

Harm minimization in school drug education: final results of the School Health and Alcohol Harm Reduction Project (SHAHRP)

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ABSTRACT

Aims The School Health and Alcohol Harm Reduction Project (SHAHRP study) aimed to reduce alcohol-related harm in secondary school students.

Design The study used a quasi-experimental research design in which randomly selected and allocated intervention and comparison groups were assessed at eight, 20 and 32 months after baseline.

Setting Metropolitan, government secondary schools in Perth, Western Australia.

Participants The sample involved over 2300 students. The retention rate was 75.9% over 32 months.

Intervention The evidence-based intervention, a curriculum programme with an explicit harm minimization goal, was conducted in two phases over a 2-year period.

Measures Knowledge, attitude, total alcohol consumption, risky consumption, context of use, harm associated with own use and harm associated with other people's use of alcohol.

Findings There were significant knowledge, attitude and behavioural effects early in the study, some of which were maintained for the duration of the study. The intervention group had significantly greater knowledge during the programme phases, and significantly safer alcohol-related attitudes to final follow-up, but both scores were converging by 32 months. Intervention students were significantly more likely to be non-drinkers or supervised drinkers than were comparison students. During the first and second programme phases, intervention students consumed 31.4% and 31.7% less alcohol. Differences were converging 17 months after programme delivery. Intervention students were 25.7%, 33.8% and 4.2% less likely to drink to risky levels from first follow-up onwards. The intervention reduced the harm that young people reported associated with their own use of alcohol, with intervention students experiencing 32.7%, 16.7% and 22.9% less harm from first follow-up onwards. There was no impact on the harm that students reported from other people's use of alcohol.

Conclusions The results of this study support the use of harm reduction goals and classroom approaches in school drug education.

KEYWORDS Behavioural impact, harm reduction, research, school alcohol education.

INTRODUCTION

Over 70% of Australians between the ages of 14 and 19 years consume alcohol, and young Australians are more likely to drink to unsafe levels than any other age group (Higgins, Cooper-Stanbury & Williams 2000). Between 66 and 83% of young people consume alcohol to adult-defined levels of hazardous or harmful consumption over a relatively short period of time (Shanahan & Hewitt 1999; Higgins *et al.* 2000). Among young Australians, the age of first alcohol use is steadily declining and the prevalence of use is steadily increasing (Commonwealth Department of Health and Family Services 1996; Australian Institute for Health and Welfare 1999; Higgins *et al.* 2000; Degenhardt, Lynskey & Hall 2000). Young females, who in the past reported lower alcohol consumption than young males, are now drinking to male levels (McCallum 1998; Australian Institute for Health and Welfare 1999; Shanahan & Hewitt 1999; Higgins *et al.* 2000). These changes in age at first use, prevalence and mode of consumption act to increase the risk of alcohol-related problems among young Australians.

Young people have relatively little experience in alcohol use and lower tolerance to the effects of alcohol than experienced drinkers (Room 1998; Lang *et al.* 1996). Young people have less experience, knowledge and skill in minimizing alcohol-related harms (Saunders & Baily 1993; Australian Drug Foundation 1994). More years of life, quality of life and productivity are lost from acute alcohol-related harm in young people than are lost from chronic diseases caused by alcohol use in older consumers (World Health Organization 1999; Chikritzhs *et al.* 2001). Alcohol is linked to the three leading causes of death among young people world-wide: unintentional injuries, homicide and suicide (Chassin & DeLucia 1996; Hillman *et al.* 2000; Zubrick *et al.* 2000).

School programmes have played an important role in community responses to alcohol use by young people (United States Department of Health and Human Services and Public Health Service 1990; Australian Department of Health Housing and Community Services 1993; World Health Organization 1997). The goal of the majority of school drug and alcohol programmes has been solely to encourage young people not to use alcohol and to delay initial use (Sharp 1994; Paglia & Room 1998; White & Pitts 1997), often by teaching social resistance skills.

Two programmes commonly cited noting the success of this approach are Project Northlands (Perry *et al.* 1996; Williams & Perry 1998; Williams *et al.* 1999) and the Midwestern Prevention Project (Pentz *et al.* 1989; Chou *et al.* 1998). Both programmes provided extensive intervention over a number of years, much of it outside

the classroom. The Northlands programme resulted in intervention students reporting less alcohol use in the past week and the past month. Three years of comprehensive intervention was required to produce this change (Perry *et al.* 1996; Williams & Perry 1998; Williams *et al.* 1999). In addition, the programme had no significant effect on those who were already drinking at baseline, suggesting that an alternative approach is required for those students who are already drinking alcohol and therefore at greatest risk of alcohol-related harm (Perry *et al.* 1996).

In the Midwestern Study initial changes in alcohol use by students occurred during the first 18 months of the programme, with a 5% difference in consumption (Pentz *et al.* 1989; Chou *et al.* 1998). Although often referenced in the literature, the methodological problems of non-random assignment to study groups and the different socio-economic, ethnic composition and grade levels of the study groups associated with this study should be noted (Paglia & Room 1998).

Both these programmes required extensive funding and professional outsider involvement (Pentz *et al.* 1989; Williams *et al.* 1999) which schools would be unlikely to match. Several classroom-only programmes have also reduced consumption (Horan & Williams 1982; Gilchrist *et al.* 1987; Hansen *et al.* 1988; Schinke *et al.* 1988; Dielman *et al.* 1989; Botvin *et al.* 1990; Ellickson & Bell 1990; Botvin *et al.* 1995; Dijkstra *et al.* 1999; Shope *et al.* 2001) by up to 35.7% in students who received the programme (Gilchrist *et al.* 1987). Classroom approaches can be more easily implemented by school staff.

More recent studies have used fewer classroom sessions, ranging from four to five initial sessions (Maggs & Schulenberg 1998; Dijkstra *et al.* 1999; Williams *et al.* 1999; Shope *et al.* 2001), followed by three to eight booster sessions (Maggs & Schulenberg 1998; Williams *et al.* 1999; Shope *et al.* 2001). A third booster phase would be appropriate if there was a rise in the prevalence of alcohol use and/or a change in the context of use (Shope *et al.* 2001; Maggs & Schulenberg 1998; Williams *et al.* 1999). All these classroom programmes adopted a similar goal (non-use/delayed use) and method (social resistance skills) to the more comprehensive programmes.

The Alcohol Misuse Prevention Programme is a classroom programme of particular note because in addition to measuring consumption it also measured some harms (Shope *et al.* 1992; Maggs & Schulenberg 1998). This abstinence-based programme reduced alcohol-related harm by 11% three years after baseline in unsupervised drinkers (Maggs & Schulenberg 1998).

The effectiveness of school-based programmes with an implicit or explicit harm minimization goal have rarely been evaluated in the United Kingdom, Canada or Aus-

tralia, countries that are open to such a goal (McLeod 1997; Midford & McBride 1997; White & Pitts 1997; Paglia & Room 1998). The adoption of a harm minimization goal, which maintains non-use and delayed use as strategies within the overall goal, may be an important component in drug education, particularly alcohol education.

This paper evaluates the School Alcohol Harm Reduction Programme (SHAHRP), an intervention with an explicit goal of harm minimization that aimed to reduce the harm that young people experience from their own, and from other people's use of alcohol.

METHODOLOGY

Aims

The SHAHRP intervention aimed to reduce alcohol-related harm in secondary school students. The study proposed that there would be less alcohol-related harm reported by students who participated in the SHAHRP intervention than students who did not participate.

Design

The study was a longitudinal efficacy study with a quasi-experimental, intervention research design (Fig. 1). The study followed individual students exposed to the alcohol intervention (SHAHRP) over a 32-month period from baseline, with earlier follow-ups at 8 and 20 months. Each assessment measured: knowledge about alcohol; attitudes towards alcohol; total consumption, risky patterns of consumption, context of alcohol use, alcohol-related harms/risks associated with the student's own use of alcohol and alcohol-related harm/risks associated with other people's use of alcohol.

Sample

The study sample was selected randomly, controlling for the design effects of clustering and attrition, and stratified by socio-economic area. The 14 schools involved in the study represented approximately 23% of government secondary schools in the Perth metropolitan area (Educa-

tion Department of Western Australia 1998). Schools were allocated randomly to intervention and comparison conditions but there was differential acceptance, with one school assigned to the intervention condition preferring to participate as a comparison school. A sensitivity analysis indicated a small (0.3–1.5%), non-significant difference in outcomes between an analysis that did and did not include students from this school, so it was retained in the dataset and random allocation was assumed.

Power calculations suggested that a minimum of 800 subjects were needed to provide statistical power greater than 0.9 to detect an effect size of 0.15 (based on previous studies) with a coefficient variation of 25%, assuming simple random sampling (SOHO 1992). A larger sample size of 2343 cases (baseline: intervention students $n = 1111$, comparison group students $n = 1232$) took account of the design effect created by cluster sampling (design effect = 1.48; minimum sample required = 1184) (Bauman & Phongsavan 1999) and also allowed for an attrition rate of 15% per year as indicated in previous studies.

Exclusion

Completed surveys were assessed by two members of the research team (McBride, Farrington & Midford 2000) and the following number were excluded from data entry: 14 surveys (0.6%) at baseline; 45 surveys (2%) at first follow-up; 49 surveys (2.2%) at second follow-up; and 44 surveys (2.1%) at final follow-up. Similar numbers of intervention and comparison students were excluded (McBride 2002). The reasons for exclusion were: distinct patterns of answers; conflict between answers from several sections; and unsolicited comments linked to the first two exclusion criteria.

Attrition

Attrition occurred when students who completed surveys at baseline were not linked with a survey at any subsequent follow-up period. Students who completed only baseline and first follow-up surveys were also included within the attrition group because they did not have the

Date	2/97 Baseline	5/97 8/97	10/97 8 months	5/98	10/98 20 months	10/99 32 months
Age, grade	13 years Year 8	13 years Year 8	13 years Year 8	14 years Year 9	14 years Year 9	15 years Year 10
Intervention	O ^B	X ¹	O ¹ 2-5 months	X ²	O ² 14-17 months	O ^F 26-29 months
Control	O ^B		O ¹	X	O ²	O ^F
Key	O: Observation (survey) X: SHAHRP alcohol intervention X: regular alcohol education					

Figure 1 Overview of study design

opportunity to complete both phases of the alcohol intervention. There was no significant difference in the number of intervention and control students lost to follow-up during any phase of the study. Similarly, there was no significant difference in the demographics or study group numbers between students who dropped out and students who were retained in the study. Students who were lost to the study (attrition group) showed riskier outcomes on five of the six measures than students who were retained (McBride 2002). Previous studies have found that absenteeism from school is associated with riskier drug-related behaviours (Hansen *et al.* 1988; Johnson *et al.* 1990). There were no significant baseline differences between intervention and comparison students who dropped out of the SHAHRP study on any of the overall measures. Similarly, there were no significant differences in demographics between these groups.

Attrition over the 32-month period was 24.1%, which is consistent with other longitudinal studies (Duncan, Duncan & Hops 1998). The attrition group was made up of students who: left the study school; remained enrolled at the school but did not attend on the day of the survey; failed to maintain the same unique identification code; or who were excluded.

Intervention

The evidence-based, alcohol harm minimization classroom intervention was conducted in two phases over a 2-year period. The initial phase was implemented during the first year of secondary school when the majority of students were 13 years of age. It consisted of 17 skill-based activities conducted over eight to ten lessons (depending on lesson length of either 40 or 60 minutes). Phase 2 was conducted in the following year when the students were 14 years of age. It consisted of 12 activities delivered over 5–7 weeks. The programme activities incorporated various strategies for interactive dissemination including delivery of utility information; skill rehearsal; individual and small group decision making; and discussions based on scenarios suggested by students, with an emphasis on identifying alcohol-related harm and strategies to reduce harm. Interactive involvement was emphasized, with 64% of activities being primarily interactive and 15.4% requiring some interaction between students. Research evidence was integral in designing the SHAHRP alcohol curriculum (see McBride *et al.* 2000).

The SHAHRP alcohol programme included the following training and resources.

Teacher training

Teacher training was conducted prior to each phase of the alcohol intervention. During phase 1, teachers were

involved in two days of training which provided an overview of the study, research evidence components, guidance and expectations about fidelity of implementation and interactive modelling of each phase 1 activity. Phase 2 training was conducted over 2 days for teachers new to the study. These teachers were briefed on the research aspects of the study and phase 1 intervention activities during the first day of training. On day 2, all teachers who taught phase 2 of the alcohol intervention participated in interactive modelling of phase 2 activities and received guidance related to measures of fidelity of implementation for phase 2.

Teacher manual

The teacher manual provided specific written guidance for teachers of the intervention. It included detailed and structured lesson plans for eight 60-minute lessons in the first phase and seven 50-minute lessons for the second phase of the intervention. Sample questions to help facilitate discussion and debriefing of activities, coaching points to aid in the management of the activities, and background information about alcohol-related issues were included in each lesson plan. Additional coaching points included in the teacher manual were based on feedback from teachers involved with the pilot phase of the intervention.

Student workbooks

Two student workbooks were developed for each phase of the alcohol intervention to stimulate and engage student's interest, provide information, encourage students to explore issues and to record what they had learned as a way of consolidating practical activities.

Trigger video

The 'Lets Look At' trigger video from the Rethinking Drinking resource (Youth Research Centre 1995) was used in phase 2. The video featured scenarios that young people may experience in alcohol use situations to prompt discussion about how to minimize the harms associated with alcohol use.

The costs of the alcohol intervention was AU\$23.55 per student over two years. This cost included teacher training and release but excluded research and development costs. Costs were reduced if trained teachers continued to teach the programme (McBride 2002).

Level of programme implementation

An assessment of the fidelity of implementation which is described elsewhere (McBride *et al.* 2002) indicated that

intervention students were taught 80.7% of the SHAHRP programme as documented in the teacher manual.

Comparison school alcohol education

Students in each comparison school participated in regular alcohol education classes during the second phase of the study. Generally these alcohol education classes did not extend beyond one term (10 weeks), with most comparison schools providing less than one term. The resources used in alcohol education lessons by comparison schools included the Western Australian K-10 health education curriculum alcohol education support materials ($n = 1$), 'Rethinking Drinking' resource (harm minimization) ($n = 1$), 'How Will You Feel Tomorrow' resource (harm minimization) and School Drug Education Project pilot lessons ($n = 1$). Several schools used a combination of activities from a number of these resources ($n = 5$).

The questionnaire

The anonymous, self-completion survey was developed and pretested to measure students' knowledge about alcohol, attitudes towards alcohol, patterns of alcohol use, context of alcohol use, harm/risk associated with the student's own alcohol consumption and harm/risk associated with other people's alcohol consumption. The conceptual basis of the dependent measures included in the survey drew on the following studies and student-generated data.

- Focus groups were conducted with students as part of the formative phase of the alcohol intervention. These covered: reasons for drinking; settings for drinking; quantity drunk by young people; alcohol-related harms of particular concern to young people; harm reduction strategies used by young people; and education approaches likely to be effective with young people.
- The Alcohol Misuse Prevention Study (AMPS) conducted by Dielman and colleagues in the United States (Dielman *et al.* 1989; Dielman 1994).
- The Youth Alcohol and Communities Project (YACP) (Australian Drug Foundation 1994) provided qualitative data for over 5000 young Australians (12–18 years) on their perceptions of alcohol use and alcohol-related harms.
- Patterns of alcohol use questions drawn from the 1995 National Drug Strategy Household Survey (Commonwealth Department of Health and Family Services 1996).

An emphasis was placed on identifying and measuring the harmful effects that young people experience in drinking situations. When asked about harms associated with alcohol use, young people identified both harms and risks associated with drinking situations.

The SHAHRP survey was pretested during the formative year of the study to assess face and content validity, internal consistency and test–retest reliability (McBride 2002).

Students completed the survey under the guidance of trained research assistants using a set procedure and survey protocol (McBride *et al.* 2000). Assessments of research-assistant impact on survey respondents indicated no difference on any overall measure of change at final follow-up.

Measures

Four scales/indices were developed to assess overall change. These were: knowledge index (19 items; internal consistency: 0.73); attitude scale (six items; internal consistency: 0.64); harms/risks associated with own use of alcohol index (17 items; internal consistency: 0.9); harms/risks associated with others' use of alcohol index (six items; internal consistency: 0.70).

A previous paper outlined in detail the individual items used in the SHAHRP measurement instrument (McBride *et al.* 2000). The *knowledge index* represented the number of correct answers to 19 knowledge questions on alcohol as a drug, metabolism of alcohol, standard drink information, Australian guidelines and normative information. The *attitude scale* was a sum of the six attitude variables with lower scores representing safer alcohol-related attitudes. Individual attitude items were based on a five-point Likert scale. The *harm indices* measured the number of harms experienced over a 12-month period, with the highest category capped at a maximum of 12 harms in the previous 12 months. This capping occurred when data were converted to interval data for multi-level modelling. Harm items included, for example, experiences of verbal and physical abuse, sexual harassment/abuse, impact on school performance and getting into trouble with police, parents and school.

Alcohol consumption was measured in two ways. First, *overall consumption* was measured by two variables: how often alcohol was consumed and how much alcohol was consumed per occasion. A combination of these variables was used to calculate total alcohol consumption over a 12-month period. Secondly, *harmful/hazardous (risky) patterns of consumption* were measured by the proportion of students who consumed more than two (female)/four (male) standard drinks (10 g of alcohol) per occasion, once per month or more often. These amounts were based on the Australian adult low-risk drinking guidelines of the time because no guidelines were provided for young people (Commonwealth Department of Health and Family Services 1996). *Context of use* was measured using six variables to define non-drinkers, supervised drinkers and unsupervised drinkers.

Data analysis

Multi-level analysis

Multi-level modelling is an extension of multiple regression and is appropriate for analysing hierarchically structured or nested data. It is more consistent with social theories than are traditional methods of analysis (ordinary regression), in that the multiple levels of data are accommodated (Goldstein 1995; Heck & Thomas 2000; Rowe 2000). When data are structured hierarchically, the assumption of independence is violated. The nested structure can cause 'intra-class dependency' among the units at the higher level of the hierarchy. Failure to account for the clustering of the data may produce misleading results via aggregation bias, incorrect parameter estimates and corresponding standard errors, and problems of model misspecification due to lack of independence between measurements at different levels (Goldstein 1995; Kreft & De Leeuw 1998; Heck & Thomas 2000; Rowe 2000). The multi-level modelling use in this analysis adjusted for any baseline differences between study groups.

Repeated measures or longitudinal data can be described as measurements on a variable for the same group of individuals at a number of consecutive points in time (Kreft & De Leeuw 1998). In longitudinal multi-level datasets, the hierarchy can be defined as level 1 units (the repeated measurement occasions), nested within the level 2 unit (the individual subject), nested within the level 3 units (the school). This approach allows for the partitioning of variance and covariance between each of the levels. This variation may in turn be accounted for by explanatory variables. An often-cited advantage of multi-level analysis of longitudinal data is its ability to handle missing data. Multi-level regressions do not assume equal number of observations, or even fixed time points, so respondents with missing observations pose no special problem (Bryk & Raudenbush 1992; Goldstein 1995; Kreft & De Leeuw 1998). MLwin version 2.1 was used for model fitting.

A three-level mixed regression model (Goldstein 1995) was fitted to the data to account for the repeated observations (level 1) nested within students (level 2) whom in turn are clustered within schools (level 3). The non-responses from the second, third and final questionnaires were considered as random so that a longitudinal multi-level regression model was appropriate (Snijders & Bosker 1999). Iterative generalized least-squares estimation (IGLS) was used. The consumption scale, own harm and else harm scales were log-transformed to satisfy the normality assumption. Assessment of harmful/hazardous consumption involved longitudinal binomial multi-level analysis. Level 1 was modelled allowing for extra-binomial variance. Extra binomial values were close to 1, suggesting that Bernoulli distribution fitted the data ade-

quately (Goldstein 1995). Second-order penalized quasi-likelihood (PQL) estimation was used for the model estimation (Rashbash *et al.* 2000). When data were extremely non-normal and normality could not be achieved by transformation, non-parametric procedures were used for analysis.

RESULTS

The following results provide a summary of the multi-level modelling analysis (significance of change over time) (Table 1) as well as descriptive results (the differences in means as percentage difference) along with means and confidence intervals (Table 2).

Knowledge

The results of the fixed part of the model indicate that the intervention group developed significantly greater alcohol-related knowledge at 8-month follow-up, after the first phase of the intervention (21.5% difference). This significant difference was maintained at 20 months, after the second phase of the intervention and after comparison students participated in regular alcohol education (9.2% difference). Seventeen months after programme completion at 32-month follow-up, the difference between the mean knowledge scores had converged (4.5% difference) (Fig. 2).

Attitude

The results of the fixed part of the model indicate that the intervention group developed significantly safer alcohol-related attitudes from first follow-up at 8 months and this was maintained to the end of the study at 32 months, 17 months after the final phase of the intervention. Although the intervention group showed significantly safer alcohol-related attitudes at all time points, the greatest difference in mean scores was evident after the first phase of the intervention at 8 months (Fig. 2).

Consumption

The results of the fixed part of the model indicate that the intervention group consumed significantly less alcohol at 8-month follow-up, after the first phase of the intervention (31.4% difference). At second follow-up, after phase 2 of the intervention and after comparison students had participated in alcohol education, the intervention group consumed significantly less alcohol (31.7% difference). At final follow-up, 17 months after the intervention, the total amount of alcohol consumed by intervention and comparison students was beginning to converge (9.2% difference) (Fig. 3). Non-parametric results of individual consumption items (Table 3), indicate that intervention students consumed alcohol less often than comparison

Table 1 Multi-level modelling results of overall measures of change, adjusted for time, group, context and time × group.

	Knowledge Estimate (SE)	Attitude Estimate (SE)	Consumption + Estimate (SE)	Risky consumption Estimate (SE)	Own Harm + Estimate (SE)	Else harm + Estimate (SE)
Fixed parameters						
Intercept	8.39 (0.18)*	14.01 (0.14)*	-1.14 (0.5)*	-1.06 (0.10)*	0.28 (0.03)*	0.26 (0.02)*
Group (0 = Control; 1 = Intervention)	0.10 (0.26)	0.06 (0.21)	0.11 (0.08)	-0.30 (0.08)*	0.09 (0.04)*	-0.04 (0.03)
Time (0 = Baseline, 1 = 8 month 2 = 20 months, 3 = 32 months)	-0.04 (0.1)	0.33 (0.13)*	0.31 (0.05)*	-0.28 (0.08)*	0.08 (0.01)*	0.05 (0.01)*
Time × group	2.17 (0.16)*	-0.94 (0.18)*	0.16 (0.06)*	0.13 (0.07)*	0.45 (0.01)*	0.23 (0.01)*
Context (0 = Abstainer; 1 = Supervised, 2 = Unsupervised)	0.88 (0.15)*	0.68 (0.18)*	0.15 (0.06)*	-0.07 (0.06)		
Context × group	0.27 (0.16)	-0.65 (0.18)*	-0.07 (0.06)	1.35 (0.05)*		
				2.23 (0.05)*		
				-1.13 (0.07)*		
				-0.18 (0.07)*		
Random parameters						
Level 3 (school variance)	0.22 (0.09)	0.08 (0.04)	0.00 (0.00)	0.04 (0.03)	0.00 (0.00)	0.00 (0.00)
Level 2 (between adolescent variance)	2.01 (0.12)	3.01 (0.17)	0.18 (0.01)	1.31 (0.08)	0.14 (0.00)	0.07 (0.00)
Level 1 (within adolescent variance due to time) (extrabinomial)	4.80 (0.10)	6.28 (0.13)	0.77 (0.01)	0.74 (0.01)	0.15 (0.03)	0.10 (0.02)

+log-transformed. *Significant at $P < 0.05$. Binomial. Parameter estimates and standard errors (in parentheses).

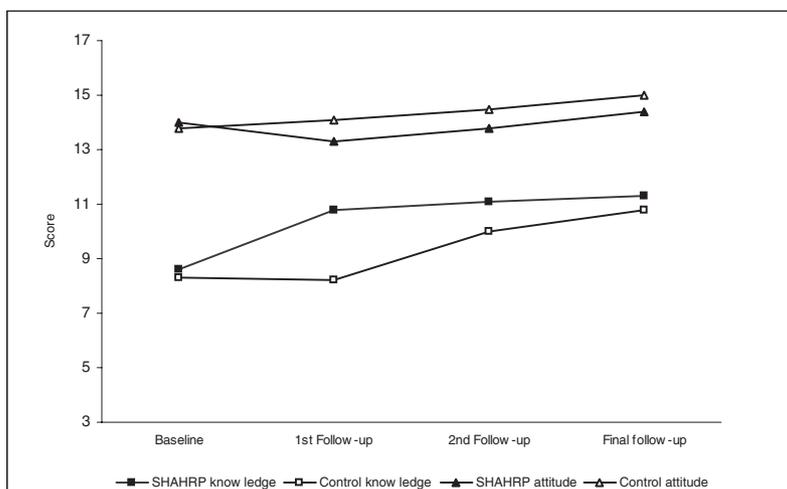


Figure 2 Alcohol-related knowledge and attitude by intervention and comparison groups

students and this was statistically significant at first and second follow-up (Mann–Whitney: $P = 0.03$; $P < 0.0001$, respectively). Intervention students consumed less alcohol per occasions from first follow-up onwards but this was significant only at the second follow-up (Mann–Whitney: $P = 0.01$).

Harmful and hazardous (risky) consumption

Over the period of the study, there was a statistical difference in the proportion of intervention and comparison

students who reported consuming alcohol to harmful or hazardous levels once per month or more often. After the first phase of the programme at 8-month follow-up, intervention students were less likely to consume to risky levels (25.7% difference) (Fig. 4). After phase 2 of the programme at 20-month follow-up, intervention students continued to be less likely to consume to risky levels (33.8% difference). Seventeen months after programme completion, although still significant, results were beginning to converge with intervention students 4.2% less likely to consume to risky levels.

Table 2 Linked cases: overall means.

Domain	Baseline	1st follow-up	2nd follow-up	Final follow-up
Knowledge index	I: 8.6 (8.4–8.9)	I: 10.8 (10.6–11.0)	I: 11.1 (10.8–11.3)	I: 11.3 (11.0–11.5)
	C: 8.3 (8.1–8.6)	C: 8.2 (7.9–8.4)	C: 10.0 (9.7–10.2)	C: 10.8 (10.6–11.0)
Attitude scale	I: 14.0 (13.8–14.2)	I: 13.3 (13.0–13.5)	I: 13.8 (13.5–14.1)	I: 14.4 (14.7–15.3)
	C: 13.8 (13.6–14.1)	C: 14.1 (13.8–14.4)	C: 14.5 (14.2–14.8)	C: 15.0 (14.7–15.3)
Consumption: no. of SD consumed in previous 12 months	I: 30.2 (11–49)	I: 70.0 (41.99)	I: 153.2 (108–198)	I: 273.8 (217–330)
	C: 19.7 (12–27)	C: 130.0 (74–186)	C: 215.6 (152–279)	C: 362.7 (283–443)
Risky drinking: hazardous/harmful drinking one per month or more often	I: 11.3 (8.8–14.3)	I: 11.3 (8.8–14.3)	I: 21.5 (18–25)	I: 32.2 (28.2–36.2)
	C: 13.3 (10.5–16.8)	C: 15.1 (12–18.7)	C: 32.5 (28.2–36.9)	C: 33.9 (29.7–39.8)
Context*	I: 32.8; 37.5; 29.7	I: 27.4; 36.0; 36.6	I: 22.2; 22.7; 55.1	I: 14.6; 15.0; 70.4
	C: 30.3; 39.6; 30.1	C: 29.0; 31.6; 39.4	C: 18.4; 23.1; 58.5	C: 9.3; 20.1; 70.6
Own harm index	I: 2.0 (1.5–2.5)	I: 3.0 (2.2–3.8)	I: 7.1 (6.8–10.5)	I: 9.8 (8.3–11.3)
	C: 1.5 (1.1–1.9)	C: 4.8 (3.2–6.4)	C: 8.7 (6.8–10.5)	C: 12.5 (10.5–14.4)
Else harm index	I: 1.5 (1.2–1.8)	I: 2.1 (1.7–2.6)	I: 3.3 (2.7–3.8)	I: 3.7 (3.2–4.3)
	C: 1.4 (1.1–1.7)	C: 2.4 (1.8–3.0)	C: 4.0 (3.1–4.8)	C: 4.6 (3.9–5.4)

Means and 95% confidence intervals reported. I: intervention, C: control. *Context of use reported as frequency by non-drinker, supervised drinker and unsupervised drinker.

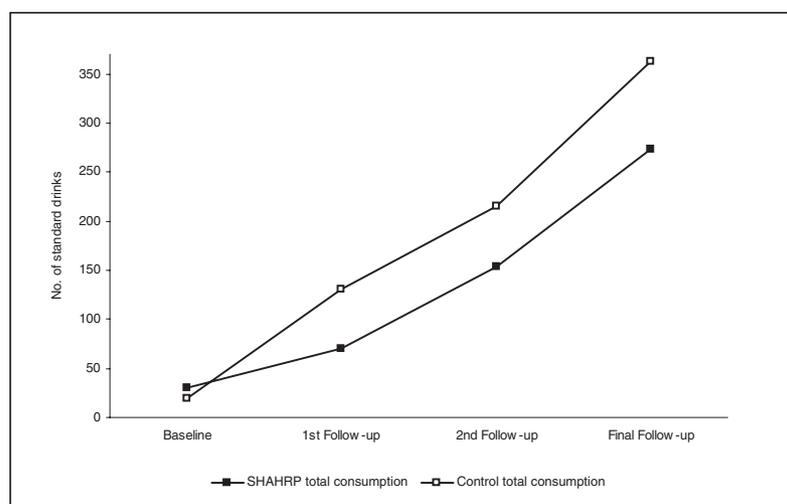


Figure 3 Total alcohol consumption by intervention and comparison groups

Context of use

The results of the fixed part of the multi-level model indicate that there was a significant difference in the

context of alcohol use between the intervention and control students over the period of the study. The intervention group reported a smaller increase in both supervised and unsupervised drinkers compared to the

Table 3 Individual consumption items that contributed to overall change.

Consumption items	Baseline	1st follow-up	2nd follow-up	Final follow-up
	I (n = 1111) C (n = 1232)	I (n = 855) C (n = 872)	I (n = 970) C (n = 1037)	I (n = 863) C (n = 915)
How often do you consume alcohol % ^o	<i>P</i> = 0.06	<i>P</i> = 0.03*	<i>P</i> < 0.0001**	<i>P</i> = 0.07
At least once per week	I: 12.3 (10.2–14.7) C: 14.9 (12.7–17.4)	I: 16.6 (14.2–19.3) C: 19.7 (17.2–22.5)	I: 23.6 (20.8–26.6) C: 30.5 (27.5–33.6)	I: 31.8 (28.7–35.0) C: 36.8 (33.7–40.0)
At least once per month	I: 22.1 (19.4–25.0) C: 26.3 (23.5–29.3)	I: 24.0 (21.2–27.0) C: 28.8 (25.9–31.9)	I: 29.2 (26.2–32.4) C: 31.1 (28.1–34.2)	I: 30.7 (27.7–33.9) C: 32.1 (29.1–35.2)
Less often	I: 65.6 (62.3–68.7) C: 58.7 (55.4–61.9)	I: 59.4 (56.0–62.7) C: 51.4 (48.1–54.7)	I: 47.2 (43.8–50.6) C: 38.4 (35.2–41.6)	I: 38.3 (35.1–41.6) C: 31.2 (28.2–34.3)
On a day that you have an alcoholic drink, how many SD do you usually have? ^o	<i>P</i> = 0.96	<i>P</i> = 0.12	<i>P</i> = 0.01	<i>P</i> = 0.10
More than four standard drinks	I: 1.6 (0.9–2.7) C: 1.0 (0.5–1.9)	I: 4.2 (3.0–5.8) C: 3.8 (2.7–5.3)	I: 15.0 (12.7–17.6) C: 16.6 (14.3–19.2)	I: 21.3 (18.6–24.2) C: 24.5 (21.8–27.4)
Two to four standard drinks	I: 2.3 (1.4–3.6) C: 3.4 (2.3–4.9)	I: 5.1 (3.8–6.8) C: 5.1 (3.8–6.8)	I: 10.5 (8.6–12.8) C: 10.7 (8.8–12.9)	I: 12.3 (10.3–14.7) C: 11.8 (9.8–14.1)
One to two standard drinks	I: 17.5 (15.1–20.2) C: 16.3 (14.0–18.9)	I: 19.4 (16.8–22.2) C: 22.0 (19.4–24.8)	I: 23.8 (21.0–26.8) C: 25.9 (23.1–28.9)	I: 19.7 (17.1–22.5) C: 18.4 (16.0–21.1)
Sip or taste	I: 55.6 (52.2–58.9) C: 57.5 (54.2–60.7)	I: 47.6 (44.2–51.0) C: 42.3 (39.1–45.6)	I: 34.3 (31.1–37.6) C: 27.8 (24.9–30.8)	I: 19.4 (16.8–22.2) C: 17.0 (14.6–19.6)
Nil	I: 22.9 (20.2–25.9) C: 22.1 (19.5–25.0)	I: 23.8 (21.4–26.3) C: 26.7 (23.9–29.7)	I: 16.3 (13.9–19.0) C: 19.0 (16.5–21.7)	I: 27.3 (24.4–30.4) C: 28.3 (25.4–31.4)

**Significant at 0.01; *significant at 0.05. Mann–Whitney and Kolmogorov–Smirnov tests. I: intervention, C: control. ^oSkip questions for non-drinkers.

comparison group (Fig. 5). The greatest difference between intervention and control unsupervised drinkers occurred at first follow-up, with the intervention group reporting 9.6% less unsupervised drinkers. At second and final follow-up, the intervention group had 18.9% and 36.3% more non-drinkers than the comparison group.

Harm associated with own use of alcohol

There was a significant difference between the study groups in the harm they reported associated with their own use of alcohol after both phases of the intervention,

which was maintained 17 months after the intervention (Fig. 6). At 8-month follow-up, after the first phase of the programme, intervention students reported less harm associated with their own use of alcohol than the comparison group (32.7% difference). At 20-month follow-up, after the second phase of the programme, and after the comparison group had received alcohol education, intervention students continued to report less harm associated with their own use of alcohol (16.7% difference). Seventeen months after the completion of the programme at 32-month follow-up, intervention students reported 22.9% less harm associated with their own use of alcohol than the comparison group.

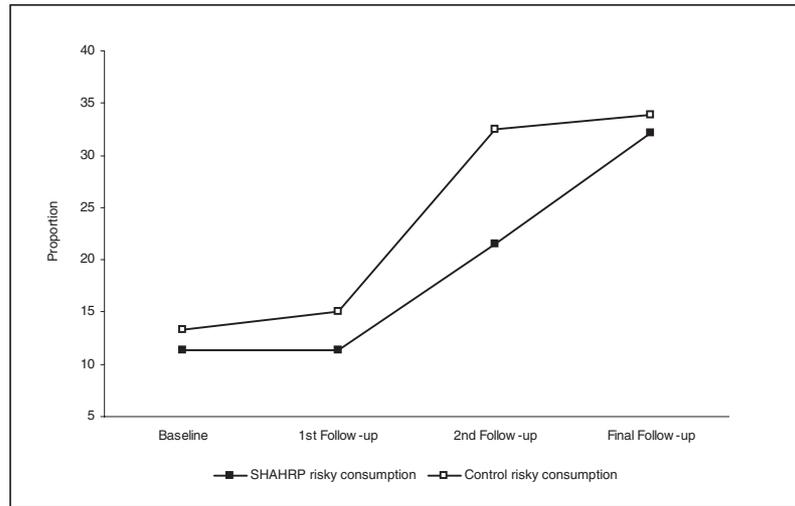


Figure 4 Proportion of risky drinkers by intervention and comparison groups

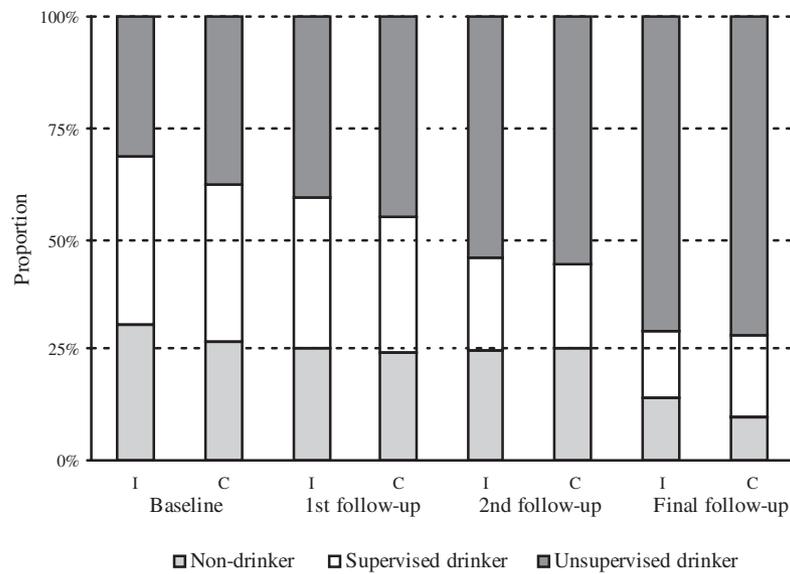


Figure 5 Change in context of alcohol use intervention and comparison groups

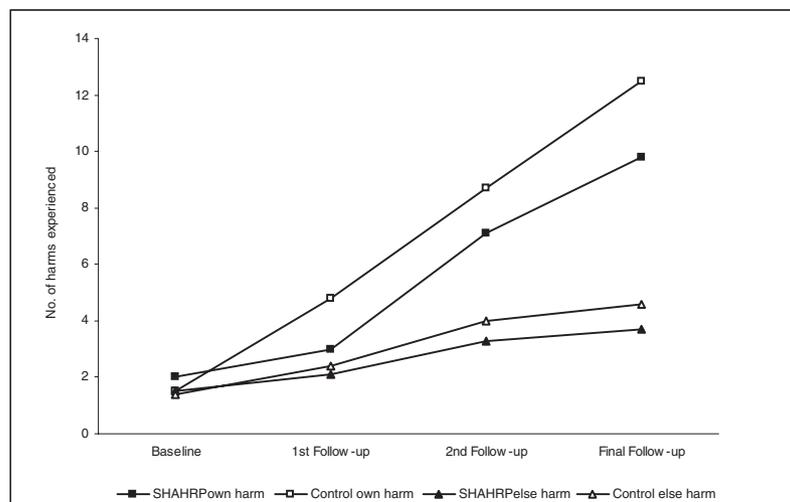


Figure 6 Alcohol-related harm by intervention and comparison groups

Own harm: harm associated with own use of alcohol; else harm: harm associated with other people's use of alcohol

Harm associated with other people's use of alcohol

There was no significant difference between study groups in the harm that they experienced associated with other people's use of alcohol. Figure 6 shows that experiences of this type of harm were generally low, with a small increase over the period of the study. There was little divergence between study groups until after the second phase of the programmes at 20-month follow-up when intervention students experienced 10% less harm associated with other people's use of alcohol compared to the comparison group. Seventeen months after programme completion at 32-month follow-up, intervention students experienced 12.8% less harm associated with people's use of alcohol.

DISCUSSION

A number of limitations of the study need to be noted. First, multi-level analysis which was used to take account of clustering may produce over-conservative results when variation within clusters is minimal (as in the present case) (Palmer *et al.* 1998). Secondly, the comparison group received alcohol education, reducing the chance of finding an intervention effect. Thirdly, the data collectors could not be blind to intervention and comparison schools when collecting data on the fidelity of the intervention, but they were trained in a protocol that attempted to reduce bias. Fourthly, self-completion surveys were used in the absence of biomedical verification, as has been the norm in studies of this type. Recent studies suggest that the assurance of anonymity can enhance the accuracy of self-reporting (Winchester *et al.* 1996). The SHAHRP survey reinforced assurance of anonymity by using a unique identification code.

There were differences between intervention and comparison groups knowledge, attitude and behaviour after the first phase of the intervention that continued to varying degrees for the duration of the study. The early changes in behaviour were not expected, given findings from previous research which suggests that the behavioural impact of drug education interventions is often delayed (Goodstadt 1986; Dielman 1994; Perry *et al.* 1996; Williams *et al.* 1999). The effects on knowledge and attitudes are less surprising, as research suggests that school-based interventions can change both (Bruvold 1993; Sharp 1994; Tobler *et al.* 1999). However, as seen in other programmes, the attitude and knowledge of intervention and comparison groups started to converge 17 months after the programme was completed. Despite evidence that behaviour is more difficult to change (Sharp 1994; Foxcroft *et al.* 1997; White &

Pitts 1998) the SHAHRP intervention had an impact on four of the five behavioural measures.

The results of the study support the aims of the SHAHRP programme in reducing the alcohol-related harm that students reported from their own alcohol use. At final follow-up, 17 months after the completion of phase 2 of the intervention, the difference between intervention and comparison students' increased, indicating a continuing effect on the harm that young people reported from their own use of alcohol. This is contrary to traditional views that the behavioural effects of school drug education programmes decay over time (Stead, Hastings & Tudor-Smith 1996; Dusenbury & Falco 1995).

The current findings also raise doubt about the claim in the literature that young people have limited capability to process harm reduction messages (Williams & Perry 1998). The results of the SHAHRP evaluation indicate that harm reduction messages, which are developed and presented within the context of young people's lives, can be processed adequately by students. This is particularly true for those who have had prior experience with alcohol and who are rarely affected by programmes that advocate non-use or the delayed use of alcohol.

The context in which alcohol was used was also affected by the SHAHRP intervention. The results indicate that the intervention produced larger changes in the drinking of some early unsupervised drinkers than self-learning in response to negative drinking experience or new life experiences. This is important, as the study found that unsupervised drinkers are over twice as likely to report alcohol-related harm than supervised drinkers and over four times more likely to report harm than non-drinkers (McBride 2002). The SHAHRP programme also had an impact on delaying and/or reverting unsupervised drinkers to supervised drinkers and supervised drinkers to non-drinkers, suggesting that such an impact is not exclusive to abstinence programmes.

The study found that a harm reduction programme which does not solely advocate non-use or delayed use can produce larger reductions in alcohol consumption than either classroom-based or comprehensive programmes that promote abstinence and delayed use. This effect also occurred earlier in this study than in abstinence-orientated programmes (Gilchrist *et al.* 1987; Perry *et al.* 1996; Williams *et al.* 1999).

In line with normative age-related trends, both study groups increased their alcohol consumption over the study period. There was, however, a significant difference in alcohol consumption between intervention and comparison students at the first and second follow-ups. Frequency of alcohol use was a major reason for the differences between intervention and comparison students' overall alcohol consumption. A lower proportion of

students in the intervention group consumed alcohol at least once per week at the first and second follow-ups. By the end of the study over one-third of study students consumed alcohol at least once per week, one-third consumed alcohol at least once per month and the remaining third consumed alcohol less than once per month. This pattern of alcohol use suggests that programmes which advocate only non-use and delayed use will have less impact on the two-thirds of young people who already drink. Broadening the goal and strategies of drug education to reduce frequency and harm increases the opportunity to impact on a greater proportion of young people.

An important finding of the study was the significant impact of the programme on risky consumption. Intervention students were much less likely to consume alcohol in a harmful or hazardous manner on all follow-up occasions. This has implications for their exposure to acute harm (World Health Organization 1999; Chikritzhs *et al.* 2001). The results also reinforce the placement of the programme phases using prevalence data, guided in this case by the increase in risky pattern of consumption between the ages of 13 and 14 years. Given the dissipation of effect at final follow-up, the results also suggest that regular booster phases of intervention are important in maintaining an effect.

The results of this study identify two important areas for future research on alcohol education programmes in schools: the use of classroom-based interventions and the adoption of a harm reduction goal.

Classroom programmes offer the greatest opportunity to impact on young people (Flay 2000; Paglia & Room 1998; White & Pitts 1998). Research evidence supports classroom programmes over comprehensive programmes (which may include classroom, policy, environmental, parental, local community components), largely because research has not yet isolated the contribution and value of individual components within a comprehensive approach (Flay 2000). Additionally, classroom programmes are practical for schools to implement, are cost- and time-effective and require less external expertise than comprehensive programmes. These practical issues are important if we are to ensure that effective programmes are available and implementation achievable by schools.

The dominance of North American research in the school drug education field has restricted programme goals to abstinence (Sharp 1994; White & Pitts 1997; Paglia & Room 1998). Williams & Perry (1998) have argued that teaching anything other than abstinence would be to condone illegal behaviour and that anything except simple messages (e.g. don't drink alcohol) will fail because full brain maturation and complex thinking do not develop until the ages of 17–21 years (Williams & Perry 1998). Although alcohol use is illegal for young

people (at different ages in different countries), a large proportion of young people use alcohol. Abstinence-based programmes provide little advice to young drinkers, leaving these students to develop their own knowledge and skills on how to cope with alcohol-related problems. Because adolescent alcohol use is related to significant morbidity and mortality we need to develop coherent programmes that assist young drinkers to reduce the harmful impact that their own and other people's use of alcohol can have. The results of SHAHRP indicate that young people are capable of processing complex messages which are relevant to their life experiences. If we are to be inclusive of all young people, particularly those who have initiated drinking at an early age (and who are more likely to experience harm), we need to broaden our approach and test effects to ensure all young people benefit from participation in school-based drug education programmes.

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