Research paper

Preventing alcohol harm: Early results from a cluster randomised, controlled trial in Victoria, Australia of comprehensive harm minimisation school drug education☆

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ABSTRACT

Background: In Australia, the burden of alcohol-attributable harm falls most heavily on young people. Prevention is important, and schools have long been seen as appropriate settings for pre-emptive interventions with this high risk group. This paper evaluates the effectiveness, in relation to alcohol harm prevention, of the Drug Education in Victorian Schools (DEVS) programme, nine months after implementation. This intervention dealt with both licit and illicit drugs, employed a harm minimisation approach that incorporated interactive, skill based, teaching methods and capitalised on parental influence through home activities.

Methods: A cluster randomised, controlled trial of the first ten lessons of the DEVS drug education programme was conducted with year eight students, aged 13–14 years. Twenty-one secondary schools in Victoria, Australia were randomly allocated to receive the DEVS programme (14 schools, $n = 1163$) or the drug education usually provided by their schools (7 schools, $n = 589$). Self-reported changes were measured in relation to: knowledge and attitudes, communication with parents, drug education lessons remembered, proportion of drinkers, alcohol consumption (quantity multiplied by frequency), proportion of student drinkers engaging in risky consumption, and the number of harms experienced as a result of alcohol consumption.

Results: In comparison to the controls, there was a significantly greater increase in the intervention students' knowledge about drugs, including alcohol ($p \leq 0.001$); there was a significant change in their level of communication with parents about alcohol ($p = 0.037$); they recalled receiving significantly more alcohol education ($p < 0.001$); their alcohol consumption increased significantly less ($p = 0.011$); and they experienced a lesser increase in harms associated with their drinking ($p \leq 0.001$). There were no significant differences between the two study groups in relation to changes in attitudes towards alcohol or in the proportion of drinkers or risky drinkers. There was, however, a notable trend of less consumption by risky drinkers in the intervention group.

Conclusions: A comprehensive, harm minimisation focused school drug education programme is effective in increasing general drug knowledge, and reducing alcohol consumption and harm.

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Introduction

Alcohol is commonly used in Australia, with 80.5% of Australians, aged 15 years and older consuming at least one standard alcoholic drink (10 g of pure alcohol) in the previous year (Australian Institute of Health and Welfare, 2011). Drinking alcohol is in many ways tied to Australian national identity, and is strongly associated with a range of social events and celebrations (Keane, 2009; Midford, 2005). While most consumption of alcohol is low risk, the harmful effects of consumption accounted

for 3.3% of the burden of disease and injury in Australia in 2003 (Begg et al., 2007). The national guidelines for alcohol consumption highlight the lifetime risk of excessive alcohol use (National Health and Medical Research Council (NHMRC), 2009). In the short-term, excessive alcohol consumption increases the risk of physical injury from falls, violence and road accidents (National Health and Medical Research Council (NHMRC), 2009). Long-term harms include liver and cardiovascular disease, cancers, obesity, as well as increased risk of mental illness (National Health and Medical Research Council (NHMRC), 2009). Data from 2004/05 estimated the social cost of alcohol consumption in Australia to be $15.3 billion annually (Collins & Lapsey, 2008).

In Australia the burden of acute alcohol-attributable injury falls most heavily on young people. In the period 1990–97 over half of all alcohol-related serious road injuries involved young people aged 15–24 years (National Health and Medical Research Council (NHMRC), 2009). Between 1993/94 and 2000/01 more than one-third of alcohol-related acute injury hospitalisations were for young people aged 15–29 years (Chikritzhs et al., 2003). Young drinkers have also been found to be particularly at risk of memory loss, violence, and unwanted sexual activity, as a result of alcohol use (Bonomo et al., 2001). This can be attributed to risk-taking behavioural norms associated with young people, as well as their inexperience in dealing with the effects of alcohol (National Health and Medical Research Council (NHMRC), 2009).

In 2011, 74% of Australian secondary school students aged between 12 and 17 years had tried alcohol at least once in their lives (White & Bariola, 2012). Adolescent alcohol use increases with age, with corresponding increases in risky behaviour. For example, while less than 1% of 12 year old students had consumed alcohol at levels that risked acute harm (defined as five or more drinks on one occasion) (National Health and Medical Research Council (NHMRC), 2009) at least once in the week before being surveyed, this figure rose to 18.5% by the age of 17 (White & Bariola, 2012). Although recent research has found that fewer young people are drinking alcohol (Australian Institute of Health and Welfare, 2011), the Victorian Youth Alcohol and Drug Survey found a steady increase in the number of young people consuming very high levels of alcohol (20 or more standard drinks in one session) (Social Research Centre, 2010). The study reported that 31% of 16–17 year olds, and 47% of 18–21 year olds consumed this much at least once in the past twelve months (Social Research Centre, 2010). In other words, more of those young people, who consume alcohol, are doing so at increasingly risky levels (Social Research Centre, 2010). This pattern highlights the need for prevention programmes that provide young people with strategies to minimise the risks associated with their drinking, including strategies to reduce heavy episodic consumption, where acute harmful consequences are most likely.

Schools have long been identified by government as an appropriate site for drug prevention interventions. This is because interventions here can be pre-emptive, wide ranging and cost effective (Caulkins, Pacula, Paddoc, & Chiesa, 2004; Midford, 2007; Ministerial Council on Drug Strategy, 2011). School-based drug education programmes as a whole, however, have not been demonstrably effective at reducing drug use, including the licit drugs, alcohol and tobacco, amongst young people (Foxcroft & Tsertsvadze, 2011; Midford, 2010). One possible explanation for this poor effectiveness is the emphasis given in many education programmes to outcomes based on abstinence rather than minimisation of harm (Vogl et al., 2009). Strengthening this argument in the case of alcohol use are the results of a systematic review of different types of prevention programmes, which found that the most common positive outcomes of the reviewed studies related to binge drinking and drunkenness (Foxcroft & Tsertsvadze, 2012). This suggests that relying solely on abstinence as a measure of success may lead to programs being dismissed as ineffective, whereas,

if assessed in terms of minimising harm, they would have been seen as beneficial.

A school drug education programme based on harm minimisation principles acknowledges that some young people use drugs, and focuses on alcohol as the drug that causes the greatest harm. A harm minimisation programme should aim to 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 reduction in risk and harm. Abstinence remains a prevention strategy within a harm minimisation approach, but it is not the measure of programme effectiveness (Lenton & Midford, 1996). The great advantage of a harm minimisation approach is that it provides for flexibility and relevance, allowing the curriculum to meet students at their individual level of experience and knowledge in relation to drug issues (Marlatt & Witkiewitz, 2010). At the same time, research indicates that teaching harm minimisation strategies does not increase up take amongst non-users (Hamilton, Cross, Resnicow, & Shaw, 2007; McBride, Farringdon, Midford, Meuleners, & Phillips, 2004).

In Australia, the Federal Government drug strategy supports drug education as a prevention measure and explicitly endorses a harm minimisation framework based on three pillars: demand reduction, supply reduction, harm reduction (Ministerial Council on Drug Strategy, 2011). Preventative drug education is also supported by the state governments, with Victoria, for example, requiring the provision of research-derived, harm minimisation approaches to drug education in secondary schools. Consequently, a well evaluated programme based on harm minimisation principles meets school requirements and aligns well with the state's Alcohol and Drug Strategy (Department of Health, 2012).

The Drug Education in Victorian Schools (DEVS) programme comprises 18 lessons, provided successively over two years to junior secondary school students. The intervention is grounded in social learning theory, but also draws on two other theoretical models, poststructuralist subjectivity and cognitive dissonance to understand how the self-concept of students, and hence their drug use can be influenced, and how the dissonance between competing conceptions of drug use can be used to reinforce ownership of responsible behaviour (Davies, 2006; Festinger, 1957; McAlister, Perry, & Parcel, 2008). Greater detail as to the conceptual underpinnings of the programme is provided in the study protocol (Midford, Cahill, Foxcroft, et al., 2012). The programme focuses primarily on alcohol, but includes discussion of other drugs. It also considers the role of alcohol in interconnecting health issues, such as mental health, violence, anti-social behaviour and sexual vulnerability. Comprehensive drug programmes are considered to be useful in tackling interrelated issues leading to risk behaviours (Stead & Stradling, 2010). An integrated approach is both economical and reinforcing in that learned skills are readily transferable to a range of situations. For example, decision-making, problem-solving and help-seeking skills are crucial across all health domains. The contrary argument is that each drug requires a slightly different focus, and that a programme dealing with multiple substances may lead to a confused or unclear message (Werch et al., 2005). The weight of evidence, however, counters this concern. A review of the literature found that alcohol-specific programmes were no more effective than comprehensive programmes that included alcohol amongst other drugs (Tobler et al., 2000). More recently, a systematic review found that comprehensive programmes were more effective in the long term, and concluded that the evidence supports generic programmes over those with an alcohol-specific focus (Foxcroft & Tsertsvadze, 2011).

This research builds on the findings of the DEVS pilot study, which produced promising results in relation to student alcohol use. Using an earlier version of the drug education curriculum taught in the current study, the pilot study results showed that

while the number of students who tried alcohol did not change, intervention students consumed less alcohol and experienced fewer harms associated with their drinking than the control students (Midford, Cahill, Ramsden, et al., 2012). The current study draws on a larger and more representative sample of Victorian schools in terms of student numbers, geographical location and socioeconomic status in order to generate findings that can be generalised more widely. This paper reports findings only in relation to alcohol prevention from the first year of the study, when the students were in year eight, aged 13–14 years.

Aim

The aim of this research is to evaluate the effectiveness, in terms of alcohol harm prevention, of a comprehensive, harm minimisation focused drug education intervention for junior secondary school students nine months after implementation. Students in the intervention group received harm minimisation education, taught by teachers who had received two days of preparatory professional training. Students in the control group received the drug education normally provided by their school. The study measured the difference between these two groups in the following intermediate change factors: alcohol and other drug (AOD) knowledge, communication with parents, lessons remembered about alcohol, and alcohol attitudes, in addition to use and harm outcomes. The specific prevention outcome hypotheses, based on findings from the pilot study (Midford, Cahill, Ramsden, et al., 2012), are that intervention students will:

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

Methodology

The research methodology for this study has been described in detail in the study protocol (Midford, Cahill, Foxcroft, et al., 2012). 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.

Design

This research is part of a longitudinal efficacy study that follows a cohort of students from the start of year eight in 2010 (average age age 13 years) to the end of year ten in 2012 (average age 16 years). The first ten lesson phase of the drug education intervention occurred during 2010, with a further eight lessons provided in 2011. These lessons were provided to the intervention students instead of their usual drug education. The control students received their usual drug education. This was a non standard curriculum that varied from school to school. In 2012, all schools continued with their usual year ten drug education program. This paper focuses on changes between the Baseline testing in March/April 2010 and Post1 testing in November/December 2010.

The two year drug education intervention was developed from material trialled in the pilot programme (Midford, Cahill, Ramsden, et al., 2012). This in turn drew on a range of earlier Australian research projects in drug education and the development of resilience (Cahill, Stafford, & Shaw, 2000; McBride et al., 2004; McLeod, 1997). The ten lessons provided in the first year of the intervention are described in Table 1. These emphasised alcohol, but also covered tobacco and cannabis, as well as issues common to

Table 1
Year eight lesson plans.

Lesson	Year 8
1	WHAT IS A DRUG? – Introduction, agreements, definitions and drug categories
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
3	PARTY BEHAVIOURS AND ALCOHOL – The relationship between levels of alcohol use and the risk of harm to self and others
4	PREVALENCE AND NORMS – Dispelling myths about levels of drug use amongst young people, identifying reasons for use/non -use
5	TOBACCO – Considering gender differences in relation to smoking; the impact of media messages
6	CANNABIS – Information about cannabis and its effects, identifying risks associated with Cannabis use
7	RISK REDUCTION – Assessing risk and developing strategies to avoid or minimise harm
8	INFLUENCES – Identifying social and media influences to use alcohol
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

all drug use. In addition, students were given home tasks, designed to be undertaken with their parents (Midford, Cahill, Foxcroft, et al., 2012; Midford, Cahill, Ramsden, et al., 2012). The teachers delivering the classroom programme participated in an intensive two day professional learning process, incorporating a summary of the evidence-base informing the programme and active sampling of each of the lesson activities in the programme. Emphasis was given to modelling and explicit leadership coaching of the participatory, skill development methods used in the lessons. The importance of adhering to the specified lesson plans was explained in terms of delivering a standard intervention for research purposes.

The paper-based, self report survey instrument used to measure change was trialled in the pilot research that preceded this study (Midford, Cahill, Ramsden, et al., 2012). It gathers information on knowledge, communication with parents, exposure to drug education, patterns and context of use, attitudes and risks or harms experienced. Self-report is well accepted practice in studies of this type, and research indicates little inconsistency between self report and other measures of drug use (Lintonen, Ahlstrom, & Metso, 2004; Morgan, 1997). A student generated code, based on easily remembered fragments of personal information, was used to maintain confidentiality, while allowing matching of individuals over the course of the study. The survey was administered by personnel external to the host schools.

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-β error probability = 0.95 (Faul, Erdfelder, Buchner, & Lang, 2009). Assuming simple 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 to test the
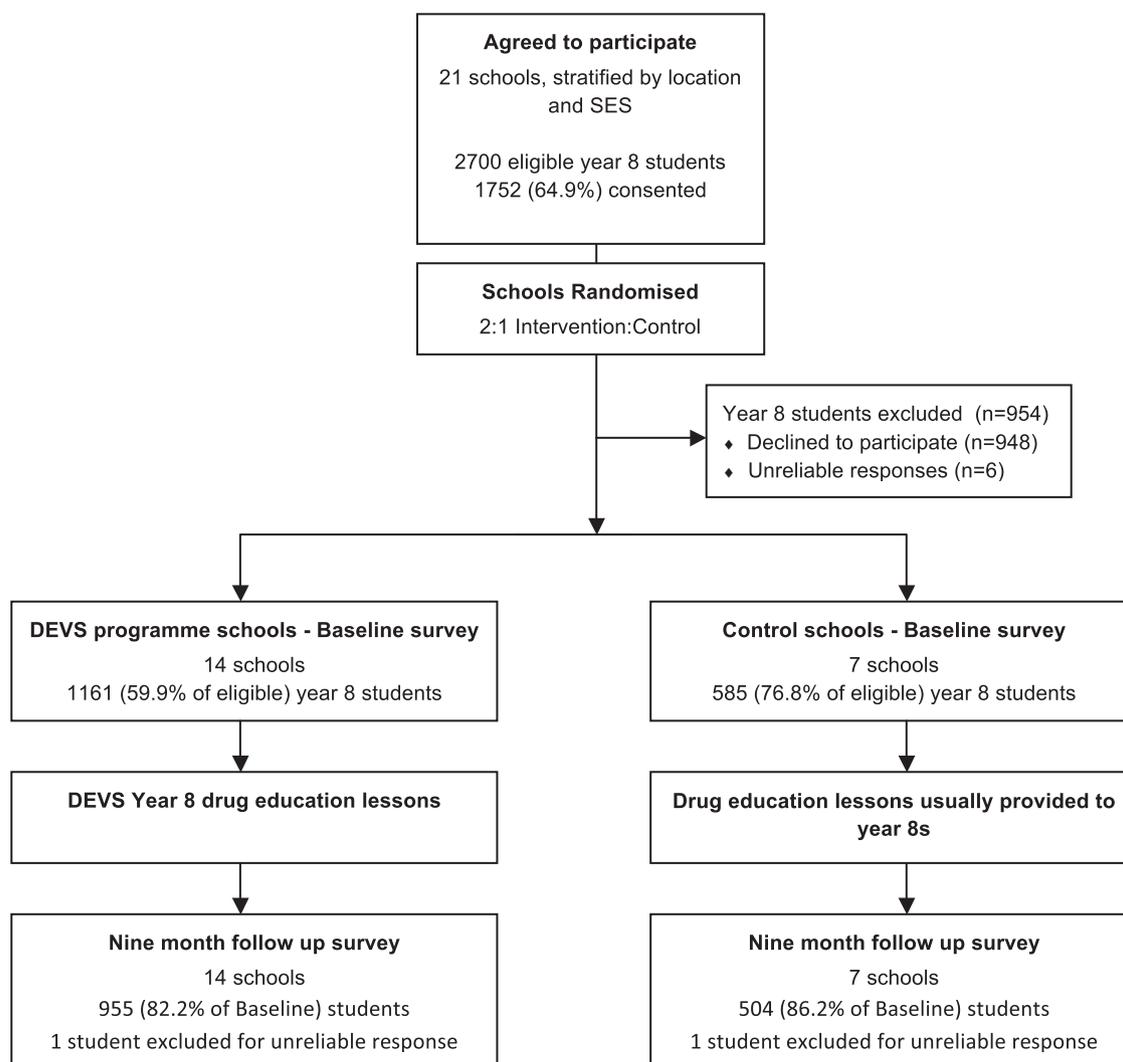
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┌─────────────────────────────────────────┐
│           Agreed to participate         │
│     21 schools, stratified by location  │
│                 and SES                 │
│                                         │
│     2700 eligible year 8 students       │
│       1752 (64.9%) consented            │
└─────────────────────────────────────────┘
                    │
┌─────────────────────────────────────────┐
│           Schools Randomised            │
│       2:1 Intervention:Control          │
└─────────────────────────────────────────┘
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Year 8 students excluded (n=954)
♦ Declined to participate (n=948)
♦ Unreliable responses (n=6)

DEVS programme schools - Baseline survey
14 schools
1161 (59.9% of eligible) year 8 students

Control schools - Baseline survey
7 schools
585 (76.8% of eligible) year 8 students

DEVS Year 8 drug education lessons

Drug education lessons usually provided to year 8s

Nine month follow up survey
14 schools
955 (82.2% of Baseline) students
1 student excluded for unreliable response

Nine month follow up survey
7 schools
504 (86.2% of Baseline) students
1 student excluded for unreliable response

Fig. 1. Flow chart illustrating the recruitment and participation of schools and Year 8 students.

effectiveness of the intervention (Faul et al., 2009; McBride et al., 2004).

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 socio-economic (SES) strata to approximate the proportion of Victorian secondary schools in each category. SES allocation was made using the Department of Education and Early Childhood Development's (DEECD) 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, while a similarly folded piece of paper, designating the research condition was drawn out of another container (Midford, Cahill, Foxcroft, 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. All students in the 14 intervention schools received the DEVS programme, as this had been approved by DEECD. Students in the seven control schools received the drug education usually provided by their schools.

Written active consent to participate in the research 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 by intervention students and 585 by control students. 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 selected maximum possible values. At Post1 similar proportions of usable surveys were returned by intervention ($n = 955$, 82.2% of Baseline returns) and control students 504 ($n = 504$, 86.2% of Baseline returns). Two Post1 surveys were excluded for the same reasons as at Baseline. A flow diagram illustrating the number of schools and students in each study group over time is presented in Fig. 1.

Measures of change

Knowledge. The knowledge index represented the number of correct answers to 38 knowledge questions on alcohol, smoking and other drugs. These were drawn from topics in the intervention curriculum. The internal consistency of the index was measured during the pilot phase, using the Cronbach's alpha test ($\alpha = .859$, $p < 0.001$) (Midford, Cahill, Ramsden, 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 were based on 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, Cahill, Ramsden, 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.

Lessons. Students were asked to recall the number of lessons concerning alcohol they had received at school over the past year. The question was phrased in the same manner as that asked as part of the 2011, and previous, national surveys of secondary school students' use of alcohol to enable comparison (White & Bariola, 2012). Response choices were: not even part of a lesson; part of a lesson; one lesson; and more than one lesson.

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. Drinking in a manner that risks acute harm was measured by the proportion of 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, Cahill, Ramsden, et al., 2012).

Statistical analysis

Analyses were conducted using STATA v12 and SPSS v19. Data was analysed as intent-to-treat, with complete-case analysis complemented with multiple imputation analysis in STATA to account for missing data. Multi-level regression models were fitted with Post1 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. The alcohol consumption, attitudes and harms indices were log-transformed. An ordinal logistic regression model was used to determine differences between groups in the number of alcohol lessons recalled. 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. For those who engaged in risky drinking at Baseline, a linear regression model was used to determine differences

Table 2
Demographics of the student sample.

	Intervention $n = 1161$ (% = 66.5)	Control $n = 585$ (% = 33.5)	Total $n = 1746$
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)

[**] $p < 0.01$.

between intervention and control groups in alcohol consumption at Post1.

Results

A total of 21 schools were involved in the study, with a total of 1746 students (1161 from intervention schools, 585 from control schools) (Table 2). Overall, 54% of students were female, with control schools having a significantly higher proportion of females than males ($\chi^2 = 32.919$, $p < 0.001$). 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 ($\chi^2 = 7.964$, $p = 0.005$). 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 ($\chi^2 = 100.263$, $p < 0.001$). 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 schools occurred despite stratification because of different student participation rates in different schools.

Knowledge

The knowledge index score increased from Baseline to Post1 for both the intervention and control students, with an average increase of 19.2% (4 correct answers) for intervention students and 7.6% (1.6 correct answers) for control students (Table 3 and Fig. 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 Post1, compared to students in the control group ($p < 0.001$) (Table 4).
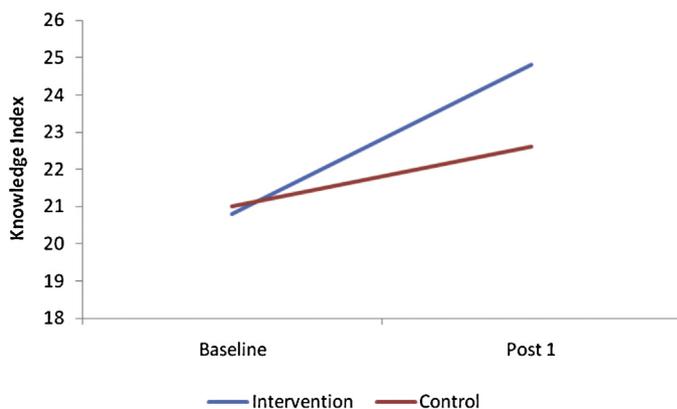

Fig. 2. Mean knowledge index score for intervention and control groups at Baseline and Post1.

Table 3
Descriptive statistics by time and group.

	Baseline		Post1	
	Intervention % (95%CI)	Control % (95%CI)	Intervention % (95%CI)	Control % (95%CI)
Lessons at school				
None	20.9 (18.7–23.3)	30.5 (26.9–34.4)	6.8 (5.4–8.6)	17.1 (14.1–20.7)
Part of a lesson	28.5 (26.0–31.2)	31.7 (28.1–35.6)	13.8 (11.8–16.2)	22.5 (19.1–26.4)
One lesson	22.5 (20.2–25.0)	13.7 (11.2–16.8)	14.7 (12.6–17.0)	17.1 (14.1–20.7)
More than one lesson	28.1 (25.6–30.7)	24.0 (20.7–27.6)	64.7 (61.6–67.7)	43.2 (39.0–47.6)
Drank a full standard drink	23.4 (21.4–25.4)	22.7 (20.7–24.7)	28.0 (25.9–30.1)	29.8 (27.7–32.0)
Risky drinking	18.8 (17.0–20.6)	18.8 (17.0–20.6)	17.6 (15.8–19.4)	21.7 (19.8–23.6)
	Mean (Std dev)	Mean (Std dev)	Mean (Std dev)	Mean (Std dev)
Knowledge index	20.8 (5.4)	21.0 (5.3)	24.8 (5.6)	22.6 (5.3)
Attitude scale	18.6 (3.7)	18.6 (3.7)	20 (3.3)	19.9 (3.1)
Talked to parents	2.1 (3.1)	2.1 (2.9)	2.3 (2.9)	2.1 (2.7)
Alcohol consumption	30.5 (98.4)	21.1 (55.0)	40.1 (101.5)	68.1 (161.1)
Consumption by risky drinkers	131.0 (196.5)	78.7 (103.2)	116.3 (156.5)	161.8 (219.2)
Alcohol harms	4.0 (7.6)	3.9 (7.2)	4.3 (9.0)	7.3 (12.3)

Table 4
Multi-level linear regression models.[a]

Post1	β	SE	95% confidence interval	p value
Knowledge index ($n = 1746$)	2.70	0.56	(1.61, 3.80)	<0.001[**]
Alcohol attitude Scale ($n = 1737$)	−0.01	0.01	(−0.02, 0.02)	0.966
Talk to parents ($n = 1737$)	0.37	0.19	(0.02, 0.77)	0.037[*]
Alcohol consumption ($n = 279$)[b]	−0.52	0.21	(−0.93, −0.12)	0.011[*]
Alcohol harms ($n = 274$)[b]	−4.01	1.06	(−6.10, −1.93)	<0.001[**]
Alcohol consumption for risky drinkers ($n = 49$)[c]	−65.46	52.21	(−167.80, 36.89)	0.210

[a] Models have taken into account Baseline variable, gender, SES and region.
[b] Drinkers at Baseline.
[c] Risky drinkers at Baseline.
[*] $p < 0.05$.
[**] $p < 0.01$.

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 Post1, attitude scores increased by 7.4% for intervention students and 7.3% for control students, with intervention students scoring 20 and control students scoring 19.9. 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 Post1 ($p = 0.966$) (Table 4).

Communication with parents

The average number of times intervention students talked to their parents about alcohol increased from Baseline to Post1 by 9.5%, from 2.1 to 2.3 occasions, compared to a decrease of 2.3% for control students, from just over 2.1 to just under 2.1 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 change by intervention students in talking with their parents differed significantly to that of the controls ($p = 0.037$) (Table 4).

Alcohol lessons remembered

The proportion of intervention students who recalled receiving more than one lesson on alcohol increased from 28.1% at Baseline to 64.7% at Post1, compared to an increase from 24 to 43.2% of control students (Table 3). By way of comparison, the 2011 national student survey found that 56.5% of 14 year olds remembered receiving more than one lesson about alcohol in the previous year (White &

Bariola, 2012). After taking into account recall of alcohol lessons at Baseline, gender, SES category and region, intervention students recalled receiving significantly more alcohol education than control students ($p < 0.001$) (Table 5).

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 28% at Post1, compared to an increase from 22.7 to 29.8% 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 ($p = 0.995$) (Table 6).

Alcohol consumption

Alcohol consumption increased for both intervention and control student drinkers, with a 31% increase from Baseline to Post1 for intervention students (mean Baseline = 30.5, mean Post1 = 40.1) and a 223% increase for control students (mean Baseline = 21.1,

Table 5
Multi-level ordinal regression models.[a]

Post1	β	SE	95% confidence interval	p value
School lessons ($n = 1741$)	0.98	0.11	(0.76, 1.19)	<0.001[**]

[a] Model has taken into account Baseline variable, gender and region.
[*]$p < 0.05$.
[**]$p < 0.01$.

Table 6
Multi-level logistic regression models.[a]

Post1	OR	SE	95% confidence interval	p value
Drank full standard drink (n = 1746)	1.00	0.25	(0.61, 1.62)	0.995
Drank in a risky manner (n = 279)[b]	0.57	0.20	(0.29, 1.13)	0.107

[a] Models have taken into account Baseline variable, gender, SES and region.
[b] Risky drinkers at Baseline.
*p < 0.05.
**p < 0.01.

mean Post1 = 68.1) (Table 3 and Fig. 3). After taking into account Baseline consumption, gender, SES category and region, consumption by intervention students increased significantly less at Post1, compared to control students (p = 0.011) (Table 4).

Proportion of risky drinkers

The proportion of intervention student drinkers who usually drank in a manner that risks acute harm decreased from 18.8% at Baseline to 17.6% at Post1, compared to an increase from 18.8 to 21.7% of control students (Table 3). After taking into account the proportion of student risky drinkers at Baseline, gender, SES category and region, there was no significant change between groups in the proportions of risky drinkers from Baseline to Post1 (p = 0.107) (Table 6).

Consumption by risky drinkers

At Baseline, intervention students who usually drank in a manner that risks acute harm decreased their consumption by 11.2% (mean Baseline = 131, mean Post1 = 116.3), compared to control students who increased their consumption by 105.3% (mean Baseline = 78.7, mean Post1 = 161.8). After taking into account gender, SES category and region, there was no significant difference between the two risky drinking groups with respect to the change in alcohol consumption between Baseline and Post1 (p = 0.210) (Table 4).

Alcohol harms

Alcohol harms experienced by student drinkers during the previous 12 months increased by 7.5% from Baseline to Post1 (mean Baseline = 4.0, mean Post1 = 4.3) for intervention students and by 87.2% (mean Baseline = 3.9, mean Post1 = 7.3) for control students (Table 3 and Fig. 4). After taking into account the number of alcohol harms experienced at Baseline, gender, SES category and region,
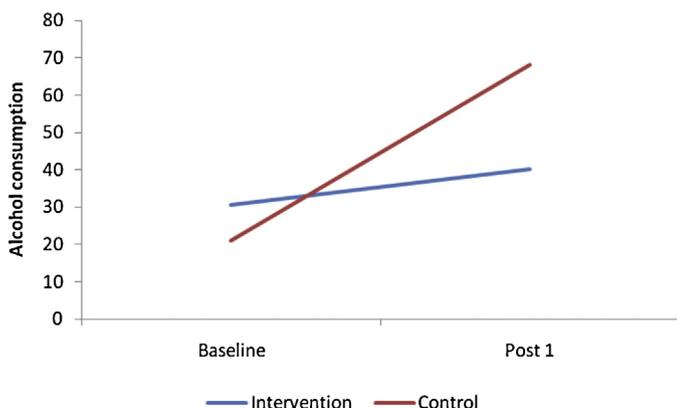
Fig. 3. Mean number of standard drinks consumed by intervention and control groups over a 12 month period at Baseline and Post1.
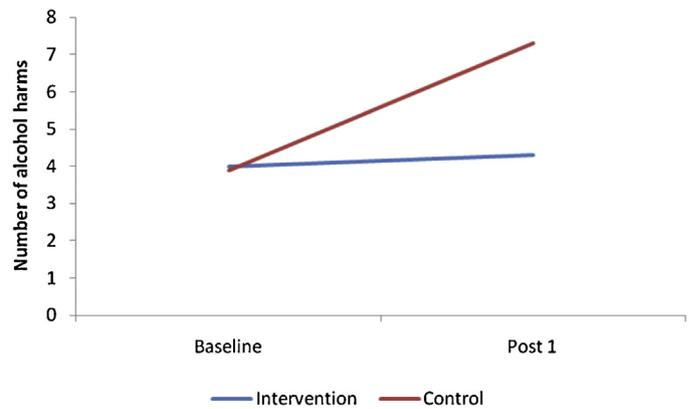
Fig. 4. Mean number of alcohol harms experienced by intervention and control groups over a 12 month period at Baseline and Post1.

the increase in harms experienced by intervention students was significantly less at Post1, compared to control students (p < 0.001) (Table 6).

Discussion

A harm minimisation approach to school drug education has received support from a number of researchers (McBride et al., 2004; Midford, 2010; Newton, Teesson, Vogl, & Andrews, 2010), who argue that traditional abstinence messages are ineffective, particularly in relation to alcohol, where adult use is so normative. Findings from the pilot study, preceding this research, found a classroom based harm minimisation programme that addressed all drug use, both licit (alcohol and tobacco) and illicit (cannabis and other drugs) was successful in reducing alcohol consumption and harm (Midford, Cahill, Foxcroft, et al., 2012; Midford, Cahill, Ramsden, et al., 2012).

These are early findings from the first year of the present study. Only half of the education intervention was delivered, but this included most of the alcohol related material. The findings are very similar to those of the pilot, and can be considered more representative, in that the study sample is larger and better matched socio-demographically to the Victorian government secondary school student population. Intervention students were more knowledgeable about alcohol and other drug use issues after receiving the education programme. This is an important intermediate change. However, Foxcroft, Ireland, Lister-Sharp, Lowe, and Breen (2003) indicated that a change in knowledge is not necessarily accompanied by a corresponding change in attitudes, and this is borne out in the present study. The intervention and control students already held very responsible attitudes at Baseline, allowing little room for improvement. It is not surprising then that the education programme did not engender more responsible attitudes towards alcohol. Given that consumption and harm increased among the control students it is evident that responsible attitudes towards alcohol are not an important determinant of actual drinking decisions. This has implications for the design of future drug education programmes, in that putting effort into engendering positive attitudes is not likely to be sufficient in terms of practical prevention benefit.

The programme was successful in bringing about change in two factors likely to influence student drinking decisions. The intervention students talked more to their parents about alcohol, which is considered an indirectly beneficial outcome due to young people consistently identifying their parents as having the greatest influence on their decisions about drinking (Miller-Day, 2008). In addition, the intervention students remembered receiving more alcohol education than the controls. They also remembered

receiving more than similarly aged students in the 2011 national survey of secondary school students (White & Bariola, 2012). The favourable control group comparison is reassuring, and this advantage is made more compelling by the similarly favourable national comparison. Most Australian schools have considerable autonomy in selecting their drug education programmes, and there is much variation in what is taught. The national comparison suggests that this programme provided better coverage of alcohol issues than the average programme currently provided in Australian schools.

The programme was successful in influencing intervention students who drank, to moderate their consumption. However, it did not persuade those student drinkers who usually drank in a manner that risks acute harm (5 or more drinks on a single occasion) to reduce their consumption to low risk levels (4 or less drinks on a single occasion). While the proportions of risky drinkers in the intervention and control groups remained much the same over time, there was a large increase (105.3%) in consumption by control group risky drinkers compared to a decrease (11.2%) by intervention group risky drinkers. This between group difference in risky drinker consumption was not significant because of the small numbers and considerable variation between individuals, but it does suggest that harm minimisation education may be particularly effective in reducing the level of high risk consumption. This trend is worthy of further investigation in future research.

The programme was effective in terms of its stated aim of reducing harm, in that alcohol related harms experienced by intervention students increased by a modest 7.2%, whereas the increase for control students was 87.2%. This is a practical, immediate prevention benefit. The programme did not aim to prevent students from taking up drinking and proved to be no more effective than the drug education normally provided in schools in persuading students to remain abstinent. Obversely, the program did not increase the uptake of drinking. This is an important point, as advocates of abstinence strategies express concern that harm minimisation can be interpreted as condoning drug, including alcohol, use and that this in turn lowers the barrier to initiation of use (World Health Organization, 1993). The findings from this study indicate that minimising harm did not involve trading off increased uptake.

A notable restriction in this study was the requirement to obtain active consent from participating students and their parents. This is ethically sound, but it meant that 35.3% of eligible students were not included in the study. This means some caution has to be exercised as to the generalisability of findings, although there was no systematic bias in terms of student involvement. Acceptance rates varied on a school by school basis and reports from the project officer liaising with schools indicated that participation rates were more a function of the procedures and resources each school employed to get consent forms returned than willingness as to student participation. In future, researchers will need to do more preparatory work with the participating schools to develop a process that optimises active consent so as to improve the representativeness of the study sample and the generalisability of findings.

This study provides further support for a harm minimisation approach to school drug education that teaches about all drug issues in an integrated fashion (Midford, Cahill, Foxcroft, et al., 2012; Midford, Cahill, Ramsden, et al., 2012; Stead & Stradling, 2010). The lessons provided to the year eight students achieved practical alcohol prevention benefits by teaching a range of strategies to minimise harm, including abstinence, rather than focusing on abstinence as the sole goal. This has a number of implications for school drug education programmes, and prevention strategy more broadly. Young people are particularly vulnerable to acute harm from alcohol and other drug use, and an effective school based harm minimisation programme offers the opportunity for immediate and mass benefit. Given that all Australian jurisdictions provide some form of school drug education, there is likely

to be incremental prevention benefit, if harm minimisation programmes, with demonstrated effect, are preferentially selected, and supported with specific professional development for teachers. There is likely to be further benefit from an approach that covers all drugs in the one integrated programme. A single programme can be more readily accommodated within an already crowded school curriculum and would act to reinforce skills relevant across a range of drug scenarios. While this paper has reported changes on measures of alcohol consumption and harm, further reporting of findings in relation to smoking and illicit drug use is planned. The Australian policy environment endorses a broad harm minimisation approach to drug use and this research explores what can be achieved by taking such an approach in school drug education.

Conflict of interest statement

We wish to confirm that there are no known conflicts of interest.

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