

Foxcroft, D and Tsertsvadze, A

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Foxcroft, D and Tsertsvadze, A (2011) Universal school-based prevention programs for alcohol misuse in young people. *Cochrane Database of Systematic Reviews*, 5 (CD009113).

Doi: 10.1002/14651858.CD009113

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Universal school-based prevention programs for alcohol misuse in young people (Review)

Foxcroft DR, Tsertsvadze A



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[Intervention Review]

Universal school-based prevention programs for alcohol misuse in young people

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Editorial group: Cochrane Drugs and Alcohol Group.

Publication status and date: New, published in Issue 5, 2011.

Review content assessed as up-to-date: 3 March 2011.

Citation: Foxcroft DR, Tsertsvadze A. Universal school-based prevention programs for alcohol misuse in young people. *Cochrane Database of Systematic Reviews* 2011, Issue 5. Art. No.: CD009113. DOI: 10.1002/14651858.CD009113.

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ABSTRACT

Background

Alcohol misuse in young people is cause of concern for health services, policy makers, prevention workers, criminal justice system, youth workers, teachers, parents. This is one of three reviews examining the effectiveness of (1) school-based, (2) family-based, and (3) multi-component prevention programs.

Objectives

To review evidence on the effectiveness of universal school-based prevention programs in preventing alcohol misuse in school-aged children up to 18 years of age.

Search methods

Relevant evidence (up to 2002) was selected from the previous Cochrane review. Later studies, to July 2010, were identified from MEDLINE, Cochrane Central Register of Controlled Trials, EMBASE, Project CORK, and PsycINFO.

Selection criteria

Randomized trials evaluating universal school-based prevention programs and reporting outcomes for alcohol use in students 18 years of age or younger were included. Two reviewers screened titles/abstracts and full text of identified records.

Data collection and analysis

Two reviewers extracted relevant data independently using an *a priori* defined extraction form. Risk of bias was assessed.

Main results

53 trials were included, most of which were cluster-randomised. The reporting quality of trials was poor, only 3.8% of them reporting adequate method of randomisation and program allocation concealment. Incomplete data was adequately addressed in 23% of the trials. Due to extensive heterogeneity across interventions, populations, and outcomes, the results were summarized only qualitatively.

Six of the 11 trials evaluating alcohol-specific interventions showed some evidence of effectiveness compared to a standard curriculum. In 14 of the 39 trials evaluating generic interventions, the program interventions demonstrated significantly greater reductions in alcohol use either through a main or subgroup effect. Gender, baseline alcohol use, and ethnicity modified the effects of interventions. Results from the remaining 3 trials with interventions targeting cannabis, alcohol, and/or tobacco were inconsistent.

Authors' conclusions

This review identified studies that showed no effects of preventive interventions, as well as studies that demonstrated statistically significant effects. There was no easily discernible pattern in characteristics that would distinguish trials with positive results from those with no effects. Most commonly observed positive effects across programs were for drunkenness and binge drinking. Current evidence suggests that certain generic psychosocial and developmental prevention programs can be effective and could be considered as policy and practice options. These include the Life Skills Training Program, the Unplugged program, and the Good Behaviour Game. A stronger focus of future research on intervention program content and delivery context is warranted.

PLAIN LANGUAGE SUMMARY

Psychosocial and Developmental Alcohol Misuse Prevention in Schools can be effective

We conducted a Cochrane systematic review of 53 well-designed experimental studies that examined the effectiveness of school-based universal programs for the prevention of alcohol misuse in young people. The studies were divided into two major groups based on the nature of the prevention program: 1) programs targeting specifically prevention or reduction of alcohol misuse and 2) generic programs with wider focus for prevention (e.g., other drug use/abuse, antisocial behavior). In the review we found studies that showed no effects of the preventive program, as well as studies that demonstrated statistically significant effects. There was no easily discernible pattern in program characteristics that would distinguish studies with positive results from those with no effects. Most commonly observed positive effects across programs were for drunkenness and binge drinking. In conclusion, current evidence suggests that certain generic psychosocial and developmental prevention programs can be effective and could be considered as policy and practice options. These include the Life Skills Training Program, the Unplugged program, and the Good Behaviour Game.

BACKGROUND

Description of the condition

Alcohol misuse is defined as drinking levels of alcohol that can cause physical, psychological and social problems - both in the short term and the long term. Worldwide, alcohol misuse causes 1.8 million deaths (3.2% of total deaths) and 58.3 million Disability-Adjusted Life Years (DALYs) (4% of total). Accidental injuries are responsible for about one third of the 1.8 million deaths, while neuro-psychiatric conditions are responsible for nearly 40% of the 58.3 million DALYs (WHO 2008).

In many countries heavy episodic or binge drinking is prevalent amongst young people and presents an increased risk for accidents, violence, criminal activity, poorer health and social outcomes. Alcohol consumption is also limited by legislated age-related restrictions, and much alcohol use by young people under the age of 21 (e.g. United States) or 18 (e.g. United Kingdom and some other European countries) is therefore illegal.

The European Union (EU) is the heaviest drinking region of the world, drinking 11 litres of pure alcohol per adult each year (Anderson 2006). More than 1 in 4 deaths among men (aged 15-

29 years) and 1 in every 10 deaths among young women in the EU is alcohol related (Rehm 2005). Young people (aged 15-24 years) are responsible for a high proportion of this burden, with over 25% of youth male mortality and approximately 10% of young female mortality being due to alcohol (Anderson 2006). Some information exists on the extent of social harm in young people, for example a third of a million (6%) 15-16 year old school students in the EU report engaging in fights, and 200,000 (4%) report unprotected sex, due to their own drinking (Anderson 2006).

Amongst young people, early initiation of alcohol use has been shown to be linked to later binge drinking, heavy drinking and alcohol-related problems, in both prospective longitudinal studies (Pitkanen 2005; Warner 2003; Zakrajsek 2006) and large scale cross-sectional epidemiological studies from the United States (Dawson 2008; Hingson 2006; Hingson 2003a; Hingson 2003b). There is some evidence that early consumption may lead to neurological development problems and impairment (AMA 2004), and the Chief Medical Officer for England has recently advised that young people below the age of 15 should not be allowed to drink alcohol (CMO 2009).

Description of the intervention

The United States Institute of Medicine (Mrazek 1994) proposed a framework for classifying prevention into universal or selective prevention interventions, as a replacement for the previous concepts of primary or secondary prevention. Universal prevention strategies address the entire population within a particular setting (schools, colleges, families, community). The aim of universal prevention is to deter or to delay the onset of a disorder or problem by providing all individuals the information and skills necessary to prevent the problem. Universal prevention programs are delivered to large groups without any prior screening for risk factors, so all members of the population share the same general risk, although the risk may vary greatly among individuals and sub-groups (EMCDDA 2010). In school settings, universal prevention typically takes the form of alcohol awareness education, social and peer resistance skills, normative feedback, or development of behavioural norms and positive peer affiliations. Prevention programs can be either specific curricula delivered as school lessons, or classroom behaviour management programs, and can be educational, psychosocial, or a combination. Psychosocial interventions aim to develop psychological and social skills (e.g. peer resistance) through modelling, understanding, norm-setting and social skill practice, so that young people are less likely to misuse alcohol. Educational interventions aim to raise awareness of the potential dangers of alcohol misuse (e.g. increased knowledge) so that young people are less likely to misuse alcohol (Foxcroft 2002).

How the intervention might work

In a robust cost-benefit model (Caulkins 2004) it was estimated that even small effect sizes in universal prevention interventions, in terms of delaying initiation into substance use for a few years, could lead to important savings to society over an individual's lifetime. Similarly, the United Kingdom National Institute for Health and Clinical Excellence (NICE 2010) has estimated that a national alcohol misuse prevention program in schools would be a cost effective use of public money if it cost £75 million and achieved at least a 1.4% absolute reduction in alcohol consumption amongst young people, a very small effect size.

Both economic models assumed that delaying onset of alcohol misuse and use would avert some of the long-term adverse health outcomes associated with alcohol consumption. Therefore, an important consideration when evaluating the effectiveness of alcohol misuse prevention programs is how long a program's effects persist, ie a program's duration of impact. Those interventions that show persistence of effects over several years are more useful than those interventions that show some immediate or short-term effects but no evidence of any longer-term duration of impact over several years.

Why it is important to do this review

A previous Cochrane systematic review (Foxcroft 2002) covered the primary prevention of alcohol misuse amongst young people, with 55 studies included for the period to January 2002. This review was broad in scope, extending across different intervention settings (e.g. schools, families, community, health clinics), age groups (up to age 25 years-old), population focus (universal and selective primary prevention programmes), and study designs (randomised controlled trials, matched comparison studies, interrupted times series studies). In updating the search for this previous Cochrane review, we found a large number of records (n=153, to July 2010) reporting new randomised trials and new results from existing randomised trials.

We therefore decided to narrow the scope of the Cochrane review and produce an updated review of randomised trials evaluating the effectiveness of universal school-based prevention programs for alcohol misuse amongst youth 18 years or younger. This is consistent with other reviews produced by the Cochrane Drugs and Alcohol Group, for example universal school-based prevention of drug misuse (Faggiano 2005). Two other, more focused, reviews have also been produced: one covers universal family-based prevention (Foxcroft 2011a), and the other universal multi-component prevention (Foxcroft 2011b).

Other Cochrane reviews, begun or published since 2002, have also focused on the prevention of alcohol misuse in young people, though typically in young adults including college student populations (Moreira 2008; Coombes 2008). A recent review published by an influential group in an influential book (Babor 2010) has concluded that education and persuasion prevention approaches are ineffective, but this was not a systematic review of the available evidence.

OBJECTIVES

To systematically review evidence on the effectiveness of universal school-based prevention programs in preventing alcohol misuse in school-aged children up to 18 years of age. The specific aim of this review was to determine if psychosocial and educational prevention programs prevent alcohol misuse compared to standard school curriculum or other types of interventions.

METHODS

Criteria for considering studies for this review

Types of studies

Randomized controlled trials (individual or cluster design).

Types of participants

Young people up to 18 years attending school. For this review, young people are defined as children and adolescents.

Types of interventions

Experimental - any universal school-based psychosocial or educational prevention program; psychosocial intervention is defined as one that specifically aims to develop psychological and social skills in young people (e.g., peer resistance) so that they are less likely to misuse alcohol; educational intervention is defined as one that specifically aims to raise awareness of the potential dangers of alcohol misuse so that young people are less likely to misuse alcohol; studies that evaluated interventions aiming specifically at preventing and reducing alcohol misuse as well as generic interventions (e.g., drug education programs, healthy school or community initiatives), or other types of interventions (e.g., screening for alcohol consumption) were eligible for inclusion in the review. **Control** - any alternative prevention program (e.g., school-, family-, office-based, multi-component, other) or standard curriculum

Types of outcome measures

Primary outcomes

1. Any direct self-reported or objective measures of alcohol consumption or problem drinking. Outcome measures related to psychological perception/attitudes or awareness were deemed as indirect and therefore were not considered in this review. As an example, the following outcomes were included and considered as relevant:

2. Alcohol use (yes/no)
3. Alcohol use (quantity, frequency)
4. Drinking 5+ drinks at any one occasion (yes/no)
5. Incidence of drunkenness
6. Note that this list is simply indicative rather than exhaustive. Many authors of potentially relevant studies develop and report their own measures for recording and quantifying the misuse of alcohol.

Secondary outcomes

1. Alcohol initiation (age)
2. Drunkenness initiation (age)

Search methods for identification of studies

All relevant studies published up to 2002 inclusively, evaluating the effectiveness of universal school-based prevention programs in reducing/preventing alcohol use or misuse in students 18 years of age or younger were identified and selected from the previously published Cochrane review (Foxcroft 2002). The selection was not restricted by language or status of publication.

Electronic searches

Update searches were conducted to identify new relevant evidence for the period of 2002 January to 2010 July. No language restrictions were applied. Details of search terms are given in [Appendix 1](#). The following electronic databases were searched:

MEDLINE (2002 January - July Week 4 2010)

Cochrane Central Register of Controlled Trials (*The Cochrane Library* 2009, issue 4)

EMBASE (2002 January - July Week 4 2010)

Project CORK (2002 January - 2009 December)

PsycINFO (up to July Week 4 2010)

Searching other resources

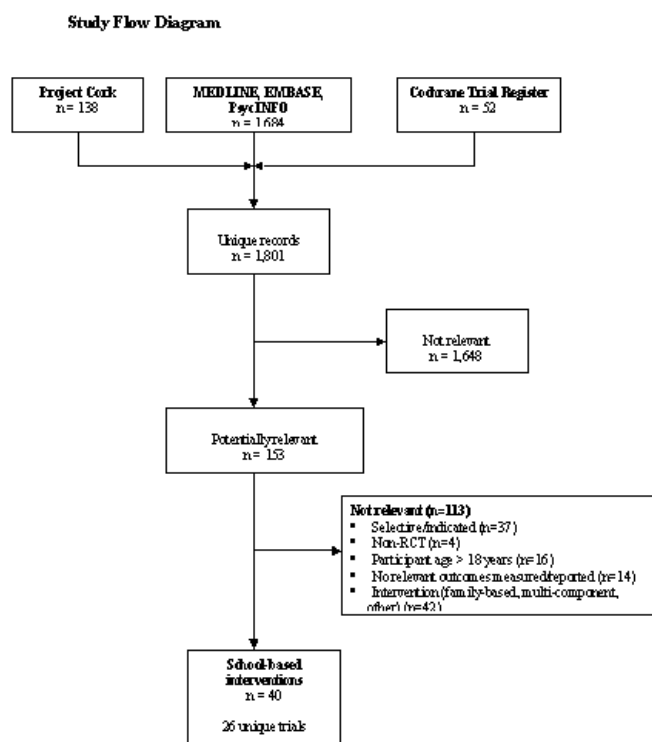
The references of topic-related systematic reviews and included studies were hand searched in order to identify potentially relevant citations. Unpublished reports, abstracts, dissertations, brief and preliminary reports were eligible for inclusion.

Data collection and analysis

Selection of studies

Two independent reviewers (D.F. and A.T.) completed broad screening of titles and abstracts of all identified records (screening level 1). Afterwards, the same reviewers independently assessed full-text reports of all potentially relevant for inclusion records that passed the initial screening level. Differences in opinion arising at both screening levels were resolved through discussions. After bibliographic searches were completed, all the retrieved records were assembled in a database and were de-duplicated (i.e., duplicate records identified and removed). The amount of evidence was maximized by using all companion publications reporting relevant outcomes for any given study. The study flow diagram of records identified from update search conducted in electronic databases is presented in [Figure 1](#).

Figure 1.



Data extraction and management

Two reviewers (D.F. and A.T.) extracted relevant data independently using *a priori* defined extraction form and entered data into RevMan 5.0.24 (RevMan 2010). Differences in opinion arising during data extraction were resolved through discussions.

Assessment of risk of bias in included studies

For each study included in the review, two authors (D.F. and A.T.) independently assessed the risk of bias using the Cochrane Collaboration's tool (Higgins 2009, section 8.5.1.) The risk of bias assessment was based on the recommended 6 methodological domains of validity:

1. Adequate sequence generation (High, Low, Unclear risk)
2. Adequate allocation concealment (High, Low, Unclear risk)
3. Blinding of personnel/outcome assessors (High, Low, Unclear risk)
4. Addressing incomplete outcome data (High, Low, Unclear risk)

5. Free of selective outcome reporting (High, Low, Unclear risk)

6. Free of other bias (High, Low, Unclear risk)

Each item was rated with one of three possible responses: yes, no, or unclear. For each response, an explanation was provided. Blinding of participants and program deliverers is not achievable for these sort of interventions, so our assessment of blinding focused on whether outcome assessors were blinded to study condition.

For addressing incomplete outcome data (item #4), a cut-off value of 20% for attrition rate (Fewtrell 2008) and reporting of intention to treat (ITT) analysis were considered. For example, studies with higher attrition rates (> 20%) not reporting ITT analysis were classified as 'No'. Studies with lower attrition rates (\leq 20%) reporting ITT analysis were classified as 'Yes'. If only either of the two criteria was met (e.g., \leq 20% attrition but no ITT analysis reported), the study was classified as 'Unclear'. For the purpose of this review, the item # 6 was assessed for possibility of confounding (i.e., baseline between study group imbalance in important covariate such as gender and alcohol use) and contamination of program effects (e.g., if clusters of students were randomised to

the experimental or control program within one school). The risk of bias data for included trials was summarized in [Figure 2](#) (risk of bias graph) and [Figure 3](#) (risk of bias summary).

Figure 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

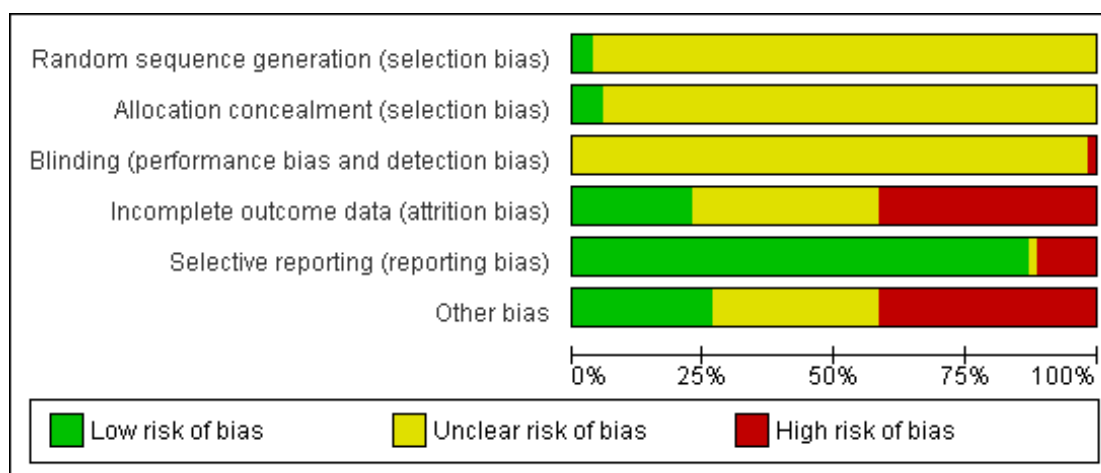


Figure 3. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding (performance bias and detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Allison 1990	?	?	?	?	?	?
Beaulieu 1998	?	?	?	?	?	?
Bond 2004	?	?	?	?	?	?
Botvin 1984	?	?	?	?	?	?
Botvin 1995	?	?	?	?	?	?
Botvin 2001	?	?	?	?	?	?
Botvin 2003	?	?	?	?	?	?
Brewer 1991	?	?	?	?	?	?
Caplan 1992	?	?	?	?	?	?
Clayton 1991	?	?	?	?	?	?
Cook 1984	?	?	?	?	?	?
Dieleman 1986	?	?	?	?	?	?
Durrant 1986	?	?	?	?	?	?
Dunyea 1984a	?	?	?	?	?	?
D'Amico 2002	?	?	?	?	?	?
Eisen 2002	?	?	?	?	?	?
Ellickson 1990	?	?	?	?	?	?
Ellickson 2003	?	?	?	?	?	?
Faggiano 2007	?	?	?	?	?	?
Furr-Holden 2004	?	?	?	?	?	?
Goldberg 2000	?	?	?	?	?	?
Goldberg 2007	?	?	?	?	?	?
Goodstadt 1983	?	?	?	?	?	?
Grimm 2009	?	?	?	?	?	?
Hansen 1988	?	?	?	?	?	?
Hansen 1991	?	?	?	?	?	?
Hecht 2003	?	?	?	?	?	?
Johnson 2009	?	?	?	?	?	?
Kelliam 2008	?	?	?	?	?	?
Koning 2009	?	?	?	?	?	?
McBride 2000	?	?	?	?	?	?
Morgenstern 2009	?	?	?	?	?	?
Moskowitz 1984	?	?	?	?	?	?
Newman 1992	?	?	?	?	?	?
Newton 2009a	?	?	?	?	?	?
Perry 1988	?	?	?	?	?	?
Perry 2003	?	?	?	?	?	?
Reddy 2002	?	?	?	?	?	?
Ringwalt 1991	?	?	?	?	?	?
Ringwalt 2009	?	?	?	?	?	?
Scaggs 1985	?	?	?	?	?	?
Schinke 2000	?	?	?	?	?	?
Sheehan 1996	?	?	?	?	?	?
Sloboda 2009	?	?	?	?	?	?
Spoth 2002	?	?	?	?	?	?
St Pierre 2005	?	?	?	?	?	?
Sun 2008	?	?	?	?	?	?
van Lier 2009	?	?	?	?	?	?
Vogl 2009	?	?	?	?	?	?
Werch 2008	?	?	?	?	?	?
Werch 2010	?	?	?	?	?	?
Wilhelmsen 1994	?	?	?	?	?	?
Williams 1968	?	?	?	?	?	?

Unit of analysis issues

Additional validity threats were ascertained regarding appropriate unit of analysis depending whether the randomisation was implemented at individual- or cluster-level (see Tables of Characteristics of included studies).

Dealing with missing data

If important data was missing, attempts were made to contact the authors of included studies.

Assessment of reporting biases

The extent of publication bias was to be assessed through visual inspection of asymmetry and running the regression-based method for a funnel plot (Egger 1997; Peters 2008).

Data synthesis

The results of the review were arranged according to two strata: 1) interventions targeting specifically prevention or reduction of alcohol misuse and 2) generic interventions with wider focus for prevention (e.g., other drug use/abuse, antisocial behavior). The statistical pooling of results of individual studies was planned conditional on the absence of heterogeneity with respect to study populations (e.g., baseline characteristics, gender), interventions (e.g., type, differences in target/focus), and outcome measures (e.g., different tools, instruments, scales) as well as the methodology of conduct (e.g., units of randomisation and analysis, cluster vs. individual trials).

Subgroup analysis and investigation of heterogeneity

The extent of heterogeneity was planned through examination of forest plots (Chi square statistic and p-value; I^2 statistic) and qualitative subgroup analysis. The subgroup analyses would explore whether or not the effects of universal school-based prevention programs differed in certain subgroups of study participants. The following *a priori* determined participant-level subgroups were based on age, race (Caucasians vs. Blacks, Hispanics), gender, and levels of alcohol use/consumption (at baseline).

Sensitivity analysis

These analysis were planned, if data allowed, to investigate whether the effects of universal school-based prevention programs in reducing alcohol misuse were different in the following trial-level defined groups:

1. Cluster (ones appropriately analysed)- vs. individually randomised trials.
2. Cluster-randomized trial appropriately analysed (i.e., units of randomisation and analysis are matching) vs. cluster-randomised trial inappropriately analysed (i.e., units of randomisation and analysis not matching).
3. Trials with attrition > 20% (1st follow-up) vs. trials with attrition ≤ 20% (1st follow-up)

RESULTS

Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

See: [Characteristics of included studies](#) and [Characteristics of excluded studies](#).

Results of the search

Initially, we examined the previously published Cochrane review (Foxcroft 2002) to identify trials published up to 2002 January inclusively by applying our eligibility criteria (see the Methods section). In total, 27 trials were deemed eligible for inclusion in the review (Allison 1990; Beaulieu 1998; Botvin 1984; Botvin 1995; Botvin 2001; Brewer 1991; Caplan 1992; Clayton 1991; Cook 1984; Dielman 1986; Durrant 1986; Duryea 1984a; Ellickson 1990; Goldberg 2000; Goodstadt 1983; Hansen 1988; Hansen 1991; McBride 2000; Moskowitz 1984; Newman 1992; Perry 1988; Ringwalt 1991; Scaggs 1985; Schinke 2000; Sheehan 1996; Wilhelmsen 1994; Williams 1968).

The updated electronic searches (2002 January - 2010 July) identified 1,874 bibliographic records (1,684 through MEDLINE, EMBASE, and PsycINFO; 138 through Project Cork; 52 through the Cochrane Trial Register). The process of de-duplication resulted in 1,801 unique bibliographic records. Through the screening of titles and abstracts, 1,648 records were excluded as obviously irrelevant. The full text reports of the remaining 153 records were examined of whom 113 were excluded due to ineligibility of intervention (n=79; selective, indicated, family-based, multi-component, other), design (n=4; non-randomised study), study participants age (n=16; age > 18 years), and outcomes (n=14; non-alcohol related). The screening process left 40 records representing 26 unique trials, which were included in this review (Bond 2004; Botvin 2003; D'Amico 2002; Eisen 2002; Ellickson 2003; Faggiano 2007; Furr-Holden 2004; Goldberg 2007; Griffin 2009; Johnson 2009; Kellam 2008; Koning 2009; Hecht 2003;

Morgenstern 2009; Newton 2009a; Perry 2003; Reddy 2002; Ringwalt 2009; Sloboda 2009; Spoth 2002; St. Pierre 2005; Sun 2008; van Lier 2009; Vogl 2009; Werch 2008; Werch 2010). The study flow diagram of the update search is depicted in Figure 1. In total, 53 trials evaluating universal school-based alcohol misuse prevention programs in young people were included in the review. Of the 53 trials, 50 were published in peer-reviewed journals and three were unpublished dissertations (Brewer 1991; Durrant 1986; Scaggs 1985). The following 12 trials were reported in multiple companion publications: Clayton 1991 (Clayton 1996; Lynam 1999), Dielman 1986 (Dielman 1989; Wynn 2000), Duryea 1984a (Duryea 1984b; Duryea 1988), Eisen 2002 (Eisen 2003), Ellickson 1990 (Ellickson 1993a; Ellickson 1993b), Faggiano 2007 (Faggiano 2008; Vigna-Taglianti 2009; Faggiano 2010; Caria 2010), Hecht 2003 (Kulis 2005; Kulis 2007a; Kulis 2007b), McBride 2000 (McBride 2003; McBride 2004), Newton 2009a (Newton 2009b), Perry 1988 (Perry 1989), Ringwalt 2009 (Ringwalt 2010), and Spoth 2002 (Spoth 2005; Spoth 2008).

Included studies

All 53 included studies were parallel-group randomised controlled trials. The unit of randomisation in 46 trials was a cluster (e.g., school, class) and in 7 trials - an individual student (Brewer 1991; Cook 1984; D'Amico 2002; Duryea 1984a; Werch 2008; Werch 2010; Williams 1968).

The total number of students randomised in cluster-randomized trials ranged from 86 (Hansen 1988) to 19,529 (Sloboda 2009). The total number of students randomised in trials with individual unit of randomisation ranged from 54 (Brewer 1991) to 416 (Werch 2010).

Forty-one trials were conducted in North America (US and Canada), 6 trials in Europe (Austria, Belgium, Greece, Italy, Spain, Sweden, Netherlands, Norway, Germany) and 6 trials in Australia. One trial was conducted in India (Reddy 2002) and one trial in Swaziland (Perry 1988). Two trials were conducted in multiple countries (Faggiano 2007; Perry 1988).

The study participants' age at baseline in the included trials ranged from 5 years (Furr-Holden 2004) to 18 years (D'Amico 2002; Perry 1988; Sun 2008). Authors of 9 trials failed to report the age of study participants at baseline (Botvin 2003; Ellickson 2003; Goodstadt 1983; Griffin 2009; Johnson 2009; Perry 2003; Ringwalt 2009; Spoth 2002; St. Pierre 2005). The proportion of males amongst the included trials ranged from 36.5% (Werch 2010) to 62% (Griffin 2009). Two trials enrolled only male students (Goldberg 2000; Williams 1968). The gender-specific proportion was not reported for 10 trials (Allison 1990; Beaulieu 1998; Botvin 1984; Dielman 1986; Duryea 1984a; McBride 2000; Moskowitz 1984; Newman 1992; van Lier 2009; Wilhelmsen 1994). The distribution of ethnic background of study participants across trials varied. Many trials conducted in North America included mixtures of Caucasian, Black American,

Asian, and Hispanic students. The majority (> 70%) of students were Caucasians in 8 trials (Botvin 1984; Botvin 1995; Clayton 1991; Ellickson 2003; Goldberg 2007; Moskowitz 1984; Spoth 2002; St. Pierre 2005) and Black Americans in three trials (Caplan 1992; Furr-Holden 2004; Griffin 2009). In one trial (Beaulieu 1998), all study participants were Black Americans and in another (Schinke 2000) - Native Americans. The ethnic composition of the study sample was not reported for 24 trials (Allison 1990; Bond 2004; Brewer 1991; Dielman 1986; Durrant 1986; Duryea 1984a; Faggiano 2007; Goldberg 2000; Goodstadt 1983; Johnson 2009; Kellam 2008; Koning 2009; McBride 2000; Morgenstern 2009; Newman 1992; Newton 2009a; Perry 1988; Reddy 2002; Scaggs 1985; Sheehan 1996; van Lier 2009; Vogl 2009; Wilhelmsen 1994; Williams 1968).

In all 53 trials, universal school-based prevention programs were implemented. In 39 trials (71%), the target of the intervention programs was of generic nature, focusing on prevention of multiple factors (i.e., alcohol, tobacco, drugs, anti-social behavior). Programs focusing exclusively on the prevention of alcohol misuse were evaluated in 11 trials (Dielman 1986; Duryea 1984a; Goodstadt 1983; McBride 2000; Morgenstern 2009; Newman 1992; Perry 1988; Sheehan 1996; Vogl 2009; Wilhelmsen 1994; Williams 1968). In the three remaining trials, the focus of preventive intervention was misuse of alcohol-cannabis (Newton 2009a), drug-alcohol (Goldberg 2007) or tobacco only (Reddy 2002). In 11 trials at least two different intervention programs were compared (Brewer 1991; D'Amico 2002; Goodstadt 1983; Hansen 1988; Hansen 1991; Koning 2009; Perry 2003; Reddy 2002; Spoth 2002; Sun 2008; Werch 2008). For example, in one trial, three groups of randomised students received Behaviour Image Model (BIM)-based brief multiple behaviour interventions: Goal Survey, Goal Survey plus Contract, and Goal Survey plus Consult (Werch 2008). In another trial, three programs of alcohol education were compared: cognitive, decision-making, and values-clarification interventions (Goodstadt 1983).

The components of the evaluated intervention programs in the majority of trials were the promotion of awareness (e.g., benefits, consequences, risks), resilient behaviour, change in normative beliefs/attitudes, self-esteem, social networking, peer resistance, as well as the development of problem solving, refusal, and/or decision-making skills. The duration of intervention programs across the included trials ranged from a single 50-minute session (D'Amico 2002) to 3 years (Botvin 1995; Botvin 2003).

In the majority of trials (85%), the effectiveness of prevention programs was compared to that of a standard curriculum. In one trial that evaluated the effectiveness of random alcohol-level testing, the control group of students received only deferred testing (Goldberg 2007).

The outcome measures of alcohol use differed greatly across the trials. For example, the outcomes varied with respect to their definition (e.g., alcohol use, frequency of use, mean number of drinks, proportion of alcohol non-users, weekly drinking, hard liquor use,

frequency of drunkenness, drunkenness in the last month, incidence of drinking and driving, binge drinking), scales of measurement (means, percentages, odds ratios, risk ratios), and the period to which they pertained (e.g., past month, past 2 months, current, past year, ever). The last follow-up at which the outcomes were measured ranged from one month (Werch 2008) to 12 years (Kellam 2008) post-randomisation.

Excluded studies

Many studies were excluded at screening because they clearly did not meet the inclusion criteria. Forty-eight studies required closer scrutiny before they were excluded on the basis that they did not meet the exclusion criteria. These 48 excluded studies are listed in the [Characteristics of excluded studies](#) table.

Risk of bias in included studies

The assessment results of risk of bias for the included trials are presented in [Figure 2](#) and [Figure 3](#). All trials were randomised.

Allocation

The adequate method of randomisation and program allocation concealment was reported only for about 3.8% of the trials. It was unclear whether the remaining 96% of the trials utilized adequate methods for randomisation or program allocation concealment.

Blinding

No blinding of study personnel was carried out and it was unclear whether or not blinding of outcome assessors was carried out in the reviewed trials; this information was not explicitly reported. It is difficult to see how blinding of students or teachers or program deliverers could be achieved and this is a methodological limitation of such social and preventive intervention studies.

Incomplete outcome data

Incomplete data was adequately addressed in about 23% of the trials and this information was unclear for about 31% of the trials. The attrition rates (at first follow-up) of 26 trials were acceptable ($\leq 20\%$) and for 21 trials not acceptable ($> 20\%$). One trial reported no loss to follow-up (Brewer 1991). The attrition rates were not reported for 6 trials (D'Amico 2002; Durrant 1986; Kellam 2008; McBride 2000; Morgenstern 2009; Newman 1992). see [Characteristics of included studies](#).

Selective reporting

The majority of the trials (88.5%) were free of selective outcome reporting, whereas only 11.5% of them were not

Other potential sources of bias

A quarter of all trials were found free of other bias (i.e., confounding, contamination), whereas results in 42% of the trials were deemed to be prone to confounding, contamination, or both. It was unclear for 32.7% of the trials whether or not their results may have been biased due to confounding and/or contamination. Of the 46 cluster-randomised trials, 37 reported at least some efforts of adjusting the intervention effect estimates for clustering effects, whereas for 9 trials, no such efforts were reported (Beaulieu 1998; Durrant 1986; Goodstadt 1983; Griffin 2009; Perry 1988; Scaggs 1985; Schinke 2000; Sheehan 1996; Wilhelmsen 1994). In 7 other trials, students were randomised individually (Brewer 1991; Cook 1984; D'Amico 2002; Duryea 1984a; Werch 2008; Werch 2010; Williams 1968).

The results based on ITT analysis were reported for only 12 out of 52 trials (Bond 2004; Brewer 1991; Eisen 2002; Faggiano 2007; Furr-Holden 2004; Goldberg 2007; Kellam 2008; Morgenstern 2009; Perry 2003; Ringwalt 2009; Spoth 2002; Vogl 2009). For three trials, it was unclear whether or not the reported results were ITT-based (Hecht 2003; Newman 1992; van Lier 2009).

The instruments or questionnaires used for measurement of alcohol misuse/consumption were reported to be validated for only 24 trials (Beaulieu 1998; Bond 2004; Cook 1984; D'Amico 2002; Dielman 1986; Furr-Holden 2004; Goldberg 2000; Goodstadt 1983; Griffin 2009; Hansen 1991; McBride 2000; Moskowitz 1984; Newman 1992; Newton 2009a; Perry 1988; Perry 2003; Scaggs 1985; Spoth 2002; Sun 2008; Vogl 2009; Werch 2008; Werch 2010; Wilhelmsen 1994; Williams 1968). It was unclear whether or not the outcome measures reported in the remaining 29 trials had been validated.

Effects of interventions

see [Characteristics of included studies](#)

Quantitative data synthesis

The reviewers could not pool the results from individual trials due to heterogeneity in study populations (baseline characteristics), interventions (differences in target/focus), and the outcome measures of alcohol misuse (different tools, instruments, scales, outcome definitions). For example, Bond 2004 reported a whole school intervention which included teaching resources and a school liaison officer, with 20 sessions; whereas Dielman 1986 reported a 4-session intervention that focused on awareness and refusal skills. Similarly, in the study by Faggiano 2007, outcomes were drinking frequency and drunkenness measures, but in the study by Furr-Holden 2004, outcomes were drinking without parents or without permission. More generally, there is a lack of clear information about the content of the interventions, and this is necessary for ensuring that appropriate comparisons and pooling of results is achieved. This is a general problem for the prevention

field, as identified by [Abraham 2008](#). Therefore, the main results are presented in tabular form and compared in the style of a narrative systematic review.

1. Alcohol-Specific Programs

This section included 11 trials that evaluated the effectiveness of universal school-based intervention programs specifically focusing on the prevention of alcohol misuse in young students ([Dielman 1986](#); [Duryea 1984a](#); [Goodstadt 1983](#); [McBride 2000](#); [Morgenstern 2009](#); [Newman 1992](#); [Perry 1988](#); [Sheehan 1996](#); [Vogl 2009](#); [Wilhelmsen 1994](#); [Williams 1968](#)).

In 5 trials ([Duryea 1984a](#); [Goodstadt 1983](#); [Newman 1992](#); [Sheehan 1996](#); [Williams 1968](#)), the intervention effects on alcohol misuse (e.g., alcohol use in past year, frequency of drinking, mean number of drinks, proportion of weekly drinkers, drinking and driving in the past month) were not statistically significantly different from those of standard curriculum at the follow-up from 6 months to 3 years post-randomisation. For example, the mean numbers of drinking occasions in the intervention and control groups in one trial were 2.06 (1.11) vs. 2.05 (0.97), respectively ([Duryea 1984a](#)). In another trial ([Newman 1992](#)), the corresponding mean monthly frequencies of drinking occasions were 3.06 (intervention group) vs. 3.43 (control group). In one trial ([Sheehan 1996](#)), although the proportions of weekly drinkers increased in both the intervention (from 10% to 36%) and the control group (from 13% to 34%), the between-group difference was not statistically significant (36% vs. 34%, $p=0.09$). In the same trial, there was no difference in drinking and driving frequency between the intervention and control groups regardless of drunk driving status at baseline. In one trial ([Williams 1968](#)), in the intervention and control groups, the proportion of students using alcohol in the past year was 85% ($p>0.05$). Note that, three ([Duryea 1984a](#); [Goodstadt 1983](#); [Williams 1968](#)) of the 5 trials had a relatively small sample size of randomised students (range: 155-540).

In the remaining 6 trials, the intervention groups had statistically significant reductions in the outcomes of alcohol misuse compared with control groups ([McBride 2000](#); [Dielman 1986](#); [Morgenstern 2009](#); [Perry 1988](#); [Vogl 2009](#); [Wilhelmsen 1994](#)). For example, in two trials, the post-intervention effects were modified by prior drinking experience or gender ([Dielman 1986](#); [Vogl 2009](#)). Specifically, one-to-three years post-randomisation, significantly greater reduced rates of mean weekly alcohol use were found in subgroups of students with prior drinking experience ([Dielman 1986](#)) or female students ([Vogl 2009](#)). In the same trials, the between-group differences in the mean weekly alcohol use rates amongst the subgroups of students without prior drinking experience ([Dielman 1986](#)) or males ([Vogl 2009](#)) were not statistically significant. In another study ([McBride 2000](#)), the intervention compared to standard curriculum, significantly reduced risky alcohol consumption (at least once a month) in baseline non-drinkers (21.5% vs. 32.5%, $p<0.05$) but not in baseline drinkers 20 months after the randomization. Note that in this trial, the intervention group at baseline

included significantly more non-drinkers than the control group. In the trial by Morgenstern and colleagues ([Morgenstern 2009](#)), students in the intervention group, compared to the standard curriculum group, experienced significantly reduced risk of lifetime binge drinking at both follow-ups: four months (OR=0.56, 95% CI: 0.41, 0.77) and 12 months (OR=0.74, 95% CI: 0.57, 0.97) after the randomisation. The intervention and standard curriculum groups were not significantly different in the post-treatment lifetime alcohol use and drunkenness. In the World Health Organization (WHO) Collaborative Study ([Perry 1988](#)), the peer-led program, compared to the teacher-led program or standard curriculum, significantly reduced the immediate post-intervention mean alcohol consumption (using a composite alcohol score) but only in baseline non-drinkers (3.15 vs. 3.46 vs. 3.52, $p<0.005$). In the same study, the post-intervention mean alcohol consumption in baseline drinkers did not significantly differ for the three groups (5.14 vs. 5.84 vs. 5.71, respectively). Finally, one trial ([Wilhelmsen 1994](#)) compared the effectiveness of two programs (Highly Role-Specified and Less Role-Specified) and standard curriculum, and found a significantly lower 4 months post-intervention mean frequency of alcohol use (6-point scale) in the Highly Role-Specified intervention group (0.53 ± 1.4) versus the Less Role-Specified intervention (0.90 ± 1.0) or the control/standard curriculum (0.69 ± 1.3).

The duration of post-intervention impact (i.e., difference between the duration of intervention and last follow-up to which positive result persisted) for the 6 trials ([McBride 2000](#); [Dielman 1986](#); [Morgenstern 2009](#); [Perry 1988](#); [Vogl 2009](#); [Wilhelmsen 1994](#)) ranged from 0 days ([Vogl 2009](#)) to 2 years ([Dielman 1986](#)).

2. Generic Programs

This section included 39 trials that evaluated the effectiveness of universal school-based intervention programs with respect to the prevention of multiple factors such as misuse of alcohol, tobacco, drugs, and anti-social behaviour in young students ([Allison 1990](#); [Beaulieu 1998](#); [Bond 2004](#); [Botvin 1984](#); [Botvin 1995](#); [Botvin 2001](#); [Botvin 2003](#); [Brewer 1991](#); [Caplan 1992](#); [Clayton 1991](#); [Cook 1984](#); [D'Amico 2002](#); [Durrant 1986](#); [Eisen 2002](#); [Ellickson 1990](#); [Ellickson 2003](#); [Faggiano 2007](#); [Furr-Holden 2004](#); [Goldberg 2000](#); [Griffin 2009](#); [Hansen 1988](#); [Hansen 1991](#); [Johnson 2009](#); [Kellam 2008](#); [Koning 2009](#); [Hecht 2003](#); [Moskowitz 1984](#); [Perry 2003](#); [Ringwalt 1991](#); [Ringwalt 2009](#); [Scaggs 1985](#); [Schinke 2000](#); [Sloboda 2009](#); [Spath 2002](#); [St. Pierre 2005](#); [Sun 2008](#); [van Lier 2009](#); [Werch 2008](#); [Werch 2010](#)).

In 24 trials, there was no statistically significant difference in the effectiveness between the intervention programs and the control/standard curriculum groups ([Allison 1990](#); [Beaulieu 1998](#); [Bond 2004](#); [Botvin 2003](#); [Brewer 1991](#); [Clayton 1991](#); [D'Amico 2002](#); [Durrant 1986](#); [Ellickson 1990](#); [Furr-Holden 2004](#); [Goldberg 2000](#); [Hansen 1988](#); [Hansen 1991](#); [Johnson 2009](#); [Koning 2009](#); [Moskowitz 1984](#); [Perry 2003](#); [Ringwalt 1991](#); [Ringwalt 2009](#); [Spath 2002](#); [St. Pierre 2005](#); [Sun 2008](#); [Werch 2008](#); [Werch](#)

2010). The follow-up period when the alcohol use outcome measures were ascertained in these trials ranged from one month to 10 years post-randomisation (Werch 2008; Clayton 1991). In 7 trials (Hansen 1988; Hansen 1991; Koning 2009; Perry 2003; Spoth 2002; Sun 2008; Werch 2008), two or more different intervention programs or their combinations were also compared and no significant differences between the effectiveness of these programs (e.g., social influences curriculum, affective education, drug abuse resistance education, life skills training, strengthening families program, cognitive perception information, behavioural skills curriculum, behaviour image model-based interventions) on measures of alcohol use were observed. The number of randomized students across 19 of the 24 trials ranged from 54 (Brewer 1991) to 8,338 (Ringwalt 2009). The randomised number of students for the remaining five trials was not reported (Botvin 2003; Clayton 1991; Durrant 1986; Goldberg 2000; St. Pierre 2005).

In one large trial (83 randomised clusters and 17,320 participating students) conducted by Sloboda and colleagues (Sloboda 2009), the intervention program (i.e., take charge of your life) had a significantly negative effect compared to the standard curriculum in preventing alcohol use within 30 days (45.7% vs. 41.9%, OR = 1.09, 95% CI: 1.01, 1.18).

In the remaining 14 trials, the program interventions demonstrated significantly greater reductions in alcohol use with respect to main or subgroup effects (i.e., gender, ethnicity, baseline alcohol use status) compared to standard curriculum (Botvin 1984; Botvin 1995; Botvin 2001; Caplan 1992; Cook 1984; Eisen 2002; Ellickson 2003; Faggiano 2007; Griffin 2009; Kellam 2008; Hecht 2003; Scaggs 1985; Schinke 2000; van Lier 2009). The number of randomised students across 11 of the 14 trials ranged from 127 (Scaggs 1985) to 6,900 (Hecht 2003). The randomized number of students for the remaining three trials was not reported (Botvin 1995; Faggiano 2007; Kellam 2008).

In two trials, the single intervention program - Life Skills Training (LST) was delivered through formal teacher, older students, or video training (Botvin 1984; Botvin 1995). In the first trial (Botvin 1984), the peer-led program significantly reduced frequency of drunkenness (ANCOVA-based $F=4.54$, $p < 0.01$) and the amount of consumption per occasion (ANCOVA-based $F=5.10$, $p < 0.006$) compared to the teacher-led program or standard curriculum at 4 months of follow-up. In the second trial (Botvin 1995), the LST program delivered either through teacher or video training was significantly more effective (0.34 ± 0.02 or 0.33 ± 0.03 , respectively) in reducing the mean number of drunkenness episodes in the last month compared to standard curriculum (0.40 ± 0.02) at 6 months of follow-up. In the same trial, post-intervention alcohol use (monthly or weekly) and the frequency of three or more drinks per occasion did not significantly differ between the intervention programs and the control group. In another trial that evaluated the LST program (Botvin 2001), the program was significantly more effective in reducing binge drinking (> 5 drinks per occasion) at one year (OR = 0.41, 95% CI: 0.18, 0.93) and two

years (OR = 0.40, 95% CI: 0.22, 0.74) of follow-up. In one trial including ethnically diverse composition of students, three different versions of one program (Multicultural, Mexican American, and Black/White) were compared and Multicultural and Mexican versions of the program were significantly more effective in reducing the mean number of alcohol drinks compared to Black/White version of the program (Hecht 2003). Similarly, 8 other trials demonstrated statistically significant superiority in the main effects of intervention programs for reducing alcohol use (e.g., 3+ drinks per occasion, daily hard liquor use, monthly frequency of alcohol drinking, 4+ drinking weekly, lifetime alcohol abuse, alcohol use in the past week) compared to standard curricula at one to six years of follow-up (Caplan 1992; Cook 1984; Faggiano 2007; Griffin 2009; Kellam 2008; Scaggs 1985; Schinke 2000; van Lier 2009). For example, in the Faggiano et al. trial, the intervention program, compared to standard curriculum, significantly reduced any or frequent drunkenness in the past month at three months (any drunkenness; OR = 0.69, 95% CI: 0.48, 0.99) and 18 months (any drunkenness; OR = 0.80, 95% CI: 0.67, 0.97) of follow-up (Faggiano 2007). In another trial (van Lier 2009), a significantly reduced growth rate of alcohol use (in the past week) for the intervention group - Good Behaviour Game program (GBG) was shown after 3-6 years of follow-up (between level slope estimate for GBG: $\beta = -0.43$, $p < 0.05$). However, no such reductions were found for alcohol use during last month ($\beta = -0.31$, $p > 0.05$) or last year ($\beta = 0.05$, $p > 0.05$).

In three trials, intervention programs were shown to be significantly more effective than standard curriculum but only in certain subgroups, which were defined by gender (Faggiano 2007), ethnicity (Eisen 2002), and baseline alcohol use status (Ellickson 2003). For example, in one trial (Faggiano 2007), the intervention program was significantly more effective in reducing any drunkenness compared to standard curricula in male (OR = 0.64, 95% CI: 0.49, 0.85) but not in female students (OR = 0.86, 95% CI: 0.63, 1.18) at three months follow-up. The trial by Eisen et al., showed that the intervention program was significantly more effective in reducing alcohol use in the past 30 days and binge drinking (three or more drinks per occasion) in Hispanics but not in non-Hispanic students after two years of follow-up. Similarly, in one trial (Ellickson 2003), the significant effect of the intervention compared to the standard curriculum in reducing overall alcohol misuse was observed after 18 months of follow-up in baseline alcohol users (1.78 vs. 2.23, $p < 0.05$) but not in baseline alcohol non-users (0.22 vs. 0.30, $p > 0.05$).

The duration of post-intervention impact in the 14 trials (Botvin 1984; Botvin 1995; Botvin 2001; Caplan 1992; Cook 1984; Eisen 2002; Ellickson 2003; Faggiano 2007; Griffin 2009; Kellam 2008; Hecht 2003; Scaggs 1985; Schinke 2000; van Lier 2009) ranged from 0 days (Ellickson 2003; Griffin 2009; Caplan 1992; Botvin 2001) to 10 years (Kellam 2008).

3. Other Programs

This section included three trials that evaluated the effectiveness of universal school-based intervention programs whose focus was the prevention of alcohol-cannabis (Newton 2009a), drug-alcohol (Goldberg 2007), or tobacco only (Reddy 2002). In all three trials, students were individually randomised to intervention or control groups. In two trials the numbers of randomized students were 1,296 (Newton 2009a) and 4,776 (Reddy 2002). No sample size (i.e., number randomised) was reported for the third trial (Goldberg 2007).

In one trial (Goldberg 2007), the mean past month/year illicit drug and alcohol use index (ranging from 0 = no use to 3=heavy use) in students allocated to the intervention program -a random Drug and Alcohol Testing (DAT) did not significantly differ from that in students allocated to only deferred random DAT after two years of follow-up (past month: 0.165 vs. 0.261, $p>0.05$; past year: 0.917 vs. 1.033, $p>0.05$).

In the remaining two trials (Newton 2009a; Reddy 2002), the intervention programs were shown to be statistically significantly better in reducing certain alcohol use outcome measures compared to standard curricula. In the first trial (Newton 2009a), students in the intervention group (-0.63 ± 1.14) compared to the standard curriculum group (5.30 ± 1.50) had a significantly reduced 'average weekly alcohol use' from baseline to 18 months of follow-up ($p < 0.02$). In the same trial, the between-group differences with respect to 'frequency of drinking to excess' and 'harms related to own use of alcohol' were not statistically significant ($p > 0.05$). In the second trial (Reddy 2002), both the school-based program alone (i.e., health-related information and dissemination among youth) or combined with a family-based program were significantly more effective than the standard curriculum in reducing alcohol use ('ever having a drink of alcohol') after 17 months of follow-up (0.128 vs. 0.144 vs. 0.288, respectively; $p < 0.001$).

The duration of post-intervention impact in the 3 trials (Goldberg 2007; Newton 2009a; Reddy 2002) ranged from 1 month (Reddy 2002) to 1 year (Goldberg 2007; Newton 2009a).

Subgroup analysis

Given the fact that studies could not be pooled in this review, the extent of between-study statistical heterogeneity in the intervention effects (e.g., forest plots; Chi square statistic and p -value; I^2 statistic) could not be assessed quantitatively.

The study-level subgroup analysis qualitatively exploring whether or not the effect of any given universal school-based prevention program differed across the subgroups defined by age, gender, ethnicity, or prior alcohol use of study participants could not be carried out due to unavailability or non-comparability of relevant data. For example, there were only four trials that included only males (Goldberg 2000; Williams 1968), Black Americans (Beaulieu 1998), or Native Americans (Schinke 2000) and the interventions evaluated in these trials differed.

Within-study subgroup effects of the interventions (if reported

that such effects existed) are qualitatively summarized in the Results section (see 'the effects of interventions' sub-section) and presented in [Characteristics of included studies](#).

Sensitivity analysis

The study-level sensitivity analysis qualitatively exploring whether or not the effect of any given universal school-based prevention program differed across methodological aspect defined by unit of randomisation (individual vs. cluster), the appropriateness of analysis (matching units of randomisation and analysis), and attrition rates ($> 20\%$ vs. $\leq 20\%$) was performed but could not reveal any specific methodological aspect(s) that would potentially account for differences in the study results; the reason being that the studies evaluating the same or similar intervention program(s) reported relatively uniform results. For example, all trials that evaluated the Life Skills Training (LST) program yielded positive results in favour of the intervention (Botvin 1984; Botvin 1995; Botvin 2001; Botvin 2003; Schinke 2000; Spoth 2002). Similarly, two of the three trials that evaluated the GBG program (van Lier 2009, Furr-Holden 2004, Kellam 2008) demonstrated positive results in favour of the intervention. Trials that evaluated the ALERT (Ellickson 1990; Ellickson 2003; Ringwalt 2009; St. Pierre 2005) or drug abuse resistance education program (DARE) (Clayton 1991; Perry 2003; Ringwalt 1991) showed no effects (i.e., statistically non-significant).

Publication bias

Many studies did not report sufficient information for calculation of effect sizes for use in a funnel plot (Allison 1990; Botvin 1984; Caplan 1992; Duryea 1984a; Eisen 2002; Ellickson 1990; Ellickson 2003; Furr-Holden 2004; Goldberg 2000; Goldberg 2007; Goodstadt 1983; Hansen 1988; Hansen 1991; Hecht 2003; Johnson 2009; Moskowitz 1984; Newman 1992; Newton 2009a; Perry 2003; Sheehan 1996; St. Pierre 2005; van Lier 2009) and therefore we were not able to construct a funnel plot and assess risk of publication bias for this review.

DISCUSSION

Summary of main results

In this systematic review we have found studies that observed no effects of preventive interventions, as well as studies that demonstrated some statistically significant effects, for both alcohol-specific and generic prevention interventions. In this review, the number of studies that evaluated generic interventions was greater compared to that of studies that evaluated alcohol-specific interventions (39 vs. 11). Five of the 11 studies that evaluated alcohol-specific interventions did not find any statistically significant effects,

whereas 6 studies found significant beneficial effects of the intervention programs (McBride 2000; Dielman 1986; Morgenstern 2009; Perry 1988; Vogl 2009; Wilhelmsen 1994). Similarly, 24 of the 39 trials that evaluated generic programs did not find statistically significant effects, whereas the remaining 15 studies reported significantly beneficial effects of the programs with regards to some of the measures of alcohol use.

For both alcohol-specific and generic intervention programs, there was no clearly discernible pattern in characteristics (e.g., sample size, appropriate analysis, attrition rates, subgroups, intervention duration, unit of randomisation, or baseline use) that would distinguish trials with positive results from those with negative results. Most commonly observed positive effects across programs were for drunkenness and binge drinking.

Duration of intervention impact tended to be longer for generic vs. alcohol-specific or other programs. In general, studies that evaluated generic programs reported longer-term follow-up evaluations than those that evaluated alcohol-specific interventions, providing evidence of persistent effects over time (i.e., duration of impact). Positive effects of programs observed in cluster-randomised trials, which did not account for clustering effects in the analyses, may have been spurious (Scaggs 1985; Schinke 2000; Griffin 2009; Perry 1988; Wilhelmsen 1994).

Amongst the generic prevention programs, those based on psychosocial or developmental approaches (e.g., life skills through the LST program in the United States; social skills and norms through the Unplugged program in Europe; development of behaviour norms and peer affiliation through the GBG in the United States and in Europe) were more likely to report statistically significant effects over several years (up to 12 years with the GBG) when compared to standard school curriculum or other types of interventions, with effect sizes that are often small but potentially important based on economic models (Caulkins 2004; NICE 2010). Generic programs offer the additional advantage of potentially impacting on a broader set of problem behaviours, for example cannabis, tobacco, harder drugs, antisocial behaviour. Overall, we conclude that the evidence supports certain generic prevention programs over alcohol-specific prevention programs.

Some trials observed subgroup effects (e.g., by gender, baseline alcohol use, or levels of disruptive behaviour) or after adjusting or stratifying the main effects, some studies found significant effects only in certain subgroups. Few studies reported planned subgroup analyses, and on the one hand, because examining smaller samples reduces statistical power, potentially important effects in some subgroups may not have reached statistical significance (e.g. weaker effects in females). Such analyses should be regarded as hypothesis generating. On the other hand, subgroup analyses through multiple testing may result in type I error and spuriously significant associations (e.g., positive effects shown in males but not in females). It is also possible that some studies that looked only at main effects, without adjusting for potential confounders or effect modifiers, may have concealed possible subgroup effects (e.g. stronger effects

in males). Characteristics such as gender and baseline alcohol use are potential effect moderators, so by not accounting for them in the analysis, subgroup effects may be missed.

One study reported unexpected effects, in that the intervention seemed to increase the risk of alcohol misuse (i.e. a statistically significant increase in drinking in the intervention group). However, before any attribution of iatrogenic effects of particular interventions can be made, it is important to rule out the possibility that occasional unexpected results did not arise by chance, differential attrition or confounding.

One interpretation of the overall picture - some studies showing some effect and other studies showing no effect - is that this is a reflection of the reality that school-based alcohol prevention programs do not work, i.e., they are ineffective, and that there is simply a variation of individual study (and sub-group analysis) effect size estimates around an actual zero effect, with some achieving statistical significance by chance (Ioannidis 2005). However, we regard this as unlikely given the proportion and sample size of studies that found statistically significant effects coupled with the likelihood that many studies were underpowered to find small effects. A more likely interpretation of the overall picture is that some school-based psychosocial and developmental prevention interventions are effective in particular settings for reducing alcohol misuse amongst young people. However, we have also found in this systematic review that some social or life-skills based prevention interventions are not effective (e.g. Sloboda 2009). It is not clear why some prevention interventions seem to work in some studies but not in others, so further investigation of the specific content of prevention programs, and the context of their delivery, is warranted, so that clear recommendations regarding the transfer of particular prevention interventions to new settings can be made.

Quality of the evidence

In previous systematic reviews of alcohol misuse prevention for young people (Foxcroft 1997; Foxcroft 2002) we have pointed to methodological limitations in included studies. Over this period, consensus statements have been published providing guidance on reporting of randomised controlled trials generally (CONSORT 2010) or more specifically for prevention trials (Flay 2005). Cochrane reviews have also become better at systematically identifying methodological limitations through the risk of bias analysis. Our assessment is that the methodological quality of trials of alcohol misuse prevention for young people has improved over time, between 1997, 2002 and 2010. However, despite these improvements, there remain important methodological limitations and reporting problems. The failure of some studies to account for clustering effects in design or analysis is a significant limitation in studies of universal school-based alcohol misuse prevention programs, given the need for large studies that have sufficient statistical power to detect small effect sizes.

High attrition rates remain a challenge, with few studies in this review achieving the standard 80% follow-up rates expected of good trials beyond the first follow-up. High attrition rates may limit the study power to detect pre-specified between-group differences and/or extent of applicability of study results (Fewtrell 2008). More importantly, in case of differential attrition, study results may be seriously biased due to selection bias/confounding. Alongside this, few studies reported using more advanced techniques for missing data imputation and analysis within an intention to treat approach (Brown 2008). Moreover, in this review over 40% of the studies included were deemed to be susceptible to other bias in the form of confounding or contamination. . Reporting of salient features of RCTs (CONSORT 2010) is also poor in some aspects, notably allocation concealment, randomisation technique, and blinding specifically of outcome assessors. Moreover, reporting of results varied markedly across studies, with many studies not reporting important statistical information such as sample sizes in each group, or standard deviations or standard errors associated with mean scores. This inconsistent reporting meant that calculation of effect sizes for a funnel plot to assess any potential publication bias was not possible.

Content and Context: further considerations

The content or ingredients of effective prevention programs, as distinct from the content of ineffective prevention programs, needs to be more clearly understood. For example, social or life skills curricula may, or may not, vary importantly across different programs. Unfortunately, standard scientific reporting of prevention trials does not include sufficient information about the content detail of prevention interventions to make an analysis of effective ingredients straightforward. Importantly, this lack of information is also one factor that limits a pooling of results across different studies in a meta-analysis, because it is not clear whether interventions have similar or different components. Rather, program manuals and unpublished reports have to be scrutinised, coded for different ingredients, and then analysed, which is a labour intensive and costly approach. Some early review work that has taken this approach has analysed the contribution of different ingredients of prevention programs and these studies have highlighted a number of methodological and analytical challenges (Hansen 2007; Abraham 2008).

Alternatively, it may be that program content is less important than context in discriminating effective from ineffective interventions. It may be that characteristics of program delivery, including program setting, key personnel, or target age are important moderators of program effects. For example, a prevention program which has been shown to be effective in a low prevalence adoles-

cent alcohol misuse setting or country may be ineffective where adolescent drinking is the norm and social and cultural pressures to drink are more powerful.

In order to better understand the importance of content and context for effective prevention, replication studies and more systematic reporting of program content details and delivery contexts are needed. Meta-analysis, via sub-group analysis or using meta-regression techniques, could then be used to illuminate the important aspects of content and context for effective prevention interventions.

AUTHORS' CONCLUSIONS

Implications for practice

Current evidence suggests that certain generic psychosocial and developmental prevention programs can be effective and could be considered as policy and practice options. These include the Life Skills Training Program in the United States, the Unplugged program in Europe, and the Good Behaviour Game in both the United States and Europe. However, given variability in effects between studies and between subgroups within studies, it is recommended that particular attention is paid to program content and delivery context, ideally through conducting further evaluation studies alongside any further implementation in different settings.

Implications for research

As small effects could provide important cost-benefits for prevention programs, it is important to undertake studies with sufficient statistical power to detect small effects. Such small effects may vary in size and importance between subgroups, so further research should also be powered to detect hypothesized subgroup effects. The relevance of content and context of prevention program delivery for program effects is poorly understood, so studies should undertake more rigorous process evaluations alongside outcome evaluations. Reporting of program content and context should be more detailed and systematic to enable comparison of these aspects across studies. Further improvement to study design, analysis and reporting, in line with accepted guidance is required (Flay 2005; CONSORT 2010).

ACKNOWLEDGEMENTS

We are grateful to the UK Cochrane Collaboration and the NIHR for providing support to update the 2002 systematic review.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Allison 1990

Methods	Design: RCT FU: 1 yr (post-randomisation) Attrition: 18% ITT: no Unit of randomisation: class Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: 4 (92) Int-2: 5 (107) Ctrl: 3 (67) Total N: 12 (266) <u>N of Clusters (subjects) participated</u> Int-1: 4 (92) Int-2: 5 (107) Ctrl: 3 (67) Total N: 12 (266) <u>Analysed sample</u> Int-1: 4 (70) Int-2: 5 (80) Ctrl: 3 (59) Total N: 12 (209) Age: 10-11 yrs Sex (male): NR Ethnicity: NR Alcohol users at baseline: 25%-33% had drunk wine with parents Country: Canada
Interventions	<u>Intervention-1</u> : Intensive staff training <u>Intervention-2</u> : less intensive staff training: 1-2 hours only <u>Intervention description</u> : a set of resource documents to assist teachers implement the Ontario guidelines for alcohol, tobacco and other drug education <u>Focus/target</u> : closely related to Life Skills curriculum, the aim was to provide specific substance use information <u>Components</u> : promote awareness, problem-solving, decision-making, refusal skills <u>Fidelity</u> : NR <u>Duration/frequency</u> : 5 x 3hr sessions <u>Control</u> : no staff training for curriculum
Outcomes	FU: 1 yr <u>Ever had a sip of alcohol (pre-post diff.)</u> Int-1: 0% vs. Int-2: -2% vs. Ctrl: 3%, p=0.95

Allison 1990 (Continued)

	<u>Ever drank wine with parents (pre-post diff.)</u> Int-1: 8% vs. Int-2: 10% vs. Ctrl: 11%, p=0.96 <u>Ever drank wine or beer (pre-post diff.)</u> Int-1: -1%; Int-2: 0%; Ctrl: 0% (p=0.68)	
Notes	Drug Abuse Prevention Program - An Education Resource (DAPPER) Teacher training had no clear effect on outcome measures. Small sample size. Possibility of contamination between Intervention groups in some schools <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); diff=difference; ITT=intention to treat (analysis); NA=not applicable; mo=month(s)	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No intention to treat analysis
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Possible contamination

Beaulieu 1998

Methods	<p>Design: RCT FU: immediate post-intervention Attrition: 47% ITT: no Unit of randomisation: class Clustering effect adjusted: no</p>
Participants	<p><u>N of Clusters (subjects) randomised</u> Int: 2 (40) Ctrl: 3 (72)</p>

Beaulieu 1998 (Continued)

	<p>Total N: 5 (112) <u>N of Clusters (subjects) participated</u> Int: 2 (40) Ctrl: 3 (72) Total N: 5 (112)</p> <p><u>Analysed sample</u> Int: 2 (16) Ctrl: 3 (44) Total N: 5 (60) Age: 12-13 yrs Sex (male): NR Ethnicity: 100% Black Alcohol users at baseline: 31% Alcohol use mean (SD) frequency (Int vs. Ctrl) at baseline: 1.06 (0.24) vs. 1.11 (0.58) Country: US</p>	
Interventions	<p><u>Intervention description</u>: primary preventive intervention to reduce tobacco, alcohol and marijuana use <u>Focus/target</u>: strategies addressing the social and personal conditions underlying abusive drug behavior, delivered by program staff with eighth-grade peer helpers <u>Components</u>: information giving, decision making, problem solving techniques, social competency-building skills, peer helpers and role models <u>Fidelity</u>: NR <u>Duration/frequency</u>: one 45 min session per week for eight weeks <u>Control</u>: standard curriculum</p>	
Outcomes	<p>FU: 2 mo <u>Current alcohol use - mean (SD) frequency</u> Int: 1.12 (0.33) vs. Ctrl: 1.07 (0.33), p>0.05</p>	
Notes	<p>Drug Abuse Prevention Program High attrition; Intervention and control groups may not have been comparable; baseline differences in drug knowledge not accounted. Abbreviations FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); SD=standard deviation; NA=not applicable; mo=month(s)</p>	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described

Beaulieu 1998 (Continued)

Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT; attrition > 40%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Differences in some baseline factors between study arms

Bond 2004

Methods	Design: RCT FU: 3 yrs (post-randomisation) Attrition: 3% (year 1), 8% (year 2), and 10% (year 3) ITT: yes Unit of randomisation: school Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int: 16 (NR) Ctrl: 16 (NR) Total N: 32 (3623) <u>N of Clusters (subjects) participated</u> Int: 12 (1335) Ctrl: 14 (1343) Total N: 26 (2678) Age: 14 yrs Sex (male): 47% Ethnicity: NR Alcohol users at baseline: 31% Country: Australia
Interventions	<u>Intervention description</u> : a multilevel program, whole school, teaching resources, and school liaison <u>Focus/target</u> : promote emotional and behavioral well-being to reduce rates of substance use <u>Components</u> : Institutional and individual <u>Fidelity</u> : one school did not deliver the intervention for the 1 st year <u>Duration/frequency</u> : 20/yr for 10 wks <u>Control</u> : standard curriculum

Outcomes	FU: 1, 2, 3, yrs <u>Any drinking (Int vs. Ctrl)</u> OR=0.93, 95% CI: 0.71, 1.21 (year 1) OR=1.00, 95% CI: 0.78, 1.28 (year 2) OR=0.96, 95% CI: 0.69, 1.33 (year 3) <u>Regular drinking (Int vs. Ctrl)</u> OR=1.09, 95% CI: 0.77, 1.57 (year 1) OR=1.05, 95% CI: 0.70, 1.57 (year 2) OR=1.13, 95% CI: 0.77, 1.66 (year 3) <u>Binge drinking</u> OR=0.95, 95% CI: 0.69, 1.32 (year 1) OR=0.99, 95% CI: 0.70, 1.38 (year 2) OR=1.02, 95% CI: 0.71, 1.46 (year 3)	
Notes	Gatehouse Project Response rate was > 89% and non-differential <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); OR=odds ratio; 95% CI: ninety-five percent confidence interval; NA=not applicable; mo=month(s)	
<i>Risk of bias</i>		
Bias	Authors’ judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT and attrition < 10%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	No obvious differences between two study arms

Botvin 1984

Methods	Design: RCT FU: 4 months (post-randomisation) Attrition < 10% ITT: no Unit of randomisation: school Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: 4 (NR) Int-2: 4 (NR) Ctrl: 2 (NR) Total N: 10 (1311) <u>N of Clusters (subjects) participated</u> Int-1: 4 (NR) Int-2: 4 (NR) Ctrl: 2 (NR) Total N: 10 (1311) <u>Analysed sample</u> Int-1: 4 (NR) Int-2: 4 (NR) Ctrl: 2 (NR) Total N: 10 (1185) Age: 12-13 yrs (7th grade) Sex (male): NR Ethnicity: mostly White Alcohol users at baseline: NR Country: US
Interventions	<u>Intervention-1</u> : multi-component substance abuse prevention curriculum (LST) delivered by older students <u>Intervention-2</u> : a multi-component substance abuse prevention curriculum (LST) delivered by classroom teachers <u>Focus/target</u> : the major social, psychological, cognitive, and attitudinal factors that promote the use of tobacco, alcohol and marijuana <u>Components</u> : personal self-management, general social skills <u>Fidelity</u> : NR <u>Duration/frequency</u> : 20 sessions over 3-4 months Control: Standard curriculum
Outcomes	FU: 4 months Frequency of drunkenness (ANCOVA): $F(2,929) = 4.54, p < 0.01$ Consumption per occasion (ANCOVA): $F(2,876) = 5.10, p < 0.006$ No specific details given but authors report that alcohol consumption was less in peer-led group. No differences were found in levels of drunkenness between any groups.

Botvin 1984 (Continued)

Notes	Life Skills Training (LST) <u>Abbreviations</u> FU=follow-up; RCT=randomized controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); ANCOVA=analysis of covariance; LST=life skills training; NA=not applicable; mo=month(s)	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No ITT; attrition < 10%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Not described

Botvin 1995

Methods	Design: RCT FU: 6 yrs (post-randomisation) Attrition: 25% (year 3) and 40% (year 6) ITT: no Unit of randomisation: school (stratified by smoking behavior) Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: NR (NR) Int-2: NR (NR) Ctrl: NR (NR) Total N: 57 (NR) <u>N of Clusters (subjects) participated</u> Int-1: 18 (NR) Int-2: 16 (NR) Ctrl: 22 (NR) Total N: 56 (5954)

	<p><u>Sample analysed: 3 yrs</u> Int-1: 18 (NR) Int-2: 16 (NR) Ctrl: 22 (NR) Total N: 56 (4466)</p> <p><u>Sample analysed: 6 yrs</u> Int-1: 18 (1128) Int-2: 16 (1327) Ctrl: 22 (1142) Total N: 56 (3597) Age: 12-13 yrs (7th grade) Sex (male): 52% Ethnicity: 91% White Alcohol users at baseline: 18% monthly drinkers Country: US</p>
Interventions	<p><u>Intervention-1</u>: a multi-component substance abuse prevention curriculum through formal teacher training and delivery with implementation feedback <u>Intervention-2</u>: a multi-component substance abuse prevention curriculum through video training for teacher with no implementation feedback <u>Focus/target</u>: the major social, psychological, cognitive, and attitudinal factors that promote the use of tobacco, alcohol and marijuana <u>Components</u>: cognitive behavioral skills to raise self-esteem, resistance, assertiveness, relationship, anxiety management & communication skills <u>Fidelity</u>: one school post-randomisation was lost. Randomly selected classes monitored and average implementation fidelity scored at 68% <u>Duration/frequency</u>: 15 sessions (1 year) and 10 + 5 booster sessions in the following 2 years <u>Control</u>: standard curriculum</p>
Outcomes	<p><u>FU: 3 yrs</u> Results for FU of 3 yrs were reported for "high fidelity" sample only and as this breaks the randomisation and increases the risk of bias then these results are not reported here <u>FU: 6 yrs</u> (Int-1 vs. Int-2 vs. Ctrl) Monthly alcohol use (0=no, 1=yes): 0.61 (0.02) vs. 0.57 (0.03) vs. 0.60 (0.02), $p > 0.05$ Weekly alcohol use (0=no, 1=yes): 0.29 (0.02) vs. 0.24 (0.023) vs. 0.29 (0.02), $p > 0.05$ 3+ drinks per occasion (0=no, 1=yes): 0.57 (0.02) vs. 0.55 (0.03) vs. 0.59 (0.02), $p > 0.05$ Drunkenness in last month (0=no, 1=yes): 0.34 (0.02)* vs. 0.33 (0.03)* vs. 0.40 (0.02), *$p < 0.05$ (vs. Ctrl; 1-tailed test)</p>
Notes	<p>Life Skills Training (LST) Response rate was non-differential <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); LST=life skills training; NA=not applicable; mo=</p>

Botvin 1995 (Continued)

	month(s)	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	no ITT; attrition: 25%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	No baseline imbalance

Botvin 2001

Methods	Design: RCT FU: 2 yrs (post-randomisation) Attrition: 20% (year 1), 42% (year 2) ITT: no Unit of randomisation: school (stratified by smoking prevalence) Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int: 16 (NR) Ctrl: 13 (NR) Total N: 29 (5233) <u>N of Clusters (subjects) participated</u> Int: 16 (NR) Ctrl: 13 (NR) Total N: 29 (5233) <u>Sample analysed (year 2)</u> Int: 16 (NR) Ctrl: 13 (NR) Total N: 29 (3041) Age: 12-13 yrs (7th grade) Sex (male): 44% Ethnicity: 57% African American, 24% Hispanic, 8% Asian, 3% White

Botvin 2001 (Continued)

	Alcohol users: 1-2% already binge drinkers Country: US	
Interventions	<u>Intervention</u> : a multi-component substance abuse prevention curriculum <u>Focus/target</u> : the major social, psychological, cognitive, and attitudinal factors that promote the use of tobacco, alcohol and marijuana <u>Components</u> : cognitive behavioral skills to raise self-esteem, resistance, assertiveness, relationship, anxiety management & communication skills <u>Fidelity</u> : randomly selected classes monitored, with average of 48% coverage achieved <u>Duration/frequency</u> : 15 sessions in 7 th Grade and 10 booster sessions in 8 th Grade <u>Control</u> : standard curriculum	
Outcomes	FU: 1 yr Binge drinking (> 5 drinks per occasion): Int: 1.8% vs. Ctrl: 4.3% OR (adjusted)=0.41, 95% CI: 0.18, 0.93, N=2982 FU: 2 yrs Binge drinking (> 5 drinks per occasion): Int: 2.2% vs. Ctrl: 5.2% OR (adjusted)=0.40, 95% CI: 0.22,0.74, N=2982	
Notes	Life Skills Training (LST) Notable baseline differences in ethnicity and free lunch status. Response rate was < 60% and non-differential <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); LST=life skills training; NA=not applicable; mo=month(s); OR=odds ratio; CI=confidence interval	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	no ITT; attrition: 20%
Selective reporting (reporting bias)	High risk	some drinking outcomes not reported

Botvin 2001 (Continued)

Other bias	High risk	baseline differences in ethnicity and free lunch status
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Botvin 2003

Methods	<p>Design: RCT</p> <p>FU: 3 yrs (post-randomisation)</p> <p>Attrition: 42% unmatched students; matched students, relative to unmatched, had lower smoking prevalence (8.6% vs. 11%) and higher proportion of White students (48% vs. 38%)</p> <p>ITT: No (778 unmatched students were not included in the analyses)</p> <p>Unit of randomisation: school</p> <p>Clustering effect adjusted: yes</p>
Participants	<p>N of Clusters (subjects) randomized: NR</p> <p>N of Clusters (subjects) participated: Int: 9 (426) vs. Ctrl: 11 (664)</p> <p>Total N Clusters (subjects): 20 (1090)</p> <p>Age: NR (3-6 graders)</p> <p>Sex (male): 52%</p> <p>Ethnicity: White (48%), Hispanic (26%), African-American (13%), Asian (3%)</p> <p>Alcohol users: 35%</p> <p>Country: US</p>
Interventions	<p><u>Intervention</u>: LST</p> <p><u>Focus/target</u>: provide knowledge and skills for resisting social influence to use alcohol/tobacco leading to reduction of alcohol/tobacco use</p> <p><u>Components</u>: personal self-management, general social skills</p> <p><u>Fidelity</u>: random monitoring of teachers</p> <p><u>Duration/frequency</u>: 8 classes/yr for 3 yrs</p> <p><u>Control</u>: standard curriculum</p>
Outcomes	<p>FU: 3 yrs</p> <p><u>Individual level analysis</u></p> <p>Drinking frequency (Int vs. Ctrl): 0.44 (± 0.04) vs. 0.41 (± 0.03), $p=0.28$</p> <p>Drink in past yr (Int vs. Ctrl): 0.15 (± 0.01) vs. 0.16 (± 0.01), $p=0.17$</p> <p><u>School level analysis</u></p> <p>Drinking frequency (Int vs. Ctrl): 0.43 (± 0.06) vs. 0.52 (± 0.05), $p=0.14$</p> <p>Proportion drink in past yr (Int vs. Ctrl)</p> <p>0.13 (± 0.02) vs. 0.17 (± 0.02), $p=0.054$</p>
Notes	<p>Life Skills Training (LST)</p> <p>Not clear if attrition was differential; int arm had lower proportion of Whites than Ctrl (44.1% vs. 50.9%, $p=0.017$)</p> <p><u>Abbreviations</u></p> <p>FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported;</p> <p>wk(s)=week(s); ITT=intention to treat (analysis); LST=life skills training; NA=not ap-</p>

Botvin 2003 (Continued)

	plicable; mo=month(s)	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	no ITT; attrition: 42%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	differences across study arms

Brewer 1991

Methods	Design: RCT FU: 6 mo (post-randomisation) Attrition: 0% (year 1) ITT: yes Unit of randomisation: student Clustering effect adjusted: NA
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: NR (18) vs. Int-2: NR (18) vs. Ctrl: NR (18) Total N: NR (54) <u>N of Clusters (subjects) participated</u> Int-1: NR (18) Int-2: NR (18) Ctrl: NR (18) Total N: NR (54) Age: 15-16 yrs Sex (male): 50% Ethnicity: NR Alcohol users: 9% used monthly Country: US

Brewer 1991 (Continued)

Interventions	<u>Intervention-1</u> : social skills development curriculum <u>Intervention-2</u> : placebo - video tapes of drug and alcohol material <u>Focus/target</u> : decrease onset and use of tobacco and alcohol <u>Components</u> : development of social skills through 5 steps; recognizing need for skills; modelling 5 steps; role playing; rehearsal; feedback <u>Fidelity</u> : NR <u>Duration/frequency</u> : 9 x 40 minute sessions over 9 weeks <u>Control</u> : standard curriculum	
Outcomes	FU: 6 mo Alcohol use (0-19 scale; 0=non-user): Int-1: 10.7 (+3.1) vs. Int-2: 13.0 (no change) vs. Ctrl: 13.1 (-0.7) (F = 4,863, df = 2, p = 0.014; higher alcohol use in the experimental group due to some methodological errors) No significant effect (level of significance adjusted for family wise error rate) for initiation, experimental and regular alcohol use	
Notes	HLAY2 Response rate was 100%. Possible contamination as study in one school only. Some concerns over methodological errors in recording alcohol use and validity/reliability of questionnaire measures <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); df=degrees of freedom; HLAY2= here's looking at you	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT done; Attrition: < 10%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported

Brewer 1991 (Continued)

Other bias	High risk	Possible contamination as study in one school only. Some concerns over methodological errors in recording alcohol use and validity/reliability of questionnaire measures
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Caplan 1992

Methods	Design: RCT FU: 15 wks (post-randomisation) Attrition: 17% ITT: no Unit of randomisation: class, stratified by ability Clustering effect adjusted: yes
Participants	Total N of Clusters (subjects) randomised: NR (298) N of Clusters (subjects) participated: Int: NR (NR) vs. Ctrl: NR (NR) Total N of Clusters (subjects) participated: NR (282) Age: 11-13 yrs Sex (male): 55% Ethnicity: 90% Black Alcohol users: NR Country: US
Interventions	<u>Intervention</u> : a school-based social competence / skills curriculum <u>Focus/target</u> : promoting personal and social competence to reduce self-reported substance use intentions and excessive alcohol use <u>Components</u> : social competence training; stress management; self-esteem; problem solving; substances and health; assertiveness; social networks <u>Fidelity</u> : NR <u>Duration/frequency</u> : 20 sessions over 15 weeks <u>Control</u> : standard curriculum
Outcomes	FU: 15 wks <u>3+ drinks per occasion (ANOVA)</u> F (1,213)=3.65, p<0.05; Ctrl higher <u>Drinking too much (ANOVA)</u> F (1,213)=3.68, p<0.05; Ctrl higher <u>Amount usually consumed per occasion (ANOVA)</u> F (1,213)=5.65, p<0.02; Ctrl higher Other measures of drinking behaviour were listed in method but not reported in results
Notes	Positive Youth Development Program (PDYP) Risk of contamination within schools. One class reassigned to Ctrl group because of "scheduling difficulties" <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported;

Caplan 1992 (Continued)

	wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); ANOVA=analysis of variance; PDYP= positive youth development program	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT
Selective reporting (reporting bias)	High risk	Some measures of alcohol drinking listed but not reported
Other bias	High risk	Possible contamination since classes were randomized within schools

Clayton 1991

Methods	Design: RCT FU: 2, 5, 10 yrs post-randomisation Attrition: 21% (year 2 post-randomisation), 45% (year 5 post-randomisation), 52% (year 10 post-randomisation) ITT: no Unit of randomisation: school Clustering effect adjusted: yes (at 5 and 10 yrs)
Participants	N of Clusters (subjects) randomised: Int: 23 (NR) vs. Ctrl: 8 (NR) Total N of Clusters (subjects) randomised: 31 (NR) Analysed sample (10 years): Int: 23 (NR) vs. Ctrl: 8 (NR) Total N analysed clusters (subjects) at year 10: 31 (1002) Age: 11-12 yrs Sex (male): 51% Ethnicity: 75% White Past yr of alcohol use: Int (19.8%) vs. Ctrl (16.2%), p<0.05 Country: US
Interventions	<u>Intervention</u> : DARE - social and life skills curriculum <u>Focus/target</u> : teaching students skills for recognizing and resisting social pressure to use

Clayton 1991 (Continued)

	drugs <u>Components</u> : resistance training, self-esteem, social skills, information, role-play. Delivered by trained uniformed police officer <u>Fidelity</u> : NR <u>Duration/frequency</u> : 17 1-hr sessions / 17 weeks <u>Control</u> : standard drug education	
Outcomes	FU: 2 yrs <u>Past yr of alcohol use (Int vs. Ctrl)</u> : 38.3% vs. 38.3%, p≥0.05 FU: 5 yrs <u>Frequency of past yr alcohol use</u> : standardized beta coefficient for DARE status in HLM = -0.12 (p≥0.05) FU: 10 yrs <u>Frequency of past mo alcohol use</u> : standardized beta coefficient for DARE status in HLM = -0.18 (p≥0.05) DARE status was not related to alcohol use at age 20	
Notes	Project DARE Some evidence of differential attrition. Baseline imbalance in alcohol use <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); DARE=drug abuse resistance education; HLM= hierarchical linear model	
<i>Risk of bias</i>		
Bias	Authors’ judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT; attrition > 20% (possibly differential)
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Baseline imbalance in alcohol use

Cook 1984

Methods	Design: RCT FU: 2 yrs (post-randomisation) Attrition: 16% ITT: no Unit of randomisation: individual Clustering effect adjusted: no
Participants	<p><u>N of Clusters (subjects) randomised</u> Int: NA (90) Ctrl: NA (64) Total N: NA (154)</p> <p><u>N of Clusters (subjects) participated</u> Int: NA (90) Ctrl: NA (64) Total N: NA (154)</p> <p><u>Analysed sample (year 1)</u> Int: NA (77) Ctrl: NA (57) Total N: NA (134)</p> <p><u>Analysed sample (year 2)</u> Int: NA (58) Ctrl: NA (50) Total N: NA (108) Age: 15-16 yrs Sex (male): 53% Ethnicity: 66.4% (White), 32% (Black), and 1.5% (Oriental) Alcohol users: 31% Country:US</p>
Interventions	<p><u>Intervention</u>: additional classes meeting during school-time to present healthy alternatives to drug abuse</p> <p><u>Focus/target</u>: promote consideration of alternative activities to reduce substance use</p> <p><u>Components</u>: PAY orientation, communication, self-concept, self-care, activities, physical, creative self-expression, consciousness alteration</p> <p><u>Fidelity</u>: NR</p> <p><u>Duration/frequency</u>: 2-3 sessions/week over 1 semester</p> <p><u>Control</u>: standard curriculum</p>
Outcomes	FU: 1 yr <u>Hard liquor use in the last 2 mo (not at all - daily)</u> Int (pre: 1.53 vs. post: 1.40) Change: -0.13 Ctrl (pre: 1.49 vs. post: 1.55) Change: +0.06 F=6.72, p=0.01 (in favour of Int) <u>Beer/wine use in the last 2 mo (not at all - daily)</u>

Cook 1984 (Continued)

	(F=0.298, p=0.58)	
	FU: 2 yrs No results were presented as all analyses reportedly were non-significant	
Notes	Positive Alternatives for Youth (PAY) Marked differences at baseline between Int. and Ctrl. Differences in baseline characteristics only taken into account in Study 2 analyses <u>Abbreviations</u> FU=follow-up; RCT=randomized controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); PAY=positive alternatives for youth; pre=pre-treatment; post=post-treatment	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT
Selective reporting (reporting bias)	High risk	Second year results of alcohol use not reported
Other bias	High risk	Differences in baseline characteristics for Study 1 not taken into account

Dielman 1986

Methods	<p>Design: RCT FU: 3-4 yrs (post-randomisation) Attrition: 12% (post-test), 33% (year 2), 36% (year 4) ITT: no Unit of randomisation: school building Clustering effect adjusted: yes</p>
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Participants	<p><u>N of Clusters (subjects) randomised</u> Int: NR (NR) Ctrl: NR (NR) Total N: 49 (5635)</p> <p><u>N of Clusters (subjects) participated</u> Int: NR (NR) Ctrl: NR (NR) Total N: NR (NR)</p> <p>Only half the randomised sample were pre-tested and analysed at follow-up:</p> <p><u>Analysed sample</u> Int: NR (1499) Ctrl: NR (706) Total N: NR (2280) Age: 10-12 yrs Sex (male): NR Ethnicity: NR Alcohol users: 7%-13% Country: US</p>
Interventions	<p><u>Intervention</u>: social learning approach to alcohol misuse prevention <u>Focus/target</u>: the acquisition of behavioral skills to resist pressures to misuse alcohol <u>Components</u>: providing information and social skills; awareness of risks and pressures to drink; peer pressure resistance & refusal skills <u>Fidelity</u>: NR <u>Duration/frequency</u>: 4 sessions (each 45 min) + booster sessions <u>Control</u>: standard curriculum</p>
Outcomes	<p>FU - Immediate post-intervention [Unadjusted for prior drinking] <u>Mean (SD) alcohol weekly use in past 12 mo</u> [Never=0 to every day=5] Int: pre 0.26 (0.70) vs. post 0.41 (0.77) Ctrl: pre 0.29 (0.69) vs. post 0.44 (0.79) Between-group: NS</p> <p><u>Mean (SD) alcohol weekly misuse in past 12 mo (overindulgence)</u> [Never=0 to three or more times =3] Int: pre 0.31 (0.70) vs. post 0.39 (0.78) Ctrl: pre 0.36 (0.75) vs. post 0.43 (0.82) Between-group: NS</p> <p>FU: 3 yrs [Adjusted for prior drinking] In those with prior alcohol drinking experience, the treatment group had greater post-intervention reduction in the rate of increase of alcohol use; in those with no prior alcohol drinking experience, there was no difference between the treatment</p>

Dielman 1986 (Continued)

	and control groups (total alcohol misuse - p < 0.01; alcohol frequency-quantity index - p < 0.05)	
	FU: 4 yrs Follow-up on a sample subset found no significant effect of the AMPS curriculum on tenth grade alcohol misuse	
Notes	Alcohol Misuse Prevention Study (AMPS) At FU immediately after treatment, prior alcohol drinking was not controlled and crude analysis did not reveal treatment effects on alcohol misuse; at FU 3yrs, controlling for prior alcohol drinking revealed treatment effects in reducing rates of alcohol misuse/usePre-test and analysis only undertaken in half of participating schools, reducing statistical power; attrition rates not clearly reported across publications; students who missed all booster or intervention sessions were coded as not having received intervention. <u>Abbreviations</u> FU=follow-up; RCT=randomized controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); AMPS=alcohol misuse prevention study; NS=statistically non-significant; SD=standard deviation; pre=pre-treatment; post=post-treatment	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT; attrition > 33%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Prior alcohol drinking not controlled

Durrant 1986

Methods	<p>Design: RCT FU: 22 wks (post-randomisation) Attrition: NR ITT: NR Unit of randomisation: school Clustering effect adjusted: no</p>
Participants	<p><u>N of Clusters (subjects) randomised</u> Int: 4 (NR) Ctrl: 4 (NR) Total N: 8 (NR) <u>N of Clusters (subjects) participated</u> Int: 4 (NR) Ctrl: 4 (NR) Total N: 8 (NR) <u>Analysed sample -N of Clusters (subjects)</u> Int: 4 (102) Ctrl: 4 (89) Total N: 8 (191) Age: 11-12 yrs Sex (male): 48% Ethnicity: NR Alcohol users: NR Country: US</p>
Interventions	<p><u>Intervention</u>: multi-component "inoculation programme" <u>Focus/target</u>: health education through lectures, class discussions, and student exercises <u>Components</u>: anti-smoking strategy applied to alcohol & other drugs: emphasizing healthy lifestyles; negative effects of drug use; decision making skills; skills to resist social pressures <u>Fidelity</u>: NR <u>Duration/frequency</u>: 9 x 45 min sessions over 22 weeks <u>Control</u>: NR</p>
Outcomes	<p>FU: 22 wks <u>Mean (SD) liquor use (6-point scale)</u> Int: 1.54 (0.35) vs. Ctrl: 1.15 (0.64), $p > 0.05$, NS F (1,184) < 1</p>
Notes	<p>Multi-component "inoculation programme" Randomization was stratified by school size, minority population and the number of free lunches <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; SD=standard deviation</p>
<i>Risk of bias</i>	

Durrant 1986 (Continued)

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not described
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Not described

Duryea 1984a

Methods	Design: RCT FU: 3 yrs (post-randomisation) Attrition: 16% (year 3) ITT: no Unit of randomisation: individual Clustering effect adjusted: NA
Participants	<u>N of Clusters (subjects) randomised</u> Int: NA (NR) Ctrl: NA (NR) Total N: NA (155) <u>N of Clusters (subjects) participated</u> Int: NA (NR) Ctrl: NA (NR) Total N: NA (155) <u>Analysed sample</u> Int: NA (91) Ctrl: NA (39) Total N: NA (130) Age: 14-15 yrs Sex (male): NR Ethnicity: NR Alcohol users: NR Country: US

Interventions	<u>Intervention</u> : a psychological “immunization” program <u>Focus/target</u> : forewarn students about the dangers of drugs to “immunize” them, especially with regard to peer pressure <u>Components</u> : film, question & answer session; highlighting specific alcohol related concepts; role playing and ability to refuse Some booster activities <u>Fidelity</u> : NR <u>Duration/frequency</u> : 6 sessions/2 weeks <u>Control</u> : NR	
Outcomes	<u>FU</u> : 6 mo Frequency of self-reported alcohol drinking did not significantly differ in Int vs. Ctrl, p>0.05 (NS) <u>FU</u> : 3 yrs Mean (SD) drinking occasions in past 2 weeks - Int: 2.06 (1.11) vs. Ctrl: 2.05 (0.97), T (128)=-0.07, p=0.94 (NS) Mean (SD) N times drank too much in past 2 weeks - Int: 1.48 (0.82) vs. Ctrl: 1.20 (0.47), T (128)=-1.98, p=0.05 (NS)	
Notes	Preventive Alcohol Education Program Compliance Increased in Int group (6 mo post-test vs. baseline, p<0.05) and decreased in Ctrl (6 mo post-test vs. baseline, p<0.0005). Response rate was c.84% but differential attrition rates between groups <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; SD=standard deviation; pre=pre-treatment; post=post-treatment	
<i>Risk of bias</i>		
Bias	Authors’ judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	High risk	Assessors were not blinded
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT; differential attrition
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported

Duryea 1984a (Continued)

Other bias	Unclear risk	Not described
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D'Amico 2002

Methods	<p>Design: RCT</p> <p>FU: 6 mo (post-randomisation)</p> <p>Attrition: More students dropped from Ctrl vs. Int 1-2 arms (p<0.01); amongst control students, male sex, low SES, and endorsement of strong positive expectancy were associated with higher dropout rates</p> <p>ITT: No</p> <p>Unit of randomisation: student</p> <p>Clustering effect adjusted: NA</p>
Participants	<p><u>N of Clusters (subjects) randomised</u></p> <p>Int 1: NA (75)</p> <p>Int 2: NA (75)</p> <p>Ctrl: NA (150)</p> <p>Total N: NA (300)</p> <p><u>N of Clusters (subjects) participated</u></p> <p>Int 1: NA (NR)</p> <p>Int 2: NA (NR)</p> <p>Ctrl: NA (NR)</p> <p>Total N: NA (NR)</p> <p>Age: 14-19 yrs</p> <p>Sex (male): 42%</p> <p>Ethnicity: White (63%), Hispanic (17%), African-American (10%), Asian (2%), Other (8%)</p> <p>Alcohol users: heavy drinkers (8%), moderate drinkers (13%), light drinkers (18%), abstainers (46%)</p> <p>Country: US</p>
Interventions	<p><u>Intervention -1: RSTP</u> - a brief interactive and motivational program</p> <p><u>Focus/target:</u> multiple risk behaviours, personal beliefs, and experienced consequences to reduce participation in risk behaviors</p> <p><u>Components:</u> Interactive group session, exchange of confidential and personalized graphic feedback regarding risk taking behavior, discussion on peer influence</p> <p><u>Fidelity:</u> 5.3 (± 0.58)</p> <p><u>Duration/frequency:</u> single 50 min session</p> <p><u>Intervention-2: DARE-A</u> is a brief didactic, education based program</p> <p><u>Focus/target:</u> Increasing knowledge of deleterious effects of substance use</p> <p><u>Components:</u> how substances change mind/body, drugs and the law, consequences, assertive resistance</p> <p><u>Fidelity:</u> 2.0 (± 0.00)</p> <p><u>Duration/frequency:</u> single 50 min session</p> <p><u>Control:</u> standard curriculum</p>

Outcomes	FU-2 mo (Int-1 vs. Int-2 vs. Ctrl) <u>Weekly drinking (0-21 drinks)</u> 2.82 (±4.19) vs. 2.64 (±4.42) vs. 2.48 (±4.14), p>0.05 (NS) <u>Risky drinking (0-41 drinks in 3 mo)</u> 1.42 (±2.98) vs. 0.84 (±2.85) vs. 1.59 (±4.92), p>0.05 (NS) FU-6 mo (Int-1 vs. Int-2 vs. Ctrl) <u>Weekly drinking (0-21 drinks)</u> 2.76 (±4.05) vs. 1.78 (±3.23) vs. 3.44 (±4.74), p>0.05 (NS) <u>Risky drinking (0-41 drinks in 3 mo)</u> 1.90 (±3.68) vs. 1.06 (±2.76) vs. 2.36 (±4.70), p>0.05 (NS)	
Notes	No significant baseline differences between the trial arms. <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; SD=standard deviation; RSTP=risk skills training program; DARE-A=drug abuse and resistance education	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT; differential attrition rates
Selective reporting (reporting bias)	High risk	One relevant outcome not reported
Other bias	Low risk	No significant baseline differences

Methods	<p>Design: RCT</p> <p>FU: 2 yrs (post-randomisation)</p> <p>Attrition: 16% (1st yr) dropout rates were associated with marijuana use, Hispanic American race, not from two-parent household</p> <p>ITT: Yes</p> <p>Unit of randomisation: school</p> <p>Clustering effect adjusted: Yes</p>
Participants	<p><u>N of Clusters (subjects) randomised</u></p> <p>Int: 17 (NR)</p> <p>Ctrl: 17 (NR)</p> <p>Total N: 34 (7426)</p> <p><u>N of Clusters (subjects) participated</u></p> <p>Int: NR (NR)</p> <p>Ctrl: NR (NR)</p> <p>Total N: NR (6239) 1st yr FU</p> <p>Total N: NR (5691) 2nd yr FU</p> <p>Age: ≤14 yrs (6th graders)</p> <p>Sex (male): 48.3%</p> <p>Ethnicity: White (25.7%), Hispanic (34%), African-American (17.6%), Asian (7.1%), Other (6.3%)</p> <p>Recent (30 days) use of alcohol: 9.5%</p> <p>Country: US</p>
Interventions	<p><u>Intervention</u>: SFA - a multi-strategy program to teach social competency and refusal skills</p> <p><u>Focus/target</u>: teaches cognitive behavioral skills for building self-esteem and personal responsibility, communicating effectively, making better decisions, and resisting social influences</p> <p><u>Components</u>: 3 sessions on challenges of entering the teen yrs, 4 sessions on building self-confidence and communication skills, 5 sessions on managing emotions in positive way, 8 sessions on improving peer relationships, resisting peer pressure, and 20 sessions on living healthy and drug free</p> <p><u>Fidelity</u>: NR</p> <p><u>Duration/frequency</u>: 40 sessions over 1 yr (35-45 min each)</p> <p><u>Control</u>: standard curriculum</p>
Outcomes	<p>FU-1 yr (Int vs. Ctrl)</p> <p><i>Substance non-users at baseline</i></p> <p>Alcohol use-lifetime: 29.61% vs. 30.19% (RD=-0.58, 95% CI: -3.11, 4.27)</p> <p>Alcohol use-recent: 7.17% vs. 7.25% (RD=-0.08, 95% CI: -2.33, 1.57)</p> <p>Binge drinking: 3.15% vs. 3.58% (RD=-0.43, 95% CI: -1.91, 0.66)</p> <p><i>Substance users at baseline</i></p> <p>Binge drinking: 16.98% vs. 20.45% (RD=-3.47, 95% CI: -15.07, 8.14)</p> <p>FU-2 yr (Int vs. Ctrl)</p> <p>Alcohol use-lifetime: 66.97% vs. 66.33% (RD=0.64, 95% CI: -2.25, 3.53)</p> <p>Alcohol use-recent: 22.85% vs. 23.18% (RD=-0.33, 95% CI: -3.01, 2.35)</p>

Eisen 2002 (Continued)

	Binge drinking: 12.67% vs. 13.11% (RD=-0.44, 95% CI: -2.78, 1.91)	
Notes	Lions-Quest “Skills for Adolescence” The effect of SFA was greater in Hispanic compared with non-Hispanic Americans <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; SD=standard deviation; RSTP=risk skills training program; DARE-A=drug abuse and resistance education; SFA=skills for adolescence; min=minute(s); RD=risk difference; 95% CI: ninety-five percent confidence interval	
<i>Risk of bias</i>		
Bias	Authors’ judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT and attrition < 20%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Not described

Ellickson 1990

Methods	Design: RCT FU: 3 mo, 12 mo, 5 yrs (post-randomisation) Attrition: 40% (15 mo), 25% (year 2), 45% (year 5) ITT: no Unit of randomisation: school Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: 10 (NR) Int-2: 10 (NR) Ctrl: 10 (NR)

	<p>Total N: 30 (6527)</p> <p><u>N of Clusters (subjects) participated</u></p> <p>Int-1: 10 (NR)</p> <p>Int-2: 10 (NR)</p> <p>Ctrl: 10 (NR)</p> <p>Total N: 30 (6527)</p> <p><u>Analysed sample</u></p> <p>Int-1: 10 (NR)</p> <p>Int-2: 10 (NR)</p> <p>Ctrl: 10 (NR)</p> <p>Total N: 30 (3852)</p> <p>Age: 12-14 yrs (Grades 7 & 8)</p> <p>Sex (male): 52%</p> <p>Ethnicity: White (67%), Hispanic (10%), Black (10%), Asian (8%), and Indian/mixed (5%)</p> <p>Alcohol users (ever): 77%</p> <p>Country: US</p>
Interventions	<p>Intervention-1: teen leader (curriculum synthesized aspects of health belief model, social learning theory and self-efficacy theory)</p> <p>Intervention-2: adult health educator (curriculum synthesized aspects of health belief model, social learning theory and self-efficacy theory)</p> <p><u>Focus/target</u>: change norms and beliefs about drug use; identify and resist peer pressure</p> <p><u>Components</u>: develop reasons not to use drugs, discuss pressures to use drugs, resistance skills, prevalence of drug use</p> <p><u>Fidelity</u>: 92% observed classes delivered curriculum as intended</p> <p><u>Duration/frequency</u>: 2 yrs; 7th grade - 8 sessions; 8th grade - 3 sessions</p> <p><u>Control</u>: standard curriculum</p>
Outcomes	<p>FU: 3 mo</p> <p><i>Non-users of alcohol at baseline (N=953)</i></p> <p><u>Alcohol use - ever (%)</u></p> <p>Int-1: 16.3* vs. Int-2: 18.0 vs. Ctrl: 22.8</p> <p><u>Alcohol use past mo (%)</u></p> <p>Int-1: 5.9* vs. Int-2: 8.0 vs. Ctrl: 10.8</p> <p><i>Users of alcohol at baseline (N=1130)</i></p> <p><u>Alcohol use past mo (%)</u></p> <p>Int-1: 69.6 vs. Int-2: 62.7 vs. Ctrl: 69.5</p> <p>FU: 12 mo</p> <p><i>Non-users of alcohol at baseline (N=953)</i></p> <p><u>Alcohol use - ever (%)</u></p> <p>Int-1: 47.4 vs. Int-2: 45.5 vs. Ctrl: 50.0</p> <p><u>Alcohol use past mo (%)</u></p> <p>Int-1: 14.4 vs. Int-2: 10.5 vs. Ctrl: 14.6</p> <p><i>Users of alcohol at baseline (N=1130)</i></p> <p><u>Alcohol use past mo (%)</u></p>

	Int-1: 73.0 Int-2: 70.7 Ctrl: 71.6 *p<0.05 (vs. Ctrl) FU: 5 yrs Alcohol use [absolute amount in % greater or less than Ctrl group prevalence] stratified by baseline risk (1 = nonuser, 2 = experimenter, 3 = user)			
	Baseline risk	1	2	3
	N	(855)	(1569)	(1042)
	<u>Lifetime (%)</u>			
	Ctrl	82.5	100	100
	Int-1	0	na	na
	Int-2	2.7	na	na
	<u>Past yr (%)</u>			
	Ctrl	54.0	80.5	91.3
	Int-1	3.4	-0.6	2.2
	Int-2	0.9	2.4	-0.4
	<u>Past mo (%)</u>			
	Ctrl	34.1	56.2	70.2
	Int-1	1.3	-3.3	4.6
	Int-2	0.2	0.4	-4.1
	<u>Monthly (%)</u>			
	Ctrl	24.2	41.3	59.9
	Int-1	-1.7	1.3	-1.0
	Int-2	-4.2	-1.9	-6.8
	<u>Weekly (%)</u>			
	Ctrl	8.3	10.2	13.9
	Int-1	-1.1	-0.3	1.3
	Int-2	-4.4*	-0.9	0
	<u>Daily (%)</u>			
	Ctrl	0.4	0.2	1.0
	Int-1	na	na	na
	Int-2	na	na	na
	*p<0.05 (vs. Ctrl)			
Notes	Project ALERT Attrition 25% to 45% but no evidence of differential attrition. No adjustment for multiple testing <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; SD=standard deviation; na=not analysed (because frequency was either 100% or <2%)			

Ellickson 1990 (Continued)

<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	Attrition > 20% but not differential
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	No evidence of baseline difference or Columbia

Ellickson 2003

Methods	Design: RCT FU: 18 mo (post-randomisation) Attrition: 9% ITT: No Unit of randomisation: school Clustering effect adjusted: Yes
Participants	<u>N of Clusters (subjects) randomised</u> Int: NR (2810) Ctrl: NR (1879) Total N: 55 (4689) <u>N of Clusters (subjects) participated</u> Int: 34 (2553) Ctrl: 21 (1723) Total N: 55 (4276) Age: NR (7 th and 8 th graders) Sex (male): 50% Ethnicity: Non-White (12.5%) Ever tried alcohol: 60% Country: US

Interventions	<p>Intervention: ALERT - program</p> <p>Focus/target: the program includes 3 theories in behavioral change:</p> <p>1) health belief model which focuses on cognitive factors that motivate healthy behavior</p> <p>2) social learning model which emphasizes social norms and significant others as key determinants of behavior</p> <p>3) self-efficacy theory of behavior change to accomplish a task as essential to effective action</p> <p>Components: interactive teaching methods such as question and answer technique and small group activities done in 11 sessions in 7th grade and 3 sessions in 8th grade</p> <p>Fidelity: 88% activities accomplished for 7th grade and 93% for 8th grade</p> <p>Duration/frequency: 14 lessons in 18 mo</p> <p>Control: standard curriculum</p>	
Outcomes	<p>FU-18 mo</p> <p>The mean scores (using specific alcohol scales) for overall misuse and high risk drinking were significantly lower (i.e., improved) in Int vs. Ctrl (p<0.05)</p> <p><i>Baseline non-users</i> (Int vs. Ctrl)</p> <p>Overall misuse: 0.22 vs. 0.30, NS</p> <p>Alcohol-related consequence: 0.13 vs. 0.18, NS</p> <p>High risk use: 0.10 vs. 0.11, NS</p> <p><i>Baseline users</i> (Int vs. Ctrl)</p> <p>Overall misuse: 1.78 vs. 2.23, p<0.05</p> <p>Alcohol-related consequence: 1.04 vs. 1.29, p<0.05</p> <p>High risk use: 0.74 vs. 0.92, p<0.01</p>	
Notes	<p>Project ALERT</p> <p>Although dropouts were more likely to be male, non-White, having low grades, single-parent family, users of alcohol or marijuana, the attrition rates did not significantly differ across the arms</p> <p>The effect of ALERT was observed only in baseline user (high risk) students but not in non-user students</p> <p><u>Abbreviations</u></p> <p>FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant</p>	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described

Ellickson 2003 (Continued)

Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	Dropouts and analyzed sample compared; attrition < 20%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	No obvious differences across study arms

Faggiano 2007

Methods	Design: RCT FU: 3, 18 mo (post-randomisation) Attrition: 10.0% (3 mo post-baseline), 21.7% (18 mo post-baseline) ITT: yes Unit of randomisation: school Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int: 102 (NR) Ctrl: 68 (NR) Total N: 170 (NR) <u>N of Clusters (subjects) participated at 18 mo FU</u> Int: NR (2811) Ctrl: NR (2730) Total N: NR (5541) Analyzed sample: N = 5541 Age: 12-14 yrs (7th-9 th grades) Sex (male): 52% Ethnicity: NR Alcohol use: 24.1% Any drunkenness: 6% Frequent drunkenness: 1.8% Multi-center study - EU-DAP (Austria, Belgium, Germany, Greece, Italy, Spain, and Sweden)
Interventions	<u>Intervention</u> : EU-Dap school program in 3 formats: 1) class curriculum alone, complemented with activities involving either 2) family or 3) peer <u>Focus/target</u> : experimental and regular use of alcohol, tobacco, and illicit drugs <u>Components</u> : Social skills, personal skills, knowledge and normative education <u>Fidelity</u> : NR <u>Duration/frequency</u> : 12 sessions (1 hr each) weekly <u>Control</u> : standard curriculum

Outcomes	<p>FU: 3 mo (Int vs. Ctrl)</p> <p><u>Any drunkenness in the past mo (%)</u> OR [3-level adjusted] = 0.69 (95% CI: 0.48, 0.99); ARR=1.2%; NNT=82 (95% CI: 47, 305)</p> <p><u>Frequent drunkenness in the past mo (%)</u> OR [3-level adjusted] = 0.77, 95% CI: 0.60, 1.00; ARR=1.7%; NNT=60, 95% CI: 34, 223</p> <p><u>Any drunkenness in the past mo (%)</u> All Boys: OR [3-level adjusted] = 0.64 (95% CI: 0.49, 0.85) Boys with high self-esteem: OR [3-level adjusted] = 0.69 (95% CI: 0.50, 0.94) Boys with low self-esteem: OR [3-level adjusted] = 0.58 (95% CI: 0.29, 1.17) All Girls: OR [3-level adjusted] = 0.86 (95% CI: 0.63, 1.18) Girls with high self-esteem: OR [3-level adjusted] = 0.83 (95% CI: 0.58, 1.19) Girls with low self-esteem: OR [3-level adjusted] = 1.23 (95% CI: 0.66, 2.29)</p> <p><u>Frequent drunkenness in the past mo (%)</u> All Boys: OR [3-level adjusted] = 0.68 (95% CI: 0.45, 1.04) Boys with high self-esteem: OR [3-level adjusted] = 0.71 (95% CI: 0.43, 1.14) Boys with low self-esteem: OR [3-level adjusted] = 0.75 (95% CI: 0.25, 2.19) All Girls: OR [3-level adjusted] = 0.66 (95% CI: 0.37, 1.18) Girls with high self-esteem: OR [3-level adjusted] = 0.59 (95% CI: 0.31, 1.12) Girls with low self-esteem: OR [3-level adjusted] = 1.71 (95% CI: 0.49, 5.92)</p> <p>FU: 18 mo (Int vs. Ctrl)</p> <p><u>Weekly drinking (%)</u> Total sample: OR [3-level adjusted] =0.93, (95% CI: 0.79, 1.09) Baseline drinkers: OR [3-level adjusted] =0.95, (95% CI: 0.72, 1.27) Baseline non-drinkers: OR [3-level adjusted] =0.88, (95% CI: 0.73, 1.07)</p> <p><u>Alcohol drinking (current)</u></p> <p><i>Baseline non-drinkers</i> None: 73.9% vs. 71.9%, p>0.05 Occasional*: 12.5% vs. 12.1%, p>0.05 Frequent**: 13.6% vs. 16.0%, p>0.05</p> <p><i>Baseline frequent drinkers</i> None: 17.7% vs. 20.2%, p>0.05 Occasional: 16.1% vs. 13.1%, p>0.05 Frequent: 66.1% vs. 66.7%, p>0.05 * Monthly but not weekly drinking ** At least weekly drinking</p> <p><u>Any drunkenness in past 30 d</u> Total sample: OR [3-level adjusted] =0.80 (95% CI: 0.67, 0.97); NNT=26</p> <p><u>Frequent drunkenness in past 30 d</u> Total sample: OR [3-level adjusted] =0.62 (95% CI: 0.47, 0.81); NNT=40</p>
Notes	<p>EU-DAP - European drug abuse prevention trial</p> <p>Results of three intervention programs were not presented separately but instead were pooled and compared with control group</p> <p>At 3 mo post-randomisation, the program was shown to be protective in terms of 'any</p>

Faggiano 2007 (Continued)

	<p>drunkenness' in boys aged 13-18 yrs (OR=0.63, 95% CI: 0.48, 0.83), but not in boys aged 11-12 yrs old (OR=0.56, 95% CI: 0.25, 1.28) or girls of any similar age group. There was similar but non-significant trend for 'frequent drunkenness' in boys aged 13-18 yrs (OR=0.69, 95% CI: 0.46, 1.04). At 18 mo post-randomization, neither baseline drinking nor gender seemed to modify the non-significant effect of program in reducing the rate of weekly drinking. At 18 mo post-randomization, the proportion of non-drinking students did not differ in the program and control groups irrespective of the baseline drinking intensity</p> <p><u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; EU-DAP= European drug abuse prevention trial; ARR=absolute risk difference; NNT=number needed to treat; OR=odds ratio; CI=confidence interval</p>
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Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Low risk	Central randomization
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT analysis; attrition: 10% (3 months post-randomisation)
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	Regression adjusted for covariate

Furr-Holden 2004

Methods	<p>Design: RCT FU: 7 yrs (post-randomisation) Attrition: 16% ITT: Yes Unit of randomisation: classroom Clustering effect adjusted: Yes</p>
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Participants	<p><u>N of Clusters (subjects) randomised</u> Int 1: NR (NR) Int 2: NR (NR) Ctrl: NR (NR) Total N: 27 (678)</p> <p><u>N of Clusters (subjects) participated</u> Int 1: NR (192) Int 2: NR (196) Ctrl: NR (178) Total N: 27 (566) Age: 5.3 - 7.7 yrs (1st graders)</p> <p>Sex (male): 50% Ethnicity: African American (85%-90%), Euro-American (10%-15%) Ever tried alcohol: NR Country: US</p>
Interventions	<p><u>Intervention 1: CC intervention</u> <u>Focus/target:</u> to modify youth's characteristics, conditions and processes in life to achieve more healthy behavior later in life; reduction of risk of use of alcohol, tobacco, marijuana, and other drugs <u>Components:</u> 1) curricular enhancements, 2) improved classroom behavior management practice, and 3) supplementary strategies for children not performing adequately</p> <p><u>Intervention 2: FSP intervention</u> <u>Focus/target:</u> to improve achievement and reduce early aggression and shy behavior by enhancing parent-school communication <u>Components:</u> 1) training for teachers and other staff, 2) weekly home-school learning and communication activities, 3) 9 workshops for parents led by the 1st grade teacher, psychologist or social worker <u>Fidelity:</u> NR <u>Duration/frequency:</u> 1 yr <u>Control:</u> standard curriculum</p>
Outcomes	<p>FU-7 yrs <u>Alcohol use without parents</u> Int 1 (34%) vs. Int 2 (37%) vs. Ctrl (33%), NS <u>Alcohol use without permission</u> RR (adjusted; Int 1 vs. Ctrl) = 0.95, 95% CI: 0.58, 1.54</p>
Notes	<p>JHU-PIRC trial Good Behavior Game (GBG) Attrition rates did not significantly differ across the arms and the dropouts were similar to completers with respect to race, academic achievement, or gender. <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=</p>

Furr-Holden 2004 (Continued)

	control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; RR=relative risk; FSP=family school partnership; CC=classroom centred	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	Dropouts similar between study arms and similar to completers in race, grades, and gender
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Not described

Goldberg 2000

Methods	Design: RCT FU: 1 yr (post-randomisation) Attrition: 20% ITT: yes Unit of randomisation: school Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomized</u> Int: 19 (NR) Ctrl: 15 (NR) Total N: 34 (NR) <u>N of Clusters (subjects) participated</u> Int: 15 (NR) Ctrl: 16 (NR) Total N: 31 (3207) Age: 15-16 yrs (grades 9-12) Sex (male): 100% Ethnicity: NR (in Int group there were more African Americans than in Ctrl group)

Goldberg 2000 (Continued)

	Alcohol users: NR Country: US	
Interventions	<u>Intervention</u> : an informational program to raise awareness about anabolic steroid (AS) and other drug dangers <u>Focus/target</u> : Primarily prevent anabolic steroid use but also other substances <u>Components</u> : classroom curriculum addressing physiology and effects of AS - Exercise and weight training; pocket sized guides on diet <u>Fidelity</u> : NR <u>Duration/frequency</u> : 8-14 sessions <u>Control</u> : anti-AS leaflet	
Outcomes	<u>Cumulative occurrence (incidents) of drinking and driving (mean score)</u> Baseline: Int: 5.0 (NR) vs. Ctrl: 4.6 (NR) FU-1 yr: Int: 10.7 vs. Ctrl: 12.1 (p<0.08 by school and p=0.004 by individual)	
Notes	Adolescents Training and Learning to Avoid Steroids Program There were some baseline differences between the study groups. Three schools in experimental arm withdrew after randomization, so one Ctrl school was randomly reassigned to Int group. <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; AS=anabolic steroids	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT analysis; attrition 20%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	There were some baseline differences between the study groups

Goldberg 2007

Methods	<p>Design: RCT</p> <p>FU: 2 yrs (post-randomisation)</p> <p>Attrition: similar across the arms (66% vs. 70%) and the dropouts were similar to completers with respect to baseline variables</p> <p>ITT: No</p> <p>Unit of randomisation: school</p> <p>Clustering effect adjusted: Yes</p>
Participants	<p><u>N of Clusters (subjects) randomised</u></p> <p>Int: 9 (NR)</p> <p>Ctrl: 9 (NR)</p> <p>Total N: 18 (NR)</p> <p><u>N of Clusters (subjects) participated</u></p> <p>Int: 5 (653)</p> <p>Ctrl: 6 (743)</p> <p>Total N: 11 (1396)</p> <p>Age: mean range 15.4 - 15.6 yrs (high school athletes)</p> <p>Sex (male): 54%</p> <p>Ethnicity: White (91%)</p> <p>Ever tried alcohol: 21%</p> <p>Any use of alcohol in prior year: 49%</p> <p>Country: US</p>
Interventions	<p><u>Intervention</u>: random DAT (100 mL urine analyzed using positive enzymatic immunoassay and gas chromatography-mass spectrometry testing; breath test for alcohol was also administered using approved analyzer)</p> <p><u>Focus/target</u>: prevent, identify, and treat substance/drug use</p> <p><u>Components</u>: Urine and breath test</p> <p><u>Fidelity</u>: NR</p> <p><u>Duration/frequency</u>: 15 visits biweekly per school year</p> <p><u>Control</u>: deferred DAT</p> <p><u>Focus/target</u>: NA</p> <p><u>Components</u>: NA</p>
Outcomes	<p>FU: 2 yrs</p> <p><u>Illicit drug and alcohol use (Index score range: 0 = no use, 1 = light use, 2 = moderate use, and 3 = heavy use)</u></p> <p>Past month: Int (0.165) vs. Ctrl (0.261), NS</p> <p>Past year: Int (0.917) vs. Ctrl (1.033), NS</p>
Notes	<p>SATURN</p> <p>There was some imbalance at baseline between the arms in the mean age, grade, and gender (students in DAT arm being older, having higher grades, and more male)</p> <p><u>Abbreviations</u></p> <p>FU=follow-up; RCT=randomized controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported;</p>

Goldberg 2007 (Continued)

	wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; AS=anabolic steroids; DAT=drug and alcohol testing	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT; attrition 66%-70%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Potential for confounding due to imbalance in covariate

Goodstadt 1983

Methods	Design: RCT FU: 6 months (post-randomisation) Attrition: 21.3% ITT: no Unit of randomisation: class Clustering effect adjusted: no
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: 4 (111) Int-2: 4 (116) Int-3: 4 (105) Ctrl: 8 (208) Total N: 20 (540) <u>N of Clusters (subjects) participated</u> Int-1: 4 (111) Int-2: 4 (116) Int-3: 4 (105) Ctrl: 8 (208) Total N: 20 (540)

Goodstadt 1983 (Continued)

	Age: no details (High School) Sex (male): 41% Ethnicity: NR Alcohol users: NR Country: Canada	
Interventions	<u>Intervention-1:</u> cognitive - detailed examination of alcohol and its role in society <u>Focus/target:</u> reduce alcohol use <u>Intervention-2:</u> Decision- making skills; facts, social influence, behavioural options; <u>Focus/target:</u> reduce alcohol use <u>Intervention-3:</u> reinforcement of values in life <u>Focus/target:</u> reduce alcohol use Fidelity: NR <u>Duration/frequency:</u> 10 sessions / 10 days <u>Control:</u> standard curriculum with no alcohol education	
Outcomes	FU: 6 months No significant differences between intervention groups and Control for frequency of drinking or usual quantity of drinking The "Values" Group reported significantly more drinking in the previous 6 months than the other programme groups, though no specific scores/details are given	
Notes	“ Three Approaches ” study Many significant differences found in pre-test measures raising possibility of confounding <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s)	
<i>Risk of bias</i>		
Bias	Authors’ judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT analysis; 21% attrition
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported

Goodstadt 1983 (Continued)

Other bias	High risk	Potential for confounding due to some baseline differences across study arms
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Griffin 2009

Methods	<p>Design: RCT FU: 1 yr (post-randomisation) Attrition: 10% ITT: No Unit of randomisation: classroom Clustering effect adjusted: No</p>
Participants	<p><u>N of Clusters (subjects) randomised</u> Int: 6 (NR) Ctrl: 6 (NR) Total N: 12 (199)</p> <p><u>N of Clusters (subjects) participated</u> Int: 6 (92) Ctrl: 6 (86) Total N: 12 (178) Age: NR (8th grade African American students) Sex (male): 62% Ethnicity: African American (99%) Ever tried alcohol: 21.1%-25.0% Country: US</p>
Interventions	<p><u>Intervention</u>: BRAVE - school-based ATOD and violence prevention program based on social learning theory and resiliency research findings <u>Focus/target</u>: encouraged the development of resilient behaviours including a sense of purpose and future, autonomy, social competence, and willingness to embrace new experiences <u>Components</u>: development and monitoring of career goals, mentoring, peer-to-peer goal monitoring and reinforcement, vocational field trips, vocational speakers' bureau, and case referral <u>Fidelity</u>: NR <u>Duration/frequency</u>: 90 min sessions for 12 mo <u>Control</u>: standard curriculum</p>
Outcomes	<p>FU-12 mo (Int vs. Ctrl) Alcohol drinking frequency in the past 30 days (0=not at all, 2=once or twice, 3= 1-2 per wk, 4=3-5 x per wk, 5=about once a day, 6=more than once a day) 1.14 (± 0.15) vs. 1.66 (± 0.19), p=0.04 (absolute mean score change between pre- and post-treatment) 7.1 (± 4.8) vs. 37.5 (± 9.9), p=NR (% mean score change between pre- and post-treatment)</p>

Griffin 2009 (Continued)

	Drunk from alcohol (frequency in the past 30 days: 0 occasions, 1-2 occasions, 3-5 occasions, 6-9 occasions, 10-19 occasions, 20-39 occasions, > 40 occasions) 1.09 (± 0.11) vs. 1.16 (± 0.14), p=0.16 (absolute mean score change between pre- and post-treatment) 3.3 (± 3.3) vs. 8.7 (± 5.9), p=NR (% mean score change between pre- and post-treatment)	
Notes	Project BRAVE non-responders excluded from analyses <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); BRAVE=building resiliency and vocational excellence; ATOD=alcohol, tobacco, and other drugs	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No ITT; 10% attrition; the attrition rates did not differ between study arms
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Some baseline differences between study groups

Hansen 1988

Methods	<p>Design: RCT FU: 1 and 2 yrs (post-randomisation) Attrition: 37% (year 1), 52% (year 2) ITT: no Unit of randomisation: school Clustering effect adjusted: yes</p>
Participants	<p><u>N of Clusters (subjects) randomised</u> Int-1: 25 (NR) Int-2: 25 (NR) Ctrl: 36 (NR) Total N: 86 (NR)</p> <p><u>N of Clusters (subjects) participated</u> Int-1: 25 (NR) Int-2: 25 (NR) Ctrl: 36 (NR) Total N: 86 (NR)</p> <p><u>Analysed sample</u> Int-1: 25 (NR) Int-2: 25 (NR) Ctrl: 36 (NR) Total N: 86 (2863) Age: 12-13 yrs (7th grade) Sex (male): 51% (missing on 95 students) Ethnicity: Hispanic (38.4%), Black (30.5%), White (22.7%), Asians (5.8%), Others (3.5%) Alcohol users: NR Country: US</p>
Interventions	<p><u>Intervention-1: a social influences curriculum</u> <u>Focus/target:</u> "Gateway drugs" (tobacco, alcohol, marijuana) <u>Components:</u> social motivations, norms, consequences, resistance, role play, adult and media influences</p> <p><u>Intervention-2: affective education</u> <u>Focus/target:</u> "Gateway drugs" (tobacco, alcohol, marijuana) <u>Components:</u> motivations, alternatives, goal setting, consequences, self-esteem, decision making, assertiveness <u>Fidelity:</u> NR <u>Duration/frequency:</u> 1 d per wk in 12 sessions <u>Control:</u> standard curriculum</p>
Outcomes	<p>FU: 2 yrs <u>Alcohol use incidence</u> Int-1 vs. Ctrl: F=0.93, p=0.3 Int-2 vs. Ctrl: F=2.14, p=0.2</p> <p><u>Alcohol use prevalence</u></p>

	Int-1 vs. Ctrl: F=3.57, p=0.06 Int-2 vs. Ctrl: F=13.18, p=0.0003* *Int-2 drinking alcohol more vs. Ctrl <u>Increased use (in baseline users) %</u> Int-1 (22.6%) vs. Int-2 (48.0%) vs. Ctrl (37.7%), p < 0.05 (Int-1 vs. Ctrl or Int-2)* *Int-2 more increase in alcohol use vs. Ctrl or Int-1 <u>Reduced use (in baseline users) %</u> Int-1 (43.8%) vs. Int-2 (69.8%) vs. Ctrl (63.3%), p < 0.05 (Int-1 vs. Ctrl or Int-2)* *Int-1 less reduced alcohol use vs. Ctrl or Int-2	
Notes	Project SMART Attrition rate was differential by race, Whites less likely to drop than Blacks. Attrition rate was differential by the study group at follow-ups with higher attrition in Ctrl than Int-2. There were pre-test differences between groups in drinking measures, the Ctrl group reporting more drinking (Int-1 vs. Ctrl). <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s)	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT; attrition > 30% (differential)
Selective reporting (reporting bias)	High risk	30-day, 7-day customary and lifetime use not reported in results section
Other bias	High risk	pre-test differences between groups in drinking measures,

Hansen 1991

Methods	<p>Design: RCT FU: 2 yrs (post-randomisation) Attrition: 22% (year 1), 46% (year 2) ITT: no Unit of randomisation: school (stratified by size, ability and ethnicity) Clustering effect adjusted: only at 2-year FU</p>
Participants	<p><u>N of Clusters (subjects) randomised</u> Int-1: NR (NR) Int-2 NR (NR) Int-3 NR (NR) Ctrl: NR (NR) Total N: 12 (3011)</p> <p><u>N of Clusters (subjects) participated</u> Int-1: NR (NR) Int-2 NR (NR) Int-3 NR (NR) Ctrl: NR (NR)</p> <p><u>Analysed sample (year 1)</u> Int-1: NR (NR) Int-2 NR (NR) Int-3 NR (NR) Ctrl: NR (NR) Total N: 12 (2416) Age: 12-13 yrs Sex (male): 45-51% Ethnicity: White (33.2%-52.2%), Hispanic (11.3%-42.6%), Black (0.8%-3.0%), and Asian (9.8%-26.0%) Alcohol users: 29% Country: US</p>
Interventions	<p><u>Intervention-1: RT</u> <u>Components:</u> negative/positive consequences of drinking using Socratic method, definition of drugs/alcohol, techniques/practice to refuse, assertiveness, role played refusals, film discussion, parent interview homework, types of social pressure</p> <p><u>Intervention-2: NE</u> <u>Components:</u> negative/positive consequences of drinking using Socratic method, definition of drugs/alcohol, parent interview homework, review of consequences of drinking, survey about prevalence of alcohol use in students, survey results, agree or disagree opinion, class discussions, non-drinker interview homework</p> <p><u>Intervention-3: RT + NE</u> <u>Components:</u> see above</p>

Hansen 1991 (Continued)

	<u>Focus/target:</u> develop social and life skills, including social norms <u>Fidelity:</u> NR <u>Duration/frequency:</u> 4-10 sessions x 45 min each <u>Control:</u> ICU	
Outcomes	FU: 1 yr Ever used: RT: F=3.22; NE: F=8.17** NE: 11.0% increase (pre-post) Non-NE: 14.2% increase (pre-post) <u>30-day use:</u> RT: F=0.58; NE: F=5.10* NE: 6.2% increase (pre-post) Non-NE: 9.1% increase (pre-post) <u>7-day use:</u> RT: F=0.88; NE: F=5.93* NE: 2.8% increase (pre-post) Non-NE: 5.1% increase (pre-post) <u>Drunkenness:</u> RT: F=0.03; NE: F=25.19*** NE: 4.2% increase (pre-post) Non-NE: 11.1% increase (pre-post) <u>Problem use:</u> RT: F=0.11; NE: F=4.26* NE: 0.3% increase (pre-post) Non-NE: 2.4% increase (pre-post) * p<0.05; ** p<0.01; *** p<0.0001 FU: 2 yrs Palmer et al (2000) re-analysed data taking into account unit (individual, class, school) effects and found no significant effects at any of these levels using the ICU group as the Ctrl	
Notes	Adolescent Alcohol Prevention Trial (AAPT) Some differences between groups at baseline in ethnic mix. Year 1 analysis mixed Ctrl and non-NE classes from other groups therefore muddying the comparison. <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); RT=resistance training; NE=normative education; ICU=information on consequences of drug use	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described

Hansen 1991 (Continued)

Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT; attrition > 21%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Some differences between groups at baseline in ethnic mix. Year 1 analysis mixed Ctrl and non-NE classes from other groups therefore muddying the comparison.

Hecht 2003

Methods	Design: RCT FU: 3 yrs (post-randomisation) Attrition: 12.5% (post-randomisation), 16% (of 6035) at last follow-up ITT: Unclear Unit of randomisation: school Clustering effect adjusted: Yes
Participants	<u>N of Clusters (subjects) randomised</u> Int: 25 (NR) Ctrl: 10 (NR) Total N: 35 (6900) <u>N of Clusters (subjects) participated</u> Int: 25 (NR) Ctrl: 10 (NR) Total N: 35 (6035) Age: 12.5 [11-18] yrs (7th grade students) Sex (male): 53% Ethnicity: Hispanic (74%), White (17.4%), African American (8.6%) Alcohol ever use (30 days prior to survey): 22.6% (1364/6035) Country: US
Interventions	<u>Intervention</u> : REAL curriculum given in 3 versions (Mexican American, Black/White, Multicultural) <u>Focus/target</u> : to promote anti drug norms and teaching resistance/social skills reinforced by booster activities and media campaign <u>Components</u> : 10 sessions and booster activities <u>Fidelity</u> : mean score of 5.8 (appropriateness in conveying the curriculum ranging from 1 = inappropriately to 7 = appropriately) <u>Duration/frequency</u> : 2 yrs 1 booster activity per mo

	Control: standard curriculum	
Outcomes	<p><u>FU- 1 yr (post-baseline)</u> Mean # of alcohol drinks (range 1= none to 9 = more than 30): mean difference -0.148 (Int vs. Ctrl), p<0.05 Multicultural and Mexican American version intervention groups had smaller mean increase in alcohol use than Black/White version group</p> <p><u>FU- 2 yr (post-baseline)</u> Mean # of alcohol drinks (range 1= none to 9 = more than 30): mean difference -0.144 (Int vs. Ctrl), p<0.01 No differences between the 3 cultural versions of curriculum in alcohol use change</p> <p><u>FU- 3 yr (post-baseline)</u> Mean # of alcohol drinks (range 1= none to 9 = more than 30): mean difference -0.232 (Int vs. Ctrl), p<0.001 Multicultural and Mexican American version intervention groups had smaller mean increase in alcohol use than Black/White version group</p>	
Notes	<p><i>Keepin' it R.E.A.L.</i> Imputation of missing data was performed; there were no gender differences in program effects on alcohol use (Kulis 2007a); amongst alcohol users at baseline, the discontinuation rate in the intervention group was 61% greater than in the control group (Kulis 2007b); students receiving multicultural version intervention had less overall alcohol use compared to the controls</p> <p><u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); REAL=refuse, explain, avoid, and leave</p>	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unclear if ITT was done;

Hecht 2003 (Continued)

Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	baseline covariate distributions not reported; analysis adjusted for covariate

Johnson 2009

Methods	Design: RCT FU: 6 mo (post-randomisation) Attrition: 29%; dropouts and participants did not differ in alcohol use and other characteristics ITT: No Unit of randomisation: community Clustering effect adjusted: Yes
Participants	<u>N of Clusters (subjects) randomised</u> Int: NR (317) Ctrl: NR (289) Total N: 14 (606) <u>N of Clusters (subjects) participated</u> Int: NR (238) Ctrl: NR (222) Total N: 14 (460) Age: NR (5 th and 6 th grades Alaskan students) Sex (male): 50% Ethnicity: Caucasians (NR) and Native Americans (NR) Alcohol use: NR Country: US
Interventions	<u>Intervention:</u> <i>Think Smart</i> is a modified form of Personal Intervention Curriculum by Schinke <u>Focus/target:</u> designed to reduce use of inhalants, over the counter drugs, alcohol, tobacco, other drugs through teaching refusal skills, peer normative beliefs, drug-related consequences, assertiveness skills, and cultural identity <u>Components:</u> 12 sessions (stereotypes-peer norms, cultural identity, drug facts, refusal and self-assertiveness skills) and 3 booster sessions (practicing problem-solving model) <u>Fidelity:</u> NR <u>Duration/frequency:</u> 12 core sessions in 5 mo and booster sessions 2-3 mo later <u>Control:</u> standard curriculum
Outcomes	FU-6 mo Use of alcohol in the past 30 days: OR [Int vs. Ctrl] = 0.39, p=NR (NS)

Johnson 2009 (Continued)

Notes	Think Smart Baseline differences were adjusted for covariate <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; OR=odds ratio	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No ITT; attrition > 20%; dropouts similar across study arms and to completers; missing data imputation
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	Baseline differences were adjusted for covariate

Kellam 2008

Methods	Design: RCT FU: 12 yrs (post-randomisation) Attrition: NR ITT: Yes Unit of randomisation: classrooms and teachers Clustering effect adjusted: Yes
Participants	<u>N of Clusters (subjects) randomised</u> Int: NR (NR) Ctrl: NR (NR) Total N: NR (NR) <u>N of Clusters (subjects) participated</u> Int: 8 (238) Ctrl: 6 (169)

Kellam 2008 (Continued)

	<p>Total N: 14 (407)</p> <p>Additional set of 515 external controls (18 classes) were employed for certain analyses</p> <p>Age: 6-7 yrs (1st and 2nd grade students)</p> <p>Sex (male): 50%</p> <p>Ethnicity: NR</p> <p>Alcohol use: NR</p> <p>Country: US</p>	
Interventions	<p><u>Intervention</u>: GBG a method of classroom behavior management</p> <p><u>Focus/target</u>: to create a classroom environment that is conducive to learning by focusing on the social context of the classroom;</p> <p>to socialize children into the role of student and to teach them how to regulate their own and classmates behavior through team</p> <p>behavior contingent reinforcement; to reduce early aggressive, disruptive behavior (at classroom and individual level) -</p> <p>antecedents of later substance use, and dependence disorders</p> <p><u>Components</u>: 1) students were assigned to one of 3 heterogeneous teams that contained equal numbers of boys and girls,</p> <p>equal numbers of aggressive, shy, and socially isolated children given the baseline measurements; 2) teacher posted basic</p> <p>classroom behavior rules and teams were rewarded if they committed 4 or fewer infractions of these rules</p> <p><u>Fidelity</u>: not measured</p> <p><u>Duration/frequency</u>: 10 min - 3 hrs long sessions 3x per wk for 2 yrs</p> <p><u>Control</u>: standard curriculum</p>	
Outcomes	<p>FU-12 yrs</p> <p><u>Lifetime alcohol abuse and dependence disorders</u>:</p> <p>Int (13%) vs. Ctrl (20%), p=0.08 (Unadjusted for baseline differences and based on 169 internal controls)</p> <p>Int (13%) vs. Ctrl (29%), p=0.03 (Unadjusted for baseline differences and based on all 922 controls, including 515 external controls)</p> <p>Adjusted OR [Int vs. Ctrl] = 0.5, p=0.05 (Individual-level risk factors and classroom variation considered)</p>	
Notes	<p>JHU-PIRC trial</p> <p>Good Behavior Game (GBG)</p> <p>Greater effect of GBG on lifetime alcohol abuse and dependence disorder was found in males compared to females</p> <p><u>Abbreviations</u></p> <p>FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported;</p> <p>wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); OR=odds ratio; GBG=good behavior game</p>	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement

Kellam 2008 (Continued)

Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	ITT done but attrition not reported
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	baseline differences between study arms not significant; results adjusted for residual confounding

Koning 2009

Methods	Design: RCT FU: 22 mo (post-randomisation) Attrition: 12.5% (2570/2937); dropouts were older, drank more, and had parents with lower education levels than completers ITT: No Unit of randomisation: school Clustering effect adjusted: Yes
Participants	<u>N of Clusters (subjects) randomised</u> Int 1: NR (801) Int 2: NR (942) Int 3: NR (812) Ctrl: NR (935) Total N: 20 (3490) <u>N of Clusters (subjects) participated</u> Int 1: NR (608) Int 2: NR (675) Int 3: NR (588) Ctrl: NR (699) Total N: 19 (2570) Age: 12.7 yrs (1 st and 2 nd yr high school students) Sex (male): 51% Ethnicity: NR Alcohol use: not heavy drinkers Country: The Netherlands

Interventions	<p><u>Intervention 1: PI</u> <u>Focus/target:</u> parental rules for their children's alcohol use <u>Components:</u> 1) 20 min presentation about adverse effects of alcohol use at young age; 2) parents meet with the class mentor to discuss rules and reach a consensus; 3) Information leaflet with summary information sent to parents' home addresses as reminder of rules and consensus reached</p> <p><u>Intervention 2: SI</u> <u>Focus/target:</u> based on HSD prevention program <u>Components:</u> 1) coordinating committee; 2) 3 series of educational lessons about tobacco, alcohol, cannabis, ecstasy, games; 3) school regulations on drug use; 4) system of detection of drug problems; and 5) parental involvement</p> <p><u>Intervention 3: [PI + SI] combined</u> <u>Fidelity:</u> NR <u>Duration/frequency:</u> 2 mo</p> <p><u>Control:</u> standard curriculum</p>
Outcomes	<p>FU-10 mo <u>Heavy weekly drinking</u> Int 1 (3.5%) vs. Int 2 (3.4%) vs. Int 3 (1.2%) vs. Ctrl (3.2%), $P < 0.05$ (Int 3 vs. Ctrl) <u>Weekly drinking</u> Int 1 (12.6%) vs. Int 2 (16.1%) vs. Int 3 (11.8%) vs. Ctrl (16.6%), $P < 0.05$ (Int 3 vs. Ctrl) <u>Frequency of drinking</u> Students in Int 3 (combined intervention: PI + SI) drank significantly less frequently than students in the Ctrl arm</p> <p>FU-22 mo <u>Heavy weekly drinking</u> Int 1 (10.5%) vs. Int 2 (8.2%) vs. Int 3 (7.6%) vs. Ctrl (9.9%), NS - OR=1.13, 95% CI: 0.73, 1.73 (adjusted; Int 1 vs. Ctrl), NNT = 48.9 - OR=0.85, 95% CI: 0.56, 1.29 (adjusted; Int 2 vs. Ctrl), NNT = 84.4 - OR=0.80, 95% CI: 0.48, 1.32 (adjusted; Int 3 vs. Ctrl), NNT = 58.7 <u>Weekly drinking</u> Int 1 (33.2%) vs. Int 2 (36.1%) vs. Int 3 (31.5%) vs. Ctrl (41.5%), NS - OR=0.86, 95% CI: 0.63, 1.16 (adjusted; Int 1 vs. Ctrl), NNT = 181.8 - OR=0.92, 95% CI: 0.71, 1.19 (adjusted; Int 2 vs. Ctrl), NNT = 67.9 - OR=0.71, 95% CI: 0.53, 0.94 (adjusted; Int 3 vs. Ctrl), NNT = 17.2 <u>Frequency of drinking</u> Students in Int 3 (combined intervention: PI + SI) drank significantly less frequently than students in the Ctrl arm</p>
Notes	<p>Even though the authors reported to have used ITT analysis (based on 2937 students) with imputations, they had already excluded 431 (baseline drinkers) + 122 (refusals/not present) students from the initial</p>

Koning 2009 (Continued)

	<p>sample of 3490 students</p> <p><u>Abbreviations</u></p> <p>FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; PI=parent intervention; SI=student intervention; HSD=healthy school and drugs; NNT=number needed to treat; OR=odds ratio; 95% CI=ninety-five percent confidence interval</p>
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Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Low risk	Central randomisation
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	ITT was done but not on the original sample
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	Baseline differences adjusted

McBride 2000

Methods	<p>Design: RCT</p> <p>FU: 32 mo (post-randomisation)</p> <p>Attrition: 24.1% (at 32 mo)</p> <p>ITT: No</p> <p>Unit of randomisation: school</p> <p>Clustering effect adjusted: yes</p>
Participants	<p><u>N of Clusters (subjects) randomised</u></p> <p>Int: NR (NR)</p> <p>Ctrl: NR (NR)</p> <p>Total N: NR (NR)</p> <p><u>N of Clusters (subjects) participated</u></p> <p>Int: NR (1111)</p> <p>Ctrl: NR (1232)</p>

	<p>Total N: 14 (2343)</p> <p><u>N of Clusters (subjects) analysed (yr 1)</u> Int: NR (855) Ctrl: NR (872) Total N: 14 (1727)</p> <p><u>N of Clusters (subjects) analysed (yr 2)</u> Int: NR (970) Ctrl: NR (1037) Total N: 14 (2007)</p> <p><u>N of Clusters (subjects) analyzed (yr 3)</u> Int: NR (863) Ctrl: NR (915) Total N: 14 (1778) Age: 13 yrs (8th grade) Sex (male): NR Ethnicity: NR Alcohol users: NR</p> <p><u>No. of standard drinks in last 12 mo (mean and 95% CI)</u> Int: 30.2 (11, 49) vs. Ctrl: 19.7 (12, 27)</p> <p><u>Hazardous or harmful drinking once a month or more often (% and 95% CI)</u> Int: 11.3 (8.8,14.3) vs. Ctrl: 13.3 (10.5,16.8)</p> <p><u>Own harm index (mean and 95%CI)</u> Int: 2.0 (1.5, 2.5) vs. Ctrl: 1.5 (1.1, 1.9)</p> <p><u>Country: Australia</u></p>
Interventions	<p><u>Intervention: SHAHRP</u> <u>Focus/target:</u> to reduce alcohol-related harm <u>Components:</u> 2 phases, phase 1 included 17 skill-based activities in 10 lessons; phase 2 included 12 activities over 5-7 wks and trigger video; these activities were skill rehearsal, individual or group decision making, discussions around scenarios suggested by students with identification of alcohol related harm and strategies to reduce the harm</p> <p><u>Fidelity:</u> 80.7%</p> <p><u>Duration/frequency:</u> 24 mo; see also above</p> <p><u>Control:</u> standard curriculum</p> <p><u>Duration:</u> 10 wks</p>
Outcomes	<p><u>FU: 8 mo (Int vs. Ctrl)</u> Non-users of alcohol: 13.1% vs. 10.1%, p>0.05 Users of alcohol (at least once per wk): 15.0% vs. 18.9%, p>0.05 Drinking alone: 23.0% vs. 25.0%, p>0.05 Supervised drinker: 33.0% vs. 30.0%, p>0.05 Unsupervised drinker: 42.5% vs. 46.0%, p>0.05</p> <p><u>FU: 20 mo (Int vs. Ctrl)</u></p>

	<p>Alcohol consumption 31.7% less in Int group Risky levels of alcohol consumption 33.8% less in Int group Harm related to alcohol own use 16.7% less in Int group % of non-drinkers: 16.3 (95% CI: 13.9, 19.0) vs. 19.0 (95% CI: 16.5, 21.7) Risky drinking at least once a month: 21.5 (95% CI: 18.0, 25.0) vs. 32.5 (95% CI: 28.2, 36.9)</p> <p><u>FU: 32 mo (Int vs. Ctrl)</u> Alcohol consumption 9.2% less in Int group Risky levels of alcohol consumption 4.2% less in Int group Harm related to alcohol own use: 22.9% less in Int group % of non-drinkers: 27.3 (95% CI: 24.4, 30.4) vs. 28.3 (95% CI: 25.4, 31.4) Risky drinking at least once a mo: 32.2 (95% CI: 28.2, 36.2) vs. 33.9 (95% CI: 29.7, 39.8) No. of standard drinks in last 12 mo (mean and 95% CI): Int: 273.8 (217, 330) vs. Ctrl: 362.7 (283, 443) Hazardous or harmful drinking once a month or more often (% and 95% CI): Int: 32.2 (28.2, 36.2) vs. Ctrl: 33.9 (29.7, 39.8) Own harm index (mean and 95% CI): Int: 9.8 (8.3, 11.3) vs. Ctrl: 12.5 (10.5, 14.4)</p>	
Notes	<p>SHAHRP</p> <p>Results were stratified by baseline use of alcohol and there was no intervention effect in baseline supervised drinkers compared to controls; but in baseline non-drinkers and unsupervised drinkers, risky alcohol consumption was significantly reduced in the Int group vs. Ctrl group. One school refused to be randomised so was assigned to control group; authors assumed randomization after sensitivity analysis. Baseline differences between the intervention and control groups were statistically significant for both context of use and harms associated with their own use of alcohol</p> <p><u>Abbreviations</u> FU=follow-up; RCT=randomized controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; NNT=number needed to treat; 95% CI=ninety-five percent confidence interval; SHAHRP=the school health and alcohol harm reduction project</p>	
Risk of bias		
Bias	Authors’ judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described

McBride 2000 (Continued)

Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Baseline distributions of covariate not reported

Morgenstern 2009

Methods	Design: RCT FU: 12 mo (post-randomisation) Attrition: 23.6% (12 mo); dropout rates did not differ across the assigned conditions ITT: yes Unit of randomisation: school Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int: 16 (911) Ctrl: 14 (964) Total N: 30 (1875) <u>N of Clusters (subjects) participated</u> Int: 16 (714) Ctrl: 14 (719) Total N: 30 (1433) Age: 13 [12-15] yrs (7 th grade) Sex (male): 52% Ethnicity: NR Alcohol use (past mo; range 0 - 6 d): Int (0.62 ± 1.34) vs. Ctrl (0.63 ± 1.35), p = 0.79 LTA-WPK: Int (34.5%) vs. Ctrl (35.8%), p=0.56 Life-time drunkenness: Int (18.5%) vs. Ctrl (18.3), p=0.24 Life-time binge-drinking: Int (12%) vs. Ctrl (13.1%), p=0.50 Country: Germany
Interventions	<u>Intervention</u> : alcohol education intervention <u>Focus/target</u> : to reduce/prevent alcohol use with a main message 'no alcohol for minors' <u>Components</u> : 1) 4 specified interactive class units (<i>what is permitted? advertisement, temptations, when is drinking alcohol OK?</i>) 2) booklet for students (knowledge about alcohol and consequences of its use) 3) booklet for parents (behavioral advices) <u>Fidelity</u> : NR

	<u>Duration/frequency:</u> 4 lessons in 3 mo <u>Control:</u> standard curriculum
Outcomes	<p>FU: 4 mo (Int vs. Ctrl) Alcohol use (past mo; range 0 - 6 d): 0.81 (\pm 0.046) vs. 0.89 (\pm 0.044), $p=0.178$ Alcohol use (life-time): OR [adjusted]=0.81, 95% CI: 0.57, 1.16 Life-time drunkenness: OR [adjusted]=0.70, 95% CI: 0.48, 1.02 Life-time binge-drinking: OR [adjusted]=0.56, 95% CI: 0.41, 0.77</p> <p>FU: 12 mo (Int vs. Ctrl) Alcohol use (past mo; range 0 - 6 d): 0.89 (\pm 0.075) vs. 0.98 (\pm 0.081), $p=0.419$ Alcohol use (life-time): OR [adjusted]=0.90, 95% CI: 0.67, 1.21 Life-time drunkenness: OR [adjusted]=0.77, 95% CI: 0.52, 1.12 Life-time binge-drinking: OR [adjusted]=0.74, 95% CI: 0.57, 0.97</p>
Notes	<p>Data imputation for missing values was performed. There were more current and lifetime smokers at baseline in Int (50.9% and 15.6%, respectively) vs. Ctrl (45.2% and 11.3%, respectively) groups ($p=0.01$)</p> <p><u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); OR=odds ratio; 95% CI=ninety-five percent confidence interval</p>

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Low risk	Allocating person was blinded to intervention and research question
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT and data imputation done; attrition < 20%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Baseline imbalance by smokers

Moskowitz 1984

Methods	Design: RCT FU: 1 yr (post-randomisation) Attrition: 26% (year 1) ITT: no Unit of randomisation: class (stratified by attitudes and involvement) Clustering effect adjusted: yes	
Participants	<u>N of Clusters (subjects) randomised</u> Int: 8 (NR) Ctrl: 8 (NR) Total N: 16 (473) <u>N of Clusters (subjects) participated</u> Int: 8 (NR) Ctrl: 8 (NR) Total N: 16 (473) Age: 12 yrs Sex (male): NR Ethnicity: Predominantly White Alcohol users: NR Country: US	
Interventions	<u>Intervention</u> : a drug education course incorporating three approaches to behavior change <u>Focus/target</u> : prevent, delay, reduce drug use including alcohol <u>Components</u> : models of motivation and decision making, advertising influence, as- sertiveness training/role play, knowledge of drugs <u>Fidelity</u> : NR <u>Duration/frequency</u> : 12 sessions (45 min each) per 12 weeks <u>Control</u> : standard curriculum	
Outcomes	FU: 1 yr No significant effects of intervention group over controls for alcohol involvement at 1 year follow-up (F<1 for males and females)	
Notes	Drug Education Course <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl= control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo= month(s)	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described

Moskowitz 1984 (Continued)

Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	no ITT; attrition: 26%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Possible contamination

Newman 1992

Methods	Design: RCT FU: 1 yr (post-randomisation) Attrition: NR ITT: unclear Unit of randomisation: school Clustering effect adjusted: by class
Participants	<u>N of Clusters (subjects) randomised</u> Int: 5 (NR) Ctrl: 4 (NR) Total N: 9 (c.3500) <u>N of Clusters (subjects) participated</u> Int: 5 (NR) Ctrl: 4 (NR) Total N: 9 (c.3500) Age: 15-16 yrs Sex (male): NR Ethnicity: NR Alcohol users: NR Country: US
Interventions	<u>Intervention</u> : study of alcohol behavior changes following a video-based alcohol education program <u>Focus/target</u> : enhancing refusal skills <u>Components</u> : video showed typical adolescent drinking situations, followed by role play; information about alcohol <u>Fidelity</u> : NR <u>Duration/frequency</u> : 10 lessons incorporating 5 videos (20 min each) <u>Control</u> : standard alcohol education curriculum
Outcomes	FU: 1 yr (Int vs. Ctrl) <u>Consumed 1+ drinks</u> Pretest: 64.9% vs. 68.5%

	FU: 79.2% vs. 81.3% <u>Mean N drinks at last party</u> Pretest: 1.64 vs. 1.9 FU: 2.46 vs. 2.63 <u>Mean N of drinking events (last mo)</u> Pretest: 1.64 vs. 1.88 FU: 3.06 vs. 3.43 No significant effects of the intervention	
Notes	Resisting Pressure to Drink and Drive (RPDD) Random allocation by school but class was the unit of analysis <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); RPDD=resisting pressure to drink and drive	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	unclear if ITT was done; attrition rate: NR
Selective reporting (reporting bias)	Unclear risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Random allocation by school but class was the unit of analysis

Newton 2009a

Methods	<p>Design: RCT</p> <p>FU: 1.5 yr (post-randomisation)</p> <p>Attrition: 51.3% (666/1296) (1 yr); dropout rates did not differ across the assigned conditions</p> <p>ITT: no</p> <p>Unit of randomisation: school</p> <p>Clustering effect adjusted: yes</p>
Participants	<p><u>N of Clusters (subjects) randomised</u></p> <p>Int: 5 (728)</p> <p>Ctrl: 5 (568)</p> <p>Total N: 10 (1296)</p> <p><u>N of Clusters (subjects) participated</u></p> <p>Int: 5 (343)</p> <p>Ctrl: 5 (287)</p> <p>Total N: 10 (630)</p> <p>Analyzed sample: N = 764 (Int: 397 vs. Ctrl: 367)</p> <p>Age: 13 yrs</p> <p>Sex (male): 60%</p> <p>Ethnicity: NR</p> <p>Alcohol use: NR</p> <p>Country: Australia</p>
Interventions	<p><u>Intervention</u>: alcohol and cannabis prevention course</p> <p><u>Focus/target</u>: to decrease alcohol and cannabis misuse</p> <p><u>Components</u>: 2 sets of six 40 min lessons including alcohol and cannabis modules; each lesson included 15-20 min internet based session completed individually; students also viewed a cartoon; 2nd part of each lesson was a predetermined activity to reinforce the information learnt in the cartoons</p> <p><u>Fidelity</u>: 91%</p> <p><u>Duration/frequency</u>: 6 mo</p> <p><u>Control</u>: standard curriculum</p>
Outcomes	<p>FU: 1 yr (Int vs. Ctrl)</p> <p><u>Average weekly alcohol use</u></p> <p>Mean difference (from baseline): -0.88 ± 0.91 vs. 2.67 ± 1.09, $p < 0.05$</p> <p><u>Frequency of drinking to excess</u></p> <p>Mean difference (from baseline): 0.32 ± 0.18 vs. 0.23 ± 0.11, $p = 0.69$</p> <p><u>Harms related to own use of alcohol</u></p> <p>Mean difference (from baseline): 0.34 ± 1.63 vs. 2.73 ± 1.47, $p = \text{NR (NS)}$</p> <p>FU: 1.5 yrs (Int vs. Ctrl)</p> <p><u>Average weekly alcohol use</u></p> <p>Mean difference (from baseline): -0.63 ± 1.14 vs. 5.30 ± 1.50, $p < 0.02$</p> <p><u>Frequency of drinking to excess</u></p> <p>Mean difference (from baseline): 0.05 ± 0.16 vs. 0.85 ± 0.30, $p > 0.05$</p> <p><u>Harms related to own use of alcohol</u></p> <p>Mean difference (from baseline): 3.06 ± 2.12 vs. 9.17 ± 2.23, $p > 0.05$</p>

Newton 2009a (Continued)

Notes	<p>CLIMATE Schools</p> <p>There were fewer males (54% vs. 65%, $p<0.05$), higher weekly alcohol use ($p<0.05$), higher frequency of bingeing ($p<0.01$) than in Ctrl group at baseline.</p> <p><u>Abbreviations</u></p> <p>FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant</p>
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Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	using online randomisation system
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT; attrition > 20%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Imbalance in baseline covariate

Perry 1988

Methods	<p>Design: RCT</p> <p>FU: 8 wks post-randomisation</p> <p>Attrition: 7-8%</p> <p>ITT: no</p> <p>Unit of randomisation: school</p> <p>Clustering effect adjusted: no</p>
Participants	<p><u>N of Clusters (subjects) randomised</u></p> <p>Int-1: NR (NR)</p> <p>Int-2: NR (NR)</p> <p>Ctrl: NR (NR)</p> <p>Total N: 25 (2536)</p> <p><u>N of Clusters (subjects) participated</u></p> <p>Int-1: NR (NR)</p>

	Int-2: NR (NR) Ctrl: NR (NR) Total N: 25 (2536) Age: 11-18 yrs Sex (male): 50% Ethnicity: NR Alcohol users: 56% used in last 12 mo Country: Australia, Chile, Norway and Swaziland
Interventions	<u>Intervention-1</u> : Peer-led <u>Focus/target</u> : social and normative influences to drink and resistance skills <u>Intervention-2</u> : Teacher-led <u>Focus/target</u> : social and normative influences to drink and resistance skills <u>Components (Int1-2)</u> : School-based alcohol education developed from early LST - normative expectancies; peer influences; consequences of alcohol use; understanding mass media influences. Booster sessions to reinforce abstinence <u>Fidelity</u> : NR <u>Duration/frequency</u> : 5 sessions (4 weeks) + booster over 2 mo <u>Control</u> : standard curriculum
Outcomes	FU: 8 wks Baseline non-drinkers (total) - Post-test composite alcohol score (Mean and SE) Int-1: 3.15 (± 0.12) vs. Int-2: 3.46 (± 0.12) vs. Ctrl: 3.52 (± 0.16), $p < 0.005$ (Int-1 vs. Int-2 or Ctrl; ANCOVA) Baseline drinkers (total) - Post-test composite alcohol score (Mean and SE) Int-1: 5.14 (± 0.35) vs. Int-2: 5.84 (± 0.27) vs. Ctrl: 5.71 (± 0.37) Baseline non-drinkers (males) - Post-test composite alcohol score (Mean and SE) Int-1: 3.19 (± 0.18) vs. Int-2: 3.48 (± 0.17) vs. Ctrl: 3.53 (± 0.25), $p < 0.005$ (Int-1 vs. Int-2 or Ctrl; ANCOVA) Baseline non-drinkers: (females) - Post-test composite alcohol score (Mean and SE) Int-1: 3.11 (± 0.14) vs. Int-2: 3.45 (± 0.15) vs. Ctrl: 3.44 (± 0.20), $p < 0.005$ (Int-1 vs. Int-2 or Ctrl; ANCOVA) Baseline drinkers (males) - Post-test composite alcohol score (Mean and SE) Int-1: 5.28 (± 0.53) vs. Int-2: 5.81 (± 0.44) vs. Ctrl: 5.74 (± 0.50) Baseline drinkers (females) - Post-test composite alcohol score (Mean and SE) Int-1: 5.01 (± 0.45) vs. Int-2: 5.79 (± 0.37) vs. Ctrl: 5.81 (± 0.54), $p < 0.05$ (Int-1 vs. Int-2 or Ctrl; ANCOVA)
Notes	WHO Collaborative Study <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant;

Perry 1988 (Continued)

	LST=life skills training; ANCOVA=analysis of covariance; SE=standard error	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unclear because no ITT but low attrition of 8%
Selective reporting (reporting bias)	High risk	12-month follow-up outcomes not reported
Other bias	Unclear risk	baseline covariate distribution not reported

Perry 2003

Methods	Design: RCT FU: 20 mo (post-randomisation) Attrition: 16%; dropout rates did not differ across the study conditions ITT: Yes Unit of randomisation: school Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: 8 (2518) Int-2: 8 (2635) Ctrl: 8 (2108) Total N: 24 (7261) <u>N of Clusters (subjects) participated</u> Int-1: 8 (2226) Int-2: 8 (2221) Ctrl: 8 (1790) Total N: 24 (6237) Analyzed sample: N = 7261 Age: NR yrs (7 th or 8 th grade) Sex (male): 51.6% Ethnicity: White (67.3%), African American (7.5%), Asian American (12.7%), Hispanic (3.6%), American Indian (4%),

	other/mixed race (4.9%) Alcohol use: NR Country: US	
Interventions	<u>Intervention 1: DARE</u> <u>Focus/target:</u> to provide skills in resisting influences to use drugs and handling violent situations, character building and citizenship skills <u>Components:</u> 10 sessions in 2 semesters <u>Intervention 2: DARE +</u> <u>Focus/target:</u> see above <u>Components:</u> ‘on the VERGE’ - 4-session program implemented by trained teachers once a week for 4 weeks and extracurricular activities <u>Fidelity:</u> NR <u>Duration/frequency:</u> 18 mo Control: no Intervention	
Outcomes	FU: 20 mo (Int-1 vs. Int-2 vs. Ctrl) <u>Boys</u> Alcohol use growth rate (past yr): 0.21 (±0.03) vs. 0.19 (±0.03) vs. 0.26 (±0.03), p=0.04 (Int-2 vs. Ctrl), other pair-wise comparisons NS Alcohol use growth rate (past month): 0.11 (±0.02) vs. 0.08 (±0.02) vs. 0.14 (±0.02), p=0.01 (Int-2 vs. Ctrl), other pair-wise comparisons NS Ever drunk growth rate: 0.11 (±0.02) vs. 0.11 (±0.02) vs. 0.15 (±0.02), p=0.07 (Int-1 or Int-2 vs. Ctrl), other pair-wise comparisons also NS <u>Girls</u> Alcohol use growth rate (past yr): 0.27 (±0.04) vs. 0.23 (±0.04) vs. 0.25 (±0.04), all pair-wise comparisons NS (p>0.05) Alcohol use growth rate (past month): 0.13 (±0.02) vs. 0.08 (±0.03) vs. 0.12 (±0.03), all pair-wise comparisons NS (p>0.05) Ever drunk growth rate: 0.13 (±0.02) vs. 0.07 (±0.02) vs. 0.12 (±0.02), p=0.04 (Int-1 vs. Int-2), other pair-wise comparisons NS	
Notes	DARE No significant differences across the conditions at baseline. Ctrl group received delayed DARE + program (started after final FU at 20 mo post-randomisation). <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); SE=standard error	
<i>Risk of bias</i>		
Bias	Authors’ judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described

Perry 2003 (Continued)

Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT done; attrition < 20%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	no baseline imbalance

Reddy 2002

Methods	Design: RCT FU: 17 mo (post-randomisation) Attrition: 7%; dropout rates did not differ across the study conditions ITT: No Unit of randomisation: school Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: 10 (1439) Int-2: 10 (1863) Ctrl: 10 (1474) Total N: 30 (4776) <u>N of Clusters (subjects) participated</u> Int-1: 10 (1293) Int-2: 10 (1769) Ctrl: 10 (1390) Total N: 30 (4452) Analyzed sample: N = 4452 Age: 12 yrs (7 th grade) Sex (male): 50.5% Ethnicity: NR Alcohol use: NR Country: India
Interventions	<u>Intervention-1: HRIDAY</u> <u>Focus/target:</u> to improve CV health (diet, physical activity, and smoking prevention); alcohol was not a focus of intervention <u>Components:</u> 1) set of 10 posters showing different aspects of CV health, 2) booklets of HRIDAY providing basic information on heart health circulated to students, 3) 30-60 min classroom activities selected by teachers, 4) debates on banning tobacco sponsorship, 5) discussions on nutrition and food policy; 3 of 20 classroom activities concerned ways

Reddy 2002 (Continued)

	to refuse offers to smoke Intervention-2: HRIDAY plus family-based program Focus/target: see above Components: students bringing home 6 booklets with information and activities to share with families Fidelity: 80% of the schools reported booklet distribution; the degree of fidelity did not differ across the intervention arms Duration/frequency: 10 mo (HRIDAY), 6 mo (booklet distribution) Control: standard curriculum	
Outcomes	FU: 17 mo (Int-1 vs. Int-2 vs. Ctrl) Having a drink of alcohol (ever) 0.1286 (95% CI: 0.0958, 0.1706) vs. 0.1447 (95% CI: 0.1096, 0.1886) vs. 0.2886 (95% CI: 0.2298, 0.3555), p < 0.001 (Int1-2 vs. Ctrl)	
Notes	HRIDAY <u>Abbreviations</u> FU=follow-up; RCT=randomized controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); SE=standard error NS=statistically non-significant; HRIDAY = health-related information and dissemination among youth; 95% CI=ninety-five percent confidence interval; CV=cardiovascular	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	no ITT and attrition < 20%, attrition rates similar between study arms
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	no imbalance in baseline covariate

Ringwalt 1991

Methods	Design: RCT FU: 17 wks (post-randomisation) Attrition: 9% ITT: no Unit of randomisation: school Clustering effect adjusted: yes	
Participants	<u>N of Clusters (subjects) randomised</u> Int: 10 (685) Ctrl: 10 (585) Total N: 20 (1270) <u>N of Clusters (subjects) participated</u> Int: 10 (NR) Ctrl: 10 (NR) Total N: 20 (3.2% parents refused permission to participate) Age: 10-12 yrs Sex (male): 48% Ethnicity: 50% Black Alcohol users: 37% had tried beer and 20% had tried wine Country: US	
Interventions	<u>Intervention</u> : school-based drug education program delivered by specially trained police officers <u>Focus/target</u> : Promote knowledge, attitudes and social skills to reduce drug use <u>Components</u> : resistance training, self-esteem, social skills, information, role-play. Delivered by trained, uniformed, police officer <u>Fidelity</u> : NR <u>Duration/frequency</u> : 17 weekly sessions (45-60 min each) in 17 weeks <u>Control</u> : standard curriculum	
Outcomes	FU: 17 wks <u>Lifetime involvement with alcohol (pre vs. post)</u> Int: 50.2% vs. 54.8% Ctrl: 40.0% vs. 49.8% p>0.05	
Notes	DARE Baseline differences on seven different variables. <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); SE=standard error NS=statistically non-significant; DARE=drug abuse resistance education	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement

Ringwalt 1991 (Continued)

Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No ITT but low attrition of 9%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Differences in baseline covariate

Ringwalt 2009

Methods	<p>Design: RCT</p> <p>FU: 3 yrs (post-randomisation)</p> <p>Attrition: 21%; dropout rates non-differential; dropouts were less likely to be Whites (52.5% vs. 47.6%, $p=0.03$)</p> <p>ITT: Yes</p> <p>Unit of randomisation: school</p> <p>Clustering effect adjusted: yes</p>
Participants	<p><u>N of Clusters (subjects) randomised</u></p> <p>Int: 20 (3990)</p> <p>Ctrl: 20 (4348)</p> <p>Total N: 40 (8338)</p> <p><u>N of Clusters (subjects) participated</u></p> <p>Int: 17 (2983)</p> <p>Ctrl: 17 (3045)</p> <p>Total N: 34 (6028)</p> <p>Analyzed sample: N = 5883 (FU-2 yrs)</p> <p>Analyzed sample: N = 4607 (FU-3 yrs)</p> <p>Age: NR yrs (6th-8th grades)</p> <p>Sex (male): 49.0%</p> <p>Ethnicity: White (50.0%), African American (16.0%), Hispanic (26.0%)</p> <p>Alcohol use (lifetime): Int (39.4%) vs. Ctrl (34.4%), $p=0.06$</p> <p>30-day use of alcohol: 7.5% vs. 5.5%, $p=0.03$</p> <p>Country: US</p>

Ringwalt 2009 (Continued)

Interventions	<u>Intervention:</u> ALERT <u>Focus/target:</u> cigarettes, alcohol, marijuana, and inhalant use; motivates not to use substances, and provides skills for resisting inducements <u>Components:</u> 11 lessons of 45 min (1 st yr), followed by 3 booster lessons the following year; activities were guided class discussions, role playing exercises and videos <u>Fidelity:</u> 97.4% of all lessons were delivered based on logs/records <u>Duration/frequency:</u> weekly lessons (1 per wk) for 2 yrs <u>Control:</u> Standard curriculum	
Outcomes	FU: 2 yrs (Int vs. Ctrl) <u>Lifetime use of alcohol</u> 55.4% vs. 52.4% (OR=0.99, p=NR) <u>30-day use of alcohol</u> 14.3% vs. 14.0% (OR=1.32, p=NR) FU: 3 yrs (Int vs. Ctrl) <i>Mean 30-day alcohol use from baseline to FU (none, 1-2 days, 3-5 days, 6-19 days, and 20 or more days in last mo)</i> Int: from 7.1 (25.6) to 22.1 (41.5) Ctrl: from 5.2 (22.2) to 19.7 (39.8) Between-group p=0.91 <i>% Students with lifetime alcohol use from baseline to FU</i> Int: from 39.6 to 63.5 Ctrl: from 34.6 to 59.9 Between-group p=0.97	
Notes	<u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); SE=standard error NS=statistically non-significant	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer generated random numbers
Allocation concealment (selection bias)	Unclear risk	students unaware of their assignment
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described

Ringwalt 2009 (Continued)

Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT and imputation done; attrition 21% but dropout non differential
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Differences in baseline covariate

Scaggs 1985

Methods	Design: RCT FU: 2 yrs (post-randomisation) Attrition: 26% ITT: No Unit of randomisation: class Clustering effect adjusted: No
Participants	<u>N of Clusters (subjects) randomised</u> Int: 3 (NR) Ctrl: 2 (NR) Total N: 5 (127) <u>N of Clusters (subjects) participated</u> Int: 3 (NR) Ctrl: 2 (NR) Total N: 5 (NR) <u>Analyzed sample</u> Int: 3 (48) Ctrl: 2 (45) Total N: 5 (93) Age: 14-15 yrs Sex (male): 48% Ethnicity: NR Alcohol users: 31% Country: US
Interventions	<u>Intervention</u> : a group-guidance based prevention program focusing on the knowledge, attitudes and behaviors of alcohol and other drug use <u>Focus/target</u> : knowledge and skills around alcohol and drugs <u>Components</u> : focus on personal use, decision making skills, family drinking, drinking and driving, knowledge of substances <u>Fidelity</u> : NR <u>Duration/frequency</u> : 45 min/day for 15 days <u>Control</u> : normal science lessons

Scaggs 1985 (Continued)

Outcomes	FU: 2 yrs Reported alcohol use (males): Int: N=12 (54.6%; -0.2% from baseline) Ctrl: N = 12 (60.0%; +4.4% from baseline) Reported alcohol use (females): Int: N=9 (33.4%; -7.7% from baseline) Ctrl: N=10 (58.9%; +29.4% from baseline) No results of formal statistical analyses were reported	
Notes	The Substance Abuse Awareness Program Prevention Model Described as a quasi-experimental study, but details indicate a RCT. Discrepancy between reported attrition rates and cell sizes in analyses. Possible contamination between groups <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s)	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	no ITT and high attrition of 264%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Possible contamination between study arms

Schinke 2000

Methods	<p>Design: RCT FU: 3.5 yrs (post-randomisation) Attrition: 14% ITT: no Unit of randomisation: school Clustering effect adjusted: no</p>
Participants	<p><u>N of Clusters (subjects) randomised</u> Int: NR (NR) Ctrl: NR (NR) Total N: 27 (1396)</p> <p><u>N of Clusters (subjects) participated</u> Int: NR (1335) Ctrl: NR (1343) Total N: 27 (1396) Age (mean): 10.3 yrs (3rd-5th Grades) Sex (male): 51% Ethnicity: 100% Native Americans Alcohol users: 9% weekly drinkers (4+ drinks) Country: US</p>
Interventions	<p><u>Intervention</u>: program derived from LST tailored to cultural setting and everyday context for Native American youth <u>Focus/target</u>: cognitive and behavioral skills for substance abuse prevention <u>Components</u>: problem-solving, personal coping, interpersonal communication - all incorporating Native American myths, legends and stories <u>Fidelity</u>: NR <u>Duration/frequency</u>: 15 x 50-minute weekly sessions + bi-annual booster sessions <u>Control</u>: standard curriculum</p>
Outcomes	<p>FU: 0.5, 1.5, 2.5 and 3.5 yrs <u>Weekly drinking: 4+ (Int vs. Ctrl)</u> 9.13% vs. 8.72% (baseline) 7.65% vs. 8.31% (0.5 yrs) 12.57% vs. 15.55% (1.5 yrs) 15.89% vs. 19.06% (2.5 yrs) * 22.87% vs. 30.17% (3.5 yrs) * * p<0.01</p>
Notes	<p>Culturally tailored LST Baseline descriptive information not reported <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); LST=life skills training</p>

Schinke 2000 (Continued)

<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	no ITT but low attrition of 14%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Baseline descriptive information not reported

Sheehan 1996

Methods	Design: RCT FU: 3 yrs (post-randomisation) Attrition: 38% ITT: no Unit of randomisation: school Clustering effect adjusted: no
Participants	<u>N of Clusters (subjects) randomised</u> Int: 21 (NR) Ctrl: 20 (NR) Total N: 41 (4545) <u>N of Clusters (subjects) participated</u> Int: 21 (NR) Ctrl: 20 (NR) Total N: 41 (4545) Age: 17 yrs Sex (male): 41% Ethnicity: NR Alcohol users: 10-13% weekly drinkers Country: Australia

Interventions	<p>Intervention: program based on Theory of Reasoned Action</p> <p>Focus/target: prevent drinking and driving through weakening student intentions to drink and drive</p> <p>Components: modification of students’ attitudes and beliefs towards drink driving, subjective beliefs and norms, and perceived control over their own behaviour. Extensive use of role place and interactional activities</p> <p>Fidelity: NR</p> <p>Duration/frequency: 12 lessons over 2 yrs</p> <p>Control: NR</p>	
Outcomes	<p>FU: 3 yrs (pre- vs. post-test)</p> <p><u>Weekly drinkers</u></p> <p>Int: 10% vs. 36%</p> <p>Ctrl: 13% vs. 34%</p> <p>Chi-squared = 6.54(3), p=0.09</p> <p><u>Drinking and driving in past mo</u></p> <p>Reported drink driving at baseline: OR=0.59 (95% CI: 0.15, 2.1)</p> <p>No reported drink driving at baseline: OR=0.90 (95% CI: 0.61, 1.31)</p>	
Notes	<p>Plan a Safe Strategy (PASS)</p> <p>No differential attrition. FU described as a random sample of 62% of baseline sample</p> <p><u>Abbreviations</u></p> <p>FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported;</p> <p>wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); LST=life skills training;</p> <p>PASS=plan safe strategy; OR=odds ratio; 95% CI: ninety-five percent confidence interval</p>	
<i>Risk of bias</i>		
Bias	Authors’ judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT and high attrition of 38%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported

Sheehan 1996 (Continued)

Other bias	Unclear risk	Baseline covariate distribution not described
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Sloboda 2009

Methods	<p>Design: RCT FU: 5 yrs (post-randomisation) Attrition: 45% ITT: No Unit of randomisation: school Clustering effect adjusted: yes</p>
Participants	<p><u>N of Clusters (subjects) randomized</u> Int: 41 (11314) Ctrl: 42 (8215) Total N: 83 (19529)</p> <p><u>N of Clusters (subjects) participated</u> Int: 40 (10028) Ctrl: 40 (7292) Total N: 80 (17320) Analyzed sample: N = 17320 Age: 12.5 yrs (7th grade) Sex (male): 49.0% Ethnicity: White (33% vs. 40%), Black (12.6% vs. 15.4%), Hispanic (27.8% vs. 17.9%), Asian (4.5%), American Indian (8.3%), and Other (11.8% vs. 12.9%) Alcohol use (past 30-d): 13.8% vs. 11.8% Country: US</p>
Interventions	<p><u>Intervention</u>: TCYL <u>Focus/target</u>: to prevent use of alcohol, tobacco, and other drugs by demonstrating consequences of the use of alcohol and drugs to students <u>Components</u>: 10 lessons (for 7th grade) and booster of 7 lessons (for 9th grade); the lessons cover normative beliefs, consequences, decision making and resistance skills <u>Fidelity</u>: NR <u>Duration/frequency</u>: 1 yr (in 7th grade) and 1 yr (in 9th grade) <u>Control</u>: standard curriculum</p>
Outcomes	<p>FU: 5 yrs (Int vs. Ctrl) <u>Binge drinking (within 14 days)</u> 28.1% vs. 24.7% (OR= 1.14, 95% CI: 1.01, 1.27) <u>Alcohol use (within 30 days)</u> 45.7% vs. 41.9% (OR= 1.09, 95% CI: 1.01, 1.18) <u>Got drunk (within 30 days)</u> 30.0% vs. 27.3% (OR= 1.10, 95% CI: 0.98, 1.22)</p>

	<u>Alcohol use (within 12 mo)</u> 61.1% vs. 58.7% (OR= 1.04, 95% CI: 0.98, 1.10) <u>Got drunk (within 12 mo)</u> 43.3% vs. 41.2% (OR= 1.05, 95% CI: 0.96, 1.14) The negative effect of intervention on 30 day and 12 mo alcohol use measures persisted in males but not in females; in White students, the intervention was associated with significantly higher risk for alcohol use compared with Ctrl; whereas no such associations were present in non-White students; non-users of alcohol in treatment group were at higher risk for alcohol use	
Notes	TCYL - Take Charge of Your Life Dropouts were more likely older, female, non-White, alcohol, marijuana or drug users; differential rates were for race with more of those classified in other race being in the Ctrl arm; missing data were imputed <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); PASS=plan safe strategy; OR=odds ratio; 95% CI: ninety-five percent confidence interval; TCYL= take charge of your Life	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT and high possibly differential attrition > 20%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Imbalance in baseline covariate may have confounded the association

Spoth 2002

Methods	<p>Design: RCT FU: 5.5 yrs (post-randomisation) Attrition: 26% ITT: yes Unit of randomisation: school Clustering effect adjusted: yes</p>
Participants	<p><u>N of Clusters (subjects) randomised</u> Int-1: NR (618) Int-2: NR (541) Ctrl: NR (491) Total N: 36 (1650)</p> <p><u>N of Clusters (subjects) participated</u> Int-1: NR (428) Int-2: NR (450) Ctrl: NR (347) Total N: 36 (1225) Analyzed sample: N = 1650 Age: NR (7th grade) Sex (male): 52.0% Ethnicity: White (96%) Alcohol use (ever): Int-1/2 (56%) vs. Ctrl (46.9%) Country: US</p>
Interventions	<p><u>Intervention-1: LST</u> Focus/target: to promote skill development, social resistance, self-management Components: 15 sessions and 5 booster sessions a year later and in 11th grade in 6 schools</p> <p><u>Intervention-2: SFP + LST</u> Focus/target: to reduce youth substance use Components: 7 sessions, 1 h parent and youth skill-building curricula, followed by conjoint family curricula to practice the skills, 4 booster sessions a yr later, and in 11th grade in 6 schools Fidelity: 92%-98% (SFP), 77%-85% (LST) Duration/frequency: 7 wks (SFP) 1 school yr (LST) Control: leaflets on teen development sent to parents</p>
Outcomes	<p><u>FU: 1 yr (Int-1 vs. Int-2 vs. Ctrl)</u> New users of alcohol: 35.2% vs. 25.7% vs. 36.7%, p<0.05 (Int-2 vs. Int-1 or Ctrl)</p> <p><u>FU: 2.5 yr (Int-1 vs. Int-2 vs. Ctrl)</u> RAU (mean/SE): 0.23±0.02 vs. 0.19±0.02 vs. 0.24±0.02, p>0.05 RAU (growth trajectories): between-arm differences - NS WD (mean/SE): 0.04±0.01 vs. 0.03±0.01 vs. 0.05±0.01, p<0.05 (Int-2 vs. Ctrl) WD (growth trajectories) between-arm differences: NS</p> <p><u>FU: 5.5 yrs (Int-1 vs. Int-2 vs. Ctrl)</u> Alcohol initiation (mean/SE): 0.94±0.02 vs. 0.93±0.02 vs. 0.96±0.02, p>0.05 Alcohol initiation (growth trajectories): p<0.05 in favour of Int-2 (Int-2 vs. Ctrl) Drunkness initiation (mean/SE): 0.60±0.03 vs. 0.64±0.03 vs. 0.68±0.03, p>0.05</p>

Spoth 2002 (Continued)

	Drunkenness initiation (growth trajectories): p<0.05 in favour of Int-1 and Int-2 (Int-2 or Int-1 vs. Ctrl)	
Notes	LST - Life Skills Training The effects of interventions were assessed in a subset of risky drinker students in whom alcohol and drunkenness frequency was significantly reduced in Int-1 compared to Ctrl, but respective growth trajectories were similar. There was some imbalance in baseline factors, % students living with both parents was greater in Ctrl (78%) vs. Int-1 (69.6%) and alcohol users in Int-1 and Int-2 (56-57% vs. 47%) <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; LST=life skills training; SFP=strengthening families program; RAU=regular alcohol use; WD=weekly drunkenness	
<i>Risk of bias</i>		
Bias	Authors’ judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT done; imputation of missing values; attrition 25% but non-differential
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Baseline imbalance in covariate

Methods	Design: RCT FU: 2 yrs (post-randomisation) Attrition: 18% ITT: No Unit of randomisation: class within school Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: NR (NR) Int-2: NR (NR) Ctrl: NR (NR) Total N: NR (NR) <u>N of Clusters (subjects) participated</u> Int-1: NR (NR) Int-2: NR (NR) Ctrl: NR (NR) Total N: 8 (1649) <u>N of Clusters (subjects) analysed</u> Int-1: NR (NR) Int-2: NR (NR) Ctrl: NR (NR) Total N: NR (NR) Age: NR (Grade 7) Sex (male): 50.5% Ethnicity: Caucasians (81.4%), African Americans (5.4%), Native Americans (2.2%), Hispanic (1.3%), Asians (1.1%), and Other (8.5%) Alcohol users: NR Country: US
Interventions	<u>Intervention-1: adult-led ALERT</u> <u>Focus/target:</u> drug and alcohol use <u>Intervention-2: adult-led and teen-assisted ALERT</u> <u>Focus/target:</u> drug and alcohol use <u>Components (Int-1/2):</u> To develop reasons not to use drugs, discuss pressure leading to drug use, learn resistance skills, and prevalence of drug use <u>Fidelity:</u> high; mean rating 5.8-6.8 (7 th grade) and 4.8-6.7 (8 th grade) <u>Duration/frequency:</u> 7th grade - 11 sessions weekly; 8th grade - 3 sessions <u>Control:</u> NR
Outcomes	FU: 2 yrs The graph showed no difference between ALERT and Control Group for alcohol use in the past mo at final follow-up <u>Multivariate statistical analysis</u> Past month alcohol use: beta = -0.011 (SE=0.17), NS (Int-1 vs. Int-2 vs. Ctrl) Past year alcohol use: beta = -0.071 (SE=0.15), NS (Int-1 vs. Int-2 vs. Ctrl) Binge drinking: beta = -0.001 (SE=0.25), NS (Int-1 vs. Int-2 vs. Ctrl)

St. Pierre 2005 (Continued)

Notes	<p>Project ALERT</p> <p>Possible contamination because of allocation by class within school, although authors discount this by comparison with substance use rates in other schools. There was no program effect modification by gender</p> <p><u>Abbreviations</u></p> <p>FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; SE=standard error</p>
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Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No ITT but low attrition of 18%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Possible contamination

Sun 2008

Methods	<p>Design: RCT</p> <p>FU: 1 yr (post-randomisation)</p> <p>Attrition: 27%</p> <p>ITT: No</p> <p>Unit of randomisation: school district</p> <p>Clustering effect adjusted: yes</p>
Participants	<p><u>N of Clusters (subjects) randomised</u></p> <p>Int-1: NR (NR)</p> <p>Int-2: NR (NR)</p> <p>Ctrl: NR (NR)</p> <p>Total N: 9 (3908)</p> <p><u>N of Clusters (subjects) participated</u></p>

	<p>Int-1: 3 (NR) Int-2: 3 (NR) Ctrl: 3 (NR) Total N: 9 (2734)</p> <p><u>Analyzed sample</u> Int-1: 3 (767) Int-2: 3 (688) Ctrl: 3 (609) Total N: 9 (2064) There were 18 schools in the randomised groups, 6 schools per arm Age: 13-19 yrs (9th to 11th grade) Sex (male): 52.1% Ethnicity: White (18.2%), Black (8.1%), Hispanic (62.1%), Asian (8.4%), and Other (3.2%) Alcohol use (past 30-d): Int-1 (38.7%) vs. Int-2 (37.4%) vs. Int-3 (38.6%) Country: US</p>
Interventions	<p><u>Intervention-1</u>: CPI <u>Focus/target</u>: to change youths' attitudes/beliefs on their drug use <u>Components</u>: classes with program curriculum <u>Intervention-2</u>: CPI + BSC <u>Focus/target</u>: BSC gives instruction in social skills and behavioral self management to allow youth flexible bond with peer groups, seek out social support when needed, and minimize stressful or conflict-type interactions <u>Components</u>: classes with program curriculum <u>Fidelity</u>: NR <u>Duration/frequency</u>: 3 times/week for 4 wks <u>Control</u>: standard curriculum</p>
Outcomes	<p><u>FU</u>: 1 yr <u>Int-1 vs. Ctrl</u> Alcohol use (past 30-d): OR=0.98, 95% CI: 0.63, 1.50 N of times of alcohol use (past 30-d): RR=0.92, 95% CI: 0.70, 1.21 <u>Int-2 vs. Ctrl</u> Alcohol use (past 30-d): OR=1.03, 95% CI: 0.66, 1.58 N of times of alcohol use (past 30-d): RR =0.84, 95% CI: 0.64, 1.11 <u>Int-2 vs. Int-1</u> Alcohol use (past 30-d): OR=1.05, 95% CI: 0.71, 1.55 N of times of alcohol use (past 30-d): RR =0.91, 95% CI: 0.69, 1.20</p>
Notes	<p>TND-4 - Project Towards no Drug Abuse Dropouts were more likely older, female, non-White, smoker; differential rates were not observed across the study arms Imbalance in ethnicity and school type at baseline; statistical adjustment was done <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=</p>

Sun 2008 (Continued)

	month(s); NS=statistically non-significant; RR=relative risk; OR=odds ratio; 95% CI=ninety-five percent confidence interval; CPI= cognitive perception information; BSC=behavioral skills curriculum; TND=project towards no drug abuse	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	High risk	No ITT, attrition > 20%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Imbalance in baseline covariate

van Lier 2009

Methods	Design: RCT FU: 6 yrs (post-randomisation) Attrition: 28% ITT: unclear Unit of randomisation: class Clustering effect adjusted: yes
Participants	<u>N of Clusters (subjects) randomised</u> Int: NR (NR) Ctrl: NR (NR) Total N: NR (666) <u>N of Clusters (subjects) participated</u> Int: NR (NR) Ctrl: NR (NR) Total N: NR (525) Analyzed sample: N = 477 Age: 7 yrs (1 st grade) Sex (male): NR% Ethnicity: NR

van Lier 2009 (Continued)

	Alcohol use (past 30-d): NR Country: Netherlands
Interventions	<p>Intervention: GBG</p> <p>Focus/target: to prevent aggressiveness, opposition and ADHD symptoms</p> <p>Components: done in 3 stages; choosing class rules, accompanied by pictograms; teachers assigned students to one of 4 teams and members are encouraged to manage their own and team-mates behavior; each team receives a number of cards and one card is taken when a student violates a rule and are rewarded if at least one card remains</p> <p>Fidelity: in 9 out of 13 schools GBG was carried completely and in 4 - it was incomplete</p> <p>Duration/frequency: 3 times a wk (10 min sessions) for 2 yrs</p> <p>Control: standard curriculum</p>
Outcomes	<p>FU: 3 to 6 yrs (Int vs. Ctrl)</p> <p>Alcohol use growth parameter</p> <p>Slope: 0.05±0.19, NS (past yr)</p> <p>Slope: -0.31±0.15, NS (past mo)</p> <p>Slope: -0.43±0.17, p<0.05 (past wk)</p>
Notes	<p>GBG - Good Behavior Game</p> <p>Abbreviations</p> <p>FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant; GBG=good behavior game; ADHD=attention deficit hyperactive disorder</p>

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	ITT not done; dropouts differ from retainers in socioeconomic status
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Not described

Methods	<p>Design: RCT FU: 12 mo (post-randomisation) Attrition: 49% ITT: yes Unit of randomisation: school Clustering effect adjusted: yes</p>
Participants	<p><u>N of Clusters (subjects) randomised</u> Int: 8 (833) Ctrl: 8 (1159) Total N: 16 (1992)</p> <p><u>N of Clusters (subjects) participated</u> Int: 8 (611) Ctrl: 8 (835) Total N: 16 (1446) Analyzed sample: N = 1434 Age: 13 yrs (8th grade) Sex (male): 59% Ethnicity: NR Alcohol use in males (weekly frequency over past 3 mo): Int (1.56±6.94) vs. Ctrl (1.24±6.45) Alcohol use in females (weekly frequency over past 3 mo): Int (0.66±3.16) vs. Ctrl (0.35±1.37) Drinking to excess on single occasion (frequency) in males: Int (0.39±2.40) vs. Ctrl (0.39±2.30) Drinking to excess on single occasion (frequency) in females: Int (0.21±1.01) vs. Ctrl (0.18±0.61) Country: Australia</p>
Interventions	<p><u>Intervention</u>: CLIMATE curriculum integrated computerized harm minimization program <u>Focus/target</u>: to reduce alcohol misuse <u>Components</u>: 40-min lessons broken by two parts: 1) 15-20 min computer-based lesson and 2) activities for teachers and students (discussions, decision-making, problem-solving, and skills) <u>Fidelity</u>: only 1 teacher failed to deliver complete curriculum <u>Duration/frequency</u>: 1 yr <u>Control</u>: CLIMATE curriculum integrated harm minimization program delivered by a classroom teacher</p>
Outcomes	<p>FU: 12 mo (Int vs. Ctrl) Alcohol use in males (weekly frequency over past 3 mo): Int (3.86±14.54) vs. Ctrl (3.50±13.12), NS Alcohol use in females (weekly frequency over past 3 mo): Int (0.99±4.07) vs. Ctrl (2.25±10.16), p <0.05 Drinking frequency to excess on single occasion in males over past 3 mo: Int (1.07±3.69) vs. Ctrl (1.16±4.72), NS Drinking frequency to excess on single occasion in females over past 3 mo: Int (0.38±1.16)</p>

	vs. Ctrl (0.93±3.45), $p < 0.05$ Alcohol-related harms in males (own): Int (11.67±27.51) vs. Ctrl (10.79±29.5), NS Alcohol-related harms in females (own): Int (3.30±9.69) vs. Ctrl (7.15±22.93), $p < 0.05$
Notes	CLIMATE - Dropouts were more likely to be male, higher alcohol use; attrition was not differential - High attrition possibly leading to confounding - More males in Ctrl (69%) vs. Int (45%); analysis adjusted and stratification by gender was also done <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significant

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	ITT done; high attrition of 49%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Unclear risk	Imbalance in baseline covariate

Werch 2008

Methods	Design: RCT FU: 1 mo (post-randomisation) Attrition: 19%; attrition rates did not significantly differ across study conditions ITT: no Unit of randomisation: individual level Clustering effect adjusted: NA
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: NA (NR) Int-2: NA (NR) Int-3: NA (NR)

	<p>Total N: NA (385)</p> <p><u>N of Clusters (subjects) participated</u></p> <p>Int-1: NA (NR)</p> <p>Int-2: NA (NR)</p> <p>Int-3: NA (NR)</p> <p>Total N: NA (375)</p> <p><u>Analyzed sample:</u></p> <p>Int-1: NA (113)</p> <p>Int-2: NA (113)</p> <p>Int-3: NA (109)</p> <p>Total N: NA (335)</p> <p>Age: 17 yrs (11th and 12th grades)</p> <p>Sex (male): 43%</p> <p>Ethnicity: White (49%), Black (23%), and Hispanic (6%)</p> <p>Alcohol use (over 30 d): 44%</p> <p>Country: US</p>
Interventions	<p><u>Intervention-1:</u> Goal Survey (based on BIM)</p> <p><u>Focus/target:</u> to influence multiple health habits by addressing images of college and career success</p> <p><u>Components:</u> printed text and scripted messages showing images of successful young adults while avoiding alcohol and tobacco smoking</p> <p><u>Intervention-2:</u> Goal Survey + Contract (based on BIM)</p> <p><u>Focus/target:</u> Contract was designed to help students in selecting goals leading to successful/happy life</p> <p><u>Components:</u> see above</p> <p><u>Intervention-3:</u> Goal Survey + Consult (based on BIM)</p> <p><u>Focus/target:</u> to provide image-based feedback tailored to personal development and health behaviors</p> <p><u>Components:</u> see above</p> <p><u>Fidelity:</u> NR</p> <p><u>Duration/frequency:</u> 1 mo</p>
Outcomes	<p>FU: 1 mo (Int-1 vs. Int-2 vs. Int-3)</p> <p><u>Intention to use alcohol (1='definitely not' to 4='definitely will')</u></p> <p>2.28±0.1 vs. 2.27±0.1 vs. 2.24±0.1, p<0.001</p> <p><u>Length of alcohol use (1='do not use' to 5='1 year or more')</u></p> <p>2.69±0.2 vs. 2.47±0.2 vs. 2.61±0.2, p=0.05</p> <p><u>30-day alcohol frequency (1='0 days' to 7='all 30 days')</u></p> <p>1.91±0.1 vs. 1.74±0.1 vs. 1.81±0.1, p=0.13</p> <p><u>30-day alcohol quantity (1='do not drink' to 12='?11 drinks')</u></p> <p>3.27±0.3 vs. 3.32±0.3 vs. 3.42±0.3, p=0.82</p>
Notes	<p>Behavior-image model (BIM)</p> <p><u>Abbreviations</u></p> <p>FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=</p>

Werch 2008 (Continued)

	control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); NS=statistically non-significan; BIM= behavior-image model	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	no ITT; attrition 19% and nondifferential
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	No significant imbalance in covariates between study arms

Werch 2010

Methods	Design: RCT FU: 3 mo (post-randomisation) Attrition: 13% ITT: no Unit of randomisation: individual Clustering effect adjusted: NA
Participants	<u>N of Clusters (subjects) randomised</u> Int: NA (NR) Ctrl: NA (NR) Total N: NA (416) <u>N of Clusters (subjects) participated</u> Int: NA (179) Ctrl: NA (181) Total N: NA (360) Age: 15.8 yrs Sex (male): 36.5%

	Ethnicity: Hispanics (15%), Asian (7%), Black (23%), White (46%), Other (24.4%) Alcohol users (past 30-d): 24.5% Any alcohol or drug problem: 30.5% Country: US	
Interventions	<u>Intervention:</u> BIM <u>Focus/target:</u> alcohol and drugs; printed text and scripted messages designed to elicit a social image of successful young adult with life goals to increase positive behaviours while avoiding those that interfere with successful goals <u>Components:</u> screening survey, consultation, and goal plan <u>Fidelity:</u> research staff conducted independent rating of audio-taped sessions <u>Duration/frequency:</u> 20 min consultation each for 3 mo <u>Control:</u> standard curriculum	
Outcomes	<p>FU: 3 mo <u>30-day mean alcohol frequency from baseline to FU (1= '0 days' to 11= 'all 30 days')</u> Int: from 1.49 (0.08) to 1.35 (0.07) Ctrl: from 1.31 (0.08) to 1.39 (0.07) Between-group p=0.06</p> <p><u>30-day alcohol quantity (1= '0 drinks per day' to 12=11 or more drinks per day)</u> Int: from 2.05 (0.16) to 1.89 (0.16) Ctrl: from 1.61 (0.16) to 1.83 (0.16) Between-group p=0.05</p> <p><u>Heavy use of alcohol in past 30 days (4-5 more drinks in a row)</u> Int: from 1.32 (0.08) to 1.20 (0.05) Ctrl: from 1.17 (0.08) to 1.15 (0.05) Between-group p=0.44</p> <p><u>Total number of alcohol/drug problems in past 30 days (17-item instrument)</u> Int: from 1.35 (0.20) to 1.11 (0.20) Ctrl: from 1.22 (0.20) to 1.11 (0.20) Between-group p=0.65</p>	
Notes	Behavior-image model (BIM) In baseline substance users subgroup, the intervention was considered as selective and the data was not abstracted <u>Abbreviations</u> FU=follow-up; RCT=randomized controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); BIM= behavior-image model	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement

Werch 2010 (Continued)

Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	no ITT but low attrition of 13%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	Low risk	No significant imbalance in covariate between study arms

Wilhelmsen 1994

Methods	Design: RCT FU: 4 months (post-randomisation) Attrition < 5% ITT: no Unit of randomisation: school, stratified by location and SES Clustering effect adjusted: no
Participants	<u>N of Clusters (subjects) randomised</u> Int-1: 4 (NR) Int-2: 4 (NR) Ctrl: 4 (NR) Total N: 12 (1042) <u>N of Clusters (subjects) participated</u> Int-1: 4 (NR) Int-2: 4 (NR) Ctrl: 4 (NR) Total N: 12 (955) Age: 12-13 yrs Sex (male): NR Ethnicity: NR Alcohol users: 31% Country: Norway
Interventions	Intervention-1: HRS - highly structured intervention Focus/target: Targeting social cognitive structures predictive of drug use Components: School-based prevention program providing knowledge of alcohol use and local traditions, norms, managing

	<p>pressures and attitudes</p> <p><u>Intervention-2</u>: LRS - loosely structured intervention</p> <p><u>Focus/target</u>: Targeting social cognitive structures predictive of drug use</p> <p><u>Components</u>: school-based prevention program providing knowledge of alcohol use and local traditions, norms, managing pressures and attitudes</p> <p><u>Fidelity</u>: NR</p> <p><u>Duration/frequency</u>: 10 sessions / 2 weeks</p> <p><u>Control</u>: NR</p>	
Outcomes	<p>FU: 4 months</p> <p><u>Mean (SD) frequency of use (6-point scale)</u></p> <p>Int-1: 0.53 (1.4)</p> <p>Int-2: 0.90 (1.0)</p> <p>Ctrl: 0.69 (1.3)</p> <p>In ANCOVA a SS interaction between program and time $F(2,838) = 6.22, (p<0.01)$ was due to a an increase in Int-2 scores ($p < 0.05$) and a decrease in Int-1 scores ($p<0.01$) and no change in the Ctrl group</p>	
Notes	<p>Alcohol Prevention Programmes</p> <p><u>Abbreviations</u></p> <p>FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported; wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s); BIM= behavior-image model; SS=statistically significant; HRS=highly role-specified; LRS= less role-specified; ANCOVA=analysis of covariance</p>	
<i>Risk of bias</i>		
Bias	Authors’ judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No ITT but low attrition 5%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported

Wilhelmsen 1994 (Continued)

Other bias	Low risk	No significant imbalance in covariate between study arms
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Williams 1968

Methods	<p>Design: RCT FU: 1 yr (post-randomisation) Attrition: 14% ITT: no Unit of randomisation: individual Clustering effect adjusted: NA</p>
Participants	<p><u>N of Clusters (subjects) randomised</u> Int: NA (111) Ctrl: NA (94) Total N: NA (205)</p> <p><u>N of Clusters (subjects) participated</u> Int: NA (111) Ctrl: NA (94) Total N: NA (205) Age: 16-17 yrs Sex (male): 100% Ethnicity: NR Alcohol users: NR Country: US</p>
Interventions	<p><u>Intervention</u>: Massachusetts alcohol education program to reduce alcoholism in the population <u>Focus/target</u>: increase knowledge about alcohol <u>Components</u>: discussion group - examine own and peer attitudes to drinking. Factual information <u>Fidelity</u>: NR <u>Duration/frequency</u>: 5 sessions per yr <u>Control</u>: alternative topics chosen for discussion</p>
Outcomes	<p>FU: 1 yr (Int vs. Ctrl) Alcohol use in past yr: 85% (77% at pre-test) vs. 85% (74% at pre-test), $p > 0.05$ Drank > 5 times in past yr (drinkers): 72% (50% at pre-test) vs. 61% (43% at pre-test), $p > 0.05$ Intoxicated in past yr (drinkers): 64% (25% at pre-test) vs. 57% (29% at pre-test), $p > 0.05$</p>
Notes	<p>Massachusetts Program Risk of contamination as same school provided both groups <u>Abbreviations</u> FU=follow-up; RCT=randomised controlled trial; N=number; Int=intervention; Ctrl=control; yr(s)=year(s); NR=not reported;</p>

Williams 1968 (Continued)

	wk(s)=week(s); d=day(s); ITT=intention to treat (analysis); NA=not applicable; mo=month(s)	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	no ITT low attrition 14%
Selective reporting (reporting bias)	Low risk	All outcomes of interest specified in study methods section were reported
Other bias	High risk	Risk of contamination as same school provided both groups

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Ackermann 2008	Participant age > 18 years old
Amaro 2009	Selective/indicated prevention
Anderson 2004	No relevant outcomes
Bailey 2004	Community-based intervention
Bauman 2002	Family-based intervention
Bell 2005	No relevant outcomes
Benner 2008	No relevant outcomes
Bersamin 2007	Participant age > 18 years old
Boekeloo 2004	Office-based intervention

(Continued)

Botvin 2006	No relevant outcomes
Brody 2004	No relevant outcomes
Brody 2005	No relevant outcomes
Brody 2006	Family-based intervention
Brody 2008	No relevant outcomes
Brown 2005	Multi-component intervention
Brown 2007	Meta-analysis
Bryan 2009	Selective/indicated prevention
Castellanos 2006	No relevant outcomes
Caudill 2007	Selective/indicated prevention
Connell 2007	Family/multi-component intervention
Conrod 2006	Selective/indicated prevention
Conrod 2008	Selective/indicated prevention
Croom 2009	Participant age > 18 years old
D'Amico 2008	Selective/indicated prevention
DeGarmo 2009	Multi-component intervention
Dembo 2002	Selective/indicated prevention
Donohue 2004	Participant age > 18 years old
Eddy 2003	Multi-component intervention
Elder 2002	Selective/indicated prevention
Elliot 2004	No relevant outcomes
Friedman 2002	Selective/indicated prevention
Fromme 2004	Participant age > 18 years old
Griffin 2003	Selective/indicated prevention

(Continued)

Griffin 2004	No relevant outcomes
Griffin 2006	Family-based intervention
Haggerty 2006	Family-based intervention
Haggerty 2007	Family-based intervention
Haggerty 2008	Selective/indicated prevention
Hembroff 2007	Participant age > 18 years old
Jemmott 2005	Participant age > 18 years old
Jones 2005	Family-based intervention
Martinez 2005	Selective/indicated prevention
Poduska 2008	No relevant outcomes
Simons-Morton 2005	Multi-component intervention
Sussman 2002	Not randomised trial
Wagenaar 2005	Not randomised trial
Wolchik 2002	Selective/indicated prevention
Wu 2003	Family-based intervention

DATA AND ANALYSES

This review has no analyses.

APPENDICES

Appendix I. Medline search Strategy

1. exp ALCOHOLS/ad, ae
2. exp Alcohol Drinking/
3. exp Alcohol Abuse/
4. exp Alcohol, Ethyl/ae
5. exp Alcohol Abuse/mo, pc, rh, th
6. alcohol\$.ti,ab.
7. drink\$.ti,ab.
8. drunk\$.ti,ab.
9. intoxicat\$.ti,ab.
10. or/1-9
11. teenage\$.ti,ab. or youth.ti,ab or adolescent\$.ti,ab
12. (early adj2 adult\$).ti,ab.
13. (young adj2 adult\$).ti,ab.
14. exp adolescent/ or exp child/ or exp students/
15. or/11-14
16. intervention\$.ti,ab.
17. educat\$.ti,ab.
18. promot\$.ti,ab.
19. adverti\$.ti,ab.
20. campaign\$.ti,ab.
21. (mass adj2 media).ti,ab.
22. (primary adj5 prevention).ti,ab.
23. (secondary adj5 prevention).ti,ab.
24. (universal adj5 prevention).ti,ab.
25. (selective adj5 prevention).ti,ab.
26. (target\$ adj5 prevention).ti,ab.
27. exp HEALTH EDUCATION/
28. School\$.ti,ab or peer\$.ti,ab or Curriculum.ti,ab or skill\$.ti,ab or program\$.ti,ab
29. or/16-28
30. randomized controlled trial.pt
31. controlled clinical trial.pt
32. random\$.ti,ab
33. placebo.ti,ab
34. drug therapy.fs
35. trial.ab
36. groups.ab
37. OR/ 31-37
38. exp animals/ NOT humans.sh
39. 37 NOT 38
40. 10 and 15 and 29 and 39
41. limit 40 to yr="2002 -Current"

Appendix 2. EMBASE Search strategy

1 random\$.ab,ti.
2 placebo.ab,ti.
3 ((singl\$ or doubl\$ or trebl\$ or tripl\$) and (blind\$ or mask\$)).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
4 (cross-over\$ or crossover\$).tw.
5 randomized controlled trial/
6 phase-2-clinical-trial/
7 phase-3-clinical-trial/
8 double blind procedure/
9 single blind procedure/
10 crossover procedure/
11 Latin square design/
12 exp PLACEBOS/
13 multicenter study/
14 or/1-13
15 limit 14 to human
16 exp alcohol/
17 Drinking Behavior/
18 Alcoholism/
19 exp alcohol abuse/
20 exp Alcohol Drinking/
21 drink\$.ti,ab.
22 drunk\$.ti,ab.
23 intoxicat\$.ti,ab.
24 alcohol.ti,ab.
25 or/16-24
26 adolescen\$.ti,ab.
27 teenage\$.ti,ab.
28 (young adj2 people).ti,ab.
29 (early adj2 adult\$).ti,ab.
30 (young adj2 adult\$).ti,ab.
31 youth\$.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
32 exp adolescent/ or exp child/ or or exp students/
33 exp youth/
34 or/26-33
35 intervention\$.ti,ab.
36 educat\$.ti,ab.
37 promot\$.ti,ab.
38 adverti\$.ti,ab.
39 campaign\$.ti,ab.
40 (mass adj2 media).ti,ab.
41 (primary adj5 prevention).ti,ab.
42 (secondary adj5 prevention).ti,ab.
43 (universal adj5 prevention).ti,ab.
44 (selective adj5 prevention).ti,ab.
45 (target\$ adj5 prevention).ti,ab.
46 exp education/
47 or/35-46
48 15 and 25 and 34 and 47
49 limit 48 to yr="2002 -Current"

Appendix 3. PsycINFO search strategy

1 clinical trials.sh.
2 placebo.sh.
3 (Single adj blind*).ab,ti.
4 (Single adj dumm*).ab,ti.
5 (Single adj mask*).ab,ti.
6 (Double adj blind*).ab,ti.
7 (Double adj dumm*).ab,ti.
8 (Double adj mask*).ab,ti.
9 (triple adj blind*).ab,ti.
10 (triple adj dumm*).ab,ti.
11 (triple adj mask*).ab,ti.
12 (treble adj blind*).ab,ti.
13 (treble adj dumm*).ab,ti.
14 (treble adj mask*).ab,ti.
15 (control* adj study).ab,ti.
16 (control* adj studies).ab,ti.
17 (control* adj trial*).ab,ti.
18 (Random* or sham or shams or placebo* or RCT*).ab,ti.
19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18
20 alcohol\$.ti,ab.
21 drink\$.ti,ab.
22 drunk\$.ti,ab.
23 intoxicat\$.ti,ab.
24 exp sobriety/ or exp alcohol withdrawal/ or exp alcohol intoxication/ or exp alcoholism/ or exp alcohols/ or exp blood alcohol concentration/ or exp binge drinking/ or exp driving under the influence/ or exp alcohol abuse/ or exp alcoholic psychosis/ or exp alcohol rehabilitation/ or exp alcohol drinking patterns/
25 or/20-24
26 adolescen\$.ti,ab.
27 teenage\$.ti,ab.
28 (young adj2 people).ti,ab.
29 (early adj2 adult\$).ti,ab.
30 (young adj2 adult\$).ti,ab.
31 youth\$.mp. [mp=title, abstract, heading word, table of contents, key concepts]
32 exp adolescent/ or exp child/ or exp infant/ or exp students/
33 exp youth/
34 or/26-33
35 intervention\$.ti,ab.
36 educat\$.ti,ab.
37 promot\$.ti,ab.
38 adverti\$.ti,ab.
39 campaign\$.ti,ab.
40 (mass adj2 media).ti,ab.
41 (primary adj5 prevention).ti,ab.
42 (secondary adj5 prevention).ti,ab.
43 (universal adj5 prevention).ti,ab.
44 (selective adj5 prevention).ti,ab.
45 (target\$ adj5 prevention).ti,ab.
46 exp education/
47 or/35-46
48 19 and 25 and 34 and 47
49 limit 48 to yr="2002 -Current"

HISTORY

Review first published: Issue 5, 2011

Date	Event	Description
6 September 2010	New search has been performed	This review represents a substantial update of the review “Primary prevention for alcohol misuse in young people” that has been split into three reviews. This represents one of the three. The other two reviews focus on universal family based prevention and on universal multi-component prevention

CONTRIBUTIONS OF AUTHORS

DF conceived and led on the scope and design of the review. DF and AW both undertook searches, screening and data extraction. AW led on data analysis. Both DF and AW contributed to drafting and writing the review.

DECLARATIONS OF INTEREST

DFs Department has received funding from the alcohol industry for adapting and evaluating a family based prevention program.

SOURCES OF SUPPORT

Internal sources

- Oxford Brookes University, UK.

Funding to employ a co-reviewer

External sources

- NIHR, UK.

Small grant for updating the previous review

NOTES

This review represents a substantial update of the review “Primary prevention for alcohol misuse in young people” that has been split into three reviews. This represents one of the three. The other two reviews focus on universal family based prevention and on universal multi-component prevention.

INDEX TERMS

Medical Subject Headings (MeSH)

*School Health Services; Adolescent; Alcohol Drinking [*prevention & control]; Alcoholic Intoxication [*prevention & control]; Central Nervous System Depressants [poisoning]; Ethanol [poisoning]; Program Evaluation; Randomized Controlled Trials as Topic; Substance-Related Disorders [prevention & control]

MeSH check words

Child; Child, Preschool; Female; Humans; Male