

The Impact of Gender, Socioeconomic Status and Locality on the Development of Students’ Patterns of Alcohol Consumption and Related Harm

Abstract

Purpose - The consequences of problematic alcohol consumption fall heavily on Australian adolescents, with this population at increased risk of death, serious injury and other harm. Research regarding whether gender, socioeconomic status (SES) or locality play a role in young people’s alcohol consumption and related harm is limited in Australia. This study aimed to determine whether Victorian students’ patterns of alcohol uptake, consumption, and related harm differed between gender, SES and locality.

Design/methodology/approach - The study involved secondary analysis of student data from the Drug Education in Victorian Schools (DEVS) harm minimization drug education program, undertaken in 21 Victorian government schools over three years. The initial cohort of 1752 students was followed during years eight, nine and ten, when their average age would have respectively been 13, 14 and 15 years.

Findings - There were no gender differences in drinking uptake, consumption or harm. Students with low SES were more likely to have consumed a full drink of alcohol and also experienced more alcohol related harm. Students living in a Regional/Rural area were more likely to have engaged in high alcohol consumption.

Originality/value - The findings of this study highlighted that different student demographics have an impact on patterns of alcohol consumption, vulnerability and harm. Students with low SES, living in a Regional/Rural area, are more at risk than students with higher SES living in a Fringe Metro/Major Regional or Metro area. Future harm minimization drug education programs delivered in schools should consider the needs

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3 of students with demographics that make them more susceptible to higher consumption and
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10 **Summary statement**

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12 What is known about the topic?
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- 14 • Adolescents and are more vulnerable to alcohol-related harm than other age groups.
15 Young drinkers are nearly four times more likely to experience negative outcomes of
16 problematic alcohol consumption.
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19 What does this paper add?
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- 21 • Different student demographics have an impact on their alcohol uptake, consumption
22 and harm, High alcohol consumption and alcohol related harm are influenced by
23 socio-economic status and locality.
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6 **The Impact of Gender, Socioeconomic Status and Locality on the Development of**
7 **Student Patterns of Alcohol Consumption and Harm**

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9 **Introduction**

10 Australian adolescents and children are more vulnerable to alcohol-related harm than
11 other age groups (National Health and Medical Research Council (NHMRC), 2009). Young
12 drinkers between the ages of 14 and 24 are nearly four times more likely to experience
13 physical and verbal abuse and damage or loss of property (Makkai, 2001). More seriously,
14 13% of deaths among 14-17 year olds are attributable to alcohol use (Chikritzhs *et al.*, 2004).

15 Although recent trends show an increase in abstinence and delay when young people
16 first try alcohol (Australian Institute of Health and Welfare (AIHW), 2017), risky drinking
17 (defined by the Australian Drinking Guidelines as five or more standard drinks in one sitting)
18 remains a problem (National Health and Medical Research Council (NHMRC), 2009). The
19 most recent data suggests that 9.1% of males and 6.8% of females aged between 12–17 years
20 exceeded the adult guidelines for single occasion risk and this increases into early adulthood
21 (18-24 years), when 56% exceed the single occasion risk guidelines (Australian Institute of
22 Health and Welfare (AIHW), 2017). Risky drinkers between 12-17 years are more likely to
23 report losing their memory after a drinking episode (Australian Institute of Health and
24 Welfare (AIHW), 2012); are more vulnerable to unwanted or regretful sexual activity and
25 violence (Bonomo *et al.*, 2001); are at higher risk of harmful patterns of alcohol use and

dependence in adulthood (Mason *et al.*, 2010); and have poorer academic achievement (Kelly *et al.*, 2015) than non-risky drinkers.

Male adolescents are more likely start drinking earlier, and consume alcohol in greater quantities and more frequently than their females peers (White and Williams, 2016). Males over 14 years of age are nearly twice as likely as females to drink daily (7.6% compared to 4.2%), although over time, their likelihood of drinking on a daily basis decreased, while, females' likelihood of drinking on a daily basis increased (Australian Institute of Health and Welfare (AIHW), 2017).

Adolescent consumption of alcohol is related to the area in which they live. A recent Victorian study reported that adolescents aged between 12 and 15 living in a rural area had higher rates of lifetime and current alcohol consumption compared to adolescents living in a metropolitan area (Chan *et al.*, 2016b). Further, adolescents between 12-17 years, who identified as drinkers in rural areas, consumed alcohol at rates approximately double those who lived in non-rural areas (Rowland *et al.*, 2016).

Another factor that may be involved in adolescent alcohol consumption and related harm is socioeconomic status (SES). A review of 28 studies across the globe involving the association between alcohol use and SES in the overall population, concluded there was no association between SES and alcohol consumption (Hanson and Chen, 2007). However, The Australian Institute of Health and Welfare (AIHW, 2014) found that those living in areas with the highest SES were more likely to consume alcohol in risky quantities than those in lowest SES locations (18.4% compared to 15.9%).

Patterns of alcohol use, along with other health behaviours, are often initiated during adolescence and *continue* into adulthood (Jefferis *et al.*, 2004). It would, therefore, be useful to better understand the role of gender, locality and SES in the patterns of alcohol use and harm that develop during adolescence. The Drug Education in Victorian Schools (DEVS)

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3 1 research, from which this study draws its data, specifically commenced harm minimization
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5 2 education with Year 8 students, whose average age was 13 years. This age group was chosen
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7 3 because initial exposure to alcohol typically occurs at this age, or soon after, and prevention
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9 4 education is likely to be most relevant during this time (McBride *et al.*, 2004). This choice of
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11 5 13 year olds is also advantageous for this study for the same reason: it allows investigation of
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13 6 demographic influences on patterns of consumption and harm at the beginning of their
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15 7 exposure to alcohol. Accordingly, the aim of the current study is to determine whether
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17 8 Victorian Year 8 students' drinking uptake, alcohol consumption, risky alcohol consumption,
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19 9 alcohol harm and harm from risky consumption are influenced by gender, SES, or locality,
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21 10 and more specifically, whether there are patterns associated with particular combinations of
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23 11 these factors.
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31 13 **Method**

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33 14 The methodology for the DEVS study, from which the present research draws its data,
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35 15 is described in detail in the study protocol and subsequent publications reporting the impact
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37 16 of the program (Midford *et al.*, 2012; Midford *et al.*, 2014a; Midford *et al.*, 2014b). The study
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39 17 involved a cluster-randomized, controlled trial of a harm minimisation drug education
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41 18 program, conducted with a student cohort during years eight, nine and ten, when their
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43 19 average age would have respectively been 13, 14 and 15 years. The study was approved by
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45 20 both the Edith Cowan University and the University of Melbourne Human Research
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47 21 Committees. It was also approved by the Research Branch, Education Policy and Research
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49 22 Division of the Victorian Department of Education and Early Childhood Development.
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56 24 *Sampling and data collection*
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Twenty-one Victorian government secondary schools were recruited to the study on a voluntary basis at the beginning of 2010, and allocated to metro/regional location and high/low socioeconomic (SES) strata in approximate proportion to Victorian secondary schools in each category. Schools within each strata were then randomly allocated to intervention or control conditions. Subsequently, schools were further partitioned into Metro, Fringe Metro/Major Regional or Regional/Rural location and high, medium or low socioeconomic strata. This was done to align with the Department of Education and Early Childhood Development's (DEECD's) school SES categories which were based on the Department's Student Family Occupation (SFO) index for 2010. The SFO was used at that time by DEECD to allocate additional funding to schools on the basis of socio economic need. Allocation to location category was made on the basis of distance and continuity of urban development between the school's location and the Melbourne CBD, and the population of its community.

Written active consent was sought from the 2700 year eight students in the 21 participating schools and their parents. Of this total population 1752 or 64.9% agreed to participate in the research. At Baseline, 1717 surveys, usable for the purposes of this research, were returned. At Post 1, 1431 usable surveys were returned, with 1121 at Post 2, and 959 at Post3.

Measures

Drinking uptake: Students indicated whether or not they had consumed a full standard drink (10 grams alcohol) in the past 12 months.

Consumption: Students indicated whether they had drunk a full standard drink in the past 12 months, and if so, their level of alcohol consumption. This was calculated by combining the responses to two questions: one on quantity (how many standard drinks were

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3 1 usually consumed per occasion) and one on frequency (how often alcohol was usually
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5 2 consumed). This provided total alcohol consumption over a 12-month period.
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8 3 Risky consumption: As above, students indicated whether they had drunk a full
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10 4 standard drink in the past 12 months and their levels of consumption. Drinkers who usually
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12 5 consumed five or more standard drinkers on the occasions when they drank were identified as
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14 6 risky drinkers. This quantity derives from the current Australian drinking guidelines for both
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16 7 men and women (National Health and Medical Research Council (NHMRC) 2009). The level
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18 8 of consumption by risky drinkers was also measured separately.
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21 9 Harms: The alcohol harm index was the sum of harms from the 10 items that
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23 10 measured different alcohol harms experienced over a 12-month period. Harms were feeling
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25 11 sick/hung over after drinking; memory lapses; verbal, physical and property abuse; regretted
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27 12 sex; and getting into trouble with police, parents, friends and school. The internal consistency
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29 13 of the scale was measured during the pilot phase using the Cronbach's alpha test ($\alpha=.949$,
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31 14 $p<0.001$) (Midford *et al.*, 2012).
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35 15 Risky drinking harms: Harms were as reported above, and were analysed separately
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37 16 for the group of students who reported drinking in a manner that risks acute harm (five or
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39 17 more standard drinks on the occasions when they drank).
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44 19 *Statistical Analysis*
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47 20 Analyses were conducted using STATA v12 and SPSS v19. Data were analysed on an
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49 21 intent-to-treat basis, with complete-case analysis, complemented with multiple imputation to
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51 22 account for missing data. Chi-square analysis was used to determine differences in the
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53 23 student population by gender, locality and SES. Three-level mixed linear regression models
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55 24 were used to determine the overall effects of the demographic predictors of gender, SES and
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57 25 region on alcohol consumption, alcohol harms, risky alcohol consumption and risky alcohol
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1 harms. A three-level mixed logistic regression model was used to determine demographic
 2 predictors of whether the students had consumed a full alcoholic drink. A random intercept
 3 was included in each model to account for the repeated measures and the clustering of
 4 students within schools. *Likelihood ratio tests between full models and null models resulted*
 5 *in a statistically significant improvement in model fit (all $p < 0.01$).*

6 A student who had engaged in risky drinking at any point in time was classified as a
 7 risky drinker within the mixed models. The efficacy of the intervention, the change in
 8 measure over time, and the interaction of the intervention and time, were not a focus of this
 9 study and have been controlled for in all models.

11 **Results**

12 The number of schools and students by gender, SES and locality are presented in
 13 Table 1. Just over half (54%) of all students were female. A significantly higher proportion of
 14 females were in high SES ($X^2=48.032$, $p < 0.001$) and metropolitan areas than males
 15 ($X^2=39.390$, $p < 0.001$).

17 --- Table 1 here ---

19 *Alcohol use, consumption and harm*

20 A similar proportion of males (34%) and females (36%) consumed a full standard drink
 21 of alcohol in the past 12 months. Approximately one-third of students in medium (35%) and
 22 high (33%) SES consumed a full standard drink of alcohol compared to 41% in low SES. While
 23 27% of Metropolitan students reported consuming a full standard drink of alcohol, 36% in
 24 Fringe Metro/Major Regional and 43% in Regional/Rural areas consumed a full standard drink
 25 of alcohol (Table 2). Alcohol consumption and risky alcohol consumption was highest for

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1 females, students in medium SES and students in Regional/Rural areas. Alcohol harms and
2 risky alcohol harms were lowest for students with high SES and students in the Metropolitan
3 area.

4 --- Table 2 here ---

6 *Gender, SES and location as predictors of alcohol use, consumption and harms*

7 After controlling for SES and location, the results indicated that gender was not a
8 significant predictor of whether the students had consumed a full alcoholic drink, their
9 alcohol consumption, alcohol harms, risky alcohol consumption and risky drinking harms (all
10 $p>0.05$) (Table 3).

11 Students in the low SES category were 1.6 times more likely to have consumed a full
12 drink during the period of the study than students categorised as medium SES ($p=0.031$) and
13 1.8 times more likely to have consumed a full drink during the period of the study than
14 students categorised as high SES ($p=0.031$). Similarly, high SES student drinkers ($\beta=-1.93$,
15 $p=0.001$) and risky drinkers ($\beta=-3.06$, $p=0.018$) reported significantly less alcohol harms than
16 their low SES peers.

17 Student drinkers ($\beta=25.31$, $p=0.025$) and risky drinkers ($\beta=53.91$, $p=0.047$) in
18 Regional/Rural areas reported significantly greater alcohol consumption than their peers in
19 the Metropolitan area.

21 --- Table 3 here ---

23 **Discussion**

1 The current study aimed to determine whether Victorian students' patterns of alcohol
 2 use and harm differed according to their demographic profile. More specifically, the study
 3 sought to identify patterns associated with particular profiles.

4 The findings indicated that when controlling for intervention effects, there were no
 5 gender differences in drinking uptake, or between student drinkers' or risky student drinkers'
 6 level of consumption, and harm. Despite literature suggesting that adolescent males are
 7 almost twice as likely to drink daily and more likely to have consumed alcohol between the
 8 age of 12 -17 (Australian Institute of Health and Welfare (AIHW), 2014; White and
 9 Williams, 2016), no significant differences between consumption or harm were identified.
 10 This suggests that in this cohort of students, one gender was not particularly more vulnerable
 11 than the other. This may presage a more general trend of gender balance in alcohol uptake
 12 and consumption, either because of an increase in female use or decrease in male use, or
 13 both.

14 Socioeconomic status had a significant impact on student drinkers' and risky drinkers'
 15 pattern of use and harm over time. More specifically, students with low SES were highlighted
 16 as being more at risk than students in medium and high SES categories. Low SES students
 17 were more likely to have consumed a full drink than medium and high SES students over the
 18 two-year study. Further, student drinkers with low SES experienced more alcohol related
 19 harm than high SES students. Also, low SES student risky drinkers experienced more harm
 20 than high SES student risky drinkers. These results run counter to the findings from previous
 21 general population studies of no association between SES and alcohol consumption for
 22 adolescents between 10- and 21-years old, or a skew towards greater consumption by high
 23 SES drinkers (Hanson and Chen, 2007) (Australian Institute of Health and Welfare (AIHW),
 24 2012). However, this study investigated a different population, namely junior secondary

1 students, and for drinkers and risky drinkers in this population low SES status increased their
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1 students, and for drinkers and risky drinkers in this population low SES status increased their
2 vulnerability in terms of both alcohol uptake and harm.

3 Low SES is associated with more risk taking behaviour as well as earlier mortality
4 and morbidity (Wardle *et al.*, 2003). This is consistent with the current study's finding of
5 increased harms in this demographic group. Interestingly, although low SES student drinkers
6 and risky drinkers were more likely to consume a full drink of alcohol and experience higher
7 levels of harm, there were no differences between consumption and risky levels of
8 consumption between low, medium or high SES students. Several studies have suggested that
9 higher family social status, resources that can be called upon, and the characteristics of the
10 surrounding community may act as a buffer against the consequences of risky alcohol
11 consumption, and this may be an explanation for the greater harm experienced by low SES
12 students compared to their high SES peers, even though there was no difference in
13 consumption levels across the three SES categories (Sussman and Dent, 2000; Droomers *et*
14 *al.*, 2003; Coomber *et al.*, 2011).

15 This finding of higher levels of alcohol related harm among low SES students is
16 consistent with previous research that found increased harm in this demographic group (Jonas
17 *et al.*, 1999), and adds to the limited literature on Australian adolescent alcohol consumption
18 and experienced harm. This finding, paired with previous research, highlights that low SES
19 student drinkers are at higher risk of experiencing harm than students with a higher SES.

20 Where students lived had an impact on alcohol patterns of use, when controlling for
21 the effects of the DEVS intervention. Student drinkers who lived in a Regional/Rural area
22 engaged in much higher alcohol consumption than students who lived in Metropolitan or
23 Fringe Metro/Major Regional areas and the same applied to risky drinking students. This is
24 consistent with current research that suggests adolescents in rural areas are over 80% more
25 likely to consume alcohol and do so at levels that are much higher than same aged peers in

metropolitan areas (Ryan *et al.*, 2010; Coomber *et al.*, 2011; Chan *et al.*, 2016a).

Interestingly, despite greater alcohol consumption and risky alcohol consumption by students in Regional/Rural areas, there was no difference in alcohol harms across different localities.

Research regarding harm experienced by adolescents living in rural versus is limited, While Miller et al (2010) in their review of alcohol use and related harm in rural Australia concluded that rural populations, as a whole, experience greater harm, they indicated the underlying mechanisms are poorly understood and may operate differentially across the age range. For example, Williams (2001) found that rural young people were less likely than their metropolitan peers to be physically abusive, and Dunsire and Baldwin (1999) found that they were also less likely to drink-drive.

Another important factor to consider in the harm equation is the higher density of alcohol outlets in rural areas. Higher outlet densities in rural areas have been associated with greater rates of alcohol related harm in adults (Campbell *et al.*, 2009; Popova *et al.*, 2009). However, many of the harms measured in these studies, such as single-vehicle night time motor vehicle crashes, child abuse and liver cirrhosis are not likely to result from drinking by young students. Consequently, the relationship between outlet density, higher consumption and greater harm does not seem to hold for young rural drinkers, which may be another reason for the less than expected rural student harm.

The findings from this study indicate that student drinkers in rural areas are not at immediate risk of greater harm, and for their age group, the rural lifestyle and environment may mitigate against the greater harm that usually accompanies higher alcohol consumption. However, the considerable weight of epidemiological evidence suggests this protection will disappear as they age (Livingston, 2008; Campbell *et al.*, 2009; Miller *et al.*, 2010).

The particular contribution of this research is that it highlights how student demographic characteristics have an impact on their patterns of alcohol use and harm:

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1 students with low SES and those living in a Regional/Rural area are more at risk than
2 students in medium or high SES categories, and those living in a Metropolitan or Fringe
3 Metro/Major Regional area. A limitation to this study is that the different groups are not
4 necessarily proportionately representative of the populations from which they were drawn.
5 The study also did not look at the pattern of consumption and types of harm in each
6 demographic group and only took into account the differences in average levels between
7 groups. The study has identified and interpreted differences in student alcohol consumption
8 and harm between demographic groups. However, further interpretation based on a risk
9 gradient of consumption patterns and whether students were experiencing harm at low,
10 medium or high levels would be beneficial in future student alcohol research.

11 Drug education programs have been implemented in Australia since the 1960s.
12 However, they have not been overly effective in preventing alcohol use by adolescents
13 (Midford, 2007; 2010). Harm minimization education programs implemented in schools are
14 argued to be more effective than abstinence programs, as many adolescents are already
15 engaging in alcohol use, and there is increasing evidence to support this proposition (Newton
16 *et al.*, 2010; Foxcroft and Tsertsvadze, 2012; Midford *et al.*, 2014a; Midford *et al.*, 2014b).
17 This research suggests that harm minimization alcohol education programs in schools could
18 also be tailored for students with heightened vulnerability because of low SES and/or rural
19 locality. Further, as gender was not highlighted as predicting better or worse patterns of
20 alcohol use and related harm, harm minimization education programs should be considered
21 equally suitable for gender specific and mixed gender schools.

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24 The authors declare no conflicts of interest.
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Table 1 Student School Demographics by SES^a and Locality

		Number of Schools (n=21)	Number of Students		
			Male (n=786)	Female (n=931)	Total (n=1717)
SES ^a					
	Low	6	161	174	335
	Medium	10	479	448	927
	High	5	146	309	455
Locality					
	Metro	4	144	293	437
	Fringe Metro/Major Regional	10	453	462	915
	Regional/Rural	7	189	176	365

^a SES refers to socioeconomic status

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Table 2 Descriptive statistics by gender, SES^a and region

	Full drink	Consumption	Harm	Risky consumption	Risky harm
	%(95%CI)	Mean(sd)	Mean(sd)	Mean(sd)	Mean(sd)
Gender					
Male	34.1(31.8-36.4)	49.8(145.8)	4.1(7.7)	159.8(259.1)	9.2(10.6)
Female	36.4(34.4-38.5)	57.3(173.2)	4.0(7.5)	218.9(310.4)	11.1(11.3)
SES ^a					
Low	41.1(37.5-44.8)	44.2(147.1)	3.7(7.9)	169.5(286.8)	9.8(12.0)
Medium	34.7(32.7-36.9)	65.9(183.8)	4.8(8.3)	214.0(311.0)	11.3(11.5)
High	32.7(29.9-35.7)	37.3(114.0)	2.6(4.9)	151.5(216.4)	7.6(8.1)
Region					
Metro	27.4(24.6-30.3)	31.7(92.9)	3.3(6.1)	129.5(179.3)	9.3(9.6)
Fringe Metro/ Major Regional	36.2(34.1-38.4)	55.8(148.9)	4.3(8.3)	183.5(250.2)	10.7(11.7)
Regional/Rural	43.0(39.6-46.4)	66.7(214.6)	4.0(7.1)	248.2(394.2)	9.8(10.6)

^a SES refers to socioeconomic status. Full drink = consumed a full standard drink (10 grams alcohol) in the past 12 months. Consumption = total alcohol consumption in the past 12-months. Harm = the alcohol harm index in the past 12 months. Risky consumption = total alcohol consumption in the past 12-months by those consuming five or more standard drinks on the occasions when they drank. Risky harm = the alcohol harm index in the past 12-months by those consuming five or more standard drinks on the occasions when they drank

Table 3 Multi-level Modelling Demographic Predictors of Alcohol Consumption and Alcohol Harms

	Full Drink OR(SE)	Consumption β (SE)	Harm β (SE)	Risky consumption β (SE)	Risky harm β (SE)
Fixed parameters					
Intercept	0.35(0.13)	-10.45(16.34)	2.86(0.81)	-27.77(36.68)	4.25(1.73)
Gender					
Female	1.05(0.08)	6.82(7.51)	-0.36(0.39)	25.31(15.97)	0.10(0.79)
SES					
Medium	0.62(0.14)*	12.20(9.27)	0.10(0.47)	22.78(20.85)	0.40(1.01)
High	0.55(0.15)*	-11.91(11.95)	-1.93(0.60)**	-19.39(26.68)	-3.06(1.29)*
Region					
Fringe metro/Major regional	1.25(0.32)	16.54(10.46)	-0.05(0.53)	19.14(25.00)	-0.77(1.21)
Regional/Rural	1.60(0.42)	25.31(11.28)*	-0.45(0.57)	53.91(27.12)*	-0.74(1.32)
Random parameters					
Level 3 (school variance)	0.07(0.11)	0.01(0.01)	0.01(0.01)	0.01(0.01)	0.07(0.11)
Level 2 (between student variance)	5.49(0.35)	47.71(4.89)	3.86(0.18)	74.55(10.17)	5.49(0.35)
Level 1 (within student variance)	6.03(0.21)	127.78(2.66)	5.17(0.12)	175.19(5.59)	6.03(0.21)

* $p < 0.05$; ** $p < 0.01$ Reference categories are Gender = male, SES (socioeconomic status) = low, Region = metropolitan. All models have taken into account group (intervention/control), time (baseline/Post1/Post2), and time by group interactions. Full drink = consumed a full standard drink (10 grams alcohol) in the past 12 months. Consumption = total alcohol consumption in the past 12-months. Harm = the alcohol harm index in the past 12 months. Risky consumption = total alcohol consumption in the past 12-months by those consuming five or more standard drinks on the occasions when they drank. Risky harm = the alcohol harm index in the past 12-months by those consuming five or more standard drinks on the occasions when they drank.