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Effects of early adolescent alcohol use on mid-adolescent school performance and connection: A longitudinal study of students in Victoria, Australia and Washington State, United States

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Abstract

BACKGROUND—This paper examines the effect of early adolescent alcohol use on mid-adolescent school suspension, truancy, commitment, and academic failure in Washington State, United States (US) and Victoria, Australia. Also of interest was whether associations remain after statistically controlling for other factors known to predict school outcomes.

METHODS—State-representative student samples were surveyed in 2002 (grade 7; N = 1858) and followed up annually to 2004 (grade 9) in both venues. Students completed a modified version

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of the *Communities That Care* survey to report alcohol use, school outcomes and risk and protective factors. Response rates were above 74% and retention rates exceeded 98% in both places.

RESULTS—Controlling for grade 7 risk factors, grade 7 current alcohol use and heavy episodic drinking were associated with grade 8 school suspension. Grade 7 current and frequent alcohol use and heavy episodic drinking were linked to grade 9 truancy. In fully adjusted analyses, associations between early alcohol use and academic failure and low school commitment did not remain.

CONCLUSIONS—Although alcohol use is one factor influencing school performance and connection, there are other risk factors that need to be targeted to improve school outcomes.

Keywords

alcohol use; school performance; school connection; longitudinal study; adolescence

Student investment in and commitment to learning (ie, school engagement or connection) are important for school achievement.[1, 2] Poor school performance (student showing there are limits to what s/he can do in a subject) is a strong predictor of early school leaving.[1, 3, 4] Tenuous connections with school exemplified by truancy (not attending school when required) and external school suspension (being excluded from attending school for a specified period of time) are also associated with negative outcomes including school dropout.[5–7] The economic costs of not completing school are high in Australia[8] and the United States (US).[9]

Student alcohol use may impact on school performance and connection by negatively affecting students' relationships with their peers and teachers, reducing school attendance and students' capacity to complete homework, and influencing student engagement in other problem behaviors such as antisocial behavior. High rates of alcohol use by students are found in many Western countries, including Australia and the US.[10] For example, Australian surveys[11] showed 34% of 14-year-olds consumed alcohol in the past month, while in the US[12] 13% of 8th grade students reported alcohol use in the past month. Rates of alcohol consumption and harm are higher in students in Victoria than those in Washington State.[13, 14] Given the high rates of alcohol use by students and the value of school performance and connection, it is important to examine the links among early adolescent alcohol use and subsequent school performance and school connection after controlling for other factors known to influence these outcomes.

Associations among Alcohol Use and School Performance and Connection

Longitudinal studies examining the effects of early adolescent alcohol use on school performance and connection generally show alcohol use is linked with adverse school consequences.[15] Higher levels and later onset of heavy episodic drinking have been associated with decreased school completion.[15, 16] More recently, Barry et al[17] reported that increased frequency of binge drinking in mid-to-late adolescence decreased students' college aspirations, even after controlling for parental education, socio-economic status, sex, and prior alcohol use. In an early study, Ennet et al[18] reported that school attachment

decreased with greater availability of alcohol and current (past month) alcohol use. Mason and Windle[19] found adolescents' alcohol use predicted decreased school grades 2 years later. More recently, Balsa et al[20] showed negative effects of alcohol use on academic achievement and difficulties at school following adjustment for grade level, school, household characteristics, employment, and health status. Specifically, for adolescent boys, alcohol use was associated with a small reduction in academic achievement. Further results showed a statistically significant effect for the influence of increased and continued alcohol use on academic achievement, such that increased monthly alcohol use was associated with reduced academic achievement. For girls, similar associations were evident between alcohol use and experiencing difficulty at school. In particular, weekly and monthly alcohol use were associated with increased school difficulties. Conversely, Boden et al[21] reported no prospective association between patterns of alcohol and drug use and leaving school without qualifications, following adjustment for parent and peer illicit drug use, frequency of tobacco, child sexual assault, and conduct problems.

Studies examining school suspension and truancy are even fewer in number. Links between school suspension and alcohol and drug use have been demonstrated in 3 studies.[7, 22, 23] For instance, Hemphill et al[23] showed school suspension remained a predictor of current tobacco use at 12-month follow-up, after controlling for established risk factors including prior tobacco and other drug use for grade 7 but not Grade 9 students. Danielsson et al[24] showed sudden increases in adolescent alcohol use predicted increased truancy. Conversely, gradual increases in alcohol use, high alcohol consumption,[24] and frequency of alcohol use[25] were not predictive of truant behavior.

Research examining associations between alcohol use and school performance and connections typically investigated measures of lifetime alcohol use or binge drinking, with minimal adjustment for prior levels of alcohol use or school outcomes or recognised risk and protective factors such as having been a victim of bullying, depressive symptoms, or the influence of peers. It is clear from reviewing the extant literature that longitudinal studies of the effects of early adolescent alcohol use on school performance and connection such as truancy, academic achievement, commitment to school and school exclusion are needed. In particular, prospective studies that include comprehensive measures of factors other than alcohol use are required to examine whether associations between alcohol use and school connection and performance remain after controlling for these predictors.

Influential Factors for School Performance and Connection

Previous researchers have noted the need for studies of school performance and connection to consider the influence of factors across multiple domains.[2] *Risk factors* increase the probability of adverse health and behavioral outcomes, whereas *protective factors* decrease or mediate the probability of the same outcomes.[26, 27] Individual risk factors for poor school performance and connection are rebelliousness,[28, 29] having been a victim of bullying,[30, 31] and depressive symptoms.[32, 33] Interaction with antisocial peers is a well-established risk factor for truancy, low commitment to school, school suspension, and low academic achievement.[34–36] Poor family management and conflict are family risk factors.[35, 37–39]

School performance and connection are also influenced by opportunities the school affords for engagement in positive activities.[40]

Cross-national Comparisons

Cross-national studies can make an important contribution to knowledge of student alcohol and other drug use. Such studies identify differences in substance use trends and the risk and protective factors underpinning these differences, as well as investigate differences within the countries' policy approaches.[41]

Two countries that adopt different policies in relation to substance use are the US and Australia. In the US, norms and policies around substance use reflect a zero-tolerance approach, with the overarching aim to achieve abstinence from alcohol, tobacco, and drug use among youth.[42] In contrast, Australian norms, beliefs, and policies reflect a harm minimization philosophy, with the ultimate goal to reduce the harms associated with use rather than use *per se*.[43] Harm minimization policies encourage a health and welfare response to student drug use rather than response centred on policing and the justice system.[44] Country differences in substance use policies are reflected in differences in school policies and school suspension rates. For example, students report more school suspensions in Washington State relative to Victoria.[45]

Within these 2 countries, the states of Washington and Victoria were selected for comparison in the present study due to their many demographic and economic similarities, including similar population size, similar proportions of residents living in urban centres,[46, 47] and both states were considered progressive with higher than national levels of educational participation and similarly low proportions living in poverty.[47, 48]

The Current Paper

The purpose of this paper is to examine the longitudinal association among early adolescent alcohol use and mid-adolescent school suspension, truancy, commitment, and academic failure in Washington State, United States (US) and Victoria, Australia, after controlling for risk and protective factors that have been shown to predict school connection and performance. It was hypothesized that: (1) Grade 7 alcohol use would be associated with school suspension, truancy, low school commitment, and low academic performance in grades 8 and 9, and (2) These associations will remain, even after controlling for established risk and protective factors.

METHODS

Participants

Participants were 7th grade students enrolled in the International Youth Development Study (IYDS) (N = 1945), followed up in grades 8 (N = 1832) and 9 (N = 1796). The IYDS used standardized methods in Washington State, US and Victoria, Australia. A 2-stage cluster sampling approach was employed in grade 7 in 2002. A probability proportionate to grade-level size sampling procedure[49] was used to randomly select public and private schools containing students in 7th grades across both states. In Victoria, 254 schools were

approached to participate in the study out of a total of 2226 schools; 165 schools agreed to participate (65%). For Washington State, 368 schools out of a total of 2383 were approached; 155 agreed to participate (42%). More schools were approached in Washington State because the districts of more than 120 schools refused participation. At the second stage, a target classroom within each school was randomly selected. The rates of students who consented to and participated in the survey were 78% and 76% in Washington State and Victoria respectively. In both states, the return of completed parental consent forms was high; 89% in Washington State, 95% in Victoria. McMorris et al[13] have published further detail on IYDS recruitment. Retention rates across the 24-month follow-up were at least 98% in both states. The sample was composed almost entirely of 12- and 13-year-olds in both states; Victoria M = 12.9, SD = 0.4; Washington M = 13.1, SD = 0.4. Boys and girls were equally represented.

Instruments

In this study, self-report measures of alcohol use, school outcomes, and risk factors were drawn from the Communities That Care (CTC) survey.[27, 50, 51] The measures in this survey demonstrate adequate reliability and cross-sectional validity in large samples of US students in grades 6–12,[27, 50, 51] as well as reliability and validity using longitudinal data in Washington State and Victoria.[52] Table 1 describes the grade 7 risk and protective factors measured in this study.

Grade 7 alcohol use—Four scales measured students' levels of alcohol consumption. *Lifetime alcohol use* was assessed by asking: 'In your lifetime on how many occasions (if any) have you: Had alcoholic beverages (like beer, wine or liquor/spirits) to drink – more than just a few sips?' *Current alcohol use* was measured using a similar item relevant to 'the past 30 days'. Both items were rated on an 8-point scale of '*Not at all'* to *'40 or more times' and* recoded to form a dichotomous measure, '*never or no use* (0)' and '*responses other than never or none* (1)'.

Heavy episodic drinking was measured with the item: 'Think back over the last 2 weeks. How many times have you had 5 or more drinks in a row?' rated on a 6-point scale of '*None*' to '*10 or more times'*. Scores were dichotomized to reflect '*never or no heavy episodic drinking* (0)' and '*one or more instances of heavy episodic drinking* (1)'. A measure of *frequent alcohol use* was constructed using the measure for current alcohol use, and included students who reported having consumed 3 or more drinks in the past month. Scores were recoded to form a dichotomous measure, '*no or less than 3 drinks* (0)' and '*3 or more drinks* (1)' in the past month.

Grade 8 and 9 school variables—Four measures examined school performance and connection; school suspension, truancy, and low school commitment were reflective of connection and below average achievement was reflective of poor school performance. *School suspension* was measured using the item: "How many times in the past year (12 months) have you been suspended from school?" *Truancy* was assessed with the item: "During the last 4 weeks how many whole days have you missed because you skipped or "cut/wagged"?" Due to the skewness of the data, these 2 items were recoded to form a

dichotomous measure; none or never scored as '*absent*' (0) and a score of one or greater scored as '*present*' (1). Students' *low commitment to school* was measured through 6 items, such as "How often do you feel that the schoolwork you are assigned is meaningful and important?" Scores were recoded so that ratings of 4 and 5 indicated '*low commitment'* (1) and ratings of 1–3 indicated '*high commitment'* (0). The fourth scale, *below average achievement*, consisted of one item: "Putting them all together, what were your grades/ marks like last year?" This item was recoded; '*below average marks'* (1) and '*higher than average marks'* (0).

Honesty of student responses—Students were categorized as "dishonest" if they reported any of the following: (1) they were not honest at all when completing the survey; (2) they had used a fake drug in their lifetime or in the past 30 days; or (3) they had used illicit drugs on more than 120 occasions in the past 30 days. The number of "dishonest" students was low, with a total of 17 in grade 7, 35 in grade 8, and 27 in grade 9. All of these dishonest cases were excluded from the analyses.

Procedures

Surveys were first administered in grade 7 and repeated in grade 8 and 9. To ensure surveys were conducted in comparable seasons in Washington State between February and June, and between May and November in Victoria. Survey staff in both states used a single administration protocol. Paper and pencil surveys were administered in a 50–60 minute class by survey staff members who explained how to complete the survey and answered any questions. Students completed surveys independently and the desks were arranged so that students could answer the questions in privacy and with confidentiality. Where students were absent on the day of the survey, trained school personnel conducted the survey at a later date. For students who no longer attended school, research staff administered the survey over the telephone (comprising less than 4% of survey in each study year). Students in Victoria received a small gift in each year of the study and Washington State students received $10 following the completion of each survey.

Data Analysis

Data for 1858 students in grade 7 at the first survey were analyzed in this study using the statistical software STATA IC for Windows (version 10).[53] The analyses consisted of several stages. First, chi-square analyses and independent t-tests compared scores on grade 7 alcohol use, risk factors and grade 8 and 9 school performance and connection in Victoria and Washington State. Unless otherwise stated the following analyses were conducted using the combined Victoria-Washington State sample. Next, correlations between grade 7 alcohol use, grade 7 risk factors, and grade 8 and 9 school performance and connection were calculated. The magnitude of associations was examined for multicollinearity. All correlations were 0.50 or less and well below the level that suggests multicollinearity.[54]

For the next series of analyses, unless otherwise stated, measures of association used robust "information-sandwich" estimates of standard errors, with adjustment for student clustering within schools. Analyses repeated using Generalised Estimated Equations (GEE) were similar to the initial analyses conducted. Hence, the initial analyses are reported in this

paper. Unadjusted logistic regression analyses were conducted separately to examine associations of alcohol use in grade 7 and school performance and connection in grade 8. Next, partially adjusted logistic regression analyses examined grade 7 alcohol use as a predictor of grade 8 and 9 school performance and connection, controlling for age, sex, state, and the grade 7 school variable.

Fifth, fully adjusted logistic regression analyses were performed in which grade 7 alcohol use, demographic factors, risk factors and school performance and connection were modeled as predictors of grade 8 and 9 school performance and connection. Given that the risk factors and alcohol use were measured at the same time in grade 7 and risk factors most proximal in time to the outcomes are likely to show the strongest associations, the analyses were structured to conduct the most conservative test possible of the impact of alcohol use on school outcomes. It should be noted that at this stage of the analyses, suppressor variables were identified; that is, variables that when entered into the fully adjusted models, changed the direction of their association with school performance and/or connection. For example, a variable changed from being a risk factor (odds ratio, OR > 1.0) to a protective factor (OR < 1.0). Analyses were repeated without these suppressor variables, however, the results remained the same. Hence, for completeness, the original models have been retained. The variables noted as suppressors were bullying victimization and interaction with antisocial peers; these are not interpreted.

Finally, to examine if the predictive effect of grade 7 alcohol use on grade 8 and 9 school performance and connection differed in each state, logistic regression analyses testing state interactions were conducted. Each grade 7 risk factor was standardized, and then multiplied by state (coded 0 and 1) to form a state interaction variable. The fully adjusted logistic regression analyses were repeated using the standardized risk factors and state interaction terms. The final step in the hierarchical regression analyses included the addition of statistically significant state interaction terms. The pseudo R^2 for the models with and without interaction terms were compared. Across all models the inclusion of interaction terms resulted in minimal difference to pseudo R^2 values, < 0.02.[55] Hence, the fully adjusted models that demonstrate a more parsimonious model without interaction terms are reported.

RESULTS

Descriptive Statistics for Influential Factors and School Variables

Table 2 presents the summary statistics and alpha coefficients for the variables analyzed in this paper for each state sample. In grade 7, more Washington State students reported below average academic achievement and school suspension. In grade 8, Victorian students reported higher rates of truancy and Washington State students had higher rates of below average academic achievement. In grade 9, Washington State students reported higher rates of below average achievement than Victorian students. For grade 7 alcohol use measures, Victorian boys and girls showed rates of alcohol use approximately double those of their counterparts in Washington State. Finally, for grade 7 risk factors Victorian students had higher levels of poor family management whereas Washington State students reported greater interaction with antisocial peers.

Longitudinal Associations between Alcohol Use and School Performance and School Connection

Table 3 presents the unadjusted, partially adjusted, and fully adjusted associations between grade 7 alcohol use and school performance and connection in grades 8 and 9. Measures of grade 7 alcohol use were associated with school variables at grade 8 in unadjusted and partially adjusted analyses; the only exception was the association between frequent alcohol use and below average achievement. Only 2 associations remained in the fully adjusted model. Specifically, current alcohol use in grade 7 was associated with 1–1/2 times greater odds of being suspended from school in grade 8. The odds of grade 8 school suspension were at least doubled when students reported heavy episodic drinking in grade 7.

Similar findings were evident for the associations between grade 7 alcohol use and grade 9 school outcomes in unadjusted analyses (Table 3). In partially adjusted analyses controlling for demographic variables, each of these associations remained except that grade 9 low school commitment was not predicted by grade 7 current or frequent alcohol use. Only associations between grade 7 current and frequent alcohol use, and heavy episodic drinking and grade 9 truancy were maintained in the fully adjusted analyses. The odds of truancy were increased more than 1–1/2 times when students reported current or frequent alcohol use in grade 7, and more than doubled for heavy episodic drinking.

DISCUSSION

This paper is novel in that it examines whether early adolescent alcohol use predicts school performance and connection one and 2 years later, after controlling for other factors known to influence these school outcomes, using standardized longitudinal survey methods in 2 states, Washington State, US and Victoria, Australia. The results show that there are associations between grade 7 alcohol use measures including lifetime, current and frequent alcohol use as well as heavy episodic use, and grade 9 school outcomes such as truancy, suspension, low commitment, and below average achievement. Importantly, when analyses controlled for demographics, earlier school performance and commitment, and other factors known to influence school performance and connection, few associations between alcohol use and later school performance and connection remained. The findings suggest that for the age groups studied in this paper, established risk factors explain most of the relationship between alcohol use and school outcomes, with some exceptions. In the fully adjusted analyses, associations between grade 7 current alcohol use and binge drinking and grade 8 school suspension, and between grade 7 current alcohol and frequent alcohol use and binge drinking and grade 9 truancy remained. Another finding of the current study is that although the rates of alcohol use are noticeably higher in Victorian than in Washington State students, the effect of alcohol use on later school outcomes appears similar.

Previous studies have shown links between adolescent alcohol use and poor academic performance.[18, 19, 25, 56, 57] In the current study, unadjusted analyses showed a relationship between early alcohol use and later below average academic achievement; however, after controlling in the analyses for other factors known to influence academic achievement, associations between alcohol use and academic achievement no longer remained. Previous studies examining this relationship may have failed to control adequately for relevant prior

influential factors. In the current study, relationships that did remain in the fully adjusted analyses were those between grade 7 current alcohol use and binge drinking and grade 8 school suspension, as well as grade 7 current and frequent alcohol use and binge drinking predicted grade 9 truancy. Hence, there is a link between alcohol use and the students subsequently not attending school - whether that is the student's (9th grade truancy) or school's (8th grade suspension) decision. The middle school years are known as a difficult and important time in a student's school life, when disengagement is more likely.[58, 59] The results of this study suggest that the use of alcohol by students may increase the odds that a student will begin to disengage from school.

As reported previously, the rates of alcohol use in Victorian students are higher than their counterparts in Washington State.[13, 14, 34, 52] Despite this, the current study demonstrated that the associations between alcohol use and school performance and connection were similar in the 2 states. An explanation for the higher rates of alcohol use in Victoria might be that there are more accepting norms for alcohol and other drug use in Victoria relative to Washington State.[52] Further research is required to confirm these hypotheses.

Limitations

Some potential limitations of the current study should be noted. First, the study uses student self-report data. However, the use of self-report measures in studies of pre-adolescents and adolescents is considered a reliable source of data for behavior problems such as substance use and low school commitment that are not readily visible to adults.[60–64] Second, the generalizability of the results in this study is limited to the states and grade level examined here. A further limitation of the current study is that in Washington State data on truancy and school performance were not collected from existing school records, although such data are not readily available in Victoria. Finally, the current paper focused on whether or not associations between alcohol use and school connection and performance remain after controlling for other known risk factors; it does not seek to explore more broadly the risk factors that predict subsequent school performance and connection.

The present study also has several strengths. First, this study is one of the first international comparative studies to ensure that 2 cross-national sites have used the same methods and data management practices[13] to make certain that any state differences cannot be attributed to the design and methods of the study. Second, this study achieved good response rates for participation, it includes approximately equal numbers of boys and girls in each state, and it has achieved a sample of over 1800 students aged 12–15 years. Third, the 2 states included in this study were chosen for their similarities on important socio-demographic characteristics and for their differences in policy around substance use and related behaviors.[13]

Conclusions

The current study is unique in the comprehensive measures of risk factors and alcohol use and in the standardized methods used in the 2 cross-national sites. Although there were associations among measures of alcohol use and school performance and connection, many of these links no longer remained once analyses controlled for other factors known to

influence school outcomes. Further research examining links among alcohol use and school performance and connection in different countries around the world is warranted to enrich understanding of how alcohol consumption impacts on the school outcomes of students.

IMPLICATIONS FOR SCHOOL HEALTH

A central message from the results of this study concerning the health and well-being of students is that although alcohol use is one influential factor to consider when addressing school performance and connection, there are also other risk factors in a young person's life that need to be targeted such as those studied here. To address these other risk factors, it is crucial that multifaceted prevention approaches are implemented to address student characteristics, as well as peer, family, and community level factors linked with school performance and connection in adolescents. These same risk factors have been shown to increase alcohol use.[52] It is likely that addressing the influential factors measured here will decrease both alcohol use and negative school outcomes. Evidence-based multifaceted prevention approaches such as the Seattle Social Development Project,[65] Olweus Bullying Prevention Program,[66] and Communities That Care[67, 68] are needed to reduce negative school outcomes in students.

Human Subjects Approval Statement

In Victoria, the Royal Children's Hospital Ethics in Human Research Committee provided permission to conduct the study, whereas school approvals were provided by the Department of Education and Training for government (public schools), and the Catholic Education Office for some private schools. In Washington State, The University of Washington Human Subjects Review Committee granted permission, while school districts provided approval to approach schools. In both states school principals and parents provided written consent and students provided assent.

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Table 1

Description of the Risk Factors Measured in Grade 7

Continuous measures	No. of items in scale	Response options
Individual risk factors		
Rebelliousness (e.g. “I do the opposite of what people tell me, just to get them mad”).	2	4 (definitely no to definitely yes)
Bullying victimization (“Have you been bullied recently (teased or called names, had rumors spread about you, been deliberately left out of things, threatened physically or actually hurt)?	1	4 (No; Yes, less than once a week; Yes, about once a week; Yes, most days)
Depressive symptoms (past month) Short Mood and Feelings Questionnaire [69] (e.g., “I found it hard to think properly or concentrate”)	3	Not true, Sometimes true, True
Family risk factors		
Poor family management (e.g., “Would you parent know if you did not come home on time?”)	9	4 (definitely no to definitely yes)
Family conflict (e.g., “People in my family have serious arguments.”)	3	4 (definitely no to definitely yes)
Peer risk factor		
Interaction with antisocial friends (e.g., “in the past 12 months, how many of your best friends have sold illegal drugs?”)	8	5 (None of my friends to 4 of my friends)
School protective factor		
Opportunities for prosocial involvement **(e.g., “In my school, students have lots of chances to help decide things like class activities and rules.”)**	5	4 (definitely yes to definitely no)

Table 2

Means, Standard Deviations and Cronbach's Alphas for Alcohol Use and Risk Factors Measured in Grade 7 and School Performance and Connection Measured in Grades 7, 8 and 9 for the Victorian (N = 938) and Washington State (N = 920) Samples

GRADE 7 RISK FACTORS

	Victoria [Mean(SD)]	Victoria (α)	Washington State [Mean(SD)]	Washington State (α)	Combined Sample [Mean(SD)]	Combined Sample (α)
Individual risk factors						
Rebelliousness	1.81 (0.65)	0.81	1.76 (0.62)	0.75	1.79 (0.64)	0.78
Victimization^	1.71 (0.99)	n/a	1.71 (0.96)	n/a	1.71 (0.98)	n/a
Depression	1.55 (0.40)	0.87	1.54 (0.44)	0.89	1.54 (0.42)	0.88
Peer risk factor						
Interaction with antisocial peers	0.19 (0.34)	0.71	0.28 (0.48)***	0.85	0.23 (0.42)	0.81
Family risk factors						
Poor family management	1.61 (0.48)**	0.79	1.55 (0.51)	0.82	1.58 (0.50)	0.81
Family conflict	2.15 (0.79)	0.81	2.19 (0.82)	0.80	2.17 (0.81)	0.81
School protective factor						
Opportunity for prosocial involvement	3.06 (0.44)	0.57	3.05 (0.41)	0.49	3.06 (0.43)	0.53

GRADE 7 ALCOHOL USE

	Victoria %		Washington State %		Combined Sample %	
	Males	Females	Males	Females	Males	Females
Lifetime alcohol use	64.11***	53.85***	37.53	39.37	51.00	46.65
Current alcohol use	35.67***	26.82***	10.34	13.00	23.17	19.94
Frequent alcohol use	11.16***	7.48***	2.47	2.52	6.87	5.01
Binge drinking	11.38***	8.73*	3.15	5.24	7.32	6.99

GRADE 7 SCHOOL PERFORMANCE & CONNECTION

	Victoria %	Washington State %	Combined Sample %
Suspension	6.42	11.98***	9.18

GRADE 7 SCHOOL PERFORMANCE & CONNECTION

	Victoria %	Washington State %	Combined Sample %
Truancy	17.65	14.60	16.14
Low commitment	0.32	0.43	0.38
Below average achievement	1.95	8.71***	5.32

GRADE 8 SCHOOL PERFORMANCE & CONNECTION

	Victoria %	Washington State %	Combined Sample %
Suspension	13.68	15.00	14.33
Truancy	12.32**	7.35	9.79
Low commitment	1.71	0.98	1.34
Below average achievement	4.93	9.68***	7.29

GRADE 9 SCHOOL PERFORMANCE & CONNECTION

	Victoria %	Washington State %	Combined Sample %
Suspension	13.63	12.50	13.06
Truancy	17.57	15.81	16.69
Low commitment	4.84	3.06	3.95
Below average achievement	6.15	9.51**	7.84

Note.

* $p < .05$;

** $p < .01$;

*** $p < .001$; α = Cronbach's alpha.

Significant state differences for dichotomous variables calculated using chi-square test. Significant state differences for continuous variables calculated using independent t-tests.

^ Scale consists of one item hence Cronbach's alpha has not been calculated.

Table 3

Unadjusted, Partially Adjusted, and Fully Adjusted Associations Between Alcohol Use in Grade 7 and School Performance and Connection in Grades 8 and 9

Grade 8 School Outcomes^	**Unadjusted OR [95% CI]**	**Partially adjusted OR [95% CI]**	**Fully adjusted OR [95% CI]**	**Unadjusted OR [95% CI]**	**Partially adjusted OR [95% CI]**	**Fully adjusted OR [95% CI]**
	Grade 7 lifetime alcohol use			Grade 7 current alcohol use		
School suspension	1.91 [1.45, 2.52]***	1.78 [1.33, 2.38]***	1.07 [0.77, 1.49]	2.82 [2.15, 3.69]***	3.11 [2.23, 4.35]***	1.68 [1.16, 2.44]**
Truancy	2.64 [1.87, 3.73]***	2.11 [1.48, 3.00]***	1.36 [0.89, 2.06]	3.21 [2.27, 4.56]***	2.44 [1.67, 3.57]***	1.18 [0.72, 1.93]
Low school commitment	4.28 [1.56, 11.71]**	3.98 [1.43, 11.11]**	1.64 [0.54, 4.94]	6.72 [2.82, 16.03]***	6.71 [2.47, 18.24]***	2.45 [0.97, 6.16]
Below average achievement	1.68 [1.21, 2.33]**	1.97 [1.42, 2.73]***	1.24 [0.81, 1.90]	2.00 [1.31, 3.06]**	2.41 [1.51, 3.84]***	1.58 [0.93, 2.69]
	Grade 7 frequent alcohol use			Grade 7 binge drinking		
School suspension	3.51 [2.40, 5.14]***	2.64 [1.67, 4.18]***	1.02 [0.57, 1.85]	5.05 [3.53, 7.23]***	4.63 [2.86, 7.51]***	2.10 [1.20, 3.66]**
Truancy	3.36 [2.07, 5.48]***	2.11 [1.33, 3.35]**	0.78 [0.41, 1.48]	5.25 [3.46, 7.97]***	3.23 [2.03, 5.13]***	1.28 [0.68, 2.39]
Low school commitment	6.54 [2.47, 17.29]***	5.65 [1.94, 16.43]**	1.63 [0.55, 4.86]	7.76 [3.63, 16.58]***	7.27 [3.08, 17.17]***	1.85 [0.65, 5.26]
Below average achievement	1.78 [0.95, 3.35]	1.75 [0.89, 3.45]	1.04 [0.47, 2.29]	2.47 [1.50, 4.07]***	2.58 [1.47, 4.52]**	1.59 [0.83, 3.04]
Grade 9 School Outcomes^						
	Grade 7 lifetime alcohol use			Grade 7 current alcohol use		
School suspension	1.73 [1.30, 2.29]***	1.51 [1.12, 2.03]**	0.95 [0.68, 1.33]	2.39 [1.74, 3.29]***	2.25 [1.55, 3.25]***	1.26 [0.82, 1.94]
Truancy	2.05 [1.54, 2.74]***	1.92 [1.43, 2.59]***	1.37 [0.99, 1.92]	2.53 [1.92, 3.33]***	2.36 [1.76, 3.17]***	1.68 [1.24, 2.28]**
Low school commitment	2.66 [1.61, 4.39]***	3.98 [1.43, 11.11]**	1.64 [0.54, 4.94]	1.91 [1.05, 3.46]*	1.63 [0.84, 3.16]	0.92 [0.49, 1.71]
Below average achievement	1.66 [1.15, 2.38]**	1.80 [1.20, 2.71]**	1.44 [0.91, 2.28]	1.55 [1.09, 2.19]*	1.63 [1.08, 2.44]*	1.15 [0.72, 1.86]
	Grade 7 frequent alcohol use			Grade 7 binge drinking		
School suspension	4.10 [2.67, 6.31]***	3.14 [1.91, 5.16]***	1.57 [0.84, 2.96]	4.22 [2.83, 6.29]***	3.49 [2.14, 5.71]***	1.66 [0.96, 2.90]
Truancy	3.34 [2.20, 5.10]***	2.84 [1.81, 4.46]***	1.75 [1.10, 2.78]*	4.85 [3.39, 6.93]***	3.87 [2.58, 5.81]***	2.62 [1.70, 4.05]***
Low school commitment	2.49 [1.11, 5.59]*	1.88 [0.80, 4.41]	1.07 [0.48, 2.35]	3.47 [1.75, 6.88]***	2.89 [1.40, 5.97]**	1.75 [0.80, 3.87]
Below average achievement	1.41 [0.75, 2.64]	1.30 [0.63, 2.66]	0.72 [0.31, 1.66]	1.91 [1.11, 3.30]*	1.97 [1.08, 3.57]*	1.27 [0.62, 2.57]

Note.

* p < .05,

** p < .01,

*** p < .001.

CI = confidence interval. N = 1,860 (lifetime alcohol use N = 906, current alcohol use N = 400, frequent alcohol use N = 110, binge drinking N = 133. Analyses compared alcohol users vs. non-users for each level of alcohol use.

^ The adjusted analyses controlled for the following variables measured in Grade 7: alcohol use, demographic factors, risk factors and school performance and connection.

Note 2. The effects of Grade 7 lifetime and binge drinking on Grade 8 school achievement were removed following the inclusion of individual risk factors. For Grade 8 school commitment, the effect of Grade 7 current alcohol use was no longer statistically significant after the inclusion of school risk factors, Grade 7 frequent alcohol use was no longer predictive after the inclusion of peer risk factors, and Grade 7 binge drinking was not predictive after the inclusion of family risk factors. Associations between Grade 7 lifetime and frequent alcohol use and school suspension one year later were no longer statistically significant after the inclusion of individual level risk factors. For Grade 8 truancy, the effect of Grade 7 binge drinking and lifetime and current and alcohol use no longer remained after adjustment for peer risk factors.

For Grade 9 low school commitment and achievement, the effect of Grade 7 lifetime alcohol use and binge drinking became statistically non-significant following adjustment for the individual risk factors of rebelliousness, victimization, and depressive symptoms. For Grade 9 school suspension, the effect of Grade 7 lifetime alcohol use no longer remained after adjustment for the individual risk factors of rebelliousness, victimization, and depressive symptoms. For Grade 9 school suspension, the associations with Grade 7 binge drinking no longer remained after adjustment for family risk factors. Similarly, the links between Grade 7 lifetime alcohol use and Grade 9 truancy did not remain after controlling for family risk factors. The effect of Grade 7 current and frequent alcohol use on Grade 9 low school commitment and Grade 7 frequent alcohol use on academic achievement became statistically non-significant after the inclusion of demographic factors. The inclusion of students' interaction with antisocial peers resulted in statistically non-significant associations between Grade 7 current and frequent alcohol use and Grade 9 suspension (full details available from first author on request