	.37		
Empathy						.37	.23**	.05		
School connectedness	.39	.18*	.02			.68	.26**	.05		
Perceived seriousness	-.17	-.21**	.04			-.20	-.19*	.03		
<b>Step 3</b>				.36***	.08***				.53**	.06**
Impulsivity	.26	.37***	.08			.42	.58***	.17		
Empathy						.33	.21**	.04		
School connectedness	.35	.16*	.02			.48	.19*	.02		
Perceived seriousness	-.13	-.16**	.02							
Sensation seeking	.63	.19**	.03							
Peer risk-taking behaviour	1.18	.20**	.03			1.78	.24**	.05		

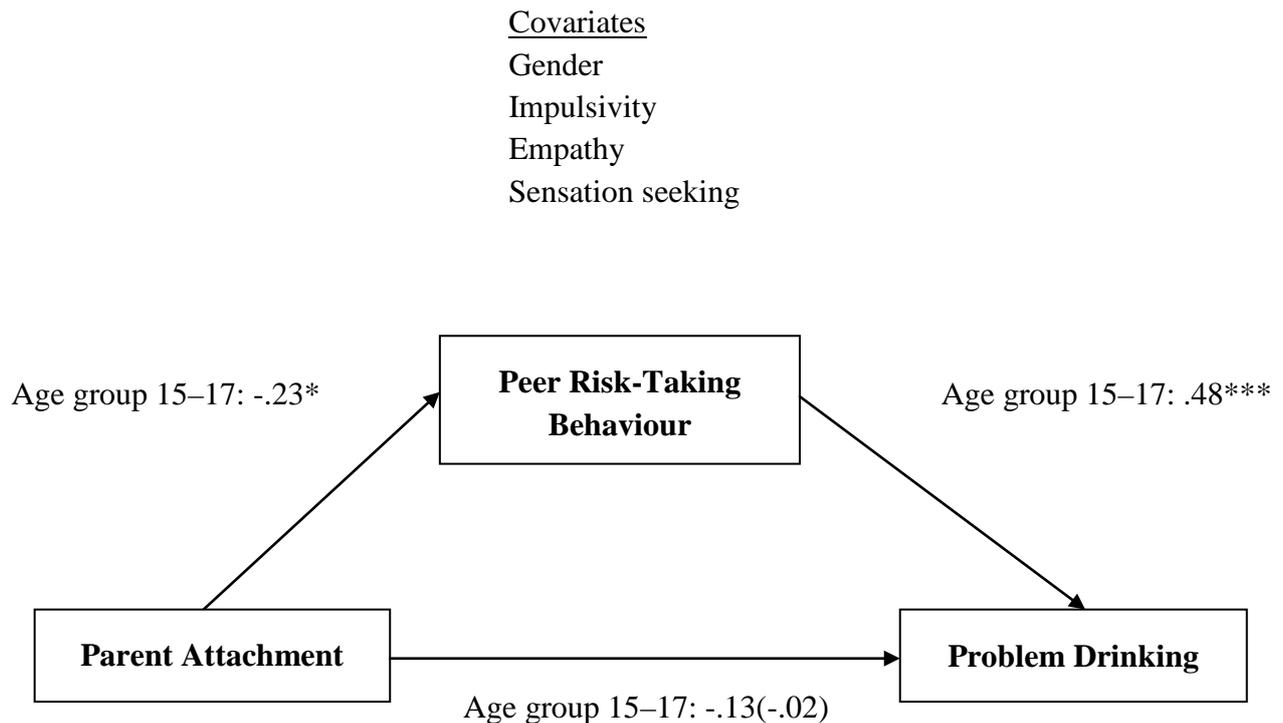
Note. For purposes of clarity, only significant values are reported.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

**Mediation Analyses**

We used mediation analyses to explore whether peer risk-taking behaviours mediated the effects of social control variables of parent attachment, school connectedness, and perceived seriousness of risk-taking behaviour on self-reported problem drinking for each of the four age cohorts (13–14, 15–17, 18–20, and 21–24 years). Significant indirect effects identified were between parent attachment and problem drinking for the 15 to 17 age group,

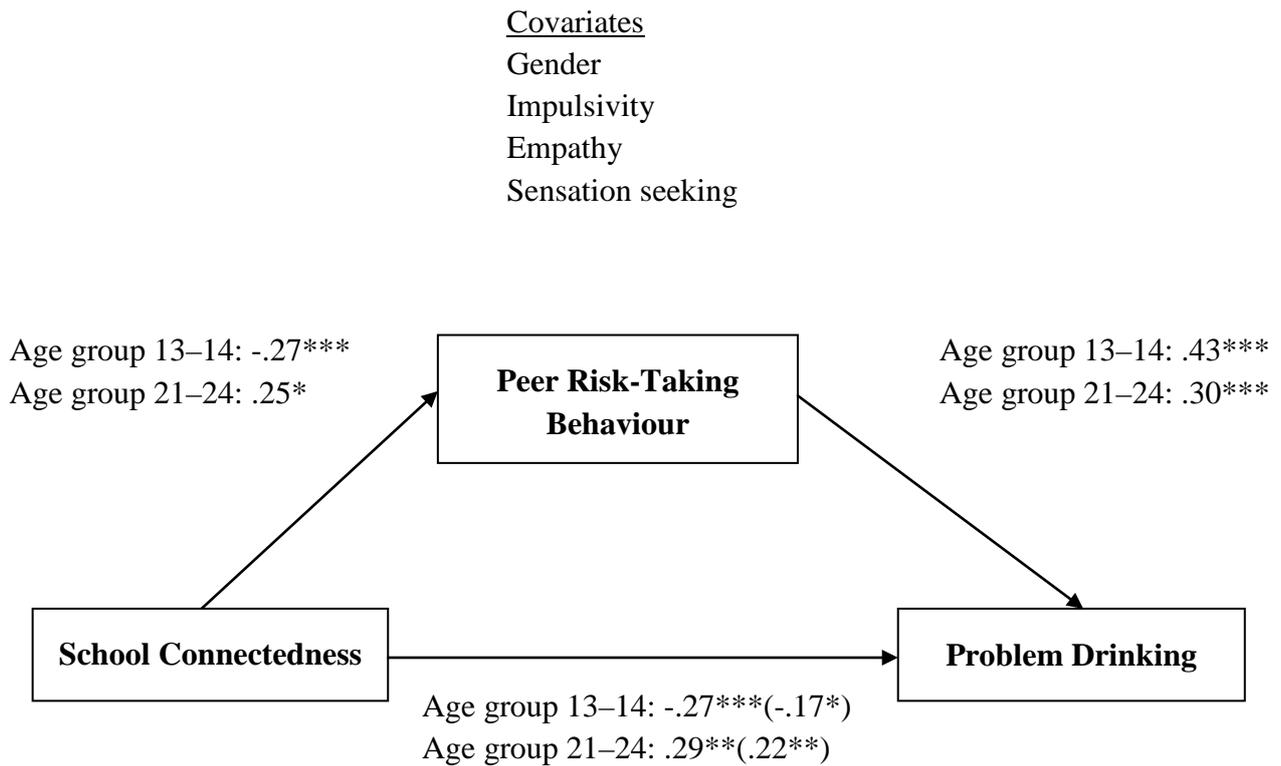
and between school connectedness and problem drinking for the 13 to 14 and 21 to 24 age groups<sup>1</sup>. Peer risk-taking behaviours also appeared to partially mediate the relationship between perceived seriousness and problem drinking for the 13 to 14, 18 to 20, and 21 to 24 age groups, although the indirect effects did not reach statistical significance. Significant results pertaining to partial or full mediations are depicted separately for the analyses involving parent attachment (Figure 2a), school connectedness (Figure 2b), and perceived seriousness of peer risk-taking behaviours (Figure 2c).



*Figure 2a.* Mediating effects of the relationship between parent attachment and problem drinking. Values are standardised regression coefficients. For the 15–17 age group final model,  $R^2 = .40$ , Adjusted  $R^2 = .36$ ,  $F(6, 106) = 11.67$ ,  $p < .001$ .

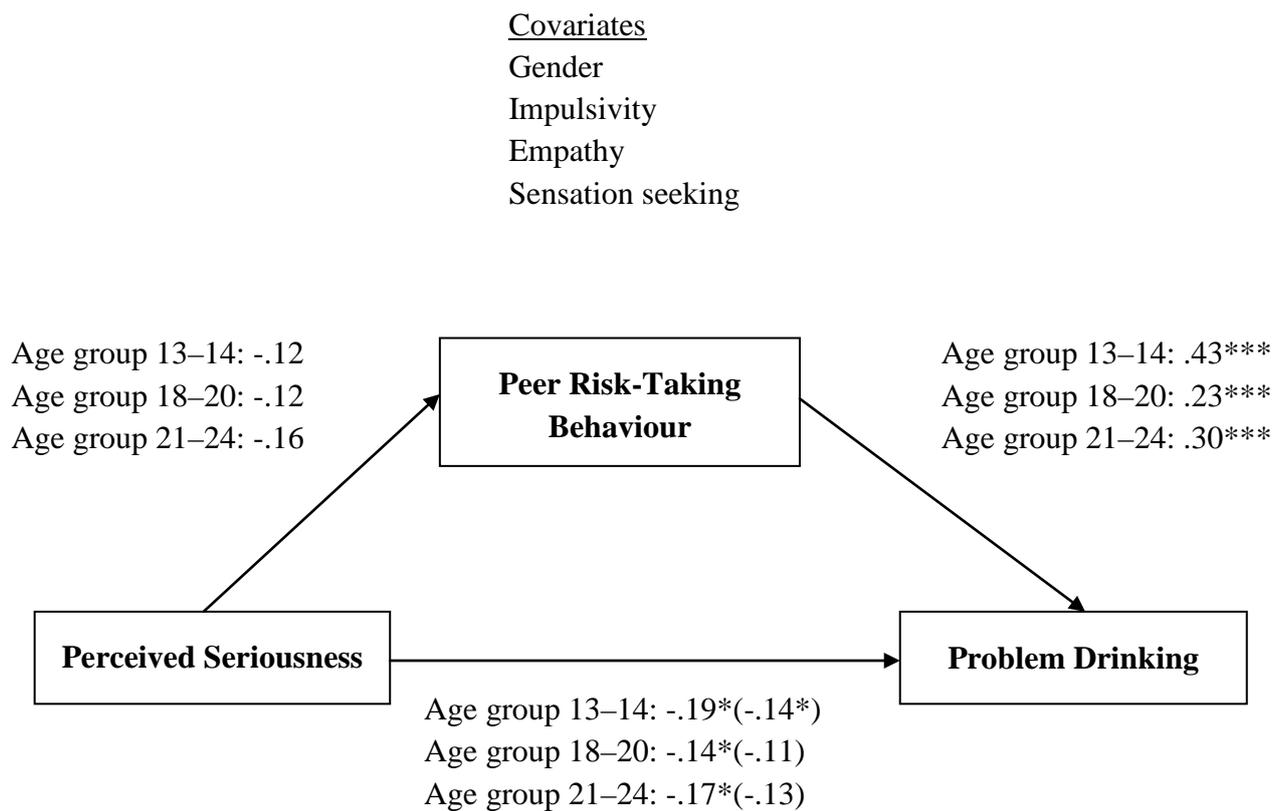
\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

<sup>1</sup> A breakdown of direct and indirect effects of mediation analyses is available from the authors upon request. Note that the indirect effects were not significant for a combined adolescent cohort aged 13 to 17. For a combined young adult cohort aged 18 to 24, parent attachment and school connectedness were partially mediated by peer risk-taking behaviours.



*Figure 2b.* Mediating effects of the relationship between school connectedness and problem drinking. Values are standardised regression coefficients. For the 13–14 age group final model,  $R^2 = .31$ , Adjusted  $R^2 = .29$ ,  $F(6, 184) = 13.92$ ,  $p < .001$ . For the 21–24 age group final model,  $R^2 = .51$ , Adjusted  $R^2 = .48$ ,  $F(6, 106) = 18.02$ ,  $p < .001$ . Note: contrary to the original psychosocial control conceptualisation, 21–24 year olds with high levels of school connectedness (rather than low levels of school connectedness) were more likely to associate with risk-taking peers and engage in subsequent problematic drinking styles.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .



*Figure 2c.* Mediating effects of the relationship between perceived seriousness of risk-taking behaviours and problem drinking. Values are standardised regression coefficients. For the 13–14 age group final model,  $R^2 = .26$ , Adjusted  $R^2 = .24$ ,  $F(6, 183) = 10.75$ ,  $p < .001$ . For the 18–20 age group final model,  $R^2 = .32$ , Adjusted  $R^2 = .30$ ,  $F(6, 212) = 16.87$ ,  $p < .001$ . For the 21–24 age group final model,  $R^2 = .48$ , Adjusted  $R^2 = .46$ ,  $F(6, 106) = 16.58$ ,  $p < .001$ .  
\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

## Discussion

The present study aimed to test whether a revised psychosocial control framework of delinquency (Curcio et al., 2013) could explain variance in problem drinking across a trajectory from early adolescence to young adulthood. We found partial support for a revised psychosocial control perspective across all four age cohorts. Social control variables were found to significantly explain variance in problem drinking, with low levels of parent attachment (adolescents only), low school connectedness (13–14 age group), and perceived seriousness (13–14, 18–20, and 21–24 age groups) all predicting problem drinking. Though low school connectedness predicted problem drinking for 13 to 14 year olds, high levels of school connectedness were found to predict problem drinking among university students. This finding reflects the normative nature of drinking on university campuses (Kypri et al., 2010), and demonstrates that the revised psychosocial model requires consideration within the broader sociocultural context. Impulsivity was found to predict problem drinking for all

four age groups, with sensation seeking also predicting problem drinking among 18 to 20 year olds. Peer risk-taking behaviours, which has both social control and social learning orientations, was found to consistently explain a significant portion of variance in problem drinking across all four age cohorts, mediating some of the relationships between other social control variables and self-reported problem drinking.

***Sensation seeking, impulsivity, and problem drinking.*** Supporting the notion that impulsivity and sensation seeking are conceptually different behaviour types, these two traits were associated with differing outcomes in the current study. Unlike impulsive individuals, sensation seekers may be able to limit some alcohol-related problems by planning ahead, such as arranging a designated driver, limiting drinks, and not drinking before exams. Individuals aged 18 to 20 years have recently turned the legal age for drinking and may be transitioning to university, a novel social environment with easily accessible licensed venues. Individuals with high levels of sensation seeking may be more likely to engage in frequent and heavy alcohol consumption to achieve excitement in such environments (Curcio & George, 2011; Zapolski, Cyders, & Smith, 2009). Early detection and screening measures could identify those at risk of impulsive or sensation seeking traits, and support the promotion of self-control strategies and encouragement of socially acceptable novel behaviours (e.g., travelling, music, extreme sports). With regard to theory and research, the implication is that the use of two separate measures of impulsivity and sensation seeking is indicated.

***Peer risk-taking behaviours and its mediating effects.*** Peer risk-taking behaviours consistently predicted problem drinking behaviours across all four age cohorts, and partially mediated the relationship between parent attachment, low school connectedness (adolescents), high school connectedness (young adults), and perceived seriousness of risk-taking behaviours with problem drinking. It may be that low parental attachment, monitoring, and supervision; disengaging from school (adolescents only); and believing that drinking behaviours are not serious lead to the selection of peers who adopt attitudes and behaviours favourable to drinking, which subsequently increases involvement in problematic drinking styles (e.g., binge drinking at parties, playing drinking games, mixing drinks or drinking shots). This may be particularly prominent for university students who are living on campus with licensed venues and who use alcohol as a means of bonding with peers. These results indicate that peer risk-taking behaviours play an important role in the initiation of problem drinking behaviours. Intervention efforts could focus on encouraging positive friendships and conventional activities and promoting pro-social norms within these groups.

Peer risk-taking behaviours were found to be a strong predictor of problem drinking among young adults, whereas parent attachment was not found to influence problem drinking among older age cohorts. This finding suggests that the influence of parents may deteriorate as one grows older, particularly for university students living away from home. As a result, intervention and prevention efforts aiming at increasing the parent-child bond (e.g., through parental warmth and supervision; Ohannessian, 2011) and decreasing the likelihood of associating with deviant peers may be beneficial during early adolescence or pre-pubertal stages.

***School connectedness and problem drinking.*** As expected, low school connectedness significantly predicted problem drinking among adolescents aged 13 to 14 years. Prior research has found attachment to the school environment protects against barriers to learning such as the initiation of alcohol use or subsequent problematic drinking styles (Baker, 2010; Catalano, Haggerty, Oesterle, Fleming, & Hawkins, 2004). Contrary to the psychosocial

control conceptualisation, and despite non-significant bivariate correlations with problem drinking, high levels of school connectedness were found to significantly predict problem drinking among university students when considered in conjunction with impulsivity, suggesting a possible suppressor effect (Lancaster, 1999). University is a social environment with licensed premises where alcohol is more readily available and its consumption often used as a means of bonding with fellow students. Thus, university may represent a very different social context to high school, where alcohol use is prohibited and illegal.

Indeed, it is considered normative to drink within the university environment, particularly for those living on campus (Kypri et al., 2010). This is reflected by the relatively high AUDIT cut-off scores for hazardous or harmful alcohol use obtained among the young adult cohort in the current study. Thus, attachment to university may indirectly affect problem drinking by allowing more concise estimation of other associated risk factors, such as impulsive personality styles and sociocultural norms. From this perspective, an ecological systems approach (e.g., Bronfenbrenner, 1979) may be useful, in that it not only considers immediate groups and institutions that directly impact an individual, but also the interaction of social-historical circumstances, cultural contexts, and social systems that may incidentally impact upon an individual's behaviour. However, interpretation of current results involving school connectedness among university students needs to take into account the less than satisfactory internal consistency reliability of the measure used.

***Empathy and problem drinking.*** Unexpectedly, high levels of emotional empathy predicted problem drinking in the 21 to 24 age group. Despite a non-significant bivariate association with problem drinking, empathy became a significant predictor of problem drinking once considered in conjunction with impulsivity, suggesting a suppressor effect (Lancaster, 1999). This finding requires replication in further research. Similarly, there is a plethora of evidence surrounding risk factors for youth problem drinking that have not been captured within the current study. In addition to the psychosocial control risk factors suggested in the present research, community and neighbourhood factors such as socioeconomic status, poverty, and neighbourhood disorganisation; cognitive factors such as motives for drinking; and temperamental characteristics such as agreeableness, extraversion, neuroticism, disinhibition, and boredom susceptibility have previously been listed as risk factors for youth problem drinking, among others (e.g., Catalano et al., 1996; Sher, 1991). Future research could focus on designing a parsimonious framework of youth problem drinking that incorporates risk factors from the aforementioned domains.

### **Strengths and Limitations**

The current study investigated problem drinking among youth by considering four age cohorts, which allows for a finer-grained understanding of the course of youth problem drinking. Second, an integrated theory of delinquency was used to explain problem drinking, which considered both psychological and social causes. Third, the current study utilised two separate, conceptually-focused measures of impulsivity and sensation seeking. Finally, the study included a measure of peer risk-taking behaviours, a variable of both social control and social learning orientations. Peer risk-taking behaviours was found to partially mediate the relationships between conventional social controls with problem drinking in certain developmental stages. Incorporating social learning theory with a revised psychosocial control perspective provides a more holistic understanding of the causes of youth problem behaviour, including delinquency and problem drinking.

Owing to the cross-sectional nature of the research, causal connections cannot be inferred. Future research could test the predictive utility of the revised psychosocial control framework longitudinally, and replicate mediation models using temporal ordering. While the current findings support a revised psychosocial model of problem drinking, the study was conducted in the small metropolitan city of Canberra, Australia. Further, the non-random selection process and the requirement of parental consent for adolescent government students both limit the representativeness of the sample. Testing the suitability of the revised model among Australia-wide and international samples could provide further support for it.

Additionally, there were issues pertaining to the reliabilities of the school connectedness measure among university students. While we used a general measure for both adolescent and young adult age groups, an instrument that focuses specifically on university lifestyles may be more appropriate for university students. The current study demonstrated that drinking behaviours vary between the social contexts of high school and university, and future directions could investigate differences between university students who live on campus and those who do not. Drinking behaviours among youth in other social-cultural environments (e.g., sports teams and clubs, employment in construction industries) should also be investigated further. While the AUDIT is an internationally recognised measure, it may lack sensitivity among the current population, particularly as many adolescents reported that they had not experienced alcohol-related problems. Further, limited information was obtained regarding binge drinking patterns. Using the revised model to consider binge and problematic drinking separately, as well as assessing these issues among clinical populations, may reduce issues related to skewed data. Considering binge and problematic drinking separately may also be particularly important for determining the unique relationships of impulsivity and sensation seeking with associated alcohol outcomes.

### **Conclusions**

Conclusions based upon current findings need to be considered in conjunction with the aforementioned limitations. Partial support for a revised psychosocial model of delinquency and problem drinking was found, with broader consideration of social-cultural norms proving particularly important with regard to drinking behaviours. Finding similar risk factors for delinquency and problem drinking, two related yet distinct problem behaviours, provides partial support for the common cause conceptualisation of youth problem behaviours (Curcio et al., 2013; Jessor & Jessor, 1977). Finding empirical support for the common cause model has important implications for conceptualising the occurrence of multiple problem behaviours, and suggests that delinquency and problem drinking are likely to share causal factors with various other health-compromising behaviours, such as illicit substance use, promiscuous sexual activity, and risky gambling owing to similar etiological causes (Jessor & Jessor, 1977). However, the ability of the revised psychosocial model to explain additional behaviours may need to be viewed through the lens of relevant social and sub-cultural norms.

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