

**Alcohol prevention for school students: Results from a one year follow up of a cluster randomized controlled trial of harm minimization school drug education**

**Running head**

Persistent effects of school drug education

**Abstract**

**Aims:** The Drug Education in Victorian Schools (DEVS) programme taught about licit and illicit drugs over two years (2010-11), with follow up in the third year (2012). It focused on minimizing harm, and employed participatory, critical-thinking and skill-focused pedagogy. This study evaluated the programme’s residual effectiveness at follow up in reducing alcohol-related risk and harm.

**Methods:** A cluster-randomized, controlled trial was conducted with a student cohort during years eight (13-14 years old), nine (14-15 years old) and ten (15-16 years old). Schools were randomly allocated to the DEVS programme (14 schools, n=1163), or their usual drug education (7 schools, n=589). Multi-level models were fitted to the data, which were analysed on an intent-to-treat basis.

**Statistically significant findings:** Over the three years there was a greater increase in intervention students’ knowledge about drugs, including alcohol. Their alcohol consumption did not increase as much as controls. Their alcohol-related harms decreased, while increasing for controls. There were fewer intervention group risky drinkers, and they reduced their consumption compared to controls. Similarly, harms decreased for intervention group risky drinkers, while increasing for controls.

**Conclusions:** Skill-focused, harm minimization drug education can remain effective, subsequent to programme completion, in reducing students’ alcohol consumption and harm, even with risky drinkers.

**Keywords**

long-term effects, harm minimization, alcohol, school drug education, cluster-randomized controlled trial, Australia, high school students

## **Alcohol prevention for school students: Results from a one year follow up of a cluster randomized controlled trial of harm minimization school drug education**

### **Introduction**

Alcohol is widely consumed in Australia, with initiation into drinking generally occurring during early adolescence, when 13-15 years of age (Australian Institute of Health and Welfare, 2014; White & Bariola, 2012). In 2010 alcohol was responsible for 3.9% of deaths and 1.8% of hospitalisations in Australia. Young Australians disproportionately experienced acute harms from drinking (Bonomo et al., 2001; Gao, Ogeil, & LLoyd, 2014; Mathews, Hall, Vos, Patton, & Degenhardt, 2011). This vulnerability comes from youthful risk-taking behaviours, as well as a lack of experience in recognizing and managing the effects of alcohol (Bonomo et al., 2001; Plant, 2002).

Australia's drug strategy explicitly endorses a harm minimization framework based on the three pillars of demand reduction, supply reduction, and harm reduction (Ministerial Council on Drug Strategy, 2011). Taking a harm minimization, rather than an abstinence approach, to school drug education is arguably more relevant to students, as it permits discussion of drug use decisions young people make (Marlatt & Witkiewitz, 2010). Such programmes should provide practical knowledge and skills to enable young people to make safer decisions in regard to drug use, and should be evaluated in terms of demonstrably reducing risk and harm. Abstinence remains a plausible prevention strategy within a harm minimization approach, but it should not be the measure of programme effectiveness (Lenton & Midford, 1996). Harm minimization does not condone drug use, and research indicates that use of harm minimization strategies within well-designed programmes does not increase uptake or level of use (Hamilton, Cross, Resnicow, & Shaw, 2007; McBride, Farrington, Midford, Meuleners, & Phillips, 2004).

The Drug Education in Victorian Schools (DEVS) programme was designed to provide junior high school students with critical disposition, practical knowledge and communication and decision making skills. These skills give capability to manage risk and minimize the harms most likely to be encountered because of drug use, whether their own or that of others (Midford et al, 2012). As alcohol is the drug that causes the most harm to young people, it was given greatest emphasis. The programme comprised 18 lessons, provided successively over two years, to a cohort of secondary school students, starting in year 8 (average age 13 years). Lessons on alcohol were integrated with lessons on other drugs, and the programme as a whole explored the connection of drug use to issues such as mental health, gender norms, violence, anti-social behaviour and sexual vulnerability.

Findings in relation to alcohol prevention from the first and second years of the main DEVS programme have been reported in previous papers (Midford et al., 2014a; Midford et al.,

2014b). The central finding in both papers was that while intervention students were no less likely to have tried alcohol, their alcohol consumption and related harm increased over time to a lesser extent than that of control students. This paper reports findings in relation to alcohol from the third year of the main study, when the intervention students received no drug education lessons from the DEVS programme.

Studies in the United States found that students, who received classroom drug education combined with family intervention, or classroom drug education by itself, had lower illicit drug use compared to controls at long term follow up. These difference were reported as persisting for up to 6½ years subsequent to programme implementation (Spoth, Trudeau, Shin, & Redmond, 2008; Spoth, Clair, Shin, & Redmond, 2006). However, a number of reviews have called into question the effectiveness of these prevention programmes (Ellickson, Bell, & McGuigan, 1993; Gorman, Conde, & Huber Jr, 2007; Midford, 2008). Other studies indicated that the influence of both alcohol and illicit drug education programmes on use dissipated soon after lessons ceased (Gandhi, Murphy-Graham, Petrosino, Chrismer, & Weiss, 2007; Strøm, Adolfsen, Fossum, Kaiser, & Martinussen, 2014). This body of research casts doubt on the residual effectiveness of school drug education programmes. The programmes in question essentially sought to achieve abstinence, or at least delay onset of use. However, one study, the School Health and Alcohol Harm Reduction Project (SHAHRP) found that a harm minimization focused school alcohol education programme provided continuing benefit 17 months subsequent to completion of the intervention phase (McBride et al., 2004).

The purpose of this study is to evaluate the ongoing effectiveness of the DEVS two year harm minimization drug education programme for junior secondary school students in terms of alcohol consumption and harm, 15 months subsequent to programme completion. SHAHRP demonstrated the residual effectiveness of an alcohol specific harm minimization programme. This research investigated whether similar results could be achieved by a school programme that provided integrated harm minimization education about all drugs, licit and illicit. As in the previous waves, this study measured the difference between the intervention and control groups in terms of alcohol and other drug (AOD) knowledge, communication with parents about alcohol, and attitudes towards alcohol, as these can be important influences on drinking behaviour. However, the primary outcome sought by the DEVS programme was a reduction in risk and harm associated with alcohol use. Consequently, consumption and harm were measured to assess actual drinking behaviour. The specific hypotheses are that in comparison to controls, the DEVS drug education programme will continue to influence intervention students to:

- (1) consume less alcohol;
- (2) consume alcohol in a less risky manner; and
- (3) experience less harm associated with the use of alcohol.

## Methods

### *Design*

This study is part of a larger three year, cluster-randomized, controlled drug education trial that followed a cohort of students from the start of year 8 in 2010 (average age 13) to the end of year 10 in 2012 (average age 16). This study evaluated alcohol-related outcomes in the third year of the trial. Other papers from the trial have published alcohol-related findings from years one and two, and findings in relation to cannabis use and tobacco smoking (Lester et al, 2014; Midford et al., 2014a; Midford et al., 2014b; Midford et al 2016).

The 18 lessons for the intervention students are described in Table 1. Extensive curriculum support resources, comprising student workbooks, trigger videos and teacher manuals were developed as part of this research, and can be accessed online at <http://www.education.vic.gov.au/school/teachers/health/Pages/drugedulearn.aspx> (Cahill, Beadle, Venning, Ramsden, & Midford, 2013a; 2013b; Cahill, Beadle, & Midford, 2013a; 2013b). The intervention provided for 10 lessons during 2010, followed by eight lessons in 2011. Feedback from departmental regional support officers indicated that the lesson sequence was followed by the intervention schools. However, lesson fidelity data was not collected, and it is possible that some schools did not implement all 18 lessons as intended.

The control students would have received a minimum of 10 hours drug education in each of these years, as this was a departmental requirement. The education would have varied from school to school, because the lessons were planned by each school's health teacher, drawing on available curriculum resources. No lessons from the DEVS programme were provided in 2012: both intervention and control students received drug education lessons usually provided by their school. This paper focuses on changes between the Baseline testing in March/April 2010 and Post 3 testing in November/December 2012, although descriptive graphs, incorporating Post 1 data and Post 2 data, collected respectively at end of 2010 and 2011, have been included in the results to illustrate trends.

Table 1 about here

### *Research ethics and registration*

The study was approved by Edith Cowan University's and the University of Melbourne's human research ethics committees. It was also approved by the Research Branch, Education Policy and Research Division of the Victorian Department of Education and Early Childhood Development (DEECD). It was registered with the Australia and New Zealand Clinical Trials Register (ANZCTR): registration number ACTRN12612000079842.

### *Sampling and data collection*

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 to approximate the proportion of Victorian secondary schools in each category. SES allocation was made DEECD’s Student Family Occupation (SFO) index for 2010. Schools within each strata were then randomly allocated to intervention or control conditions on a two to one proportion to allow more precise statements about the effects of the intervention (Hendricks Brown, 2006). A piece of paper, folded to conceal the name of a school was drawn out of one container by the researchers, while a similarly folded piece of paper, designating the research condition was drawn out of another container (Midford et al., 2012). Subsequently, schools were further partitioned into high, medium and low socioeconomic strata. This was done to better align with DEECD’s school SES categories. One intervention school, with 44 participating students, dropped out of the study prior to Post 2 data collection in 2011 due to staffing limitations.

The demographics of the student sample are provided in Table 2.

Table 2 about here

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, 1161 usable surveys were returned students in the intervention schools and 585 by students in the control schools. Six Baseline surveys were excluded as unreliable because all responses to the questions on either alcohol, smoking, cannabis or other drug use and harm were uniformly in the highest category. This was considered a strong indication that these students had not reported their true behaviour, but simply reported maximum possible values.

Overall, 54% of students were female, with controls schools having a significantly higher proportion of females than males ( $X^2=32.919$ ,  $p<0.001$ ). The majority of students were from schools within the metropolitan area, with control schools having a significantly higher proportion of students from regional areas than intervention schools ( $X^2=7.964$ ,  $p=0.005$ ). The majority of schools were classified as medium SES, with intervention schools having a higher proportion of low SES and medium SES and a lower proportion of high SES students than control schools ( $X^2=100.263$ ,  $p<0.001$ ). The significant gender difference between the intervention and control schools is in the main accounted for by one control school being exclusively female. The significant geographic and SES differences between intervention and control students occurred, despite stratification of schools, because of different student participation rates in different schools. A flow diagram illustrating the number of schools and students in each study group over time is presented in Figure 1.

Figure 1 about here

### *Sample size calculation*

Sample size estimations are based on detecting a small effect size of .15 in relation to alcohol consumption patterns and associated harm. This effect size was chosen on the basis of previous school drug education studies (Malmberg et al., 2010; McBride et al., 2004). The target sample size has been estimated using G\*Power v.3.1.3 software where  $\alpha = 0.05$  and  $1 - \beta$  error probability = 0.95 (Faul, Erdfelder, Buchner, & Lang, 2009). Assuming random sampling, a total sample size of 364 is required at the end of the study. However, there is a design effect due to the loss of effectiveness created by cluster sampling. The design effect for the School Health and Alcohol Harm Reduction Project (SHAHRP) study, which took into consideration the effect of clustering by school, and a 15% annual rate of student attrition, was calculated to be 1.48. Using this correction, a total sample size of at least 539 is required at the end of the study to test the effectiveness of the intervention (Faul, Erdfelder, Buchner, & Lang, 2009; Midford et al., 2012; McBride et al., 2004).

### *Measures*

#### *Knowledge*

The knowledge index represented the number of correct answers to 38 knowledge questions on alcohol, smoking and other drugs. The internal consistency of the index was measured during the pilot phase, using the Cronbach's alpha test ( $\alpha = .859$ ,  $p < 0.001$ ) (Midford et al., 2012).

#### *Attitudes*

The alcohol attitude scale was a sum of the five attitude variables, with higher scores representing safer alcohol-related attitudes. Individual attitude items used a five-point Likert scale and measured attitudes on alcohol harm, alcohol education, safe use of alcohol, getting drunk on purpose and talking with parents about alcohol. The internal consistency of the scale was measured during pilot phase, using the Cronbach's alpha test ( $\alpha = .387$ ,  $p < 0.001$ ) (Midford et al., 2012). Two components, knowledge/communication and harm accounted for most of the variance.

#### *Talking to parents*

Students were asked to indicate how often they talked to their parents about alcohol in the past 12 months. Response choices were: never; once or twice; 3-4 times; 5-11 times; and 12 times or more.

#### *Consumption*

Students were asked whether they had drunk a full standard drink in the past 12 months. Overall alcohol consumption for drinkers was calculated by combining the responses to two variables: one on quantity (how many standard drinks were usually consumed per occasion) and one on frequency (how often alcohol was consumed). This provided total alcohol consumption over a 12-month period.

*Risky consumption*

The proportion of students who drank in a manner that risked acute harm was calculated by identifying student drinkers who usually consumed five or more standard drinks (10 g of alcohol) on the occasions when they drank. This quantity derives from the current Australian drinking guidelines (National Health and Medical Research Council (NHMRC), 2009). The consumption by risky drinkers was also measured.

*Harms*

The alcohol harm index was the sum of harms from the 10 items that measured different alcohol harms experienced over a 12-month period. Harms were feeling sick/hung over after drinking, memory lapses, verbal, physical and property abuse, regretted sex, and getting into trouble with police, parents, friends and school. The internal consistency of the scale was measured during pilot phase, using the Cronbach’s alpha test (alpha=.949,  $p<0.001$ ) (Midford et al., 2012).

*Comparing missing and retained respondents*

The attrition rate over the 33 months from Baseline to Post 3 data gathering was 44.7% (Figure 1). As non-respondents could not be followed up on survey items, missing at random was determined by running Chi-square analysis comparing being missing on outcome variables with the key demographic variables, group (intervention vs control), gender, location and SES. There was no significant difference in the outcome variables knowledge, attitudes, talks to parents, alcohol consumption and demographic variables (all  $p>0.05$ ). While the missing data in the number of alcohol harms was not significantly different for the demographic variables, group and SES, a significantly greater proportion of males than females ( $X^2=6.661$ ,  $p=0.010$ ) and metro compared to non-metro students ( $X^2=4.323$ ,  $p=0.038$ ) recorded missing data. As there was no significant difference for 95% of the variables, data was presumed to be missing at random.

*Statistical Analysis*

Analyses were conducted using STATA v12 and SPSS v19. Data were analysed on an intent-to-treat basis, with complete-case analysis. Multiple imputation within STATA (MI Impute Regress) was used to complete the data for up to 45% of missing at random cases. Each of the imputed datasets produced by STATA were analysed and pooled for overall inference

using Rubin's Combination Rules (Rubin, 1987) which account for the uncertainty associated with imputed values. Examination of the multiple imputation estimates versus the pooled imputation estimates of the outcome variables showed very minor discrepancies: for example, with knowledge the confidence intervals differed by 0.01 (see Table 3). Examination of imputed data revealed no significant differences in regression coefficient estimates between single and multiple imputations.

Table 3 about here

Multi-level regression models were fitted with Post 3 independent variables modelled as a function of study condition, gender, region, SES and Baseline variables to adjust for any Baseline differences between the intervention and control groups. A random intercept was included in each model to account for the clustering of students within schools. Linear regression models were used to determine differences between intervention and control groups for alcohol and other drug knowledge, alcohol attitudes, talking to parents about alcohol, alcohol consumption and alcohol harms (including risky drinkers). The alcohol consumption and attitudes indices were log-transformed. Logistic regression models were used to determine differences between groups as to whether the students had consumed a full alcoholic drink and whether they usually engaged in risky drinking.

## Results

### *Knowledge*

The knowledge index score increased from Baseline to Post 3 for both the intervention and control students, with an average increase of 35.6% (7.4 correct answers) for intervention students and 25.2% (5.3 correct answers) for control students (Table 4, Figure 2). After taking into account Baseline knowledge index score, gender, SES category and region, students within the intervention group significantly increased their knowledge index scores at Post 3, compared to students in the control group ( $\beta=2.02$ ; 95%CI=0.95, 3.05;  $p<0.001$ ).

----Table 4 and Figure 2 about here----

### *Attitudes*

The attitudes of students towards alcohol issues in both the intervention and control groups were highly responsible at Baseline, with both intervention and control students scoring 18.6 out of a possible 25 (Table 3). At Post 3, attitude scores increased by 11.3% for intervention students and 10.2% for control students, with both intervention and control students scoring 21. After taking into account Baseline attitude score, gender, SES category and region, there



was no significant difference between groups in the change of attitudes from Baseline to Post 3 ( $\beta=0.01$ ; 95%CI= - . 3, 0.04;  $p=0.737$ ).

***Communication with parents***

The average number of times intervention students talked to their parents about alcohol increased from Baseline to Post 3 by 95.2%, from 2.1 to 4.1 occasions, compared to an increase of 71.4% for control students, from 2.1 to 3.6 occasions (Table 3). After taking into account the number of times each group talked to their parents at Baseline, gender, SES category and region, the increase by intervention students in talking with their parents was not significantly greater at Post 3 than the increase by control students ( $\beta=0.69$ ; 95%CI= - .33, 1.71;  $p=0.178$ ).

***The proportion of students who drank at least one full drink (student drinkers)***

The proportion of intervention students who consumed a full standard drink increased from 23.4% at Baseline to 51.9% at Post 3, compared to an increase from 22.7% to 55.4% of control students (Table 3). After taking into account the proportion of student drinkers at Baseline, gender, SES category and region, there was no significant difference between groups in the increase of drinkers (OR 0.75; 95%CI=0.40, 1.41;  $p=0.373$ ).

***Alcohol consumption***

Alcohol consumption increased for both intervention and control student drinkers, with a 84% increase from Baseline to Post 3 for intervention students (mean Baseline=30.5, mean Post 3 = 56.2) and a 331% increase for control students (mean Baseline=21.1, mean Post 3 = 90.9) (Table 3, Figure 3). After taking into account Baseline consumption, gender, SES category and region, intervention students reported significantly less consumption than control students ( $\beta=-.49$ ; 95%CI= - .87, - .1 ;  $p=0.013$ ).

---- Figure 3 about here----

***Proportion of risky drinkers***

The proportion of intervention student drinkers who usually drank in a manner that risks acute harm increased from 18.8% at Baseline to 38.8% at Post 3, compared to an increase from 18.8% to 51.3% of control students (Table 3, Figure 4). After taking into account the proportion of student risky drinkers at Baseline, gender, SES category and region, intervention students were significantly less likely to be risky drinkers than control students at Post 3 (OR=0.53; 95%CI=0.33, 0.86;  $p=0.009$ ).

---- Figure 4 about here----

### *Consumption by risky drinkers*

At Post 3, intervention students who usually drank in a manner that risks acute harm decreased their consumption by 10.2% (mean Baseline=131, mean Post 3 = 118.9), compared to control students who increased their consumption by 106.9% (mean Baseline=78.7, mean Post 3 = 162.8) (Table 3, Figure 5). After taking into account gender, SES category and region, there was a significant difference between the two risky drinking groups, with intervention students consuming less alcohol than control students at Post 3 ( $\beta=-1.29$ ; 95%CI=-2.28, - .3 ;  $p=0.011$ ).

---- Figure 5 about here----

### *Alcohol harms*

Alcohol harms experienced by student drinkers during the previous 12 months decreased by 27.5% from Baseline to Post 3 (mean Baseline= 4.0, mean Post 3 = 2.9) for intervention students and increased by 38.4% (mean Baseline= 3.9, mean Post 3 = 5.4) for control students (Table 3, Figure 6). After taking into account the number of alcohol harms experienced at Baseline, gender, SES category and region, intervention students experiencing significantly less alcohol harms than control students ( $\beta=-2.14$ ; 95%CI=-3.54, - .74;  $p=0.003$ ).

---- Figure 6 about here----

### *Alcohol harms for risky drinkers*

At Post 3, intervention students who usually drank in a manner that risks acute harm decreased their alcohol harms by 36.0% (mean Baseline=8.6, mean Post 3 = 5.5), compared to control students who increased their alcohol harms by 60.2% (mean Baseline=10.3, mean Post 3 = 16.5) (Table 3, Figure 7). After taking into account gender, SES category and region, there was a significant difference between the two risky drinking groups, with intervention students experiencing significantly less alcohol harms than control students ( $\beta=-.99$ ; 95%CI=-1.66, - .33;  $p=0.004$ ).

---- Figure 7 about here----

## **Discussion**

The findings from this long term follow up of the DEVS school drug education programme support the hypotheses as to programme effects. The trends in the alcohol data from this third

year, non-intervention, wave of the investigation were generally similar to those from the first and second waves, when the DEVS programme was being provided in schools (Midford et al., 2014a; Midford et al., 2014b). There were, however, a number of minor differences. At Post 1 and Post 2 the intervention students talked more to their parents about alcohol than the controls, whereas here there was no difference between the groups at Post 3. This was likely due to no home learning tasks that required parental involvement, as was the case during the intervention phase. This change also suggests that if communication with parents about alcohol use is important it has to be supported by structured interaction.

As at Post 1 and Post 2, intervention students were more knowledgeable about alcohol and other drug use issues, and this difference persisted at Post 3 (Midford et al., 2014a; Midford et al., 2014b). This has been noted previously as an important intermediate step in changing behaviour (Midford et al., 2014b). Attitudes toward alcohol by both intervention and control groups at Post 3 remained similarly responsible, as was the case at Post 1 and Post 2. This was likely for the same reason, namely, that both groups already held very responsible attitudes at Baseline, allowing little room for improvement. The implication of this finding is that seeking to engender responsible attitudes towards alcohol is an exercise in preaching to the cognitively converted, and unlikely to influence consumption and harm (Midford et al., 2014b).

As with the first two years, intervention students at Post 3 were no less likely to drink than controls, but unlike the first two years, the intervention students were less likely to be risky drinkers (5 or more drinks on a single occasion) than control students. The intervention students continued to moderate their consumption at Post 3, as did the intervention student risky drinkers. In the case of risky drinkers the long-term effect of the DEVS programme was particularly marked. Not only did consumption by intervention students in this group decrease in absolute terms, while consumption by their control peers increased by over 100%, but for the first time the increase in the proportion of risky drinkers compared to Baseline was less than controls (Midford et al., 2014a; Midford et al., 2014b)..

The long-term influence of the programme carried through to alcohol-related harms. Harms experienced by intervention student drinkers decreased at Post 3 compared to Baseline, whereas harms experienced by the control group drinkers increased, albeit mostly in the first year. There was a similar trend in harms experienced by risky drinkers: harms went down for intervention students and went up for controls.

The DEVS programme remained effective in terms of its stated aims, at Post 3, even though the programme provided no education in the third year. The increase in alcohol consumption by intervention students, both risky and non-risky drinkers, was relatively less than for controls. There were relatively fewer intervention students consuming alcohol in a risky manner. Non-risky and risky drinking intervention students experienced fewer harms. These

findings were similar to evaluations conducted after the first and second year of the programme (Midford et al., 2014a; Midford et al., 2014b).

These consistent results indicate that an integrated, harm minimization focused school drug education programme delivered by specifically trained teachers, employing participatory, student-centred pedagogy is capable of influencing both risky and non-risky drinking students, to consume alcohol in a more responsible manner. The particular contribution of this study is that it indicated these changes are maintained, and in some cases improved, in the year subsequent to lesson delivery - the programme had a lasting effect.

A number of limitations do, however need to be noted. The requirement to obtain active consent from both student and parent meant that 35.3% of eligible students were not included in the study. This was more a function of the extent to which schools followed up on the return of consent forms than students or their parents being actively opposed to participation. In a similar vein, the study suffered from 44.7% attrition from Baseline to Post 3. Although higher than desirable, the annual attrition was not that dissimilar to a previous comparable study, and can be largely explained in terms of family mobility, although absenteeism on the day of data collection and unique identification code inconsistencies played a small part

(McBride et al., 2004). Such loss of participants does, however, have implications for the generalisability of findings. Another potential criticism of the programme is that it did not deter underage students from taking up drinking, but this has to be balanced against the reduction in consumption and harm achieved with both low risk and risky drinkers. This should be seen as a worthwhile benefit in the context of Australian society, and by implication, western society in general, where it is normative for young people to have consumed alcohol well before they reach the legal age of purchase (Australian Institute of Health and Welfare, 2014; White & Bariola, 2012)

DEVS has demonstrated effective harm minimization education that covers all drugs in an integrated programme can be accommodated in a school's health curriculum (Midford et al., 2014a; Midford et al., 2014b). On this basis it is now the recommended drug education programme for year 8 and 9 students in Victorian government schools, and all the teaching material is readily available on the department's website. In this respect the programme has ongoing influence. However, findings from this long-term evaluation of the DEVS programme have a number of broader implications for the delivery effective school drug education. They reinforce findings from the earlier studies that effective school drug education offers immediate and mass benefit, but they additionally demonstrate that these benefits can continue past the life of programme delivery.

All Australian jurisdictions provide some form of school drug education, so there is likely to be worthwhile prevention benefit if harm minimization programmes, with demonstrated and long lived effect, are preferentially selected over existing programmes with no demonstrated

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effect. Australian policy endorses a harm minimization approach to drug use on the basis of evidence of effect. Findings from this and the earlier DEVS studies provide a strong argument for such an approach to be the basis of standard drug education practice within schools.

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## Conflict of interest statement

The authors confirm that there are no known conflicts of interest.

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## Alcohol prevention for school students: Results from a one year follow up of a cluster randomised controlled trial of harm minimization school drug education

### Figures and Tables

**Table 1** Year eight and year nine lesson plans

Lesson	Year 8	Year 9
1	WHAT IS A DRUG? - Introduction, agreements, definitions and drug categories	PRIORITIES AND CONCERNS - Identifying what young people value and worry about generally and what particular concerns they have around drugs
2	ALCOHOL AND EFFECTS AND STANDARD DRINKS - How alcohol effects the body, assessing harms associated with use, pouring standard drinks, understanding blood alcohol content and safer levels of use	FACING FACTS AND FINDING SOLUTIONS - Alcohol and Cannabis guidelines on use and the research that informs them
3	PARTY BEHAVIOURS AND ALCOHOL – The relationship between levels of alcohol use and the risk of harm to self and others	USING YOUR RESOURCES - Pouring standard drinks, matching harms to levels of alcohol use, identifying strategies to reduce harm
4	PREVALENCE AND NORMS - Dispelling myths about levels of drug use amongst young people, identifying reasons for use/non-use	WINDING UP, WINDING DOWN - Learning about the effects/risks of Amphetamine type stimulants, identifying drug-free ways of achieving 'high' and 'serene' states of mind
5	TOBACCO - Considering gender differences in relation to smoking, the impact of media messages	DRUGS, DISINHIBITION, SEXUAL VULNERABILITY AND VIOLENCE - Discussing sexual vulnerability and violence in relation to drug use, identifying strategies for avoiding or reducing harm
6	CANNABIS - Information about cannabis and its effects, identifying risks associated with Cannabis use	INVISIBLE RISKS - Information about injecting drug use, blood-borne viruses and methods of protection
7	RISK REDUCTION - Assessing risk and developing strategies to avoid or minimize harm	PERSONAL CONFIDENCE AND DRUG USE - Developing and rehearsing positive self-talk, refusal skills and tactics for peer negotiation
8	INFLUENCES - Identifying social and media influences to use alcohol	GETTING HELP AND TALKING WITH ADULTS - Information about heroin, rehearsing steps for practical first aid in situations involving overdose, rehearsing help seeking with adults
9	OPTIONS AND DECISIONS - Generating and rehearsing strategies to reduce harms associated with drug use	
10	STANDING UP FOR YOURSELF – Providing peer support, using assertion skills in situations involving alcohol	

**Table 2** Demographics of the student sample

	Intervention	Control	Total
	n = 1161(% = 66.5)	n = 585(% = 33.5)	n = 1746
Gender**			
Male	587(50.6)	211(36.0)	798(45.7)
Female	574(49.4)	374(64.0)	948(54.3)
Location**			
Metropolitan	930(80.1)	434(74.2)	1364(78.1)
Regional	231(19.9)	151(26.8)	382(22.9)
SES Category**			
Low	257(22.1)	81(13.8)	338(19.4)
Medium	682(58.7)	262(44.8)	944(54.1)
High	222(19.1)	242(41.4)	464(26.6)

\*\*p<0.01

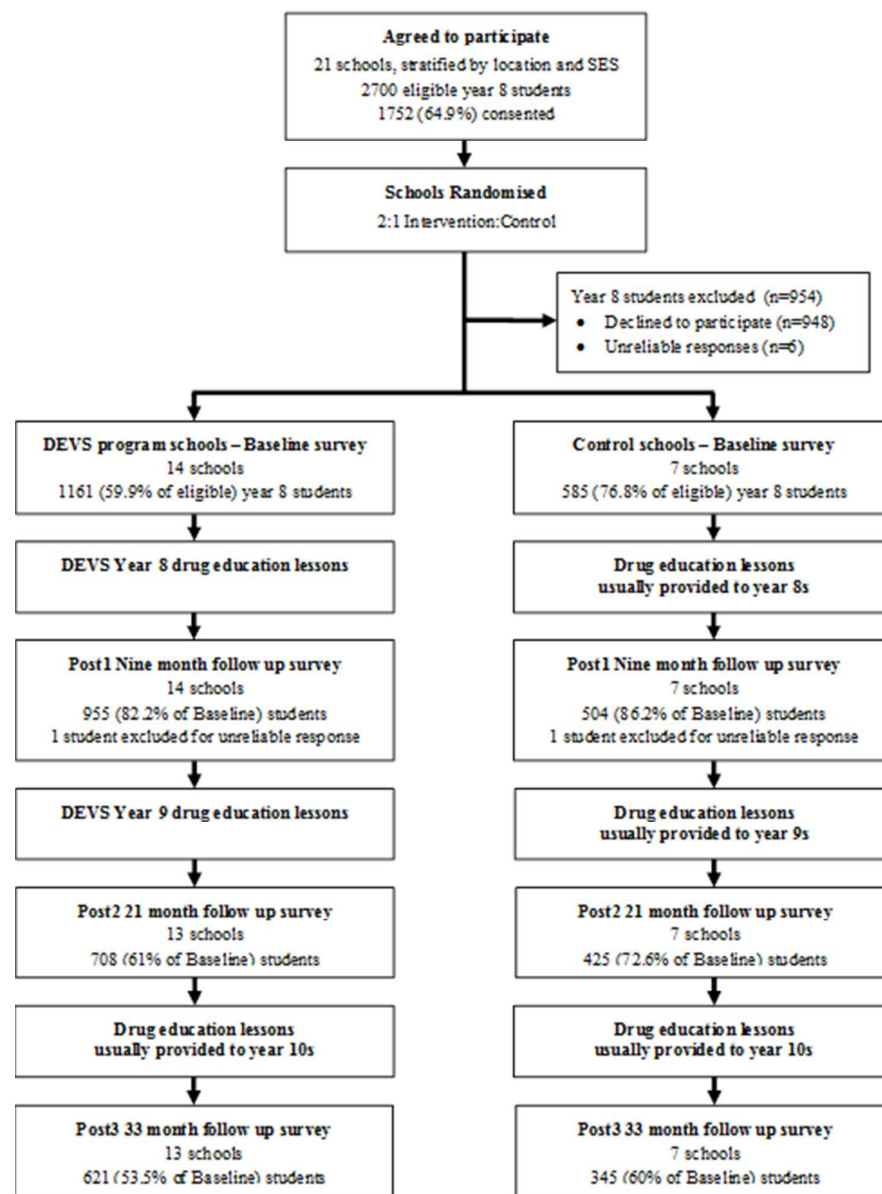
**Table 3** Multiple imputation and pooled imputation estimates for the knowledge variable

Knowledge	n	Co-efficient	95% CI	p value
Multiple imputation	1744	0.32	0.27-0.37	<0.001
Single imputation	966	0.32	0.27-0.38	<0.001

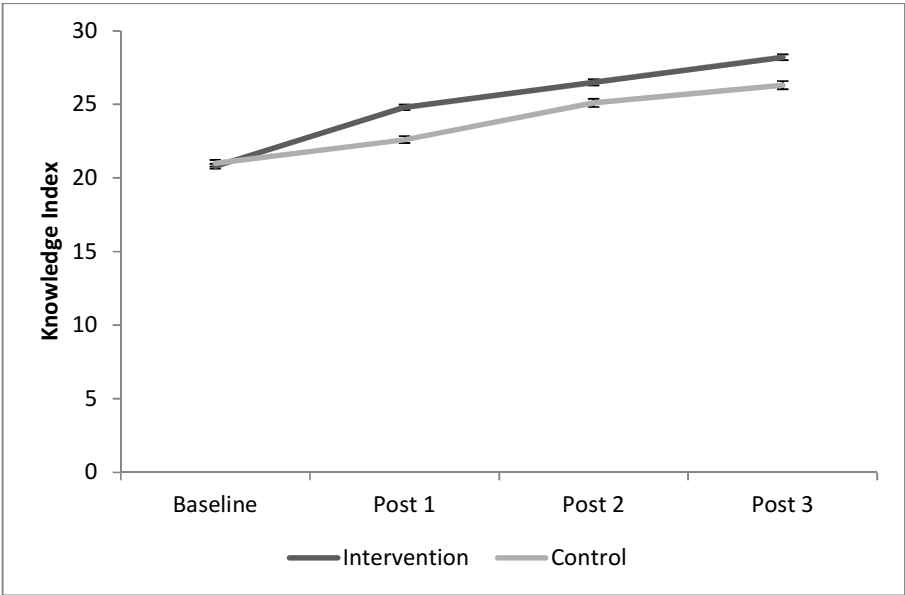
Table 4 Results by time and group

		Baseline		Post3	
		Intervention	Control	Intervention	Control
		n	%(95%CI)	%(95%CI)	%(95%CI)
Drank a full standard drink	1744	23.4(21.4-25.4)	22.7(20.7-24.7)	51.9(47.9-55.8)	55.4(50.1-60.5)
Drank in a risky manner**	513	18.8(17.0-20.6)	18.8(17.0-20.6)	38.8(33.7-44.2)	51.3(44.3-58.3)
		Mean (Std dev)	Mean (Std dev)	Mean (Std dev)	Mean (Std dev)
Knowledge index***	1744	20.8(5.4)	21.0(5.3)	28.2(4.7)	26.3(5.1)
Attitude scale	1734	18.6(3.7)	18.6(3.7)	20.7(2.6)	20.5(2.6)
Talked to parents	1735	2.1(3.1)	2.1(2.9)	4.1(4.6)	3.6(4.4)
Alcohol consumption**	513	30.5(98.4)	21.1(55.0)	56.2(111.3)	90.9(188.5)
Consumption by risky drinkers*	33	131.0(196.5)	78.7(103.2)	118.9(150.9)	162.8(241.6)
Alcohol harms**	510	4.0(7.6)	3.9(7.2)	2.9(4.7)	5.4(8.1)
Alcohol harms for risky drinkers**	33	8.6(9.8)	10.3(9.9)	5.5(5.0)	16.5(14.7)

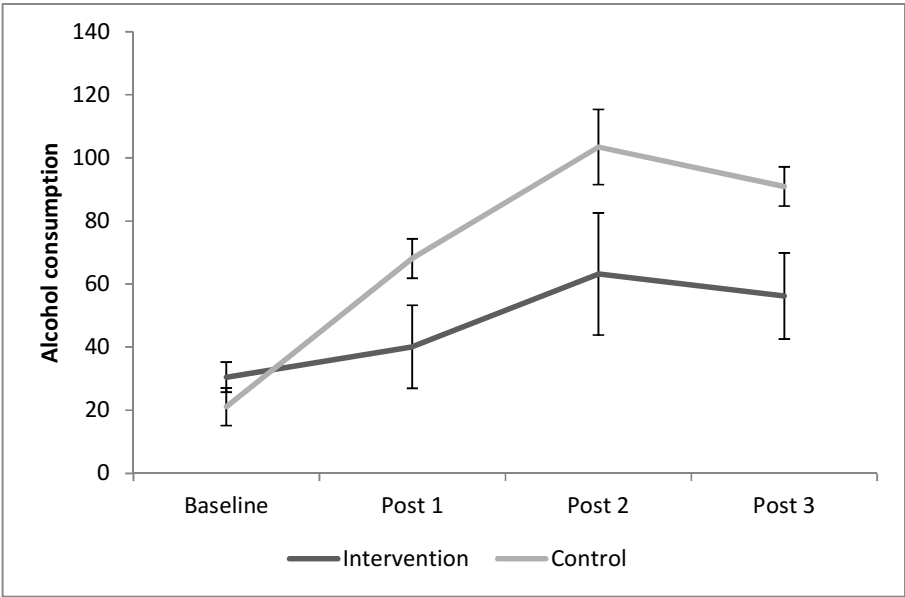
\*p<0.05 at post3, \*\*p<0.01 at post 3, \*\*\*p<0.001 at post 3



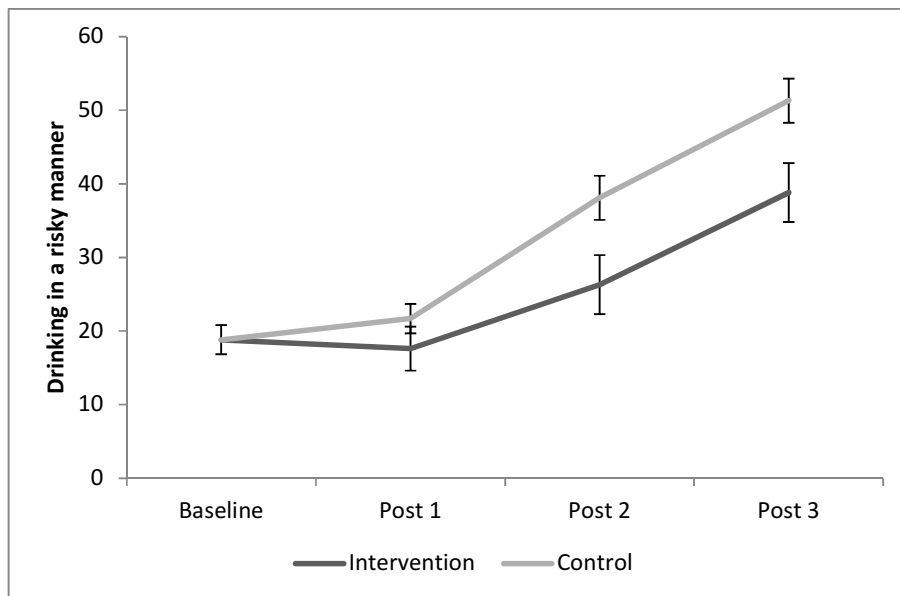
**Figure 1** Flow chart illustrating the recruitment and participation of schools and students in the full three year 8-10 program



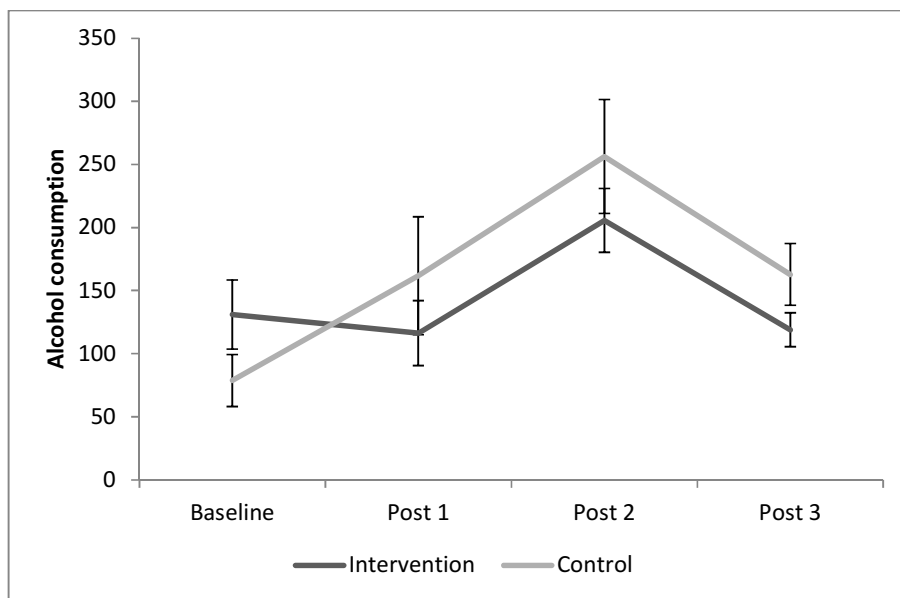
**Figure 2** Mean knowledge index score for intervention and control groups (bars represent standard error)



**Figure 3** Mean alcohol consumption in standard drinks by intervention and control group drinkers over a 12 month period (bars represent standard error)

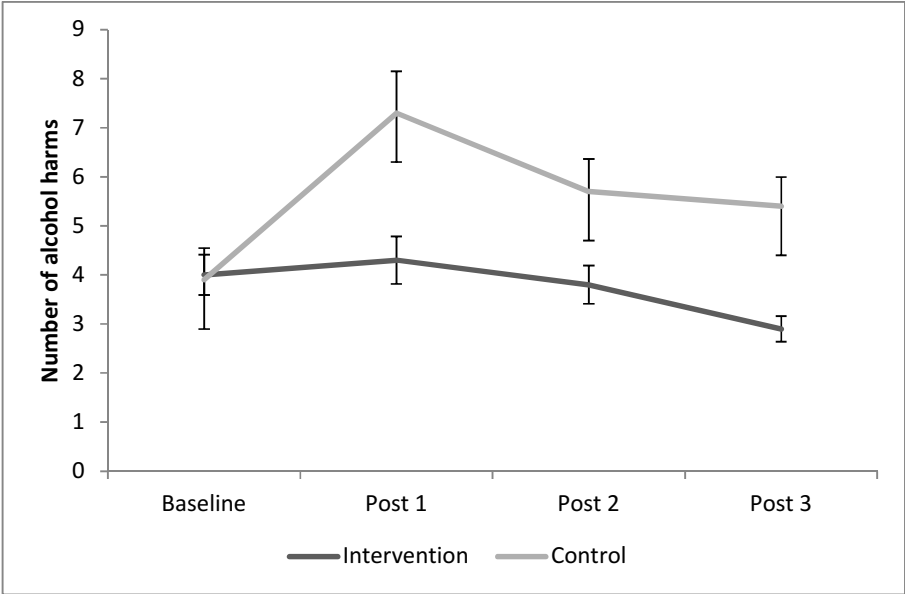


**Figure 4** Proportion of intervention and control students drinking in a risky manner over a 12 month period (bars represent standard error)

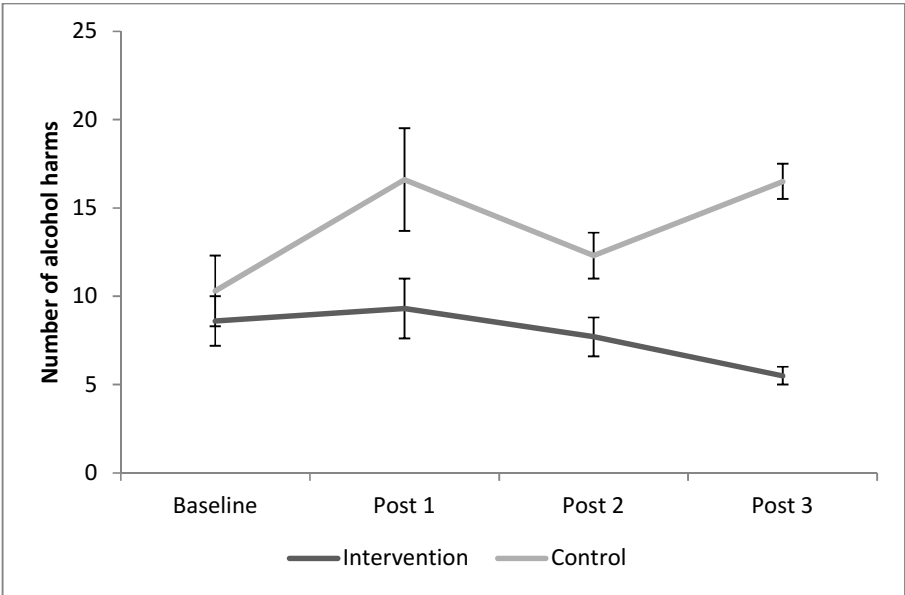


**Figure 5** Mean alcohol consumption in standard drinks by intervention and control group risky drinkers over a 12 month period (bars represent standard error)





**Figure 6** Mean number of alcohol harms experienced by intervention and control group drinkers over a 12 month period (bars represent standard error)



**Figure 7** Mean number of alcohol harms experienced by intervention and control group risky drinkers over a 12 month period (bars represent standard error)

## **Alcohol prevention for school students: Results from a one year follow up of a cluster randomized controlled trial of harm minimization school drug education**

### **Compliance with Ethical Standards**

All procedures performed during the course of this research were in accordance with the ethical standards of Edith Cowan University's and the University of Melbourne's Human Research Ethics Committees, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

### **Clinical Trial Registration Details**

Australia and New Zealand Clinical Trials Register (ANZCTR) ACTRN12612000079842.

### **Declarations of Conflicting Interests**

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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