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Individual-, family-, and school-level interventions for preventing multiple risk behaviours relating to alcohol, tobacco and drug use in individuals aged 8 to 25 years (Protocol)

Hickman M, Caldwell DM, Busse H, MacArthur G, Faggiano F, Foxcroft DR, Kaner EF, Macleod J, Patton G, White J, Campbell R

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[Intervention Protocol]

Individual-, family-, and school-level interventions for preventing multiple risk behaviours relating to alcohol, tobacco and drug use in individuals aged 8 to 25 years

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ABSTRACT

This is the protocol for a review and there is no abstract. The objectives are as follows:

Primary research objective

To assess the effects of interventions at the individual, family and school level that aim to target multiple substance use behaviours (two or more from alcohol, tobacco, cannabis, other substance use) for the primary or secondary prevention of substance use and related harms in individuals aged 8 to 25.

Secondary research objectives

- To explore whether the effects of the intervention differ within and between population subgroups.
- To explore whether the effects of the intervention differ by risk behaviour and by outcomes.
- To explore the influence of the setting of the intervention on the design, delivery and outcomes of the interventions.
- To explore the relationship between the number and/or types of component(s) of an intervention, duration, and effects of the interventions.
- To explore whether the impact(s) of interventions differ according to whether behaviours are addressed simultaneously or sequentially and/or whether behaviours are addressed in a particular order.
- To explore the cost-effectiveness of interventions.
- To identify the implications of the review findings for further research, policy and practice.

BACKGROUND

Description of the condition

Evidence shows that risk behaviours such as smoking, antisocial behaviour, alcohol consumption, physical inactivity and unprotected sexual intercourse cluster in adolescence (Basen-Engquist 1996; Burke 1997; DuRant 1999; Farhat 2010; MacArthur 2012a; Mistry 2009; Pahl 2010; van Nieuwenhuijzen 2009) and that such behaviours, individually and collectively, are associated with increased risk of poor educational attainment, morbidity and premature mortality (Biglan 2004; Khaw 2008; Kvaavik 2010). This is particularly true of substance use, with tobacco smokers more likely to consume alcohol and vice versa, and cannabis users more likely to use other drugs (Currie 2012; Hale 2013; Leatherdale 2008; Leatherdale 2010). Further, adolescence is a period of increased risk to engage in substance misuse which is prevalent among young people (Anderson 2006; Black 2011; Eaton 2012; Hibell 2012; White 2012). A research study investigating a British cohort of young people reported that adolescents categorised as hazardous drinkers were six times more likely to engage in tobacco and drug use (MacArthur 2012a) compared to non-hazardous drinkers. Estimates of the prevalence of concurrent tobacco, alcohol, and illicit drug use range from 4% to 17% in young people (Connell 2009; Conway 2013; Dierker 2007; Hawkins 2012; Henderson 2013; Leatherdale 2010; McVie 2005). For example, in Lao People's Democratic Republic 15% of males aged 14 to 19 years reported concurrent smoking and alcohol use (Sychareun 2011) and in a health survey in the United States, 17% of young people reported engaging in polysubstance use (Dierker 2007).

Multiple risk behaviours (MRB) are defined by Hurrelmann (Hurrelmann 2006) as "more than one behaviour directly or indirectly associated with health, well-being and the healthy development of personality". MRB are an important area of investigation in relation to substance misuse, because of the attendant risk of mortality and serious morbidity, their high costs and burden to society (Chisholm 2006; Rehm 2009) and because engagement may continue from adolescence into early adulthood (Chassin 1996; Chassin 2002; Chen 1995; Rohde 2001; Schmid 2009; Wilson 2002). Relevant MRB interventions may target the substances themselves or predisposing factors such as poor mental health, or shared biological or environmental factors such as family or peer influences, or senses of a lack of connection with school (Beyers 2004; Jackson 2010; Viner 2006).

Recognising the co-occurrence of substance use risk behaviours, there have been recommendations that intervention programmes simultaneously address MRB so as to impact on more than one outcome (Biglan 2004; Hawkins 1992; Jackson 2010; Jessor 1991). However, the overall effectiveness of such programmes has not been systematically investigated.

This review was initially part of the registered Cochrane review by MacArthur et al (MacArthur 2012b) entitled "Individual-, family-, and school-level interventions for preventing multiple risk behaviours in individuals aged 8 to 25 years". Due to the large number of eligible studies identified that addressed a combination of substance use risk behaviours without addressing other risk behaviours, a decision was made to investigate separately those interventions targeting a combination of at least two or more substance use risk behaviours only.

MacArthur et al's (MacArthur 2012b) review, therefore, only includes interventions addressing a combination of other non-substance use risk behaviours or interventions which target non-substance use risk behaviours (such as antisocial behaviour or risky sexual behaviour) in combination with a substance use behaviour.

Description of the intervention

This review will assess the effectiveness of interventions that aim to prevent multiple substance use risk behaviours in children and young people. These interventions may be delivered directly to children and young people, or indirectly through targeting parents or other family members, teachers or other school staff, or others in close contact with children and young people. Interventions may include psychological, educational, behavioural, parenting, or environmental interventions - and may involve multiple components delivered at different levels (individual, family or school). Specific interventions at the individual level might include brief interventions, motivational interviewing, education and/or provision of individual support. Interventions delivered at the family level might include home visits, education and/or training for parents. Interventions delivered in a school setting might include changes to the educational curriculum, introduction of policies on substance use, training for teachers, school staff members, and/or peer support.

Those delivering the interventions are likely to include nurses, preschool staff, teachers, peers, police, and health promotion staff. For instance, a randomised controlled trial of the effectiveness of a school-based, peer-led smoking intervention included the recruitment and training of nominated influential peers to diffuse smoking messages among the young people (Campbell 2008).

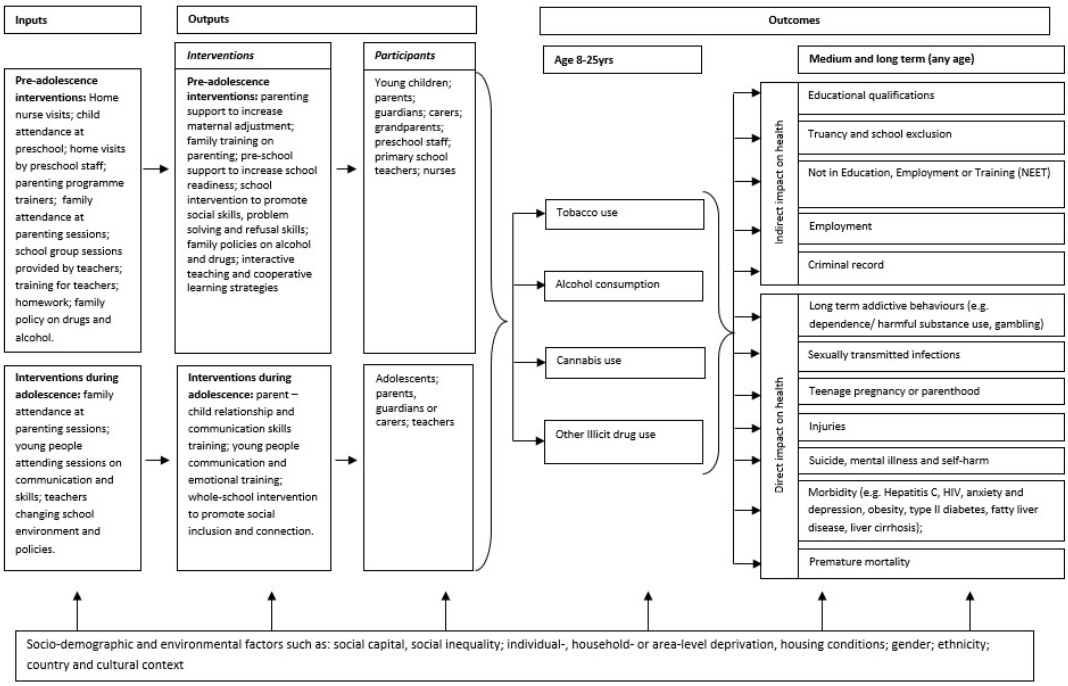
Examples of the focus of interventions will be those that attempt to improve: parenting skills; communication between teachers or parents and children or adolescents; the behaviour of teachers or parents with children or adolescents; children's problem solving; or adolescents' decision-making ability and resilience.

How the intervention might work

The determinants of engagement in risk behaviours during adolescence are complex and their antecedents may originate during the early years or even before birth (Biglan 2004; Jessor 1991; Kuh 2003). Interventions which influence the early determinants may be more likely to impact on propensity to engage in risk

behaviours than interventions which focus on reducing the behaviours or mitigating the harms once the risk behaviours have become established, as the logic model indicates (Figure 1). Interventions providing support to mothers may enhance maternal skills, promote healthy behaviours and promote emotional wellbeing which may increase mother-child interaction and reduce environmental stressors (Biglan 2004; Eckenrode 2010). Interventions during the preschool years, which provide training in parenting or increased preschool attendance, may prevent MRB later in life by reducing stressors within the family environment, and by enhancing parental and child skills (Biglan 2004; Reid 1999; Tremblay 1995). School interventions with young children, which promote adults' (parents and teachers) effective and appropriate use of positive behaviour management, and which promote children's social and cognitive skills, may interrupt the potential for negative family or peer processes which can promote MRB (Biglan 2004; Hawkins 2005). In addition, health promoting schools which incorporate changes to the curriculum, community and school environment can also have an impact on multiple risk behaviours (Langford 2014).

Figure 1. Logic Model: Interventions for preventing multiple risk behaviours relating to alcohol, tobacco and drug use in individuals aged 8-25 years.



During adolescence, interventions may address MRB by promoting effective parenting practices and family involvement; by improving young people's decision-making skills, resilience to peer influences, assertiveness and social and life skills; by targeting common risk factors such as character traits, attitudes and knowledge; by altering existing norms around risk behaviours; by altering the social environment; and/or by enhancing teachers' behaviour management capabilities (Biglan 2004; Chen 1995; Jackson 2010; Langford 2014, Mason 2010). Multi-component interventions may promote a number of the family-based, skills- or knowledge-based factors described above. Interactive, skill-based programmes have been shown to be more effective than knowledge- or affective-based programmes at preventing drug use, which may be because social and psychological factors are relevant in promoting the onset of drug use (Faggiano 2005; Tobler 2000).

Why it is important to do this review

Other Cochrane reviews have been published or are currently in progress that aim to investigate substance use risk behaviours,yet

these reviews typically focus on interventions which target single behaviours such as alcohol use (Foxcroft 2011a; Foxcroft 2011b; Foxcroft 2011c; Foxcroft 2011d; Moreira 2009), tobacco use (Carson 2011; Carson 2012; Civljak 2013; Thomas 2007; Thomas 2013a; Thomas 2013b) and illicit drug use (Faggiano 2005; Gates 2006) and are delivered in a variety of settings including schools (Carney 2014) or the individual's family or community (Carson 2011; Foxcroft 2011a; Thomas 2007).

In contrast, little is known about the effectiveness (or cost-effectiveness) of interventions that aim to prevent MRB (Biglan 2004; Jackson 2010). To our knowledge there is only one review which sought to identify interventions effective in preventing two or more adolescent risk behaviours (Hale 2014). It differs substantially from this review as we will: search a wider range of databases; include relevant papers in any language with no date restriction, not just those published in English; include interventions regardless of their proven effectiveness; include interventions for the prevention of substance use in a wider age range from 8 to 25; and at the individual, as well as at the family and school level.

Our review also differs from two reviews that investigate interventions aimed at multiple substance use behaviours currently being undertaken (Wollscheid 2014) or published (Thomas 2011) as we will include a wider variety of intervention settings, look at interventions delivered at the individual, family and school level, and include any combination of substance use behaviours.

Given the limited opportunities and resources to prevent health-compromising behaviours, it might be more efficient if interventions targeted multiple behaviours. By reviewing evidence relating to the effectiveness and cost-effectiveness of interventions to prevent MRB and their attendant harms, this review will be useful to public health policy makers and commissioners in assisting with decisions around investment or dis-investment in particular interventions. In particular, it may provide evidence about appropriate life stages and settings at which to intervene to prevent MRB.

OBJECTIVES

Primary research objective

To assess the effects of interventions at the individual, family and school level that aim to target multiple substance use behaviours (two or more from alcohol, tobacco, cannabis, other substance use) for the primary or secondary prevention of substance use and related harms in individuals aged 8 to 25.

Secondary research objectives

- To explore whether the effects of the intervention differ within and between population subgroups.
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- To explore the influence of the setting of the intervention on the design, delivery and outcomes of the interventions.
- To explore the relationship between the number and/or types of component(s) of an intervention, duration, and effects of the interventions.
- To explore whether the impact(s) of interventions differ according to whether behaviours are addressed simultaneously or sequentially and/or whether behaviours are addressed in a particular order.
- To explore the cost-effectiveness of interventions.
- To identify the implications of the review findings for further research, policy and practice.

METHODS

Criteria for considering studies for this review

Types of studies

We will include randomised controlled trials (RCTs), including clustered RCTs, aimed at changing at least two substance use risk behaviours of interest. Studies will only be included if there is a minimum follow-up period of 6 months from the start of the intervention, to enable identification of the impact of interventions over the shorter term without excluding studies that were not able to monitor outcomes over a longer time period.

Types of participants

The key participants in this review are children and young people aged 8 to18 years. Individuals aged 8 to 11 years are defined in our review as children and individuals aged 12 years or above are defined as adolescents.

Interventions might directly and indirectly target substance use risk behaviours of these participants.

- Direct interventions are those addressed at children and young people aged 8 to 18 years and might be delivered in primary or secondary schools.
- Indirect interventions may address other people/ organisations but aim to target the substance use behaviours of individuals aged 8 to 18 years. Participants of this type will comprise parents, guardians, carers, teachers, peers, staff at nursery, preschool, primary school or secondary school.

Interventions where the majority of adolescent participants are over 18 years at baseline assessment will be excluded from this review. Intervention that are aimed at individuals with clinically-diagnosed disorders will also not be included.

Types of interventions

Interventions will comprise public health improvement programmes that address at least two substance use risk behaviours in children and young people, including: tobacco smoking; alcohol consumption; cannabis and other substance use. Interventions will be included if they aim to address multiple risk behaviours (MRB) that emerge before 25 years of age.

The interventions to be included in the review will include those both universal and targeted interventions implemented across the prenatal, antenatal, nursery, preschool, primary and secondary school ages. These interventions may be provided universally, without regard to the young people's level of risk, or targeted to particular young people or families identified to be at higher risk. Interventions might be delivered in a variety of ways including by individuals (such as trained staff members, nurses, preschool staff, teachers, parents, peers, and police) or via electronic equipment (such as telephones and/or computers).

Interventions may start before the onset of behaviours (primary prevention), or may target those engaged in risk behaviours (secondary prevention), which is expected to depend on the age of the target population within each study. Clinical interventions such as, for example, cognitive behavioural therapy will be excluded. The inclusion of a range of different types of intervention, the exclusion of interventions aimed solely at individuals at higher risk or with clinically-diagnosed disorders, and consideration of interventions that address two or more different behaviours, prevent overlap with previously published, or ongoing, Cochrane reviews (Civljak 2013; Faggiano 2005; Foxcroft 2011a; Fellmeth 2013; Langford 2014; Livingstone 2013; Petrosino 2013; Thomas 2011; Wollscheid 2014).

Comparator interventions

Eligible comparator interventions will be usual practice (as defined by the study author), no intervention or a placebo.

Excluded interventions

Interventions that address substance use risk behaviours in combination with other, non-substance use risk behaviours will be excluded as they are being investigated in another ongoing Cochrane review (MacArthur 2012b). Interventions delivered at a community or population level, such as media campaigns, or policy, regulatory or legislative interventions, will be excluded from this review, but they will be included in another Cochrane review (Campbell 2012).

Types of outcome measures

Primary outcomes

The primary outcome is the primary or secondary prevention of two or more risk behaviours in individuals aged between 8 and 25 years. Since there are relatively few studies that examine the epidemiology of MRB, the review will include behaviours that have an adverse impact on health, whether or not the behaviour involves an active desire for 'risk-taking' or immediate gratification. Consultation with the DECIPHer Public Involvement Advisory Group (the ALPHA group; http://www.decipher.uk.net/en/content/cms/about-decipher/involvement-advisory/) of young people supported the inclusion of the range of behaviours outlined in MacArthur and colleagues (MacArthur 2012b).

The risk behaviours to be included in the present review relate to two or more of the following:

- Tobacco use (use, frequency)
- Alcohol consumption (use, frequency): binge drinking (alcohol); hazardous drinking, regular or problem drinking
- Cannabis use (use, frequency)
- Other substance use (use, frequency): e.g. illicit drugs, legal highs, solvents, aerosols, inhalants.

Secondary outcomes

The secondary outcomes include medium- and longer-term outcomes. Of specific interest are:

- Education and employment: e.g. educational qualifications; truancy and school exclusion; employment; not being in education, employment or training (NEET), receipt of government benefits
- Crime: e.g. criminal record/offending; re-offending
- Long-term addictive behaviours: e.g. gambling
- Health outcomes: e.g. teenage pregnancy or parenthood; sexually transmitted infections; injuries; morbidity (e.g. Hepatitis C, HIV, anxiety and depression, obesity, type II diabetes, fatty liver disease, liver cirrhosis); suicide/self-harm; premature mortality
- Dependence/harmful substance use: e.g. compulsive, persistent and harmful use of drugs, alcohol or tobacco as measured by DSM-V/ICD10 or equivalent scale.
- Adverse events associated with the implementation of intervention: e.g. if the extent of engagement in risk behaviours or adverse health outcomes increase as a result of the intervention
- Cost effectiveness of the intervention: e.g. measures of resource use; costs; or cost-effectiveness of the intervention (e.g. incremental cost-effectiveness ratios (ICERs), incremental cost-per quality adjusted life year (QALY); cost-benefit ratio).

Search methods for identification of studies

Electronic searches

The following databases will be searched from their inception:

- Australian Education Index (1978 onwards)
- British Education Index (1975 onwards)
- Campbell Library (2004 onwards)
- CINAHL - Cumulative Index to Nursing & Allied Health Literature (1982 onwards)
- Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library*, most recent)
- EMBASE (1980 onwards)
- ERIC (1966 onwards)
- EThOS - British Library electronic theses online service (latest version)
- International Bibliography of the Social Sciences (IBSS) (1951 onwards)
- MEDLINE (Ovid) (1966 onwards)
- PsycINFO (1806 onwards)
- Sociological Abstracts (1963 onwards)
- Social Science Citation Index (SSCI) (1956 onwards)
- Dissertation express (Dissertation Abstracts International) (1938 onwards)

We will search for ongoing trials and unpublished studies via Internet searches on the following sites and databases:

- Clinical Trials (https://clinicaltrials.gov/)
- International Clinical Trials Registry Platform (http://www.who.int/ictrp/en/)
- TRoPHI - The Trials Register of Promoting Health Interventions (http://eppi.ioe.ac.uk/webdatabases/Search.aspx)

The search strategy that will be used to search MEDLINE can be found in Appendix 1. It will be modified where necessary for the other databases listed. There will be no date or language restrictions.

Searching other resources

We will handsearch the reference lists of relevant articles to identify additional relevant studies, and contact experts in the field to identify ongoing research. Citation searches will be carried out for key studies identified.

Data collection and analysis

Selection of studies

References obtained from databases, website searches, and handsearching of reference lists will be downloaded into reference management software and duplicates removed. Papers will be screened according to the title and abstract (where available), using specific inclusion and exclusion criteria (see Criteria for considering studies for this review).

Initially, two review authors will screen the first 500 publications in the list to ensure the quality and accuracy of the process. Thereafter, screening will be conducted by a single review author; a further 10% of studies selected at random will be double-screened to ensure that the screening process is consistent and accurate throughout. The full text of selected articles will be obtained and multiple publications from one particular study will be grouped together. Full text articles will also be obtained if additional information is required, to assess eligibility for inclusion.
Full text papers will be screened by two review authors using the pre-specified criteria for inclusion. Disagreement relating to the inclusion of particular studies will be resolved by discussion or, where disagreements persist, by a third review author, to enable a consensus to be reached.

Data extraction and management

A data extraction form will be used independently by two authors to extract data from eligible studies. The data extraction form will be piloted by two review authors to assure that it captures study data and assesses study quality effectively. Data to be extracted will include:

- Lead author, review title or unique identifier and date
- Eligibility for inclusion
- Reasons for exclusion
- Study aim(s)
- Study design
- Study location
- Study setting
- Theoretical underpinning
- Context
- Implementation factors
- Equity (using PROGRESS Plus;see below for details)
- Sustainability
- Intervention (content and activities, number/type of behaviours addressed, whether an intervention targets a behaviour or environment/setting, duration of intervention, and details of any intervention offered to the control group)
- Participants of intervention (including the number randomised and the number in each intervention group; age at start of intervention; and demographic data where possible e.g. ethnicity, gender, socio-economic status)
- Scope of the intervention (universal or targeted to high risk or vulnerable group)
- Proximal or distal nature of the intervention delivery in relation to the behaviours examined
- Method of measurement of risk behaviour (self-report or objective measure)
- Duration of follow up(s)
- Outcome measures pre and post intervention (including unit of measurement)
- Effect size and precision (e.g. 95% confidence interval)

- Whether clustering was taken into account in cluster RCTs, number of clusters, mean cluster size and intracluster correlation coefficient (ICC);
- Method of analysis
- Analysis of cost-effectiveness of intervention
- Any other comments.

Disagreements around data extraction between the two authors will be resolved by discussion, or by a third author if a consensus cannot be reached by discussion alone.

Where there are multiple reports from the same study, one data collection form will be completed for the study collated from all of the reports.

The impact of interventions on equity will be identified across a number of categories using PROGRESS plus, an acronym for the following parameters: place of residence; race/ethnicity; occupation; gender; religion; education; social capital; and socio-economic status; with plus representing the additional categories: age; disability; and sexual orientation. Record baseline data and subgroup analyses data that relates to PROGRESS Plus characteristics will be collected. Data will be entered into Review Manager 5.3 and checked by a second review author.

Assessment of risk of bias in included studies

Risk of bias will be assessed by two review authors. Disagreements between these review authors will be addressed by discussion, and where necessary, a third review author will independently assess the study and remaining disagreements will be resolved by consensus. The 'Risk of bias' assessment of RCTs in this review will be performed using the criteria recommended in the *Cochrane Handbook* (Higgins 2011). This is a two-part tool, addressing seven specific domains, namely sequence generation and allocation concealment (selection bias), blinding of participants and providers (performance bias), blinding of outcome assessor (detection bias), incomplete outcome data (attrition bias), selective outcome reporting (reporting bias) and other sources of bias. The first part of the tool involves describing what was reported to have happened in the study. The second part of the tool involves assigning a judgement relating to the risk of bias for that entry, in terms of low, high or unclear risk. To make these judgments we will use the criteria indicated by the *Cochrane Handbook* adapted to the addiction field. See Appendix 2 for details.

The domains of sequence generation and allocation concealment (avoidance of selection bias) will be addressed in the tool by a single entry for each study.

Blinding of participants, personnel and outcome assessor (avoidance of performance bias and detection bias) will be considered separately for objective outcomes (e.g. use of substance of abuse measured by urine analysis) and subjective outcomes (e.g. adverse events, social functioning as integration at school or at work, family relationship).

Incomplete outcome data (avoidance of attrition bias) will be considered for all outcomes except for the drop out from the treatment, which is often the primary outcome measure in trials on addiction.

Measures of treatment effect

Binary data will be summarised using odds ratios (ORs) with 95% confidence intervals (CIs). To aid interpretation we will transform the pooled summary treatment effect estimates to risk ratios (RRs) using the formula and recommendations in section 12.5.4.4 of the *Cochrane Handbook* (Higgins 2011). This will be reported in the main text of the review. Continuous outcomes will be handled as the difference in mean values with 95% confidence intervals. However, where continuous outcomes are measured using different measures or scales, standardised mean difference (SMD) will be calculated. Ordinal outcomes will be transformed as binary or continuous outcomes, as appropriate.

It is possible that frequency of alcohol consumption, tobacco use and cannabis use may have been recorded by study authors as 'count data' where the event can occur multiple times to the same participant (Higgins 2011). Where study data allow (i.e. data are available on both events and person-years at risk) we will calculate rate ratios for count outcomes. However, count data can be reported in a number of ways by study authors. As such, our strategy will be to extract count data in the form in which the original authors have reported them.

Transformation of outcome data will be considered as necessary. For example, if outcome data in some studies to be combined are dichotomous and in others continuous, the dichotomous data will be re-expressed as SMD if the underlying continuous measurements in each intervention group follow a normal or binominal distribution, enabling data to be pooled.

Unit of analysis issues

The review will include interventions implemented at individual, family, nursery, preschool, or school level. As such, study outcomes may be reported at the group and/or individual level. Review authors will determine whether analysis has taken the effect of clustering into account. Where clustering has not been taken into account, approximately correct analyses will be conducted following methods set out in section 16.3.4 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011). Data from cluster randomised trials will only be included in meta-analyses if clustering has been taken into account or if approximately correct analyses can be undertaken (Higgins 2011). Missing data will be requested from study authors wherever possible to enable re-analysis. Data that have been re-analysed will be marked as such in the review.

Where there are multiple measures of behaviours e.g. number of drinks of alcohol and frequency of alcohol consumption, all data will be extracted.

Where there are multiple repeated measurements or recurring events in studies with a long follow-up period, or the outcome is measured at multiple points in time after the intervention, data relating to outcome(s) measured at the end of the intervention delivery will be extracted.

Where more than two intervention groups are included in the study, groups will be combined to create a single pair-wise comparison, as recommended in section 16.5.4 of the *Cochrane Handbook* (Higgins 2011).

Dealing with missing data

Study authors will be contacted electronically where there are missing or unclear data (for instance, relating to the primary outcome; or attrition rate). Missing data will be reported in the data extraction form and in the 'Risk of bias' table. We will also contact study authors if insufficient data are provided to permit intention-to-treat analyses. Studies for which insufficient data are available (for instance where missing data cannot be obtained) will be excluded from the review and reasons for exclusion listed in the 'Characteristics of excluded studies' table.

Assessment of heterogeneity

It is anticipated that the studies identified in this review will be heterogeneous with respect to settings, participants, interventions, the risk behaviours addressed, and outcomes analysed. If it is appropriate to combine studies, we will undertake meta-analyses. Heterogeneity will be examined via inspection of the forest plot and by a Chi^2 test to demonstrate whether the observed differences in results are compatible with chance alone. We will calculate the I^2 statistic to examine the percentage of variability that is due to heterogeneity rather than to sampling error. We will conduct subgroup analyses to investigate heterogeneous results, if the data are available.

Assessment of reporting biases

Funnel plots will be used to plot the study effect size against sample size to assess publication bias, if sufficient studies are identified (a minimum of 10). Publication bias is one of several possible explanations for asymmetry, and these explanations will be discussed in the review.

Data synthesis

Since we anticipate heterogeneity between studies, we will include a structured description and summary of the findings of included studies in the review. The narrative synthesis will be grouped using categories to be determined when the studies have been identified. The groupings may be type of intervention, length of intervention or type of outcome. Further methodological work led by David Foxcroft will consider how studies can be classified and combined for synthesis.

Where studies are sufficiently similar, and where meta-analyses are considered appropriate, we will use a random-effects model to allow for the substantial heterogeneity we anticipate. The appropriate method of meta-analysis to be used depends on the nature of the outcome data (dichotomous, ordinal, continuous, time-to-event etc.) as outlined in chapter 9 of the *Cochrane Handbook* (Higgins 2011).

Findings relating to resource use or the cost-effectiveness of interventions (e.g. incremental resource use and resource costs; ICERs, incremental cost per QALY; or cost-benefit ratio) will be summarised in a narrative synthesis.

If appropriate to the studies included in the review, we will include a 'Summary of findings' table, including the number of participants and studies for each outcome, the intervention effect and measure of the quality of the body of evidence. The table may include the primary and secondary outcomes.

Subgroup analysis and investigation of heterogeneity

If there is evidence of heterogeneity amongst the studies we will explore reasons for this. Where sufficient data are available, we will perform subgroup analyses to compare outcomes by:

- Age group at start of intervention
- Gender
- Participants (individual, infant, child, adolescent, parent, guardian, carer, grandparent, teacher, nurse)
- Number of behaviours targeted
- Duration of intervention
- Type of intervention (pre- or antenatal, family, preschool, school, friendship group; and whether the intervention was universal or targeted to a high-risk group(s))
- High-income or low- and middle-income country.

Sensitivity analysis

For meta-analysis, we will use sensitivity analysis to determine to what extent the overall intervention effect is changed by the inclusion of studies at high or unclear risk of bias.

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We are grateful to Val Hamilton for her assistance in devising the search strategies for this review, and to members of the review advisory group (Alison Bell, Professor Selena Gray, Professor Angela Harden, Dr Caroline Jackson, Professor Mike Kelly, and Hazel Miller) and the Public Involvement Advisory Group (ALPHA Group) of the Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer) for their helpful advice. Helpful comments on the draft

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REFERENCES

Additional references

Anderson 2006
Anderson P. Global use of alcohol, drugs and tobacco. *Drug and Alcohol Review* 2006;**25**(6):489–502.

Basen-Engquist 1996
Basen-Engquist K, Edmundson EW, Parcel GS. Structure of health risk behavior among high school students. *Journal of Consulting and Clinical Psychology* 1996;**64**(4):764–75.

Beyers 2004
Beyers JM, Toumbourou JW, Catalano RF, Arthur MW, Hawkins JD. A cross-national comparison of risk and protective factors for adolescent substance use: the United States and Australia. *Journal of Adolescent Health* 2004;**35**: 3–16.

Biglan 2004
Biglan A, Brennan PA, Foster SL, Holder H. *Helping Adolescents At Risk - Prevention of Multiple Problem Behaviors*. London: The Guildford Press, 2004.

Black 2011
Black C, Eunson J, Sewel K, Murray L. Scottish Schools Adolescent Lifestyle and Substance Use Survey (SALSUS) 2010- National Report. NHS Scottland 2011.

Burke 1997
Burke V, Milligan RAK, Beilin LJ, Dunbar D, Spencer M, Balde E, et al. Clustering of health-related behaviors among 18-year-old Australians. *Preventive Medicine* 1997; **26**:724–33.

Campbell 2008
Campbell R, Starkey F, Holliday J, Audrey S, Bloor M, Parry-Langdon N, et al. An informal school-based peer-led intervention for smoking prevention in adolescence (ASSIST): a cluster randomised trial. *Lancet* 2008; **371**(9624):1595–602. [DOI: 10.1016/S0140-6736 (08)60692-3]

Campbell 2012
Campbell R, MacArthur G, Kipping RR, Hickman M, Lewis G, Petticrew M. Policy-level interventions for preventing multiple-risk behaviours in individuals ages 8 to 25 years (Title registered). Cochrane Summaries. 2012.

Carney 2014
Carney T, Myers BJ, Louw J, Okwundu CI. Brief school-based interventions and behavioural outcomes for substance-using adolescents. *Cochrane Database of Systematic Reviews* 2014, Issue 2. [DOI: 10.1002/ 14651858.CD008969.pub2]

Carson 2011
Carson KV, Brinn MP, Labiszewski NA, Esterman AJ, Chang AB, Smith B. Community interventions for preventing smoking in young people. *Cochrane Database of Systematic Reviews* 2011, Issue 7. [DOI: 10.1002/ 14651858.CD001291.pub2]

Carson 2012
Carson KV, Brinn MP, Labiszewski NA, Peters M, Chang AB, Veale A, et al. Interventions for tobacco use prevention in Indigenous youth. *Cochrane Database of Systematic Reviews* 2012, Issue 8. [DOI: 10.1002/ 14651858.CD009325.pub2]

Chassin 1996
Chassin L, Presson CC, Rose JS, Sherman SJ. The natural history of cigarette smoking from adolescence to adulthood: demographic predictors of continuity and change. *Health Psychology* 1996;**15**(6):478–84.

Chassin 2002
Chassin L, Pitts SC, Prost J. Binge drinking trajectories from adolescence to emerging adulthood in a high-risk sample: predictors and substance abuse outcomes. *Journal of Consulting and Clinical Psychology* 2002;**70**(1):67–78.

Chen 1995
Chen K, Kandel DB. The natural history of drug use from adolescence to the mid-thirties in a general population sample. *American Journal of Public Health* 1995;**85**(1): 41–7.

Chisholm 2006
Chisholm D, Doran C, Shibuya K, Rehm J. Comparative cost-effectiveness of policy instruments for reducing the global burden of alcohol, tobacco and illicit drug use. *Drug and Alcohol Review* 2006;**25**(6):553–65.

Civljak 2013
Civljak M, Stead LF, Hartmann-Boyce J, Sheikh A, Car J. Internet-based interventions for smoking cessation. *Cochrane Database of Systematic Reviews* 2013, Issue 7. [DOI: 10.1002/14651858.CD007078.pub4]

Connell 2009
Connell CM, Gilreath TD, Hansen NB. A multiprocess latent class analysis of the co-occurrence of substance use

and sexual risk behaviour among adolescents. *Journal of Studies of Alcohol and Drugs* 2009;**70**(943):951.

Conway 2013
Conway KP, Vullo GC, Nichter B, Wang J, Compton WM, Iannotti RJ, et al. Prevalence and patterns of polysubstance use in a nationally representative sample of 10th graders in the United States. *Journal of Adolescent Health* 2013;**52**(6): 716–23.

Currie 2012
Currie C, Zanotti C, Morgan A, Currie D, de Looze M, Roberts C, et al. eds. Social determinants of health and well-being among young people. Health Behaviour in School-aged Children (HBSC) study: international report from the 2009/2010 survey. Copenhagen, WHO Regional Office for Europe (Health Policy for Children and Adolescents, No. 6) 2012.

Dierker 2007
Dierker LC, Vesel F, Sledjeski EM, Costello D, Perrine N. Testing the dual pathway hypothesis to substance use in adolescence and young adulthood. *Drug and Alcohol Dependence* 2007;**87**:83–93.

DuRant 1999
DuRant RH, Smith JA, Kreiter SR, Krowchuk DP. The relationship between early age of onset of initial substance use and engaging in multiple health risk behaviors among young adolescents. *Archives of Pediatrics and Adolescent Medicine* 1999;**153**(3):286–91.

Eaton 2012
Eaton DK, Kann L, Kinchen S, Shanklin S, Flint KH, Hawkins J, et al. Centers for Disease Control and Prevention (CDC). Youth risk behavior surveillance - United States, 2011. *MMWR Surveillance Summaries* 2012; **61**(4):1–162.

Eckenrode 2010
Eckenrode J, Campa M, Luckey DW, Henderson CR Jr, Cole R, Kitzman H, et al. Long-term effects of prenatal and infancy nurse home visitation on the life course of youths: 19-Year follow-up of a randomized trial. *Archives of Pediatrics and Adolescent Medicine* 2010;**164**(1):9–15.

Faggiano 2005
Faggiano F, Vigna-Taglianti F, Versino E, Zambon A, Borraccino A, Lemma P. School-based prevention for illicit drugs' use. *Cochrane Database of Systematic Reviews* 2005, Issue 2. [DOI: 10.1002/14651858.CD003020.pub2]

Farhat 2010
Farhat T, Iannotti RJ, Simons-Morton BG. Overweight, obesity, youth and health-risk behaviors. *American Journal of Preventive Medicine* 2010;**38**(3):258–67.

Fellmeth 2013
Fellmeth GLT, Heffernan C, Nurse J, Habibula S, Sethi D. Educational and skills-based interventions for preventing relationship and dating violence in adolescents and young adults. *Cochrane Database of Systematic Reviews* 2013, Issue 6. [DOI: 10.1002/14651858.CD004534.pub3]

Foxcroft 2011a
Foxcroft DR, Tsertsvadze A. Universal family-based prevention programs for alcohol misuse in young people. *Cochrane Database of Systematic Reviews* 2011, Issue 9. [DOI: 10.1002/14651858.CD009308]

Foxcroft 2011b
Foxcroft DR, Tsertsvadze A. Universal multi-component prevention programs for alcohol misuse in young people. *Cochrane Database of Systematic Reviews* 2011, Issue 9. [DOI: 10.1002/14651858.CD009307]

Foxcroft 2011c
Foxcroft DR, Tsertsvadze A. Universal school-based prevention programs for alcohol misuse in young people. *Cochrane Database of Systematic Reviews* 2011, Issue 5. [DOI: 10.1002/14651858.CD009113]

Foxcroft 2011d
Foxcroft D, Ireland D, Lowe G, Breen R. Primary prevention for alcohol misuse in young people. *Cochrane Database of Systematic Reviews* 2011, Issue 9. [DOI: 10.1002/14651858.CD003024.pub2]

Gates 2006
Gates S, McCambridge J, Smith LA, Foxcroft D. Interventions for prevention of drug use by young people delivered in non-school settings. *Cochrane Database of Systematic Reviews* 2006, Issue 1. [DOI: 10.1002/14651858.CD005030.pub2]

Hale 2013
Hale D, Viner R. Trends in the prevalence of multiple substance use in adolescents in England, 1998-2009. *Journal of Public Health* 2013;**35**(3):367–74. [DOI: 10.1093/pubmed/fdt022]

Hale 2014
Hale DR, Fitzgerald-Yau N, Viner RM. A systematic review of effective interventions for reducing multiple health risk behaviors in adolescence. *American Journal of Public Health* 2014;**104**(5):e19–e41. [DOI: 10.2105/AJPH.2014.301874]

Hawkins 1992
Hawkins JD, Catalano RF, Miller JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin* 1992;**112**(1):64–105.

Hawkins 2005
Hawkins JD, Kosterman R, Catalano RF, Hill KG, Abbott RD. Promoting Positive Adult Functioning Through Social Development Intervention in Childhood: Long-term Effects From the Seattle Social Development Project. *Archives of Pediatrics and Adolescent Medicine* 2005;**159**(1): 25–31.

Hawkins 2012
Hawkins V. Smoking, drinking and drug use. In: Fuller E editor(s). *Smoking, Drinking and Drug Use among Young People in England 2011*. Leeds: The Health and Social Care Information Centre, 2012.

Henderson 2013
Henderson H. Smoking, drinking and drug use. In: Fuller E editor(s). *Smoking, Drinking and Drug Use among Young People in England 2012*. Leeds: The Health and Social Care Information Centre, 2013.

Hibell 2012
Hibell B, Guttormsson U, Ahlström S, Balakireva O, Bjarnason T, Kokkevi A, Kraus L, The European School Survey Project on Alcohol and Other Drugs (ESPAD). Alcohol and Other Drug Use Among Students in 36 European Countries. Stockholm: Swedish Council on Alcohol and Other Drugs 2012.

Higgins 2011
Higgins JPT, Green S. *Cochrane Handbook for Systematic Reviews of Interventions. Version 5.1.0 [updated March 2011]*. The Cochrane Collaboration. Available from www.cochrane-handbook.org, 2011.

Hurrelmann 2006
Hurrelmann K, Richter M. Risk behaviour in adolescence: the relationship between developmental and health problems. *Journal of Public Health* 2006;**14**(1):20–8.

Jackson 2010
Jackson C, Haw S, Frank J. Adolescent and Yong Adult Health in Scotland. Interventions that address multiple risk behaviour or take a generic approach to risk in youth: An environmental scan with special reference to Scotland. A report for the Adolescence and Yound Adulthood (AYA) Working Group of the Scottish Collaboration for Public Health Research and Policy 2010.

Jessor 1991
Jessor R. Risk behavior in adolescence: A psychosocial framework for understanding and action. *Journal of Adolescent Health* 1991;**12**(8):597–605.

Khaw 2008
Khaw KT, Wareham N, Bingham S, Welch A, Luben R, Day N. Combined Impact of health behaviours and mortality in Men and Women: The EIPC-Norfolk Prospective Population Study. *Plos Medicine* 2008;**5**(1):e12.

Kuh 2003
Kuh D, Ben-Shlomo Y, Lynch J, Hallqvist J, Power C. Life course epidemiology. *Journal of Epidemiology and Community Health* 2003;**57**:778–83.

Kvaavik 2010
Kvaavik E, Batty D, Ursin G, Huzley R, Gale C. Influence of individual and combined health behaviours on total and cause-specific mortality in men and women. The United Kingdom Health and Lifestyle Survey. *Archives of Internal Medicine* 2010;**170**(8):711–18.

Langford 2014
Langford R, Bonell CP, Jones HE, Pouliou T, Murphy SM, Waters E, et al. The WHO Health Promoting School framework for improving the health and well-being of students and their academic achievement. *Cochrane Database of Systematic Reviews* 2014, Issue 4. [DOI: 10.1002/14651858.CD008958.pub2]

Leatherdale 2008
Leatherdale ST, Hammond D, Ahmed R. Alcohol, marijuana, and tobacco use patterns among youth in Canada. *Cancer Causes & Control* 2008;**19**(4):361–9.

Leatherdale 2010
Leatherdale ST, Ahmed R. Alcohol, marijuana and tobacco use among Canadian youth: do we need more multi-substance prevention programming?. *Journal of Primary Prevention* 2010;**31**:99–108.

Livingstone 2013
Livingstone N, Macdonald G, Carr N. Restorative justice conferencing for reducing recidivism in young offenders (aged 7 to 21). *Cochrane Database of Systematic Reviews* 2013, Issue 2. [DOI: 10.1002/14651858.CD008898.pub2]

MacArthur 2012a
MacArthur GJ, Smith MC, Melotti R, Heron J, Macleod J, Hickman M, et al. Patterns of alcohol use and multiple risk behaviour by gender during early and late adolescence: the ALSPAC cohort. *Journal of Public Health* 2012;**34**(1):20–30.

MacArthur 2012b
MacArthur G, Kipping R, White J, Chittleborough C, Lingam R, Pasch K, et al. Individual-, family-, and school-level interventions for preventing multiple risk behaviours in individuals aged 8 to 25 years. *Cochrane Database of Systematic Reviews* 2012, Issue 6. [DOI: 10.1002/14651858.CD009927]

Mason 2010
Mason WA, Hitch JE, Kosterman R, McCarty CA, Herrenkohl TI, Hawkins JD. Growth in adolescent delinquency and alcohol use in relation to young adult crime, alcohol use disorders, and risky sex: a comparison of youth from low- versus middle-income backgrounds. *The Journal of Child Psychology and Psychiatry* 2010;**51**(12):1377–85.

McVie 2005
McVie S, Bradshaw P. Adolescent Smoking, Drinking and Drug Use. Number 7: The Edinburgh Study of Youth Transitions and Crime. Centre for Law and Society, The University of Edinburgh 2005.

Mistry 2009
Mistry R, McCarthy WJ, Yancey AK, Lu Y, Patel M. Resilience and patterns of health risk behaviors in California adolescents. *Preventive Medicine* 2009;**48**:291–7.

Moreira 2009
Moreira MT, Smith LA, Foxcroft D. Social norms interventions to reduce alcohol misuse in University or College students. *Cochrane Database of Systematic Reviews* 2009, Issue 3. [DOI: 10.1002/14651858.CD006748.pub2]

Pahl 2010
Pahl K, Brook DW, Morojele NK, Brook JS. Nicotine dependence and problem behaviours among urban South African adolescents. *Journal of Behavioural Medicine* 2010;**33**(2):101–9.

Petrosino 2013
Petrosino A, Turpin-Petrosino C, Hollis-Peel ME, Lavenberg JG. 'Scared Straight' and other juvenile awareness programs for preventing juvenile delinquency. *Cochrane Database of Systematic Reviews* 2013, Issue 4. [DOI: 10.1002/14651858.CD002796.pub2]

Rehm 2009
Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet* 2009;**373**:2223–33.

Reid 1999
Reid JB, Eddy JM, Fetrow RA, Stoolmiller M. Description and immediate impacts of a preventive intervention for conduct problems. *American Journal of Community Psychology* 1999;**27**(4):483–517.

Rohde 2001
Rohde P, Lewinsohn PM, Kahler CW, Seeley JR, Brown RA. Natural course of alcohol use disorders from adolescence to young adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry* 2001;**40**(1):83–90.

Schmid 2009
Schmid B, Hohm E, Blomeyer D, Zimmermann US, Schmidt MH, Esser G, et al. Concurrent alcohol and tobacco use during early adolescence characterizes a group at risk. *Alcohol and Alcoholism* 2007;**42**(3):219–25.

Sychareun 2011
Sychareun V, Thomsen S, Faxelid E. Concurrent multiple health risk behaviours among adolescents in Luangnamtha province, Lao PDR. *BMC Public Health* 2011;**11**:36–46.

Thomas 2007
Thomas RE, Baker PRA, Lorenzetti D. Family-based programmes for preventing smoking by children and adolescents. *Cochrane Database of Systematic Reviews* 2007, Issue 1. [DOI: 10.1002/14651858.CD004493.pub2]

Thomas 2011
Thomas RE, Lorenzetti D, Spragins W. Mentoring adolescents to prevent drug and alcohol use. *Cochrane Database of Systematic Reviews* 2011, Issue 11. [DOI: 10.1002/14651858.CD007381.pub2]

Thomas 2013a
Thomas RE, McLellan J, Perera R. School-based programmes for preventing smoking. *Cochrane Database of Systematic Reviews* 2013, Issue 4. [DOI: 10.1002/14651858.CD001293.pub2]

Thomas 2013b
Thomas RE, Lorenzetti D, Schmidt E, Smith K, Spragins W. Systematic review of mentoring to prevent or reduce tobacco use by adolescents. *Academic Pediatrics* 2013;**13**(4):300–7.

Tobler 2000
Tobler NS, Roona MR, Ochshorn P, Marshall DG, Streke AV, Stackpole KM. School-based adolescent drug prevention programs: 1998 meta-analysis. *Journal of Primary Prevention* 2000;**20**(4):275–336.

Tremblay 1995
Tremblay RE, Pagani-Kurtz L, Msse LC, Vitaro F, Pihl RO. A bimodal preventive intervention for disruptive kindergarten boys: its impact through mid-adolescence. *Journal of Consulting and Clinical Psychology* 1995;**63**(4):560–8.

van Nieuwenhuijzen 2009
van Nieuwenhuijzen M, Junger M, Klein Velderman M, Wiefferink KH, Paulussen TWGM, Hox J, et al. Clustering of health-compromising behavior and delinquency in adolescents and adults in the Dutch population. *Preventive Medicine* 2009;**48**:572–8.

Viner 2006
Viner RM, Haines MM, Head JA, Bhui K, Taylor S, Stansfeld SA, et al. Variations in associations of health risk behaviors among ethnic minority early adolescents. *Journal of Adolescent Health* 2006;**38**(1):55.

White 2012
White V, Smith G. Australian Secondary School Students' Use of Tobacco, Alcohol, and Over-The-Counter and Illicit Substances in 2011. Canberra: Drug Strategy Branch, Australian Government Department of Health and Ageing 2012.

Wilson 2002
Wilson N, Battistich V, Syme L, Boyce T. Does elementary school alcohol, tobacco, and marijuana use increase middle school risk?. *Journal of Adolescent Health* 2002;**30**(6):442–7.

Wollscheid 2014
Wollscheid S, Fang L, Nilson W, Smedslund G, Steiro A, Thune Hammerstrøm K, et al. Effect of Early, Brief Computerized Interventions on Risky Alcohol and Cannabis Use Among Young People: Protocol for a Systematic Review. The Campbell Collaboration Library of Systematic Reviews. 2014.

* *Indicates the major publication for the study*

APPENDICES

Appendix 1. MEDLINE search strategy

1	("Health risk behavio?r*" or "multiple risk behavio?r*" or "high risk behavio?r*" or "multiple risk factor*" or "behavio?r* risk factor*").mp
2	Dangerous Behavior/
3	Risk-Taking/
4	1 or 2 or 3
5	"Tobacco Use Disorder"/
6	Smoking/
7	smoking.mp.
8	((tobacco or cigarette* or nicotine) adj3 (addict* or use* or usage or using or intake or consum*)).mp
9	5 or 6 or 7 or 8
10	exp Drinking Behavior/
11	exp Alcohol-Related Disorders/
12	((alcohol* or ethanol or beer or cider or wine or spirit* or alcopop*) adj3 (use* or usage* or using or intake or consum* or drink* or misus* or abus*)).mp
13	((alcohol* or drink* or ethanol) adj3 (excess* or binge* or binging or intoxicat* or poison* or risk* or depend*)).mp
14	10 or 11 or 12 or 13
15	cannabis/ or exp street drugs/ or marijuana smoking/
16	Drug-Seeking Behavior/
17	Substance-Related Disorders/
18	((marijuana or cannabis or recreational drug* or class c or white widow*) adj2 (abus* or use* or using or usage or misus*or smok* or addict* or depend*)).mp
19	substance abuse, intravenous/
20	(class c adj2 (abus* or addict* or depend* or misus* or use* or usage or using)).mp
21	(substance* adj2 (abus* or addict* or depend* or inject* or intravenous or misus* or use* or usage or using)).mp

(*Continued*)

22	((Class a or class b or drug* or cocaine or ecstasy or mdma or glue or gas or aerosol* or solvent* or magic mushroom* or crack or ketamine or heroin or morphine or narcotic* or opiat* or opioid* or popper* or lsd or methamphetamine* or amphetamine*) adj2 (abus* or addict* or depend* or inhal* or misus* or sniff* or use* or using or usage)).mp
23	(inhal?nt* adj2 (abus* or addict* or depend* or misus* or sniff* or use* or using or usage)).mp
24	15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23
25	(4 and 9) or (4 and 14) or (4 and 24) or (9 and 14) or (9 and 24) or (14 and 24)
26	child/ or adolescent/ or child, preschool/ or infant/
27	(school* or student* or child* or pupil* or infant*).tw.
28	(Adolescen* or teen* or young person or young people or youth* or hooligan or young adult* or early adult* or juvenile* or minor? or emerging adult* or girl or boy or apprentice* or FE college* or young m#n or young wom#n or young male* or young female* or under 18* or sixth-form* or secondary education or tertiary education or higher education or further education or preschool* or primary education or infan* or kid or nurser* or playschool* or kindergarten* or prekindergarten*).mp
29	(teacher* or parent* or guardian* or grandparent* or mother* or father* or mum$1 or dad$1 or maternal or paternal or nurse? or childminder or child care provider or playworker or family or families or carer* or midwife or mid wife or midwives or mid wives).mp
30	26 or 27 or 28 or 29
31	(randomized controlled trial or controlled clinical trial).pt
32	(randomi#ed or placebo or randomly).ab.
33	trial.ti.
34	clinical trials as topic.sh.
35	31 or 32 or 33 or 34
36	exp animals/ not humans.sh.
37	35 or 36
38	25 and 30 and 37

Appendix 2. Criteria for 'Risk of bias' assessment

Item	Judgement	Description
1. random sequence generation (selection bias)	low risk	The investigators describe a random component in the sequence generation process such as: random number table; computer random number generator; coin tossing; shuffling cards or envelopes; throwing dice; drawing of lots; minimisation
	high risk	The investigators describe a non-random component in the sequence generation process such as: odd or even date of birth; date (or day) of admission; hospital or clinic record number; alternation; judgement of the clinician; results of a laboratory test or a series of tests; availability of the intervention
	unclear risk	Insufficient information about the sequence generation process to permit judgement of low or high risk
2. allocation concealment (selection bias)	low risk	Investigators enrolling participants could not foresee assignment because one of the following, or an equivalent method, was used to conceal allocation: central allocation (including telephone, web-based, and pharmacy-controlled, randomisation); sequentially numbered drug containers of identical appearance; sequentially numbered, opaque, sealed envelopes
	high risk	Investigators enrolling participants could possibly foresee assignments because one of the following method was used: open random allocation schedule (e.g. a list of random numbers); assignment envelopes without appropriate safeguards (e.g. if envelopes were unsealed or nonopaque or not sequentially numbered); alternation or rotation; date of birth; case record number; any other explicitly unconcealed procedure
	unclear risk	Insufficient information to permit judgement of low or high risk. This is usually the case if the method of concealment is not described or not described in sufficient detail to allow a definite judgement
3. blinding of outcome assessor (detection bias) Objective outcomes	low risk	No blinding of outcome assessment, but the review authors judge that the outcome measurement is not likely to be influenced by lack of blinding; Blinding of outcome assessment ensured, and unlikely that the blinding could have been broken
	high risk	No blinding of outcome assessment, and the outcome measurement is likely to be influenced by lack of blinding; Blinding of outcome assessment, but likely that the blinding could have been broken, and the outcome measurement is likely to be influenced by lack of blinding
	unclear risk	Insufficient information to permit judgement of low or high risk

(*Continued*)

4. blinding of outcome assessor (detection bias) Subjective outcomes	low risk	Blinding of outcome assessment ensured, and unlikely that the blinding could have been broken
	high risk	No blinding of outcome assessment, and the outcome measurement is likely to be influenced by lack of blinding; Blinding of outcome assessment, but likely that the blinding could have been broken, and the outcome measurement is likely to be influenced by lack of blinding
	unclear risk	Insufficient information to permit judgement of low or high risk
5. blinding of outcome assessor (detection bias) Objective outcomes	low risk	No blinding of outcome assessment, but the review authors judge that the outcome measurement is not likely to be influenced by lack of blinding; Blinding of outcome assessment ensured, and unlikely that the blinding could have been broken
	high risk	No blinding of outcome assessment, and the outcome measurement is likely to be influenced by lack of blinding; Blinding of outcome assessment, but likely that the blinding could have been broken, and the outcome measurement is likely to be influenced by lack of blinding
	unclear risk	Insufficient information to permit judgement of low or high risk
6. blinding of outcome assessor (detection bias) Subjective outcomes	low risk	No blinding of outcome assessment, but the review authors judge that the outcome measurement is not likely to be influenced by lack of blinding; Blinding of outcome assessment ensured, and unlikely that the blinding could have been broken
	high risk	No blinding of outcome assessment, and the outcome measurement is likely to be influenced by lack of blinding; Blinding of outcome assessment, but likely that the blinding could have been broken, and the outcome measurement is likely to be influenced by lack of blinding
	unclear risk	Insufficient information to permit judgement of low or high risk
7. incomplete outcome data (attrition bias) For all outcomes except retention in treatment or drop out	low risk	No missing outcome data; Reasons for missing outcome data unlikely to be related to true outcome (for survival data, censoring unlikely to be introducing bias); Missing outcome data balanced in numbers across intervention groups, with similar reasons for missing data across groups; For dichotomous outcome data, the proportion of missing outcomes compared with observed event risk not enough to have a clinically-relevant impact on the intervention effect estimate; For continuous outcome data, plausible effect size (difference in means or standardised difference in means) among missing outcomes not enough to have a clinically-relevant impact on observed effect size; Missing data have been imputed using appropriate methods;

(*Continued*)

		All randomised patients are reported/analysed in the group they were allocated to by randomisation irrespective of non-compliance and co-interventions (intention to treat)
	high risk	Reason for missing outcome data likely to be related to true outcome, with either imbalance in numbers or reasons for missing data across intervention groups; For dichotomous outcome data, the proportion of missing outcomes compared with observed event risk enough to induce clinically-relevant bias in intervention effect estimate; For continuous outcome data, plausible effect size (difference in means or standardised difference in means) among missing outcomes enough to induce clinically-relevant bias in observed effect size; 'As-treated' analysis done with substantial departure of the intervention received from that assigned at randomisation
	unclear risk	Insufficient information to permit judgement of low or high risk (e.g. number randomised not stated, no reasons for missing data provided; number of drop outs not reported for each group);
8. selective reporting (reporting bias)	low risk	The study protocol is available and all of the study's pre-specified (primary and secondary) outcomes that are of interest in the review have been reported in the pre-specified way; The study protocol is not available but it is clear that the published reports include all expected outcomes, including those that were pre-specified (convincing text of this nature may be uncommon)
	high risk	Not all of the study's pre-specified primary outcomes have been reported; One or more primary outcomes is reported using measurements, analysis methods or subsets of the data (e.g. subscales) that were not pre-specified; One or more reported primary outcomes were not pre-specified (unless clear justification for their reporting is provided, such as an unexpected adverse effect); One or more outcomes of interest in the review are reported incompletely so that they cannot be entered in a meta-analysis; The study report fails to include results for a key outcome that would be expected to have been reported for such a study
	unclear risk	Insufficient information to permit judgement of low or high risk

CONTRIBUTIONS OF AUTHORS

This draft drew heavily on a protocol for another Cochrane review which was drafted by GJM and colleagues (MacArthur 2012b). RC was responsible for primary conceptualisation of the review. HB, MH and RC wrote a draft of this protocol which the co-authors helped to develop and revise.

DECLARATIONS OF INTEREST

Rona Campbell is a Director of Decipher Impact, a not-for-profit spin-out company wholly owned by the Universities of Cardiff and Bristol, which licences and supports the delivery of evidence-based public health interventions.

David Foxcroft's department has received funding from the alcohol industry for the provision of prevention programme training. This is led by academic colleagues, and David has no direct involvement in this industry funded work. David was previously a Trustee of the alcohol industry funded Drinkaware Trust.

Professor Matthew Hickman, Professor David Foxcroft and Professor Fabrizio Faggiano are members of the CDAG.

George Patton is an investigator of the Gatehouse Project which is potentially eligible for inclusion in this review.

Faggiano Fabrizio is an investigator of the EU-Dap school based prevention trial which is potentially eligible for inclusion in this review.

Deborah Caldwell, Heide Busse, Georgina MacArthur, Eileen Kaner, John Macleod, James White - None known.

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