

School-based programmes for preventing smoking (Review)

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ABSTRACT

Background

Smoking rates in adolescents are rising in some countries. Helping young people to avoid starting smoking is a widely endorsed goal of public health, but there is uncertainty about how to do this. Schools provide a route for communicating with a large proportion of young people, and school-based programmes for smoking prevention have been widely developed and evaluated.

Objectives

To review all randomized controlled trials of behavioural interventions in schools to prevent children (aged 5 to12) and adolescents (aged 13 to18) starting smoking.

Search strategy

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) and the Cochrane Tobacco Addiction Group's Specialized Register, MEDLINE, EMBASE, PsycINFO, ERIC, CINAHL, Health Star, Dissertation Abstracts and studies identified in the bibliographies of articles. Individual MEDLINE searches were made for 133 authors who had undertaken randomized controlled trials in this area.

Selection criteria

Types of studies: those in which individual students, classes, schools, or school districts were randomized to the intervention or control groups and followed for at least six months.

Types of participants: Children (aged 5 to12) or adolescents (aged 13 to18) in school settings.

Types of interventions: Classroom programmes or curricula, including those with associated family and community interventions, intended to deter use of tobacco. We included programmes or curricula that provided information, those that used social influences approaches, those that taught generic social competence, and those that included interventions beyond the school into the community. We included programmes with a drug or alcohol focus if outcomes for tobacco use were reported.

Types of outcome measures: Prevalence of non-smoking at follow up among those not smoking at baseline. We did not require biochemical validation of self-reported tobacco use for study inclusion.

Data collection and analysis

We assessed whether identified citations were randomized controlled trials. We assessed the quality of design and execution, and abstracted outcome data. Because of the marked heterogeneity of design and outcomes, we computed pooled estimates only for those trials that could be analyzed together and for which statistical data were available. We predominantly synthesized the data using narrative systematic review. We grouped studies by intervention method (information; social competence; social influences; combined social influences/social competence; multi-modal programmes). Within each group, we placed them into three categories (low, medium and high risk of bias) according to validity using quality criteria for reported study design.

Main results

Of the 94 randomized controlled trials identified, we classified 23 as category one (most valid). There was one category one study of information-giving and two of teaching social competence. There were thirteen category one studies of social influences interventions. Of these, nine found some positive effect of intervention on smoking prevalence, and four failed to detect an effect on smoking

prevalence. The largest and most rigorous study, the Hutchinson Smoking Prevention Project, found no long-term effect of an intensive eight-year programme on smoking behaviour. There were three category one RCTs of combined social influences and social competence interventions: one provided significant results and one only for instruction by health educators compared to self-instruction. There was a lack of high quality evidence about the effectiveness of combinations of social influences and social competence approaches. There was one category one study providing data on social influences compared with information giving. There were four category one studies of multi-modal approaches but they provided limited evidence about the effectiveness of multi-modal approaches including community initiatives.

Authors' conclusions

There is one rigorous test of the effects of information-giving about smoking. There are well-conducted randomized controlled trials to test the effects of social influences interventions: in half of the group of best quality studies those in the intervention group smoke less than those in the control, but many studies failed to detect an effect of the intervention. There are only three high quality RCTs which test the effectiveness of combinations of social influences and social competence interventions, and four which test multi-modal interventions; half showed significant positive results.

PLAIN LANGUAGE SUMMARY

There is little strong evidence that school-based programmes are effective in the long term in preventing uptake of smoking.

We identified 23 high quality randomized controlled trials of school-based programmes to prevent children who had never smoked becoming smokers. The interventions included information-giving, social influence approaches, social skills training, and community interventions. There is little evidence that information alone is effective. The majority of studies drew on a social influences intervention. Although half of the best quality studies in this group found short-term effects on children's smoking behaviour, the highest quality and longest trial (the Hutchinson Smoking Prevention Project) found no long-term effects from 65 lessons over eight years. There was limited evidence for the effects of interventions that included developing generic social competence, and for those with a multi-modal approach that included community initiatives.

BACKGROUND

(1) The incidence and prevalence of smoking among children and adolescents

Because many of the studies are from the US, it may be helpful to note that children in Kindergarten are age 5, in Grade 1 are usually age 6; and in Grade 12 are age 17-18.

The WHO Health Behaviour in School-aged Children 1997-8 survey of 11-, 13- and 15-year-olds in 29 countries (Europe, Canada and the USA) found that for the 15-year-olds in 14 countries more than 20% of females smoked daily (Greenland 56%, Austria 26%, Germany 25%, France 25%, England 24%, Scotland 24% and Northern Ireland 24%). In 11 countries more than 20% of males smoked daily (Greenland 45%, Hungary 29%, Latvia 27%, Germany 22%, Poland 22% and Flemish-speaking Belgium 21%) (WHO 2000).

When data from the U.S. Teenage Attitudes and Practices Survey are applied to U.S. census data, it is estimated that each day 5500 youth and 4000 teenagers experiment for the first time with cigarettes, and that 3400 youth and 2300 teenagers initiate regular smoking.

The 1999 U.S. National Youth Tobacco Survey estimated that 12.8% of middle school, and 34.8% of high school students used tobacco in the previous month. In Australia 12% of 13-year-olds, 19% of 14-year-olds, 22% of 15-year-olds, and 26% of 16- and 17-year-olds, and 23% of female adolescents (compared with 16% of males) reported they were 'current smokers'. By age 13, 50% of Australians had experimented with tobacco, and 70% by age 17. The greatest increase occurred at age 14, and the rates for females increased progressively more with age than those for males (Thornton 1999).

Rates also vary by culture. In the U.S., Native American youths use cigarettes, smokeless tobacco, alcohol and other drugs earlier and at higher rates than other ethnic groups. Smokeless tobacco use is particularly pronounced among young Native American females, and 50% of Native American seventh- through 12th-grade students (i.e. 12- to 18-year olds) report ever using marijuana, compared with 12% in the general population (Schinke 2000). In the 1989 U.S. National Youth Tobacco Survey middle school sample the rates were highest for Native Americans, then Whites (32.8%), then Hispanics (25.8%), then African-Americans (15.8%) (Pletcher 2000). The rates for less acculturated Latinos are lower than those who are more acculturated to the majority

culture (Tyas 1998).

Rates of daily smoking among U.S. high school seniors peaked at 29% in 1977, declined to 19% in 1986 and 17% in 1992, increased to 24.6% in 1997 and declined slightly to 23.1% in 1999. Rates increased in all ethnic groups, but stayed low in African-Americans. Reasons for the recent increases may be that the relative price of cigarettes decreased, and advertisers targeted the youth market (Surgeon General 2000).

The U.S. Monitoring the Future Study found that between 1994 and 1997 rates of smoking in the past month stayed stable for eighth-graders, but increased for 10th- to 12th-graders, and increased more for females than for males. Rates of smokeless tobacco use in this survey and in the Youth Risk Behavior Survey fell in the same period (Soldz 2000).

Adolescent smoking remains a risk factor in adulthood. The 1995 U.S. National College Health Risk Behaviour Survey found that 70% had ever tried smoking a cigarette, and of these 42% were current smokers and 13% current daily smokers. Females were more likely to smoke than males (Pletcher 2000).

Adolescents who begin smoking at younger ages are more likely to become regular smokers and less likely to quit (Tyas 1998).

It is estimated for the U.S. population who were 17 or younger in 1995, that 5 million will die prematurely of tobacco-related causes, and that 20% of deaths could be avoided if smokers had either never started or had quit (Epstein 2000b).

(2) Quitting

For those born in the U.S. between 1975 and 1979, and who began smoking in adolescence, the median quitting age is 33 for males (after 16 years of smoking), and 37 for females (after 20 years of smoking) (Pierce 1996).

Among U.S. smokers between 12 and 18 years old, between 55 and 65% report attempts to quit. In the 1993 Teenage Attitudes and Practices Survey 18% of 10- to 18-year-old monthly smokers and 74% of daily smokers said that it would be 'really hard to quit' (US DHHS 1993). Quitting attempts are more frequent among those with health-oriented values, among females than males, and among those who had smoked less than five cigarettes a week over the previous three months than among those who smoked more than 11 cigarettes a day (Pletcher 2000).

(3) Smoking as a prevalence-driven behaviour

Smoking may be modelled as a prevalence-driven behaviour depending upon the extent to which the adolescent comes into contact with significant others who smoke, and has risk factors for smoking (Tyas 1998).

Parental example is important. Children from intact two-parent families have lower rates, and twice as many studies find a significantly increased risk of children smoking if their parents smoke than find a non-significant association. Parental interest is also important; parental indifference, lack of supervision, and lack of

knowledge about their children's friends increase the risk (Tyas 1998).

Children have a higher risk of smoking if their best friends and siblings smoke. If their best friends smoke the risk is higher than if other friends or peers smoke. The perception that friends smoke is also a predictor of smoking (Tyas 1998).

Risk-taking and other problem behaviours (drinking, other drug use, early sexual activity, riding with a drinking driver, not wearing a seatbelt, carrying a weapon, fighting and poor eating habits) are also associated with smoking. Participating in sports or other physical activity is associated with lower rates of smoking (Tyas 1998).

Thus with increasing age and with the transition to puberty marking independence and a claim to beginning adult status, the influences of parents, siblings and peers cumulate. In school classes, if a few children begin smoking the rate at which smoking will spread from this cluster depends on the number of youths at risk in each family, school, class, and friendship group. It is therefore crucial to use research designs and statistical analyses which model the effects of social clustering in classes in order to determine the true effect of interventions.

(4) School-based interventions

Over the past three decades the school has been a particular focus of efforts to influence youth smoking behaviour. The main perceived advantages are that almost all children can be reached through schools, and a focus on education fits naturally with the daily activities of schools. Researchers have used five types of interventions in schools, each based on a different theoretical orientation:

1. Information-giving curricula present participants with information about smoking, including health risks of tobacco use, and the prevalence and incidence of smoking (Bangert-Drowns 1988), assuming that information alone will lead to changes in behaviour.

2. Social competence curricula use enhancement interventions (also called Affective Education) based on Bandura's social learning theory (Bandura 1977). This model hypothesizes that children learn drug use by modelling, imitation, and reinforcement, influenced by the child's pro-drug cognitions, attitudes and skills. Susceptibility is increased by poor personal and social skills and a poor personal self-concept (Botvin 2000). These programmes use cognitive-behavioural skills (instruction, demonstration, rehearsal, feedback, reinforcement, and out-of-class practice in homework and assignments). They teach generic self-management personal and social skills, such as goal-setting, problem-solving, and decision making, and also teach cognitive skills to resist media and interpersonal influences, to enhance self-esteem, to cope with stress and anxiety, to increase assertiveness, and to interact with others of both genders.

3. Social influence approaches, based on McGuire's persuasive communications theory (McGuire 1968) and Evans's theory of

psychological inoculation (Evans 1976), use normative education methods and anti-tobacco resistance skills training. These include correcting adolescents' overestimates of the smoking rates of adults and adolescents, recognising high-risk situations, increasing awareness of media, peer, and family influences, teaching and practising refusal skills, and making public commitments not to smoke. They often apply the techniques of generic competence enhancement to specific anti-tobacco, anti-alcohol, and anti-drug goals.

4. Combined methods draw on social competence and social influence approaches.

5. Multi-modal programmes combine curricular approaches with wider initiatives within and beyond the school, including programmes for parents, schools, or communities and initiatives to change school policies about tobacco, or state policies about the taxation, sale, availability and use of tobacco.

Tobacco education curricula are widely used in US schools, though few of those in use have been rigorously evaluated. The U.S. 2000 National Youth Tobacco Survey national sample of 35,828 6th- to 12th-graders in 324 schools found that 70% of the middle schoolers and 50% of the high schoolers said they had received a programme that taught them the short-term consequences of tobacco use. The percentages for receiving a normative programme were 40% and 18%; for programmes teaching why people smoke 64% and 38%; for programmes teaching refusal skills 51% and 17%; and for multistrategy programmes 38% and 17%. (Wentz 2002). Wiehe 2005 identified eight programmes that followed participants to age 18 or the 12th-grade and found little or no evidence of effectiveness. There is nevertheless continued uncertainty about both the relative and absolute effectiveness of school-based programmes, and considerable variation in the extent to which they are implemented in other countries. In this context, we set out to review existing evidence.

OBJECTIVES

The primary objective of this review was to assess the effectiveness of school-based programmes in preventing children and adolescents from starting smoking. A secondary objective was to assess which programme elements are associated with effectiveness.

We considered one central question:

(1) Are school programmes, categorized by intervention type, more effective than minimal or no intervention in preventing smoking? We considered the hypothesis that they are more effective separately according to the theoretical orientation of the prevention programme:

Information-giving;

Social competence;

Social influence;

Combined social influence and social competence;

Multi-modal programmes.

(2) If the review showed the effectiveness of one or more of these types of intervention, we proceeded to the secondary objective, i.e. to examine the direct evidence comparing different types of intervention, categorized by theoretical orientation, including:

Social influences versus information-giving;

Social influences versus social competence;

Combinations of social influences, social competence and information versus single component interventions;

Multi-modal programmes versus single component interventions.

We also aimed to consider the method of programme delivery, including:

Peer-led programmes versus those taught by researchers or teachers;

Longer versus shorter durations of programme;

Booster sessions after programme completion versus no booster;

Age- and gender-specific programmes versus standardized interventions;

Tobacco-focused interventions versus interventions focused on tobacco together with other substances such as alcohol and drugs.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

We included studies in which individual students, classes, schools, or school districts were randomized to receive different programmes or to be the control, and in which baseline tobacco use was measured. We excluded studies if they did not state that allocation of individuals or groups to intervention and control groups was randomized. Random allocation of intervention was either to the individual or to individuals in clusters (in classes, in schools, in classes nested within schools, or in school districts). We assessed whether the studies were analyzed using methods appropriate to the level of allocation and the level of measurement of the outcomes. We excluded those studies presenting only cross-sectional data that permitted neither individuals nor clusters nor cohorts to be followed to the conclusion of the study.

Types of participants

Children (aged 5 to 12) and adolescents (aged 13 to 18) in school settings. The search strategy chosen also located studies in which the participants were 5 to 18 during the intervention phase of the study, but were followed up in a few instances beyond 18.

Types of intervention

We included all school-based programmes that had as one of their goals deterring tobacco use, irrespective of theoretical intervention. Some programmes aimed simply to provide information about tobacco. Others had more complex goals: teaching generic social skills to reinforce societal norms about individual behaviour; reinforcing the adolescent's self-concept; and teaching social skills and

specific tobacco refusal skills. Some focused on multiple addictions, and we included any programmes with any drug or alcohol focus provided outcomes for tobacco use were reported. Some focused on 'healthy schools'. We included these provided outcomes for tobacco use were reported. We classified programmes according to the theoretical orientation of the programme. Where programmes drew on more than one model we classified them by the dominant component, or as a combined programme.

For each study we determined whether the experimental programmes were compared with a control group, and whether the control group received no intervention, or the standard health education curriculum taught in the school, or the tobacco education curriculum in normal use in the school.

There were no restrictions on who delivered the intervention. These could include researchers, classroom teachers, health science teachers, healthcare professionals, undergraduate or graduate students, adolescent peers, or other personnel.

Types of outcome measures

The primary outcome was the effect of the intervention on the smoking status of individuals or cohorts who reported no use of tobacco at baseline. We recorded whether effects of the interventions were found at the conclusion of the programme, and whether such effects were sustained at follow up after completion of the programme. We required a minimum follow up of six months after intervention. In addition, we recorded whether studies achieved long-term effects (defined as two years after the end of the programme).

We did not require biochemical validation (by saliva thiocyanate or cotinine or expired air carbon monoxide levels) of self-reported tobacco use for inclusion, but recorded its use. If saliva samples were collected but not analyzed (sometimes described as the 'bogus pipeline' procedure), this was recorded.

One problem in this field is that the studies often use different measures of tobacco use, either recording frequency (monthly, weekly, daily), or the number of cigarettes smoked, or an index constructed from multiple measures. Sometimes the variety of measures is intended to record the fact that young children begin smoking on a monthly basis, but as they get older may proceed to weekly and daily smoking. We excluded no measure of smoking behaviour.

We excluded studies that did not assess baseline smoking status in the pre-test survey.

We included studies that reported smoking behaviour and excluded those which reported only changes in knowledge or attitudes about smoking.

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: methods used in reviews.

Data sources (Search strategies used as many of the terms used in the MEDLINE search as possible)

MEDLINE 1966 - 10/2005

EMBASE 1974 - 10/2005

PsycINFO 1967 - 10/2005

ERIC 1982 - 10/2005

Health Star

Tobacco Control 1992 - 2005

Journal of Smoking Related Disorders 1990 - 2005

Dissertation Abstracts 1960 - [Search strategy = (Tobacco or smoking) and prevent? and (child or adolescent)]

US Department of Health Reviews

Proceedings of the World Conferences on Tobacco and Health

Cochrane Tobacco Addiction Review Group Specialized Register

Reference lists of the articles selected in the above sources

Index of Scientific and Technical Proceedings

Conference Papers Index

Searches for 133 individual authors were made in MEDLINE from 1966 to the present for authors who had published in the field

Detailed search strategies are displayed in Additional Tables

Table 01 (MEDLINE) and Table 02 (CINAHL).

None of the previous meta-analyses of the literature (listed in the additional references below) undertook a Cochrane search strategy.

METHODS OF THE REVIEW

The review had four stages:

(1) **Assessment of study type:** Two authors evaluated 191 studies that appeared to be randomized controlled trials (RCTs). We independently assessed the full text of each study, and we contacted authors for clarification in cases of uncertainty.

(2) **Data entry:** Two authors (RT and KB [a collaborator on the first version of this review]) independently extracted data until 1998. From then on, one reviewer (RT) extracted data from new studies with data checked by the Review Group Co-ordinator. For the 2006 update, RP became a co-author and checked data extraction.

(3) **Study quality:** Quality of studies was independently assessed by RT and RP. For this process, we judged the likelihood of four forms of bias that may threaten validity. We used six measures of study quality. These were the extent to which the studies minimized the following sources of bias:

a) Selection bias (systematic differences in comparison groups, due to imperfect randomization).

- b) Performance bias (problems with the implementation of the intervention, often due to incomplete intervention or contamination of the control group).
- c) Attrition bias (losses to follow up or systematic differences in rate of loss to follow up among different groups). We considered that studies with an overall attrition rate of greater than 20% to be at significant risk from attrition bias. Where there was differential attrition between groups, we considered bias more likely if there was no sensitivity analysis of the effect of this attrition on outcomes.
- d) Detection bias (significant differences in outcome assessment).

We also applied the following statistical criteria:

- e) A reported power calculation with attainment of the desired sample size.
- f) The statistical analysis deemed appropriate to the unit of randomization. Intra-class correlations (ICCs) in smoking behaviour vary by school grade, frequency of smoking, gender, ethnicity, and time of school year. ICCs typically inflate the required sample size, and failure to take account of these may lead to inadequate sample size and the risk of drawing false negative conclusions (Type II error) (Dielman 1994; Murray 1990; Murray 1997; Palmer 1998). We considered statistical analysis to be appropriate if the analysis used the same unit as randomization (for example, if the intervention was delivered at the level of the school then the school was the unit of analysis), or if other methods were used to account for cluster effects, such as multi-level modelling.

We assigned studies to three quality categories: 1 (minimal risk of bias in all six areas noted above); 2 (a risk of bias in one or more areas); and 3 (risks of bias in design and execution such that no conclusions can be drawn from the study).

(4) Data Synthesis:

Data were extracted from randomized controlled trials that reported smoking prevention (number or percentage of non-smoking children at baseline that remain nonsmokers at follow up) and a minimum follow-up time of six months. The outcomes used were proportion prevented from smoking at short term (less than or equal to 18 months) and long term (over 18 months). We used the longest available follow-up time for the analysis.

Odds ratios were obtained from individual randomized trials with the control group as comparator, and using intention-to-treat analyses whenever possible (i.e including in the denominator all participants originally randomized).

Adjusted odds ratios from cluster-randomized trials were obtained either directly from those trials that reported them or by adjusting the original (non-adjusted) odds ratios using an interclass correlation coefficient of 0.097 (ICC for current smoking status averaged among all ethnicities (Siddiqui 1996). This allowed the pooling of both cluster- and individually randomized trials.

A pooled estimate of the effect was obtained using the generalized inverse variance method and a fixed-effect model. The adjusted odds ratio (logarithms) and the standard errors were calculated in Excel before entering them into RevMan 4.3.

The χ^2 and I^2 statistics (Higgins 2003) were used to test the adequacy of the assumption of homogeneity.

Pooled estimates were obtained for the different interventions using data extracted for those trials that provided information on prevention, were properly randomized and where the only difference between the groups was the intervention. We considered studies in five groups corresponding to the type of intervention (information; generic social skills; social influences/tobacco resistance and refusal skills; combined; multi-modal). Within each group we categorized studies into three groups according to methodological strength. Results are presented as: forest plots (pooled data on prevention) and tables (extended description of study results and original prevention data before adjustment for clustering).

DESCRIPTION OF STUDIES

We identified 94 randomized controlled trials (RCTs) eligible for inclusion. There were 93 single country studies (USA 66; Canada six; Netherlands five; Italy three; Australia, Germany, Norway and the UK two each; and Finland, France, India, Mexico and Spain one each). The one multi-country study included Denmark, Finland, the Netherlands, Portugal, Spain and the UK. We excluded 115 studies identified as possible RCTs either because they were not an RCT, or because the follow up was shorter than six months, or because the focus was not on children or adolescents in schools. Full details of all the trials are given in the Included and Excluded Studies Tables.

The foci included tobacco alone, and tobacco in relation to alcohol, drugs, violence, cardiac health or policy change. The range of interventions was heterogeneous. They included information about:

- Short- and long-term consequences of smoking;
- Prevalence of smoking;
- Generic social skills;
- Tobacco-, alcohol- and drug-refusal skills;
- Interventions about tobacco included with interventions about risk-taking, violence and carrying weapons;
- School interventions associated also with family and community interventions;
- Interventions to change school and state policies about tobacco availability;
- Classroom management and reading strategies for teachers;

- Culturally sensitive programmes, for example programmes for native North Americans.

The educational techniques were also varied, and included lectures, quizzes, skits, collages, puppet plays, debates, role-plays, making videos, discussions of videotaped role-plays, films, and meetings with athletes. Some studies compared experimental treatments without a control group, and some included a control group in their comparisons. Some compared different types of presenters (teachers versus peers), and some compared videotaped to lecture presentations.

The presenters included researchers, health educators, classroom and science teachers, undergraduate and graduate students, and same-age and older peers. The duration of the interventions ranged from three sessions in total to weekly lessons delivered over eight years.

The outcome measures most frequently chosen were never-smoking, and lifetime, monthly, weekly or daily smoking. Some studies used Pechacek's (Ary 1990; Pechacek 1984) or Botvin's (Botvin 1980; Botvin 1984) composite indices, or constructed their own. Few studies confirmed self reports biochemically at all stages of the research.

We describe individual studies in the Included Studies Table and in the Results section. Each study is identified by the name of the first author and year of publication of the main results paper. Additional references are listed together with this main paper in the references section. In the text we have also used the name of the project where one was used.

METHODOLOGICAL QUALITY

We identified 23 category one randomized controlled trials (RCTs) which met the criteria in all of the following areas:

- (1) minimal selection bias (no systematic differences in comparison groups, assessed by adequacy of randomization);
 - (2) minimal performance bias (no problems with the implementation of the intervention);
 - (3) minimal attrition bias (no systematic differences in withdrawals from groups);
 - (4) minimal detection bias (no significant differences in outcome assessment);
 - (5) a power calculation was performed and the desired sample sizes were achieved;
 - (6) correct statistical analysis was performed, appropriate to the unit of allocation by randomization and the unit of assessment.
- One study (Hansen 1991) contributed data to two different Groups.

We identified 31 category two RCTs which contained one or more problems in design or conduct that could threaten the validity of their conclusions.

We identified 40 category three RCTs which were judged to have serious problems in design or conduct that precluded drawing any conclusions. One study (Hansen 1988) contributed data to two different Groups. The data to support these judgements are presented in the *Notes* column of the Included Studies Table.

None of the 94 RCTs stated that they concealed the allocation of individuals or clusters to intervention or control.

RESULTS

Full details of the results for each trial are presented in the Comparisons and Data Tables, including the raw data for short-term outcomes (less than 18 months; Comparison 09.01) and long-term outcomes (more than 18 months; Comparison 09.02).

(I) Information-giving curricula versus control:

There were 10 randomized controlled trials (RCTs) of information-giving: one Category one (Crone 2003); one Category two (Ausems 2004); and eight Category three (Chatrou 1999; Denson 1981; Figa-Talamanca 1989; Gatta 1991; Hirschmann 1989; Howard 1996; MacPherson 1980; Rabinowitz 1974). Nine focused on tobacco and one on tobacco and cardiac health (Howard 1996).

Two trials (Ausems 2004; Crone 2003) provided information for statistical analysis of short-term prevention. Ausems 2004 at 12 months reported that the in-school group were less likely to continue to smoke compared to the Control (odds ratio [OR] 0.49; 95% confidence interval [CI] 0.29 to 0.84); and at 18 months the out-of-school group were less likely to start smoking compared to the Control (OR 0.42; 95% CI 0.18 to 0.96). Crone 2003 reported a significant effect of the intervention (OR 0.61; 95% CI 0.41 to 0.91).

Randomization in the Ausems 2004 trial occurred within two different groups. Nineteen schools already in the in-school intervention were randomly assigned to the out-of-school intervention or not (given in conjunction with the in-school intervention). Another 17 schools were randomly assigned to the out-of-school intervention or not (without further intervention). This could be thought as two separate RCTs, with out-of-school status being the intervention studied. The results presented do not make this separation, and pool the results from both RCTs, which breaks the randomization process; and compares non-randomized groups for the in-school intervention. Bias in the results therefore cannot be ruled out.

(II) Social competence interventions versus control:

There were three RCTs in this Group: two Category one trials (Kellam 1998; Storr 2002), which provided information for statistical analysis of long-term prevention. A non-significant positive effect was obtained from the pooled estimate (OR 0.77; 95% CI 0.48 to 1.22). The χ^2 (0.10, $P = 0.76$) and I^2 (0%) statistics are

consistent with the assumption of homogeneity. There was one Category three RCT (O'Donnell 1995).

(III) Social influences interventions versus control

There were 56 RCTs that met the inclusion criteria.

There were 13 Category one RCTs (Aveyard 1999; Botvin 2001; Brown 2002; Cameron 1999; Dijkstra 1999; Elder 1993; Ellickson 1990; Ellickson 2003; Hansen 1991; Murray 1992; Noland 1998; Peterson 2000; Walsh 2003).

There were 20 Category two RCTs (Abernathy 1992; Armstrong 1990; Ary 1990; Biglan 1987a; Biglan 1987b; Bush 1989; Clarke 1986; Clayton 1996; De Vries 1994; Flay 1995; Murray 1984; Nutbeam 1993; Schinke 1985b; Schinke 1986a; Schinke 2000; Severson 1991; Unger 2004; Vartiainen 1998; Walter 1985; Walter 1986).

There were 23 Category three RCTs (Coe 1982; Cohen 1989; Ennett 1994; Flay 1985; Focarile 1994; Gilchrist 1986; Gindre 1995; Hansen 1988; Hort 1995; Kaufman 1994; Laniado-Laborin 1993; Lloyd 1983; Schinke 1984; Schinke 1985a; Schinke 1985c; Schinke 1986b; Schinke 1986c; Schinke 1988; Scholz 2000; Shope 1996; Telch 1990; Tell 1984; Villalbi 1993).

Thirteen trials (Abernathy 1992; Armstrong 1990; Ary 1990; Aveyard 1999; De Vries 1994; De Vries 2003; Ellickson 1990; Ellickson 2003; Flay 1985; Hansen 1988; Lloyd 1983; Telch 1990; Unger 2004) provided information for statistical analysis on short-term prevention and seven (Abernathy 1992; Armstrong 1990; Brown 2002; Flay 1985; Focarile 1994; Hansen 1988; Vartiainen 1998) on long-term prevention. A non-significant positive effect on short-term prevention was obtained from the pooled estimate (OR 0.93; 95% CI 0.84 to 1.03); while a non-significant negative effect on long-term prevention was obtained from the pooled estimate (OR 1.19; 95% CI 0.99 to 1.42). For short-term prevention, the χ^2 (6.59, $P = 0.88$) and I^2 (0%) statistics are consistent with the assumption of homogeneity; while for long-term prevention the χ^2 (11.72, $P = 0.07$) and I^2 (48.8%) statistics cast some doubts about the homogeneity of the data, but both tests are inconclusive.

To test for possible bias in terms of trial quality, sensitivity analyses were done, including only high quality trials. In the short-term outcome, seven studies provided information for the pooled effect estimate (Aveyard 1999; De Vries 1994; De Vries 2003; Ellickson 1990; Ellickson 2003; Flay 1985; Lloyd 1983). The pooled effect estimate from these trials showed the same result as the one including trials of any quality (OR 0.97; 95% CI 0.86 to 1.09).

A similar analysis was done for the long-term effect with only one trial (Brown 2002) providing information of a beneficial but not statistically significant effect (OR 0.86; 95% CI 0.44 to 1.71).

(IV) Combined social competence and social influences versus control

There were 16 trials for inclusion, with three Category one RCTs (Spoth 2001; Spoth 2002; Sussman 1995); seven Category two

RCTs (Botvin 1990a; Botvin 1990b; Botvin 1999; Gersick 1988; Josendal 1998; Scheier 2001; Sussman 1993); and six Category three RCTs (Botvin 1980; Botvin 1982; Botvin 1983; Gilchrist 1987; Hanewinkel 1994; Schaps 1986).

Six trials (Botvin 1980; Botvin 1982; Botvin 1983; Botvin 1999; Scheier 2001; Spoth 2002) provided information for statistical analysis on short-term prevention and one (Spoth 2001) on long-term prevention. A non-significant positive effect on short-term prevention was obtained from the pooled estimate (OR 0.72; 95% CI 0.45 to 1.16); while the only trial on long-term prevention reported a non-significant positive effect (Spoth 2001, OR 0.55; 95% CI 0.30 to 1.01). For short-term prevention, the χ^2 (0.39, $P = 1$) and I^2 (0%) statistics are consistent with the assumption of homogeneity.

We carried out sensitivity analyses including only high quality trials. In the short-term outcome only one study (Spoth 2002) provided information showing a positive but not significant effect (OR 0.75; 95%CI 0.12 to 4.60); while for long-term prevention only Spoth 2001 provided information.

(V) Social influences versus information-giving.

There was one Category one RCT (Hansen 1991), and this trial did not provide information for statistical analysis. It also provided a comparison in Group III Social influences vs. control.

(VI) Social influences versus social competence: There was one Category three RCT (Hansen 1988), which also provided a comparison in Group III Social influences vs. control.

(VII) Multi-modal programmes compared to single-component interventions

There were nine RCTs: four Category one (Biglan 2000; Elder 1996; Perry 1996; Perry 2003); three Category two (De Vries 2003; Piper 2000; Schofield 2003); and two Category three (Reddy 2002; Rohrbach 1994).

Three of the Category one studies found positive significant results. Biglan 2000 found after three years that the communities which received the community-plus-school programme had net 4.0% less smoking ($P < 0.038$) and smokeless tobacco ($P < 0.04$) than the communities which received the school-only programme. Perry 1996 for baseline non-users of alcohol found less smoking in the intervention group compared to control after three years ($P < 0.05$). Perry 2003 for males found that the growth rates in tobacco use were lower in the DARE group compared to control ($P < 0.04$); and lower for DARE Plus compared to DARE ($P < 0.04$), but found no significant differences for females. Elder 1996 at 36 months found there were no significant differences in the percentages in the experimental (4.7%) and control groups (5%) stating that they had ever smoked (OR 1.01; 95% CI 0.79 to 1.30). However, there was an increase from 55% to 75% among control schools in smoke-free policies, and from 45% to 78% among experimental schools (no statistical analysis stated).

The authors stated that differences in the rate of policy adoption could not be directly attributed to the CATCH intervention, and that Minnesota schools already had a policy of 100% smoke-free schools at all time periods.

DISCUSSION

Twenty-three high quality studies (24 comparisons) addressed the issue of whether school programmes to prevent tobacco are more effective than minimal or no intervention: one information-giving, two social competence, 13 social influence, three combined social competence and social influence, one social influence versus information-giving, and four multi-modal initiatives. The high quality study on information-giving alone reported a significant effect of the intervention (odds ratio [OR] 0.61; 95% confidence interval [CI] 0.41 to 0.91). Studies that compared an information curriculum with other models of delivery showed the information curricula to be either less effective or detected no difference (Botvin 1999; Hansen 1991; Sussman 1993). Due to the limited number of rigorous studies, it is difficult to exclude a beneficial effect of information about tobacco alone, but there is little positive evidence available to support this intervention.

Only two studies teaching social competence were deemed to be of high quality (Kellam 1998; Storr 2002). Both showed positive but not statistically significant effects. A pooled effect estimate obtained from these studies provided the same answer (OR 0.77; 95% CI 0.49 to 1.22).

The largest group of studies included those drawing to a greater or lesser degree on social influence models. We identified 13 high quality trials in which social influences were the dominant mode of intervention. Of these, nine showed some positive effect of intervention on smoking prevalence (Botvin 2001; Brown 2002 only for males; Cameron 1999 only for high risk schools; Dijkstra 1999; Project SHOUT Elder 1993; Project ALERT Ellickson 1990; AAPT trial Hansen 1991; Noland 1998; Walsh 2003). Four failed to detect an effect on smoking prevalence: (Aveyard 1999; Ellickson 2003; Minnesota Murray 1992; and Hutchinson Smoking Prevention Project Peterson 2000). Thirteen trials (seven of high quality) provided information on short-term effect and seven (one of high quality) on long-term effect. Pooled effect estimates showed a beneficial but not statistically significant effect in the short term (OR 0.93; 95% CI 0.84 to 1.03), and a negative (not significant) effect in the long term (OR 1.19; 95% CI 0.99 to 1.42). Analyses including only high quality trials showed a negative (non-significant) effect in the short term (OR 1.07; 95% CI 0.87 to 1.30), but a beneficial (non-significant) effect in the long term (OR 0.86; 95% CI 0.44 to 1.71).

Of the high quality studies, one stands out both for the quality of the intervention and the duration and methodological rigour of the evaluation. The Hutchinson Smoking Prevention Project

(HSPP) (Peterson 2000) ran for 15 years from 1984 to 1999. It aimed to assess the effect of an enhanced social influences approach that included all the 'essential elements' for school-based prevention recommended by existing guidelines. The intervention included 65 classroom lessons, and the intervention programme was sustained for eight years from grades 3 to 10. The intervention was successfully implemented. The trial was large, and powered to detect cluster level differences. The trial followed participants to two years after leaving school. Criticisms of the trial are that because of the variation in social influences interventions it is not a definitive test of the social influences model (Botvin 2001); that it focused on small rural schools in Washington State and did not intervene to change mediators of smoking (Sussman 2005); and that the school districts changed during the period of the study (Steve Sussman, personal communication). This trial was not included in the analyses as the data reported were on prevalence, not prevention. However, it is consistent with our analysis as no effect of intervention on prevalence of smoking was found either at school-leaving or later follow up.

This review shows that there is some evidence that school programmes incorporating social influences models can affect smoking behaviour in the short term. In addition, some studies with long follow up periods had positive results. The Life Skills Training studies (Botvin 1990a; Botvin 1995) found a 25% reduction in pack-a-day cigarette smoking until the end of the 12th grade, and the TNT project (Sussman 1993) reduced initiation of smoking and smokeless tobacco by 30% and weekly use by 60% across the two-year junior high to senior high school period. These studies must be weighed against the findings of the HSPP which failed to find a sustained effect of a social influences intervention programme on smoking behaviour, and our pooled estimates that failed to demonstrate a statistically significant effect either in the short or the long term.

Not surprisingly, there is disagreement about how to weight these different results. The applicability of the HSPP findings has been questioned on both methodological and demographic grounds. Some commentators suggested that the intervention lacked key features present in more successful programmes (Bliss 2001). Others argued that the HSPP study population, based in mainly white, rural schools, has limited generalizability to other settings (Sussman 2001). Clayton 2001 noted that there was wide variation in daily smoking between schools (e.g. daily smoking among 12th-grade females in the 20 schools in the control group ranged from 0% to 41.9%), and commented that 'schools differ from each other on a number of dimensions, most of which have been ignored in the school-based curriculum-driven part of prevention science'. They pointed out that some interventions have reduced smoking in high risk schools but not in other schools and suggested that an approach which took account of the variability among schools in smoking norms might be productive. It is thus clear that despite the comprehensive nature of the intervention and the rigour of the evaluation, many researchers do not accept that the Hutchin-

son Smoking Prevention Project represents a definitive statement about the effectiveness of social influences programmes to prevent smoking.

A number of studies considered combinations of social influences and social competence models, such as 'life skills training'. Of the three high quality studies identified, one (Spoth 2001) found significant positive effects. However after adjusting for clustering this effect was no longer statistically significant (OR 0.55; 95% CI 0.30 to 1.01). Another study (Sussman 1995) found significant positive effects only for the intervention delivered by health educators. A pooled effect estimate obtained from all quality studies showed a positive non-significant effect (OR 0.72; 95% CI 0.45 to 1.16) in the short term which remained the same when only high quality studies were included in the analysis (OR 0.75; 95% CI 0.12 to 4.60). The only study that provided information on long-term effect was Spoth 2001, showing the effects discussed above. There is, therefore, insufficient evidence to determine whether adding generic social competence training to social influence interventions will be more effective than social influence interventions alone.

There are limited data on which to make a judgement about the added effectiveness of social influence interventions delivered in conjunction with wider, multi-modal initiatives such as community participation. There were four high quality studies that tested such initiatives. Three studies found positive significant results: Perry 1996; Perry 2003 only for males; and Project SIXTEEN Biglan 2000. The CATCH Study (Elder 1996) tested a multi-modal intervention, but did not test it against a purely social skills intervention and found no differences in smoking in the intervention group compared with the control, although the percentage of schools with a no-smoking policy increased. These studies do not shed light on whether the school programmes enhance community initiatives. We found no studies that compared the effects of a school-based programme with community initiatives, although some analysts argue that community initiatives may be more cost-effective than school-based programmes (Reid 1999).

In considering our secondary objective of identifying factors that were associated with effectiveness, we were limited by a lack of high quality studies directly comparing different formats of intervention. Although no high quality study directly compared different numbers of programme sessions and boosters, the Hutchinson Smoking Prevention Project included more sessions than any other study. Its null findings therefore cast doubt on the importance of the number of sessions as a mediating variable, at least in the context of social influence interventions. There was no high quality study comparing peer with teacher delivery, or age-, gender- or culture-specific interventions with standardized interventions.

One problem in interpreting the findings of the existing studies is how to characterize the interventions. Many programmes draw on an eclectic mix of approaches. Even where there is a clear theoretical orientation, there are differences in components, and

disagreement about which are the effective elements. For example, the AAPT study (Hansen 1991) directly compared two social influences approaches, treating resistance training and normative education as distinctive interventions.

The difficulty in characterizing interventions may be one reason for the conflicting findings of previous reviews and meta-analyses, which have tended to be more optimistic about the benefits of school-based programmes than this review (Bruvold 1993; Rooney 1996; Tobler 2000). Bruvold 1993, for example, characterized interventions as having a 'social reinforcement' orientation, a 'developmental or a social norms' orientation, or a 'rational' orientation.

By contrast, Rooney 1996 reviewed 131 school-based smoking prevention programmes published between 1974 and 1991. These used peer or social interventions to encourage non-smoking by students in grades 6 to 12. Sixty-three per cent focused on tobacco only, and 30% on other drugs as well. They classified interventions as generic health promotion programmes (8%), social influence (40%), generic social skills (41%) and resistance skills (14%). Sixty-three per cent used some form of media intervention. Ninety studies and 131 different interventions were identified. Results were expressed as effect sizes, defined as the standardized difference between experimental and control group means. Post-test and longer term outcomes were evaluated separately. Seventy-three per cent of the study arms were randomly assigned. This meta-analysis attempted to adjust for studies with a unit of analysis error, although this had little or no effect on the overall effect sizes. The average effect size was around 0.10 at long-term follow up. This would approximate to a 5% relative reduction in smoking. Using a modelling approach the authors estimated that the impact could be increased if programmes began around sixth grade as part of a multi-component health programme, gave same-age peer leaders a role in programme delivery and used booster sessions. They thought this might achieve a relative reduction in smoking of between 19% and 29%. There was no evidence that the strategy, whether social influences, resistance skills or generic skills, had a large effect on outcomes.

Tobler's meta-analysis (Tobler 2000) identified 207 school-based drug prevention programmes and within these identified 74 tobacco prevention programmes. The weighted mean effect size for the six tobacco prevention programmes with minimal student interaction was 0.05 (95% confidence interval [CI] -0.04 to 0.14) and for the 68 interactive programmes 0.17 (95% CI 0.14 to 0.20). From the subset of 30 high-quality programmes the weighted mean effect sizes for the two non-interactive programmes was 0.13 (95% CI 0.06 to 0.31), and for the 28 interactive programmes 0.17 (95% CI 0.13 to 0.22). This meta-analysis included some studies excluded from this review on the ground that they were not randomized controlled trials. In addition, the results were based on shorter-term follow up. Hwang 2004, in a meta-analysis of 65 programmes published in the USA between 1978 and 1997 found that the average effect size was highest for knowledge about to-

bacco after one year (0.53), but diminished to 0.19 after one year, and behavioural effects persisted with an average effect size of 0.19 from one to three years. La Torre 2005 summarized seven prior systematic reviews (including the first edition of this review), but did not critically evaluate or integrate their findings. Their conclusions were that information interventions are ineffective, that social influence interventions are effective, and that it is important to adopt policies for schools as non-smoking institutions and to target young children before they begin to smoke. Estabrooks 2003 assessed the reporting of validity in studies of nutrition, physical activity and smoking prevention and concluded there should be stronger reporting of the representativeness of students and schools compared to 'real world' situations.

Skara 2003 and Sussman reviewed 25 adolescent and tobacco prevention programmes (14 of them quasi-experimental), with at least a two-year follow-up (average 69 months). They concluded that 15 of the 25 for baseline non-smokers found at least one significant main effect with an average of 11.4% (range 9% to 14.2%) less recent or long-term smoking in the intervention group compared to the control group. The inclusion of quasi-experimental studies in their review is based on the view that differences in outcome can be successfully modelled as functions of design and statistical strengths and weaknesses (Sussman: personal communication).

However, the most important reason for the more cautious conclusions of this review is the change in the evidence base since the earlier reviews. After a positive review of social influences curricula in 1994 (US DHHS 1994), the U.S. Surgeon General's report in 2000 (US DHHS 2000) was more cautious, concluding that, while some programmes showed short-term effects, there was a lack of strong evidence for a long-term benefit. Since the publication of that report, Sussman 1995 in the Continuation High School study, reporting in 2003 on the two year follow up, found that for students who received programmes delivered by health educators the odds ratio for 30-day smoking prevalence was 0.50 ($P = 0.016$, 1 tailed). However, three other studies failed to detect a long-term effect (Aveyard 1999; Cameron 1999; Peterson 2000). In particular, the Hutchinson Smoking Prevention Project (Peterson 2000) was larger and more rigorously implemented and evaluated than any previous study. As this discussion has shown, many researchers in the field do not see this study as the final word on the effectiveness of school-based programmes. However, its failure to detect an effect must lead to much greater caution in interpreting positive effects of earlier studies, many of which were of smaller size and less rigorous design.

There will continue to be disagreement about the extent to which the success or failure of particular studies relates to differences in the interventions tested. In deciding whether to implement a particular programme, policy makers need to weigh up not only the evidence for effectiveness but also the costs of implementing the intervention. Reid 1999 has, for example, argued that complex school-based interventions make unrealistic demands on teacher

time, and hence cannot be sustained in the long term. Policy makers may need to give as much attention to these issues as to the finer details of the intervention used.

AUTHORS' CONCLUSIONS

Implications for practice

There is no strong evidence for offering school-based programmes that provide information only.

The most widely used school interventions draw on social influence models. Although half of the high quality randomized controlled trials (RCTs) found positive significant results, there is conflicting evidence about the effects of such programmes, and the largest and most rigorous test of a social influences model, the Hutchinson Smoking Prevention Project (Peterson 2000), found no evidence of a sustained effect on smoking prevalence.

Three of the four high quality multi-modal interventions showed a positive significant effect. It is possible that combining social influences models with other components, such as community interventions and generic social competence training may improve effectiveness. However, these interventions have not been subject to the same rigorous evaluation as the social influences approach. In addition, there are few data from direct comparisons to suggest how large an increment might be achieved.

Cost is an important factor in planning school-based programmes. The Hutchinson Smoking Prevention Project delivered 65 classroom sessions to each group of students. This requires investment in teacher training, and diverts from other academic uses of classroom time. Those planning services will need to determine whether these costs are justified in the light of the existing evidence.

Implications for research

The central question in research is whether it is worthwhile to develop and trial new school-based interventions in the light of existing evidence. Researchers in the field disagree on this question. Based on lack of evidence, or conflicting results to date, areas that may merit further exploration include combining multi-modal school programmes with community initiatives, and combining social influences approaches with generic social competence approaches. There may also be scope for further studies focusing on programmes by student characteristics such as social, gender or cultural groups, or targeting programmes at high-risk groups.

One clear message, however, is that any new studies should be rigorously designed and analyzed. The Hutchinson Smoking Prevention Project has set new standards in evaluating school-based interventions, and this review has highlighted the difficulties of interpreting less rigorous research. Design issues of particular importance in this field include sample size calculation that takes

account of clustering, completeness and duration of follow up, and analysis that accounts for clustering and for attrition. Other important issues include ensuring faithful implementation of the intervention, and taking account of previous research in defining the intervention.

POTENTIAL CONFLICT OF INTEREST

None

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*Indicates the major publication for the study

T A B L E S**Characteristics of included studies**

Study	Abernathy 1992
Methods	Country: Canada Site: all schools in Calgary, Alberta Focus: Smoking prevention: Design: PAL Programme: Schools stratified into quintiles according to neighbourhood median income, randomly assigned to programme (94 schools) or control (96 schools). Analysis: X2 tests compared proportions smoking in the three groups
Participants	Number at pre-test (1988): all 190 schools in Calgary which had a 6th grade (7508 6th grade students; with 7207 (96%) after 12 months; 6884 (92%) after 26 months; and 6530 (87%) followed to the 9th grade). The analysis sample is the 3567 children (48% of the original sample) for whom all four questionnaires could be matched; Age: grade 6; Gender: 49% F Baseline never smoked: 67% M 71% F
Interventions	Intervention: Peer Assisted Learning (PAL) social influences programme, with information about the benefits of not smoking (with peer-led component) Duration: 5 sessions over 3m Teachers were invited to in-service presentations about the PAL programme (attendance not stated) Control: no intervention

Characteristics of included studies (Continued)

Outcomes	Smoking categories: Never smoked/ Tried but no longer smoke/ Currently smoke Main analysis based on baseline never smokers. Follow up from start of programme: 1yr (Grade 7, 1989), 2yr (1990), 3yr (1991)
Notes	Study Category 2: 1. Randomization bias: minimal risk; method of randomization not stated; 2. Performance bias: moderate risk: a telephone survey found that 5 teachers had not taught the programme; 40 had not taught the entire programme; and 49 had taught the complete programme; 3. Attrition bias: moderate risk: the analysis sample is the 48% of the sample who completed all four questionnaires; no analysis of differential attrition; In the evaluation, intervention classes were divided into those in which teachers reported teaching all lessons, and those where fewer were delivered; 4. Detection bias: minimal risk; 5. Power computation: not performed; 6. Statistical bias: moderate risk: X2, no adjustment for clustering;
Allocation concealment	B – Unclear

Study	Armstrong 1990
Methods	Country: Australia Site: 45 Primary schools in Nedlands, WA Focus: Smoking prevention Design: Primary schools feeding randomly selected high schools stratified by class size and location, random allocation of schools to 3 conditions Analysis: Comparison of the proportions of students in the 3 groups who took up smoking was by Pearson's X2 (two sided); Effects of other variables controlled in separate LRs (using EGRET) for boys and girls, and for each year of follow up, using only children present at baseline and both follow ups. Once the final models were chosen, the parameters were re-estimated with an added risk model.
Participants	Number at pre-test (1981): 2366 Age: 7th grade (modal age 12 years); Gender: 49% F Baseline smoking prevalence 24-37%, higher for boys than girls. No sig diffs between groups No differential attrition by treatment group at 12m follow up
Interventions	Direct comparison of peer and teacher delivery 1. Peer-led (selected by class), teacher facilitated; 5 sessions Intervention based on Minnesota model. Components: estimating smokers in age group; negative consequences; why children smoke; physiological effects; information on % of smokers; listed situations where pressure to smoke; practised refusal techniques; students presented arguments for non-smokers' rights; developed counter-arguments to smokers' reasons for smoking; role of the family; advertising techniques; essay on reasons for remaining non-smokers; public commitment. 2. Teacher-led same programme 3 Control Training : 'all leaders received appropriate previous training' Duration: 6m
Outcomes	Definition of non-smoking: had not smoked a single cig (not even a few puffs) in previous 12m. Saliva samples collected but not analyzed Follow up: 12m, 24m, 7yrs from end of programme
Notes	Study Category 2: 1. Randomization bias: minimal risk: no differences between groups at baseline; no statement about method of randomization; 2. Performance bias: moderate risk: no process analysis; the authors state: 'all leaders received appropriate previous training'; 3. Attrition bias: minimal risk: no differential attrition by treatment group at 12m follow up; 4. Detection bias: minimal risk;

Characteristics of included studies (Continued)

5. Power computation: not performed;
6. Statistical bias: moderate risk; the data on schools were erased after 1yr, so that ICCs could not be computed, and the data were not corrected for the effects of clustering; comparison of the proportions of students in the 3 groups who took up smoking was by Pearson's X2 (two sided); effects of other variables controlled in separate LR's (using EGRET) for boys and girls, and for each year of follow up, using only children present at baseline and both follow ups. Once the final models were chosen, the parameters were re-estimated with an added risk model;

Allocation concealment B – Unclear

Study	Ary 1990
Methods	<p>Country: USA</p> <p>Site: 22 middle/elementary and 15 high schools from 13 Oregon districts</p> <p>Focus: tobacco, alcohol and marijuana prevention</p> <p>Design: Project PATH: Schools matched on urban/rural status, level of tobacco use, ethnicity and school size, then randomized (with the exception of one middle school assigned to the treatment condition as it had earlier served as a pilot school for programme development).</p> <p>In the 12 intervention schools, parents randomized to receive or not receive parent messages</p> <p>Analysis: ANCOVA.</p>
Participants	<p>Number at pre-test: 7837</p> <p>Age: 1943 6th graders; 1890 7th graders; 698 8th graders; 1364 9th graders; 205 10th graders; 163 11th graders 9.9% weekly smoking</p> <p>Gender: not stated; Ethnicity : 89% W, 4.9% B, 2.2% A, 1.8% Latin American, 1.2% H</p> <p>Only results for grades 6-9 given in Ary 1990</p> <p>Attrition: 24.4 % in experimental and 24.6% in control schools; no differential attrition on pretest use by gender, grade, CO level, number of peers who smoked, offers of cigarettes, parental smoking.</p>
Interventions	<p>Intervention: Project PATH (Programs to Advance Teen Health) Components: At each grade level (a) awareness of social influences to engage in substance use (b) refusal skills training (c) health facts (d) contracting not to use cigarettes and other substances.</p> <p>Programme different for each grade. Parent message group mailed 3 brochures</p> <p>Duration: 5 classroom sessions in each of grades 6 through 10, typically taught over a 1w period ('focused most heavily on cigarette smoking and smokeless tobacco use, it was designed to deter the use of marijuana and alcohol'. Deliverer: science or health teachers who received 2 to 3 hrs training. Peer leaders presented some activities in 2 grades</p> <p>Control groups typically received 10 classroom sessions of standard tobacco/drug use education.</p>
Outcomes	<p>Smoking: Pechacek's self-reported smoking index to yield an estimate of no. cigs smoked in last month (composite of no in last 6m, last month, last week, and last 24 hours): Dichotomized on >1 cig in previous month. Expired air CO tested before survey completion</p> <p>Follow up: 9-12m after pre-test</p>
Notes	<p>Study Category 2:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk: schools randomized with the exception of one middle school assigned to the treatment condition as it had earlier served as a pilot; 2. Performance bias: minimal risk: surveys of teachers indicated that the control group received 10 sessions of standard tobacco and drug education (with 97% recognizing peer pressures, 97% short-term effects on the body and brain, 96% long-term health consequences, 84% decision-making skills, 72% media pressures, and 67% refusal skills practice), and the experimental schools received a median of 5 sessions of other drug education in addition to PATH; 3. Attrition bias: 24%; no differential attrition; 4. Detection bias: minimal risk; 5. Power computation: not performed; 6. Statistical bias: moderate risk: ANCOVA, no adjustment for clustering;

Characteristics of included studies (Continued)

Allocation concealment B – Unclear

Study	Ausems 2004
Methods	<p>Country: Netherlands</p> <p>Site: 8 local health departments were approached, 6 participated and 36 vocational schools participated</p> <p>Focus: smoking prevention</p> <p>Design: Cluster-Randomized Controlled Trial, with 19 schools already participating in the in-school programme randomly assigned to either the in-school (I) or combined in- and out-of-school (I+O), and 17 other schools randomly assigned to either the out-of-school (O) or the control (C).;</p> <p>Analysis: multilevel regression modelling using MIXREG for continuous and MIXOR for dichotomous outcomes</p> <p>Missing data: replaced by previous observation; Intention-to-treat: drop-outs were treated as smokers</p>
Participants	<p>Numbers at pre-test: In-school (I) = 525; out of school (O) = 513; I + O = 829; control = 509</p> <p>Numbers at 12m: I = 434 (83%); numbers at 18m: O = 265 (52%); I + O = 625 (75%); C = 317 (61%)</p> <p>Age: average 13 years</p> <p>Gender: 52% F</p> <p>Smoking status: 59.7% ever smoked; 19.5% current smokers</p>
Interventions	<p>1. In-school: 3 lessons x 50 mins: ingredients of tobacco and physical and mental reactions of smoking; norms concerning smoking; pressures to smoke and skills to resist</p> <p>2. Out-of-school: 3 letters mailed to students' homes, tailored to pre-test attitudes, norms, self-efficacy, smoking intentions and behaviour</p> <p>Process analysis for students was 15 item questionnaire; and for teachers a 5 item implementation questionnaire</p>
Outcomes	Self-reported never smoked even one puff; not in past month; smoked in past month
Notes	<p>Category study 2:</p> <p>1. Randomization: moderate risk of bias: randomization of schools did not give all schools an equal chance of being assigned to the three groups: 19 schools already participating in the in-school programme were randomly assigned to either the In-school (I) or combined In- and Out-of-school (I+O) groups, and 17 other schools were randomly assigned to either the Out-of-school (O) or the Control (C) groups; but method of randomization not stated</p> <p>2. Performance bias: moderate risk: [only 58% of schools returned teacher process questionnaire; and only 65% of Out-of-school students received and read the letters]</p> <p>3. Attrition bias: moderate risk: attrition at 18m = 24.6%; Attrition less likely for students 'diffusely' surrounded by smokers (OR = 0.87; 95% CI 0.84 to 0.90);</p> <p>4. Detection bias: minimal risk</p> <p>5. Power calculation: Power computation to demonstrate an effect size with an OR = 2, with power = 80%, alpha 2-tailed = 0.05, with 25 students per school, and between school variance = 0.30, implying an ICC = 0.08, required 36 schools, and sample size achieved</p> <p>6. Statistical bias: low risk: appropriate analysis with multilevel modeling; intention-to-treat analysis</p>
Allocation concealment	C – Inadequate

Study	Aveyard 1999
Methods	<p>Country: UK</p> <p>Site: 53 West Midlands secondary schools</p> <p>Focus: smoking prevention</p> <p>Design: Schools sampled with probability proportional to size of year 9 enrolment; 89 schools approached, 53 agreed to participate. Randomized in 5 strata based year 9 size.</p> <p>Analysis: multi-level modelling to allow for clustering. Sensitivity analysis for handling of losses to follow up. Analyses done adjusted for baseline smoking status and other variables.</p>
Participants	Number at pre-test (1997); 8352, 90% of potential participants

Characteristics of included studies (Continued)

Age: year 9, 13-14 yrs, Gender, 50% F
 Ethnicity 86% W, 5% Indian subcontinent, 4% Afro=Caribbean

Interventions	<p>Intervention: 1 class lesson and 1 computer session per term for three terms based on Prochaska's trans-theoretical model/ stages of change. Students used individual computers to answer questions about their smoking, and an expert system gave feedback on how their temptations compared to those of others in same stage, and their changes from previous sessions. Also saw video clips of young people talking about smoking. Class lessons developed understanding of stages of change, and pros and cons of smoking at different stages. Teachers delivered a 1 hr classroom 'transtheoretical model' intervention. Teachers received a 2 day training course.</p> <p>Control: Normal health education on tobacco. Teachers provided with lesson plans and handouts but were not required to use them, and received no training.</p> <p>Duration: 6 hrs over 3 terms.</p>
Outcomes	<p>Self-reported behaviour: Ex-smoker. Smoker/ tried/ never. Primary outcome was smoking one or more cigs a week</p> <p>Questionnaires were confidential</p> <p>Follow up: 12m after start of intervention</p>
Notes	<p>Study Category 1:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk: (1 school dropped out after randomization leaving 52); 2. Performance bias: minimal risk: 79% of baseline non-regular smokers and 69% of baseline regular smokers received all three computer lessons; 70-80% of sessions lasted long enough to read all the material; though baseline smokers were less likely to attend, and smokers were less likely to spend long enough to receive the individualized messages. Data on attendance and the students' reactions to the classroom lessons were not collected by the researchers. Half the teachers returned data, with a mean score of 4/5 for delivery of the lesson, and pupils' understanding and enjoyment. The researchers reported that: 'All teachers reported that all intervention lessons were delivered, but we have no record of which individuals received the class based intervention. ... Teachers were reluctant to return their questionnaires, despite prompting'. 3. Attrition bias: minimal risk: 7444 students (89%) were followed up at 12m, and smoking status could be allocated for 7413; 4. Detection bias: minimal risk; 5. Power computation: minimal risk: sample size of 8500 was calculated to achieve 90% power to detect a 4% difference in smoking with 5% Type I error (the ICC for smoking was calculated from a lifestyle survey as 0.008); 6. Statistical bias: minimal risk: multi-level modelling to allow for clustering; analysis by intention-to-treat; sensitivity analysis for handling of losses to follow up; analyses performed by adjusting for baseline smoking status and other variables;
Allocation concealment	A – Adequate

Study	Biglan 1987a
Methods	<p>Country: USA</p> <p>Site: 13 middle, junior & high schools, Oregon</p> <p>Focus: Preventing and reducing smoking</p> <p>Design: In 1 school district whole schools assigned to conditions. In 2 districts classes of teachers willing to use curriculum were randomized. In an additional component students in 6 schools randomized individually</p> <p>Analysis: classroom unit of analysis, factorial analysis of covariance</p>
Participants	<p>Number at pre-test: 3387 in 135 classrooms (4.9% weekly smokers)</p> <p>Age: 7th-10th grades</p> <p>51% F</p> <p>Majority ethnicity White</p>
Interventions	<p>Intervention: Training in refusal skills including modelling, rehearsal, reinforcement, practice. Video used.</p> <p>Other components: health and short-term effects, addiction;</p>

Characteristics of included studies (Continued)

	<p>In an additional intervention 7th grade students in 6 schools randomized to have 4 messages mailed to parents following programme; Duration: 5 sessions; 4 on consecutive days + booster at 2w Providers: regular science or health teachers, trained for 2-3 hrs Control: no intervention</p>
Outcomes	<p>Weighted index of self-reported smoking (Pechacek) based on number smoked in previous week and yesterday. Nonsmoking = no cigs in previous week. Expired CO measured and saliva collected prior to questionnaire completion Follow up: 9m and 1yr</p>
Notes	<p>Study Category 2: 1. Randomization bias: minimal risk: the method of allocation was not stated; 2. Performance bias: moderate risk: no process analysis 3. Attrition bias: minimal risk: no differential attrition; 4. Detection bias: minimal risk; 5. Power Computation: no power computation for the main study. 6. Statistical bias: minimal risk: separate analyses for those reporting smoking in previous week at baseline and others. A combined within- and between-schools design was used to investigate contamination effects;</p>
Allocation concealment	B – Unclear

Study	Biglan 1987b
Methods	<p>Country: USA Site: 3 high schools & 6 middle schools in Eugene, Oregon Focus: Smoking prevention (focus on effects of attrition) Design: 9 schools from 2 school districts [no further statement on school selection]. The classes of teachers who had agreed to participate were randomly assigned Analysis: X2 of proportions smoking in the two groups; ANCOVA of pretest smoking status, treatment condition, grade and gender (smoking rates log transformed to control skewness).</p>
Participants	<p>Number at pretest: 1730 (873 7th; 588 9th; 262 10th graders) Age: 7th, 9th and 10th graders Gender: 49% F; Ethnicity: “almost all white” Follow up: 68% at 12m No baseline differences between groups Differences in baseline characteristics of drop-outs: more likely to have been baseline smokers and have multiple risk factors for smoking</p>
Interventions	<p>Intervention: Social-Reinforcement short- and long-term consequences of smoking; public commitment; teaching of refusal skills (film; practised role-playing refusal skills; skits; teachers praised skills; class voted on best refusal) Deliverer: regular science or health teachers Duration: 3 consecutive days with a 4th session 2w later Control: no intervention</p>
Outcomes	<p>Self-reported smoking (Pechacek’s index) = a weighted average of the number of cigs smoked last week and the reported number smoked yesterday. Also categorised into 4 baseline groups: never smoked/ triers/ experimenters (1-6 in previous week)/ regular Expired air CO content. Follow up: 6m and 1yr Refusal skills assessed for a sample (Hops 1986)</p>
Notes	<p>Study Category 2: 1. Randomization bias: minimal bias; groups were similar at baseline; no statement of method of randomization 2. Performance bias: moderate risk: no process analysis;</p>

Characteristics of included studies (Continued)

3. Attrition bias: minimal risk: 32% at 12m; significant differences ($P = 0.00$) between those remaining and those missing both at 6 and 12m on cigs/week and for all family members and best friend smoking, but no differential attrition;
4. Detection bias: minimal risk;
5. Power computation: no power computation
6. Statistical bias: moderate risk: no adjustment for clustering;

Allocation concealment B – Unclear

Study **Biglan 2000**

Methods	Country: USA Site: 8 Oregon communities Focus: tobacco, alcohol, marijuana, and anti-social behaviours Design: 8 communities were matched on community socio-economic status and population. Allocation of treatment was by community for community intervention activities, and by schools for schools intervention activities. Randomization was by the flip of a coin. There were no differences at baseline between community pairs in size, per capita income, median household income, % below poverty level, % minority students, or % high school graduates; Analysis: Generalized estimating equations and MANOVA; individual students were nested within communities, and community means were the unit of analysis.
Participants	2187 grade 7 and 2251 grade 9 in Year 1 of the study; and 2045 in grade 7 and 2120 in grade 9 in Year 5 (13.5% of students were not assessed across all 5yrs of the study).
Interventions	35 session intervention with Information, Social Influences, Community Advocacy, Media Advocacy, Youth Activities, Parental Communication, and Programmes to stores to reduce selling tobacco to minors components.
Outcomes	Smoking defined as (1) level of smoking (never to pack+/day); (2) number of cigs (past month, week and day, with responses scaled to form Pechacek's smoking index [monthly x 4.3 + weekly + daily/7] to form an index of the number of cigs smoked weekly), (3) net CO score (expired air minus classroom CO level). Similar measures were derived for smokeless tobacco
Notes	Study Category 1: 1. Randomization bias: minimal risk: flip of a coin 2. Performance bias: moderate risk: information was collected on adolescents' exposure to information about smoking cessation; awareness of efforts to reduce illegal tobacco sales to minors; and media activities; however, no process analysis for the school intervention component; 3. Attrition bias: minimal risk: attrition was low at 6%; 13.5% of students were not assessed across all 5yrs of the study; no assessment of differential attrition; 4. Detection bias: minimal risk; 5. Power computation: no power computation; 6. Statistical bias: minimal risk: generalized estimating equations and MANOVA;
Allocation concealment	C – Inadequate

Study **Botvin 1980**

Methods	Country: USA Site: 2 suburban New York City schools Focus: smoking prevention Design: random assignment of one school to experimental and other to control
Participants	Number at pre-test: 281 (70% non-smokers) Age: 8th, 9th and 10th graders Gender: not stated; Ethnicity: 'predominantly white' Attrition: 80% of experimental and 74% of control group followed up at 6m; Differential attrition from baseline: not discussed.

Characteristics of included studies (Continued)

Interventions	Experimental: social influences and psychosocial skills; group discussion, modelling, behaviour rehearsal, and the application of special skills training to life situations, including the decision to smoke; homework; self-improvement project. Duration: 10 lessons over 12w Deliverer: outside specialist (see Notes) Control: no intervention
Outcomes	Smoking: Self-reported smoking (last month, and last week). Pretest smokers excluded from analysis Follow up: 6m from pretest
Notes	Study Category 3: 1. Randomization bias: moderate risk: only two schools randomized; no statement of method of randomization; no statement of equivalence at baseline; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: 80% of experimental and 74% of control group followed up at 6m; differential attrition from baseline; 4. Detection bias: minimal risk; 5. Power Computation: no power computation; 6. Statistical bias: moderate risk: no correction for clustering;
Allocation concealment	B – Unclear

Study	Botvin 1982
Methods	Country: USA Site: 2 suburban New York City schools Focus: Smoking prevention Design: All 7th grade classes of both schools. Schools randomly assigned Analysis: X2
Participants	Number at pretest: 426 Age: 7th graders; Gender: not stated Ethnicity: White (school A 93%; school B 90%); Black (2%,4%); Oriental (3%,3%); Hispanic (2%,3%) Follow up: complete pre-and post-test data on 84%, of whom 74% were nonsmokers at the pretest Attrition: not discussed.
Interventions	Experimental: Physiological effects; teenage smoking rates; LST smoking prevention programme skills (self image, self improvement, decision making, independent thinking, advertising techniques, coping with anxiety, communication skills, social skills, assertiveness); homework; a self improvement project. Duration: 12 1hr sessions over 12w Deliverer: Peers: high schoolers from a neighbouring school recruited through advertisement, 4hr training workshop. Supervised by a teacher and project staff. Control: no programme Delivered by peers - see Botvin 1980 for similar programme delivered by outside health specialists and Botvin 1983 for delivery by classroom teachers
Outcomes	Smoking: Self-reported smoking (last month, and last week). Pretest smokers excluded from analysis Saliva samples collected, 25% subsample analyzed for thiocyanate Follow up: 1yr after post-test Process: no data on programme adherence.
Notes	Study Category 3: 1. Randomization bias: moderate risk; method of randomization not stated; only two schools were randomized 2. Performance bias: moderate risk: no process analysis; no statement of equivalence at baseline; 3. Attrition bias: 16%; no attrition analysis; 4. Detection bias: minimal risk; 5. Power computation: no power computation; 6. Statistical bias: no correction for clustering;

Characteristics of included studies (Continued)

Allocation concealment B – Unclear

Study	Botvin 1983
Methods	Country: USA Site: 7 schools in suburban New York Focus: smoking prevention Design: schools randomly assigned, 2 to each of two experimental and 3 to control Analysis: X2, ANCOVA
Participants	Number at pretest & post-test: 902, of whom 92% nonsmokers Age: 7th grade; Gender: not stated; Ethnicity: 91% W Total at baseline = 902 7th graders; the numbers at pretest giving their smoking status ranged from 891 to 911; and the number at the 1yr follow up ranged from 605 to 633 (67%); no attrition analysis
Interventions	Direct comparison of long or short delivery format LST: immediate physiologic effects of smoking, self image, self improvement, decision making, advertising techniques, coping with anxiety, communication skills, social skills, assertiveness, techniques for resisting peer pressure to smoke Experimental Grp 1. LST taught in 15 1hr sessions as part of science or health curriculum, over 15w Experimental Grp 2. LST in intensive minicourse format, 15 sessions, consecutive days over approx 1m. (1 Exp 2 school also had 8 session booster between post-test and 1yr follow up) Delivered by classroom teachers, 1 day workshop training Control: received standard smoking education mandated by NY State; Delivered by classroom teachers - see Botvin 1980 for similar programme delivered by outside health specialists and Botvin 1982 for delivery by peer leaders
Outcomes	Self report of smoking (monthly recall; weekly recall; daily recall) Saliva samples collected but not analyzed.
Notes	Study Category 3: 1. Randomization bias: minimal risk; method of randomization not stated; no statement of equivalence at baseline; 2. Performance bias: moderate risk; process analysis performed but not reported; 3. Attrition bias: moderate risk: 33% attrition; no attrition analysis; 4. Detection bias: minimal risk; 5. Power computation: no power computation; 6. Statistical bias: moderate risk; no correction for clustering;

Allocation concealment B – Unclear

Study	Botvin 1990a
Methods	Country: USA Site: 56 schools in New York Focus: substance abuse prevention Design: schools from 3 regions of NY state, divided into tertiles on pretest smoking levels) randomized to one of 2 experimental or 1 control group Analysis: GLM; MANOVA, and ANOVA.
Participants	Pretest (1985): 5954 Age: 7th graders Gender: 48% F; Ethnicity: 91% W, 2% B, 2% H, 1% Native American No significant differences at pretest Follow up: 4466 (75%) completed the post-test, and the 3684 [62%] students who received at least 60% of the programme were included in the analysis;

Characteristics of included studies (Continued)

Interventions	<p>Intervention: LST (cognitive-behavioural skills for building self esteem; resisting advertising pressure; managing anxiety; communicating effectively; developing personal relationships; asserting one's rights; developing specific skills to resist social influences to smoke, drink or use drugs)</p> <p>Experimental Grp 1. Formal (1 day) training of providers and feedback on implementation</p> <p>Experimental Grp 2. 2hrs of training of providers by videotape, and no feedback,</p> <p>Duration: 12 lessons over 15 class periods for 8w in grade 7, 10 booster sessions in grade 8 and 5 in grade 9.</p> <p>Control: No intervention.</p>
Outcomes	<p>Smoking: 10 point scale: 1. never - 10. more than a pack a day. Breath samples were collected but not analyzed</p> <p>Follow up: 3yrs (9th grade, end of programme) and 5-6 yrs (12th grade) from baseline</p>
Notes	<p>Study Category 2:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk: method of randomization not stated 2. Performance bias: moderate risk: average 68% implementation (ranging from 27% - 97%), with only 75% of the students in the prevention conditions exposed to 60% or more of the prevention programmes; 3. Attrition bias: minimal risk: pretest smokers more likely to be lost but no differential attrition across conditions; 4. Detection bias: low risk; 5. Power computation: no power computation; 6. Statistical bias: minimal risk: GLM; MANOVA, and ANOVA.;
Allocation concealment	B – Unclear

Study **Botvin 1990b**

Methods	<p>Country: USA</p> <p>Site: 10 suburban New York junior high schools</p> <p>Focus: substance abuse prevention</p> <p>Design: 10 schools randomly assigned to 4 experimental and 1 control group (2 schools each)</p> <p>Analysis: Attrition tested by ANOVA, treatment and control conditions compared using GLM. Students were unit of analysis</p>
Participants	<p>Number at pretest: 1311</p> <p>Age: 7th grade</p> <p>Gender: 51% F at 1yr follow up</p> <p>Ethnicity: 80% W, 13% B, 2% H, 2% A, 4% Other</p> <p>Follow up: 90% available for post-test, and 76% at 1yr follow up</p> <p>No differential attrition in pretest smokers</p>
Interventions	<p>4 experimental interventions, all using LST approach. In 7th grade all experimental groups received a 20-session multi-component substance abuse prevention curriculum focusing on social, psychological, cognitive, and attitudinal factors - facilitation of basic life skills and improvement of personal competence (teaching social resistance skills)</p> <p>In 8th grade the 10 booster sessions were directed toward the consequences of smoking, decision making, resistance to advertising, anxiety coping skills, communication skills, social skills, assertiveness, and problem solving.</p> <ol style="list-style-type: none"> 1. Peer-led 2. Peer-led plus 8th grade booster 3. Teacher-led 4. Teacher-led plus 8th grade booster <p>Peer leaders and teachers received a 4hr training workshop conducted by project staff</p> <p>5. Pretest/post-test control: no intervention</p>
Outcomes	<p>Smoking: monthly, weekly, and daily smoking dichotomous measures, and an index of smoking frequency (5-point scale: never to everyday). Results presented as adjusted response proportions</p>
Notes	<p>Study Category 2:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk; method of randomization not stated;

Characteristics of included studies (Continued)

2. Performance bias: the field staff noted the low degree of fidelity of implementation by many teachers;
3. Attrition bias: 24% at 1yr; no statement of equivalence at baseline, but no differential attrition;
4. Detection bias: minimal risk;
5. Power computation: no power calculation;
6. Statistical bias: minimal risk: attrition tested by ANOVA, treatment and control conditions compared using GLM

Allocation concealment B – Unclear

Study **Botvin 1999**

Methods Country: USA
 Site: 29 New York junior high schools
 Focus: reduction in tobacco and motivation to use substances by providing knowledge and skills to resist tobacco, alcohol and drugs.
 Design: schools randomly assigned to intervention or control groups
 Analysis: X2 and GLM ANCOVA were used to compare the experimental and control groups.

Participants 2690 7th. grade girls, and 2209 (82%) provided data in the 8th. grade. Smokers had higher attrition rates ($P < 0.0001$), but there was no differential attrition between experimental and control groups. The programme was taught by teachers, who attended a 1 day workshop.

Interventions 1. Experimental Grp: 15 session Life Skills Training Programme, with cognitive-behavioral skills to enhance assertiveness, resist advertising pressures, manage anxiety, communicate effectively, develop strong interpersonal relationships, and problem-specific skills related to drug use influences, including assertiveness skills for use in situations in which students experience pressure from peers to smoke, drink or use drugs. The programme was modified for minority group use by changing the examples and the situations used for the behavioural exercises. They received 10 boosters the following year.
 Control group: received 10 sessions of an information-only drug programme + 3 boosters the following year.

Outcomes Smoking was defined as a 9-point index from 1 (never) to 9 (more than 1/day), and CO samples were collected at pre- and post-test.

Notes Study Category 2:
 1. Randomization bias: minimal risk: method of randomization not stated; at baseline the intervention group differed from the control in ethnicity and the percentage receiving free lunches;
 2. Performance bias: minimal risk: Project staff randomly monitored how much of the material was implemented by the teachers, and assigned an implementation score (material covered in full by 55%), which was used as a covariate in the ANCOVA;
 3. Attrition bias: minimal risk: smokers had higher attrition rates ($P < 0.0001$), but there was no differential attrition;
 4. Detection bias: minimal risk;
 5. Power computation: no power computation
 6. Statistical bias: moderate: X2 and GLM ANCOVA but there is no statement of correction for clustering;

Allocation concealment B – Unclear

Study **Botvin 2001**

Methods Country: USA
 Site: 29 inner city middle schools, New York
 Focus: universal drug prevention
 Design: schools were divided into low, medium and high prevalence of drug use, then randomized to intervention or control
 Analysis: X2; GLM ANOVA; and generalized estimated equations independent (PROC GENMOD in SAS)

Participants Botvin 2001: 5222; (intervention = 3621, of whom 2144 received the programme); 1477 controls;
 Griffin 2003: 758 identified as at high risk of using drugs from Botvin 2001 study; 426 intervention; 332 control;

Characteristics of included studies (Continued)

	Age: middle school students Gender: 53% F
Interventions	LST taught drug resistance skills, norms against substance abuse, development of personal and social skills, improved self esteem. managing anxiety, communicating effectively, developing personal relationships, asserting one's rights, and resistance to advertising; main programme in 7th grade, booster in 8th grade (number of lessons not stated) Control: substance abuse curriculum normally provided in NY schools
Outcomes	Frequency of smoking from 1 (never) to 9 (more than once/day); quantity of smoking from 1 (none) to 8 (> 2 packs/day); Staff randomly monitored protocol adherence in classrooms (most teachers monitored in 2-3 classes); average number of programme points covered = 48% (SD = 19.8)
Notes	Category 1 study: 1. Randomization bias: minimal risk; method of randomization not stated 2. Performance bias: moderate risk: process analysis of protocol adherence: 48% of all programme points presented (compared to 68% in the Borvin 1990 implementation of the LST programme) 3. Attrition bias: minimal risk: attrition 38% controls, 36% intervention; no differential attrition 4. Detection bias: minimal risk 5. Power calculation: no power computation 6. Statistical bias: minimal risk: GLM ANOVA; and generalized estimated equations independent (PROC GENMOD in SAS);
Allocation concealment	B – Unclear

Study	Brown 2002
Methods	Country: Canada Site: 6 school boards in SW Ontario; 30/35 schools participated Focus: tobacco prevention Design: Schools were matched within school boards by size and number of cohorts from the elementary schools studied by Cameron 1999 and randomized by pairs to intervention or control; collectors blinded to assignment; Analysis: analysis of paired clusters using a variance term appropriate to the randomization of schools
Participants	Of the 3028 students, 2776 (91.7%) participated At end of grade 10: 2643 (95.2% of those who consented) Age: grade 8 followed through Grade 10 Gender: 50% F
Interventions	Intervention group: A teacher in each school facilitated students and staff to participate in as many activities as possible inconsistent with smoking, build commitment to non-smoking, and strengthen non-smoking as a school norm Control: 'usual care' not further described Co-interventions not ascertained
Outcomes	Outcomes: 1. Intervention activities in each grade; 2. Self-reported never smoking, tried once, quit, experimental smoker [smoking < once a week]; and regular smoker [smoking weekly]; 3. CO samples collected but not analyzed
Notes	Category Study 1: 1. Randomization bias: low risk: no significant baseline differences in Grade 8 baseline smoking status, social models risk score or elementary school risk of smoking; but intervention schools included marginally higher proportion of children who had been in an elementary intervention group in Cameron 1999 study (P < 0.10); method of randomization not stated 2. Performance bias: adequate activities occurred: 3.8 intervention activities in Grade 9 and 3.5 in Grade 10; 3. Attrition bias: minimal risk: at end of grade 10: 2643 (95.2% of those who consented) participated; no differential attrition across conditions;

Characteristics of included studies (Continued)

4. Detection bias: minimal risk
5. Power Calculation: No power computation;
6. Statistical bias: low risk: appropriate analysis with analysis of paired clusters using a variance term appropriate to the randomization of schools; intention-to-treat analysis;

Allocation concealment B – Unclear

Study	Bush 1989
Methods	Country: USA Site: 9 schools, Washington, D.C. Focus: Prevent cig smoking, and improve fitness and nutrition; involved parents and community physicians. Design: Know Your Body Programme: 9 schools ranked into tertiles by eligibility for Federal lunch programmes, randomly allocated to 2 experimental and 1 control group. Analysis: Mean differences; LR was used to adjust for gender, age, SES, and baseline risk factors.
Participants	1234 eligible subjects (1983), 892 (72%) screened and completed questionnaires. Age: 4th. to 6th. graders followed up through the 7th. to 9th. grades. Average age at baseline 10.5. Gender: 54% F Follow up: 431 (41%) at 2yrs, similar across groups. Significantly more males, lower SES, and older students in control group. Females were more likely to be available at the 2yr follow up ($P < 0.05$). Serum thiocyanate in the baseline cohort was 34.2 umol/L and 33.3 in those lost to the 1yr follow up ($P < 0.41$). High attrition due to transfers to other schools. Non-participants at baseline did not differ from participants in health knowledge, attitudes and psychosocial attributes.
Interventions	Intervention: 'Know Your Body' programme, (values clarification, goal setting, modeling, rehearsal, feedback of screening results, and reinforcement). The PRECEDE programme was used to target predisposing, enabling and reinforcing factors for the success of the school-based programme, and also recognized the importance of teachers and parents. Half the students received their screening results to enter on their Health Passport, and half did not (the results were sent to their parents). All family physicians and pediatricians in the area were sent letters describing the programme and informing them that parents might bring them their child's Health Passport with screening results. A quarterly newsletter, The Pacesetter, was taken home by the students after class discussion. Staff present the programme at Parent Teacher Association meetings. Teachers had four 3hr training sessions. Adherence to curriculum and the quality of teaching were monitored. Control group: The students did not receive the 'Know Your Body' programme, and only the parents received the screening results for their children. Duration: Two 45 min sessions per week throughout grades 4 to 6 through grades 7 to 9; Similar programme to the 2 other 'Know Your Body' studies (Walter 1985, Walter 1986).
Outcomes	Definition of smoking: serum thiocyanate (>100 mu/L) Duration of follow up: 2yrs (but thiocyanate based on measurements after 1yr of intervention)
Notes	Study Category 2: 1. Randomization bias: minimal risk: non-participants at baseline did not differ from participants; method of randomization not stated; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: minimal risk: 59% attrition; however, no differences in serum thiocyanate between baseline cohorts and drop-outs at 1yr; 4. Detection bias: minimal risk: 5. Power computation: no power computation; 6. Statistical bias: moderate risk: LR was used to adjust for gender, age, SES, and baseline risk factors; no adjustment for clustering;
Allocation concealment	B – Unclear

Study **Cameron 1999**

Methods Country: Canada

Characteristics of included studies (Continued)

	<p>Site: 100 elementary schools in 7 boards Focus: Smoking prevention Design: Ranked by school risk score and stratified by board, randomized to 5 experimental conditions; School risk score derived using smoking rate of grade 8 students when cohort in grade 6, estimates of teacher smoking, and community SES. Categorized as high, medium or low; Analysis: LR. Pearson goodness of fit used to allow for between school variation</p>
Participants	<p>4971 eligible students, 4466 provided baseline data Age: 6th grade. Gender, Ethnicity not described Smoking rate 18.6% at baseline for cohort followed. Follow up: 89% at end of 8th grade</p>
Interventions	<p>Direct comparison of different programme providers and training methods. All taught same social influences curriculum, developed at University of Waterloo. See Flay 1985, Santi 1992, Santi 1994. All sessions 40 min, taught over consecutive weeks; 6 lessons in grade 6 (information on the social consequences and short-term physiological consequences of tobacco use, peer, parent and media influences on tobacco use; modelling and building resistance skills); 3 lessons in grade 7 (review of Grade 6 programme, develop social norms supporting nonsmoking, build awareness of the hazards of second-hand smoke, and develop self efficacy for assertive behaviour around the issue of second-hand smoke), 6 lessons in grade 8 (similar content). All providers given a manual, audiovisual aids, student workbook, peer leader manual and host teacher manual for each grade unit and a 1hr orientation session. Provider conditions: Public Health Nurses regularly involved in school programming, or teachers Training conditions: Self preparation - materials listed above and videotape demonstrating interactive learning. Workshops: 1 day before each grade and half day after 2 lessons in grade 6 Experimental Grp 1: Nurse Workshop Experimental Grp 2: Nurse Self Preparation Experimental Grp 3: Teacher Workshop Experimental Grp 4: Teacher Self Preparation Duration: 15 lessons over grades 6-8 Control: no intervention.</p>
Outcomes	<p>Smoking categories: Never/ tried once/ quit/ experimental (< 1/ week)/ regular (weekly). Some analyses for smokers/nonsmokers separately. Pre-specified breath samples collected but not analyzed. Social models risk score calculated from friends, older siblings, parents who smoked Follow up: 3yrs (end of grade 8)</p>
Notes	<p>Study Category 1: 1. Randomization bias: minimal risk: the method of randomization is not stated; 2. Performance bias: minimal risk: there was a detailed analysis of provider training, but no process analysis of programme delivery; 3. Attrition bias: minimal risk: 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: minimal risk: LR. Pearson goodness of fit used to allow for between school variation;</p>
Allocation concealment	B – Unclear

Study	Chatrou 1999
Methods	<p>Country: Netherlands Site: 48 classes in 4 Brabant schools Focus: prevention of smoking onset Design: 48 classes randomized to treatment (13 classes, n = 284); treatment control (15 classes, n = 315), control (20 classes, n = 350) Analysis: Individual was unit of analysis; X2; LR to predict smoking; no ICC</p>

Characteristics of included studies (Continued)

Participants	949 12-14 yr olds. At baseline treatment group had more nonsmokers (93%) than control (89%) or active control (85%; $P < 0.01$); fewer intending to smoke ($P < 0.01$), fewer friends who smoked ($P < 0.01$), and the treatment groups had more males (47%) than the control (38%; $P < 0.02$). The active-control group had more students with a lower level of education.
Interventions	Treatment group: 3 lesson Wisconsin programme (Flay 1985, Leventhal 1988): 'emotional/self' programme to enhance awareness of peers' influence and encourage re-evaluation of positive image of smoking conveyed by some peers and parents; Active control group received 3 lesson knowledge 'health/technical' Wisconsin programme; Control received no intervention, and any smoking information if it occurred 'by chance' in their curriculum. Instructors were 'adults trained by the researchers'.
Outcomes	Nonsmoking = none in past month; smoking = regular (at least 1 cig/week) or experimental (< 1 cig/week) in past month
Notes	Study Category 3: 1. Randomization bias: moderate risk: method of randomization not described; at baseline treatment group had more nonsmokers (93%) than control (89%) or active control (85%; $P < 0.01$); fewer intending to smoke ($P < 0.01$), fewer friends who smoked ($P < 0.01$), and the treatment groups had more males (47%) than the control (38%; $P < 0.02$). The active control group had more students with a lower level of education; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: no attrition analysis; 4. Detection bias: moderate risk: no process analysis; 5. Power computation: no power computation 6. Statistical bias: moderate risk: no adjustment for clustering;
Allocation concealment	B – Unclear

Study	Clarke 1986
Methods	Country: USA Site: 10 schools in Vermont Focus: smoking prevention Design: 10 schools in which administrators agreed to participate, 2 schools allocated to each of the 3 experimental conditions and 4 to control Analysis: ANCOVA for trends over time.
Participants	Number at pretest (1980) 1321 Age: 7th graders: Gender: N's not stated, but analysis by gender given; Ethnicity: not stated Prevalence of daily smoking at baseline ranged from 1-13% across treatment groups Attrition: 1-5% non-response at each testing;
Interventions	Direct comparison of programme deliverer Social influences programme: sources of pressure to smoke, with videotapes, role playing, question periods, and resistance strategies 1. Peer-led (5-6 9th graders selected by school administrators, 1 day training) 2. Expert-led (professional health educator) 3. Teacher-led (usual health teacher) Duration: 4 days, 1hr/day Control: no intervention
Outcomes	Smoking 1. Self-report of smoking last month, last week, or yesterday, 2. Saliva samples for thiocyanate testing. The authors state only: 'saliva thiosalinitic tests were included in the evaluation procedure, though not with reliable results'. Follow up: 1yr and 18m after intervention
Notes	Study Category 2 : 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: no process analysis;

Characteristics of included studies (Continued)

- 3. Attrition bias: minimal risk: the authors state that non-response was low at 1-5% in the different groups at the 4 measurement times, but the numbers remaining at 12m are not stated; differential attrition from baseline characteristics not stated;
- 4. Detection bias: minimal risk:
- 5. Power computation: no power computation;
- 6. Statistical bias: moderate risk: ANCOVA for trends over time; no adjustment for clustering;

Allocation concealment B – Unclear

Study Clayton 1996

Methods	Country: USA Site: 31 schools in Lexington, Kentucky; Focus: Drug abuse prevention Design: Project DARE (Drug Abuse resistance Education): All 31 elementary schools in county used; 23 randomized to receive DARE, 8 to usual education (the school system would not permit more than 8 to receive only the control conditions) Analysis: 3-stage mixed-effects regression modelling.
Participants	Number at pretest: 2071 (93% of all 6th. graders in community) 28% had tried tobacco Age: 11-12 yrs Gender: 49% F Ethnicity: 75% W; 22% African-American Attrition by the 10th grade was 44.8%
Interventions	DARE curriculum: information about drugs and their effects, peer pressure resistance skills, awareness of media influences; decision making skills; accurate perceptions of levels of drug usage, enhancement of self esteem, taking responsibility Duration: 1hr/week x 17w Deliverers: Uniformed police officers Control: usual drug education curricula, which varied by school
Outcomes	Smoking: No of cigs in past year. Follow up: yearly for 5 yrs, 10 yrs (age 20).
Notes	Study Category 2: 1. Randomization bias: moderate risk: method of randomization not stated; school system would only allow 8 comparison schools as no treatment schools; '23 schools wre randomised to receive DARE and 8 were designated comparison schools'. 2. Performance bias: moderate risk: no process analysis; and usual drug education varied across the control schools; 3. Attrition bias: minimal risk: attrition by the 10th grade was 44.8%, but no differential attrition; 4. Detection bias: minimal risk: 5. Power computation: nopower computation 6. Statistical bias: minimal risk: 3-stage mixed-effects regression modelling;
Allocation concealment	B – Unclear

Study Coe 1982

Methods	Country: USA Site: 2 classes in 2 public schools in St Louis Metropolitan area Programme type: smoking prevention Method: classes in each school randomized Analysis: comparison of % remaining nonsmokers and becoming smokers
Participants	Number at pretest: 226

Characteristics of included studies (Continued)

	7th or 8th graders. Ethnicity: 1 school was 88% B; experimental group had a median age of 13yrs and 56% never-smokers, and 14yrs and 44% never-smokers in the control group. The other school was 89% W with a median age of 12 years and 54% never-smokers in the experimental and 60% in the control group
Interventions	Experimental Group: social influences (peer pressure to smoke, advertising, role plays, and promoting group support for nonsmoking). In one school positive reinforcement offered to the class with greatest reduction in smoking behaviour. Duration: 8 sessions Deliverer: 1st yr medical students who had received 4 hrs training led groups of 15-20 students Control: no intervention
Outcomes	Never smoked/ experimenting (had not smoked within the last 30 days)/ smoker (had smoked at least 1 cig in past 30 days). Saliva samples were collected but results not presented. Follow up: 12m
Notes	Study Category 3: 1. Randomization bias: high risk: School A in its experimental group had a significantly higher percentage of both never-mokers and smokers, and in its control group more experimenters; School B in its experimental group had a higher percentage of never-smokers and in its control group a higher percentage of smokers. One school was 89% white and the other 88% black. 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: no attrition analysis; 4. Detection bias: minimal risk: 5. Power computation: no power computation 6. Statistical bias: moderate risk: no correction for clustering;
Allocation concealment	C – Inadequate

Study	Cohen 1989
Methods	Country: USA Site: Williamsport Consolidated School District. Focus: Tobacco, nutrition and blood pressure. Design: students randomly assigned to groups led either by older peers or by teachers. Analysis: Pearson correlations for parents' and students' responses; phi coefficients for dichotomous smoking responses; and repeated measures ANOVA for curricula evaluation;
Participants	1051 households: 273 5th, 272 6th, 255 7th, and 251 8th graders.
Interventions	All intervention groups received 4 sessions taught by the older peer leaders, with a focus on (a) parents as role models, (b) homeworks completed by the child and parents; (c) risk factors mailed to the parents. 5th gradee students received the nutrition programme (5 schools); 6th grade the blood pressure programme (5 schools); 7th grade the smoking prevention programme (3 schools), adapted from Project CLASP (review tobacco advertisements to counter media pressure; practise resisting peer pressure; public commitment to non-smoking; homework where child interviewed a parent about smoking). Peer leaders received 4 days of training. Control group received health curricula taught by teachers and received neither group discssion nor homeworks.
Outcomes	Ever smoking; frequency of discussing smoking with parents in the past 6m.
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: no process analysis 3. Attrition bias: moderate risk: no statement of the number followed up and no attrition analysis; 4. Detection bias: minimal risk: 5. Power computation: no power computation:

Characteristics of included studies (Continued)

	6. Statistical bias: moderate risk: no correction for clustering;
Allocation concealment	B – Unclear
Study	Crone 2003
Methods	Country: Netherlands Site: 26 schools that provided lower secondary education Focus: smoking prevention Design: All 54 community health services (except 3 already involved in another project) were invited to participate; 14 services provided the names of 48 schools and 18 agreed; 4 community services approached the researchers directly and recruited 8 schools; Schools were stratified on their use of a frequently used national drug programme then randomized by toss of a coin by an independent person Analysis: multilevel techniques
Participants	Baseline: 2562 (1444 intervention; 1118 control group) in 154 classes 12m: 941 (37%); also, 3 schools dropped out Average age: 13yrs
Interventions	Intervention group: 3 lessons on knowledge, attitudes and social influences, class agreement not to smoke, class competition (for entry class had to have < 10% smokers after 5m); 2 optional video lessons Control group: schools used usual anti-smoking programmes; Teachers were trained and then the Stivoro and Trimbo's Institute 'supported the schools in all activities concerning the intervention ... and looked at adherence to the protocol in the intervention'.
Outcomes	Self-reported smoking: experimenting; weekly; daily
Notes	Study category 1: 1. Randomization bias: minimal risk: randomized by toss of a coin by an independent person; significantly more boys in intervention group at baseline 2. Performance bias: minimal risk: Teachers were trained and then the Stivoro and Trimbo's Institute 'supported the schools in all activities concerning the intervention ... and looked at adherence to the protocol in the intervention', But no data on adherence were provided; 3. Attrition bias: minimal risk: although 63% attrition after 12m, and 3 schools dropped out; however, drop-outs were examined in an intention-to-treat analysis under 3 assumptions (started smoking; stopped smoking; or did not change behaviour) with persistent lack of effect on the long-term outcome. 4. Detection bias: minimal risk; 5. Power calculation: minimal risk: A power calculation indicated that 1400 students were needed in both the intervention and control groups to find a difference in the increase in smoking of 5% with power of 80% and alpha of 0.05 and intraclass correlation of 0.075; 6. Statistical bias: low risk: analysis was by intention-to-treat; multilevel techniques;
Allocation concealment	C – Inadequate

Study	De Vries 1994
Methods	Country: Netherlands Site: 6 vocational and 8 high schools, Maastricht Focus: smoking prevention Design: Cluster-randomized controlled trial; table of random numbers assigned schools to experimental and control. Analysis: linear regression for quantitative effect measures and for binary effect measures; multi-level analyses using VARCL
Participants	Number at pretest (1986) approx 1784 (inferred from attrition rate) Age: 2nd grade of secondary school (US 8th grade) Gender: not stated

Characteristics of included studies (Continued)

Follow-up: At 1yr attrition was 14% and did not differ between the experimental and control groups. More pretest smokers (27%) dropped out than nonsmokers (13%; $P < 0.001$).

Interventions	Experimental Grp: Social influences programme; short-term effects of smoking; pressure from peers, adults and advertising; alternatives; and decision making. Students formed their own groups and chose their own peer leaders. Teachers co-ordinated the lessons and assisted the peer leaders. Peer leaders and teachers received training and manuals. Duration: 5 x 45 min lessons Control group: not stated
Outcomes	Self-reported smoking: never/ smoked up to 5 times/ quitter/ occasionally but not every week/ at least 1 cig/week/ at least 1 cig/day. Questionnaires were confidential. Saliva was collected and CO levels correlated with smoking ($r = 0.79$ to 0.85). Duration of follow up: 1yr from pretest
Notes	Study Category 2: 1. Randomization bias: minimal risk: The first author provided additional information that a table of random numbers was used for school assignment; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: minimal risk: 14%; no differential attrition; 4. Detection bias: minimal risk: 5. Power computation: no power computation 6. Statistical bias: minimal risk: linear regression for quantitative effect measures and for binary effect measures; multi-level analyses using VARCL;
Allocation concealment	A – Adequate

Study

De Vries 2003

Methods	Countries: Denmark, Finland, Netherlands, Spain, Portugal, UK Site: schools Focus: smoking prevention Design: European Prevention Framework Approach: In Netherlands schools were partly matched, partly randomized; in Barcelona and Madrid regions not randomly assigned; Analysis: LR to compare drop-outs to non-drop-outs and compare smoking rates; exposure to lessons by t-tests; final models run with multi-level analysis
Participants	23,531, of whom 23,125 (98%) completed baseline questionnaires; baseline nonsmokers = 20166 Age: average 13.3 years Gender: 50% F Of 20,166 nonsmokers at baseline, 15,422 (76.5%) remained after 2yrs
Interventions	European Smoking Prevention Framework (EFSA) Approach and School Policy Guide; however each country individualized its interventions Individual: 5-6 lessons by teachers on (1) knowledge (know the increased risk of short-term effects of smoking on the body; know that there are alternative ways of managing stress and weight; be able to name positive healthy alternatives for smoking; know what smoking addiction and habit is; realize that non-smoking is the majority behaviour; social influences (know the general mechanism of social pressures and social norms; be able to identify direct and indirect pressures to smoke; be able to recognize the influence of smoking advertisements); and refusal skills (realize that there are ways of politely telling people you would prefer that they not smoke around you; be able to cope with parental and peer influences to use tobacco; be able to resist pressure to smoke by saying 'no'); School: appoint a staff member to co-ordinate a non-smoking policy in the school; assess smoking by pupils and staff and measure the level of environmental smoke; gather information about the wishes of pupils and staff about a non-smoking policy for the school; write a smoke-free policy; develop an annual written plan for smoking regulations; plan smoke-free activities; develop smoking education within the school curriculum,

Characteristics of included studies (Continued)

	<p>specifying the number of lessons per grade; distribute a smoke-free newsletter and posters; use a brochure about how to stop smoking; use a brochure about how to talk about smoking;</p> <p>Parents: letter, leaflet or meeting; 'Quit & Win' competition;</p> <p>Out of school: access point pupils, committees; community activities for children; media campaign</p> <p>Teacher training varied: 20 hrs in Finland; 48 in Portugal, 8 in UK, not specified in Denmark</p> <p>Control regions: 'Usual care' which differed between countries (not further described)</p>
Outcomes	Self-reported never smoker; nonsmoking deciders [had quit experimenting]; triers; experimenters [not smoking weekly]; regular [at least once/week]; and quitters [had quit after having smoked at least once/week]
Notes	<p>Category study 2:</p> <ol style="list-style-type: none"> 1. Randomization bias: low risk in 4 countries (Denmark, Finland, Portugal and UK; but method of randomization not stated); not randomized in Spain and Netherlands; Groups not significantly different at baseline; 2. Performance bias: moderate risk: Intervention schools implemented on average 3-4 lessons and the control schools 1-2; large variations in teacher training; projects understaffed in all countries; wide variations in content of intervention between countries; 3. Attrition bias: moderate risk: of 20,166 non-smokers at baseline, 15422 (76.5%) remained after 2yrs; Drop-outs more likely to be weekly smokers (OR 8.8% vs 4.7%; OR = 1.61, 95% CI 1.40 to 1.86); 4. Detection bias: minimal risk 5. Power calculation: assumed drop-out rate of 30% except 20% in Finland, with power = 0.095 and significance = 0.001, and differences in probability of success = 10%, resulted in recommended sample size of 2 x 1200 in countries with smoking incidence <30% and 2 x 1500 in countries > 30% [with higher expected dropout]; target sizes amply achieved. 6. Statistical bias: low risk: appropriate analysis with LR; final models run with multi-level analysis
Allocation concealment	C – Inadequate

Study	Denson 1981
Methods	<p>Country: Canada</p> <p>Site: 12 elementary schools in Saskatoon</p> <p>Focus: smoking prevention</p> <p>Design: selection of schools not described, matched on size and socio-economic characteristics and randomly assigned</p> <p>Analysis: experimental and control cohorts followed from beginning of Grade 7 to end of Grade 8.</p>
Participants	<p>Number at pretest (1976) 604</p> <p>Age: grades 7-8</p> <p>Gender: not stated; Ethnicity: not stated</p> <p>In Experimental schools 14% were regular smokers, in Control school 10%</p> <p>Follow up: 88%</p> <p>Differential attrition from baseline: not stated.</p>
Interventions	<p>3 lectures with films (drugs and the nervous system; choosing to smoke; advertising) over 2 school yrs.</p> <p>Particular emphasis on addictive nature of smoking.</p> <p>Control: no intervention</p>
Outcomes	<p>Weekly smoking (≥ 1 cig/week).</p> <p>Duration of follow up: Less than 2yrs. The intervention began in 1976, but only the class which graduated in 1978 received the complete programme, and that is the group analyzed. They were surveyed at the beginning of grade 7 and end of grade 8</p>
Notes	<p>Study Category 3:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk: method of randomization was not stated; 2. Performance bias: high risk: schools received between 1 and 4 lectures; no process analysis; 3. Attrition bias: moderate risk: no attrition analysis; 4. Detection bias: minimal risk: 5. Power computation: nopower computation;

Characteristics of included studies (Continued)

6. Statistical bias: moderate risk: no adjustment for clustering;

Allocation concealment B – Unclear

Study	Dijkstra 1999
Methods	Country: Netherlands Site: 20 of 62 health districts were approached, 15 agreed to participate, and health educators invited school boards to participate; 52 schools participated. Focus: tobacco Design: Grades 8 & 9 in 52 schools randomly assigned to social influence (SI) programme (51 classes), SI + Decision making (64 classes) or the control group (67 classes). Within the treatment condition, half the schools were randomly assigned to receiving 3 boosters. Analysis: multilevel analyses using VARCL and SPSS
Participants	Numbers at pretest : decision making (DM) group (n=1381); Social Influences (n=1221); Control (n=1458. At T3: DM (n=460); DM+boosters (n=351); Social Influences (n=575); SI+boosters (n=526); Control (n= 1192). Attrition from pretest to final follow up 1yr later was 35%. Those less likely to drop out were: OR 0.85 for girls; 1.18 for younger students; 1.38 for nonsmokers; 1.57 for students in the control compared to the SI+DM group; 0.61 for students in the SI compared to the control group; 1.22 for 4yr students.
Interventions	5 lessons: 1. Why people do or do not smoke and quit 2. Short-term effects of smoking, dangers of experimentation, passive smoking, addiction, quitting, brochure on quitting 3. Resisting peer pressure, acquiring skills to resist peer pressure 4. How to react when bothered by smoke, indirect pressure to smoke from adults and advertisements, government measures against smoking 5. Alternatives to smoking, making the decision to smoke or not, commitment to non-smoking. The 3 boosters were magazines similar in content to the lessons
Outcomes	Self report as never, up to 5 times, stopped smoking, occasionally but not every week, at least 1/week, at least 1/day
Notes	Study Category 1: 1. Randomization bias: minimal risk: method of randomization was not stated; 2. Performance bias: minimal risk: 91% of teachers used the manuals; 90% used the video, 84% used activities, 87% worked with peer leaders, 91% used group activities, 78% gave out summaries to students, 75% asked students to write their name on a non-smoking poster, and 81% handed out quit brochures. Of the students in the SI+DM condition, 73% read 1 magazine, 58% 2 and 42% 3; 3. Attrition bias: minimal risk: 36% attrition at 36m, with students in the control compared with those in the experimental social influences decision making group less likely to drop out (OR 1.57; 95% CI 1.36 to 1.82), and students in the social influences programme less likely to drop out than those in the control group (OR 0.61; 95% CI 0.51 to 0.72), but the authors comment 'In sum, the attitude analyses showed that at T2, T3 as well as T4 there were no significant interactions between pre-test smoking and treatment conditions with respect to attrition'. 4. Detection bias: minimal risk; 5. Power computation: no power computation; 6. Statistical bias: minimal risk: multilevel analyses using VARCL and VARCL with model reduction by SPSS showed < 5% residual variance was due to between-class and between- school effects, and no differences between VARCL and SPSS analyses;

Allocation concealment B – Unclear

Study	Eckhardt 1997
Methods	Country: USA Site: San Diego County, CA Focus: tobacco use prevention (Project SHOUT)

Characteristics of included studies (Continued)

	Design: In the original SHOUT study schools were randomized to experimental and control (See Elder 1993 for initial design). In the 11th grade follow up participants agreeing to 11th grade intervention were individually randomized, stratified by original intervention or control Analysis: X2
Participants	2051 students (77% of 2668 SHOUT cohort) Av. age 16 yrs, Gender: 54% F Ethnicity: significant group differences ($P < 0.001$) by intervention Follow up: 75%
Interventions	The 11th grade intervention was not school-based, but continued the SHOUT intervention, which was. It consisted of 2 newsletters (tobacco company tactics to recruit new smokers; recent city, state and national tobacco legislation; secondhand smoke) and 1 phone call (eliminating smoking in restaurants and public places; rights of employees and the public in areas affected by the potential ban) made to participants homes 1. Continued intervention: SHOUT during Grades 7 to 9 then 11th grade intervention 2. Lapsed intervention: SHOUT, no additional intervention 3. Continued control: SHOUT control, no additional intervention 4. Delayed intervention: SHOUT control then 11th grade intervention
Outcomes	Smoking: any tobacco use (cigs and smokeless) in past month and past week. Self report survey by mail or phone. Duration of follow up: 1yr after present intervention, over 4yrs from SHOUT baseline.
Notes	This study is the follow-up data to Elder 1993 Study Category 1: 1. Randomization bias: minimal risk: individuals were unit of allocation; 2. Performance bias: moderate risk: 69% received at least 1 of the intended 4 phone calls, and 31% received none; 3. Attrition bias: minimal risk: 42% attrition from original cohort; 25% attrition from Grade 9 baseline; no differential attrition; 4. Detection bias: minimal risk: 5. Power computation: no power computation 6. Statistical bias: minimal risk: individuals were the unit of allocation and X2 was used
Allocation concealment	B – Unclear

Study	Elder 1993
Methods	Country: USA Site: 22 junior high schools in San Diego County, CA Focus: tobacco use prevention Design: random assignment of 11 schools (75 classrooms) to SHOUT programme and 11 controls, matched on tobacco use (past week) and school size Analysis: percents, logistic regression and logit model odds ratios.
Participants	Pretest: 3655. Cohort of 2668, 73% of initial sample, 1174 in Experimental, 1494 in Control surveyed 4 times: beginning of 7th grade (T1), end of 7th (T2), end of 8th (T3) end of 9th (T4) Av. age 12yrs (range 11-16), Gender: 'near equal proportions of M and F' Ethnicity: overall - 57% W/non-H, 24% H, 19%, O, significant group differences ($P < 0.001$) Follow up: 2668; no differential attrition by condition across any relevant covariates.
Interventions	Experimental: 7th grade: fall (6 lessons 1/week) videos of health consequences of tobacco use, celebrity endorsements of non-use, psychosocial consequences, refusal skills, decision making, skits; spring (4 lessons 1/month) review of refusal methods, discussion of tobacco addiction/cessation, public declarations of non-use and skits; 8th grade (8 lessons 1/month) demonstration/rehearsal of refusal skills, writing campaigns against tobacco use, community action projects, discussion groups and debates. 9th grade (booster intervention) - 5 newsletters containing tobacco control events, legislation, research and tobacco industry's power, cessation tips, 2 newsletters mailed to SHOUT participants' parents and phone calls (2/semester) following Pawtucket

Characteristics of included studies (Continued)

	Heart Health Programme protocol oriented toward newsletter material, refusal skills training and cessation support (79.9% call completion rate). Deliverer: university undergraduates, 15 hrs of training included videotaped role plays, Duration: 10 sessions in 7th grade, 8 sessions in 8th grade, mail and telephone in 9th grade Control: no interventions
Outcomes	Smoking: any tobacco use (cigs and smokeless) in past month and past week. Self report surveys under 'bogus pipeline' conditions. Follow up: end of 7th, end of 8th, end of 9th grades
Notes	Elder 1993a and 1993b discrepant on number of sessions/year. See also Eckhardt 1997 which provided further intervention to the cohort. Study Category 1: 1. Randomization bias: minimal risk; 2. Performance bias: minimal risk: no process analysis, but the 100 undergraduate volunteers were closely supervised, received academic credit, and 'attrition was rare' 3. Attrition bias: minimal risk: no differential attrition; 4. Detection bias: minimal risk; 5. Power computation: no power computation 6. Statistical bias: minimal risk: LR and logit model ORs;
Allocation concealment	B – Unclear

Study	Elder 1996
Methods	Country: USA Sites: 96 schools in Texas, California, Louisiana and Minnesota; Focus: cardiovascular health promotion Design: CATCH Study: 10 schools at each site randomized to control, 7 to school-based intervention, 7 to school and family Analysis: % in experimental and control groups; multiple LR.
Participants	Number at end of 5th grade: 7827, of whom 6527 gave complete information Age: 5th graders; Gender: 51% F ; Ethnicity: 71% W, 16% H; 14% African-Americans. No report of differential characteristics at baseline or differential attrition from baseline.
Interventions	The Child and Adolescent Trial for Cardiovascular Health (CATCH) used social learning theory and organizational change to intervene in school environments, class room curricula, family interventions and school smoking policies to change smoking status and cardiovascular health Classroom curriculum: Facts and Activities about Chewing Tobacco and Smoking (FACTS for 5) [dangers, costs, and aversive aspects of tobacco; benefits of not using tobacco; being tobacco free is the most acceptable way of life now). Home curriculum the Unpuffables was a 4 session programme from the American Lung Association to be used to complement each school lesson. Duration: 4 x 50 min sessions; CATCH intervention began in 3rd grade cohort but smoking prevention curriculum not introduced until 5th grade. Study not designed to find a difference in smoking prevalence
Outcomes	% of schools with smoke-free policies Smoking prevalence Duration of follow up: 3 yrs
Notes	Study Category 1: 1. Randomization bias: minimal risk; 2. Performance bias: minimal risk: of the children who began in a school which offered the school + family intervention, 47% attended such a school for the entire 3yrs. The process analysis for the FACTS tobacco curriculum showed that 87% of teachers participated in the classroom sessions; checklists were returned

Characteristics of included studies (Continued)

for 96% of classroom sessions; 96% completed the entire lesson; and 87% were implemented without modification. For the Family Intervention for tobacco 97% of session-specific activities were completed; 78% of adults participated in the home activities; and 48% of home team activity cards were returned; one third of schools held assemblies about tobacco; 40% participated in 'Great American Smokeout' activities; and 25% sponsored anti-tobacco or anti-drug clubs;

3. Attrition bias: minimal risk: no attrition analysis; 100% of 3rd grade teachers and 67% of students attended Family Fun Nights; 100% of schools remained in the dietary assessment process;

4. Detection bias: minimal risk;

5. Power computation: no power computation

6. Statistical bias: minimal risk: Analysis was by multiple LR (including a school random effect), but school effects were not stated;

Allocation concealment B – Unclear

Study	Ellickson 1990
Methods	<p>Country: USA</p> <p>Site: 30 schools from 8 districts, California and Oregon</p> <p>Focus: Smoking, alcohol and marijuana prevention</p> <p>Design: Project ALERT: 30 schools blocked by district and restricted assignment, randomized to 3 conditions (schools represented a broad cross-section of SES and ethnicity from urban, suburban and rural areas)</p> <p>Analysis: X2, LR, student level analyses to assess curriculum's effectiveness according to risk level (non-user, experimenters, users), common covariates used included district, dummy variables for Black/Asian ethnicity and a composite variable (peer/family use and attitudes, personal beliefs and background variables)</p>
Participants	<p>Number at pretest: 6527 (1984) (14% baseline nonresponse due to parental refusals or absence)</p> <p>Age: 7th grade, 13-14 yrs; Gender: not reported;</p> <p>Ethnicity: 9 of the schools had minority populations of 50% or more</p> <p>Follow up: 2yrs (9th grade) approx 72% of baseline; 59% (n=3852) had data for first 4 points. By 10th-12th grade f-up, 53-57% of baseline.</p> <p>No differential attrition across treatment groups, although students lost from the analysis tended to have baseline characteristics linked with later drug use.</p>
Interventions	<p>Direct comparison of programme deliverer</p> <p>Experimental Grp 1. Adult health educators (10 schools)</p> <p>Experimental Grp 2. Older age peer teen leaders and teachers (10 schools)</p> <p>Duration: 8 lessons (1/week) in 7th grade and 3 booster sessions in 8th grade; based on social influence model with self efficacy model of behaviour change: develop reasons not to use drugs; identify pressures to use them; counter pro-drug measures; learn how to say no to internal and external pressures; understand that most people do not use drugs; and to recognize the benefits of resistance. Participatory curriculum, with question-and-answer sessions, small group exercises, role modeling, and repeated skills practices.</p> <p>Controls: no intervention or continuation of traditional drug education programmes (4/10 control schools did latter).</p>
Outcomes	<p>Analysis based on 3 risk levels for future smoking at baseline (Non-user - never/ Experimenters - tried but <3 times in yr before baseline and not in month prior to baseline/ Users - 3 times in past year and any use in prior month to baseline)</p> <p>Saliva cotinine levels obtained and analyzed. At baseline and at 15m, 95% of students with cotinine scores that identified them as recent tobacco users (N = 603) reported cig use in the past month.</p> <p>Follow up: 3, 12 and 15m, 2yrs, 6yrs</p>
Notes	<p>Study Category 1:</p> <p>1. Randomization bias: minimal risk: the method of sample blocking is stated but method of randomization not stated; groups were equivalent at baseline;</p> <p>2. Performance bias: minimal risk: In a process analysis 17 monitors observed 950 of the 2300 lessons and found that every scheduled class was delivered, and in 92% of the observed classes all lesson activities were covered;</p>

Characteristics of included studies (Continued)

3. Attrition bias: minimal risk: 53-57% attrition but no differential attrition;
4. Detection bias: minimal risk:
5. Power computation: no power computation
6. Statistical bias: minimal risk: LR, student level analyses to assess curriculum's effectiveness according to risk level (non-user, experimenters, users), common covariates used included district, dummy variables for Black/Asian ethnicity and a composite variable (peer/family use and attitudes, personal beliefs and background variables); individual level analyses were used as they produced more conservative results than school level analyses;

Allocation concealment B – Unclear

Study **Ellickson 2003**

Methods	Country: USA Site: 55 S. Dakota middle schools Focus: drug, alcohol and tobacco prevention Design: Project ALERT: 48 school clusters (high schools and their associated middle school feeders) blocked by geographic region and community size then randomly assigned to 2 intervention groups or control; Analysis: generalized estimating equation to account for ICCs
Participants	Baseline: 5412 enrolled, of whom 4669 (86.6%) completed the baseline survey; 18m after baseline: 4276 8th Graders Age: 8th graders followed to 10th Grade Gender: 50% F; at baseline 1/3 had tried cigs
Interventions	Intervention 1: 11 lessons in Grade 7 and 3 in Grade 8 from the revised Project ALERT drug prevention programme 2. Same, with 3 boosters in 9th and 10th Grades Control: other prevention curricula (not described) Teachers trained in 1 day workshops; additional teacher manuals and videotaped lessons
Outcomes	1. Self-reported ever, past month and weekly smoking 2. Saliva samples collected, and analyzed for a random sample of 654: only 3 (0.5%) of the 560 who reported not smoking in the prior month or 2 days had saliva cotinine concentrations > 10 ng/ml; 1.7% gave inconsistent responses at baseline; 1.5% at follow up, and 6.5% across waves
Notes	Category Study 1: 1. Randomization: low risk of bias; but method of randomization not stated; 2. Performance bias: some risk of bias due to 40% of Grade 7 and 31% of Grade 8 lessons rushed; 9% of lessons interrupted by fire drills, school announcements or shortened class periods 3. Attrition bias: minimal risk of bias: no differential attrition across groups 4. Detection bias: minimal risk 5. Power calculation: no power computation 6. Statistical bias: low risk: generalized estimating equation to account for ICCs, with adjustment for multiple covariates, including school geographic location and community size; missing data imputed using Bayesian model; intention-to-treat analysis.
Allocation concealment	B – Unclear

Study **Ennett 1994**

Methods	Country: USA Site: 36 elementary schools, Illinois Focus: Drug abuse prevention Design: Project DARE: convenience sample of 18 pairs of schools matched on ethnicity and SES, stratified by urban/suburban/rural status. 12 pairs of schools randomly assigned, 6 pairs in rural areas non-randomly selected
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Characteristics of included studies (Continued)

	Analysis: nested cohort to adjust for unit of analysis.
Participants	Number at pretest 1803 20% had smoked cigarettes. Sample characteristics at post-test: Age: 33% 5th and 67% 6th grade Gender 49% F Ethnicity 54% W, 22% African-American, 9% H Attrition: 26% missing at one or more data collection points
Interventions	DARE curriculum: see Clayton 1996 Duration: 1 hr/week x 17 weeks Providers: Uniformed police officers Control: unspecified, but likely to have included some drug-education program
Outcomes	Smoking: Initiation (for those reporting no use at baseline); Increased use (for those reporting past 30 day use); quitting (for those reporting current use). Follow up: post-test, 1yr (6th or 7th grade) and 2yrs. Participants were tracked to their middle schools;
Notes	Study Category 3: 1. Randomization bias: high risk: method of randomization not stated; 6 pairs of rural schools were non-randomly assigned; 2. Performance bias: moderate risk: no process analysis; and usual drug education varied across the control schools; 3. Attrition bias: minimal risk: Attrition was 12% (defined as students dropping out by the end of 2nd yr) and 26% (defined as students missing at 1 or more of 4 data collection points). More urban students and those with more positive attitudes towards drugs dropped out, but there was no differential attrition across conditions; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: minimal risk: nested cohort to adjust for unit of analysis. For continuous measures analysis used least squares regression and expressed results as regression coefficients; for categorical data used LR with results expressed as ORs;
Allocation concealment	C – Inadequate

Study	Figa-Talamanca 1989
Methods	Country: Italy Site: 4 schools; one professional or technical school in each of Perugia, Cagliari, Pavia and Genova Focus: smoking prevention and cessation Design: Health Education Specialist selected a school in each of the 4 cities willing to participate, 6 classes in each school randomly assigned to the two experimental groups or control group Analysis: comparison of % smoking in the experimental and control schools.
Participants	Number at pretest: 562 Age: 15-17; Gender: 47% F; Ethnicity: not stated Follow up: 93% at 1yr Differential attrition from baseline: not stated.
Interventions	Intervention components: creating awareness of smoking as a cultural, economic, social and health problem; information on physiology of respiratory and cardiovascular systems, motivation for smoking, role of media Intervention A: measurement of effects of smoking by spirometry, providing a forum for discussing reduction in smoking by students. Intervention B: no spirometry Deliverer: Health education specialist Duration: 3 sessions over 3 days Control: no intervention
Outcomes	Smoking: everyday (1-4 cigs/day;5-9;10-19;20+)/ occasionally/ex-smoker/never smoked

Characteristics of included studies (Continued)

	In intervention classes students coded and analyzed the baseline questionnaire themselves Duration of follow up: 12m
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization was not stated; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: attrition was 7%; no adjustment for attrition; 4. Detection bias: minimal risk: 5. Power computation: no power computation 6. Statistical bias: high risk: no statistical analysis, and the study did not adjust for clustering;
Allocation concealment	B – Unclear

Study	Flay 1985
Methods	Country: Canada, Ontario Site: 22 schools in 2 counties Focus: smoking prevention Design: Waterloo Study: 16 of 22 schools. Schools matched on size, rural/urban location and SES. Assignment to experimental or control random except for 3 schools where the superintendent thought the principal would not be satisfied if the students were assigned to the control group Analysis: X2, School level analysis also reported
Participants	Number at pretest 654 (94% of target population) Age: 6th grade, Mean age of controls higher. 42% never smokers at baseline. Attrition: 4%/year; absenteeism was 5%/test 17% of dropouts were experimenting with smoking compared to 12% of the sample. No between-group differences At the 6yr follow up 90% of students were traced and data obtained from 80% of these.
Interventions	The Waterloo Smoking Prevention Programme: 6 x1hr weekly sessions in Grade 6 on information and attitudes to smoking; family, peer and media influences on smoking; decision making and commitment. 2 maintenance session in grade 6, 2 booster sessions in 7th grade and 1 in 8th. Duration: 11 sessions over 3yrs Control: usual health education
Outcomes	Self-reported smoking; never/ tried once/ quit/ experimenter/ regular Regular smokers divided into =< 3/week; and >3/week Saliva for thiocyanate levels. Follow up: 18m (end of grade 7, 5yr (grade 11), 6yrs (grade 8)
Notes	Study Category 3: 1. Randomization bias: high risk: method of randomization not stated; and non-random allocation of three schools by the school superintendent; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: minimal risk: no differential attrition; 4. Detection bias: minimal risk: 5. Power computation: no power computation 6. Statistical bias: minimal risk: the unit of allocation was the school, and the unit of analysis was both the individual and the school;
Allocation concealment	C – Inadequate

Study	Flay 1995
Methods	Country: USA Site: 340 classes in 6 school districts with 35 Los Angeles and 12 San Diego schools. Focus: Tobacco

Characteristics of included studies (Continued)

Design: TVSFP Project: To test the independent and combined effects of classroom and television programming with information about and social resistance skills to tobacco. Within each of LA and San Diego counties, entire schools were assigned to conditions using a multi-attribute blocking approach.
Analysis: ML3 multilevel least squares, with adjustment for clustering

Participants	7352 pretested (of whom 49.6% M, 35.5% H, 33.3% W, 13.9% African-American, 17.3% Other) and of whom 6695 (91%) indicated gender, race and smoking status. No differences at pretest in smoking rates across conditions.
Interventions	Television, School and Family project (TVSFP) curriculum: (a) correction of misperceptions about tobacco usage, (b) awareness of peer influences to smoke, (c) development of peer resistance skills, (d) awareness of family influences to use tobacco, (e) development of media influences resistance skills, (f) social and physiological effects of smoking, (g) development of decision-making skills. The control groups received no intervention.
Outcomes	Self-reported smoking for the past week (test- retest stability 0.26 between waves B and C, and 0.31 between waves C and D); ever-use in lifetime (test-retest stability 0.71 between waves B and C, and 0.72 between waves C and D).
Notes	Study Category 2: 1. Randomization bias: minimal risk: the method of randomization was not stated; no differences at baseline; 2. Performance bias: moderate risk: numerical results of process analysis not stated; 'Instructors completed delivery process questionnaires daily, weekly and immediately postprogram. Classroom teacher observers were surveyed weekly. The school staff was interviewed during the week immediately following the class session'. Parents signed when student-parent homeworks were complete; the authors commented 'Fidelity of implementation was assured through curriculum delivery by trained health educators' but 'Unfortunately the television programming was poorly executed and there was significant variability in the integrity of classroom program delivery'. 3. Attrition bias: minimal risk: 53% attrition at 2yrs, with higher attrition among African-Americans, and students with lower school grades, but there was no differential attrition across groups; 4. Detection bias: minimal risk: 5. Power computation: no power computation 6. Statistical bias: minimal risk: Results were adjusted for clustering using ML3 multilevel analysis programme for unbalanced data that uses iterative generalized least-squares estimation.
Allocation concealment	B – Unclear

Study	Focarile 1994
Methods	Country: Italy Site: Health District of Rozzano, Milan Focus: Smoking prevention Design: 53 classes stratified by baseline smoking and risk factors randomly allocated using table of random numbers. Analysis: LR, binomial LR
Participants	Number at pretest: of the 1268 registered students 1057 (83%) were registered in the randomized classes and 1017 were randomized (508 intervention, 549 control); Age: 12-13 yrs: Gender: 50% F: Ethnicity: not stated 55% never-smokers at baseline. Risk factor index for smoking was 0.79 in intervention and 0.85 in control group at baseline (no P value stated). Follow up at 36m: 420 (222 intervention, 198 control)
Interventions	Intervention: social influences, resistance skills training, based on Waterloo Smoking Prevention Program, delivered by volunteer teachers during classes. Duration: 6 lessons over 3m Control: programme of information on cardiovascular risks (including the risk of smoking)
Outcomes	Never-smoking; 1 cig/month; 1 cig/week; > 1 cig/week; < 7 cigs/week; > 1 cig/day

Characteristics of included studies (Continued)

	Follow up: 18m. At 36m only pupils in classes which completed the programme were followed up. Some sent postal questionnaires and some contacted by telephone.
Notes	Study Category 3: 1. Randomization bias: minimal risk; 2. Performance bias: moderate risk: the analysis at 36m is limited to the classes which delivered 2/3 of the material, and was limited by the resources available for telephone follow up; no process analysis; 3. Attrition bias: moderate risk: students with a high risk of smoking had a lower response rate; attrition at 36m was 60%; 4. Detection bias: minimal risk; 5. Power computation: no power computation 6. Statistical bias: minimal risk: results were adjusted for clustering with LR and binomial LR
Allocation concealment	A – Adequate
Study	Gatta 1991
Methods	Country: Italy Site: 163 schools in Milan Focus: Smoking prevention Design: 163 of the 165 state elementary schools in Milan to an intervention group (55 schools, 5796 children); an intervention group in which only half the classes were further randomized to the intervention (52 schools, 5639 children); and a control group (56 schools, 6011 children). Analysis: X2
Participants	Number at pretest: 16,074 Age: 9 and 10, 4th. year primary school Gender: Not possible to determine from data in Table 1. Number at follow up: At the 4yr follow up attrition was 36%; no attrition analysis was stated.
Interventions	Intervention: 1 day of lessons; harmful effects of tobacco taught by slides, comic strips and posters; poster of a famous non-smoking sportsperson and comic books on adolescent smoking given to each student. Teachers encouraged to develop these lesson topics in subsequent weeks. Duration: 1 day Control: no intervention
Outcomes	Definition of smoking: non-smoking (< 1 cig/week); at least 1 cig/week, and at least 1 cig/day. Anonymous self-administered questionnaires. Duration of follow up: 4 yrs
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization not described; 2. Performance bias: moderate risk: 'Teachers were encouraged to develop these lesson topics in subsequent weeks'. No process analysis; 3. Attrition bias: moderate risk: at the 4yr follow-up attrition was 36%; no attrition analysis was stated; 4. Detection bias: minimal risk; 5. Power computation: moderate risk; performed post-hoc power, and showed that the study had only 67% power to detect the pre-specified outcome; 6. Statistical bias: high risk: the unit of allocation was the school and the unit of analysis the individual, and the analysis was not adjusted for clustering;
Allocation concealment	B – Unclear
Study	Gersick 1988
Methods	Country: USA Site: 32 classrooms in 20 schools from public school systems in 2 New England towns Focus: Substance abuse prevention

Characteristics of included studies (Continued)

	Design: post-test only, control group design, schools grouped into 2 clusters by SES and ethnicity; within clusters classrooms randomized to treatment and control. Analysis: Analysis was both at the individual and classroom means levels. by t-tests and X2.
Participants	Number: 1372 at post test Age: 6th grade (2 cohorts, 1980-81 and 1981-82) Gender: 49% F; Ethnicity: 'dominant ethnic group in both towns is third or later generation Italian and mixed European', 9.2% Black or non-White, 3.5% did not indicate race Follow up: (% of grade cohort participating): 1yr - 73% for 1st cohort, 90% for 2nd; 2yr - 79%; No sig diffs in absentee rate for intervention and controls.
Interventions	Experimental Grp: Social cognitive skills; effective decision making (assessing situations realistically, brainstorming alternatives, using a balance sheet to identify negative and positive consequences, evaluating risk); role flexibility (peer influence and conflict resolution, decisions about drugs, alcohol and cigs); enhancing support (basic concepts of social networks, family and non-family support systems). Duration: 40min/w for 12ws Control: no intervention.
Outcomes	Student Drug Use Survey (self report of 10 drugs including tobacco, with 7-point scale (1 never; 2 once or twice; 3 < once/month; 4 once or twice/month; 5 once/week; 6 2 or 3 times/week; 7 almost every day). Follow up: 1yr, 2yrs
Notes	Study Category 2: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: minimal risk: follow up: (% of grade cohort participating): 1yr - 73% for 1st cohort, 90% for 2nd; 2yr - 79%; no differential attrition; 4. Detection bias: minimal risk: 5. Power computation: no power computation 6. Statistical bias: minimal risk: Analysis was both at the individual and classroom means levels. by t-tests and X2;
Allocation concealment	B – Unclear

Study

Gilchrist 1986

Methods	Country: USA Site: Middle schools, Seattle, Washington Focus: smoking prevention Design: Number of schools and school selection not reported. Schools randomized to experimental, placebo or control conditions Analysis: ANOVA
Participants	Pretest: 741 5th and 6th graders, most were white, middle and lower-middle class families, 69% nonsmokers Age: mean 11.4 yrs; Gender: 49% F; Follow up: 94%, no differential attrition across conditions. Higher attrition amongst baseline smokers.
Interventions	Experimental self control group: 8 x 60-min sessions. Identify stress and use cognitive and behavioural techniques to counter negative feelings; leaders modelled skill use, and subjects practiced skills in role plays and homeworks. Videos of adolescents handling socially difficult situations. Communication, self instruction, self reinforcement, and problem-solving skills. Leaders presented verbal and non-verbal communication skills. Group exercises (SODAS: Stop, consider Options, Decide, Act, and Self praise). Placebo health education group: received 8 x 60-min sessions, of factual information and attitudes about smoking and health (films, handouts, games, in-class exercises, discussions, skits). In-class exercises included making posters and conducting discussions. Female/Male co-leader team conducted all sessions in self control and placebo groups after 30 hours of training. Control: measurement only.

Characteristics of included studies (Continued)

Outcomes Smoking: never, experimental (tried at least once but had never smoked weekly), regular smokers (1 or more cigs/week).
Main outcome: Self-reported smoking of 1 or more cigs during past week, not grouped by baseline status
Saliva collected but not analyzed.
Follow up: 15m from pretest

Notes Study Category 3:
1. Randomization bias: moderate risk: No of schools not reported; method of randomization not stated; equivalence of groups at baseline not stated;
2. Performance bias: moderate risk: no process analysis;
3. Attrition bias: minimal risk: % attrition at 15m; no differential attrition;
4. Detection bias: minimal risk:
5. Power computation: no power computation
6. Statistical bias: moderate risk: no adjustment for clustering;

Allocation concealment B – Unclear

Study Gilchrist 1987

Methods Country: USA
Site: 7 urban and rural sites in the Pacific Northwest.
Focus: Reduction of alcohol, tobacco and drug use.
Objective: Assessment of a culturally relevant programme.
Design: 102 American Indian youth randomly assigned
Analysis: Two-tailed tests of means

Participants Number at pretest: 102
Age: mean 11.2 years. Gender: 49% F
Both groups similar in age, gender, substance use, % living with parents, and living on a reservation.
Number at follow up: 102

Interventions Experimental Grp: Included myths about Indian drinking and drug use, the impact of stereotypes on behaviour, an activity to promote self esteem, health education on drugs and alcohol through films, handouts and posters, the roles of values in decision making, the SODAS model (Stop, consider Options, Decide, Act, and Self praise), create a SODAS commercial on videotape, and an adult from the tribal alcohol treatment program was a guest speaker). 83% completed the intervention.
Duration: 10 x 60-min sessions.
Control: no intervention

Outcomes Definition of smoking (Table 4): Self-reported, on a 5 point scale (0 = never used; to 4 = used 4 or more times in past week)..
Duration of follow up: 6m.

Notes Study Category 3:
1. Randomization bias: minimal risk: method of randomization not stated; no statement of equivalence at baseline;
2. Performance bias: moderate risk: no process analysis;
3. Attrition bias: no risk: 0% attrition;
4. Detection bias: minimal risk:
5. Power computation: no power computation
6. Statistical bias: moderate risk: assigned by site, no correction for clustering;

Allocation concealment B – Unclear

Study Gindre 1995

Methods Country: France
Site: secondary schools and the primary schools linked to them in Lyon

Characteristics of included studies (Continued)

	<p>Focus: health, especially tobacco addiction</p> <p>Design: a random sample of 4 secondary schools and the primary schools linked to them were randomized to: A: intervention in CM2 and 5th form; or B: intervention in CM2 only; or C: intervention in 5th form only; or D: control</p> <p>Control D: both CM2 and 5th forms received no intervention</p> <p>Analysis: Not stated (probabilities are reported)</p>
Participants	3651 pupils in CM2 (age 10 -11 years) in intervention and 3183 in control; numbers for SES Special education (5th form) ages 12-13 years not stated as this publication reported results only for CM2 students
Interventions	10 interventions/yr in class to encourage reflection on behaviour and health, particularly on tobacco addiction, through dialogues with teachers, health professionals and students (not further described) Training of teachers, educational staff and health professionals 3 -6 days/year
Outcomes	One question: 'Do you smoke?'
Notes	<p>Category study 3:</p> <ol style="list-style-type: none"> 1. Randomization bias: unknown as method not stated; 2. Performance bias: moderate risk: 75% of teachers responded to the process questionnaire (90% judged the programme was easily integrated into the curriculum; 91% the collaboration between health professionals and teachers was good; 94% felt it had a positive impact in class; and 86% were motivated to continue in subsequent years; but there was no statement of a protocol and no measurement of adherence to a protocol; 3. Attrition bias: unknown as no numbers stated at 18m; 4. Detection bias: unknown: only one question on smoking status; 5. Power calculation: no power computation; 6. Statistical bias: no statement of method of analysis, no control for clustering, no statement of intention-to-treat
Allocation concealment	B – Unclear

Study	Hanewinkel 1994
Methods	<p>Country: Germany</p> <p>Site: 2 Realschulen, 3 Hauptschulen and 1 Gymnasium in Schleswig-Holstein.</p> <p>Focus: Tobacco</p> <p>Design: RCT, with the control group on a 'waiting list' and later received the intervention (personal communication).</p> <p>Analysis: X2</p>
Participants	1985 students average age 13.8 years; 1 gymnasium withdrew for organizational reasons, leaving 1299 potential, of whom 650 completed the baseline questionnaire.
Interventions	10 sessions covering: confronting socially uncertain situations; learning to differentiate facial expressions and feelings; understanding gestures; making demands, recognizing others' demands; accepting and working with criticism; getting through difficult situations, self confidence in relations with others; coping with failure; fate and self responsibility. Tobacco resistance training was discussed in sessions 4 and 6. There were also homework, relaxation exercises and the use of comics, story books, and role-plays. There were separate stop-smoking programmes for students and parents who smoked.
Outcomes	Smoking in last 7 days
Notes	<p>Study Category 3:</p> <ol style="list-style-type: none"> 1. Randomization bias: moderate risk: method of randomization not stated; 1 Gymnasium did not participate in the intervention phase for organizational reasons; experimental group 1 (2 Hauptschulen) differed in student composition from the control group (1 Hauptschule, 2 Realschulen, 1 Gymnasium); no analysis of equivalence at baseline; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: 50% attrition at 16m; no attrition analysis; 4. Detection bias: minimal risk; 5. Power computation: no power computation;

Characteristics of included studies (Continued)

6. Statistical bias: moderate risk: no correction for clustering;

Allocation concealment B – Unclear

Study	Hansen 1988
Methods	<p>Country: USA Site: 8 Junior high schools, Los Angeles Focus: Substance abuse prevention (Project SMART) Design: Project SMART: RCT; 8 schools randomly assigned to 2 experimental (2 schools each) and control (4 schools) groups Analysis: aggregate classroom scores used (85 classes). Indices of use by ANOVA and ANCOVA using pretest scores as covariates. Dichotomous 30-day use by Fisher's exact test.</p>
Participants	<p>2863 7th grade (1982) Gender: 49% F Ethnicity: 38% H, 30% B, 22% W. There was high attrition (37% from baseline to first post-test, and 32% from pretest to final post-test). There was differential attrition of Black students ($p < .0001$), of baseline smokers ($p < .0001$), and greater total attrition in the Social and Control groups (60%) than the Affective group (37%). Control and Social group subjects differed on baseline smoking within the past 30 days in Data set 1-2 ($p < .005$)</p>
Interventions	<p>Direct comparison of social influences, affective education and control 1. Social curriculum: health effects, resistance training, normative expectations, mass media, social activism, public commitment. 2. Affective curriculum: stress reduction, goal setting, decision making, self esteem, assertiveness, public commitment Duration: 12 sessions over 1 term Deliverer: staff health educators and regular classroom teachers with peer opinion leader involvement Control: No intervention</p>
Outcomes	<p>Smoking: Smoking index, with aggregated classroom means. Dichotomized on +/- 30 day use. Separate analysis for baseline non-users, with onset to various levels of use. Saliva samples collected but not analyzed. Follow up: initial post-test 1yr after pretest (grade 8), 2nd post-test at 2yrs</p>
Notes	<p>Project SMART involved a total of 44 randomized schools, Hansen 1988 reports only on first 7th grade cohort. See Graham 1990 for further SMART results Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: no differences in tobacco use at baseline, but there was attrition of smokers compared to non-smokers at the 1yr follow up ($P < 0.0001$); and more attrition from the social influences and control groups (60%) than the affective social condition group (37%; $P < 0.0001$); 4. Detection bias: minimal risk: 5. Power computation: no power computation 6. Statistical bias: moderate risk: no correction for clustering;</p>
Allocation concealment	B – Unclear

Study	Hansen 1991
Methods	<p>Country: USA, California Site: 12 Junior high schools in LA and Orange County Focus: Preventing onset of alcohol abuse, marijuana and tobacco use; primary outcome was alcohol use; Design: Adolescent Alcohol Prevention trial (AAPT): (no statement on how schools were selected) 12 schools stratified by size, test scores and ethnic composition, randomly assigned to one of 4 experimental groups.</p>

Characteristics of included studies (Continued)

	Analysis: General linear model analysis of covariance approach was used with classroom means for each composite index and for each dichotomous item.
Participants	Number at pretest (1987) 3011 Age: 7th graders; Gender: 48-55% F; Ethnicity (range by intervention group): A 9% - 26% (sig diffs); B 1-3%; H 11-43% (sig diffs); W 33-52%. Follow up: 80%; Differential attrition from baseline: attrition among students who received resistance training 18% vs 21.6% other conditions ($P < 0.01$).
Interventions	Direct comparison of social influences programme components Experimental Grp 1: Information (32 classrooms): 4 x 45-min lessons about the social and health consequences of alcohol, tobacco and drugs Experimental Grp 2: Resistance training [RT] (33 classrooms): 4 lessons on consequences of using substances, 5 on resisting peer and media pressures to use alcohol, tobacco and other drugs (ATOD). Experimental Grp 3: Normative Education [NE] (27 classrooms): 4 information lessons, 5 lessons on perceptions on prevalence and acceptability of using ATOD. Experimental Grp 4: Combined programme of NE and RT (26 classrooms): 3 information, 3.5 resistance skills, 3.5 conservative norms. Duration: 9-10 sessions (Only 4 for Information) Deliverers: Project staff with 2w intensive training
Outcomes	Smoking index, and never/ever smoking/ 30 day smoking Follow up: 8th grade, 1yr from baseline
Notes	Part of Adolescent Alcohol Prevention Trial (AAPT); Rohrbach 1993 discusses techniques of implementing the AAPT in Los Angeles, but without any data on student smoking Study Category 1: 1. Randomization bias: minimal risk: the method of randomization not stated; 2. Performance bias: minimal risk: process analysis showed high fidelity in the delivery (average 6 on a 7 point scale for 8 aspects of programme implementation were achieved) of the interventions; but 3 of the independent variables (skill, resistance knowledge and acceptability) were judged by programme specialists to have been affected by programme integrity; 3. Attrition bias: minimal risk: 20% attrition at 1yr with differential attrition in the resistance training group ($P < 0.01$), but the authors comment: 'Since main effects of Resistance Training did not even approach significance, the interpretation of findings is not threatened'. 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: minimal risk: The unit of allocation was the school, and the unit of analysis in the 1991 paper was class. In the 1998 re-analysis, a combination of multilevel analysis (ML3 programme) and ordinary least-squares analysis for the post-test at 2yrs were used for: (i) the 2370 individuals, (ii) the 120 classes, and (iii) the 12 schools;
Allocation concealment	B – Unclear

Study	Hirschmann 1989
Methods	Country: USA Site: 1 public middle school in Milwaukee, Wisconsin Focus: Smoking prevention Design: non-random selection of school, chosen for representative distribution of sex and race; random assignment of classrooms (7 experimental, 6 control) Analysis: correlation, X2, ANCOVA
Participants	Number at pretest: 315 16% 6th grade, 41% 7th grade, 43% 8th grade; Gender: 51% F; Ethnicity: not reported Follow up: 84%. Students who had not attended at least 2 programme sessions were excluded

Characteristics of included studies (Continued)

	Differential drop-out between groups (Experimental: 11.6%, C: 20.5%, $P < 0.01$). No differences in characteristics between groups at baseline.
Interventions	<p>Experimental Grp: 15-min slide-tape show of 4 F and 4 M students discussing smoking (pathways to regular smoking, risk-taker/ affect-regulator/ submission to social pressure). Role-plays discussed (symptoms after smoking; adaptation to smoking; process of becoming addicted). Content focused on smoking stage-specific experiences and their meanings. Cognitive developmental approach.</p> <p>Duration: 3 x 45-min sessions during 1w.</p> <p>Control: 3 films on 3 days (Who's in charge here?; The tobacco problem: what do you think?; and First cigarette) wrote down what they liked and disliked about each, and ideas for improvement. Film content focused on immediate and long-term health effects of smoking.</p>
Outcomes	<p>Self-reported smoking (0 tries; 1 try; 2+ tries; smoked in past month; smoked in past week)</p> <p>Follow up: 6m and 18m.</p>
Notes	<p>Study Category 3:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk: no differences in characteristics between groups at baseline; method of randomization was not stated; 2. Performance bias: moderate risk: partial programme delivery: 15% of students failed to attend at least 2 sessions, with 20% in the control group and 12% in the experimental group missing 2 or more sessions, and non-attenders more likely to smoke; 3. Attrition bias: moderate risk: differential drop-out between groups (Experimental: 11.6%, Control: 20.5%, $p < .01$); absentees at follow-up were more likely to have smoked in the past week; 4. Detection bias: minimal risk; 5. Power computation: not performed; 6. Statistical bias: moderate risk: no adjustment for clustering;
Allocation concealment	B – Unclear

Study	Hort 1995
Methods	<p>Country: Germany</p> <p>Site: 19 secondary schools in Duesseldorf</p> <p>Focus: reduce current and new onset smoking</p> <p>Design: Schools matched on student enrollments and social composition of catchment areas, randomized to intervention (9 schools) or control (10 schools)</p> <p>Analysis: Anonymous questions in the questionnaires of 1992, 1993, and 1994 permitted comparison of the smoking status for the 630 students remaining in the study in 1994. X² for comparison of percentages, McNemar test for comparison of changes in samples, and t-tests for comparison of means.</p>
Participants	<p>Pretest: 878, 93% of eligible population.</p> <p>Age: 13yrs; Gender: 38% F; Ethnicity: not stated</p> <p>Differential attrition from baseline: 0.4% refusals in the intervention classes, 5.7% in the controls. Refusals plus missing students comprised 7% at the first questionnaire, and 9.5% at 2yr follow up.</p>
Interventions	<p>Experimental: Yr 1, 6w period. Classroom teachers (2 hrs) explained lung and heart function, and how advertisers encouraged children to smoke (1 hr). Investigators (physicians) discussed (2 hrs) body function, protective mechanisms of the airways, heart attack, cancer. Students in groups simulated how cilia in an airway remove particles. Non-smoking students conducted role-plays (2 hours) on refusing a cig without feeling uncomfortable. Excerpts videotaped and used in 2nd half of session. Competition for an advertisement against smoking.</p> <p>Yr 2 (15 hours): physicians discussed lung function and smokers' cough. Role-plays. Students introduced to top non-smoking sports personalities, who discussed their sport and training system and conducted Q&A sessions. Posters of these personalities were displayed and students could attach their own photo to them and receive a copy of the poster.</p> <p>Duration: 2yr programme = 15 hrs.</p> <p>Control schools: Talk by a physician on a topic of their choice: most wanted to hear about alcohol, but they were permitted to chose tobacco and its consequences.</p>

Characteristics of included studies (Continued)

	Experimental intervention for smokers (35 students in 4 schools); 11 x 1hr sessions: Each cig smoked was recorded; stories suitable for the age group were told to provide relaxation.
Outcomes	Never smoker (never or only 1 cig); Nonsmoker (never smoker, or had not smoked for more than half a year); Smokers (precise number of cigs smoked to date, or stopped smoking less than 1/2 year ago): weak smoker = 2-10 cigs to date; moderate smoker = 11-100 cigs to date; strong smoker = 100 cigs to date; daily smoker = at least 1 cig/day). Anonymous questionnaire with matching for cohort. Duration of follow up: 24m.
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: differential attrition from baseline in intervention and control classes; 20.2% attrition at 24m with no attrition analysis; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: moderate risk: no correction for clustering;
Allocation concealment	B – Unclear

Study	Howard 1996
Methods	Country: USA Site: Private school, location not identified, but study team based in Spokane, WA. Focus: cardiovascular risk reduction programme Design: 1 class within each of grades 4 to 6 randomly assigned to experimental and 1 to control group. Analysis: ANCOVA
Participants	Number at pretest: 98 Age: 9-12 years (av 10.4) 4th-6th grade Gender: 46% F Attrition not stated.
Interventions	Experimental Grp: Cardio-vascular risk reduction programme on physiology of the heart, smoking, hypertension, diet and physical activity and how to reduce those risks based on the American Heart Association 'Getting to know your heart' and 'Future Fit' materials. Duration: 5 x 40-min sessions Control: no intervention relevant to smoking and cardiovascular health.
Outcomes	Current or experimental smoking Duration of follow up: 1yr
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: no attrition analysis; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: moderate risk: no adjustment for clustering;
Allocation concealment	B – Unclear

Study	Josendal 1998
Methods	Country: Norway Site: nationwide sample of 4441 students in 195 classes in 99 schools Focus: smoking prevention; Design: BE Smokefree programme: From a listing of all Norwegian secondary schools listed in order of zip code a school was randomly chosen, then the next 3 schools with a similar number of students, yielding clusters of 4 schools.

Characteristics of included studies (Continued)

	Analysis: Pearson X2 for differences across groups; McNemar's test for significance of changes and multiple LR for changes in smoking rates.
Participants	4441 students, of whom 4215 provided written consent. Programme administered by classroom teachers. Parents received a brochure, teachers involved parents in discussions, and students signed a contract of non-smoking with parents.
Interventions	(A) Control; Unclear whether the control group received any intervention; (B) classroom programme with involvement of parents and teachers (C) classroom programme with involvement of parents only (D) classroom programme with involvement of teachers only The 8-session programme focused on personal freedom, freedom to choose, freedom from addiction, making one's own decisions, tobacco-resistance skills, and the short-term consequences of smoking. The classroom teachers received 2 days of training, received detailed programme manuals to secure fidelity, and filled in a questionnaire after each lesson to evaluate programme fidelity. Students brought 2 brochures home; teachers involved parents in discussions 'at appropriate occasions', and students and parents signed non-smoking contracts.
Outcomes	Daily, weekly, less than weekly smoking, and non-smoking.
Notes	Study Category 2: 1. Randomization bias: minimal risk: by random numbers; 2. Performance bias: moderate risk: process analysis conducted but results not stated; also, the programme was varied and no process analysis of the variations as time progressed: 'During Grade 8, teachers and students indicated to the program administrators that the main messages and educational approaches that had been chosen when planning the intervention had been sufficiently emphasized' and 'Grade 9 students developed, carried out, and evaluated their own campaign to promote a smoke-free lifestyle among Grade 7 students at their own school'. 3. Attrition bias: minimal risk: after 4yrs attrition 11% in intervention and 5.8% in control; more smokers left comparison than model intervention group; 4. Detection bias: minimal risk: 5. Power computation: power 80% alpha = 0.05 required n = 757 in each group, and sample sizes achieved; 6. Statistical bias: minimal risk: no adjustment for clustering in Josendal 1998; multilevel modeling allowed for clustering for 3yr follow up (Josendal 2005).
Allocation concealment	A – Adequate

Study	Kaufman 1994
Methods	Country: USA Site: 3 Chicago public high schools Focus: Tobacco Design: 3 public schools were specifically chosen as they were in Black neighbourhoods. Schools were randomly assigned either to a school + media intervention or a media intervention or a control group. Analysis: ANOVA
Participants	276 6th and 7 graders. Pretest information available on 131 (75%) in experimental and 76 (75%) in control schools.
Interventions	Intervention Grp 1: the 7-session Social Influences Intervention included information about smoking; problem solving skills; pressures in the environment to smoke; making a public commitment not to smoke; homework assignments with parents; a video of a peer refusing to smoke; and tobacco refusal skills, based on the American Lung Association's 'Smoking Deserves a Smart Answer'. Intervention Grp 2: the School plus Media Intervention, which added: (a) articles on preventing smoking on the children's page of the in the Chicago Defender; (b) 8 public service smoking radio announcements; (c) a rap contest; and (d) a poster contest (with the 5 winners' posters displayed on 5 billboards). The Chicago

Characteristics of included studies (Continued)

	School Board sent all 472 schools a copy of 'Smoking Deserves a Smart Answer;' and 65% of the experimental and 31% of the control group children said they read part of the Defender curriculum. 3. Control group received no other intervention;
Outcomes	Botvin's Usage Scale
Notes	Study Category 3: 1. Randomization bias: moderate risk: method of randomization not stated; at pretest the intervention groups smoked more than the control ($P < 0.02$); 2. Performance bias: moderate risk: no process analysis; the School Board had sent all schools the American Lung Association's curriculum; and 65% of the experimental and 31% of the control group reported reading part of the Defender curriculum; 3. Attrition bias: moderate risk: 40% attrition; no attrition analysis; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: moderate risk: no correction for clustering;
Allocation concealment	B – Unclear
Study	Kellam 1998
Methods	Country: USA. Site: 19 elementary schools in Baltimore. Focus: Smoking prevention by changing behaviour predicting later smoking uptake. Design: 5 areas in Baltimore ranging from very poor to middle class identified, 3 to 4 public schools with similar socioeconomic and racial/ethnic profiles selected in each. Within areas, classes randomly assigned. Analysis: Life table and survival curve approach. Cox proportional hazards model (EGRET).
Participants	Pretest: 2311 1st grade 1985 or 1986. Analysis limited to 1604 nonsmokers at baseline. Age: 5-6 Gender: 49.6% F. Follow up: 69%, attrition unrelated to intervention status
Interventions	Compared 2 programmes designed to reduce future tobacco usage by addressing risk factors for uptake. 1. Good Behaviour Game, led by classroom teachers during regular classes. They defined and posted undesirable behaviours (fighting, shouting out of turn, and teasing), and the class with the most points for good behaviour won prizes. The game was played initially for 10 mins 3 times weekly, increasing in frequency and duration 2. Mastery Learning for reading. Students proceeded to the next unit only when they mastered 85% of the learning objectives, small groups, formative testing, and individual instruction. Control group: 'customary school programs'. Duration: 2yrs (1st and 2nd grades)
Outcomes	Definition of smoking: 'tobacco user', 'tobacco nonuser'. Assessed at individual interview Duration of follow up: from age 8 to 14
Notes	Study Category 1: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: minimal risk: 3. Attrition bias: minimal risk: 31%, attrition unrelated to intervention status; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: minimal risk: Effects of clustering accommodated by presorting students into strata defined by school attended in the first grade.
Allocation concealment	B – Unclear
Study	Laniado-Laborín 1993
Methods	Country: Mexico

Characteristics of included studies (Continued)

	<p>Site: 6 elementary schools, Tijuana Design: random selection of schools, random assignment to group (from pairs matched on baseline smoking prevalence) Analysis: t tests, multiple LR</p>
Participants	<p>Baseline: 168 6th grade Average age: 12 Gender: 46% M 63% never-smokers at baseline</p>
Interventions	<p>Intervention: Social influences; groups of 6-8 discussed noxious aspects of smoking; advertising strategies of the tobacco companies; influences of family and friends; and resisting offers to smoke. Sessions led by a medical student. Duration 4 sessions Control: no intervention.</p>
Outcomes	<p>Smoking: past year/ past week/ past 24 hrs Saliva samples collected and tested for nicotine/cotinine. Follow up: 10m</p>
Notes	<p>Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; difference in the baseline % of smokers in the experimental (41%) and control (31%) groups, but was n.s. 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: no attrition analysis; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: moderate risk: no adjustment for clustering;</p>
Allocation concealment	B – Unclear

Study	Lloyd 1983
Methods	<p>Country: Australia Site: 88 primary schools in NSW Focus: smoking prevention Design: Smoking or Health Programme: schools matched on size and SES variable, pair randomized Analysis: X2 and multiple regression.</p>
Participants	<p>Number at pretest (1979): 6299 Age: Yrs 5 and 6 Of the baseline students 3231(51%); (1657 boys were surveyed in Yr 5 and 1572 in Yr 6; and 157 girls in Yr 5 and 1496 in Yr 6; Gender: approx 50% F Ethnicity: not stated There were baseline differences in smoking behaviour with more girls in yr 6 smoking in treatment schools Differential composition at baseline or differential attrition: not stated.</p>
Interventions	<p>'Smoking or Health' programme of the Teaching Resources Centre of the NSW Department of Education: (1) Respiration process; (2-3) physiological effects of smoking, 'Puffing Poll', creative dance; (4) advertising (5) resisting peer pressure (6) decision making, value clarification (7-9) revision. Duration 6w, 90-mins/week Control: no intervention</p>
Outcomes	<p>Never-smoker; or smoked in the past 4w. Participants were assured of confidentiality and surveys were identified by numbers and not names. Follow up: 12m</p>
Notes	Study Category 3:

Characteristics of included studies (Continued)

1. Randomization bias: minimal risk: smoking rates at baseline were similar across groups, except that they were higher for the 6th grade females in the experimental group ($P < 0.002$);
2. Performance bias: moderate risk: Teachers received one day of training, 80% replied to a questionnaire which asked if they had used the programme (no actual process analysis of fidelity of protocol delivery). The control group received no intervention, and 72% of those teachers replied to a questionnaire which asked if they had used any anti-smoking interventions; more children took up smoking in the group where teachers scored lowest on the implementation scale;
3. Attrition bias: moderate risk: 49% attrition; no attrition analysis;
4. Detection bias: minimal risk;
5. Power computation: minimal risk: A power computation to detect differences of 5% smoking levels (two-tailed test) and 80% power required 720 children per group; power computation achieved desired sample sizes.
6. Statistical bias: moderate risk: no adjustment for clustering;

Allocation concealment B – Unclear

Study **MacPherson 1980**

Methods	Country: USA. Site: 8 school superintendencies in Vermont Focus: Prevention of smoking by past and current cig smokers. Design: Schools selected to be representative of wealth, attendance, number of school nurses, expenditures per student, and educational staff. 2 withdrew, 6 randomly allocated to experimental and control using table of random numbers. 1 received only post-test. Analysis: SPSS, using classes as the unit of analysis.
Participants	Number at pretest: 1750 students in 85 classrooms (82% of eligible). Age: Not stated. Gender: Not stated. Number at follow up: Completed questionnaires were obtained from 1750 students in 85 classrooms at baseline (82%), and 1683 (79%) 6m later, including 345 (86%) from the group which only received the post-test.
Interventions	Experimental groups: (1) The Mobile Unit Programme: mobile van with lung samples and X-rays from healthy, cancerous and emphysematous patients. Students heard wheezing and whistling sounds of pulmonary disease through stethoscopes. Smoking machine demonstrated the accumulation of tar and nicotine. Air pollution monitors were demonstrated. Students could analyze their own expired air. The van visited each classroom three times. The Lung Association educator guided groups through for a half hour. (2) The Traditional curriculum was 12 class sessions developed by teachers and researchers and based on the School Health Curriculum project (SHCP), the School Health Education Study (SHES), and the Smoking and Your Health Teacher-Student Workshop of the Pennsylvania Lung Association. (3) The Combined programme received the mobile van + traditional programmes. Control group: Not stated. Duration: not stated
Outcomes	Definition of smoking: 'Current cigarette smokers'; 'Past cigarette smokers' Duration of follow up: 6m.
Notes	Study Category 3: 1. Randomization bias: minimal risk: table of random numbers; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: 21% attrition; no attrition analysis; 4. Detection bias: minimal risk; 5. Power computation: no power computation 6. Statistical bias: moderate risk: the unit of allocation was the superintendencies and the unit of analysis was the individual; no adjustment for clustering;

Characteristics of included studies (Continued)

Allocation concealment A – Adequate

Study	Murray 1984
Methods	Country: USA Site: 8 junior high schools in Minneapolis (Study 1) Focus: Smoking prevention Design: Minnesota Smoking Prevention program: 8 schools, randomized to 4 experimental conditions Analysis: LR for dichotomous smoking incidence and prevalence dependent variables, ANOVA for intensity of smoking. Adjustments made for baseline differences
Participants	Number at pretest, 1979: 3184 7th graders (94% of enrolled 7th graders); 49-62% were non smokers at baseline; Age: 12; Gender: 50% F; Ethnicity: 'nearly all white'. Attrition analysis: baseline ever-smokers were lost to follow up at higher rates than never-smokers, but the pattern of attrition was equivalent for all 4 experimental conditions.
Interventions	Direct comparison of social influences (including skills training) and rational model 1. (AH) Adult led, concentrated on long-term health consequences but not fear arousal. Main components of interventions 2-4: social forces that encourage smoking; short-term social and physiological effects of smoking; correct normative expectations for smoking; public commitment not to smoke; major emphasis to teach and practise skills to resist social pressures to smoke. 2: (PS) Peer-led (selected by classmates), short-term influences 3: (PSV) Peer-led, short-term influences, with videotapes. 4: (ASV) Adult-led, short-term influences, with videotapes Duration: 5 sessions over 6m All interventions were led or facilitated by programme staff
Outcomes	Smoking Index (Pechacek) of average cigs/week. Separate analyses for baseline never-smokers and those with scores 0-1, with categories of ever, weekly and daily smoking incidence. Index used as a continuous measure for smoking intensity. Saliva test for thiocyanate at pre- and post-test and 1yr follow up. Outcome assessed for baseline nonsmokers and experimental smokers. Follow ups: posttest, 1yr (1981), 2yr (1982), 3yr (1983), 5yr (1985), 6yr (1985/6)
Notes	Study Category 2: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: no process analysis; however, all interventions were led or facilitated by programme staff; 3. Attrition bias: minimal risk: no differential attrition; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: moderate risk: no statistical modelling to allow for allocation by school; and for study 2 only the experimental groups could be compared, as the non-equivalent control groups were selected in the 2nd year of the study; large sample size, but small number of clusters;
Allocation concealment	B – Unclear

Study	Murray 1992
Methods	Country: USA Site: Minnesota Focus: compare 3 social influences anti-tobacco programmes with the existing curriculum. Design: Minnesota Smoking Prevention Program and Smoke-Free Generation program: 112 Minnesota schools invited at random to participate; 81 (72%) agreed, forming 48 sampling units, with 8992 students eligible for the 6th. grade baseline survey.

Characteristics of included studies (Continued)

Analysis: ANOVA	
Participants	8271 (92%) participated; 7180 enrolled in 7th grade. Those lost to follow up were more likely to report smoking by their father ($P < 0.0005$), mother ($P < 0.0001$), older siblings ($P < 0.0024$) and best friend ($P < 0.0012$).
Interventions	4 social influences anti-tobacco school programmes: 1. 6 lesson Minnesota Prevention Program (MSPP) 'based on the social influences model'; 2. 3 lesson Smoke-Free Generation Program (SFG) 'patterned after the Minnesota Smoking Prevention program but in a shorter form'; 3. Minnesota Guidelines Programme 'developed by the Department of Education and providing written guidelines and a workshop to help teachers adapt existing programs to incorporate elements of the social influences model'; 4. Control: Existing curricula. Teachers received a 2 hr instructional videotape.
Outcomes	Smoking defined as an Index of weekly smoking (number of cigs/week), and expired CO was measured.
Notes	Study Category 1: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: minimal risk: For the process analysis 1 researcher observed 90% of the health teachers in the 81 schools once, and the MSPP had higher compliance than the 2 other programmes, with the control having the lowest compliance; differences in teacher compliance with programme implementation between groups; 3. Attrition bias: minimal risk: 13% attrition in 2nd yr and those lost to follow-up had more family members and friends who smoked, but there was no differential attrition across groups; Students reported exposure to 2-3 traditional anti-smoking programmes, but there were no differences between groups during the study; 4. Detection bias: minimal risk: 5. Power computation: minimal risk: The power analysis hypothesized that the most effective intervention would result in a 50% reduction in the incidence of weekly smoking, (4.5% vs 9% in the existing curriculum group), and the other curricula would have intermediate effectiveness. Estimated sample sizes achieved; 6. Statistical bias: minimal risk: Within-school ICCs were estimated = 0.02, and the variance reduction expected from covariance adjustments (25%), 2-tailed tests, Type I error rate = 5%, and power = 80%, that usable data be required from 90 students from each of 12 sampling units to detect treatment effects using hierarchical ANOVA..
Allocation concealment	B – Unclear

Study	Noland 1998
Methods	Country: USA. Site: 19 schools in Kentucky. Focus: Tobacco use prevention in a high tobacco production area. Design: 19 schools in 14 counties ranked by baseline tobacco usage to form 10 blocks of 2 schools each (last block contained 1 school), within each block schools randomly allocated to experimental and control. Analysis: Mixed model ANOVA with school as the unit of analysis.
Participants	Number at pretest: 3588; Av age: 12.4 yrs. Gender: 51% F Ethnicity: 92% W; 6% B; 2% O At the 24m follow up there were 3072 students (14.4% attrition). Groups were similar at baseline on smoking status. There was no differential attrition from baseline between groups.
Interventions	Experimental: Social influences programme consisted of 6 X 45-50 min sessions in the 7th. grade (skills training in learning to recognize types of peer pressure, refusal skills, and assertiveness, recognizing and countering advertising appeals, student pledges, the negative social and immediate physical consequences of using tobacco; peer leaders were trained); and 3 similar sessions in the 8th. grade. Duration: 9 sessions over 2yrs.

Characteristics of included studies (Continued)

	Control: usual health education
Outcomes	Smoking: Ever, 30-day, 7-day, and 24-hr smoking. Expired air was collected and CO content was analyzed, but not reported. Duration of follow up: 2yrs from baseline.
Notes	Study Category 1: 1. Randomization bias: minimal risk: groups were similar at baseline; 2. Performance bias: minimal risk; 3. Attrition bias: minimal risk: at 24 months 14.4% attrition; no differential attrition; 4. Detection bias: minimal risk; 5. Power computation: not performed; 6. Statistical bias: minimal risk: Mixed model ANOVA with school as the unit of analysis;
Allocation concealment	B – Unclear

Study	Nutbeam 1993
Methods	Country: U.K. Study site: 39 secondary schools in 4 different educational authorities in Wales and England; Focus: smoking prevention and changes in attitudes, knowledge, and values toward smoking; Programme type: 2 projects integrated into classroom settings - 1 adapted from Norwegian family smoking education project (FSE) and the other derived from the Minnesota smoking prevention programme [Smoking and Me (SAM)]; Theoretical basis: informational (formal classroom instruction, booklets, discussion); Objective: to delay smoking onset and improve health knowledge, beliefs, and values by evaluating effectiveness of 2 school-based smoking education programmes; Type of study: Family Smoking Education Project: Schools randomly selected in 2 districts; in remaining 2 districts schools solicited based upon previous response to health education; schoolsmatched by size and catchment area and assigned (e-mail from Dr. Nutbeam says method was by using cards from a hat) to one of 4 groups - 10 schools (controls), 10 schools (FSE), 9 schools (SAM), and 10 schools (both projects in sequence FSE/SAM); Method of analysis: ANOVA, X2, and LR, and statistical analyses take account of clustering.
Participants	Type of sample: random in 2 school districts but convenience sample in other 2 school districts, non-random assignment to conditions; Number at pre-test: 5078 students aged 11 and 12 were eligible, with 4562 (89.8%) completing the pretest; Age: 11-12 yrs; Gender: 2188 F and 2347 M; Ethnicity: not stated; Follow up: 4538 (89.4%) valid cases for analyses. Classroom teachers administered the programmes after a 1-day training session.
Interventions	Experimental Grp 1: Family Smoking Education Project (FSE) - 3 hrs of teaching, booklet given to students, leaflet given to parents encouraging discussion of smoking, material focused on immediate health effects of smoking; Experimental Grp 2: Smoking And Me project (SAM) - 5 lessons, pupil-led discussion groups, material focused on social consequences of smoking and on peer, family, and media influences on smoking, practice of smoking refusal skills Experimental Grp 3: FSE + SAM Control group: no formal interventions Duration of stimulus: 3m; Duration of follow up: immediate post-test following programmes and 1yr after.
Outcomes	Self-reported smoking (never; tried once or twice; < 1 cig/week; 1-6 cigs/week; > 6 cigs/week) Saliva for thiocyanate levels collected but not processed or analyzed; 5 scales assessing health knowledge, self-esteem, health values, external and internal locus of control.
Notes	Study Category 2: 1. Randomization bias: moderate risk: cards chosen from a hat; 'The schools were not a strict random sample since in two of the areas schools were approached because of their past commitment to health education'. Also at baseline there were 83% never-smokers in the FSE/SAM and 74% in the SAM group;

Characteristics of included studies (Continued)

2. Performance bias: moderate risk: '... the organisation and management of the projects were at the discretion of the teachers, who recorded their lessons in a book';
3. Attrition bias: minimal risk: 4538 (89.4%) valid cases for analyses;
4. Detection bias: minimal risk;
5. Power computation: no power computation;
6. Statistical bias: minimal risk: LR takes account of clustering;

Allocation concealment C – Inadequate

Study	O'Donnell 1995
Methods	Country: USA Study site: Seattle Focus: school failure, drug abuse, delinquency Design: Seattle Social Development Project: in 1981 2 schools assigned to either intervention or control and then students in the remaining 6 schools randomly assigned; then from 1981-1984 newly entering students were randomly assigned to intervention or control classrooms; and in 1985 study expanded to include all 18 Seattle elementary schools; Analysis: not stated; apparently by differences of means;
Participants	Baseline 1985 when entered 5th grade: results are reported only for 177 low income students (42%) from the 424 students in 5th grade; Completion of 6th grade in 1987: 106 (60%) of the low income group completed 6th grade surveys; Students in intervention or control groups enrolled in 5th or 6th grade for < 1 semester were excluded from the analysis; Gender: 48% F
Interventions	1. Classroom intervention: Teachers trained in proactive classroom management, interactive teaching, and co-operative learning; 2. Child intervention: cognitive and social skills training to solve problems (communication, decision making, negotiation, conflict resolution skills); recognition of trouble, identify legal name of trouble, name consequences, generate positive alternatives to stay out of trouble; 3. Parent intervention: parent training classes on child behaviour management, academic support, antisocial prevention and goals 4. Control. Teachers did not receive training in instructional skills; teachers were observed to document their teaching practices during four classes on different days;
Outcomes	Smoked cigarettes (not further defined)
Notes	Study Category 3: 1. Randomization bias: high risk: method of randomization not stated; 2. Performance bias: moderate risk: teachers observed and given feedback every 3w; control teachers observed over 4 periods to document their teaching practices; no numerical presentation of process analysis; 3. Attrition bias: minimal risk: 40% attrition; no differential attrition; 4. Detection bias: minimal risk; 5. Power computation: no power computation; 6. Statistical bias: high risk: non-randomly assigned groups not separated from randomly assigned; students randomly assigned as individuals or to classes not separately analyzed; no adjustment for clustering;
Allocation concealment	C – Inadequate

Study	Perry 1996
Methods	Country: USA Site: rural communities in 6 NE Minnesota counties Focus: diminishing alcohol use; tobacco and marijuana use also measured but no specific intervention Design: Project Northland: 20 school districts blocked by size then randomized

Characteristics of included studies (Continued)

	Analysis: mixed model regression and ANOVA
Participants	Baseline beginning of 6th grade: 2351; at end of 8th grade: 1901 (81%)
Interventions	Project Northland had 4 components: parent involvement/education; behavioural curricula; peer participation; community task force activities Each grade had a unique theme: 6th grade (Slick Tracy Home team programme); 7th grade (Amazing Alternatives! programme); and 8th grade (Power Lines) Control districts: usual alcohol and other drug education programmes (90% of students had taken part in Project DARE, compared to 40% in the intervention districts; and 21% in the control and 2% in the intervention districts had taken part in Project Quest sponsored by the Lion's Club)
Outcomes	Cigarette and smokeless tobacco use defined as > 2 or 3 uses in lifetime, and then defined as occasionally but not regularly; regularly in the past; or regularly now;
Notes	Category 1 study: 1. Randomization bias: minimal risk 2. Performance bias: minimal risk: all schools implemented the curricula; peer leaders organised 60 alcohol-free activities in 16 of 20 intervention schools during the year; and half of the students participated in peer out-of-school non-alcohol activities; of the 66 adult volunteers recruited, 33 remained active in the programme throughout the year; 3. Attrition bias: minimal risk: 19 % attrition by end of 8th grade (no differential attrition) 4. Detection bias: minimal risk 5. Power calculation: no power computation 6. Statistical bias: minimal risk: mixed model regression and ANOVA to adjust for ICCs
Allocation concealment	B – Unclear

Study	Perry 2003
Methods	Country: USA Site: 24 middle and junior high schools in Minneapolis and St. Paul, Minnesota Focus: tobacco, alcohol and marijuana use and violent behaviour Design: schools matched on drug use, size and socioeconomic measures and then randomized: 8 schools to DARE, 8 to DARE. and DARE Plus, and 8 to control with delayed delivery of DARE. Analysis: 3 level linear random coefficients model testing for differences in growth curves over time, which permits inclusion of students with missing data points
Participants	6726 7th graders in 1999-2000 or 8th grade in 2000-2001; of these 6237 (82.7%) completed the baseline questionnaire (2226 DARE; 2221 DARE Plus; 1790 control) Follow up after 18m at the end of 8th grade: 84%; no differential attrition Age: middle and junior high school Gender: 48.4% F
Interventions	Intervention 1: DARE 10 sessions drug resistance, handling violent situations, character building, citizenship skills Intervention 2: DARE and DARE Plus (which included a 4 session peer-led parental involvement programme; home team activities with parents; extracurricular activities; neighbourhood action teams) Police officer instructors had received instruction in the elementary school DARE curriculum and had taught DARE for at least 2 semesters; those who taught DARE Plus received an additional 2 hrs instruction on interactive teaching methods
Outcomes	Current use of tobacco on a scale from 1 to 10
Notes	Category study 1: 1. Randomization bias: minimal risk: no differences at baseline; method of randomization not stated 2. Performance bias: probably minimal bias: authors state 'high participation rates' and 'extraordinary support on the part of the school districts and police departments', but no further details or references 3. Attrition bias: minimal risk: no differential attrition 4. Detection bias: minimal risk

Characteristics of included studies (Continued)

5. Power computation: for power = 80% and alpha = 0.05 and ICC = 0.008, the design could detect a 43% reduction in behaviours with a population prevalence of 10% and a 24% reduction in behaviours with a prevalence of 30%: schools were surveyed and those with at least 200 in the 7th grade were 'targeted for sufficient statistical power'.

6. Statistical bias: low risk: 3-level linear random coefficients model testing for differences in growth curves over time

Allocation concealment B – Unclear

Study Peterson 2000

Methods
 Country: USA
 Site: 40 school districts in Washington state
 Focus: Tobacco
 Design: Hutchinson Smoking Prevention Project: Districts randomized. Schools selected with < 35% attrition from Grades 3 to 7, 50-250 students/grade level, and within 200 miles of study HQ, matched on high school smoking, size and location
 Analysis: randomization-based permutation inference, which requires no distributional or modeling assumptions, and accomodates ICCs.

Participants
 4177 3rd graders in experimental and 4211 in control; equivalent at baseline; at Grade 12 + 2 yrs follow up 48 developmentally unable to participate, unable to locate 241, 181 no reply, 8 declined, yielding 7864 (93.8%)

Interventions
 Students received 65 sessions consisting of: (1) skills to identify marketing and peer influences to smoke; (2) skills to resist marketing and other influences; (3) information to correct erroneous perceptions about smoking; (4) motivation to be smoke-free, and distinguishing between what the adolescent wants to do and is able to do; (5) promoting self-confidence in the ability to refuse influences and pressure to smoke; (6) enlisting positive family influences.
 Control schools continued usual health curricula.

Outcomes
 Self-reported smoking in Grade 12 and Gr 12 + 2; saliva cotinine measured on a 12.6% random sample of Grade 12, and no differential bias in reporting between experimental and control groups

Notes
 Study Category 1:
 1. Randomization bias: minimal risk: groups similar at baseline;
 2. Performance bias: minimal risk: All teachers participated in the training; > 99% implemented the interventions; and teachers effectively communicated the key concepts in 80% of the lessons observed;
 3. Attrition bias: minimal risk: Major effort was invested in explaining the purpose of the RCT and maintaining the long-term collaboration of the school districts, parents and students and there were 7,865 (94%) at follow-up two years after Grade 12;
 4. Detection bias: minim
 5. Power computation: based on no of districts, no of students, actual attrition, prevalence of daily smoking at Grade 12 + 2yrs; programme exposure estimated at 0.745 due to outmigration, ICCs of 0.01, and 2-sided alpha = 0.05, which was estimated to provide power to detect a 30% nominal relative reduction in daily smoking prevalence at the endpoint 2yrs after high school.
 6. Statistical bias: minimal risk: randomization-based permutation inference, which requires no distributional or modeling assumptions, and accomodates ICCs;

Allocation concealment B – Unclear

Study Piper 2000

Methods
 Country: USA
 Site: suburbs, small towns and rural areas in Wisconsin
 Design: Healthy for Life Project: 21 schools stratified on substance use, then randomly assigned to intervention or control; intervention schools chose either the Intensive or Age Appropriate curriculum to suit their scheduling needs;

Characteristics of included studies (Continued)

	Analysis: parametric ANCOVA , with school level differences in substance abuse and health risk behaviours as covariates; hierarchical linear modeling with the HLM/3L programme; hierarchical multilevel regression models; and school level models
Participants	Baseline in grade 6: 2483 6th graders At Grade 9: 1981 (80%); at Grade 10 68% (because were unable to schedule in school surveys of two Intensive and one control school) Age: 68% 14yrs, 29% 15yrs Gender: 52% F
Interventions	Intervention 1: Healthy for Life curriculum (HFL) (Intensive Condition) targeted 5 health behaviours: alcohol, tobacco, marijuana, nutrition, and sexuality in 54 lessons in 12ws in the 7th grade Intervention 2 : HFL Age Appropriate curriculum taught 58 lessons in 3 4w segments in each of grades 6, 7, and 8; The curriculum used 8 strategies: social inoculation; peer leaders; parent interviews; health advocacy; short-term effects; advertising and media; public commitments; peer norms. Included peer, family and community components Control: 'usual programming', usually Quest; Choices; Here's Looking at You; or locally developed curricula;
Outcomes	Annual self-reported smoking status; saliva samples collected but not analyzed
Notes	Study Category 2: 1. Randomization bias: minimal risk: the groups were equivalent at baseline; method of randomization not stated; 2. Performance bias: the authors state that: 'extensive qualitative data indicate positive reception of the program by the participating students', and that: 'implementation fidelity was not a problem' but provided no documentation. The authors also commented that the teaching techniques were not commonly used by teachers and would have needed additional resources to sustain them; 3. Attrition bias: moderate risk: 20% attrition and no attrition analysis; 4. Detection bias: minimal risk 5. Power computation: minimal risk: calculated that 6 schools per condition were needed with average enrolment of 200 students per school to detect a 20% reduction in tobacco use; achieved needed sample size of schools; 6. Statistical bias: minimal risk: parametric ANCOVA , with school level differences in substance abuse and health risk behaviours as covariates; hierarchical linear modeling with the HLM/3L programme; hierarchical multilevel regression models; and school level models controlled for multiple levels
Allocation concealment	B – Unclear

Study Rabinowitz 1974

Methods	Country: USA Site: 5 schools in Niagara County, N.Y. Focus: To increase anti-smoking health knowledge, attitudes and behaviours. Objective: To assess the effects of an anti-smoking programme. Design: 36 classes from one urban and 4 rural US school districts in randomly allocated to experimental and control groups. Analysis: ANOVA.
Participants	Number at pretest: 758 Age: grades 7-9. Gender: Not stated. Number at follow up: 758. After 1yr 748 remained (95%); the total at post-test incorrectly adds the cells to 728.
Interventions	Experimental group (N = 381): Teachers taught anti-smoking health knowledge, attitudes and behaviours in a programme developed by the authors in conjunction with teachers' committees. Control group (N = 347): Programme not stated.

Characteristics of included studies (Continued)

	Duration: Number of sessions not stated.
Outcomes	Definition of smoking: 'Occasional' smoking was defined as a student claiming not to smoke every day. Regular smoking was defined as 5-10 cigs/day. Duration of follow up: 6m
Notes	Study Category 3: 1. Randomization bias: minimal risk: no statement of the method of randomization; 2. Performance bias: high risk: number of sessions not stated; no process analysis; 3. Attrition bias: moderate risk: no attrition analysis; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: minimal risk: Analysis was by ANOVA, which controlled for variation between schools, classes within schools, treatments, and classes within schools x treatments, but ICCs were not computed;
Allocation concealment	B – Unclear

Study	Reddy 2002
Methods	Country: India; Site: New Delhi Focus: alcohol and tobacco prevention; Design: Health-Related Information and Dissemination Among Youth Project (HRIDAY): listed all schools in New Delhi and blocked them on type (private, government) and gender (males only, females only, and co-educational) and randomized them by coin toss [e-mail from Dr. Cheryl Perry] either to a school- and family-based intervention, or a school-based intervention or control; Analysis: Analysis was by mixed effects regression with the school specified as the nested effect.
Participants	At baseline: 5752 students aged 12; 5043 (88%) provided consent, 4776 (83%) participated in the baseline survey; Present after 1yr: 4452 (77%)
Interventions	1. School Intervention consisted of: (a) 10 posters in schools on cardiovascular health; (b) the HRIDAY project booklet with information on heart health circulated among students; (c) classroom activities selected by teachers from a list of 20 [including 3 on influences to smoke, ways to refuse offers to smoke, and passive smoke]; (d) round table discussions on food policy and nutrition; (e) students invited to sign a petition requesting a ban on tobacco advertising to be presented to the Prime Minister of India. 2. Family intervention consisted of 6 booklets (1 on tobacco use, the rest on dietary patterns and exercise) brought home by the students, who brought back their parents' signed opinions about the booklets. Teachers received training (duration not stated) and selected peer leaders (duration of training not stated). 14/20 schools displayed all 10 posters, and 6 displayed 7-9; 6 schools implemented all 20 activities from the teachers' manual; of the 10 schools which participated in the family intervention, teachers in 8 schools reported they distributed at least 5/6 booklets.
Outcomes	One question: 'Have you ever tried a cigarette/bidi.'
Notes	Study Category 3: 1. Randomization bias: minimal risk: randomization by coin toss; groups were equivalent at baseline; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: no attrition analysis; no linkage of pre- and post student responses. [an e-mail from Dr. Cheryl Perry states there was adjustment for clustering, but insufficient funding for process evaluation and attrition]; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: high risk: Individual student survey data could not be matched from pre-to post-test, but 'the populations of the schools were fairly stable during the study period, ensuring that the data collected represented students who took part in the entire study'. Analysis was by mixed effects regression with the school specified as the nested effect.

Characteristics of included studies (Continued)

Allocation concealment C – Inadequate

Study	Rohrbach 1994
Methods	Country: USA Site: 57 schools in 12 school districts in Indianapolis Focus: alcohol and tobacco prevention Design : Midwestern Prevention project [I-STAR programme in Indianapolis]: schools were randomly assigned to intervention or control groups Analysis: multiple regression with multiple covariates
Participants	Students: baseline 3528; 18m follow up 2649 (75%) Parents: 70% of parents of 2500 students presented at baseline were randomly selected for follow up by mail 18m later and 1262 returned the survey (50.5%)
Interventions	13 lesson school-based social influences resistance curriculum; mass media programming; community organization; a parent education programme, and health policy change. In Indianapolis it is called the Indiana Students Taught Awareness and Resistance programme (I-STAR)
Outcomes	1. cigarette use in the past 30 days and past 7 days, measured with 7 response categories 2. combined index of past 30 day and 7 day use 3. samples of CO in expired air were collected but not analyzed 4. parental smoking from none to > 1 pack/day 5. parental activities participation score
Notes	Category 3 study: 1. Randomization bias: minimal risk; method of randomisation not stated; 2. Performance bias: moderate risk: 72.9% of parents reported participation in at least 1 programme component; 66.3% helped children with homework exercises linked to the I-STAR curriculum; 23% participated in the parenting skills workshop; and 23% participated in drug community prevention activities 3. Attrition bias: high risk: 25% of students and 50% of parents by 18m; attrition analysis showed that students present at both baseline and 18m were significantly more likely to be higher SES, White, and have a lower lifetime prevalence of alcohol and lifetime and 30 day cig use; parents who completed a survey were significantly more likely to be of high SES, White, and have a lower lifetime prevalence of alcohol and lifetime and 30 day cig use; no differential attrition analysis 4. Detection bias: minimal risk 5. Power calculation: no power computation 6. Statistical bias: minimal risk: multiple regression with multiple covariates

Allocation concealment B – Unclear

Study	Schaps 1986
Methods	Country: USA Site: Napa Valley United School District, California Focus: For Drug Education I and II studies, focus on tobacco, drugs and alcohol; Cohort I and II studies on drug addiction were quasi-randomised and are excluded here; 8 other programmes on classroom management techniques without a tobacco component are excluded here. Design: Napa Project: Drug Education I and II Studies: randomized schools to treatments. Analysis: not stated.
Participants	250 students in the Drug Education I study; 237 in Drug Education II;
Interventions	(1) For Drug Education Studies I and II: 12 session tobacco, alcohol, and marijuana intervention. The tobacco, alcohol and marijuana intervention was 12 sessions to: (1) enhance students' decision-making, goal-setting and assertion skills; (2) increase understanding of human motivation using Maslow's framework; peer social influences; and the methods used to advertise alcohol and tobacco; and (3) increase knowledge of the psychological and social consequences of tobacco, alcohol and marijuana use.

Characteristics of included studies (Continued)

Cohort I and II studies on drug addiction were quasi-randomized and are excluded here. The other 8 studies are classroom management techniques unrelated to addictions and are excluded here.

(2) Control: no statement whether received intervention;

Outcomes	Smoking and drug use, not further defined
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: high risk: process data were gathered to monitor implementation of the programmes but are not stated; 'only a minority of experimental students were exposed to prevention strategies during all three years because many of the teachers did not participate in in-service training'. 3. Attrition bias: high risk: overall attrition was 'substantial', and greater in the control group; no attrition analysis; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: moderate risk: no adjustment for clustering;
Allocation concealment	B – Unclear

Study	Scheier 2001
Methods	Country: USA Site: NE USA Focus: alcohol, cigs and tobacco Design: schools were blocked on cig use, then randomly assigned to 1 of 2 interventions or a control group Analysis: latent variable structural equation modeling (SEM); confirmatory factor analysis (CFA)
Participants	Baseline in 7th grade: 3288 10th grade: 2228 (68%) Gender: 48% F
Interventions	15 session Life Skills Training (LST) programme with normative education (drug-specific cognitions, including the short- and long-term consequences of substance use; knowledge about the levels of drug use among adults and adolescents; information about smokers' rights and the declining social acceptability of smoking; media pressures to smoke, drink or use drugs; techniques used by cigarette and alcoholic beverage advertisers; and techniques to resist pressure to smoke, drink or use drugs); social skills (improving interpersonal skills; effective communication; initiating social interactions; conversational skills; complimenting; skills relating to boy/girl relationships; verbal and non verbal assertiveness skills); and social and personal competence (self-management; critical thinking; responsible decision-making; coping with anxiety by cognitive and behavioural self-control strategies) in the Fall of the 7th grade + 10 booster sessions in the 8th grade + 5 booster sessions in the 9th grade Experimental Grp 1 received a 1-day training workshop for teachers with feedback about implementation; Experimental Grp 2 received the same workshop plus a 2 hr videotape but no implementation feedback Control: no training or prevention curriculum
Outcomes	Self-reported answers to one question: 'How much do you generally smoke now?' rated from 1 (never) to 7 (> pack/day)
Notes	Study Category 2: 1. Randomization bias: minimal risk; method of randomization not stated 2. Performance bias: moderate risk (no process analysis); 'Teachers were given primary responsibility for implementing the prevention curriculum'. 3. Attrition bias: minimal risk: 32% attrition; attrition analysis showed no differential attrition 4. Detection bias: minimal risk 5. Power computation: no power computation; 6. Statistical bias: minimal risk: latent variable structural equation modeling (SEM); confirmatory factor analysis (CFA)
Allocation concealment	B – Unclear

Characteristics of included studies (Continued)

Study	Schinke 1984
Methods	Country: USA Site: Washington state Focus: Smoking prevention Design: Schools randomised to 2 experimental and 1 control group.
Participants	234 6th graders No assessment of attrition.
Interventions	1. Skills-Building intervention Group: received (a) information about adolescent smoking from films and testimonials by Junior High students, analyzed advertisements, did homework to note environmental events that stimulate or discourage smoking; and (b) an additional 8 sessions to develop refusal skills, viewed videotapes of peers refusing cigs, then practised refusals and received praise and coaching; 2. Attitude Modification intervention Group: received: (a) the same information about adolescent smoking from films and testimonials by Junior High students, analyzed advertisements, and did homework to note environmental events that stimulate or discourage smoking; and (b) in addition participated in quizzes, contests, and debates to weigh the merits of non-smoking, and made a public commitment not to smoke. Interventions were delivered by pairs of graduate students, who received training in skills-building and attitude modification; 3. Control Group: no statement of whether the control group received an intervention.
Outcomes	Smoking: Cig use, not further specified. Saliva thiocyanate assessed.
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; no statement of equivalence at baseline; 2. Performance bias: high risk: no process analysis; 3. Attrition bias: high risk: No assessment of attrition; analysis of differential attrition; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: high risk: No statistical analysis was presented; no assessment of the effects of clustering;
Allocation concealment	B – Unclear

Study	Schinke 1985a
Methods	Country USA Setting: 9 elementary schools, Washington State Focus: smoking prevention Design: 3 schools randomized to each condition Analysis: School as unit of analysis, Scheffe contrasts on % smoking in past week at each time
Participants	Number at pretest 689 Age: 6th grade, mean 11.76 Gender: 53% F Lower to middle SES Follow up 91% to 94% by condition. No differential attrition.
Interventions	Experimental Grp 1: 10-session Skills Training and Information intervention: (1&2) health and smoking-related films; (3&4) peer testimonials and group discussion; (5) problem solving; (6) techniques to resist urges and temptations; (7) dealing with interpersonal pressures to smoke; (8&9) additional components of 5-7; (10) review. Students also had homework; Experimental Grp 2: Information intervention: sessions 1-4, and 5 sessions with debates, quizzes, and anti-smoking skits. Interventions were delivered by graduate social workers, who received 40 hrs training prior to randomization to intervention 3. Control group: measurements only.

Characteristics of included studies (Continued)

Outcomes	Primary outcome was smoking in past week. Saliva thiocyanate measured. Follow up: post-test, 6m, 12m and 24m
Notes	Study Category 3: 1. Randomization bias: minimal risk: no differences between schools at pre-test; method of randomization not stated; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: minimal risk: attrition was 6-9%, no differential attrition; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: high risk: no adjustment for clustering; no significance levels presented;
Allocation concealment	B – Unclear

Study **Schinke 1985b**

Methods	Country: USA Setting: 3 elementary schools, Washington state Focus: smoking prevention Design: 1 school randomly assigned to each of 2 interventions, or pre- and post-test only.
Participants	Number at pretest 193 Age; 6th grade 97% of eligible students at pretest Attrition: no sig diffs
Interventions	Experimental Grp 1: 10-session skills training and information intervention: problem solving, resistance to offers to smoke, interpersonal pressures to smoke, and health information about smoking; Experimental Grp 2: 0-session Attention Placebo Information Intervention: health information, debates, quizzes, and anti-smoking skits. Both interventions included films, peer testimonials, and the influence of the media. Interventions were delivered by graduate assistants; 3. Control group: pre- and post-tests only.
Outcomes	Main outcome was weekly smoking. Saliva samples analyzed for thiocyanate. Process data collected on delivery of interventions and subject participation Follow up: post-test, 6m, 1yr, 2yrs
Notes	Study Category 2: 1. Randomization bias: minimal risk: no differences between the groups at baseline; no statement of method of randomisation; 2. Performance bias: minimal risk: 'Observational data from the 2 research assistants showed agreements between written protocols and the in vivo delivery of both interventions. Research assistants' recordings of subject participation indicated uniformly high rates and no differences between Skills and Attention-placebo intervention conditions'. 3. Attrition bias: minimal risk: attrition at 24m 5.6% for the skills-building, 7.1% for the attention-placebo, and 7.7% for the control groups; no differential attrition; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: moderate risk: no adjustment for clustering;
Allocation concealment	B – Unclear

Study **Schinke 1985c**

Methods	Country: USA
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Characteristics of included studies (Continued)

	<p>Setting: 4 elementary schools, Washington state Focus: smoking and smokeless tobacco prevention Design: schools randomly selected and randomly assigned to 2 experimental interventions, a pre- and post-test or post-test only controls; Analysis: X2; t-tests;</p>
Participants	<p>Number at pretest 331 Age; 6th grade Attrition: no sig diffs</p>
Interventions	<p>Direct comparison of skills training and information Experimental Grp 1: Skills: problem solving, resistance, interpersonal pressure in addition to health information Experimental Grp 2: Health information, debates, quizzes, antismoking skits. Both interventions included films, peer testimonials and commitments to non-smoking Duration: 8 x 50 min weekly sessions Providers: 4 pairs of graduate social workers leaders, 40 hrs training prior to randomization to intervention Control 1: pre- and post-test only Control 2: post-test only</p>
Outcomes	<p>Main outcome was ever-smoking, reported as change in % between test points. Follow up: post-test, 6m, 12m and 15m</p>
Notes	<p>Study Category 3: 1. Randomization bias: minimal risk: groups similar at baseline in age and gender and parental smoking but student smoking rates were not compared; method of randomization not stated; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: minimal risk: no sig diffs; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: high risk: no statistical analysis, and no correction for clustering;</p>
Allocation concealment	B – Unclear

Study **Schinke 1986a**

Methods	<p>Country: USA Setting: 12 elementary schools, Washington state Focus: smoking and smokeless tobacco prevention Design: schools randomly selected and randomly assigned to 3 conditions Analysis: Duncan multiple-range comparisons</p>
Participants	<p>Number at pretest 1281 Age: 5th and 6th graders 4% smoked at baseline Attrition: average at 2yrs 10%, no group differences</p>
Interventions	<p>Experimental Grp 1: Discussion intervention group received 8 lessons on information about smoking and use of smokeless tobacco. Peer testimonials noted alternatives to tobacco use. Students debated health effects, lifestyle and economic effects of tobacco use, and games focused on negative aspects of tobacco use, parodies of TV quiz shows, and skits on tobacco advertisements. Students also did homework assignments; Experimental Grp 2: Discussion and Refusal Skills Training intervention group received the same 8 lessons as the information group, and also learned methods to deal with peer pressure and to use problem-solving methods to identify peer pressure and personal temptation to use tobacco. They learned to generate solutions to such problems, and to choose the best solution. Students practised refusing invitations to smoke, and gave each other praise and coaching. Whether the control received an intervention was not stated.</p>
Outcomes	<p>Primary outcome was smoking or smokeless tobacco use in previous 7 days.</p>

Characteristics of included studies (Continued)

25% of saliva samples were tested for thiocyanate, and levels in micrograms/ml correlated 0.37 with reported tobacco use ($P < 0.001$).
Follow up: post-test, 6m, 12m and 24m.

Notes	<p>Study Category 2:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk: groups similar at baseline; method of randomization not stated; 2. Performance bias: minimal risk: intervention groups were equivalent on student attention, involvement and participation; 3. Attrition bias: minimal risk: 10% attrition; no differential attrition among groups; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: moderate risk: not adjusted for clustering;
Allocation concealment	B – Unclear

Study	Schinke 1986b
Methods	<p>Country: USA Setting: 2 elementary schools, Washington state Focus: smoking prevention Design: 1 school randomly assigned to each of 2 interventions Analysis: differences of means;</p>
Participants	<p>Number at pretest 65 Age: 6th grade 54% F Attrition: not stated</p>
Interventions	<p>Direct comparison of skills training and information Experimental Grp 1: Skills: problem solving, resistance, interpersonal pressure, role play Experimental Grp 2: Health information, debates, quizzes, antismoking skits. Duration: 8 x 50 min weekly sessions for experimental and placebo Providers: pairs of graduate assistants</p>
Outcomes	<p>Weekly smoking. Saliva samples analyzed for thiocyanate. Follow up: post-test, 6m, 12m, 24m</p>
Notes	<p>Study Category 3:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: minimal risk: 3. Attrition bias: high risk: no attrition stated; no attrition analysis; 4. Detection bias: minimal risk: 5. Power computation: high risk: no power computation: only 1 school per condition, very small numbers; 6. Statistical bias: moderate risk: no correction for clustering
Allocation concealment	B – Unclear

Study	Schinke 1986c
Methods	<p>Country: USA Site: 3 schools in ?Seattle Focus: Tobacco prevention Design: schools randomly allocated. Analysis: ANOVA</p>
Participants	<p>214 5th and 6th graders There were no differences in smoking rates at baseline among the groups, and no differential attrition.</p>
Interventions	Skills training versus attention control

Characteristics of included studies (Continued)

Intervention: Information about the effects of smoking; problem solving; self instruction about how to stay calm; communication skills; media analyses.
 Attention control: Information and games, quizzes and debates.
 Both groups taught by social workers
 Duration: 8 x 50 min sessions
 Control: no intervention, pre- and post test only

Outcomes	Smoking behaviour. Saliva thiocyanate used for biochemical validation
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; no differences in smoking rates at baseline among the groups, 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: no statement of attrition; no differential attrition; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: moderate risk: no adjustment for clustering;
Allocation concealment	B – Unclear

Study **Schinke 1988**

Methods	Country: USA. Site: 2 Indian reservations in western Washington state. Focus: Prevention of smoking, alcohol and drug use. Objective: Assess the effects of a 10 session prevention programme. Design: 137 Indians aged 11yrs were randomized by reservation to intervention and control conditions. Analysis: ANOVA and MANOVA; Tukey-Kramer procedures for paired comparisons.
Participants	Number at pretest: 137 Age: 11.8yrs. Gender: 54% F Experimental and control groups were similar at baseline. At 6m follow up attrition was 9%
Interventions	Experimental Grp: Programme to learn bicultural competence skills taught by American-Indian counsellors. Communication, coping and discrimination skills, modeled, coached and praised turning down substance offers from peers without offence, taught self instruction and relaxation to help refuse offers of substances, rewarded refusals, anticipated temptations, predicted high-risk situations, built networks with friends and family, homeworks supporting each others' refusals. Duration: 10 sessions Control group: No programme.
Outcomes	Definition of smoking: Self-reported smoking in previous 14 days Duration of follow up: 6m.
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: minimal risk: attrition 8% at 6m with no differential attrition between groups; 4. Detection bias: minimal risk: 5. Power computation: not performed: N only 137 6. Statistical bias: moderate risk: no adjustment for clustering;
Allocation concealment	B – Unclear

Study **Schinke 2000**

Methods	Country: USA Setting: 27 schools from 10 reservations in N. and S Dakota, Idaho, Montana, and Oklahoma.
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Characteristics of included studies (Continued)

	<p>Focus: tobacco, alcohol, and marijuana.</p> <p>Design: RCT, with control group receiving no intervention.</p> <p>Analysis: One-way ANOVAs, with individuals as the unit. Significant omnibus F-ratios from the ANOVAs were then tested with Scheffe's post-hoc multiple comparison tests.</p>
Participants	<p>1,396 3rd. to 5th. graders</p> <p>After 3.5 years 1177 (86%) remained.</p> <p>No differences in baseline substance abuse levels between groups;</p>
Interventions	<p>Experimental Grp: Tobacco, alcohol, and marijuana intervention (15 sessions + 12 boosters) designed to help them resist pressures within the Native community and the wider society to use substances. Within the context of Native American culture they learned problem-solving, personal coping, and interpersonal communication skills for preventing substance abuse, which were explained by group leaders, then demonstrated by older peers, and practised by the students. Every session incorporated Native American values, legends and stories and holistic concepts of health, and also drew on cultural materials specific to individual communities to take account of the wide variations among Plains Indians. Community members were mobilised to support the youth's activities.</p> <p>The control group received no intervention.</p>
Outcomes	<p>Smoking was defined as 7 or more cigarettes or uses of snuff/chewing tobacco in the week prior to each measurement. Saliva cotinine was collected at each test, and the correlation with self-reported smoking and smokeless tobacco use was $r = 0.53$.</p>
Notes	<p>Study Category 2:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk: groups equal at baseline; method of randomization not described; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: minimal risk: 14% attrition; no differential attrition; 4. Detection bias: minimal risk: 5. Power computation: not performed: 6. Statistical bias: moderate risk: no adjustment for clustering; covariates were not included in post-baseline analyses.
Allocation concealment	B – Unclear

Study

Schofield 2003

Methods	<p>Country: Australia</p> <p>Site: 24 public secondary schools in the Hunter Valley Region of NSW, of which 22 participated</p> <p>Focus: tobacco prevention</p> <p>Design: Health Promoting Schools programme: 24 schools randomly selected from 31 schools, then randomized to intervention or control;</p> <p>Analysis: Initial analysis showed no statistically significant effect of schools in predicting smoking and, therefore, LR was used instead of cluster-based multilevel analysis</p>
Participants	<p>Baseline: 4841 (intervention 2573; control 2268); Although 24 schools randomized, only 22 participated, i.e. 12 intervention and 10 control.</p> <p>After 2yrs: 1852 (38%)</p> <p>Age: Yr 7-8 students, followed to Yr 9-10</p> <p>Gender: 55% F</p>
Interventions	<p>Intervention schools: Health Promoting Schools intervention, with schools encouraged to adopt health promoting strategies to address health risk behaviours; information leaflets; school newsletters for parents; letters to tobacco retailers; development of policies for smoke-free schools; encouragement of non-smoking parents, peers, and teachers as role models; peer influence programmes; and incentive programmes</p> <p>Control schools: if they requested, they were offered help for other health promotion projects; and smoking-specific support at the completion of the research project; not stated if received other interventions</p>
Outcomes	<p>Self-reported smoking: never; just a few puffs; < 10 cigs in life; > 10 cigs in life; number of cigs in past 7 days;</p>
Notes	<p>Study Category 2:</p>

Characteristics of included studies (Continued)

1. Randomization bias: minimal risk; method of randomization not stated
2. Performance bias: minimal risk: 100% of schools ensured curriculum covered effects of smoking; 100% distributed the smoking pamphlet to parents; 83% implemented a school no-smoking policy; 83% distributed letters to tobacco retailers; 83% had discussion groups or conducted surveys with parents; 58% followed up with action after the discussion groups or survey; and 33% trained leaders to deal with smoking issues;
3. Attrition bias: moderate risk: 48% of drop-outs were from the intervention and 52% from control ($P < 0.05$); 18% of those lost to follow up had smoked in the last week compared to 8% of those remaining in the study); no analysis of differential attrition of smokers from intervention and control groups;
4. Detection bias: minimal risk
5. Power calculation: no power computation
6. Statistical bias: minimal risk: Initial analysis showed no statistically significant effect of schools in predicting smoking; and therefore LR was used instead of cluster-based multilevel analysis

Allocation concealment B – Unclear

Study **Scholz 2000**

Methods Country: Germany
 Site: 15 Gymnasien (59 classes) and 13 Realschulen (25 classes) in 3 towns (Hanau, Darmstadt, Offenbach) in Hesse.
 Design: Half of each class was randomized to experimental and control groups, with more allocated to the experimental group due to inexact enumeration of classes.
 Focus: The focus of the intervention was on tobacco, but the screening questionnaire also asked about alcohol and drug consumption.
 Analysis: Percentages.

Participants 1956 13yr olds (98.3% of possible); 1080 experimental, 876 control.

Interventions 8 x 60 min lessons delivered by non-smoking physicians: (1,2) function of the heart, circulation and lungs; (3) action of the pulse and blood pressure; (4) motivations for smoking and non-smoking, prevalence rates, consequences; (5,6) role plays about conflicts between smokers and nonsmokers, developed by participants; (7) cigarette advertising; (8) quiz with small prizes.
 The control group received 'no particular instruction'.

Outcomes Smoking defined as at least 1/week; at least 1 in the last 24 hrs.

Notes Study Category 3:
 1. Randomization bias: minimal risk: method of randomization not stated;
 2. Performance bias: moderate risk: no process analysis;
 3. Attrition bias: high risk: the students for whom code numbers were lost by the schools could not be tested, and the analysis is limited to the 1598 for whom there were code numbers both at pretest and 2yrs later
 4. Detection bias: minimal risk;
 5. Power computation: no power computation
 6. Statistical bias: moderate risk: no adjustment for clustering;

Allocation concealment B – Unclear

Study **Severson 1991**

Methods Country: USA
 Site: 22 schools (13 middle, 9 high) in Lane County, Oregon
 Focus: Smokeless tobacco (ST) and cig prevention/cessation
 Design: Project PATH [Programs to Achieve Teen health]: rural schools blocked into 3 high use and 3 low use clusters and randomized to treatment conditions within blocks - remaining urban schools were randomly assigned to treatment conditions (blocking variable: high vs middle schools)
 Analysis: X2 ANOVA, ANCOVA, LR, with students as unit of analysis.

Characteristics of included studies (Continued)

Participants	Pretest: 2552 (1434 middle school, 1118 high school), 4.7% parental refusal, 2% of students chose not to complete questionnaire Age: not stated Gender: approx 50/50 Ethnicity: not reported Follow up: 69%. Attrition analyses revealed no sig diffs between groups, but fewer high school than middle school students were available at follow up
Interventions	Experimental Grp: Social-influences model; overt and covert pressures to use tobacco. Refusal skills training. 7 videos standardized instruction and maintained students' interest. Parents were sent 3 brochure messages. See Biglan studies for similar programme Deliverer: regular science or health teachers. 5/7 sessions included activities led by peer leaders. Teachers received 2-3 hrs training; peer leaders received 2 half-days of training. Duration: 7 sessions over 2-3ws; Control: no intervention - usual curricula
Outcomes	Expired air and saliva samples. Smoker defined as a student with an expired air CO > 10 ppm; self report of no smoking but expired air CO > 20 ppm reclassified as a smoker. Due to cost, saliva samples were not analyzed. Self report of daily, weekly, monthly and 6-monthly smoking. Index based on weighted average of use in last day, week and month computed. Follow up: 12m
Notes	Study Category 2: 1. Randomization bias: minimal risk: method of randomization not stated; the 1 high school in 1 urban district was assigned to the experimental group; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: minimal risk: 31% attrition; attrition analyses revealed no sig diffs between groups, but fewer high school than middle school students were available at follow up; 4. Detection bias: minimal risk: 5. Power computation: no power computation: 6. Statistical bias: moderate risk: although ICCs were computed, they were not used to correct for the effects of clustering;
Allocation concealment	B – Unclear

Study **Shope 1996**

Methods	Country: USA Site: 179 classes in 6 school districts in Michigan
Participants	Baseline: 4730 6th and 7th grade students; Equal gender distribution in experimental and control groups at baseline. Ethnicity not assessed at the request of school boards; rural boards were predominantly White, and urban boards predominantly Black.
Interventions	30 lesson cigs, smokeless tobacco, alcohol, marijuana, and cocaine intervention, with a focus on tobacco in the 5th grade, alcohol in the 6th grade, and on tobacco, alcohol, marijuana and cocaine in the 8th. The control group received no programme.
Outcomes	Smoking and smokeless tobacco use measured 'by a single item on current frequency of use'
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: teachers received 1 day of instruction, and copies of the curricula. Process analysis showed that 84% of teachers documented their teaching, and they reported having taught 92% of the 5th grade and 100% of the other grades' curricula; however, (i) some teachers delivered less than 50% of the programme; (ii) classes that received less than 50% of the intervention programme were included in the control group; (iii) the oldest cohort (which received only the 8th grade programme, and for which no programme was available in the 9th grade) were classified as programme students; (iv) whereas 'the three

Characteristics of included studies (Continued)

younger cohorts who, by virtue of their assignment to classroom teachers received only one year of curriculum were omitted from analyses’;

3. Attrition bias: moderate risk: attrition analyses were conducted only for the 6-7th grade cohort, and excluded 703 students who received only 1yr of the programme: these analyses found no differences at pretest between the longitudinal and attrition students on use of cigarettes, but attrition students reported higher smokeless tobacco use;

4. Detection bias: minimal risk:

5. Power computation: no power computation:

6. Statistical bias: minimal risk: no correction for clustering;

Allocation concealment B – Unclear

Study	Spoth 2001
Methods	<p>Country: USA</p> <p>Site: 6th graders in 33 rural schools in 19 contiguous counties in a midwestern US state [Iowa].</p> <p>Focus: tobacco, alcohol, marijuana prevention</p> <p>Design: ISFP and PDFY programmes: 33 rural schools in a midwestern US state were blocked on school size and proportion in lower income households identified; schools then randomly assigned to 1 of 2 interventions or control:</p> <p>Analysis: multilevel mixed model ANCOVA; dichotomous outcomes by z tests; for the 6ye follow-up growth curve analysis was used;</p>
Participants	<p>Baseline: 1309 eligible families, of whom 667 (51%) completed the pretest;</p> <p>10th grade follow up: 447 (67%); and 373 families (56%) completed all 5 data assessments across 4yrs;</p> <p>Follow up at age 18:</p> <p>Age: 6th graders, age 11</p> <p>Gender: 55% F</p>
Interventions	<p>Intervention 1: the 7-session Iowa Strengthening Families Program (ISFP) used concurrent 1 hr sessions for parents and children: parents were taught to clarify expectations; use appropriate discipline; manage strong emotions regarding their child; effectively communicate with their child; and the children’s sessions paralleled the parents’ sessions and also included peer resistance and peer relationship skills training; during family sessions family members practiced conflict resolution and communication skills and engaged in activities to increase family cohesiveness and positive involvement of the child in the family;</p> <p>Intervention 2: the 5-session Preparing for the Drug Free Years Program (PDFY), which hypothesizes that bonding to prosocial others is a key protective factor against substance abuse, and that bonding with family members facilitates bonding with school and prosocial peers. 4 sessions were for parents only: parents were instructed on risk factors for substance abuse; developing clear guidelines on substance-related behaviours; enhancing parent-child bonding; monitoring compliance with their guidelines and providing appropriate consequences; managing anger and family conflict; and enhancing positive child involvement in family tasks; in 1 session children were instructed on peer resistance skills;</p> <p>Control: 4 mailed booklets (physical and emotional changes in adolescence; and parent-child relationships).</p>
Outcomes	<p>Ever smoked, ever used chewing tobacco, cigs per day, and number of times chewed tobacco in the past month.</p>
Notes	<p>Study Category 1:</p> <p>1. Randomization bias: minimal risk: schools were randomly assigned by computer;</p> <p>2. Performance bias: minimal risk: (a) for the PDFY programme a process analysis showed that all teams covered all key concepts, and 69% of the detailed tasks in the group leaders’ manual were completed. Of the attending families, 93% attended at least 4/5 sessions. The leaders covered all of the key concepts, and of the activities in the group leader’s manual, 87% were covered in the family sessions, 83% in the parent sessions, and 89% in the youth sessions; (b) for the ISFP intervention, 94% of attending families were represented by 1 family member in 5 or more sessions, and observation of ISFP teams showed that all key programme concepts were covered;</p>

Characteristics of included studies (Continued)

3. Attrition bias: minimal risk: although only 447 remained at 4yrs, there was no differential attrition across groups; a multiple imputation Monte Carlo software programme (NORM) showed that attrition did not affect the findings; there was also no differential attrition after 6yrs;
4. Detection bias: minimal risk;
5. Power computation: no power computation;
6. Statistical bias: minimal risk: the groups were equivalent at baseline and multilevel analyses with logistic growth curve techniques controlled for the effects of clustering; multilevel mixed model ANCOVA; dichotomous outcomes by z tests;

Allocation concealment A – Adequate

Study	Spoth 2002
Methods	Country: USA Site: 36 randomly selected schools in 22 contiguous counties with the same selection criteria as Spoth 2001; Focus: tobacco, alcohol and marijuana prevention; Design: SFP 10 Programme: Schools were randomly assigned to either the LST intervention; or the LST + SFP interventions; or control; Analysis: multilevel ANCOVA analysis controlled for the effects of clustering;
Participants	Pretest: LST 621; LST + SFP 549; control 494; Follow up at 1yr: LST 503; LST + SFP 453; control 416; Gender: LST 45.3% F; LST + SFP 46.5% F; Control 48.3% F
Interventions	Intervention 1: the Strengthening Families Program for Parents and Youth 10-14 (SFP 10, a revision of the Iowa Strengthening Families Program), which used 7 separate concurrent 1 hr sessions for parents and children: those for parents strengthened parental skills in nurturing, setting limits and communication about substances; those for children strengthened prosocial and peer resistance skills. 1yr later families were invited to participate in 4 x 1hr booster sessions; Intervention 2: Life Skills Training, which used homework and 15 x 45-min classes to provide knowledge about substance abuse, and promote youth skills in social resistance, self-management and general social skills, using coaching, facilitating, role modeling, feedback and reinforcement; One intervention group received LST, another both LST + SFP; 3. Control (no statement if received an intervention or usual care).
Outcomes	Self-reported never smoking;
Notes	Category 1 Study: 1. Randomization bias: minimal risk 2. Performance bias: minimal risk: adherence to the SFP programme was 92%, and to the LST programme 85%. Of the students who participated, the % attending 50% or more of the lessons were 100% for the LST programme; 100% for the LST booster; 90% for the SFP programme; and 89% for the SFP booster; 3. Attrition bias: minimal risk: no differential drop out between groups; 4. Detection bias: minimal risk; expired air samples were collected but not analyzed; 5. Power computation: no power computation; 6. Statistical bias: minimal bias: allocation was at the school level and multilevel analysis controlled for the effects of clustering;
Allocation concealment	B – Unclear

Study	Storr 2002
Methods	Country: USA Site: 9 public primary schools in Baltimore Focus: classroom management Design: within each school pupils were randomly assigned to 1 of 2 interventions: (1) the Classroom-Centered (CC) Intervention; or (2) the Family-School Partnership (FSP); or Control

Characteristics of included studies (Continued)

	Analysis: X2 and ANOVA to analyze pre-intervention equivalence of groups; LR to assess attrition; multilevel LR models; intention-to-treat analysis
Participants	Baseline: 678 1st graders; Follow up in 6th, 7th, and 8th grades: 566 (84%) Age: 5.3 - 7.7 years (av 6.2); Gender: 50% F
Interventions	Intervention 1: the Classroom-Centered (CC) Intervention: (a) language and maths curricula were enhanced with materials to encourage skills in critical thinking, composition, listening and comprehension; (b) whole-class strategies to encourage problem solving by children in group contexts, decrease aggressive behaviour, and encourage time on task; (c) strategies for children not performing adequately. Teams of children received points for good behaviour and lost points for behaviours such as starting fights. Points could be exchanged for classroom activities, game periods and stickers; Intervention 2. the Family-School Partnership (FSP): (a) the 'Parents on Your Side Program' trained teachers to communicate with parents and build partnerships, with a 3-day workshop, a training manual; and follow-up supervisory visits; (b) weekly home-school learning and communicating activities; (c) 9 workshops for parents; 3. Control group received usual curriculum and parent-teacher communications.
Outcomes	Self-reported time to initiation of smoking.
Notes	Study Category 1: 1. Randomization bias: low risk; (an e-mail from Dr. Ialongo states that a SAS programme generated the class lists and randomly assigned students; that children and teachers were randomly assigned to 1st grade within each of the 9 participating schools; and that there was balancing for gender and kindergarten teacher ratings of aggressive disruptive behaviour and academic readiness); 2. Performance bias: minimal risk: implementation scores for the CC intervention averaged 60% (range 30% to 78%), and parents in the FSP intervention attended an average of 4/7 sessions; teachers received 60 hrs of training and attended monthly meetings to discuss intervention issues and receive support; fidelity to the interventions was assessed at the monthly meetings and during observation of 3 classroom sessions during the year; the FSP group teachers were asked to document all contacts with parents; and parents reported on the interventions and the skill of the presenters; teachers rated the child's adaptation to school on a 6-point scale and family and household characteristics were assessed in a 60-min interview with parents; 3. Attrition bias: minimal risk: of the 678 pupils who entered Grade 1, 566 (84%) were assessed in Grade 8; and there was no differential attrition among groups across baseline characteristics or smoking status; 4. Detection bias: minimal risk; 5. Power computation: The power computation assessed that 150 children per group would be needed; with an av 30% cumulative risk of initiating smoking; between-group relative risk of initiating smoking = 1.75; and alpha 0.05, 2-tailed for 80% power. 6. Statistical bias: minimal risk: analysis was by intention-to-treat, with general estimating equations with a multivariate response profile approach;
Allocation concealment	A – Adequate

Study	Sussman 1993
Methods	Country: USA Site: 48 junior high schools in California Focus: Tobacco use prevention Design: Project Towards No Tobacco Use (TNT): schools randomly assigned within blocks defined by region (urban, rural), school type (middle school with 6th-8th grades, junior high with 7th-8th grades), and a composite based on school size, SES, language, income, academic status, ethnicity, population, age, tobacco use, to 1 of 4 programme conditions or to a 'usual care' control group Analysis: t-tests and ANCOVA.
Participants	6716 7th graders

Characteristics of included studies (Continued)

Age: 12-13yr olds; Gender: 50% F
 Ethnicity: 60% W, 27% H, 7% B, 6% Asian or other
 Follow up: 7219 9th graders of which 65% (4365) had attended a Project TNT school 2yrs before.

Interventions	<p>Social influence resistance training vs other approaches (note: some overlap between curricula) Project Towards No Tobacco Use (TNT)] Experimental Grp 1: Normative social influence (peer pressure) - refusal assertion skills training (active listening; ingratiation; cognitive restructuring; refusal learning; avoidance; refusal practice; escape and stress management; social activism; and public commitment); Experimental Grp 2: Informational social influence - social image misperceptions of tobacco (active listening; tobacco prevalence; values; advertising images; self-esteem; effective communication; starting/maintaining conversations; social problem solving; social image activism; and public commitment) Experimental Grp 3: Physical consequences of tobacco use (active listening; consequences course; addiction; diseases; cost of addiction; horrific images; Sean Marsee memorial; risk of consequences; consequences advocacy; and public commitment); Experimental Grp 4: combined Duration: 10 lessons in 7th grade academic year Control: 'usual care' standard health education programme.</p>
Outcomes	<p>Trial cig use; weekly cig use; trial smokeless tobacco use; weekly smokeless tobacco use Saliva or breath sample collected before each questionnaire administration, but not analyzed. Duration of follow up: 24m.</p>
Notes	<p>Study Category 2: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: minimal risk; 3. Attrition bias: moderate risk: there were more students at follow up than at baseline due to students joining the study (in the analysis turnover of approximately 7% per year was added to the model to adjust for this difference); and attrition from baseline was not estimated; 4. Detection bias: minimal risk; 5. Power computation: no power computation; 6. Statistical bias: minimal risk: 2 methods of data collection were used: for cohort 1 all 7th grade students at 20 of the schools were surveyed and followed as individuals; in cohort 2 students from the remaining 28 schools were surveyed as repeated cross-sectional partial samples of approximately 3 classes per school;</p>
Allocation concealment	B – Unclear

Study	Sussman 1995
Methods	<p>Country: USA Site: 29 school districts in a 5-county region of southern California (each district contained 1 Continuation High School for students unable to remain in regular high schools for reasons including drug abuse). Focus: Alcohol, tobacco and drugs. Design: Project TND (Towards No Drug Abuse), CHS (Continuation High Schools) and RHS (Regular High Schools) Analysis: SAS PROC MIXED ANCOVA analysis Study TND-1 [RHS]: trial in 26 classes in 3 regular high schools to assess whether the TND programme could be used in regular high schools. Study TND-II [CHS]: 18 continuation high schools, to compare the relative effectiveness of the TND programme as delivered by health educators or by self instruction.</p>
Participants	<p>TNDII- CHS trial: 2863 students in 21 schools were contacted (75% of those enrolled). Pretest data obtained from 2001 (70%). There were no sig diffs on 31 items of drug use and psychosocial correlates between the pretest sample and those measured at both pretest and 1yr. In Continuation high schools in the past month 57% used cigs, 64% alcohol, 55% marijuana, 21% stimulants, and 13% hallucinogens. %s for comprehensive high schools from overlapping school districts were 24%, 36%, 22%, 2% and 2% respectively.</p>

Characteristics of included studies (Continued)

The programme was taught by 9 project staff health educators, who were trained by the project manager, instructed in each session, and observed each session being taught once. In the 7 schools in the schools + school-as-community group, a volunteer staff member taught the school-as-community component.
 TND-II CHS trial at baseline: 715 students in 18 continuation high schools.
 TND-1 RHS trial at baseline: 679 students in 26 classes in 3 regular high schools.

Interventions	9 session health motivation, social skills and decision making curriculum about alcohol, marijuana, cocaine, and hallucinogen use. First 3 sessions motivated youth to listen to subsequent health programming and provided them with effective listening skills (listening, stereotyping, drug use myths, and denial sessions); 2nd set of 3 sessions instructed students in chemical dependency issues and alternative coping strategies (stages of chemical dependency, a talk show on the consequences of drug abuse, and stress coping sessions); 3rd set of 3 sessions encouraged making non-drug-use choices (self control skills, taking a moderate perspective, decision-making, and commitment sessions). After the first year three more sessions were added: a session on the confusion between the effects and causes of marijuana use and consequences on use; a session on tobacco cessation and coping with withdrawal; and a session on coping with feelings of anger that could lead to substance abuse or violence. The control group received 'standard care'.
Outcomes	Smoking measured on an 11 point scale (from 0 to 9 = 1 to 100+ times/month), and expired air CO measured.
Notes	Study Category 1: 1. Randomization bias: minimal risk: method of randomization not stated; no significant differences in drug use and 6 demographic variables when pretest sample compared to sample resurveyed after 2 years; 3. Attrition bias: minimal risk: no sig diffs on 31 items of drug use and psychosocial correlates between those measured at pretest and 1yr; at 2 years no significant differences in attrition rates across programmes 4. Detection bias: minimal risk: Health educators delivered the programme and received 2.5 hrs training for each session. At 1yr the process analysis showed that students attended 2/3 of the drug abuse sessions, with good adherence by educators to planned lesson delivery (99-100% in 10/20 lessons); all scores on class control appropriateness of the material were 5 or higher on a 1 to 7 scale; 5. Power computation: no power computation: 6. Statistical bias: minimal risk: Corrections for estimated ICCs between 0.013 and 0.019. If these correlations had not been included, the true standard errors would have been underestimated and the P values overestimated by 75-77% for the cluster (school) sizes.
Allocation concealment	B – Unclear

Study	Telch 1990
Methods	Country: USA Site: 2 junior high schools in southern California Focus: smoking prevention (other drug use also assessed) Design: (initial selection of schools not reported), 15 social studies classes in 1 school randomly assigned to one of 2 interventions or a control. Classes in other non-treated school were a non-random control Analysis: X2, no adjustment for clustering
Participants	Number at pretest (1984) 540 x 7th graders in randomized classes, 234 in control school Age: 12yrs. Approx 80% baseline never users in school 1 Gender: 47% F; Ethnicity: 24% W, 17% B, 19% H, 24% A, 16% O Follow up: complete pretest-post-test data from 81% in school 1; 58% from school 2
Interventions	Direct comparison of programme deliverer Experimental Grp 1: Peer-led; videotape social pressure resistance with vignettes, workgroups and worksheets; acute negative effects of smoking, social pressures to smoke, role modelling, resistance strategies, advertising/media influences. Same-age peers elected and given 1hr training Experimental Grp 2: As Grp 1 without peer leaders Duration: 5 sessions over 3w Control Grp 1: survey only

Characteristics of included studies (Continued)

	Control Grp 2: (not random) in another school: survey only, no intervention
Outcomes	Self-reported smoking [nonsmoker; experimental (< 1/week); regular (once/week or more). Individual students were tracked using coded questionnaires. Results presented both as pre and post prevalences, and as onset rates for baseline non-users. Expired CO (analyzed but not reported) and saliva ('bogus pipeline') Alcohol and marijuana use Duration of follow up: 7m (Oct - May)
Notes	Study Category 3: 1. Randomization bias: high risk: method of randomization not stated; and the control group in 2nd school was non-random; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: no attrition analysis; 4. Detection bias: minimal risk; 5. Power computation: no power computation; 6. Statistical bias: moderate risk: no correction for clustering;
Allocation concealment	C – Inadequate

Study	Tell 1984
Methods	Country: Norway Site: 6 schools in Oslo Focus: Multiple risk factors for adolescent health (reduce alcohol and smoking and improve nutrition and exercise). Design: 6 schools grouped into 3 pairs. 2 of the pairs randomly assigned to experimental and control, in 3rd the experimental school assigned, due to existing relationship. Analysis: ANOVA.
Participants	N at pretest (1979): 828 (80% of eligible sample) Age: 10-15yrs, 5th-7th grade. Gender: 50% F (of baseline nonsmokers at follow up). N at 2yr follow up: 486 baseline nonsmokers; some differential attrition across conditions.
Interventions	Experimental: Social influences programme (personal commitment not to smoke; discussion of social pressures; role plays; discussion of experiences; coping with social anxiety; plays about lifestyle and pressure to smoke; self pollution by smoking; wasting resources; passive smoking; long-term effects of smoking; social and health aspects of smoking; and a film 'Its Your Choice'). 2 sessions based on US programmes, 8 were developed by the Oslo staff. Student leaders were nonsmokers chosen by the staff and teachers. For cohort 1, first 5 sessions were taught by student peer leaders; for cohorts 2 and 3 the first 3 sessions were taught by student leaders; sessions 6-10 were taught by the study staff. Control: not stated. Duration: 10 x 45-mins over 17m.
Outcomes	Smoking = 'any current smoking'. Those who had never smoked or were not currently smoking defined as nonsmokers. The correlation between serum thiocyanate and the frequency of smoking was 0.41 (P < 0.001), but there was no relationship between thiocyanate levels and the number of cigs reportedly smoked the previous week. Follow up: 2yrs, 12yrs.
Notes	Study Category 3: 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: high risk: no process analysis; at the 12yr follow up 60% of the comparison group were under the impression that they had participated in the intervention; and the authors noted that younger students were more enthusiastic about being taught by older students; 3. Attrition bias: high risk: at 1yr only 486 students remained, with 54% attrition of the 13- and 14yr-old males in the control group and 25% in the experimental group, and similar attrition for 7th grade females);

Characteristics of included studies (Continued)

and there was also substantial attrition at the 10yr follow up (577 participated, with differential attrition of males, weekly smokers, and students from the control compared to the intervention schools);

4. Detection bias: minimal risk;
5. Power computation: no power computation;
6. Statistical bias: minimal risk: no correction for clustering;

Allocation concealment	C – Inadequate
Study	Unger 2004
Methods	Country: USA Site: 16 middle schools in southern California Focus: smoking prevention; multicultural curriculum vs same curriculum without multicultural content; Design: Project FLAVOR: schools randomly assigned to receive either the multicultural or the standard curriculum; Analysis: pre-intervention equivalence of groups assessed by X2 and ANOVA; LR assessed differential attrition; multilevel LR with school as a random effect assessed outcomes;
Participants	Baseline in 6th grade: 2775 invited; of whom 2131 (77%) provided parental consent; and of these 1978 (92%) completed the 6th grade survey; Follow up 1yr later: of those who completed the 6th grade survey 1571 (80%) completed 7th grade survey; Follow up 2yrs later: 2412 (76.4%) completed the 8th grade survey; Results are presented for 1430 never-smokers at baseline; Age: 11.3 years Gender: 54% F;
Interventions	Experimental Grp: Fun Learning About Vitality, Origins and Respect (FLAVOR) with 8 weekly lessons on social norms about smoking and refusal skills with multicultural examples and projects (e.g. Mexican soap opera; the Wheel of Life using the Yin-Yang concept); Control: 8 lessons on the same psychosocial issues about smoking with role-plays, trivia games, and art projects Co-interventions: all schools in California are legally obliged to provide tobacco education in grades 4-8
Outcomes	Lifetime smoking in 7th grade among 6th grade never-smokers
Notes	Study Category 2: 1. Randomization bias: minimal risk; 2. Performance bias: moderate risk; no process analysis; 3. Attrition bias: minimal risk: 23% attrition; no differential attrition; 4. Detection bias: minimal risk; 5. Power computation: no power computation; 6. Statistical bias: minimal risk: multilevel LR with school as a random effect assessed outcomes;
Allocation concealment	B – Unclear

Study	Vartiainen 1998
Methods	Country: Finland; Site: 40 schools; in North Karelia 24 schools were randomly assigned for the intervention to be taught by project workers, teachers, and trained peer leaders (8 schools); or by teachers (8 schools); or for teachers to provide written and audiovisual material but to receive no training or assistance from project educators (8 schools); in Kuopio county out of 36 schools 16 schools were randomly selected either for teachers to teach the intervention (8 schools), or to be controls (8 schools); Design: for the evaluation from the above sample of 40 schools 3 pairs of schools were chosen: 1 pair in capital, 1 in a small village for evaluation; 1 pair received programme from health educator; 2nd pair from teachers; 3rd pair were controls from another province; Analysis: separate analyses for individuals and schools; the authors state: '... there was surprisingly little difference in the results whether the unit was a school or a student'; no multilevel modeling;

Characteristics of included studies (Continued)

Participants	At baseline 7th grade students in 1978: 903 (health educator-led programme = 314; teacher-led programme = 299; control = 290); 15yr follow up in 1993: 640 (70%); health educator-led programme = 208 (66%); teacher-led programme = 210 (70%); control = 222 (77%);
Interventions	1. School Social Influences intervention: Pressures to smoke by peers, adults and mass media; and resistance skills; In 2 schools health educators and trained peer leaders led 10 sessions in grades 7-9; in other schools teachers led 10 sessions in the 8th grade; 2. The North Karelia Project for adults was also started in 1972; the authors did not separately assess any effect of this programme on the students and it was not directed to the students; 3. Mass media communication and community organization during the school prevention programme; the organizers did not separately assess the effect of these programmes on the students;
Outcomes	1 question 'Do you smoke now?' on a scale from 1 (not at all) to 5 (daily); daily smokers were asked for cigs/day;
Notes	Category 2 Study: 1. Randomization bias: minimal risk; 40 schools randomly assigned to 3 types of intervention or control; however only 6 schools were used for evaluation and these were selected non-randomly from the 40; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: minimal risk: 30% after 15yrs; no differential attrition; programmes that ignored missing data and which replaced missing data with previous observations obtained the same results; 4. Detection bias: minimal risk; 5. Power calculation: no power computation; 6. Statistical bias: minimal risk: separate analyses for individuals and schools
Allocation concealment	C – Inadequate

Study	Villalbí 1993
Methods	Country: Spain Site: 23 schools in Barcelona Focus: Prevent tobacco, alcohol and drug use Design: 25 schools agreed to participate, were stratified by school type, and were randomly assigned to experimental and control groups; 2 schools withdrew before the study commenced.
Participants	Target population: 2205; anonymous questionnaires completed by 2033 students present in March 1990, 2075 present in March 1991, and matched by demographic data; 1795 (86.5%) present at completion of study, 1723 responses at conclusion of the study. Age: 12-14 Gender: not stated N at follow up: 1723 At baseline the experimental group had slightly more one-time smokers ($P < 0.05$), regular smokers ($P < 0.01$) and those who had purchased tobacco ($P < 0.01$) than the control.
Interventions	Experimental Grp: Information on addictions; group pressures; mechanisms of advertising; personal experience; external pressures to use ATOD; the diffusion of addictive activities in society; difficulties in breaking addictions; confronting anticipated situations; personal expression of attitudes; information for parents Duration: 8 sessions Control: not stated
Outcomes	Definition of smoking: accepted a cigarette; smoked once; bought tobacco; regular smoker (weekly or daily) Duration of follow up: 1yr
Notes	Study Category 3: 1. Randomization bias: moderate risk: method of randomization not described; there was a higher proportion of smokers in the experimental group; 2. Performance bias: moderate risk: no process analysis; 3. Attrition bias: moderate risk: 15% attrition; no attrition analysis;

Characteristics of included studies (Continued)

4. Detection bias: minimal risk;
5. Power computation: no power computation;
6. Statistical bias: moderate risk: no correction for clustering;

Allocation concealment B – Unclear

Study **Walsh 2003**

Methods	Country: USA Site: rural high schools in California Design: 177/222 randomly selected rural high schools in California contacted; 143 agreed to participate; 44 eligible schools stratified by spit tobacco usage and number and size of baseball teams then randomized to intervention or control; Analysis: multivariate LR for clustered data;
Participants	Baseline: 1084 (516 in 22 intervention schools; 568 in 22 control schools); Follow up at 1yr: 250/307 of ST users (81%) and 687/777 of nonusers (88%)
Interventions	1. Intervention: (a) peer-led 60-min educational team meeting on nicotine usage; mortality from tobacco; harmful ingredients in tobacco; addiction; tobacco industry advertising; ST changes in mouths of users; oral cancer; (b) dental examination and counselling to quit tobacco; 2. Control
Outcomes	ST current use; never used spit tobacco; tried but never used more than once a month; formerly used more than once a month but not in past month; saliva sample collected from all subjects; cotinine assay performed on a random subsample of 8% of ST nonusers;
Notes	Study Category 1: 1. Randomization bias: minimal risk; method of randomization not stated; 2. Performance bias: minimal risk: 86% attended the peer-led session; 76% of non-users and 77% of ST users received a dental examination; 3. Attrition bias: minimal risk: 81% users and 88% non-users remained at 1yr; 4. Detection bias: minimal risk: 5 (8%) of those who stated they did not use ST had cotinine levels > 10 ng/ml; 5. Power calculation: to detect an increase of 10% over a control group cessation rate of 1% with 90% power, one side alpha = 0.05, and ICC 0.04 required 334 users (44 schools); sample size achieved; 6. Statistical bias: minimal risk: multivariate LR for clustered data;
Allocation concealment	B – Unclear

Study **Walter 1985**

Methods	Country: USA Site: 22 elementary schools in Bronx (NY) Focus: Prevent cigarette smoking and improve fitness and nutrition Design: 'Know Your Body' Studies: Random assignment by school to intervention (14 schools) and control (8 schools). Analysis: School level, difference in risk-factor change. Linear regression to adjust for school differences
Participants	2283 eligible subjects, baseline risk factors measured in 1563 (68.5%) Age: 4th graders 25% W, 49% B, 23% H, 3% Asian or Pacific. 1115 (71.3%) at 1yr due to high mobility from inner schools and high absenteeism Follow-up data were computed for individuals. No differences at baseline and no differential attrition at 12m, except for serum thiocyanate (37.6 umol/L for those examined at the 12 m vs 35.0 umol/L (P < 0.036) for subjects lost to follow up).

Characteristics of included studies (Continued)

Interventions	<p>Intervention: 'Know Your Body' programme addressed nutrition, physical fitness and smoking components with 5 teaching techniques (modeling of desired behaviours, behavioural rehearsal, goal specification, feedback of results, and reinforcement for favourable behavioural change).</p> <p>Duration: 2 hrs/w over school yr, from 4th-8th grade</p> <p>Teachers received 1.5 days training. Teacher adherence to programme monitored.</p> <p>Control group received the results of their health screens and explanatory information (authors note that this may constitute a minor treatment effect)</p>
Outcomes	<p>Serum thiocyanate at first follow up, saliva cotinine subsequent (Blind analysis of double samples correlated $r = 0.97$)</p> <p>Follow up 1yr (from start of programme), 5yrs (Walter 1988).</p>
Notes	<p>Study Category 2:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: results of the process analysis not stated; 3. Attrition bias: minimal risk: 29% attrition; no differential attrition at 12m; 4. Detection bias: minimal risk; 5. Power computation: no power computation; 6. Statistical bias: moderate risk: no adjustment for clustering;
Allocation concealment	B – Unclear

Study **Walter 1986**

Methods	<p>Country: USA</p> <p>Site: 22 schools in 6 districts, Westchester County NY.</p> <p>Focus: Smoking prevention, improving nutrition and fitness</p> <p>Design: 'Know Your Body' studies: Randomization by district to intervention and control.</p> <p>Analysis: comparison of means adjusted for risk factors, age, gender, and ethnic origin by multiple linear regression, adjustment for unit of analysis</p>
Participants	<p>1822 eligible subjects, of whom baseline risk factors measured in 1525 (84%), similar in both experimental and control groups. Age: 4th grade, 9.0yrs.</p> <p>Gender: 47% F</p> <p>Ethnicity: 84% W, 9.5% B, 2% H, 4% Asian or Pacific.</p> <p>N at 12m follow up: 1215 (80%). No differences in health knowledge and behaviours at baseline among the groups.</p>
Interventions	<p>Intervention: 'Know Your Body' programme to prevent smoking, and improve nutrition and fitness, see Walter 1985.</p> <p>Duration: 2 class periods/w during the school year, 4th to 9th grade</p> <p>Control: Control group received the results of their health screens and explanatory information.</p>
Outcomes	<p>Definition of smoking: serum thiocyanate at baseline and 1yr (cut off for smoking ≥ 100 umol/L). At subsequent follow ups saliva cotinine (cut off = any detectable levels).</p> <p>Follow up reported after 1yr from baseline, 5yrs (Walter 1988), 6yrs (Walter 1989). Later results for 15 schools in 4 districts</p>
Notes	<p>Study Category 2:</p> <ol style="list-style-type: none"> 1. Randomization bias: minimal risk: method of randomization not stated; 2. Performance bias: moderate risk: researchers monitored teachers' proficiency in delivering the curriculum, but the results were not stated; 3. Attrition bias: minimal risk: 20% attrition; serum thiocyanate concentrations did not differ between those present at baseline and termination and those lost to follow up; 4. Detection bias: minimal risk; 5. Power computation: no power computation;

6. Statistical bias: minimal risk: adjustment for unit of analysis by multiple linear regression; Changes in risk factors for individual students were estimated by linear regression, averaged over schools, and schools were compared;

Allocation concealment B – Unclear

av = average (mean)

ATOD = alcohol, tobacco and other drugs

'bogus pipeline' = biochemical verification samples collected but not tested

CI = confidence interval

cig = cigarette

CO = carbon monoxide

DARE = Drug Abuse Resistance Education

Ethnicity: W -white; B -black; H -hispanic; A - Asian; O -other

Gender: M - Male; F -female

GLM = General Linear Model

ICC = Intraclass correlation calculation

LR = logistic regression

LST = Life Skills Training

m = month

N or No = number

NNT = number needed to treat

n.s. - not statistically significant

OR = odds ratio

ppm = parts per million

SD = standard deviation

SES = Socio-economic status

sig diff = significant difference

ST = smokeless tobacco

umol/L = micromole per litre

w = week

X² = chi squared

yr = year

Characteristics of excluded studies

Study	Reason for exclusion
Aarø 1983	Not an RCT. 'The schools had been divided into four groups in advance, and the package was presented in four different versions'.
Abernathy 1994	Programme aimed at tobacco vendors and changing city by-laws.
Andrews 1984	Not an RCT
Arciti 1986	Not an RCT
Ausems 2002	only 6 week post-test follow up for School, and 1 week follow up for School + Out of School group
Aßhauer 1999	Quasi-experimental pre-post design.
Barrueco 1998	Not an RCT
Beaglehole 1978	Not an RCT
Becker 1992	Not an RCT
Bergamaschi 2000	Not an RCT. 'Participation in the previous middle school campaign depended solely on the assent of teachers to the proposal of the work group; no other selection or randomization was made'.
Bloor 2000	No statement on randomization; 3 month follow up.
Botvin 1989a	RCT; but only 3.5 month follow up
Botvin 1989b	RCT; but only 4 month follow up

Botvin 1992	RCT; but only pre-test and post-test measurements.
Botvin 1997	Controlled trial, only 3 month follow up
Botvin 2000	Data collected only on illicit drugs, not on smoking behaviour
Botvin 2003	RCT; but only post-test at 3 months
Bowen 1991	Not an RCT.
Burke 1987	Not an RCT, and no smoking-related data reported
Burke 1992	Not an RCT; and no smoking related data
Calafat 1995	Programme description; no data on smoking behaviour reported.
Calman 1985	Pretest-post-test study with no follow up.
Charlton 1986	Controlled trial, not randomized, only 4 month follow up
Connell 1985	School Health Education Evaluation project: 20,000 children in Grades 4-7 in 20 U.S. States, but does not report if the study was randomized; and reports 'self-reported health practices' but within this category tobacco use is not identified.
Davis 1995	Quasi-experimental; pretest, 13 week intervention, then post-test conducted only 3 weeks after the intervention.
De Jong 1987	Not an RCT; post-test only.
Del Greco 1986	Not an RCT.
Dielman 1985	Not an RCT.
Donato 1994	No mention of randomization. 'The other 632 students not involved in the programme formed the control group'.
Dupont 1984	Only drug use knowledge and attitudes reported, no smoking-related data, also < 30 participants.
Epstein 2000a	Longitudinal survey; no intervention.
Errecart 1991	Not an RCT; no smoker/nonsmoker N's, no information on time/duration of intervention or follow up.
Evans 1978	RCT; but only 10 week follow up
Evans 1981	Not an RCT; 'junior high schools were assigned to three experimental and four control groups'.
Flay 1987	Not an RCT; quasi-experimental design: 'we selected one or more potential control schools comparable in size, ethnic composition and socioeconomic status'. Included in Cochrane review of mass media interventions for smoking prevention
Flynn 1992	Not an RCT; 2 pairs of US Standard Metropolitan Statistical Areas not randomized to treatments. Included in Cochrane review of mass media interventions for smoking prevention
Frydman 1985	Not an RCT.
Gillies 1984	Not an RCT.
Gislason 1995	Not an RCT.
Gohlke 1989	Not an RCT.
Gordon 1997	RCT; but school and community based; 6 month follow up, but community interventions introduced throughout that period.
Gritz 1992	18-60 year old females; 18 year olds not separately analyzed.
Hamm 1994	Does not report if the 1320 7th grade students in Omaha, Nebraska, were randomized to the 4 experimental and 3 control groups. At the 12 month follow up, more smokers quit in the experimental than the control groups (chi squared 4.70, one-tailed test, no P value reported), but there were no differences in nonsmokers staying nonsmokers.
Hanewinkel 1996	Not an RCT; quasi-experimental pre-test post-test.
Hanewinkel 2003	Not an RCT
Hanewinkel 2004	Not an RCT
Hansen 1982	No statement of randomization; only 9 week follow up.

Hansen 1988a	On page 96 the authors state that the study has a 'quasi- experimental design' with schools referred to as being 'assigned', and 'rather than being pure copntrols, they are more appropriately viewed as standard treatment comparison schools'. However, on p. 111 the authors use the words 'random assignment'.
Hansen 1996	Not an RCT; 'The study involved the entire eighth grade of the school ... All students had received D.A.R.E. in the fifth grade. Four of the eight classes participated in the seventh grade D.A.R.E. booster program .. and became a comparison group'. 4 month follow up.
Hansen 1997a	Not an RCT; students tracked over time by school number only, with low tracking rates between grades.
Harmon 1993	Quasi-experimental design.
Harrell 1996	RCT; but only 8 week follow up. Smoking rates low at baseline, and no change was reported.
Harrell 1998	RCT; no data reported on smoking behaviour, only on predictors of smoking
Higgs 2000	Not an RCT.
Hommel 1981	Controlled trial, not randomized
Hovell 1996	Not school-based.
Hurd 1980	Controlled trial, not randomized
Jason 1982	RCT, secondary prevention, no intervention for baseline nonsmokers
Johnson 1986	Controlled trial, not randomized
Katz 1989	RCT; only pre- and post-test
Kersch 1998	Not an RCT; the experimental groups were carefully 'made parallel' on demographic and pedagogical variables, and then compared to a corresponding control population.
Killen 1988	RCT, but only a 4 month follow up.
Killen 1989	RCT; but only 2 month follow up
Kim 1982	Not an RCT
Kim 1993	Not an RCT: '6 schools served as the experimental group while two randomly selected schools served as a control group'.
Knutsen 1991	RCT; family intervention, but no school intervention.
Kröger 2000	Not an RCT.
Lammers 1984	Quasi-experimental non-equivalent pre-test post-test design.
Ledwith 1985	Controlled trial, not randomized.
Lillington 1984	Those younger than 18 excluded.
Litrownik 2000	Pretest, 8 week intervention, then immediate post-test.
Luepker 1983	Not an RCT.
MacKinnon 1991	Not an RCT (the Kansas City part of the Midwestern Prevention Project was not randomized).
McAlister 1980	Controlled trial, not randomized.
McFall 1993	Participants > 18 years.
Moberg 1990	Not an RCT; control groups not randomized.
Moskowitz 1984	Not an RCT: non-equivalent control group. No smoking-related data (frequencies or %) reported.
Murray 1982	Not an RCT.
Murray 1984a	Not an RCT.
Newman 1991	RCT; no data on children's smoking; data on teachers' acceptance of the 'Smoking and Me' programme.
Nishioka 2005	Not an RCT
Olsen 1980	Not an RCT.
Parcel 1995	Not an RCT: the adoption of the Smart Choices intervention programme was made by the school administrators.
Pederson 1981a	RCT; but no data on smoking behaviour reported.

Pederson 1981b	Not an RCT, no Ns reported for smoker/nonsmoker groups, no follow up.
Pederson 1987	Not an RCT.
Pentz 1989	Not an RCT. The MidWestern Prevention Project was a community intervention with a school component. In the Kansas City study schools were not randomly assigned. However, in the Indianapolis study the schools were randomized. Chou 1998 reports effects for baseline substance users only.
Perry 1980	No an RCT
Perry 1990	Not an RCT.
Perry 1992	Minnesota Heart Health Program was quasi-experimental, and communities were assigned to intervention or control.
Perry 1999	No data on smoking behaviour; only attitudes and intentions
Pfau 1994	No smoking-related data reported, only attitudes to smoking.
Philips 1990	Study of the intentions of 3-6 year olds to protect themselves from adult smoking, with only a 6 week follow up. No data on smoking behaviour.
Pilgrim 1998	Not an RCT; no school intervention.
Piper 1971	Not an RCT. 'we allocated two thirds of them [schools] to the study and one third to the control group'.
Pomrehn 1995	Not an RCT: partial cross-sectional study, with no control group.
Price 1992	No data on smoking behaviour; no control group, post-test or follow up.
Price 1998	Controlled trial, not randomized. Reports no data on smoking behaviour; only knowledge, attitudes and smoking intentions.
Prokhorov 1994	Controlled trial, non random. Schools were randomly selected for intervention, but control schools were in a different district
Reimers 1990	Not an RCT.
Renaud 2002	Not an RCT.
Ringwalt 1991	RCT; but only pre-test post-test design.
Robinson 1999	RCT; but no data on smoking behaviour.
Rohrbach 1993	No data on smoking behaviour.
Sarvela 1987	Controlled trial, not randomized.
Schinke 1981	groups < 30 participants.
Schinke 1983	RCT; only pre- and post-test
Schinke 1994	RCT; but pre-test post-test only.
Schinke 1996	RCT; but community intervention.
Schinke 2004	Students recruited from community agencies not schools.
Scholz 1985	Not an RCT.
Secker-Walker 1997	Not an RCT.
Secker-Walker 1998	Females < 18 not analyzed separately from adults.
Seid 1994	RCT; but the control group schools were selected from a separate list; only 5 month follow up; 70% attrition at 5 months.
Shaffer 1983	Only a 3 month follow up.
Skinner 1985	Not an RCT.
Spitzzeri 1979	RCT; only 3 month follow-up
Steenkamp 1990	15-18 year olds not analyzed separately from 19-64 year olds.
Stone 1978	Controlled trial, not randomized; no assessment of smoking behaviour.
Sussman 2001B	Includes only smokers, without control or comparison group.

Characteristics of excluded studies (Continued)

Svoen 1999	Not an RCT; non-randomized selection of control group.
Szyborski 1999	No data on smoking behaviour; is a description of an anti-smoking programme for schools.
Tudor-Smith 1998	Quasi-experimental design
Turner 1993	No data on tobacco use, only on refusals of offers of tobacco immediately after 3 experimental stimuli.
Van Dyke 2002	Not an RCT
Vartiainen 1990	The North Karelia Project was a non-randomized community intervention
Wahlgren 1997	Trial in orthodontists' offices.
Webster 2002	Not an RCT
Werch 1991	Pre-test post-test design.
Wiist 1991	Not an RCT
Williamson 1981	Controlled trial, not randomized; no assessment of smoking behaviour
Worden 1988	Not an RCT.
Worden 1996	Mass-media intervention.
Wu 2003	RCT; no school component.
Young 1996	RCT; but pre-test post-test design; and no data on smoking behaviour.
Zavela 2004	Not an RCT.
Zoller 1986	RCT; but pre-test, post-test design with post-test only 2 weeks after the intervention.
Zollinger 2003	Not an RCT

N = number

ADDITIONAL TABLES

Table 01. MEDLINE

Search strategy

'SMOKING'/ all subheadings or 'SMOKING-CESSATION'/ all subheadings or SMOK* or TOBACCO or NICOTINE or SMOKING CESSATION
PREVENT* or STOP* or QUIT* or ABSTIN* or ABSTAIN* or REDUC* or TOBACCO USE DISORDER OR EX-SMOKER OR FREEDOM FROM SMOKING OR ANTI-SMOK*
#1 and #2
'HEALTH-PROMOTION'/ all subheadings
explode 'HEALTH-EDUCATION'/ all subheadings
'ADOLESCENT-BEHAVIOR'/ all subheadings
'PSYCHOTHERAPY,-GROUP'/ all subheadings
EDUCATION or PREVENT* or PROMOT* or TEACH* or (GROUP near THERAPY)
#4 or #5 or #6 or #7 or #8
#3 and #9
'CHILD-' or 'ADOLESCENCE'/ all subheadings or CHILD or ADOLESCEN* or STUDENT* or SCHOOL* or CLASS*
#10 and #11
(CLINICAL-TRIAL IN PT) OR (randomizED-CONTROLLED-TRIAL IN PT) OR (CONTROLLED-CLINICAL-TRIAL IN PT)
explode 'CLINICAL-TRIALS'/ all subheadings
'EVALUATION-STUDIES'
'PROGRAM-EVALUATION'/ all subheadings

Table 01. MEDLINE (Continued)

Search strategy

'META-ANALYSIS'
 SYSTEMATIC REVIEW
 RANDOM*
 #13 or #14 or #15 or #16 or #17 or #18
 #12 and #20

Table 02. CINAHL

Search strategy

#14 #9 and (trial* or meta-analysis or systematic review)
 #13 review
 #12 systematic
 #11 meta-analysis
 #10 trial*
 #9 #2 or #4 or #6 or #8
 #8 'Tobacco-Smokeless' /all topical subheadings / in-adolescence, in-infancy-and-childhood in DE
 #7 'Tobacco-Smokeless' / all topical subheadings / in-adolescence, in-infancy-and-childhood
 #6 'Smoking-Cessation-Programs' / all topical subheadings / in-adolescence, in-infancy-and-childhood in DE
 #5 'Smoking-Cessation-Programs' / all topical subheadings / in-adolescence, in-infancy-and-childhood
 #4 'Smoking-Cessation' / all topical subheadings / in-adolescence, in-infancy-and-childhood in DE
 #3 'Smoking-Cessation' / all topical subheadings / in-adolescence, in-infancy-and-childhood
 #2 explode 'Smoking-' / prevention-and-control in-adolescence, in-infancy-and-childhood in DE
 #1 explode 'Smoking-' / prevention-and-control in-adolescence, in-infancy-and-childhood

ANALYSES

Comparison 01. Information giving curricula versus control

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Results of Category 1 Studies			Other data	No numeric data
02 Results of Category 2 studies			Other data	No numeric data
03 Results of Category 3 studies			Other data	No numeric data
04 Smoking prevention (adjusted) - short term			Odds ratio (Fixed) 95% CI	Totals not selected

Comparison 02. Social competence curricula versus control

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Results of Category 1 studies			Other data	No numeric data
02 Smoking prevention (adjusted) - long term	2		Odds ratio (Fixed) 95% CI	0.77 [0.48, 1.22]
03 Results of Category 3 studies			Other data	No numeric data

Comparison 03. Social influences curricula versus control

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Results of Category 1 studies			Other data	No numeric data
02 Results of Category 2 studies			Other data	No numeric data
03 Results of Category 3 studies			Other data	No numeric data
04 Smoking prevention (adjusted) - short term	13		Odds ratio (Fixed) 95% CI	0.93 [0.84, 1.03]
05 Smoking prevention (adjusted) - long term	7		Odds ratio (Fixed) 95% CI	1.19 [0.99, 1.42]

Comparison 04. Combined social competence and social influences curricula versus control

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Results of Category 1 studies			Other data	No numeric data
02 Results of Category 2 studies			Other data	No numeric data
03 Results of Category 3 studies			Other data	No numeric data
04 Smoking prevention (adjusted) - short term	6		Odds ratio (Fixed) 95% CI	0.72 [0.45, 1.16]
05 Smoking prevention (adjusted) - long term			Odds ratio (Fixed) 95% CI	Totals not selected

Comparison 05. Social influences versus information-giving

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Results of Category 1 studies			Other data	No numeric data

Comparison 06. Social influences vs. social competence

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Outcomes for Category 3 studies			Other data	No numeric data

Comparison 07. Multi-modal programmes compared to single-component interventions

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Results of Category 1 studies			Other data	No numeric data
02 Results of Category 2 studies			Other data	No numeric data
03 Results of category 3 studies			Other data	No numeric data

Comparison 08. Sensitivity analyses: Social influences curricula versus control

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Smoking prevention -high quality only - (adjusted) - long term			Odds ratio (Fixed) 95% CI	Totals not selected
02 Smoking prevention - high quality only - (adjusted) - short term	5		Odds ratio (Fixed) 95% CI	1.07 [0.87, 1.30]

Comparison 09. Raw data results

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Short-term outcomes (< 18 months)			Other data	No numeric data
02 Long-term outcomes (> 18 months)			Other data	No numeric data

INDEX TERMS

Medical Subject Headings (MeSH)

Adolescent; *Program Evaluation; Randomized Controlled Trials; School Health Services [standards]; *Schools; Smoking [*prevention & control]

MeSH check words

Child; Child, Preschool; Humans

COVER SHEET

Title	School-based programmes for preventing smoking
Authors	Thomas R, Perera R
Contribution of author(s)	RT conceived the review and wrote the first edition (2002), with Dr Keith Busby as a co-author. For the current update, RP became co-author. RT and RP both extracted data. RT wrote the updated review, and RP provided statistical support and meta-analyses.
Issue protocol first published	1998/4
Review first published	2002/4
Date of most recent amendment	04 September 2006
Date of most recent SUBSTANTIVE amendment	20 April 2006
What's New	In comparison 03.04 of the 2006 update, the data for De Vries 1994 and De Vries 2003 were accidentally transposed. This has now been corrected for 2007 Issue 1 of The Cochrane Library. The results of the meta-analysis are unchanged.
Date new studies sought but none found	Information not supplied by author
Date new studies found but not yet included/excluded	Information not supplied by author

Date new studies found and included/excluded	30 March 2006
Date authors' conclusions section amended	Information not supplied by author
Contact address	Prof Roger Thomas Professor of Family Medicine Department of Medicine University of Calgary UCMC #1707-1632 14th Avenue Calgary Alberta T2M 1N7 CANADA E-mail: rthomas@ucalgary.ca Tel: +1 403 210 9200
DOI	10.1002/14651858.CD001293.pub2
Cochrane Library number	CD001293
Editorial group	Cochrane Tobacco Addiction Group
Editorial group code	HM-TOBACCO

Analysis 01.01. Comparison 01 Information giving curricula versus control, Outcome 01 Results of Category 1 Studies

GRAPHS AND OTHER TABLES

Results of Category 1 Studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Crone 2003	2562 completed baseline questionnaire; 1728 after the intervention; 941 at one year; some students did not complete identifiers so their subsequent measurements could not be linked; also 3 schools dropped out.		Intervention vs. usual curriculum: At one year 25% in the intervention and control in the 29% in the control smoked (ns); OR = 0.61 (0.41-0.90);	

Analysis 01.02. Comparison 01 Information giving curricula versus control, Outcome 02 Results of Category 2 studies

Results of Category 2 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Ausems 2004	Of the 3734 recruited, 3349 completed posttest questionnaires; 3014 after	At 12 months for pre-test non-smokers initiation of smoking was 25% in the	At 18 months smoking initiation was 27% in the out-of-school, 40% in the	

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	1 year; 2130 pretest non-smokers;	out-of-school group; 28% in the in-school group; 29% in the in-and-out-of-school group; and 41% in the control. (1) Intervention vs. no-intervention control: For the out-of-school group vs. control OR = 0.44 (95% CI 0.18 -1.09); (2) Intervention vs. Intervention: for the in-and-out-of-school vs. out-of-school OR = 1.85 (95% CI 0.71-4.83).		in-and-out-of-school group, and 48% in the control. (1) Intervention vs. no-intervention control: 3 lesson out-of-school OR = 0.42 (0.18 -0.96); (2) Intervention vs. Intervention: 3 lesson in-school + 3 letter out-of-school vs. 3 letter out-of-school, OR = 1.85 (0.71-4.83) (in favour of out-of-school);

Analysis 01.03. Comparison 01 Information giving curricula versus control, Outcome 03 Results of Category 3 studies

Results of Category 3 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Chatrou 1999	949 at baseline, of whom 846 (89%) available at 18 months follow-up: 78 [9%] of the 832 baseline nonsmokers, and 25 [23%] of the 107 baseline smokers were missing.	6 months: No significant differences in smoking (defined as any smoking vs. experimental or regular) between the experimental and control groups.	18 months: No significant differences in smoking between the experimental and control groups.	Methodological problems: (1) significant differences at baseline between groups in % smoking, intentions to smoke, gender, and education; (2) no power computation; (3) no biochemical validation; (4) no differential attrition analysis; and (5) no computation of ICC's. The school was the unit of assignment, and the individual the unit of analysis.
Denson 1981	Baseline approx 600 (numbers not precisely stated). Similar number responded at follow-up, but no evidence of tracking of individuals.		At 24 months follow-up: the number of regular smokers increased by 8 (total N=256) in the experimental group, and by 49 (N=272) in the control group (p <.001). Smoking prevalence rose from 14% to 17.5% in the experimental group and from 10.4% to 26% in the control (p <.01).	Methodological problems are that there was no biochemical validation; no statements about the method of randomisation, if blinded or concealed; no power computation; attrition of 13%; no ICC's; and no statistical modeling to assess effect of difference in unit of allocation and analysis. It is not clear that the analysis followed the same students, but the difference between smoking prevalence and recruitment rates was substantial.
Figa-Talamanca 1989	Baseline: 562; Baseline never smoking rates varied 47-61% by city. Attrition at 12 months: 7%	12 months: No statistically significant differences between intervention and control groups. Few baseline non-smokers became regular daily smokers in any group. There was some decline in the proportion of regular smokers amongst intervention groups.		Methodological problems are that there is no statement about attrition; no statements about the method of randomisation; if blinded or concealed; no biochemical validation; no power computation; minimal statistical analysis; no ICC's; and no statistical modeling to assess the effects of differences in units of allocation and analysis. Proportion of never smokers increased in 2 groups, so

Results of Category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Gatta 1991	Baseline: 16,074; At 4 years 10,317 (36% attrition). No attrition analyses reported.		4yr: the relative risk for smoking was 0.90 (95%CI = 0.79 - 1.06) in the intervention group; for the participants 0.96 and the non-participants 0.99 in the group where half received the intervention, and 1.00 in the control group (p < 0.19). There were no effects on the frequency of smoking.	possible misreporting Methodological problems are that at 4 years attrition was 36%; no attrition analysis; no statements about method of randomisation or concealment; the power computation was made after the study and the sample had 67% power to detect a 0.05 significant difference; no biochemical validation; no ICC's; and no statistical modeling to assess differences in units of allocation and analysis.
Hirschmann 1989	Baseline 315 (of whom 47% never smokers, 82% self labelled non smokers). Analysis based on the 266 students who attended 2 or more sessions.	6m: No effect of the intervention on never-smokers progressing to trying a first cigarette, or on more frequent baseline users. For students who had tried 1 cig prior to pre test, the experimental group had fewer (33%) who progressed to a second cigarette compared to control (69%; p <.05). There were no statistically significant differences in the prevalence of smoking for the Exptl (15.3%) compared to the control (18.6%) group.	18m: No effect on never smokers. Pretest self labelled non smokers less likely to describe themselves as regular or occasional smokers in Exp (4.8%) than C (18.2%). (p<.05) Overall prevalence: fewer in Exp group (19.1%) reported smoking in the past 6 months than controls (30.9%) (p<0.1)	Methodological problems are that 15% attended only 1 session and these were more likely to have smoked in the past week (p <.001); 20% in the control and 12% in the experimental group (p <.01) missed 2 sessions; absentees at follow-up were more likely to have smoked in the past week (p <.001); no biochemical validation; no statements about the method of randomisation, if blinded
Howard 1996	Baseline 98; No attrition reported. No smoking reported at baseline.	12m: 3 control students reported experimental smoking, no expt students reported any use (no statistical analysis provided).		Methodological problems: the sample is a convenience one; attrition was not stated; no analysis of differential drop out; no statement about method of randomisation, blinding or concealment, no power

Results of Category 3 studies (Continued)

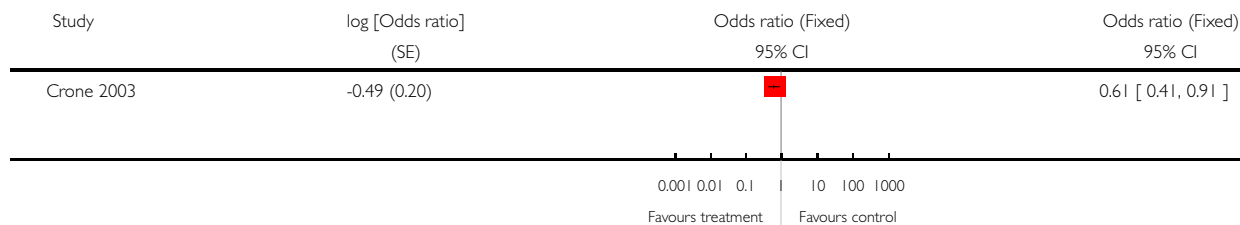
Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
MacPherson 1980	Baseline: 1750; Follow-up at 6 months: 79%.	6m: Significant increase in the number of smokers in the traditional instruction group from 2.6% to 3.8% (+9%, $p < .05$) and no increase in the groups that received instruction from the mobile van, the combination mobile van + traditional curriculum, or in the control group. There were no significant differences for current cigarette smokers.		computation, no biochemical validation, no statement about attrition or attrition analysis; no ICC's. and no statistical modeling. Methodological problems are that there is no description of the method of randomisation, blinding or concealment; differential attrition; no power computation; no biochemical validation; no ICC's; and no statistical modeling to assess effects of differences in allocation and analysis.
Rabinowitz 1974	Baseline: 758. 6 months: not stated.	6m: No statistically significant differences between experimental and control groups.		Methodological problems are: that there are no statement about the number of sessions, their theoretical orientation or their content; no statement about differential attrition from baseline; no statements about method of randomisation, blinding, or concealment; no biochemical validation; no power computation; no ICC's; and no statistical modeling to assess the effects of differences in units of allocation and analysis.

Analysis 01.04. Comparison 01 Information giving curricula versus control, Outcome 04 Smoking prevention (adjusted) - short term

Review: School-based programmes for preventing smoking

Comparison: 01 Information giving curricula versus control

Outcome: 04 Smoking prevention (adjusted) - short term



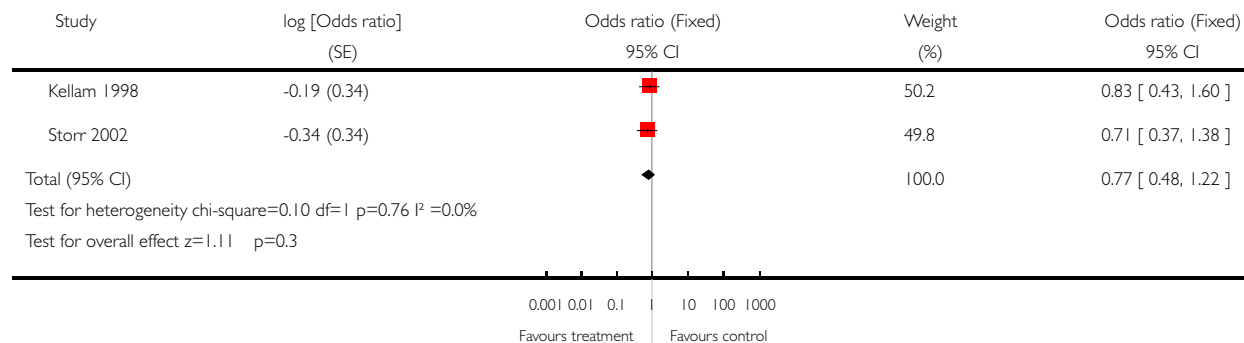
Analysis 02.01. Comparison 02 Social competence curricula versus control, Outcome 01 Results of Category I studies

Results of Category 1 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Kellam 1998	Baseline: 2311; Follow-up at 2 years: 69%. Attrition was unrelated to intervention status (p>.25).		2 years: Of 1,604 nonsmokers at baseline, 502 had tried smoking by age 14. Boys in Good Behaviour classrooms less likely to start smoking than those in control classrooms (RR 0.62; 95% CI 0.40, 0.97, p = .04). Mastery Learning also reduced risk of starting smoking for boys (effect significant for one cohort, RR 0.46; 95% CI 0.24, 0.87, P= .017). For females there was no effect of either programme	Methodological problems are: no statements about the method of randomisation and if the researchers were blinded or concealed; and no power computation. Boys in the cohort rated by teachers as the best behaved were less likely to smoke compared to the control groups (RR = .13; 95% CI 0.03, 0.62, p =.01).
Storr 2002	678 pupils entered Grade 1; and 549 (81%) were assessed 6 years later.		Intervention vs. usual curriculum control: After 6 years: Classroom-Centered RR = 0.57 (0.34 - 0.96; p =.03); Family-School Partnership RR = 0.69 (0.50 - 0.97; p = .03);	

Analysis 02.02. Comparison 02 Social competence curricula versus control, Outcome 02 Smoking prevention (adjusted) - long term

Review: School-based programmes for preventing smoking
 Comparison: 02 Social competence curricula versus control
 Outcome: 02 Smoking prevention (adjusted) - long term



Analysis 02.03. Comparison 02 Social competence curricula versus control, Outcome 03 Results of Category 3 studies

Results of Category 3 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
O'Donnell 1995	Two schools were assigned to experimental or control and in the remaining six schools the classrooms were randomly assigned to experimental and control groups [the number of students who entered 1st grade in 1981 was not stated]; when these students entered 5th grade in 1984 the study was expanded to include all 5th grade students (424) in 18 schools; with 608 students at the end of 6th grade. The analysis was of a group of 177 low income students in the 5th grade assessed to be at higher risk, with 106 (60%) of these remaining at the end of the 6th grade.			After 2 years: Smoked cigs: females: intervention 0.07; control 0.36 (P < 0.05); males: intervention 0.065; control 0.11 (n.s.).

Analysis 03.01. Comparison 03 Social influences curricula versus control, Outcome 01 Results of Category 1 studies

Results of Category 1 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Aveyard 1999	Baseline: 8352; 89% followed up, 96% of whom gave consistent answers. Over 77% received all 3 computerised intervention sessions, although baseline smokers less likely to attend.	1y: No statistically significant changes in smoking overall between the groups, or in subgroups defined by baseline status. The intention to treat odds ratio for smoking in the intervention group compared to control was 1.08 (95% CI 0.89-1.33). Adjustment for confounding, or assuming those lost to follow-up did not alter their smoking status, did not affect results. Point estimates suggested an intervention reduction in smoking prevalence for baseline regular smokers but an increase for those who were not regular smokers.	Two years: (1) there were no significant differences in changes of stage in the intervention group compared to the control at either the one or two year follow-up (Aveyard 2001); (2) the odds ratios for smoking for participants using the interventions but not engaging once were 1.83 (95%CI = 1.41-2.39) at 1 year and 1.70 (1.38-2.11) at 2 years, and for those engaging three times were 0.79 (0.60-1.03) at 1 year and 0.96 (0.75-1.21) at 2 years (Aveyard 2003).	Authors conclude that it is unlikely that the intervention reduces smoking prevalence by more than 2% and more likely it has no effect. No biochemical ascertainment of smoking.
Botvin 2001	2144 intervention, 1477 controls.	3m post-test. Frequency and quantity of use measured by validated scales. Smoking uptake not reported, but normative expectations for smoking were lower in the intervention group than in the controls.	At 1yr follow up, mean score for frequency of smoking (on a scale from 1-9) was lower in the experimental than in the control group, at 1.73 vs 1.94 (F [1,3504] = 9.3, P < 0.0012). Mean score for quantity smoked (1.19 vs 1.32, on a scale from 1-11) was also lower in intervention than in controls (F [1,3423] = 20.5, P < 0.0001).	Smoking outcomes remained significant whether or not ICCs were used.
Brown 2002	3028 elementary students who attended the 30 recruitment schools, 2776 (91.7%) agreed to participate; and 2643 (95%) completed questionnaires at end of 10th Grade.	None reported	2 year follow up: For males who were never-smokers at end of Grade 8, 9.8% in the intervention group and 16.4% in the control schools were smoking in Grade 10 (P = 0.02); no sig diffs for females.	
Cameron 1999	Baseline: 4466; Follow-up at 3 years = 3972 (89%), with analysis based on 3821 who remained in same treatment condition.		3y (end of grade 8): All 4 treatment conditions had smoking rates which were lower than control (16-19% versus 21% in control) but differences were not significant.	Methodological problems are that 1 board declined due to budget cuts, 2 declined as the programme did not fit their approach; school recruitment rates ranged from 65% in 1 board to

Results of Category 1 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	No difference in dropouts by condition or school risk score, but greater social models risk score and more baseline smoking amongst dropouts.		When grouped by school risk score, no significant difference found between intervention (all conditions combined) and control for low- or medium- risk schools. In high risk schools there was a significant benefit from treatment (P=.006); smoking rate was 16.0% for programme and 26.9% for control. No signif diffs between training methods. Nurses had significantly better results than teachers in low risk schools (P=.05) and marginally better in medium risk (P=.08), though neither teachers nor nurses were significantly different to control in low- or medium- risk schools	100% in 4 boards; student consent rate was 92% in boards with passive consent and 70% in 1 board with active consent policy; differential loss for boys (p <.05), for boards (p <.05), for the group with high risk scores in the 6th. grade (p .001) and for smokers in the 6th. grade (p <.001); no reports of expired CO; no power computation. No ICC's computed but Pearson goodness-of-fit, GLIM, and quasi- likelihood models were computed to assess school-level effects, with all anayses giving the same results. School risk score was derived using smoking rate of grade 8 students in Grade 6, and estimates of teacher smoking prevalence and community SES
Dijkstra 1999	At baseline: 4,060. At 6 months: 4,060 At 1 year: 3,653 At 18 months: 3,104.	6 months: less smoking in the decision-making (p<.05) and social influences groups (p<.01) compared to the control. 12 months: less smoking in: (1) SI + boosters compared to boosters (p<.01) (2). SI+DM compared to control (p<.05) (3) DM compared to control (p<.005) (4) DM compared to SI (p<.005) (5) DM+boosters compared to SI+ boosters (p<.005)	18 months: less smoking in: (1) SI + boosters group compared to SI (p<.05) (2) SI + boosters group compared to control (p<.005).	Methodological problems are: attrition at 6 months was 16%, at 12 months 24%, and at 18 months was 36%. There was differential attrition at 18 months for males, younger students, non-smokers; the Control group vs. the Decision-Making group; the Social Influences vs. the Control group; no power computation; no biochemical validation; and the definition of smoking used in the analysis is not clear.
Elder 1993	Baseline 3655; A cohort of 2,668 (73%) was surveyed at 4 follow-up	At end of 7th grade (T2): monthly smokeless + cigarette prevalence	At end of the 9th grade (3 years of intervention): past month	Methodological problems are that the experimental and control groups

Results of Category 1 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	<p>points. The proportion lost to follow-up was similar for intervention and control, and there was no differential attrition across conditions. Eckhardt (1997) is follow-up: Of the cohort located at the beginning of the 11th grade, 1,545 (75%) responded at the end of the 11th grade (constituting 58% of the original SHOUT cohort). No evidence of differential attrition by condition; 9th grade smokers less likely to be in this cohort.</p>	<p>similar in Experimental (5.7%) and Control (6.4%). At the end of 8th grade (T3) prevalence similar with no statistically significant differences between Experimental (10.2%) and Control (15.6%). The Continued Intervention group had significantly lower smoking rates than the Continued Control group (p<.05)</p>	<p>smokeless + cigarette prevalence was significantly lower in the Experimental (13.2%) than the Control (22.5%), with a logit model Odds Ratio compared to Control of 0.71 (p<.05) at the school level and 0.72 (p<.001) at the individual level. For cigarette smoking the Odds Ratios were 0.77 (p<.05) at the school level and 0.79 (p<.05) at the individual level. For smoking in the past week OR's for the Intervention group relative to controls were 0.69 (ns) at school level and 0.75 (p<.05) at the individual level. Eckhardt (1997) is follow-up: Past month smoking (at least 1 cigarette in the past month): Continued Intervention group 7%; Lapsed Intervention group 10.8%; Continued Control group 12.6%; Delayed Intervention group 9.4%.</p>	<p>differed in ethnic composition (p <.001); high attrition at 24 months (27%) but no differential attrition across conditions; no statements about the method of randomisation, if blinded or concealed; and no power computation. Authors note that lack of treatment effect after 2 years lead to continuation of intervention by telephone and mail Eckhardt (1997) follow-up: Methodological problems were: no power computation; no computation of ICC's and the effects of clustering in classes (schools were assigned to treatments).</p>
Ellickson 1990	<p>Baseline 6527; Follow-up: 15 months: 60% 2 years: 72-76% 4-6 years: 53-57% There was no differential attrition across treatment groups, although students lost from the analysis tended to have baseline characteristics linked with later drug use.</p>	<p>15m: Little effect on nonusers, but significant reductions in experimenters: their weekly smoking declined 50% in teen-led group (p<.006) and by 33% in health-led group (p<.09). Daily use dropped by 50% in teen-led group (p<.03). More experimenters reported no smoking for 1 year, p<0.006 for teen-led and p<0.09 for adult-led. For baseline smokers, the program increased smoking (boomerang effect), with significant increase for smoking in the</p>	<p>2y: (grade 9, Bell 1993) only 2 sig diffs (p<.05) amongst multiple comparisons: There was 5% less monthly smoking amongst baseline experimenters for teen led group, in same group there was a higher incidence of weekly smoking for baseline users. 6y: (grade 12, Ellickson 1993) no evidence of any benefit from the programme for any baseline risk group. More weekly smokers amongst baseline smokers in the Adult taught</p>	<p>Classroom logs and observance by monitors of 950 of the 2300 lessons taught showed the curriculum was delivered as intended. In 92% of classes all lesson activities were covered. Adjustments were made for within- school correlations, and for baseline differences.</p>

Results of Category 1 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Ellickson 2003	5,412 students; of whom 4,689 [87%] completed the baseline survey; and 4,276 completed the follow-up at 18 months [91% of baseline].	past month ($p < .01$), and monthly smoking ($p < .05$) in teen-led group	group than control ($P = < .01$), again there were multiple comparisons. Intervention vs. usual curriculum control: at 18 months: For baseline nonusers: past month experimental 8.6% control 11.1%; weekly experimental 4.0%, control 6.6%; proportion of new smokers 26% in combined experimental groups, 32% in control $p < .01$; 23% reduction in past month ($p < .01$) and weekly smokers ($p < .01$).	
Hansen 1991	Baseline: 3,011; 1 year: 2,416 (80%). Attrition amongst students who received resistance training was 18% vs. 22% in other conditions. Analysis based on cohort followed.	1 year: There was a trend towards lower cigarette use in normative education classes. 8.1% vs 10.3% for ever smoking and 4.8% vs 6.5% for 30 day smoking. ANCOVA showed a significant main effect for normative education ($F 4.76, p < 0.05$) on the main cigarette index. There was no evidence of an effect of Resistance Training.		Methodological problems are: differential attrition in the Resistance Training (18%) compared to the other 3 experimental groups (21.6%, $p < .01$); no statement about method of randomisation, if blinded, or concealed; no biochemical validation; no power computation. No baseline use rates given. The uptake of smoking was relatively low in all groups.
Murray 1992	Baseline: 8,271 (= 92% of the 8,992 enrolled in 6th grade). 1 year: 7,180 (87% of 8,271)	Process analysis: Project staff visited each study school, and 90% of the health educators in the 81 schools were observed once during smoking education classes. Follow up interval not stated but text implies a school year: No programme effects on weekly cigarette smoking, or smokeless tobacco use, or expired carbon monoxide; and no differences between the 4 programmes.		Methodological problems: only 81 of the 112 invited schools participated; 13% attrition in the second year; those lost to follow-up had more family members and friends who smoked.

Results of Category 1 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Noland 1998	Baseline: 3588; of whom 86% present at all 3 assessments. The groups were similar at baseline on smoking status. No differential attrition from baseline.	No differences among 4 groups in exposure to traditional tobacco-use educational activities. The existing curriculum group received more discussions, activities and peer-led activities than in Minnesota as a whole. The authors comment: "Our attempt to create a randomized control group that would receive less social influences programming than the rest of the state clearly did not succeed."	24m (9th. grade): experimental group had lower rates than control for smoking in the last 30 days (34% vs. 44%, $p < .01$); in the last 7 days (30% vs. 38%, $p < .01$); and in the last 24 hours (22% vs. 28%, $p < .05$). There were no significant effects for ever smoking. For those not involved in growing tobacco the results were significant for 30-day smoking ($p < .01$). For those involved in growing tobacco the results were significant for 30 day ($p < .01$), 7 day ($p < .05$) and 24-hour smoking ($p < .01$).	Methodological problems are that there is no description of blinding or concealment; no power computation, no ICC's, and no statistical modeling to assess the effects of differences in the unit of allocation and analysis.
Peterson 2000	Baseline: 8388. 7,910 (93.8%) followed up to Grade 12 + 2 years in both experimental and control groups. All 40 school districts participated fully during the 12 years of the trial. 100% of teachers who presented the HSPP curriculum attended inservice		At both Grade 12 and Grade 12 + 2 years, no significant differences were noted between the experimental and control groups in daily, current or cumulative smoking, or those with family risk for smoking.	The authors comment that this RCT is a rigorous test and indicates that the social influences approach is not effective in the long-term deterrence of smoking in youth. The trial was adequately powered, 95% CI's are narrow, randomised assignment was maintained, because the school

Results of Category 1 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Walsh 2003	education; in 86% of the lessons observed teachers implemented the lesson activities.	At 1yr, cessation rate in intervention schools was 27%, in control schools 14%; OR 2.29 (95% CI: 1.36 to 3.87)		district was the experimental unit there was minimal social mixing of students (1.7%), the control and experimental groups were well matched at baseline and throughout the trial, the intervention includes all the components advocated by the CDC & NCI-Expert Advisory Panel, and was well implemented by trained teachers teachersteachersclassroom teachers teachers. Spit tobacco use, not cigs.

Analysis 03.02. Comparison 03 Social influences curricula versus control, Outcome 02 Results of Category 2 studies

Results of Category 2 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Abernathy 1992	Baseline: 7508. Based on matching of ID codes in each survey: 3566 in matched cohort by Grade 9, 47% of baseline. No discussion of attrition. Data presented only for baseline never-smokers who were matched.	1yr: Grade 7 males who had received the entire programme were less likely to smoke than those in the control schools ($p < .005$), and the difference would still have been significant if entire randomised groups were compared. Prevalence of smoking in baseline never smokers reduced by about 7%. No programme effects for females.	2 & 3y: Small differences maintained (approx 5%) amongst males. No effect for females.	Methodological problems: no power computation; no computation of ICC's; no statistical modeling to account for differences in units of allocation and analysis; process analysis showed incomplete delivery (49 teachers taught the complete PAL programme; 40 taught part , 5 did not teach the programme. Effects found only for males (not a pre-specified sub- group. No adjustment for clustering. Clusters likely to have been small.
Armstrong 1990	Baseline: 2366 82% resurveyed at 1y, 64% at 2y, 38% at 7 yrs. No significant differences in follow-up in peer-led or teacher-led groups, or between females and males. At 7 years, significantly lower response from control condition.	1y: Females: For both intervention groups combined, fewer females started smoking compared to the control group ($p < .05$). Males: Fewer males in the teacher-led group began smoking compared to the control and peer-led groups ($p < .0002$). No effect on baseline smokers	2yr: Females: Smoking uptake was 6.6% (95%CI: -17.3% to +4.0%) lower in teacher-led and 8.1% (95%CI: -18.9% to 2.7%) lower in the peer-led group compared to control ($p < .03$). Males: Smoking uptake was 2.8% (95%CI: -11.2% to 5.6%) lower in the teacher-led group than the control or peer-led groups ($p < .009$), but was 6.4% (95%CI: -3.6% to + 16.4%) higher in the peer-led group compared to control. After 7 years there were no effects on male initial smokers or non-smokers; but the odds of girls in the experimental groups who were non-smokers starting smoking was 0.5.	Methodological problems are that there were no statements about method of randomisation, if blinded or concealed; no power computation; saliva samples were collected but the results were not presented, and no ICC's were computed because the data were erased after the first year. Authors note that they had no prior hypothesis that effect would be limited to girls (differential response bias a possibility).
Ary 1990	Baseline: 7837 Attrition 24% No differential attrition across conditions. Dropouts were more likely to be smokers or at risk of	12m: No differences in effect of the intervention on pretest non smokers - 12% became smokers in both conditions. Pretest smokers in expt group		Methodological problems: no statements about the method of randomisation, if blinded or concealed; no power computation; 1 middle school not randomised; 20%

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	smoking.	reported fewer cigarettes/month at 1 year (77 vs 112, $F=3.02$, $p<0.05$), but the difference in smoking prevalence (65% vs 69%) was not significant No effect of messages to parents.		attrition at follow-up; no ICC's; and no statistical modeling to assess clustering. The school was used as the unit of analysis Control schools had similar amount of time devoted to tobacco/drug education, and used curricula with similar components to PATH. Programme similar to that used in Biglan 1987a & b. CO levels were higher in higher grades ($p<.002$)
Biglan 1987a	Baseline: 3387 Attrition 19.8% in treatment and 24.1% in control (NS). Dropouts more likely to be users or have risk factors for use, but no evidence of differential attrition between intervention groups.	1y: No evidence of a beneficial effect on nonsmokers (no smoking in previous week), and for males there was a higher rate of smoking in the intervention condition ($p<.04$). For baseline smokers, the intervention group had lower smoking rates (weighted mean index 19.4) than the control (29.6; $p<.05$) and significantly lower CO levels (5.3 vs. 10.7 ppm; level of significance not stated). No evidence of any effect of parent messages.		
Biglan 1987b	Baseline 1730; 68% followed up at 12 months.	At 12 months: Overall smoking index rates were higher in the experimental group in grade 7, but lower for experimental group in grades 9 & 10. When analysed by baseline status there was no evidence of programme effect on never smokers.		Methodological problems are that more high-rate smokers dropped out of the experimental than the control groups; drop-outs were more likely to be smokers at the start of the study, and smoked more cigarettes and marijuana, and consumed more alcohol. No statements about

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Bush 1989	Baseline: 1,234, of whom 1,041 (84.4%) participated in the baseline examination of risk factors, and 892 (72%) completed the questionnaire. 2 years: 431 (41%), with similar percentages in the control and experimental groups.	Apparent effect on deterring continued smoking amongst those smoking at pretest; E group smoked less (mean 22.33) than C group (mean 50.35; $F = 4.55$, $p < .04$), but more high-rate smokers dropped out of E than C.	2 years (Tables 3 and 4): Serum thiocyanate differed by 29.9 micromoles/L (increased 20 micromoles/L in the control and decreased 9.87 in the experimental group; $p < .000$). After adjustment, the difference was 15 micromoles/L ($p < .000$). Significantly more nonsmokers (4.3%) in intervention group. “Because of inconsistencies in laboratory measurement of serum thiocyanate at the year 3 follow-up, mean values for this variable are based on measurement after one year of intervention.” (Bush, 1989, p. 473). There is no further explanation in the text, and the differences in Tables 3 and 3 are listed as differences 2 years after baseline.	method of randomisation, if blinded or concealed; no power computation; no computation of ICC's; and no statistical modeling to account for differences in unit of allocation and analysis. Authors report that differential loss of subjects in different smoking categories likely to jeopardise internal and external validity. Apparent effect of the programme on reducing smoking in regular smokers at one year could be attributed to attrition. Authors also suggest that programme may have had deleterious effects. Methodological problems: no power computation; 59% attrition at 2 years; females more likely to be present at 2 years (55%, $p < .05$); no discussion of method of randomization, blinding or concealment; no ICC's; and no assessment of clustering.

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Clarke 1986	Baseline: 1321; with 1-5% non-response at each testing		At 20 months: For females the percentages saying they smoked yesterday changed from pretest to 20 month f-up: peer-led 13% to 18%, expert-led 1% to 15%, teacher-led 8% to 2%, control 5% to 16% (p<.002) No other significant changes for other measures of smoking behaviour or for males.	Methodological problems are: no statements about method of randomisation, how blinding or concealment was achieved; no biochemical validation; no statement of final N's and whether there was differential attrition from baseline; no power computation; no ICC's; no statistical modeling to assess the effect of differences in the units of allocation and analysis. Results presented as rate of change estimates.
Clayton 1996	Baseline: 2,071; Attrition by 10th grade was 44.8%, with no signif diffs. between control and experimental groups. However, 35% of those absent at the 10th. grade follow-up used cigarettes, compared to 23% of those who were present (p<.0001). 10y: 1002 responded ot mailed survey.	At 12 months: No statistically significant effects on cigarette, or other drug use attributed to the DARE programme after one year (in 7th grade) or at any further follow-up point.	5y: no evidence of effect of intervention. 10y: no relationship of receiving DARE and cigarette use. However, pre-DARE use and expectancies significantly related to use. There was some evidence for changes in attitudes in the short term, but over 5 years the trajectories of change were similar in the intervention and comparison groups.	Methodological problems were: 18% attrition in the 7th. Grade, 22% in the 8th., 35% in the 9th., and 45% in the 10th., and those who smoked at pretest were more likely to drop out (p <.05 in the 7th; p < .01 in the 8th.; and p <.0001 in the 9th. and 10th. grades), but there was no differential attrition across groups. Students who had used cigarettes and marijuana were more likely to drop out in all grades (Grade 7, p <.05, to Grade 10, p <.0001). For the 10 year follow-up, 1,002 students were contacted by post, with females (57%) more likely to be contacted, and older males who smoked in the 6th. grade more likely to be missing; no statements about the method of randomisation, or concealment; and no power computation.
De Vries 1994	1529 had data at both baseline and T3.	1y: For baseline never-smokers, programme effect only for high		Methodological problems are that males (OR = 1.36) and older

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	Attrition was 14%, and did not differ between expt and control. No sig diffs in the smoking behaviour of the dropouts between expt and control. Males (OR = 1.36) and older students (OR = 1.47) more likely to drop out. No significant inter-class or inter-school effects (these accounted for 6% of the residual variance).	schoolers (OR = 0.63; 95% CI 0.43-0.91, $p < .02$), 42% of them began experimental smoking in the Expt and 52% in the control. No programme effect on regular (i.e. weekly or daily) smokers in high schools (OR = 0.78; 95%CI = 0.38-1.58), but there was a programme effect in vocational schools (OR = 2.24; 95%CI 1.30-3.90, $p < .01$). Regular smoking in vocational schools increased less in Expt (16% to 24%) than control (16% to 30%). No programme effects on helping existing smokers to quit.		students (OR = 1.47) were more likely to drop out; no statements about blinding or concealment; and no power computation.
Flay 1995	At 2 years 3,155 (47%), with greater attrition in Los Angeles than San Diego, and among African-Americans and students with lower grades. No differential attrition across experimental and control conditions.	Post-test: In Los Angeles at the post-test there was lower prevalence in the social resistance ($p < .00001$) and television ($p < .006$) conditions. In San Diego at the post-test prevalence was lower in the social resistance groups ($p < .00001$).	At the 2 year follow-up in Los Angeles there was lower prevalence in the social resistance group ($p < .0007$) and in the television + social resistance group ($p < .05$). In San Diego at 1 year prevalence was lower in the social resistance group ($p < .028$).	Results were adjusted for clustering using ML3 multilevel analysis programme for unbalanced data that uses iterative generalised least-squares estimation. Design problems are that there was no power computation; 53% attrition at 2 years, and no biochemical validation.
Murray 1984	Baseline: 3184 in 8 schools. 6 years: 3021 (95%) Attrition was higher for baseline experimental smokers than for nonsmokers. No evidence of differential attrition across treatment groups. (Attrition higher at 1 year because those with missing data, without saliva samples or with inconsistent reports were excluded).	(1) Posttest : For baseline non-smokers all 4 conditions similar. (2) 1 year: For baseline non-smokers both peer-led groups had significantly lower ($p < .01$) smoking levels than the two adult-led short-term influences group. Adult led long-term influences had intermediate position ($F = 4.10$, $df = 3874$, $P < .01$). For baseline experimenters, all four conditions appeared to produce equivalent short	(1) At 2&3 years no significant differences between conditions. For baseline non- smokers incidence of ever smoking was 47-49% at 3 years (2) At four years a posteriori tests found a modest effect on daily ($p < .05$) and weekly ($p < .05$) smoking for never smokers in the peer-led no video condition (3) At 6 years, there was no evidence for any intervention effect.	Methodological problems were that there are no statements about the method of randomisation, if blinded or concealed; no power computation; no ICC's; and no statistical modeling to assess the difference in units of allocation.

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Nutbeam 1993	Baseline before teaching (1988): 4538. After teaching (1989): 3930. 1 Year: 3,786 (83.4%).	term results. At 1 year: Across all 4 groups pupils who reported at baseline that they were smokers, had tried smoking, or had a mother or father who smoked were significantly less likely to participate in the follow-ups (significance level not stated). Of non-smokers at baseline, at 1 year 74% remained non-smokers in the control, 65% in FSE group, 70% in SAM group, 69% in the FSE/SAM group (no signif diffss by Chi2). Using logistic regression to control for factorial design and confounders, FSE group significantly less likely to remain never-smokers ($p < 0.05$).		Methodological problems: No power computation, partial process analysis ("the organisation and management of the projects were at the discretion of the teacher." Teachers recorded lesson content in a book). Saliva samples not analysed.
Schinke 1985b	Baseline: 193. Attrition at 24 months: 7.7%.	Percentages smoking weekly: Posttest: significantly lower for the skills (1.6%) and control (1.3%) compared to the attention group (2.5%; $p < .05$) 6 months: significantly lower in the skills (2.7%) compared to the control (3.6%) and attention (4.7%; $p < .05$) groups. 1 year: significantly lower in the skills (3.2%) than the control (6.5%) and attention (6.9%; $p < .05$) groups. No significant differences in thiocyanate levels at any time.	From baseline to 2 years: Weekly cigarette consumption increased from 2.4% to 3.6% in the skills group; from 1.9% to 8.1% in the attention- placebo group; and from 2.1% to 8.4% in the control group. Weekly smoking levels were significantly lower in the skills (3.6%; $p < .05$) than the attention - placebo (8.1%) or control (8.4%) groups. Thiocyanate levels were lower in the skills (44.6; $p < .05$) than the attention-placebo or control groups.	Methodological problems are: no power computation; and no ICC's and no correction for clustering.
Schinke 1986a	Baseline: 1281; Attrition at 2 years: 10%. No differential attrition across groups.	6 months: Percentages smoking were significantly lower in the skills group (5%; $p < .05$) compared to the control (6%), but there were	18 months: Percentages smoking were lower in the skills (8%; $p < .05$) than in the discussion (10%) and control (11%) groups.	Methodological problems are that there are no statements about method of randomisation, if blinded or concealed; no power computation;

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Schinke 2000	Baseline: 1396; Follow-up at 3.5 years: 1,177 (86%). Attrition on baseline and outcome variables was random.	no significant differences from the discussion group (6%). 12 Months: Percentages smoking were significantly lower in the skills group (6%; $p < .05$) compared to the discussion (8%) and control (9%) groups. There were similar results for smokeless tobacco use. At the 6 or 12 month follow-ups: No differences between groups in cigarette smoking.	2 years: Percentages smoking were lower in the skills (7%; $p < .05$) than in the discussion (11%) and control (12%) groups. There were similar results for smokeless tobacco use. No differences in cigarette smoking between groups at the 6,12,18,24, 30,36, or 42 month follow-ups. Use of smokeless tobacco was lower at the 30 and 42 month follow-ups for the skills compared to the skills + community or control groups ($p < .001$).	no ICC's; and no statistical modeling to assess effects of differences in allocation and analysis. Methodological problems are that there was no power computation; no ICC's; and no statistical modeling to assess effects of differences in the unit of allocation and analysis.
Severson 1991	Baseline: 2552; Follow-up at 12 months: 1768 (69%). No differential attrition by condition.	12m: Significantly higher cessation rate among male middle-school tobacco chewers (OR = 10.45; 95%CI = 1.93 - 56.64), but no other statistically significant effects for cigarettes or smokeless tobacco.		Analysis used students as the unit of analysis. "We attempted to tabulate and analyze classroom means, but due to the small number of classrooms and students within a classroom, as well as the impact of attrition, the resulting means were very unstable." The ICC for ST use = 0.028 and for cigarettes = 0.03. The authors analysed the data with ANOVA and logistic regressions, but did not correct the results by using the ICC's. There are 3 methodological problems: no power computation; no correction for clustering using the computed ICC's; and differential drop-out of smokers (to assess

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Unger 2004	2,775 6th grade students were invited to participate; 2,131 [77%] provided parental consent; of these 1,970 [92%] completed the 6th grade survey; and 1,571 [80%] completed the survey at the end of the 7th grade; and the results are presented for the 1,430 who were non-smokers at baseline.	At 12 months: Intervention vs. Intervention: For baseline non-smokers smoking rates increased in the multicultural programme group to 8% and to 11% in the standard intervention; only for the Hispanic boys was the multicultural programme more effective than control (OR = 0.49; 95% CI = 0.27, 0.88); and that there were no significant effects for females, or Asian-Americans or other ethnic groups.	(1) at four years (only four schools were chosen for analysis) at baseline in 1978 4-9% of the children reported smoking 1-2 times/month; in 1981 the percentages were 37% in the control schools, 27% in the direct intervention schools (p	external validity, the main effects of attrition status were calculated, and for 10/12 variables, the lost subjects were at higher risk of smoking based on pre-test variables). For internal validity of 36 interaction terms involving attrition status only 2 were significant: dropouts in the intervention condition chewed less tobacco at baseline (4 chews/month) than subjects assessed at follow-up (7 chews/month); and dropouts in the control condition chewed more at baseline (21 chews/month) than non-drop-outs (7 chews/month).
Vartiainen 1998	4,253 9th graders at baseline; and 4,179 (98%) completed the baseline questionnaire			

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Walter 1985	<p>The target population at baseline was 2,283 Baseline = 1,563 (68.5%) who participated in the baseline examination of risk factors. Follow-up at 1 year: 1,115 (71%). Baseline thiocyanate levels were nonsignificantly higher in the intervention than control cohort at baseline. 5 year follow -up: 66% (65% of intervention, 69% of control).</p>	<p>12m: serum thiocyanate in the control group increased from 34.6 to 37.6, and decreased from 38.6 to 36.8 in the experimental group (p <.008).</p>	<p><.05) and 26% in the “county-wide intervention schools” (p <.01); (2) at eight years three pairs of matched schools were analysed, and there was 10% less smoking in the direct intervention than the control schools, and 16% less in the county-wide compared to the control schools (no statistical significance stated). If all drop-outs were assumed to be smokers, the smoking rate in the intervention schools was 48-49%, and 59% in the control (no statistical significance stated). 5y: (beginning of 9th grade), prevalence of smoking (Walter 1988, p. 1096) “still too low to permit detection of an effect on the number of subjects who started to smoke”. No biochemical measures reported.</p>	<p>Methodological problems are: no power computation; nonparticipation of 720 baseline target population students due to school absenteeism and parental unwillingness for them to participate in a medical examination (however participating students did not differ from non- participating students); high attrition (but no differential attrition). The authors state (Walter 1985; p. 775) that “the randomization by school, rather than by individual child, was accounted for by using indicator variables for all schools, following the method suggested by Kirk” without further explanation. There was no adjustment of the analysis for clustering by computing ICC’s.</p>
Walter 1986	<p>Baseline: 1,525 Follow-up at 1 year:</p>	<p>12m: serum thiocyanate</p>	<p>5y: (beginning of 9th grade),</p>	<p>Methodological problems are: no</p>

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	<p>80%.</p> <p>5 year follow-up: 81% from 15 schools (84% of intervention, 77% of control).</p> <p>6 year follow-up: 65% of subjects available (69% of intervention, 61% of control).</p>	<p>increased more in the control (5.3 micromoles/L) than in the experimental group (0.6 micromoles/L, difference -4.7, (-5.4 after adjustment; p <.000).</p>	<p>prevalence of smoking 'still too low to permit detection of an effect on the number of subjects who started to smoke'.</p> <p>After six years (end of 9th grade): in intervention group significantly lower % of biochemically confirmed smoking for all smokers between experimental schools (3.5%) and control schools (13.1%; p <.005) and also for male smokers (0% vs. 12.4%; p <.05) but no statistically significant differences for females. (p <.005), although limited power given small number of schools.</p>	<p>power computation; no ICC's and no correction for clustering.</p>

Analysis 03.03. Comparison 03 Social influences curricula versus control, Outcome 03 Results of Category 3 studies

Results of Category 3 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Coe 1982	Baseline: 226; Follow-up at 12 months: 66 (64%) of E, 84 (68%) of C. No attrition analysis	12m: no statistically significant differences between the intervention and control groups in smoking behaviour.		Methodological problems were: 1 school 88% Black (E group 13 years, 56% never-smokers; C group 14 years, 44%); other school 89% White (12 years, E group 54% never-smokers, C group 60%); saliva tests not reported; no statement about method of randomisation, if blinded or concealed; no power computation; no ICC's; no allowance for clustering
Cohen 1989	886 students received the interventions (no 8th graders recieved interventions). Number at follow-up not stated.	At 1 year: there were no statistically significant differences in percentages smoking (non-smoking vs. "even smoked part of a cigarette") between the intervention and control group or by gender.		Methodological problems are there was no power computation; no statement of the number followed up no attrition analysis; no biochemical validation; no computation of ICC's; and no statistical modeling to assess effects of differences in level of allocation and analysis.
Ennett 1994	Baseline 1803; of whom 74% were reached at all 4 follow-ups. Attrition: no differential attrition across conditions. More urban students and those with more positive attitudes towards drugs were lost; 62% of attrition was due to respondents absent for 1 posttest, and 32% to those absent for two; only 6% due to studens lost to follow up altogether.	1y: No intervention effect on initiation of smoking, or on quitting. Some initial effect on change in use. DARE subjects who smoked were half as likely to increase their cigarette use from pre-test to post-test, but this disappeared at 1 year. There was a small and short term impact on some social and psychological outcomes.	At 2 years: no effect on initiation of smoking, quitting or change in level of use Results were corrected for clustering.	Methododlogical problems: attrition: 26% missing at one or more data collection points; and no power computation.
Flay 1985	Baseline: 654; 76% present at the pretest and all subsequent tests up to 18m.		(1) 18m: Among never smokers at baseline, at 18 months there were no significant differences in	Methodological problems were: 3 schools were allocated by the School Superintendent; 24% attrition at 2

Results of Category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	17% of dropouts were experimenting with smoking compared to 12% of the sample. 6 years: attrition was not related to treatment condition but was related to smoking behaviour.		the percentage smoking in the experimental compared to the control group. Among children experimenting with smoking at the pretest, at 18 months there were fewer smokers in the experimental compared to the control group ($p < .003$). (2) 6 years: there were no significant differences between the experimental and control groups in the percentages of non-smokers who had become smokers; and no differences for initial smokers in quit rates.	years; and no power computation. Because controls were significantly older, analyses were also run for students close to mean age. The pattern and significance of results were the same as main analyses. Social risk and pretest smoking behaviour was the strongest predictor of smoking by grade 12. 68% of school leavers were smokers, compared to 28% of those still in school. 98% of the school-leavers had tried smoking vs 84% of those in school.
Focarile 1994	Baseline 1,057. The intervention was completed for 80% of the intervention and 70% of control pupils (in 38 out of the 53 classes). Follow-up: 80% in the experimental and 73% control at 18 months. 44% Int. 36% Control at 36 months (only classes in which programme delivered followed at 36m. Differential attrition at follow-up: smokers more likely to refuse to complete the questionnaire ($X^2 = 8.94, p < .005$).	18m: Proportion of current non smokers 88% in expt and 80% in control (diff 7.4%, 95% CI 2.3; 12.5) no significant difference for never smokers.	36m: (selective follow-up) Proportion of current non smokers 55% in the expt and 44% in the control (diff +11%, 95%CI 1.4; 20.6; OR adjusted for clustering = 1.7, $p = .03$). Non significant difference for never-smokers. No statistical differences by gender.	Methodological problems are that more of the teachers who taught the experimental groups smoked (16%) than those whose who taught the control groups (5%); students with a high risk of smoking had a lower response rate; no biochemical validation; attrition at 18 months in the control group was 27%; attrition at 36 months was 36%; no statements about blinding or concealment; no power computation; no ICC's stated.
Gilchrist 1986	Baseline: 741 (69% nonsmokers) Follow-up: 94%, no differential attrition across conditions, but those lost more likely to be smokers		At 15 months: Fewer self-control skills subjects reported smoking one or more cigarettes in previous week compared to placebo and	There are 2 methodological problems: no power computation; and no ICC's and no correction for clustering.

Results of Category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Gindre 1995	3651 intervention, 3183 controls	At 1yr, smoking declined in intervention group from 1.3% to 1%, compared with an increase in the controls from 1.5% to 2.1% (P = 0.001)	control conditions. (F(2,697) = 3.52, p<.05), risk difference about 2%	85% response rate from pupils
Hansen 1988	Baseline 2863; Attrition 37% at year 1; 52% at year 2. Tobacco users more likely to drop out. Differential attrition by condition, higher in Social and lower in Affective than in control group. No condition by status interaction. Authors concluded "there is no strong reason to suspect that the results obtained were attributable to attrition artefacts."	1 yr: For baseline non-smokers the rate of onset (1 puff or more) was lower among Social curriculum (13%) than Control (18%) (p<.05 for all measures of onset), but higher in the Affective group (21%) than Control (NS). On the smoking index measure, the Affective group was significantly higher than the Control (p <.009).	2y: For baseline non-smokers Social curricula still better than control, but not signif for each measure. Affective curriculum significantly worse (p < .0001) on all measures.	Methodological problems: the Control Group subjects had higher baseline smoking within the past 30 days than the Social Group subjects in Data set 1-2 (p <.06); attrition was 37% from pretest to 1st post-test, and 52% from pretest to final post-test; there was differential attrition of Black students (p <.0001), of baseline smokers (p <.0001), and greater total attrition in the Social and Control (60%) than in the Affective group (37%; p <.0001; no description of the randomization process, blinding or concealment; saliva samples were collected but not analysed; no power computation; no ICC's; and no assessment of clustering. Subsequent 7th grades in control schools received one of the experimental curricula, authors suggest possibility of 'trickle up effect in reducing uptake amongst control students."
Hort 1995	Baseline: 878;		2y: For boys, smoking in the	Methodological problems are

Results of Category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	Follow-up at 2 years: 630 (72%), due to outmigration from the school, and 0.4% refusals in the intervention and 5.7% refusal in control classes. No further attrition analysis.		control schools increased 11% more than in the intervention schools ($p < .02$), and for girls increased 23% more ($p < .0001$). and for both genders 16% ($p < .0001$). For daily smoking for boys there were no differences in the increases in the control and intervention groups, but for girls the increase in the control group (36%) was greater than that in the intervention group (24%; borderline significance).	that there was 26% attrition by 24 months, with no attrition analysis; 0.4% refusals in the intervention classes and 5.7% in the controls; no statements about the method of randomisation, if blinded or concealed; no power computation; no ICC's; and no statistical modeling to assess effect of differences in units of allocation and analysis.
Kaufman 1994	Baseline: 276 6 months: 165 (60%)	6 months: No differences between experimental and control groups in smoking. Both groups significantly declined from pre-test ($p < .001$). School + media group smoked more cigarettes at baseline than the media group ($p < .02$).		There are 5 methodological problems: the school + media group smoked more at baseline than the media group; 40% attrition at 6 months; no power computation; there were substantial differences between groups in awareness of the media programme; and no ICC's and no correction for clustering.
Laniado-Laborín 1993	Baseline: 168. No discussion of attrition	10m: smoking within past 12m declined in the expt group from 38% to 8% and in the control from 23% to 20% ($p < .05$); smoking within past week declined in the experimental group from 4% to 1% and in the control group increased from 5% to 8% ($p < .05$); more quit in the experimented group (72%) than in the control (35%, $p < .01$).		Methodological problems are that there is no statement of the method of randomisation; if anonymity entailed blinding or concealment of the researchers; no power computation; no attrition analysis; no ICC's; and no allowance for clustering.
Lloyd 1983	Baseline 6299; Attrition at 1 year: <10%	1y: No significant differences. For older girls prevalence was lower in treatment schools, reversing		Methodological problems are that there were no statements about the method of randomisation, blinding

Results of Category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Schinke 1984	Baseline: 234. Follow-up at 6 & 12 months: not stated. No attrition analysis.	<p>the baseline difference. For boys, prevalence was non significantly higher in treatment schools Quitting rates generally higher in treatment group but diff's NS.</p> <p>It is not clear if Figure 1 shows absolute percentages or percentage changes (no commentary made in text). No definition of cigarette use Post-test to 6 months: No increase in skills-building, 5% increase in attitude modification, and 6% in control group. 6 months to 12 months: Increase of 3% in the skills-building, 11% in the attitude-modification, and 10% in the control group (no statistical analysis provided). No differences in saliva thiocyanate levels between groups at any measurement time.</p>		<p>or concealment; no ICC's; and no statistical modeling to assess the effects of differences in units of allocation and analysis. Inadequate implementation may have been a problem.</p> <p>Methodological problems: Number at follow-up not stated; no attrition analysis; no definition of cigarette use; no power analysis; no ICC's and no assessment of the effects of clustering.</p>
Schinke 1985a	Baseline: 689; Follow-up at 24 months: attrition: less than 10%. No differences in attrition by school or condition.	At 12 months: 6% of the skills, 9% of thge control and 10% of the information group reported weekly smoking. "Scheffe contrasts of significant condition differences favoured skills condition subjects over information and control at 6, 12 and 24 months." (No significance levels stated).	At 24months: 8% of skills and 12% of information and control groups reported weekly smoking (no significance levels reported for Scheffe comparisons).	The school was the unit both for allocation of treatment and for analysis. Methodological problems are: no power computation; and the statistical analysis is stated to be significant but the results are not presented.
Schinke 1985c	Baseline: 331; Attrition at 154 months: not stated.	The percentage of subjects reporting ever smoking:		There are 4 methodological problems: no power computation;

Results of Category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Schinke 1986b	Baseline: 65; Follow up at 12 months: no attrition stated.	<p>(1) Increased from pre-test to post-test by 2% in the skills building group, by 2% in the pretest-posttest group; and by 5% in the discussion group.</p> <p>(2) Decreased from post-test to 6 months post-test by 2% in the skills group, by 6% in the pretest-posttest group, and by 5% in the discussion group (no statistical analysis).</p> <p>(3) The percentage of subjects reporting every smoking increased from the 6 month to the 15 month post-test by 2% in the skills group, by 10% in the pretest-posttest group, and by 11% in the discussion and post-test only groups (no statistical analysis).</p>		no attrition analysis; no statistical analysis; and no ICC's and no correction for clustering.
Schinke 1986c	Baseline: 214. Number at 1 year follow-up: not stated. Attrition rates did not differ between groups.	<p>6 months: The percentage smoking weekly in the skills (2%) was lower than in the health education group (3%; $p < .01$).</p> <p>Saliva thiocyanate levels correlated $r = .52$ ($p < .01$) with self-reported smoking, nd</p> <p>12 months: The percentage smoking weekly in the skills (3%) was lower than in the health education (5%; $p < .001$) group.</p> <p>1 yr: Rates of regular tobacco use were unchanged for experimental group subjects, and increased from post test by 10.6% for comparison group and 13.7% for the control group ($p < .001$).</p>		There are 3 methodological problems: small sample size, no power computation, no ICC's and no correction for clustering.
				Methodological problems are: no power computation; small sample ($n = 214$); attrition not stated and no differential analysis; and no ICC's and no correction for clustering.

Results of Category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Schinke 1988	Baseline: 137 Attrition at 6 months: 8%.	Saliva thiocyanate levels were lower in the expt group than in the attention and control groups (p <.001) 6m: expt had lower mean smoking (1.41) than control (2.37) and less smokeless tobacco use (2.56 vs. 4.11) (p <.005).		Methodological problems: no statements about method of randomisation, blinding or concealment; no power computation; no biochemical validation; no attrition analysis; and allocation of the first reservation determines the second; no ICC's and no statistical modeling for clustering.
Scholz 2000	Baseline: 1956; After 2 years: 1598. The Ministry of Education required the codes of the groups to be kept at the schools. Two years later codes were not available for several schools, reducing the number followed up after 2 years to 1,598.		(1) For neversmokers beginning smoking by 2 years later: (a) Gymnasien students: those beginning smoking between the baseline and the 2 year follow-up were 17% in the Intervention and 25% in the Control group (p<.05), with males (13% and 22%, p<.01) showing less increase in the experimental group than females (21%, 28%, p<.05). (b) Realschule students: the rates of new smokers for males was 17% in the experimental and 25% in the control (p<.05) and for females 18% and 22%, n.s.). (2) Increase in daily smokers (at least 1 cigarette) over two years: (a) Gymnasien students: the percentages increased from 1.5% to 6.8% in the Experimental and	Methodological problems are: that the school authorities would not permit biochemical validation; 358 students were lost to follow-up at 2 years as their codes were lost by the schools, with no attrition analysis; no power computations; no ICC's; and no statistical modeling to assess effects of differences in units of allocation and analysis.

Results of Category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Shope 1996	Baseline: 4,730 6th. & 7th graders; 2nd. year: 4116 (87%), and 3,112 (66%) for whom data were matched in all 3 years. A subset of 1,911 was analysed who either: (1) received 2 years of the programme, or (2) received no programme, + the "comparison" class students whose teachers taught < 50% of the curriculum.	1 year: 8th. - 9th. graders in the programme had less tobacco use ($p < .0005$) and smokeless tobacco use ($p < .0005$) than comparison groups. Students lost to attrition did not differ on tobacco use. A process analysis showed that 84% of teachers documented their teaching (and reported having taught 92% of the 5th. grade and 100% of the other grades).	from 1% to 10.7% in the Control group ($p < .05$) (b) Realsschule students: no differences between experimental and control groups. No programme effects by the 12th. grade for programme delivered in the 6th and 7th grades.	Methodological problems are: smoking was defined by 1 question on "current frequency of use;" Black students lost to attrition used more smokeless tobacco ($p < .01$); substantial numbers of students did not receive the programme; no power computation; no biochemical validation; classes were included in the control group who received < 50% of the intervention programme; no ICC's; the oldest cohort, for whom no programme was available in the 9th. grade, were classified as programme students; and no statistical modeling for clustering. curricula).
Telch 1990	1040 eligible students were given a package to take home for their parents to complete, of whom 852 returned consent forms and of whom 562 (68%) completed the questions about their smoking status. 2 year follow-up: substantial differential loss to follow-up across conditions for some age/gender subgroups (e.g. 54% of 13-14 year old males in control and 25% in expt schools lost to follow-		(1) 2 years: Significantly lower smoking amongst baseline nonsmokers in experimental (16.5%) compared to control (26.9%; $p < .001$), with males E = 13% and C = 21%, and females E = 20.5% and C = 32.1% (no significant differences stated). (2) 10 years: No significant differences in smoking rates between experimental and control groups.	Methodological problems are: at 1 year only 486 students remained (attrition 18-44%, with 54% attrition of the 13-14 year old males in the control group, 25% in the experimental schools, and similar attrition for 7th. grade females). At the 10 year follow-up, 577 participated (average age 23 years), with differential attrition of males (OR = 1.40, 95%CI = 1.04, 1.88; $p < .05$); weekly smokers (OR =

Results of Category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	<p>up). Higher attrition for baseline smokers. At the 12 year follow-up: the researchers contacted 947 of the baseline cohort, but only 382 attended the screening sessions in Oslo, and there was substantial differential attrition by condition and baseline smoking status.</p>		<p>(3) 12 years: No significant differences in daily smoking between experimental (44%) and control (48%) groups (p=0.1). Adjusting for baseline differences, daily smoking in men was lower in the experimental (36%) compared to the control group (49%; p<0.05). Daily smoking by baseline non smoking men was 31% vs 45% (p<.06). The difference for women was in the opposite direction (E = 47%, C = 42%; NS).</p>	<p>1.99, 95%CI = 1.13, 3.51; p<.05); and students from the reference rather than the intervention schools (OR = 1.56, 95%CI = 1.16, 2.10, p<.01). There were no significant interactions between smoking category, treatment condition, and attrition. In the third pair of schools the experimental school was not randomly assigned. There was no blinding or concealment; no power computation; no biochemical validation; no ICC's; and no statistical modeling to assess effects of differences in units of allocation and analysis. At 12 year follow-up, 60% of the comparison group were under the impression they had participated in the intervention</p>
Tell 1984	<p>1040 eligible students were given a package to take home for their parents to complete, of whom 852 returned consent forms and of whom 562 (68%) completed the questions about their smoking status. 2 year follow-up: substantial differential loss to follow-up across conditions for some age/gender subgroups (e.g. 54% of 13-14 year old males in control and 25% in expt schools lost to follow-up). Higher attrition for baseline smokers. At the 12 year follow-up: the researchers contacted 947 of the baseline cohort, but only</p>		<p>(1) 2 years: Significantly lower smoking amongst baseline nonsmokers in experimental (16.5%) compared to control (26.9%; p <.001), with males E = 13% and C = 21%, and females E = 20.5% and C = 32.1% (no significant differences stated). (2) 10 years: No significant differences in smoking rates between experimental and control groups. (3) 12 years: No significant differences in daily smoking between experimental (44%) and control (48%) groups (p=0.1).</p>	<p>Methodological problems are: at 1 year only 486 students remained (attrition 18-44%, with 54% attrition of the 13-14 year old males in the control group, 25% in the experimental schools, and similar attrition for 7th. grade females). At the 10 year follow-up, 577 participated (average age 23 years), with differential attrition of males (OR = 1.40, 95%CI = 1.04, 1.88; p <.05); weekly smokers (OR = 1.99, 95%CI = 1.13, 3.51; p<.05); and students from the reference rather than the intervention schools (OR = 1.56, 95%CI = 1.16, 2.10,</p>

Results of Category 3 studies (Continued)

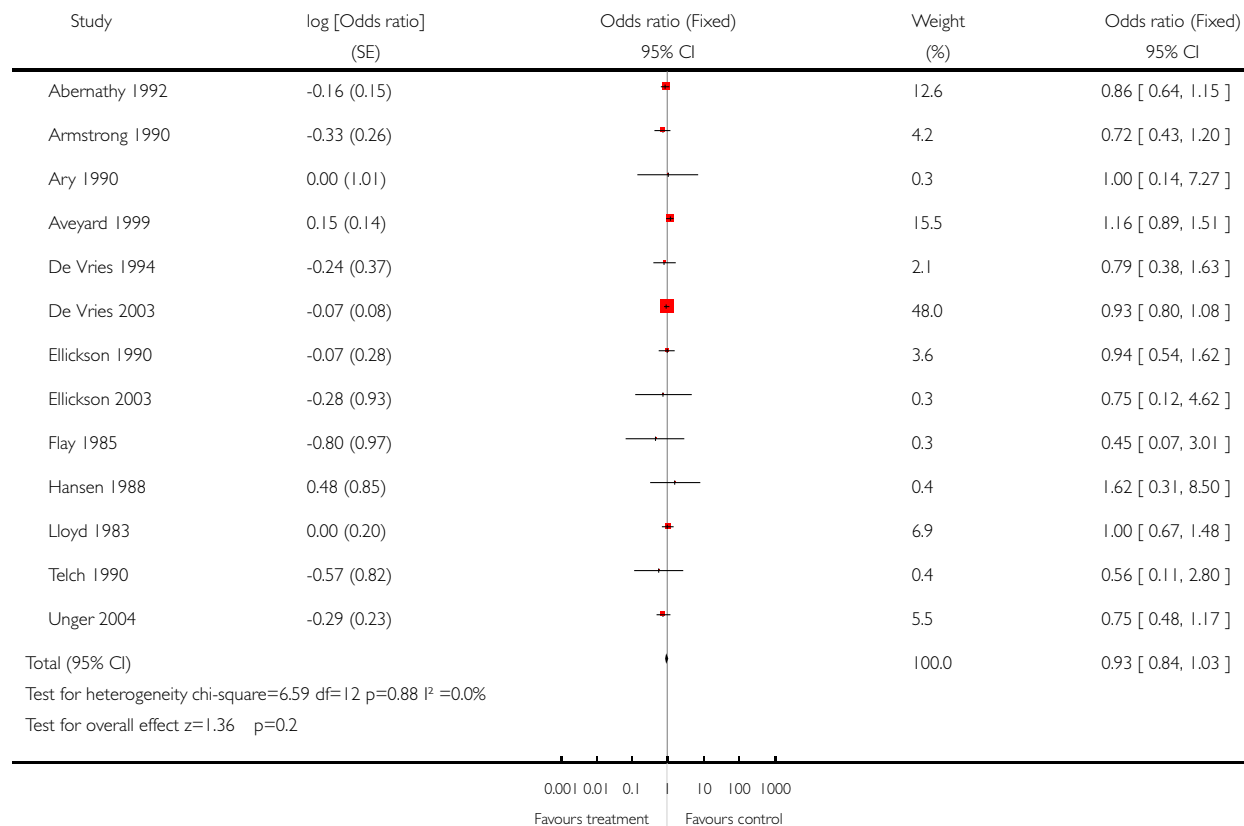
Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	382 attended the screening sessions in Oslo, and there was substantial differential attrition by condition and baseline smoking status.		Adjusting for baseline differences, daily smoking in men was lower in the experimental (36%) compared to the control group (49%; $p < 0.05$). Daily smoking by baseline non smoking men was 31% vs 45% ($p < 0.06$). The difference for women was in the opposite direction (E = 47%, C = 42%; NS).	$p < .01$). There were no significant interactions between smoking category, treatment condition, and attrition. In the third pair of schools the experimental school was not randomly assigned. There was no blinding or concealment; no power computation; no biochemical validation; no ICC's; and no statistical modeling to assess effects of differences in units of allocation and analysis. At 12 year follow-up, 60% of the comparison group were under the impression they had participated in the intervention
Villalbí 1993	Baseline: 2033. 12 month follow-up: 1723 with responses matched to those of the baseline group (approx 78% of target population).	12m: those admitting to having "smoked once" increased from 23% to 34% in the experimental group, and in the control from 19% to 34% ($p < .001$); habitual smoking in the expt from 2.7% to 6.4% and in the control from 1% to 5.7% ($p < .001$); and purchasing tobacco from 5% to 11.6% in the expt and 2.6% to 8.6% in the control ($p < .001$).		Methodological problems are: at baseline the experimental group had more one-time ($p < .05$) and regular smokers ($p < .01$), and purchasers of tobacco ($p < .01$) than the control group; no descriptions of the randomisation process, blinding or concealment; no power computation; no biochemical validation; no ICC's; and no statistical modeling to assess the effect of differences in the unit of allocation and analysis. Not clear from Table 2 if the significant differences marked with asterisks relate to changes within the experimental and control groups or between the groups.

Analysis 03.04. Comparison 03 Social influences curricula versus control, Outcome 04 Smoking prevention (adjusted) - short term

Review: School-based programmes for preventing smoking

Comparison: 03 Social influences curricula versus control

Outcome: 04 Smoking prevention (adjusted) - short term

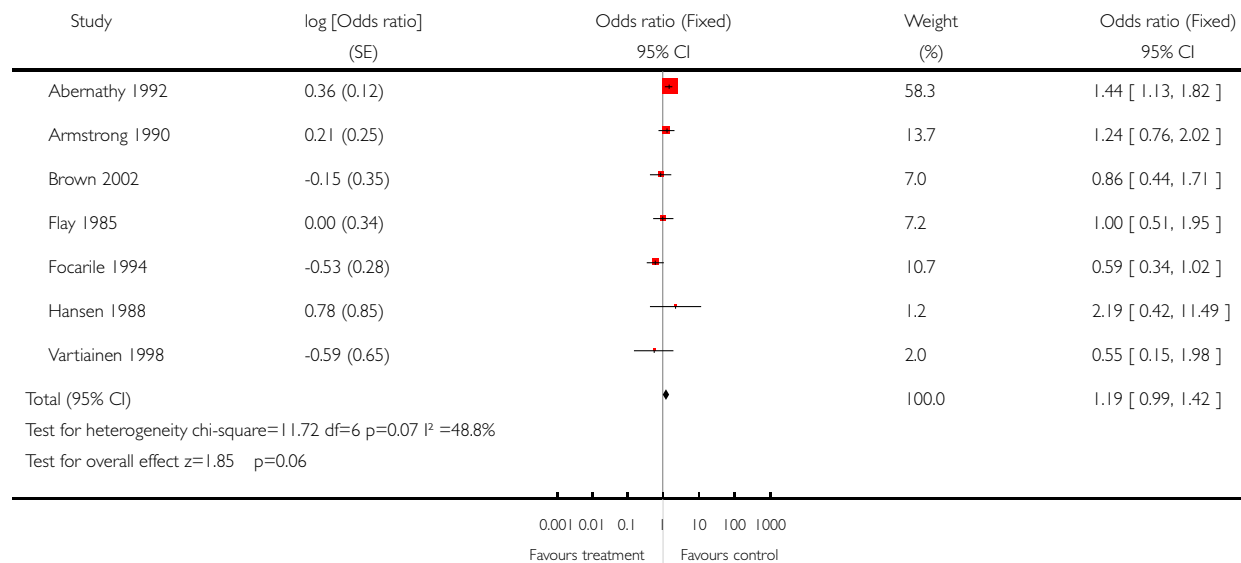


Analysis 03.05. Comparison 03 Social influences curricula versus control, Outcome 05 Smoking prevention (adjusted) - long term

Review: School-based programmes for preventing smoking

Comparison: 03 Social influences curricula versus control

Outcome: 05 Smoking prevention (adjusted) - long term



Analysis 04.01. Comparison 04 Combined social competence and social influences curricula versus control, Outcome 01 Results of Category I studies

Results of Category 1 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Spoth 2001	1,309 eligible families, of whom 667 (51%) completed the pretest; and at 36 months 447 families remained [34%].			At 36 months: (1) Intervention vs. no-intervention control: Fewer ever smokers in Iowa Strengthening Families Program (33%) than control (50%; $p < .01$). (2) Intervention vs. Intervention: No significant difference in ever smokers in Iowa Strengthening Families Program (33%) than Preparing for the Drug Free Years Program (44%)
Spoth 2002	Schools in 22 contiguous counties in a midwestern US state, with 20% or more of households in the school district within 185% of the federal poverty level, school district enrolment under 1,300, and all middle school grades to be taught at one location. From this pool 36 schools were randomly selected and matched and randomly assigned to one of two experimental conditions or control	At 12 months: Intervention vs. no-intervention control: No significant differences in new users between Life Skills Training Program (13.9%); LST + Strengthening Families Program (12.1%) and Control (16.7%)		
Sussman 1995	Study TND-I CHS: At baseline administrative access was provided to 75% of the enrolled students (= 2,863 students), and pretest data were obtained from 2,001 (70% of the 2,863)). 1-year follow-up: 1,074 (23% were still in the Continuation High School, and 77% were followed-up by telephone). TND-II CHS: 69% followed up at 1 year TND-I RHS: 63% followed up at one year.	Study TND-I CHS: Process analysis showed that students attended 2/3 of the drug abuse sessions. Adherence by educators to planned lesson delivery was high, and was 99-100% in 10 of 20 lessons. 100% of class control and 100% of material appropriateness scores were 5 or above on a 1-7 scale. 1 Year: adjusted means for past 30 days cigarette smoking were 30.71 for control, 34.53 for classroom, and 33.08 for classroom plus school-as-community groups (n.s.). Study TND-II CHS: 27% relative		Methodological problems are: no power computation; only 6% of Experimental Group 2 (which received the School component + School-as-Community Component) attended School Programme and Associated Student Body Core Group meetings, and 20% attended drug-free events. The authors comment "Perhaps the greatest threat to internal validity involves the fact that posttests were assessed on the basis of telephone interviews ... On the other hand, if

Results of Category 1 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
		reduction in cigarette use in health-educator led group compared to self instruction. Study TND-I RHS: no differences between classroom and control.		underreporting was a serious problem in only the program conditions, then these conditions should have also shown significantly lower levels of marijuana and cigarette use compared with the control conditions ... Overall, the possible invalidity of phone interviews does not provide a consistent explanation for the obtained pattern of findings.“

Analysis 04.02. Comparison 04 Combined social competence and social influences curricula versus control, Outcome 02 Results of Category 2 studies

Results of Category 2 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Botvin 1990a	<p>Baseline: 5974; 75% followed-up at 3y. Analysis at 3y based on 3684 (62%) from 50 schools who received at least 60% of the programme. At 6y, 60% of baseline were followed-up. Attrition: no differential between conditions. Amount of course material covered by presenters = mean implementation 68% (range 27-97%) with 75% of the students in the expt conditions being exposed to 60% or more of the programme. Implementation was significantly related to outcome.</p>		<p>At 3 years (end of programme), and using the school as the unit of analysis, the Experimental group 1 (teachers received a 1 day workshop, and feedback from project staff) had less smoking compared to control ($p < .03$), but there was no significant difference ($p < .09$) for Experimental group 2 (teachers received videotape training, and no feedback from project staff) (p. 442, footnote 3). At 5 years expired air carbon monoxide levels correlated $r = 0.35$ ($p < .001$) with self-reported smoking. Using the school as the unit of analysis, for the full sample ($n = 3597$) for Experimental Group 1 (teachers received a 1 day workshop, and feedback by project staff) compared to the control there was less monthly (27%, 33%; $p < .05$), and weekly (23%, 27%; $p < .05$) smoking. For Experimental Group 2 (videotape training, no feedback by project staff), compared to the Control group there was less monthly (26%, 33%; $p < .01$), weekly (21%, 27%; $p < .05$) and pack-a-day (9%, 12%; $p < .05$) smoking. For the High-Fidelity sample ($n = 2752$) who received at least 60% of the intervention during the 7th., 8th. and 9th. grades, the results were nearly identical.</p>	<p>Methodological problems are: 38% attrition at 36 months; differential attrition of smokers; no statements about method of randomisation, if blinded or concealed; 68% implementation (ranging from 27-97%); 75% of the students in the prevention conditions were exposed to 60% or more of the prevention programmes; and no power computation. Schools were used as the unit of treatment allocation and analysis. ICC's were not computed.</p>
Botvin 1990b	<p>Baseline: 1311; 998 (76%) followed up at 1 year. No differential attrition by pre-test smoking status.</p>	<p>(1) 4 month post test after 7th grade programme: there was a lower proportion of monthly smoking in the peer-led (15%) compared to the</p>		<p>Methodological problems are: 24% attrition at 12 months; saliva was collected for thiocyanate but no results are stated; no statements</p>

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
		<p>teacher led (22%, $p < .01$) and control (21%, $p < .05$). Weekly and daily measures in same direction (NS).</p> <p>(2) 1 year: In the Peer-led booster group compared to the Control there were fewer students reporting monthly (12%, 23%; $p < .02$), weekly (5, 16%; $p < .005$), and daily smoking (3%, 13%; $p < .005$) and on the index of smoking (.40, .74; $p < .005$).</p> <p>In the Peer-led booster group compared to the Teacher-led booster group there were fewer students reporting monthly (12%, 34%; $p < .0001$), weekly (5%, 21; $p < .0001$), daily (3%, 16%; $p < .0005$) smoking and on the index of smoking (.40, 1.08; $p < .0001$).</p> <p>For the Peer-led booster group compared to the Peer-led non-booster group there were fewer students reporting monthly (12%, 31%; $p < .0002$), weekly (5%, 22%; $p < .0001$), daily (3%, 17%; $p < .0002$) smoking and on the index of smoking (.40, .98; $p < .0001$), and also compared to the Teacher-led non-booster group on monthly (12%, 26%; $p < .002$), weekly (5%, 16%, $p < .002$), daily (3%, 11%; $p < .02$) smoking and on the index of smoking (.40, .75, $P < .002$).</p> <p>Because field staff observed that many teachers implemented the programme with a low degree of</p>		<p>about the method of randomisation, if blinded or concealed; no power computation; and no ICC's and allowance for clustering.</p> <p>The authors suggest that the difference between teacher and peer led conditions may have been due to booster implementation failure. Peer leaders were supported by project staff, whilst teachers were not.</p>

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Botvin 1999	2,209 (82%) at 1 year. Smokers had higher attrition rates ($p < .0001$), but no differential attrition by condition.	<p>fidelity, a separate analysis was made for the 145 8th. graders whose teachers were rated as 4 or 5 on a 5 point implementation scale: for the Teacher-led compared to the Control group there was considerably less weekly (12%, 17%; $p < .05$), and daily (8%, 13%; $p < .05$) smoking and on the index of smoking ($p < .05$).</p> <p>At 1 year: less lifetime smoking in the experimental (28%) vs. the control group (34.5%; $p < .001$), 30-day (8.8%) vs. (12.3%; $p < .005$), initiation (19.6%) vs. (23.9%; $p < .02$) and escalation from lifetime to monthly (6.7%) vs. (9.9%; $p < .009$). A logistic regression controlling for ethnicity, percentage of programme completed, and receiving free lunches showed that the experimental group, compared to control, had a risk of initiating smoking of 0.76 (95%CI = 0.57,1.01), and of escalating of 0.55 (95%CI = 0.35,0.86).</p>	<p>At 24 months: No significant differences in smoking between intervention and control groups when corrected for classroom effects by MANOVA ($p < .09$). A post-hoc power computation showed that to achieve power $> .80$, alpha would have to be set at $.10$ for MANOVA and logistic analyses.</p>	<p>Methodological problems were that at baseline the intervention group had more Blacks (67%) than the control group (47%; $p < .001$); more students receiving free lunches (47%) than the control group (38%; $p < .001$); and lower self-reported grades ($p < .02$); no power computation; no ICC's; and no statistical modeling to assess the effect of differences in the unit of allocation and analysis.</p>
Gersick 1988	<p>No baseline measurements, 1372 at post test</p> <p>At 2 years, attrition 21% compared to post test.</p> <p>Dropouts were post test substance users</p>	<p>The results at 12 months were that the experimental group used less tobacco (mean = 1.65 on a 7-point scale) than control group students (1.87; $p < .02$) for the individual level analysis, and for smoking "once a month to 2-3 times/week or more" (8%, 13%; $p < .03$), but there were no significant differences for a classroom level analysis ($p < .10$). 66% were never users in intervention</p>	<p>At 24 months: No significant differences in smoking between intervention and control groups when corrected for classroom effects by MANOVA ($p < .09$). A post-hoc power computation showed that to achieve power $> .80$, alpha would have to be set at $.10$ for MANOVA and logistic analyses.</p>	<p>Design problems: dropouts in the 8th. grade smoked more ($p < .006$); those from married families were less likely to drop out ($p < .0001$); no statements about the method of randomisation, if blinded or concealed; and no power computation. ICC's were not computed.</p>

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Josendal 1998	Baseline: 4441; 2 years: 3,820 (92%)	group vs 61% in control 6 months: Non-smokers in Group A (control) declined from 93% to 85%; and from 93 to 91% in Group B (classroom + parents + teacher training) (p<.01). These differences were maintained for separate analyses on subgroups: high sensation seekers (p <.05), those with strong expectations to smoke (p <.01) and with 1 parent who smoked (p <.05). However, for students categorized as low sensation seekers, and who had low expectations of smoking and whose parents did not smoke, there were no differences in % smoking. Changes from 92% to 87% in Group C (classroom + parents) and from 90% to 84% in Group D (classroom programme + teacher training) not significantly different from control.		Methodological problems are: no power computation; and no ICC's and no allowance for clustering.
Scheier 2001	Pretest: 3288 7th Grade students; 2724 in 8th Grade; 2468 in 9th Grade; 2228 in 10th Grade		Intervention in the 7th Grade: refusal skills efficacy reduced tobacco use in the 10th grade (r = -.14, P < 0.001)	
Sussman 1993	Baseline: baseline data collected from 6,716 7th graders Follow-up at 12 months: 7,052, with 93% reporting attending the same school 1 year earlier Follow-up at 24 months: 7,219, of whom 65% had attended a Project TNT school 2 years before.	1y: Prevalence of trial (p<.05) and weekly (p<.05) cigarette use rose significantly less from posttest in 3 of the curricula (informational social influence, physical consequences, combined) than control, absolute difference 2-3% for trial use. The TNT combined curriculum reduced the increase in weekly prevalence by 64% compared to control. At posttest (used as baseline for	2y: Prevalence of trial cigarette use rose significantly less (p<.05) in all experimental curricula than control, absolute difference 6-10%. Weekly cigarette use was significantly lower (p<.05) in the combined curriculum than all other conditions and control. The combined curriculum reduced the increase in weekly prevalence by 56% compared to control.	Methodological problems are: there are more students at follow-up than baseline due to students joining the study; attrition from baseline is not estimated; breath and saliva samples were collected but not analysed; there are no statements about the method of randomisation, if blinded or concealed; no power computation; 28 schools were assessed only by assessing 3 classes randomly chosen;

Results of Category 2 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
		changes in prevalence), trial cigarette use prevalence was 40%, weekly use prevalence was 6%. Process analysis: Adherence to implementation, and student attendance (90%) did not vary by condition.		no analysis of results at the student level.

Analysis 04.03. Comparison 04 Combined social competence and social influences curricula versus control, Outcome 03 Results of Category 3 studies

Results of Category 3 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Botvin 1980	Baseline 281 (of which approx 70% non smokers). Attrition: 6 month follow-up data available for approx 80% of post-test expt group and 74% control	At 6 months: The experimental group had fewer monthly smokers than the control (6% vs 18%, $p < 0.05$).		There were 5 methodological problems: only 2 schools were randomised; no power computation; only 80% of the experimental and 74% of the control group were followed-up at 1 year; no differential attrition analysis; and no ICC's and no correction for clustering were made.
Botvin 1982	Baseline 426; 84% followed-up at 1 year; of whom 74% were nonsmokers at pretest. No analysis of attrition.	12m: For baseline non-smokers there were fewer monthly smokers in the experimental (24%) than in the control group (32%, n.s.), and fewer weekly smokers (11% vs. 25%, $p < .01$); thiocyanate levels remained the same in the experimental group but increased in the control group ($p < .05$).		Methodological problems are: no statement about method of randomisation, or if researchers blinded or concealed; no power computation; no attrition analysis; no ICC's or allowance for clustering; only 2 schools in trial.
Botvin 1983	Baseline & post-test: 902, of whom 831 were nonsmokers; approx 73% followed at 1 year.	1y: For non smokers at baseline, the smoking rates for both Expt groups compared to control were: monthly smoking 15% vs. 22% ($p < .05$); 7 day smoking 8% vs. 15% ($p < .004$); and daily smoking 6% vs. 11% ($p < .03$). The E2 minicourse group had lower rates of onset of monthly ($p < .005$), weekly ($p < .0008$), and daily smoking ($p < .008$) compared to the control, but there were no differences between the E1 and control groups. There were no significant intervention effects when the E2 and E2 with booster groups were compared, but group n's were small.		Methodological problems are: no statement about the method of randomisation, if the researchers blinded or concealed; saliva samples not analysed; no power computation; no attrition analysis; no ICC's and no allowance for clustering. Baseline smoking rates differed between schools Secondary analysis using GLM to control for school effects also demonstrated a significant benefit from Exp 2
Gilchrist 1987	Baseline: 102; 6 months: 83% of the intervention subjects completed the 10 session programme. Attrition was 8% across	6m: The text (p. 875) states: "Positive changes in tobacco use found at pretest were not evident at follow-up." Table 4 notes that from pretest to posttest self-		Methodological problems: no statements about method of randomisation, blinding or concealment, or whether the control group received an intervention; no power

Results of Category 3 studies (Continued)

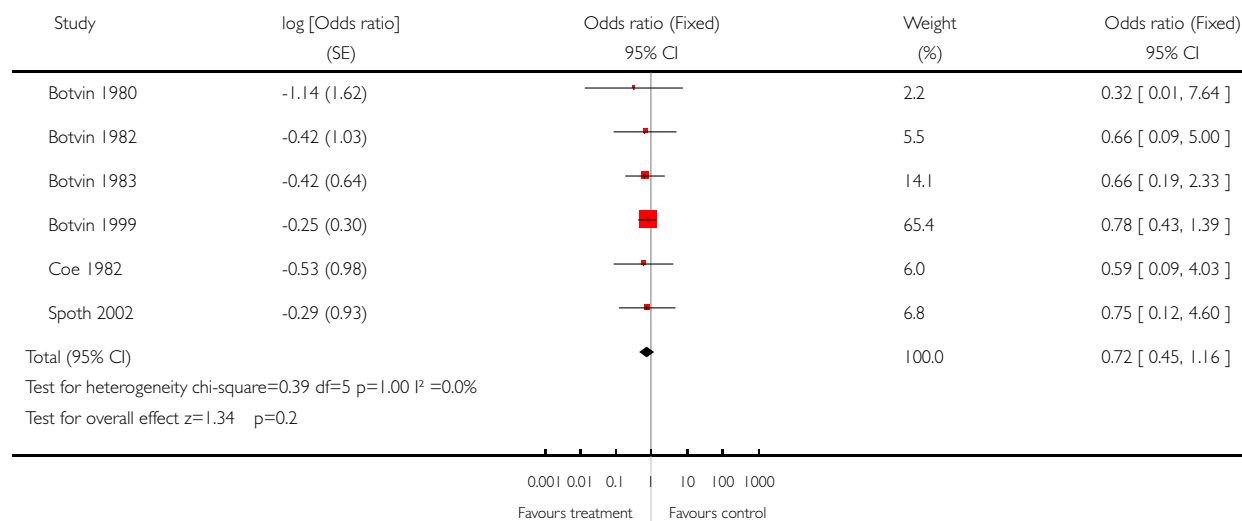
Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Hanewinkel 1994	both conditions. No differential attrition mentioned. Baseline: 1,299; Follow-up at 6 months: 650 (50%)	identification as a tobacco user decreased 31% in the experimental and increased 5% in the control group (p<.001). From posttest to 6 month follow-up there were increases in both the experimental (9%) and the control (7%) groups (ns). At 6 months: In the Experimental group (Hauptschule 3, Realschulen 1 and 2, Gymnasium 1) 75% were nonsmokers at baseline, 84% post-intervention (p<.001); and 84% of the 519 assessed at follow-up. For the control group (Hauptschulen 1 and 2) there were no significant differences in % smoking at baseline and follow-up. Figure 1 (no statistical analysis offered) shows that the results in the experimental group are due to changes in Hauptschule 1 (46% smokers at baseline, 34% post-intervention, and 33% at 6 months follow-up), and Realschule 1 (22% smokers at baseline, 8% post-intervention, and 14% at 6 month follow-up). The authors used a "waiting list control design" in which all groups eventually received the intervention, with the control groups receiving it later. The group which served as the Control group to which Experimental Group 1 was compared was later designated as Experimental Group2, but no intervention results are shown for this experimental group.		computation; no biochemical validation; no ICC's and no analysis of clustering. Methodological problems are: no description of the method of randomisation, if researchers blinded or concealed; 1 gymnasium withdrew; the control group (2 Hauptschulen) differs in student composition from the Experimental Group 1 (1 Hauptschule, 2 Realschulen, and 1 Gymnasium), 50% attrition at 6 months; no power computation; no ICC's, and no allowance for clustering; control schools were placed on a "waiting list" design and subsequently received the intervention. Reported smoking in the last 7 days correlated r = 0.499 (p<.01) with expired CO COcarbon monoxide.
Schaps 1986	Baseline: Drug Education Study I = 250; Drug Education Study II = 237.	1 year: No significant differences in smoking between the intervention and		Methodological problems are: high attrition; differential attrition from

Results of Category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	Follow-up at 1 year: not staed.	control group.		control group; no attrition analysis; partial programme delivery; no definition of smoking; no statements about whether the control group received an intervention, no power computation; no ICC's and allowance for clustering. The authors comment that: "The Cohort Study I suffered from serious methodological problems ... the over-all rate of student attrition was substantial and was greater in the control group than the experimental group. Furthermore, only a minority of experimental students were exposed to prevention strategies during all 3 years because many of their teachers did not participate in in-service training." No comments on whether the groups were equivalent at baseline. The Cohort II study was described as quasi experimental

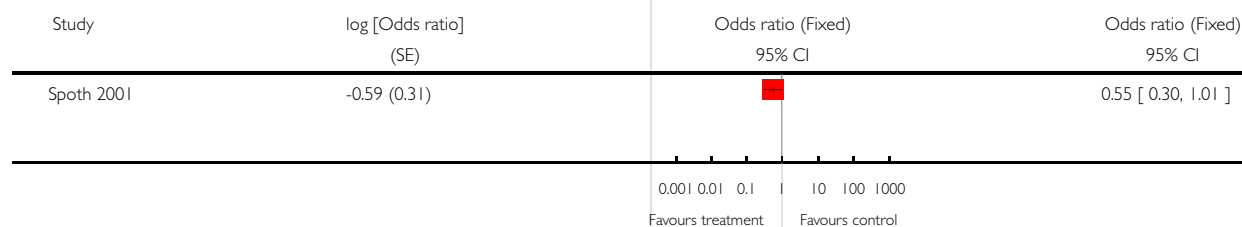
Analysis 04.04. Comparison 04 Combined social competence and social influences curricula versus control, Outcome 04 Smoking prevention (adjusted) - short term

Review: School-based programmes for preventing smoking
 Comparison: 04 Combined social competence and social influences curricula versus control
 Outcome: 04 Smoking prevention (adjusted) - short term



Analysis 04.05. Comparison 04 Combined social competence and social influences curricula versus control, Outcome 05 Smoking prevention (adjusted) - long term

Review: School-based programmes for preventing smoking
 Comparison: 04 Combined social competence and social influences curricula versus control
 Outcome: 05 Smoking prevention (adjusted) - long term



Analysis 05.01. Comparison 05 Social influences versus information-giving, Outcome 01 Results of Category I studies

Results of Category 1 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Hansen 1991	Baseline: 3,011; 1 year: 2,416 (80%). Attrition amongst students who received resistance training was 18% vs. 22%	1 year: There was a trend towards lower cigarette use in normative education classes. 8.1% vs 10.3% for ever smoking and		Methodological problems are: differential attrition in the Resistance Training (18%) compared to the other 3 experimental

Results of Category 1 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	in other conditions. Analysis based on cohort followed.	4.8% vs 6.5% for 30 day smoking. ANCOVA showed a significant main effect for normative education (F 4.76, p<0.05) on the main cigarette index. There was no evidence of an effect of Resistance Training		groups (21.6%, p <.01); no statement about method of randomisation, if blinded, or concealed; no biochemical validation; no power computation. No baseline use rates given. The uptake of smoking was relatively low in all groups.

Analysis 06.01. Comparison 06 Social influences vs. social competence, Outcome 01 Outcomes for Category 3 studies

Outcomes for Category 3 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Hansen 1988		For details see Hansen 1988 entry under Group III Category 3		

Analysis 07.01. Comparison 07 Multi-modal programmes compared to single-component interventions, Outcome 01 Results of Category 1 studies

Results of Category 1 studies

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Biglan 2000	<p>Baseline: 2231 seventh and 2251 ninth graders.</p> <p>Year 2: 2231 seventh and 2284 ninth graders.</p> <p>Year 3: 2170 seventh and 2255 ninth graders.</p> <p>Year 4: 2268 seventh and 2440 ninth graders.</p> <p>Year 5: 2045 seventh and 2120 ninth graders.</p> <p>Only 13.5% of students did not receive an assessment in all 5 years of the study.</p>	<p>After 1 year: In the communities which received the Community + School Programme, the percentage smoking (measured by an Index of weekly smoking) at baseline was 8.7% compared to 12.4% in the communities which received the School Only Programme (p <.022).</p>	<p>After 4 years (T5): the Index of weekly smoking in the Community intervention group was 12.4% and in the Schools Intervention group was 13.8% (p <.038). Smokeless tobacco use in the Community Intervention communities decreased from 13.8% at baseline to 9.7% in Year 2 (p <.04), and in the School Intervention communities from 11.4% to 13.6% (n.s.)</p> <p>However, there were no significant differences between the communities on expired carbon monoxide levels at any time.</p>	<p>Methodological problems are: no assessment of differential attrition; and no power computation.</p> <p>The unit of treatment allocation for the Community Intervention group was the community, and for the Schools Intervention group was schools within those communities. Communities were appropriately the unit of analysis. No ICC's were computed.</p>
Elder 1996	<p>Baseline: 7827 replied to the tobacco use items on the baseline questionnaire at the end of 5th. grade. Study reports results for the 6527 respondents at end of 5th grade who could be identified, had a known smoking/ nonsmoking status, and had no missing data. Differential attrition not stated</p>	<p>Significant differences in smoking prevalence at the end of 5th grade (4.71% in expt, 5.03% in control).</p>	<p>At 36 months: Results for the intervention designed to reduce smoking by students: there were no significant differences in the percentages stating they had ever smoked in the experimental (4.7%) and the control group (5%): OR = 1.01, 95% CI = 0.79 - 1.30. Results for the intervention designed to increase the percentage of schools with no smoking policies: there was an increase from 55% to 75% among control schools, and from 45% to 78% among experimental schools (Minnesota schools already had a policy of 100% smoke-free schools at all time periods). No statistical analysis was provided.</p>	<p>Methodological problems: no power computation; no biochemical validation; incomplete programme delivery (only 1/3 of schools held assemblies about tobacco, 40% participated in Great American Smokeout activities, and 25% sponsored anti-tobacco or anti-drug clubs); no attrition or differential attrition analysis.</p> <p>The study was not designed to find a difference in smoking prevalence. Logistic regressions with a school random effect and fixed and random effects was designed to assess school effects.</p>
Perry 1996	<p>2351 at baseline, to 1901 @ 2.5yrs follow up</p>	<p>At 6 months, cig use rose in the intervention group from 6.9% to 8.4%, and in controls from 4.7% to</p>	<p>For the "baseline nonsmokers group" cigarette use was 1.5% in 1991 and 15.5% in 1994 in the experimental</p>	<p>Trial was primarily about alcohol use; tobacco use was not fully reported.</p>

Results of Category 1 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Perry 2003	DARE Grp 2518, DARE Plus Grp 2635, controls 2108.	8.8%.	<p>and 1.5% and 24.6% in the control (p <.05); and for all students 6.9% and 24.8 % in the experimental and 4.7% and 30.7% in the control (p <.05).</p> <p>At 18 months: Males: DARE (baseline score 7.65; growth rate 0.95); DARE Plus (baseline score 7.72; growth rate 0.68); control (baseline score 7.66; growth rate 0.96); for growth rates DARE vs control P < 0.04; DARE Plus vs DARE P < 0.04)</p> <p>Females: DARE (baseline score 7.82; growth rate 0.93); DARE Plus (baseline score 8.07; growth rate 0.79); control (baseline score 7.71; growth rate 1.01); for growth rates DARE vs control n.s.; DARE Plus vs DARE n.s.)</p>	

**Analysis 07.02. Comparison 07 Multi-modal programmes compared to single-component interventions,
Outcome 02 Results of Category 2 studies**

Results of Category 2 studies

Study	Number followed-up	Early outcomes	Long-term outcomes	Additional comments
De Vries 2003		27 schools with 145 classes in Helsinki; two regions in Denmark with 60 schools and 100 classes; two health authority regions with 43 schools and 331 classes in the UK; and two regions with 25 schools and 159 classes in Portugal [the Netherlands and Spanish studies were not RCT's and are not presented here]. The non-smoking students in all 6 countries at baseline numbered 20,166; and after one year were 15,422 (76%).	At 1 year: In Denmark weekly smoking was 12.9% in the experimental and 10.3% in the control group (OR =1.63; 1.06-2.52; p <.05); in Finland 11.2% and 15.9% (OR = 0.61; 0.46-0.80; p<.001); in Portugal 3.8% and 3.2% (OR= 1.15; 0.70-1.89; ns); and in the UK 9.0% and 9.0% (OR = 1.27; 1.00-1.62; p <.05).	
Piper 2000	22 elementary, middle or junior high schools in small towns and rural areas of Wisconsin (of 2,899 enrolled students, parental consent was obtained for 2,528 at baseline; 2,483 completed the pre-test; and 1,981 [67%] were participating after three years; and 554 parents in 6th grade (baseline) and 9th grade (1st follow up); 1677 in 10th grade (2nd follow up)	Not tested	Annual surveys from Grade 6 until grade 10: Cig use in the past month: Age Appropriate HFL (6th grade 4%, 9th grade 24%; 10th grade 36%); Intensive HFL (6th grade 5%, 9th grade 22%; 10th grade 28%); control (6th grade 5%, 9th grade 24%; 10th grade 30%); Age appropriate higher in 10th grade than Control or Intensive (P < 0.01). Intensive HFL showed a positive effect (P = 0.05) at 10th grade.	These are raw data, unadjusted for covariates.
Schofield 2003	sample of 24 public secondary schools in the Hunter Region of New South Wales (22 agreed to participate; 4,841 [60% of the eligible students] gave consent and completed the pre-test; and 1,852 (38%) were present at two years		At baseline and 2yrs, intervention: 7.8% and 17.5%; controls: 10.5% and 20.5%; n.s.	

Analysis 07.03. Comparison 07 Multi-modal programmes compared to single-component interventions, Outcome 03 Results of category 3 studies

Results of category 3 studies

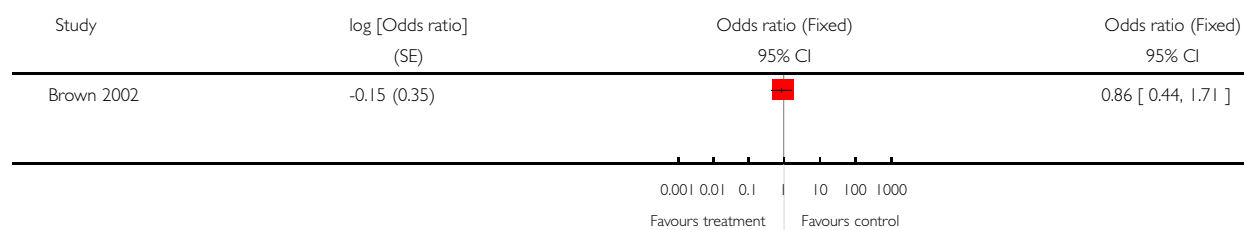
Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
Reddy 2002		<p>Researchers listed all schools in New Delhi and blocked them on type (private, government) and gender (males only, females only, and co-educational) and randomised them to a school- and family-based intervention, a school-based intervention, or control. There were 5,752 students aged 12 at baseline, 5,043 (88%) provided consent, 4,776 (83%) participated in the baseline survey, and 4,452 (77%) were present at one year. Individual student survey data could not be matched from pre-to post-test.</p>	<p>At 1yr there was significantly less smoking ($P < 0.001$) in both the school + family intervention and the school intervention groups compared to the control.</p>	
Rohrbach 1994	57 schools in 12 school districts in Indianapolis, and randomly assigned middle and junior-high schools within each school district to the intervention or delayed intervention groups. Rohrbach reported on the third cohort of students and their parents, who were exposed to all components of the I-STAR programme. A 25% sample ($n = 3,528$) was selected by classroom from each school to participate in the evaluation of the programme, and 2,649 (75%) completed the 18 month assessment. For these 2,649 students, a 70% ($n = 2,500$) sample of their parents was randomly selected to participate in an evaluation of the parent programme, and at 18		<p>At 18m: Parental participation was negatively associated with child's tobacco use at baseline ($r = -.12$; $P < 0.0001$) and at 18m ($r = -.14$; $P < 0.0001$).</p>	

Results of category 3 studies (Continued)

Study	Number followed-up	Early outcomes	Long term outcomes	Additional comments
	months 1,001 (45%) of their parents returned a mail survey.			

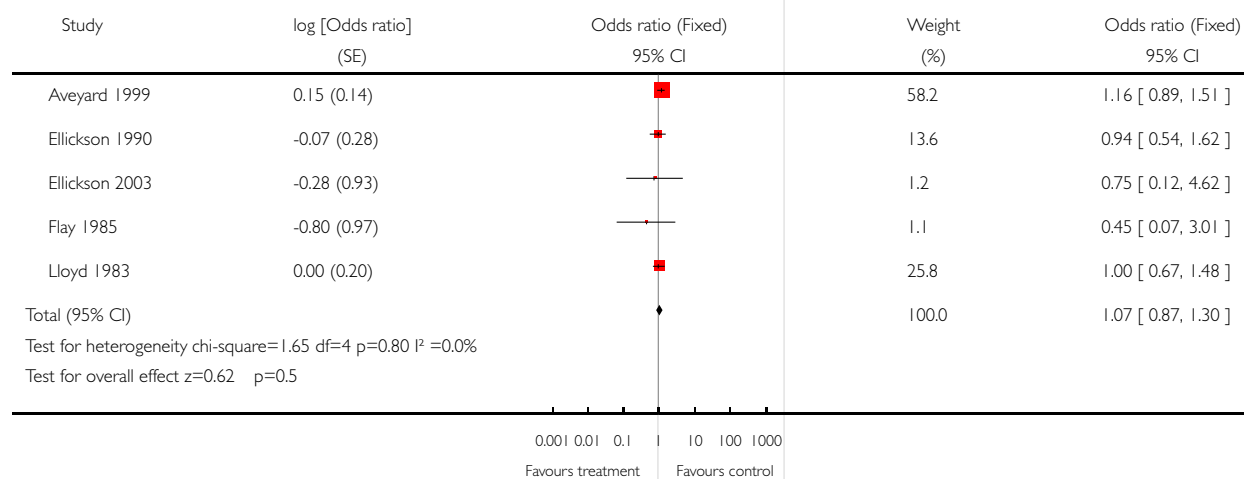
Analysis 08.01. Comparison 08 Sensitivity analyses: Social influences curricula versus control, Outcome 01 Smoking prevention -high quality only - (adjusted) - long term

Review: School-based programmes for preventing smoking
 Comparison: 08 Sensitivity analyses: Social influences curricula versus control
 Outcome: 01 Smoking prevention -high quality only - (adjusted) - long term



Analysis 08.02. Comparison 08 Sensitivity analyses: Social influences curricula versus control, Outcome 02 Smoking prevention - high quality only - (adjusted) - short term

Review: School-based programmes for preventing smoking
 Comparison: 08 Sensitivity analyses: Social influences curricula versus control
 Outcome: 02 Smoking prevention - high quality only - (adjusted) - short term



Analysis 09.01. Comparison 09 Raw data results, Outcome 01 Short-term outcomes (< 18 months)

Short-term outcomes (< 18 months)

Study	Exp smokers	Exp schools	Control smokers	Control schools	Adjusted OR	95% CI
Abernathy 1992	215/1172	95	263/1264	95		
Armstrong 1990	170/689	30	106/339	15		
Ary 1990	12%	19	12%	18		
Aveyard 1999					1.16	0.89 to 1.50
Botvin 1980	4/63	1	14/80	1		
Botvin 1982	26/110	1	32/100	1		
Botvin 1983	44/284	4	70/321	3		
Botvin 1999	243.4/1242	15	214.6/898	14		
Coe 1982	8/66	2	16/84	2		
Crone 2003					0.61	0.41 to 0.90
De Vries 1994	185/391	8	149/280	6		
De Vries 2003					0.93	0.80 to 1.08
Ellickson 1990	394.4/1327	20	206/663	10		
Ellickson 2003	2.9/34	34	2.3/21	21		
Flay 1985	6/314	11	10/241	11		
Hansen 1988	9.6/49	4	4.6/35	4		
Lloyd 1983	356/2458	44	379/2607	44		
Spoth 2002	92.4/707.4	26	57.7/345.3	13		
Telch 1990	8.9/187	8	13/161	6		
Unger 2004					0.75	0.48 to 1.18

Analysis 09.02. Comparison 09 Raw data results, Outcome 02 Long-term outcomes (> 18 months)**Long-term outcomes (> 18 months)**

Study	Exp smokers	Exp schools	Control smokers	Control schools	Adjusted OR	95% CI	P value
Abernathy 1992	551/1155	95	485/1249	95			
Armstrong 1990	248/689	30	106/339	15			
Brown 2002	126.6/945	15	133.5/878	15			
Flay 1985	91/314	11	70/241	11			
Focarile 1994					0.588235294		0.03
Hansen 1988	11.3/49	4	4.2/35	4			
Kellam 1998	203/700	10	299/904	8			
Spoth 2001	96/269	22	71/142	11			

Long-term outcomes (> 18 months) (*Continued*)

Study	Exp smokers	Exp schools	Control smokers	Control schools	Adjusted OR	95% CI	P value
Storr 2002	99.1/381	18	55.4/168	9			
Vartiainen 1998	90.9/490	4	73/250	2			