School-based programmes for preventing smoking (Review)

Thomas R

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School-based programmes for preventing smoking (Review)

Thomas R

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ABSTRACT

Background
Smoking rates in adolescents are rising. 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 randomised controlled trials of behavioural interventions in schools to prevent children (aged 5 to 12) and adolescents (aged 13 to 18) starting smoking.

Search strategy
We searched The Cochrane Controlled Trials and Tobacco Review group registers, 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 randomised controlled trials in this area.

Selection criteria
Types of studies: those in which individual students, classes, schools, or school districts were randomised to the intervention or control groups and followed for at least six months.
Types of participants: Children (aged 5 to 12) or adolescents (aged 13 to 18) 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 randomised controlled trials. We assessed the quality of design and execution, and abstracted outcome data. Because of the marked heterogeneity of design and outcomes, we did not perform a meta-analysis. We synthesised the data using narrative systematic review. We grouped studies by intervention method (information; social competence; social influences; combined social influences/social competence and multi-modal programmes). Within each category, we placed them into three groups according to validity using quality criteria for reported study design.

Main results
Of the 76 randomised controlled trials identified, we classified 16 as category one (most valid). There were no category one studies of information giving alone. There were fifteen category one studies of social influences interventions. Of these, eight showed some positive effect of intervention on smoking prevalence, and seven 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 8-year programme on smoking behaviour. There was a lack of high quality evidence about the effectiveness of combinations of social influences and social competence approaches. There was limited evidence about the effectiveness of multi-modal approaches including community initiatives.
Authors’ conclusions
There is no rigorous test of the effects of information giving about smoking. There are well-conducted randomised 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 showed no effect of the intervention. There is a lack of high-quality evidence about the effectiveness of combinations of social influences and social competence interventions, and of multi-modal programmes that include community interventions.

Plain Language Summary
We identified 16 good quality randomised controlled trials of school-based programmes to prevent children who had never smoked becoming smokers. The interventions included information-giving, social influence approaches, generic 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 group of best quality studies found short-term effects on children's smoking behaviour, the best quality and longest trial (the Hutchinson Smoking Prevention Project) showed 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
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 7th through 12th grade students 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 Afro-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 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, 55-65% 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 5 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:

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.

Social competence curricula use enhancement interventions (also called Affective Education) based on Bandura’s social learning theory (Bandura 1977). This model hypothesises 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.

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.

Combined methods draw on social competence and social influence approaches.

Multi-modal programmes combine curricular approaches with wider initiatives within and beyond the school, including programmes for parents, schools, or communities and/or 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%. (Wenter
2002). 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 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, categorised 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 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 randomised 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 randomised. 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 analysed 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, health care 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 analysed (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: Tobacco Addiction Group methods used in reviews.

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

MEDLINE 1966 -
PsycInfo 1967 -
ERIC 1982 -
EMBASE 1974 -
Health Star
Tobacco Control 1992 -
Journal of Smoking Related Disorders 1990 -
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 Specialised Register Reference lists of the articles selected in the above sources
Index of Scientific and Technical Proceedings
Conference Papers Index
MEDLINE search strategy for Silver Platter ASCII 3.0 WINN
Selected Databases:
'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

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 reviewers evaluated 191 studies that appeared to be randomised 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 reviewers (RT and KB) independently extracted data until 1998. From then on, one reviewer (RT) extracted data from new studies with data checked by the review group coordinator.

3. **Study quality:** Quality of studies was independently assessed. In assessing quality, we judged the likelihood of four forms of bias that may threaten validity. In addition, as we had made the decision not to attempt meta-analysis, we considered it important to have statistical quality criteria prior to synthesizing data qualitatively. We therefore used six measures of study quality. These were the extent to which the studies minimised the following sources of bias:
   - **Selection bias** (systematic differences in comparison groups, due to imperfect randomisation).
   - **Performance bias** (problems with the implementation of the intervention, often due to incomplete intervention or contamination of the control group).
   - **Attrition bias** (losses to follow-up and/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.
   - **Detection bias** (significant differences in outcome assessment).
   - **There was a reported power calculation with attainment of the desired sample size.**
   - **The statistical analysis was appropriate to the unit of randomisation.** Intra-class correlations in smoking behaviour vary by school grade, frequency of smoking, gender, ethnicity, and time of school year. Intra-class correlations 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 2 error) (Dielman 1994; Murray 1990; Murray 1997; Palmer 1998). We considered statistical analysis to be appropriate if the analysis used the same unit as randomisation (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.

(4) **Data Synthesis:** Based on considerable heterogeneity in study design, type of outcome measure and statistical reporting, we determined that quantitative synthesis was not appropriate and we therefore used a narrative systematic review. We considered studies in five groups corresponding to the type of intervention (information; generic social skills; social influences/tobacco resistance and refusal skills; multiple; and multi-modal). Within each group we categorized studies into three groups according to methodological strength. In synthesising the results, we gave greatest weight to category one studies.

**DESCRIPTION OF STUDIES**

We identified 76 randomised controlled trials of which 54 were from the US, four were from Canada, three each were from Australia, Germany, Italy and the Netherlands, two each from Norway and the UK, and one each from Mexico and Spain. 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.

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 the short- and long-term consequences of smoking
- The 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 (Pechacek 1984; Ary 1990) 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 results section and also in the Table 'Description of Included Studies'. 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 16 category one 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 randomisation); (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; and (6) correct statistical analysis was performed, appropriate to the unit of allocation by randomisation and the unit of assessment. We identified 37 category two RCTs which contained one or more problems in design or conduct that could threaten the validity of their conclusions. We identified 26 category three RCTs which were judged to have serious problems in design or conduct that precluded drawing any conclusions.

**Results**

(1) Information-giving curricula versus control.

There were nine randomised controlled trials of information-giving, eight of which focused on tobacco (Andrews 1984, Chatrou 1999, Denson 1981, Figa-Talamanca 1989, Gatta 1991, Hirschmann 1989, MacPherson 1980, Rabinowitz 1974), and one on tobacco and cardiac health (Howard 1996):

**Category 1:** No studies identified.

**Category 2:**

(1) Chatrou (Chatrou 1999) compared an information intervention with two control groups. The intervention group received a three-lesson Wisconsin programme (Flay 1985) with an 'emotional/self' programme to enhance awareness of peers' influence and to encourage re-evaluation of a positive image of smoking conveyed by some peers and parents. The active control group received a three-lesson knowledge 'health/technical' Wisconsin programme, and the control group received no intervention. The sample was 949 12- to 14-year-olds in the Netherlands. Methodological problems included significant differences at baseline between groups in proportions smoking, intentions to smoke, gender and education; no power calculation; no differential attrition analysis; and no adjustment for clustering. At both six and 18 months there were no differences between the experimental and control groups in smoking (defined as no smoking versus experimental plus regular smoking).

(2) In Gatta (Gatta 1991) the intervention comprised one day of lessons on the harmful effects of tobacco, taught by slides, comic strips and posters. A poster of a famous non-smoking sportsperson and comic books on adolescent smoking were given to each student. Teachers were encouraged to develop these lesson topics in subsequent weeks. In one group, the intervention was carried out in all the classes (55 schools and 5796 children). In the second group, half the classes were further randomised to the intervention (52 schools and 5639 children), or to a control group with no intervention (56 schools and 6011 children). The sample was drawn from 163 state elementary schools in Milan. Smoking was defined as less than one cigarette a week, at least one cigarette a week, and at least one cigarette a day. Methodological problems were that the attrition rate at four years was 36%, and there was no adjustment for this in the analysis; the analysis was not adjusted for clustering, and the post-hoc power calculation showed that the study had only 67% power to detect the prespecified outcome. After four years there were no significant differences in smoking behaviour between the groups.

(3) Hirschman and Leventhal (Hirschmann 1989) compared an information intervention with a control group. The experimental group received three 45-minute sessions, and a 15-minute slide-tape show of four female and four male students discussing smoking (three pathways to regular smoking: risk-taking, affect-regulating, or submission to social pressure). Role-plays discussed symptoms after smoking, adaptation to smoking, and the process of becoming addicted. The content of the role-plays focused on smoking stage-specific experiences and their meanings. The content of the role-plays focused on smoking stage-specific experiences and their meanings. The control group saw three films on three separate days: 'Who's in charge here?'; 'The tobacco problem: what do you think?'; and 'First cigarette,' and wrote down what they liked and disliked about each film, together with ideas for improvement. The film content focused on immediate and long-term health effects of smoking. The sample was 315 sixth- to eighth-graders in a middle school in Milwaukee. For the 266 students included in the analysis there were no differences in smoking or associated variables between groups. Smoking was defined as cigarettes smoked in the past week. Methodological problems included partial programme delivery: 15% of students failed to attend at least two sessions, with 20% in the control group and 12% in the experimental group missing two or more sessions. Absentees at follow-up were more likely to have smoked in the past week, there was no power calculation and the analysis was not adjusted for clustering.

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School-based programmes for preventing smoking (Review)

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At six months there was 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 one cigarette prior to pre-test, the experimental group had fewer (33%) who progressed to a second cigarette compared with control (69%; p < 0.05). There were no statistically significant differences in the prevalence of smoking for the experimental group (15.3%) compared with the control group (18.6%). At 18 months for never-smokers there were no differences between groups in trying a single cigarette. Fewer students in the experimental group (5%) described themselves as occasional or regular smokers than in the control group (18%; p < 0.05). For students who had tried only one cigarette at the pre-test, the experimental groups were less likely (50%) to try a second than the controls (70%).

(4) Denson and Stretch (Denson 1981) compared an information intervention with a no intervention control group. The intervention included three lectures with films (drugs and the nervous system, choosing to smoke, advertising) over two school years, with a particular emphasis on the addictive nature of smoking. The sample comprised 604 students in 12 elementary schools in Saskatoon. Pairs of schools were matched on enrolment and socio-economic characteristics, then randomly assigned. Attrition was 13%. Smoking was defined as one or more cigarettes a week. Methodological problems were that there was no power calculation and no adjustment for clustering in the analysis.

At 24 months there was less smoking in the experimental group (3%) than in the control group (14%).

Category 3:

(5) Howard (Howard 1996) compared an information intervention with a tobacco and cardiac focus with a no intervention control. The intervention was a five-session cardiovascular risk-reduction programme on the physiology of the heart, smoking, hypertension, diet and physical activity, with advice on how to reduce those risks based on the American Heart Association ‘Getting to know your heart’ and ‘Future Fit’ materials. The sample was a convenience sample of 98 students in one U.S. private parochial school. Methodological problems included no power calculation, small sample size, no attrition analysis and no adjustment for clustering.

The results were that at baseline no children smoked, and at 12 months three students in the control group and none in the experimental group smoked.

(6) Figa-Talamanca and Modolo (Figa-Talamanca 1989) compared an information intervention with a no intervention control group. The intervention included three sessions on three separate days, with the goals of creating awareness of smoking as a cultural, economic, social and health problem, and of providing information on the physiology of the respiratory and cardiovascular systems, the motivations for smoking, and the role of the media. Intervention group A received a demonstration of the effects of smoking by spirometry, which provided a forum for discussing reductions in smoking by the students. Intervention group B received no spirometry demonstration, and the control group received no intervention. The programme was delivered by a health education specialist.

The sample consisted of 562 students from Perugia, Cagliari, Pavia and Genova.

At one year for males, never-smokers decreased from 47% to 43% in the experimental groups and from 63% to 54% in the control groups. For females in one experimental group never-smokers decreased from 52% to 48%, and increased from 44% to 47% in the experimental group which used spirometry, compared with the control group which increased from 59% to 68%. The only statistically analysis offered is that the reductions in occasional smokers and ex-smokers were not statistically significant. The study did not adjust for clustering and reported no formal statistical analysis.

There was no power calculation and no adjustment for attrition.

(7) The Primary Grades Health Care Curriculum (Andrews 1984) compared an ‘experiential health education program’ with a control group. The intervention, which is not further described, was delivered from ‘kindergarten through 3rd grade’. The control group received a standard teacher/text book programme in health education, but the number of sessions is again not stated. The sample consisted of 600 kindergarten children in two New York school districts. Groups were similar at pre-test. Smoking was defined as ‘on a regular basis,’ and by a report from parents on a questionnaire sent home. There was no power calculation, attrition analysis or adjustment for clustering.

At 36 months the experimental group reported less smoking than the control group. Parents with children in the experimental group reported that the curriculum had a significant effect in changing their children’s attitudes to health.

(8) The School Health Curriculum Project (MacPherson 1980) compared three methods of delivering a 12-session intervention with a no intervention control group. One experimental group received the Mobile Unit Programme: a mobile van contained lung samples and X-rays from healthy, cancerous and emphysematous patients. Students heard the wheezing and whistling sounds of pulmonary disease through stethoscopes, and a smoking machine demonstrated the accumulation of tar and nicotine. Air pollution monitors were demonstrated, and students could analyse their own expired air. The van visited each classroom three times, and a Lung Association educator guided groups through for a half hour. The second experimental group received the traditional curriculum including 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. The Combined programme received the mobile van plus traditional programmes. The control group received only a post-test.
The sample consisted of eight of the 56 school superintendencies in Vermont selected to be representative of population wealth, attendance, number of school nurses, expenditures per student, and educational staff. Two superintendences withdrew after randomisation. Completed questionnaires were obtained from 1750 students in 85 classrooms at baseline (82%), and 1683 (79%) six months later, including 345 (86%) from the group which only received the post-test. Methodological problems were that there was no power calculation and the analysis was not adjusted for clustering.

At six months for those who had previously been cigarette-smokers there was an increase in the number of smokers in the traditional instruction group (from 2.6% to 3.8%) and no increase in the groups that received instruction from the mobile van, the combination mobile van plus traditional curriculum, or in the control group. There were no significant differences for current cigarette-smokers.

(9) Rabinowitz (Rabinowitz 1974) compared an information intervention with a control group. The intervention from teachers gave anti-smoking health knowledge, attitudes and behaviours in a programme developed by the authors in conjunction with teachers' committees. The number of sessions was not stated. Whether the control group received an intervention was not stated. The sample consisted of 758 students in 36 classes in grades seven up until two years after 12th grade. The school district was the experimental unit, permitting a multi-grade sequential intervention. The sample size was no power calculation and the analysis was not adjusted for clustering.

The results at the 24 month follow-up were that boys in the Good Behaviour classrooms were less likely to smoke than those in the control classrooms (Relative Risk (RR) = 0.62; 95% confidence interval (CI) 0.40-0.97). Mastery Learning also reduced the risk of starting smoking for boys (effect significant for one cohort, RR = 0.46; 95% CI 0.24-0.87). For females there was no effect of either programme.

There were no Category 2 Studies.

Category 3 Studies:

(2) The NAPA VALLEY SCHOOL DISTRICT STUDIES (Shaps 1986) used a 12-session tobacco, alcohol and marijuana intervention, but did not provide further details. The samples consisted of 250 students in the Drug Education I study and 237 in the Drug Education II study. Design problems included high attrition, differential attrition from the control group, no attrition analysis, partial delivery of the programme, no definition of smoking, no power calculation and no correction for clustering.

At one year there were no significant differences in smoking between the intervention and control group.

(III) Social influences interventions versus control

Category 1 Studies:

(1) In the Hutchinson Project (Peterson 2000) students received 65 intervention sessions drawing on recommended best practice for social influence programmes. The interventions included skills to identify marketing and peer influences to smoke, skills to resist marketing and other influences, information to correct erroneous perceptions about smoking, motivation to be smoke-free, and distinguishing between what the adolescent wants to do and is able to do, promoting self-confidence in the ability to refuse influences and pressure to smoke, and enlisting positive family influences.

The sample was drawn from 40 school districts in Washington State with 8388 third-graders in two consecutive cohorts followed up until two years after 12th grade. The school district was the experimental unit, permitting a multi-grade sequential intervention in elementary, junior high and high school, and minimising contamination of experimental and control groups. Control districts continued to provide their usual health curricula. The sample size...
calculation took into account estimated attrition and missing data, the prevalence of smoking two years after 12th grade, and intraclass correlations (ICCs), and was powered to detect a 30% reduction in smoking. Smoking was biochemically validated. Assessment was by group randomisation-based permutation inference, which requires no modelling or distributional assumptions. Major effort was invested in maintaining the long-term collaboration of the school districts, parents and students and there was 94% follow-up.

At neither the 12th grade nor at two years after the 12th grade were there any significant differences between the experimental and control groups in daily, current or cumulative smoking.

(2) In Aveyard, (Aveyard 1999) the intervention was one class lesson and one computer session per term for three terms based on Prochaska's transtheoretical model of stages of change. Students used individual computers to answer questions about their smoking, and an expert system gave feedback on how their temptations compared with those of others in the same stage, and their changes from previous sessions. Students also saw video clips of young people talking about smoking. Class lessons developed understanding of the stages of change, and the pros and cons of smoking at different stages. Teachers delivered a one-hour classroom 'transtheoretical model intervention'. Teachers received a two-day training course. The control group received standard classroom instruction on smoking, and the teachers were provided with lesson plans and handouts but were not required to use them, and received no training.

The sample consisted of 8352 Year 9 students in the United Kingdom. The 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). Eighty-nine schools were approached, and 53 agreed to participate (90% of potential participants in these schools were recruited), with 77% of students receiving all three lessons. These 53 schools were sampled with probability proportional to the size of their year nine enrolment. Within the 53 schools 90% of the potential participants were recruited. 7444 students (89%) were followed up at 12 months, and 77% received all three lessons. Smoking was defined as one or more cigarettes per week. Groups were similar at baseline. Clustering was adjusted for using multi-level modelling.

(3) Cameron (Cameron 1999) compared a 'usual care' control group with a 15-lesson intervention. The intervention included six lessons in sixth grade giving information on the social consequences and short-term physiological consequences of tobacco use, peer, parent and media influences on tobacco use and modelling and building resistance skills; three lessons in the seventh grade to review the grade six programme, develop social norms supporting non-smoking, build awareness of the hazards of second-hand smoke, and develop self-efficacy for assertive behaviour around the issue of second-hand smoke; and six lessons in eighth grade with similar content.

All providers were given a manual, audiovisual aids, a student workbook, a peer leader manual and a host teacher manual for each grade unit, and a one-hour orientation session. The training conditions were either self-preparation (the materials listed above) plus videotape demonstrating interactive learning, or workshops one day before each grade.

The sample consisted of 4971 sixth grade students in southwest Ontario. Ten school boards and five health units were approached, and 3821 students (89%) who remained in the same treatment group were tracked at the end of the eighth grade. There were no baseline differences across the five experimental conditions on the proportions who smoked, who were female, or who were at high social risk, and no differential attrition by school risk score or treatment. Smoking was defined by five levels (1 = never smoked to 5 = weekly smoker), and expired air carbon monoxide levels.

The analysis was adjusted for clustering.

Of those who had been never-smokers in the sixth grade, only 65% remained never-smokers by the end of the eighth grade. High risk students in the control group were 1.5 times more likely to smoke than students in all four experimental groups. There were no significant differences between any of the four experimental conditions (nurse-led and trained by workshop, nurse-led and self-trained, teacher-led and trained by workshop, and teacher-led and self-trained), and from the control group. The OR curves diverged in favour of the experimental treatments when the smoking rate by senior students was more than 20% (and 27% of schools had levels >20%). Cameron noted that in high-risk schools both the teacher- and nurse-provider interventions resulted in significantly lower smoking rates relative to control schools.

(4) STUDENTS HELPING OTHERS UNDERSTAND TOBACCO (Project SHOUT) (Elder 1993; Eckhardt 1997) Initially, Young (1988) used health facilitators to provide five sessions followed by three booster sessions in six schools (215 pupils). Over the six months of the intervention the average weekly proportion of students using tobacco rose slightly, and the correlations between peer leader ratings and proportional change in tobacco use were significant for facilitators who were well-prepared, related well to students and worked well in a team. Later (Elder 1993) Elder used an 18-lesson intervention over three years. Five newsletters were posted to the homes of participants during the intervention, with information about tobacco control events, legislation, research, the tobacco industry's power, cessation tips, and a question-and-answer column. In addition, two newsletters per year were posted to parents. The trained counsellors made two phone calls per year to each participant, one week after the most recent newsletter was mailed out. The counsellors achieved an 80% call completion rate. It is not stated whether the control group received an intervention.
The sample consisted of 3655 seventh-graders in 22 junior schools in San Diego County, California, with 2668 (73%) followed up at 36 months. There was no differential attrition across groups. The outcome was smoking in the past month. The experimental and control groups were similar in gender, baseline tobacco use, and the percentage with a parent or close friend who used tobacco. A two-level random effects logistic model estimated that school effects contributed 0.02%, and individual student effects contributed 13% to the divergences between groups.

After 36 months of intervention (at the end of the ninth grade) past month smokeless and cigarette prevalence was significantly lower in the experimental (13.2%) than in the control group (22.5%), with a logit model OR compared with control of 0.71 (p < 0.05) at the school level and 0.72 (p < 0.001) at the individual level. For cigarette-smoking the ORs were 0.77 (p < 0.05) at the school level and 0.79 (p < 0.05) at the individual level. For smoking in the past week ORs for the intervention group relative to controls were 0.69 (p > 0.05) at school level and 0.75 (p < 0.05) at the individual level. Whether the newsletters to parents and the phone calls after the newsletters to the children had an effect on non-smoking rates was not identified.

Eckhardt (Eckhardt 1997), once the junior high school students had transferred to high schools, used an intervention of two newsletters and a telephone call in the 11th grade for the continued intervention group, and their monthly smoking was significantly less (7%) than that of the continued control group (12.6%; p < 0.05).

(5) De Vries (De Vries 1994) compared a five-lesson social influences intervention to a control group. The intervention focused on the 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 coordinated the lessons and assisted the peer-leaders, and peer-leaders and teachers received training and manuals. Whether the control group received a programme was not stated.

The sample consisted of 1529 students in six vocational and eight high schools in Maastricht, the Netherlands. More pre-test smokers (27%) dropped out than non-smokers (13%; p < 0.001), but there were no significant differences in the smoking behaviour of the drop-outs between the experimental and control groups. At 10 months attrition was 14% and did not differ between the experimental and control groups. Saliva was collected and the correlations of carbon monoxide levels with smoking were r = 0.79-0.85.

Inter-class or inter-school effects accounted for less than 6% of the residual variance.

At 12 months, regular smoking (i.e. weekly or daily) among the vocational students in the experimental group increased from 16% to 24%, and in the control group from 16% to 30% (OR = 2.24; 95% CI 1.30-3.90, p < 0.01). Regular smoking among high school students increased in the experimental group from 4% to 7% and in the control group from 3% to 6% (OR = 0.78; 95% CI 0.38-1.58). Fewer high school students began experimental smoking in the experimental (42%) than in the control (52%) groups (OR = 0.63; 95% CI 0.43-0.91, p < 0.02). There were no effects of the programme on increasing the number of current smokers who quit.

(6) The TELEVISION, SCHOOL, AND FAMILY SMOKING PREVENTION AND CESSION PROJECT (TVSFP) (Flay 1995) compared a social resistance intervention to a TV curriculum, a combined group and control groups. The intervention social resistance curriculum included correction of misperceptions about tobacco usage, awareness of peer influences to smoke, development of peer-resistance skills, awareness of family influences to use tobacco, development of media influence-resistance skills, social and physiological effects of smoking, and the development of decision-making skills.

Schools were randomly assigned to either: the 10-session social resistance to tobacco curriculum in Los Angeles and San Diego; the 10-session curriculum plus a TV curriculum in Los Angeles; the TV curriculum only in Los Angeles; an attention-control placebo in Los Angeles, or control groups in Los Angeles and San Diego which received no intervention.

The sample consisted of 7351 students in 340 classes in 35 Los Angeles and 12 San Diego schools, of whom 91% indicated gender, race and smoking status. Three thousand one hundred and fifty-five (47%) were present at the two-year follow-up. There were no differences in smoking rates between groups. There was 53% attrition at two years, in particular among Afro-Americans, and students with lower school grades. The two TV-delivery conditions were located only in Los Angeles County. Smoking was defined as in the past week, and ever-smoked. Analysis was by the ML3 multilevel analysis programme, with a random effects model with students within classrooms within schools.

The authors commented ‘Unfortunately the television programming was poorly executed and there was significant variability in the integrity of classroom program delivery.’ They also commented ‘... although over 40% of students had tried smoking by 7th grade, only about 4.5, 9 and 10.8% reported smoking during the previous week in the seventh, eighth and ninth grades respectively ...

The resulting “floor effects” minimize the chances of finding program effects on intentions and behavior ... might suggest that interventions ... must continue until later grades’.

There were no differences between the school and school-plus-TV interventions in rates of non-smoking.

(7) The Nutbeam study (Nutbeam 1993) had three experimental groups, which received either a British adaptation of the Minnesota programme (five lessons, with pupil-led discussion groups about the social consequences of smoking, peer, family and media influences on smoking, and tobacco refusal skills); or a British adaptation of the Norwegian family smoking education project (three lessons, a pupil booklet and a parent booklet which encourages parents to discuss and discourage smoking with their children); or both programmes; or control conditions.
The sample was 39 schools in four education authorities. Schools were allocated to treatments. The groups were similar in demographic factors at baseline, but the group that received both programmes had fewer never-smokers. Schools were matched on demographic characteristics into four clusters, and then a school from each cluster was randomised by cards drawn from a hat (D. Nutbeam, personal communication). The outcome measure was never-smoking (self-report, with saliva samples not analysed). The conduct of the intervention was left to the discretion of the teachers, who recorded their lessons in a book.

The results were that of the 5078 eligible 11- and 12-year-olds, 4538 (89%) completed valid questionnaires. Of the 3455 never-smokers, 2180 (63%) remained non-smokers two years later. The results were adjusted for clustering. There were no significant differences between the two experimental groups and the control, but with logistic regression controlling for factorial design and confounders, the family smoking education group was significantly less likely to remain never-smokers ($p < 0.05$).

(8) The ADOLESCENT LEARNING EXPERIENCES IN RESISTANCE TRAINING PROJECT (Project ALERT) (Ellickson 1990) compared different methods of delivering the Project Alert curriculum. The intervention was 11 sessions directed towards tobacco, alcohol and marijuana prevention. The Project ALERT curriculum uses the social influence model, helping students to develop reasons not to use drugs, to identify pressures to use them, to counter pro-drug measures, to learn how to say no to internal and external pressures, to understand that most people do not use drugs, and to recognize the benefits of resistance. It is a participatory curriculum, with question-and-answer sessions, small group exercises, role-modelling, and repeated skills practices. In the first experimental group adult health educators taught the curriculum (10 schools). In the second experimental group older peer teen leaders and teachers (10 schools) taught the curriculum. The duration was eight lessons (one per week) in the seventh grade and three booster sessions in the eighth grade. The control group received either no intervention or continuation of traditional drug education programmes (which 40% of control schools did later). The sample comprised 6527 students, and 4837 (74%) remained at 24 months. Thirty schools in California and Oregon were selected to represent a variety of community environments, ethnic groups and socio-economic levels. There was 26% attrition at one year but no differential attrition between groups, and no interactions between attrition and propensity to use substances. 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. Smoking was defined as lifetime, most frequent, past year, and past month. Data were analysed for individual students, and corrected for within- and between-school correlations.

The results at 24 months were that the only significant differences were lower past month, monthly, and daily smoking for four of 18 comparisons in peer-led groups. At 60 months no effects were detected.

(9) The MINNESOTA-WISCONSIN ADOLESCENT TOBACCO-USE RESEARCH PROJECT (THE TWO-STATE TOBACCO PROJECT) (TSTP) (Murray 1992) compared four social influences anti-tobacco school programmes most likely to be funded by the Minnesota State government. These were the six-lesson Minnesota Prevention Program (MSPP), the three-lesson Smoke-Free Generation Program (SFG), the Minnesota Guidelines Programme and the existing curricula. The sampling plan was designed to give each sixth-grader in Minnesota an equal chance to participate, and the sample size calculation was based on an estimated 50% reduction in the prevalence of smoking due to the strongest programme, with a 39% inflation factor to allow for absenteeism and loss from the study.

The principals of 112 schools in Minnesota were invited at random to participate, of whom 81 (72%) agreed, forming 48 sampling units, with 8992 students eligible for the sixth grade baseline survey. Smoking was defined as an index of weekly smoking (number of cigarettes per week), and expired carbon monoxide was measured. For the process analysis one researcher observed 106 teachers. There was 13% attrition in the second year, and those lost to follow-up had more family members and friends who smoked.

There were no significant differences detected for weekly cigarette smoking, smokeless tobacco use or expired carbon monoxide between the four programmes.

(10) The ADOLESCENT ALCOHOL PREVENTION TRIAL (AAPT) (Hansen 1991) compared different social influences programme components. The first experimental group received an information intervention consisting of four 45-minute lessons about the social and health consequences of alcohol, tobacco and drugs. The second experimental group received a resistance training (RT) intervention consisting of four lessons on the consequences of using substances, and five on resisting peer and media pressures to use alcohol, tobacco and other drugs. The third experimental group received a normative education (NE) intervention consisting of four information lessons and five lessons on perceptions of prevalence and acceptability of using alcohol, tobacco and other drugs (ATOD). The fourth experimental group received a combined programme of NE and RT with three information, 3.5 resistance skills, and 3.5 conservative norms sessions. The duration of the interventions was four sessions for the information intervention and nine or ten sessions for the others. The interventions were delivered by the project staff who received two weeks intensive training.

The sample comprised 3011 seventh- and eighth-graders in 12 junior high schools in Los Angeles and Orange County. At 12 months 80% remained. Smoking was defined both as cumulative lifetime use and use during the past 30 days (with Cronbach alphas of 0.81 for the seventh and 0.87 for the eighth grade students). The unit of analysis in the 1991 analysis was class. In the 1998 re-analysis, a combination of multilevel analysis (ML3 programme)
and ordinary least-squares analysis for the post-test at two years were used for: (i) the 2370 individuals, (ii) the 120 classes, and (iii) the 12 schools. There was 20% attrition at one year with differential attrition in the resistance training group. The results at one year were that the NE classes had lower rates of both ever-smoking (8.1% vs. 10.3%; p < 0.05), and smoking during the preceding 30 days (4.8% vs. 6.5%, p < 0.05), compared with the other three groups. At two years analysis was performed on five levels. The RT group had less smoking than the Information group only when measured by class means (p < 0.041). The NE group had less smoking on four measures compared with the Information group: (individuals [p < 0.001], classes [p < 0.001], ML3 analysis for class as a group [p < 0.001] and ML3 analysis for school as a group [p < 0.014]). The Combined group had less smoking than the Information group only when measured by class means (p < 0.009).

(11) Biglan (Biglan 1987a) compared a social influences intervention with a no intervention control group. The experimental group received training in refusal skills including modelling, rehearsal, reinforcement, practice and video practice. They also received information about the health effects and short-term effects of tobacco, and about addictions. The duration was five sessions, with four on consecutive days and a booster at two weeks. The providers were regular science or health teachers who received two to three hours of training. In an additional intervention seventh grade students in six schools were randomised to have four messages mailed to their parents following the programme. The sample consisted of 3387 seventh- to twelfth-graders in 13 schools in Oregon. In one school district (five schools) whole schools were assigned to conditions, and in eight schools the classes of teachers who agreed to teach the experimental condition were randomly assigned to experimental and control groups. Smoking was measured by a modification of Pechacek’s index (cigarettes last week + [7 x cigarettes yesterday]/2)). Those missing at follow-up were more likely to be smokers, but tests of internal validity showed there were no effects of treatment condition and attrition status for smoking. School and classroom effects were non-significant when analysed by factorial analyses of covariance. At one year for female non-smokers there were no effects of intervention on smoking behaviour. For male non-smokers smoking rates in the experimental group were higher than in the control group but there were no effects on expired carbon monoxide. Smokers in the experimental group had a lower smoking index (19.4) than the control group (29.6, p < 0.05) and had significantly lower (significance level not stated) expired air carbon monoxide levels (5.3 versus 10.7 parts per million). There were no effects of the messages to parents on student smoking.

(12) The SMOKING OR HEALTH PROGRAMME (Lloyd 1983) compared the ‘Smoking or Health’ programme of the Teaching Resources Centre of the New South Wales Department of Education with a no intervention control group. The intervention included sessions on the respiration process, the physiological effects of smoking: the ‘Puffing Poll’ model and creative dance, advertising, resisting peer pressure, decision making, and values clarification. The duration was 90 minutes a week for six weeks. The sample consisted of 6299 children in 1979 who provided usable baseline data, 7127 in 1980, and 5686 (87%) for both years. Smoking rates at baseline were similar across groups, except that they were higher for the sixth grade females. Smoking was defined as smoking in the past 4 weeks. A power calculation showed that 720 children would be needed per group to detect a 5% difference in smoking (two-tailed) with 80% power for three variables (both genders, years 5 and 6, and treatment and control groups), yielding a total required sample size of 6400 and 88 schools. However, clustering was not taken into account. At the end of the study, there were no significant differences in smoking prevalence between the intervention and control groups.

Category 2 Studies:

(13) Schinke (Schinke 2000) compared an intervention with Native American values, community involvement and social influences components (15 sessions and 12 boosters, tobacco, alcohol, and marijuana focus) with a no intervention control group. Students learned problem-solving, personal coping, and interpersonal communication skills for preventing substance abuse, which were explained by group leaders and then demonstrated by older peers. Every session included Native American values, legends and stories and holistic concepts of health, and also drew on cultural materials specific to individual communities. The sample consisted of 1396 third- to fifth-graders in 27 schools from 10 reservations in North and South Dakota, Idaho, Montana and Oklahoma. After 3.5 years 1177 (86%) remained. Attrition on baseline and outcome variables was random. The treatment groups were compared using one-way ANOVA, with individuals as the unit. Significant omnibus F-ratios from the ANOVAs were then tested with Scheffé post-hoc multiple comparison tests. There were no differences in baseline substance abuse levels between groups, and covariates were not included in subsequent analyses. Smoking was defined as seven or more cigarettes or use of snuff/ chewing tobacco in the week prior to each measurement. There was no adjustment for clustering. Salivary cotinine was collected at each test, and the correlation with self-reported smoking and smokeless tobacco use was r = 0.53. There were no differences in cigarette smoking 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 with the skills-plus-community or control groups.

(14) Dijkstra (Dijkstra 1999) compared a social influences intervention with a control group. The intervention consisted of five lessons on why people do or do not smoke and quit; the short-term effects of smoking, the dangers of experimentation, passive smoking, addiction, and quitting, and participants received a brochure on quitting; resisting peer pressure and acquiring skills to resist
peer pressure; how to react when bothered by smoke, the indirect pressure to smoke from adults, advertisements, and government measures against smoking; alternatives to smoking, making the decision to smoke or not, and a commitment to non-smoking. It is not stated whether the control group received an intervention. The sample was drawn from 15 district health centres in the Netherlands with 52 schools. The decision-making component included five steps towards making a decision about smoking: appraising the challenge, surveying alternatives, weighing alternatives, deliberating about commitment, and adhering despite negative feedback. The Social Influences Programme and the Decision-Making Component were delivered to 67 classes with 1381 students. Half of each intervention group also received as boosters three magazines similar in content to the lesson. The control group consisted of 20 schools with 1458 students.

Smoking was classified from 1 (never) to 6 (at least one cigarette a day). Multilevel analysis of schools, classes, and students using VARCL showed that less than 5% of the residual variance was due to between-class and between-school variation. A methodological problem was that there was 36% attrition at 36 months.

At 18 months there was less smoking in the Social Influences-plus-boosters group compared with both the Social Influences group (p < 0.05) and with the control (p < 0.005), but it is unclear whether these results would hold if corrected for attrition.

(15) Noland (Noland 1998) compared a social influences intervention with a usual care control group. The intervention consisted of six 45 to 50 minute sessions in the seventh grade, and three in the eighth grade. The components were skills training in recognising types of peer pressure, refusal skills, assertiveness, recognising and countering advertising appeals, student pledges, the negative social and immediate physical consequences of using tobacco, and the training of peer leaders. The control group received 'health education as usual'.

The sample consisted of 3588 students in 19 schools in 14 counties in Kentucky, and 3072 students (85.6%) remained at 24 months. Groups were equivalent at baseline. Smoking was defined as lifetime, for seven-day smoking was r = .55 (p < 0.0001). The school was the unit of analysis. There was no power calculation.

At 24 months the ninth grade experimental group had lower rates compared with the control group for smoking in the last 30 days (34% vs. 44%, p < 0.01); in the last seven days (30% vs. 38%, p < 0.01); and in the last 24 hours (22% vs. 28%, p < 0.05). For those not involved in growing tobacco the results were significant for 30-day, and marginally significant for seven-day smoking, but not significant for 24-hour smoking.

(16) THE DRUG ABUSE RESISTANCE EDUCATION (DARE) STUDIES (Clayton 1996) (Lexington-Fayette study) compared a social influences intervention with a usual care control group. The intervention was a 17-lesson tobacco, alcohol, and marijuana DARE curriculum. It included 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, and taking responsibility. The programme was delivered by uniformed police officers. The control group received the usual drug education curricula, which was part of their health curriculum and varied by school.

The sample comprised 2071 sixth-graders in 31 schools in Lexington-Fayette County, U.S. Groups were equivalent at baseline. The five-year results were analysed with a three-stage mixed effects regression model, which allowed for interconnected serial observations, unequal groups, and ICCs. For the 10-year results the effects on school means were analysed with a hierarchical linear model, and school effects were controlled for by logistic regressions. There was attrition of 18% in the seventh grade, increasing to 45% in the 10th grade, and students who smoked were more likely to drop out. The results were that cigarette use in all groups increased 130% over the five-year study interval. There were no programme effects detected at five- or 10-year follow-up.

(17) Laniado-Laborin (Laniado-Laborín 1993) compared a four-session social influences intervention with a no intervention control group. In the intervention, groups of six to eight students discussed noxious aspects of smoking, advertising strategies of the tobacco companies, influences of family and friends, and resisting offers to smoke. The sessions were led by a medical student. The sample consisted of 168 sixth-graders in six elementary schools in Tijuana, Mexico. Smoking was defined as within the past year, past week, or past 24 hours, and saliva samples were collected. The difference in the proportion of smokers in the experimental (41%) and control (31%) groups was not statistically significant. A methodological problem was that the analysis was not adjusted for clustering.

At 10 months smoking within the past 12 months declined in the experimental group from 38% to 8% and in the control from 23% to 20%. Smoking within the past week declined in the experimental group from 4% to 1% and increased in the control group from 5% to 8%. More quit in the experimental (72%) than in the control (35%) group.

(18) Villalbi (Villalbi 1993) compared a social influences intervention with an information only control group. The eight-session tobacco, alcohol, and drugs intervention included information on addictions, group pressures, mechanisms of advertising, personal experience; external pressures to use alcohol, tobacco and other drugs; the diffusion of addictive activities in society; difficulties in breaking addictions; confronting anticipated situations; personal expression of attitudes; and information for parents. The control group received information on addiction, and information for parents.
The sample consisted of 2205 12- to 14-year-olds in 23 schools in Barcelona, Spain, and at 12 months 1723 (86.5%) remained. Methodological problems included a higher proportion of smokers in the experimental group and no correction for clustering in the analysis. At 12 months those admitting to having 'smoked once' increased from 23% to 34% in the experimental group, and in the control group from 19% to 34% (p < 0.001). Habitual smoking in the experimental group increased from 2.7% to 6.4% and in the control group from 1% to 5.7% (p < 0.001); and purchasing tobacco from 5% to 11.6% in the experimental group and from 2.6% to 8.6% in the control group (p < 0.001).

(19) The PAL PROGRAMME (Abernathy 1992) used an eight-lesson intervention that gave information on the benefits of not smoking, and developed the interpersonal skills required to resist peer pressures to smoke. The sample consisted of 190 schools with 7508 sixth grade students in Calgary, Canada; 97% were followed up after 12 months, 92% after 26 months, and 87% followed to the ninth grade. Non-smoking was defined as never having smoked. There were no differences in smoking rates before PAL. Methodological problems were that a process analysis showed incomplete delivery of the intervention, and the analysis did not adjust for clustering. Males who received the programme were significantly less likely to smoke after one year (p < 0.005), but the results were not significant after two and three years. There were no significant differences in non-smoking for females over the three years of the programme.

20) PROGRAMS TO ADVANCE TEEN HEALTH (PATH) (Severson 1991) compared a seven-session social influences intervention with a usual care control group. The intervention over two to three weeks covered the overt and covert pressures to use tobacco and refusal skills training. Seven videos were used to standardize the instruction and to maintain students’ interest. The parents were sent three brochure messages. The intervention was delivered by the regular science or health teachers, and five of the seven sessions included activities led by peer leaders. Teachers received two to three hours training, and peer-leaders received two half-days of training. The control group received their usual curricula.

The sample consisted of 2552 students in middle and high schools in Lane County, Oregon, with 69% remaining at one year, and 60% remaining in the high school control group. There was differential drop-out of smokers. Smoking was measured with an index based on smoking in the last day, week, and months. Saliva samples were collected, but not analysed due to cost. Smokers were defined as children who identified themselves as smokers and had an expired air carbon monoxide reading of 10 or more ppm, or said they were non-smokers but had an expired air carbon monoxide reading of more than 20 p.p.m. The ICC for smoking was 0.03 and for smokeless tobacco was 0.028; using the school as the grouping variable the ICC was 0.009. Results were analysed for individuals. Methodological problems were that there was no power computation. Although ICCs were computed, they were not used to correct for the effects of clustering, and there was differential drop-out of smokers. To assess external validity, the main effects of attrition status were calculated, and for 10 out of 12 variables, the lost subjects were at higher risk of smoking based on pre-test variables.

At 12 months the cessation rate among male middle-school tobacco-chewers was significantly higher (OR = 10.45; 95%CI 1.93-56.64) than for the control group, but there were no other statistically significant effects for cigarettes or smokeless tobacco.

(21) Armstrong (Armstrong 1990) compared two methods of delivery of a five-session social influences intervention. The intervention over six months was based on the Minnesota model. It included estimating the percentage of smokers in the students’ age group, the negative consequences of smoking, why children smoke, the physiological effects of smoking, and information on the percentages of smokers in the population. Students listed situations where there was pressure to smoke, practised refusal techniques, presented arguments for non-smokers’ rights, and developed counter-arguments to smokers’ reasons for smoking. They considered the role of the family in smoking and advertising techniques, wrote an essay on their reasons for remaining non-smokers, and made a public commitment not to smoke. In the first experimental group, the programme was delivered by peers selected by the class. In the second experimental group, teachers delivered the same programme after appropriate training. The control group received no intervention.

The sample consisted of 2366 students in 45 primary schools in Australia, with 88% remaining after one year and 64% after two years. There were no significant differences in follow-up for males and females, or for students in peer- and teacher-led groups. Schools were stratified on size of class and location, and then randomly assigned. Non-smoking was defined as not even a puff in the previous 12 months. There was no power calculation. The data were erased after one year, so that ICCs could not be computed, and the data were not corrected for the effects of clustering. After two years for 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%) in the peer-led group compared with the control group. For males smoking uptake was 2.8% (95%CI: -11.2% to +5.6%) lower in the teacher-led group but 6.4% higher (95%CI: -3.6% to +16.4%) in the peer-led group compared with the control group. There was no effect on the 24 to 37% who were smokers at the start of the study. Shean (1994) traced 68% at seven years follow-up, and only 53% of these responded: there were no effects on male initial smokers or non-smokers, but the odds of non-smoking girls in the experimental groups starting smoking were 0.5.

(22) The ‘KNOW YOUR BODY’ (KYB) PROGRAMME (Walter 1986) (Westchester study) compared a social influences intervention with an information control. The intervention was identical to that in Walter’s KYB study in the Bronx (Walter 1985). It
included nutrition, physical fitness and smoking prevention, and used five teaching techniques (modelling of desired behaviours, behavioural rehearsal, goal specification, feedback of results, and reinforcement for favourable behavioural change). The duration of the programme was two hours a week over the entire school year from the fourth to the eighth grades. Teachers received 1.5 days training, and their adherence to the programme was monitored. The control group received the results of their health screens and explanatory information.

The sample comprised 1525 students in 22 schools in six districts in Westchester County, N.Y., with 80% followed at one year, 81% at five years and 65% at six years. There were no differences in health knowledge and behaviours at baseline between groups. Differences between schools at baseline were adjusted for by linear regression. Changes in risk factors for individual students were estimated by linear regression, averaged over schools, and schools were compared. There was no power calculation and no adjustment for clustering.

At 12 months serum thiocyanate increased more in the control group (5.3 micromoles/litre) than in the experimental group (0.6 micromoles/litre, difference -4.7 [± 5.4 after adjustment]). After six years there was a significant difference for biochemically-confirmed smoking for all smokers between experimental schools (3.5%) and control schools (13.1%) and also for male smokers (0% vs. 12.4%), but no statistically significant differences for females.

(23) The 'KNOW YOUR BODY' PROGRAMME (Bush 1989) (Washington D.C. study) compared an information and affective education intervention (nutrition, exercise, and tobacco focus) for two hours a week from the fourth to the ninth grades, with a full personalised health screening in the fall of each school year. In the full intervention group the students received the results of their health screening to place in their 'Health Passport.' For the part-intervention group only the students' parents received the results of the health screening. The control group did not receive the 'Know Your Body' programme.

The sample comprised mostly Afro-American fourth- to ninth-graders in nine schools in Washington D.C. There were 1234 students at baseline, 1041 (84%) participated in baseline screening, 892 (72%) completed questionnaires, and 431 (41%) remained at two years. The percentages were similar in the control and experimental groups. Methodological problems were that there was no power calculation and no adjustment for clustering, and the 59% attrition rate raises significant concerns about bias.

After one year serum thiocyanate levels increased by 20 micromoles/litre in the control group and decreased by 9.87 micromoles/litre in the experimental group (difference 29.9; after adjustment 15 micromoles/litre). There were 'significantly more' (level of significance not stated) non-smokers (4.3%) in the intervention group. Although the results for Tables three and four are stated to be after two years of intervention, the authors state '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), and it is assumed here that the values are after one year. For analysis of the outcomes the intervention and part-intervention groups were combined, and the authors only comment that there were no significant differences in mean cholesterol level outcomes, but do not compare the intervention groups on blood pressure, obesity and serum thiocyanate outcomes.

(24) The 'KNOW YOUR BODY' (KYB) PROGRAMME (Walter 1985) (Bronx Study) intervention included nutrition, physical fitness, and smoking prevention; and used five teaching techniques (modelling of desired behaviours, behavioural rehearsal, goal specification, feedback of results, and reinforcement for favourable behavioural change). The duration of the programme was two hours a week over the entire school year from the fourth to the eighth grades. The control group did not receive the KYB programme.

The sample comprised 2283 fourth-graders in all 22 elementary schools in the Bronx, and baseline risk factors were measured in 1983 (70% of the experimental and 65% of the control groups). Of these 1115 (71.3%) were followed up at one year, with the experimental and control groups remaining similar. Of these, 1063 (65% of the experimental and 69% of the control groups) were measured after five years. Follow-up data were calculated for individuals then aggregated to intervention groups. The authors state (Walter 1985, p. 775) that 'the randomisation by school, rather than by individual child, was accounted for by using indicator variables for all schools, following the method suggested by Kirk.' There is, however, no further explanation of the Kirk method and how it was applied to assess the effects of clustering. There were no differences at baseline, and no differential attrition at 12 months, except that serum thiocyanate levels were slightly lower in those examined at the 12 month follow-up than in those subjects lost to follow-up. Methodological problems were that there was no power calculation and no adjustment of the analysis for clustering by computing ICCs.

The results at 12 months were that only serum thiocyanate results were reported, and not percentages smoking. In the experimental group serum thiocyanate levels decreased from 38.6 to 36.8, and in the control group increased from 34.6 to 37.6. After five years, at the beginning of the ninth grade, the authors stated (Walter 1988, p. 1096) that 'the prevalence of smoking was still too low to permit detection of an effect on the number of subjects who started to smoke.' No biochemical measures were reported at five years.

(25) The Murray Studies 1 and 2 (Murray 1984) compared social influences and skills training and rational/informational models. The first experimental group (AH) was adult-led, and focused on the long-term health consequences of smoking (but without using fear arousal techniques), the social forces that encourage smoking, short-term social and physiological effects of smoking, correct normative expectations for smoking, a public commitment not to smoke, and had a major emphasis on teaching and practising...
skills to resist social pressures to smoke. The second experimental group (PS) was peer-led (with the peers selected by their classmates), and focused on short-term influences on smoking. The third experimental group (PSV) was peer-led, focused on short-term influences, and used videotapes. The fourth experimental group (ASV) was adult-led, focused on short-term influences, and also used videotapes. All interventions were led or facilitated by programme staff. The duration of the interventions was five sessions over six months.

The sample consisted of 7124 seventh-graders in Minneapolis and St. Paul, Minnesota, in two studies (94% of the seventh grade enrollment) and followed 90% of them for six years. There was differential attrition of smokers (8.9%) compared with non-smokers (5.9%) but the rates were similar across the study conditions. Smoking was defined as cigarettes smoked per week. Students gave samples of saliva thiocyanate or expired air carbon monoxide. For older adolescents the correlation with cigarettes smoked per week was $r = 0.74$. Methodological problems were that there was 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 second year of the study.

At six years for Study 1 there were data for the four experimental conditions and no comparison with the control group. For Study 2 the five-year follow-up data were compared with the control group. The smoking rate and the intensity of smoking among never-smokers were lower in the four experimental conditions than in the control group at the one-year follow-up only, and non-significantly lower for the years two through five follow-ups. For smokers, the prevalence of daily smoking was lower at the two-year follow-up only for the peer-led social influences (PS) experimental group.

(26). Schinke (Schinke 1988) compared a social influences intervention with a no intervention control group. The intervention was a 10-session tobacco, alcohol, and drugs intervention to teach bicultural competence skills not to use substances. Native American counsellors taught communication, coping, and discrimination skills; modelled, coached and praised turning down substance offers from peers without offence; taught self-instruction and relaxation to help refuse offers of substances; rewarded refusals; and taught how to anticipate temptations, how to predict high-risk situations, and how to build networks with friends and family. In addition, the students did homework supporting each others’ refusals of substance offers.

The sample comprised 137 Native Americans from two reservations in western Washington State. The groups were similar at baseline. Attrition was 8% at six months. The analysis did not adjust for clustering. Subjects reported their substance use over the previous 14 days on a 35-item self-report questionnaire, adapted from Oetting et al. (1983), which in previous use had a 0.77 test-retest reliability. Methodological problems include a small sample size, and no adjustment for clustering. The author does not state whether the results are actual cigarettes smoked over 14 days or are a composite index.

The results at six months are that the experimental group had less smoking (1.41) than the control group (2.37), and less smokeless tobacco use (2.56 vs. 4.11; $p < 0.005$).

(27) Biglan (Biglan 1987b) compared a four-session social reinforcement intervention with no intervention control. The intervention included short- and long-term consequences of smoking, a public commitment not to smoke, and learned refusal skills. Students watched films, practised role-playing refusal skills, and performed skits. Teachers praised students’ skills, and the class voted on the best demonstration of a refusal. The programme was delivered by regular science or health teachers. The duration was three consecutive days, with a fourth session two weeks later.

The sample consisted of 1730 seventh- to tenth-graders in three high and six middle schools in Oregon, with 68% remaining after 12 months. Non-smoking was defined as having never smoked. Smoking was measured by Pechacek’s Index and expired air carbon monoxide. Methodological problems were that there was no power calculation and the analysis did not adjust for clustering.

At 12 months for female triers’ expired air carbon monoxide levels were higher in the control than in the experimental group. Males reported less smoking than females. Among the triers, males reported less smoking than females. Among the regular smokers the index of smoking was lower in the treatment than the control group.

(28) THE SCHOOL HEALTH DEVELOPMENT PROJECT (Clarke 1986) compared different methods of delivering a four-session social influences intervention. The intervention reviewed the sources of pressure to smoke, and students viewed videotapes, did role-plays, participated in question periods, and practised resistance strategies. In the first experimental group, the programme was peer-led (ninth-graders were selected by school administrators as leaders, and received one day of training). In the second experimental group the programme was expert-led by professional health educators. In the third experimental group the programme was led by usual health teachers. The programme ran for one hour a day over four days. Whether the control group received an intervention was not stated.

The sample consisted of 1321 seventh-grade students in 10 junior/senior high schools in Vermont. Non-response rates were 1-5% within study schools at each of the four observation periods. Smoking was defined as smoking in the last month, last week, or yesterday. Methodological problems were that there was no power calculation, no attrition analysis, and no adjustment of the analysis for clustering.

From the pre-test to the 20 month follow-up the number of females who ‘smoked yesterday’ increased in the peer-led group from 13% to 18%, in the expert-led from 1% to 15%, in the control from 5% to 16% and declined in the teacher-led group from 8% to 2%. For females who smoked ‘last month’ the peer-led and exper-
led groups had lower rates than the control group. There were no significant differences for males.

29) Gilchrist (Gilchrist 1986) compared a social influences intervention with two information groups and a no intervention control group. The eight-session Self-Control Skills Intervention focused on identification of stress and use of cognitive and behavioural techniques to counter negative feelings. Leaders modelled skill use; students practiced skills in role-plays and homework assignments; leaders showed videos of adolescents handling socially difficult situations; students learned communication, self-instruction, self-reinforcement, and problem-solving skills; leaders presented verbal and non-verbal communication skills, and students applied self-instruction and problem-solving skills in group exercises. This was the SODAS programme, i.e. Stop (think about what you are going to do); Options (think of all the different things you can do); Decide (choose which options you will take); Act (implement the chosen option); and Self-Praise (compliment yourself). A Placebo Health Education Group received sessions in which leaders presented factual information and attitudes about smoking and health, using films, handouts, games, in-class exercises, discussions and skits. In-class exercises included making posters and conducting discussions. A team with a female and male co-leaders conducted all sessions in the self-control and the placebo groups, and received 30 hours of training. The Placebo Group received health education about smoking, using films, handouts, games, exercises, and skit. The Control Group received only tests. The sample consisted of 741 fifth- and sixth-graders, with 701 (94%) at 15 months. Smoking was defined as non-smokers, experimental smoking (at least once, but never weekly), and regular (one or more cigarettes a week), and smoking was verified by saliva thiocyanate (results not reported). The analysis was not adjusted for clustering.

At 15 months fewer students in the self-control skills group reported smoking one or more cigarettes in the previous week, compared with the placebo and control conditions.

30) Schinke (Schinke 1986a) compared discussion and skills training interventions with a control group. In the first experimental group the discussion intervention group received eight lessons on information on smoking and the use of smokeless tobacco. Peer testimonials noted alternatives to tobacco use. Students debated the 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. The skills training group (Discussion and Refusal Skills) received the same eight lessons as the information group, but in addition they 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.

The sample comprised 1281 fifth- and sixth-graders in 12 schools in Washington State, with 89% present at two years. There was no differential attrition among groups. Smoking was defined as within the past seven days. Saliva thiocyanate samples were collected, and 25% were analysed (the correlation with reported tobacco use was $r = .37 \ [p < .001]$; for youths with no or regular tobacco use $r = .46 \ [p < .0001]$, and for youth with sporadic or high use rates $r = .11 \ [p < .01]$). The analysis did not adjust for allocation by schools.

At two years the percentages smoking were lower in the skills (7%; $p < .05$) than in the discussion (11%) and control (12%) groups, with a similar pattern at 6, 12 and 18 months, and similar results for smokeless tobacco.

(31) Schinke (Schinke 1986c) compared skills training and attention control interventions, each of eight-sessions, with a no intervention control group. Skills Training included information about the effects of smoking, problem-solving, self-instruction about how to stay calm, communication skills and media analyses. Attention Control included information, games, quizzes and debates about smoking. The control group received no intervention. Both experimental groups were taught by social workers. The control group received no intervention, and only pre- and post-tests. The sample consisted of 214 fifth- and sixth-graders in three schools (location not stated, but the authors academic location was Seattle). There were no differences in smoking rates at baseline between the groups, and no differential attrition. There was no adjustment for clustering.

At one year rates of regular tobacco use were unchanged for the Skills Training group, and increased from the post-test by 10.6% for the Attention Control group and by 13.7% for the control group ($p < .001$). Saliva thiocyanate levels were lower in the Skills Training group than in the Attention Control and control groups ($p < .03$).

(32) Schinke (Schinke 1985b) compared 10-session skills training and information interventions. Skills-building included problem-solving, resistance to offers to smoke, interpersonal pressures to smoke, and health information about smoking. The Attention Placebo Information Intervention included health information, debates, quizzes, and anti-smoking skits. Both interventions included films, peer testimonials, and the influence of the media. The interventions were delivered by graduate assistants. The control group received pre- and post-tests only.

The sample consisted of 193 sixth-graders in three middle schools (97% of eligible students) in an unnamed city (the authors academic location was Seattle). There were no differences between the groups at baseline, and attrition was low at 24 months (5.6% for the Skills-building, 7.1% for the Attention-placebo, and 7.7% for the control groups). Smoking was defined as weekly cigarette use, and correlated $r = .37 \ (p < .0001)$ with saliva thiocyanate levels, with the best correlation for daily smokers. Methodological problems were a small sample size, and that the analysis did not adjust for clustering.
Weekly cigarette consumption increased from baseline to 24 months from 2.4% to 3.6% in the Skills-building group, from 1.9% to 8.1% in the Attention-placebo group and from 2.1% to 8.4% in the control group. The percentages smoking were significantly lower at post-test for the Skills-building group (1.6%) and for the control group (1.3%) compared with the Attention-placebo group (2.5%; \( p < 0.05 \)). At six months they were lower in the Skills-building group (2.7%) compared with the control group (3.6%) or with the Attention-placebo group (4.7%; \( p < 0.05 \)). At one year they were lower in the Skills-building group (3.2%) than in the control group (6.5%) or in the Attention-placebo group (6.9%; \( p < 0.05 \)), and at two years lower in the Skills-building group (3.6%) compared with the Attention-placebo (8.1%) or control group (8.4%; \( p < 0.05 \)). After two years thiocyanate levels were lower in the Skills-building group (44.6; \( p < 0.05 \)) than in the Attention-placebo or control groups, but there were no differences in earlier time periods.

Category 3 Studies:

(33) Scholz (Scholz 2000) compared an intervention with eight lessons delivered by physicians who were non-smokers to a ‘no special instruction’ control group. The intervention included the function of the heart, circulation and lungs, the action of the pulse and blood pressure, motivations for smoking and non-smoking, prevalence rates and consequences, role-plays about conflicts between smokers and non-smokers developed by the participants, cigarette advertising, and a quiz with small prizes. The sample comprised 1598 students in all 15 Gymnasien (with 59 classes) and 13 Realschulen (with 25 classes) in three towns (Hanau, Darmstadt and Offenbach) in the state of Hesse in Germany. The school system required that the code lists of students’ names remained at the schools. At two years the code list was not available for 15 Gymnasien classes and for six Realschule classes, and these students were excluded, leaving a sample of 1598 (1159 Gymnasium and 439 Realschule students). Smoking was defined as at least one cigarette a week, and one in the last 24 hours. The analysis did not adjust for clustering, and there was no attrition analysis for the students lost to follow-up.

Among Gymnasien students those beginning smoking between the baseline and the two-year follow-up were 17% in the intervention group and 25% in the control group (\( p < 0.05 \)), with males (13% and 22%, \( p < 0.01 \)) showing less increase in the experimental group than females (21%, 28%, \( p < 0.05 \)). Among Realschule students: the rate of new smokers for males was 17% in the experimental group and 25% in the control group (\( p < 0.05 \)) and for females 18% and 22% (n.s.). For daily smokers (at least one cigarette) comparing baseline with two years later: Among Gymnasien students: the percentages increased from 1.5% to 6.8% in the experimental group and from 1% to 10.7% in the control group (\( p < 0.05 \)). Among Realschule students: no differences between experimental and control groups.

(34) The MICHIGAN MODEL FOR COMPREHENSIVE

SCHOOL HEALTH EDUCATION PROJECT (Shope 1996) compared a 30-lesson cigarette, smokeless tobacco, alcohol, marijuana and cocaine intervention with a no intervention control. The intervention focused on tobacco in the fifth grade; alcohol in the sixth grade; and on tobacco, alcohol, marijuana, and cocaine in the eighth grade. The intervention focused on pressures to use substances, short-term effects of substances, and ways to resist pressures to use substances. The intervention was taught by regular classroom teachers, and used worksheets, media, and student participation to prepare and practice role-plays. Teachers received one day of instruction, and copies of the curricula.

The sample comprised 4730 sixth and seventh grade students in 179 classes in six school districts in Michigan, U.S.; there were 4116 in the second year; and 3112 for whom data were matched in all three years. A subset of 1911 was analysed: either those who received two years of the programme, or those who received no programme plus the ‘comparison’ class students whose teachers taught less than 50% of the curriculum. There was an equal gender distribution in experimental and control groups at baseline. Ethnicity was not assessed at the request of school boards; however, rural boards were predominantly white and urban boards predominantly black. 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 fifth grade and 100% of the other grades’ curricula.

Methodological problems included case definition (smoking was defined by one question on ‘current frequency of use’); substantial numbers of students did not receive the programme; classes that received less than 50% of the intervention programme were included in the control group; the oldest cohort (which received only the eighth grade programme, and for which no programme was available in the ninth grade), were classified as programme students; and the analysis made no correction for clustering. The eighth- and ninth-graders in the programme had less tobacco and smokeless tobacco use than comparison groups, but no effects of the programme were detected by the 12th grade.

(35) Hort (Hort 1995) compared a 15-session social influences intervention with an information control. In the first year, over a six-week period, classroom teachers explained how the lung and heart functioned (a two-hour session), and how advertisers encouraged children to smoke (one hour). The authors (physicians) discussed body function, protective mechanisms of the airways, heart attack, and cancer (two-hour session). Students in groups simulated how cilia in an airway remove particles. Non-smoking students of German Language and Media Studies, participating in a course on how to teach theatre at the University of Düsseldorf, conducted role-plays (two hours) with the students on how to refuse a cigarette without feeling uncomfortable. Excerpts from the role-plays developed in the first hour were videotaped and used in the second hour. There was a competition for an advertisement against smoking.

In the second year, physicians discussed lung function and smoker's
cough, students performed role-plays, students were introduced to top non-smoking sports personalities, who discussed their sport and training system and conducted question-and-answer sessions about training. Posters of these personalities were displayed and students could attach their own photo to them and receive a copy of the poster as a Christmas present. In the control schools a talk was given by a physician on a topic of the students’ choice: most wanted to hear about alcohol, but they were permitted to choose tobacco and its consequences.

There was also an intervention for smokers (35 students in four schools): 11 one-hour sessions, during which each cigarette smoked was recorded, and stories suitable for the age-group were told to provide relaxation. The control group received a talk by a physician.

The sample consisted of 945 sixth-graders in 19 secondary schools in Düsseldorf, with 878 (92.9%) participating in the first questionnaire, and 630 (72%) at 24 months. Smoking was defined as never, non-smoker (smoked more than six months ago), light smoker (maximum 2-10 cigarettes to date), medium smoker (11-100 cigarettes to date), strong smoker (> 100 cigarettes to date), and daily smoker (one cigarette a day). Methodological problems were that there was 26% attrition at 24 months with no attrition analysis, and no correction for clustering.

At 24 months for boys, smoking in the control schools increased 11% more than in the intervention schools (p < 0.02), for girls increased 23% more (p < 0.0001), and increased for both genders 16% (p < 0.0001) 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).

(36) Focarile and Scaffino (Focarile 1994) compared a six-lesson social influences intervention with an information control. The intervention included social influences to smoke and resistance skills training based on the Waterloo Smoking Prevention Program, and delivered by volunteer teachers during classes. The intervention was six lessons over 3 months. The control group received a programme of information on cardiovascular risks, including the risk of smoking.

The sample consisted of 1268 children in 53 middle school classes in Rozzano, Milan, of whom 1057 were randomised, and 792 (75%) were tested at 18 months. Groups were similar at baseline. Smoking was defined in 12 levels (never; trier, but not in last month; last month, less than one cigarette a week; last month, one cigarette a week; last week, less than seven cigarettes; last week, more than seven cigarettes; more than one a day). The effects of clustering in classes were assessed by a logistic model, and required adjustment only for the proportions of male and female smokers. Methodological problems were that students with a high risk of smoking had a lower response rate, and that attrition at 36 months was 36%.

At 18 months the percentage of never-smokers was 54.7% in the experimental group and 55.4 % in the control group (difference -0.7; 95%CI -13.7 to +16.3). At 36 months the percentage of never-smokers was 30.5% in the experimental group and 26.5% in the control group (difference +11%; 95% CI 1.4-20.6; OR adjusted for clustering = 1.7; 95% CI 1.1-2.9; p = 0.03).

37) In THE DRUG ABUSE RESISTANCE EDUCATION (DARE) STUDIES (Ennett 1994) the DARE intervention was similar to that of Clayton (Clayton 1996). The curriculum included information about drugs and their effects, peer pressure refusal skills, awareness of media influences, decision-making skills, accurate perceptions of levels of drug usage, enhancement of self-esteem, and taking responsibility, and was delivered by uniformed police officers. The control group received the usual drug education curricula, which varied by school.

The sample consisted of 1803 fifth- and sixth-graders in 36 elementary schools in Illinois. Eighteen pairs of schools were matched on ethnicity and socio-economic status and stratified by urban/suburban/rural status. Twelve pairs of schools were randomly assigned, but six pairs in rural areas were non-randomly assigned.

The experimental group received the DARE curriculum for one hour a week for 17 weeks. Attrition was 26% (student missing at one or more of four data collection points). There was no differential attrition across conditions, but more urban students and those with more positive attitudes towards drugs dropped out. Smoking was defined as initiation (for those reporting no use at baseline), increased use (for those reporting past 30-day use), and quitting (for those reporting current use). Analysis was of nested cohorts to adjust for the school as the unit of allocation. Methodological problems were that more urban students and those with positive attitudes to drugs dropped out, and that six pairs of rural schools were non-randomly assigned.

At both one and two years there were no differences between groups in initiation of smoking or quitting.

(38) Kaufman (Kaufman 1994) compared a social influences intervention, a school plus media intervention and a no intervention control group. The seven-session school 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, video of a peer refusing to smoke, and tobacco refusal skills based on the American Lung Association’s ‘Smoking Deserves a Smart Answer’. The media intervention consisted of articles in the Chicago Defender, eight public service smoking radio announcements, and a rap contest.

The intervention sample comprised 175 sixth and seventh-graders in three Chicago public schools, with 101 students in the control group. There were no socio-economic differences between the groups at pre-test. Smoking was defined by Botvin’s Usage Scale. Methodological problems were that the school-plus-media group smoked more at baseline than the media group; there were sub-
stantial differences between groups in awareness of the media programme; there was 40% attrition at six months, no power calculation, and no correction for clustering.

The results at six months were that there were no differences in smoking rates between the groups, but both the media and the media + school groups smoked less than at baseline.

(39) PROJECT CLASP (Telch 1990) used a five-session social influences intervention over three weeks to make a direct comparison of programme deliverer. A peer-led group used videotapes of resistance to social pressures to smoke, with vignettes, workgroups, and worksheets. They examined the acute negative effects of smoking, social pressures to smoke, role-modelling, resistance strategies, and advertising and media influences. Students elected their same-age peers as leaders, and these received one hour of training. The second experimental group used the same intervention, but with no peer leaders. There were two control groups, one from another school, who received a survey only.

The sample consisted of 774 seventh-graders in two junior high schools in southern California, with 540 randomly assigned to the two experimental groups. There were no differences between experimental groups at baseline, and at eight months 572 (81%) remained. The control group consisted of 234 students assigned from a second junior high school, and they received only carbon monoxide and saliva tests. Smoking was defined as regular smoking (once a week). Methodological problems were that there was evidence of imbalance in the groups at baseline, and there was no correction for clustering.

At seven months, for the transition from never-smoker to experimenter there was a lower rate of onset in the peer-led experimental group (2.1%) compared with other groups. For the transition from never-smoker to regular user there was a lower rate of onset in both interventions compared with both control groups. For the transition from experimenter to regular user there was a lower rate of onset in the peer-led experimental group compared with the no-peer-leader experimental group.

(40) PROGRAMS TO ADVANCE TEEN HEALTH (Ary 1990) compared a 25-session tobacco and smokeless tobacco, alcohol, and marijuana intervention (the same as in Severson 1991) with a control group that received 10 sessions of standard tobacco and drug education.

The sample was 7837 students in 37 elementary, middle and high schools in Oregon. Analysis was by ANOVA. There was no differential attrition to affect internal validity, but drop-outs were likely to smoke more. The school was used as the unit of analysis. ICCs were not computed. Methodological problems were that there were no statements about the method of randomisation, whether blinded or concealed; no power computation; one middle school was not randomised; a survey of teachers showed that control schools devoted a similar amount of time to tobacco and drug education, and used curricula with similar components to PATH; drop-outs were likely to smoke more; and there was 20% attrition at follow-up.

Those in the experimental group smoked fewer cigarettes a month (77) than those in the control (111; p < 0.05), but there were no significant differences in proportions of non-smokers (65% vs. 69%).

(41) Cohen (Cohen 1989) compared a peer-led four-session social influences tobacco prevention curriculum with a control group which received the usual health curriculum taught by teachers.

The interventions included a focus on the parents as role-models through discussions by the children of their parents’ behaviour and through homework assignments which the children and parents completed together, and by mailing risk factor information to the parents. Parents were viewed as enablers of health behaviour rather than as the direct agents of change. The students completed a comprehensive health survey before and after the study, and their parents were also contacted by telephone to complete identical surveys. The surveys asked about the health habits of the children (smoking, exercise, dieting, and fast food consumption) and about family discussions of health. The seventh-graders received a smoking curriculum adapted from PROJECT CLASP, and it is their results that are reported on here (the fifth-graders received a curriculum about nutrition, and the sixth-graders a curriculum about blood pressure).

The sample consisted of 1051 fifth-, sixth-, and seventh-graders plus parents in the Williamsport Consolidated School District, U.S. Smoking was defined as having ever smoked even part of a cigarette. Analysis was by Pearson correlations for parent’s and student’s responses, phi coefficients for dichotomous smoking responses, and repeated measures ANOVA for curricula evaluation.

Methodological problems included no statement of the number followed up, no attrition analysis, and no correction for clustering. At one year there were no statistically significant differences in percentages smoking (non-smoking versus ‘even smoked part of a cigarette’) between the intervention group and the control group, nor by gender.

(42) Schinke (Schinke 1986b) compared an eight-session skills training intervention with a health information curriculum. The skills training intervention included problem-solving, resistance to offers to smoke, interpersonal pressure to smoke, and role-plays refusing offers to smoke. The health information intervention included debates, quizzes, and anti-smoking skits. The programmes were delivered by pairs of graduate assistants.

The sample consisted of 65 students from two schools. Smoking was defined as the number of cigarettes a week. Methodological problems were the small sample size and no correction for clustering.

At 12 months the number of cigarettes smoked a week increased from 1.5 to 3 in the problem-solving experimental group, and from 1.5 to 5 in the health curriculum group. Saliva thiocyanate levels correlated 0.52 (p < 0.01) with reported cigarette use.

(43) Schinke (Schinke 1985a) compared ten-session skills training and information curricula, and a control group which re-
The information intervention included health information about smoking, debates, quizzes, and anti-smoking skits. The interventions were delivered by graduate social workers, who received 40 hours of training prior to randomisation to implement the skills or information interventions.

The sample consisted of 689 sixth-graders in nine schools (97% of enrolments) in an unnamed city (the authors’ academic location was Seattle). There were no differences between schools at pre-test. Attrition was 6–9%. Smoking was defined as in the past week, and saliva samples correlated \( r = .30 \) in the skills group, \( r = .36 \) in the information group and \( r = .31 \) in the control group. Schools were both the unit for allocation of treatment and for analysis. Methodological problems were that there was no power calculation, and that the statistical analysis was stated to be significant but without presentation of results.

Smoking rates at pre-test were 4%, and at 24 months they were 12% in the control group, 11% in the information group, and 8% in the skills group. The authors state that ‘Scheffé contrasts of significant condition favored skills condition subjects over information and control condition subjects,’ but no results are presented.

(44) Schinke (Schinke 1985c) compared eight-session skills training and information interventions. Two control groups received respectively pre- and post-tests only and a post-test only. The skills training intervention included problem-solving, resistance to offers to smoke, interpersonal pressures to smoke, and health information about smoking. The health information intervention included health information about smoking, debates, quizzes, and anti-smoking skits. Both interventions included films, peer testimonials, and commitments to non-smoking. The interventions were conducted by four pairs of graduate social workers leaders, who received 40 hours of training.

The sample consisted of 331 sixth-graders in four suburban schools in Seattle (94% of eligible students), with no differential attrition. Smoking was defined as ever-smoking. Saliva samples were collected, and correlations of thiocyanate levels with smoking were reported as significant but were not stated. Methodological problems included no attrition analysis, no statistical analysis, and no correction for clustering.

At 15 months those ever-smoking remained unchanged at 2% in the skills-training group, increased from 5% to 11% in the health-information group, and from increased from 2.5% to 10% in the pre-test/post-test control groups.

(45) The WATERLOO SMOKING PROJECTS (WSP) (Flay 1985) compared a social influences intervention with a usual health education control group. The intervention consisted of six one-hour weekly sessions in the sixth grade on information and attitudes to smoking; family, peer and media influences on smoking; and decision-making and commitment. There were two maintenance sessions in sixth grade, two booster sessions in the seventh grade and one in the eighth grade. The control group received the usual health education (six sessions plus three booster interventions).

The sample consisted of 697 students in 22 schools in southern Ontario. There were no differences in smoking behaviour between groups at pre-test; no differential attrition from the experimental and control groups; and non-significant differential attrition of smokers (17% of drop-outs were experimenting with smoking or were smoking regularly, compared with 12% of the sample). Smoking was defined as never smoked, tried once, quitter, experimenter (‘not every week’) and regular (‘usually every week’). Methodological problems included non-random allocation of three schools by the school superintendent, 24% attrition at two years, and no correction for clustering.

At 18 months 74% of non-smokers in the experimental group and 67% in the control group remained never-smokers (p < 0.003). Using the school as the level of analysis and a binomial regression model, there was also less smoking in the experimental group (p < 0.02). However, the 80% followed up at six years showed no programme effects.

(46) Schinke (Schinke 1984) compared a skills building intervention with an attitude modification intervention and a control group. In both experimental groups, students also received information about adolescent smoking from films and testimonials by Junior High students, analysed advertisements, and did homework to note environmental events that stimulate or discourage smoking. Students in the skills-building intervention had an additional eight sessions to develop refusal skills, viewed videotapes of peers refusing cigarettes, then practised refusals and received praise and coaching. Students in the attitude-modification intervention also participated in quizzes, contests, and debates to weigh the merits of non-smoking, and made a public commitment not to smoke. There is no statement of whether the control group received an intervention.

The sample consisted of 234 sixth-graders in Seattle. Smoking was measured by saliva thiocyanate. Methodological problems included no attrition data or analysis, no definition of smoking and no assessment of the effects of clustering.

At 12 months cigarette use was unchanged at 2% in the skills-building group, had increased from 5% to 12% in the attitude-modification group, and increased from 2% to 10% in the control groups. No statistical analysis was presented. There were no differences in thiocyanate levels.

(47) THE OSLO YOUTH STUDY (Tell 1984) compared a ten-session social influences intervention group with a control group. The intervention included a personal commitment not to smoke, discussion of social pressures to smoke, role-plays, discussion of experiences about smoking, coping with social anxiety, plays about lifestyle and pressure to smoke, self-pollution by smoking, wasting resources by smoking, passive smoking, the long-term effects of smoking, and the social and health aspects of smoking. Students also watched a film ‘It’s Your Choice’. Two sessions were based...
on U.S. programmes, and eight were developed by the Oslo staff. Student leaders were non-smokers chosen by the staff and teachers. For cohort 1 the first five sessions were taught by student peer-leaders. For cohorts 2 and 3 the first three sessions were taught by student leaders, and sessions six to ten were taught by the study staff. The duration of the intervention was ten 45-minute sessions over a 17-month period. Whether the control group received an intervention was not stated.

The sample consisted of 1040 students in six elementary schools in Oslo, Norway. The parents of 852 gave consent. Smoking was defined as daily, cigarettes/week, or any smoking. The correlation between serum thiocyanate and the frequency of smoking was 0.41 (p < 0.001). Methodological problems included substantial attrition at one year (only 486 students remained, with 54% attrition of the 13- and 14-year-old males in the control group, 25% in the experimental group, and similar attrition for seventh grade females); substantial attrition at the 10-year follow-up (577 participated, with differential attrition of males, weekly smokers, and students from the control compared to the intervention schools); in the third pair of schools the experimental school was not randomly assigned; there was no power calculation; no correction for clustering; and at the 12-year follow-up 60% of the comparison group were under the impression that they had participated in the intervention.

At two years there were 16.5% new smokers in the experimental group, and 29.6% in the control group. There were no programme effects at 10 years.

(48) Coe (Coe 1982) compared an eight-session social influences intervention with a no intervention control group. The intervention covered peer pressure to smoke, advertising, role-plays, and promoting group support for non-smoking. In one school positive reinforcement was offered to the class with the greatest reduction in smoking behaviour. The intervention was delivered to groups of 15 to 20 students by first year medical students who had received four hours of training.

The sample consisted of one class in each of two public schools in the St. Louis metropolitan area, and comprised 220 students. Non-smoking was defined as never smoking, smoking as 'experimenting' (had not smoked within the last 30 days) or 'smoking' (had smoked at least one cigarette in the past 30 days). Methodological problems included major differences in ethnicity, age and smoking composition of the schools; attrition after 12 months with 64% of the experimental and 68% of the control remaining; no attrition analysis; and no correction for clustering.

At 12 months there were no significant differences in the percentages never-smoking between the groups.

(IV) Combined social competence and social influences versus control

Category 1 studies.

(1) PROJECT TOWARDS NO DRUG USE (PROJECT TND) (Sussman 1995) included three related studies.

The TND-I CHS project compared a nine-session tobacco, alcohol, marijuana, cocaine, and hallucinogen intervention with a 'standard care' control group. Based on curriculum development studies with high risk youths, it was concluded that the usual social influences curriculum was not effective, and so a health motivation social skills decision-making approach was used. This included three sessions on motivation to listen to health programming, and effective listening skills (listening, stereotyping, drug use myths, and denial); three sessions on chemical dependency issues and alternative coping skills (stages of chemical dependency, and a talk show on the consequences of drug abuse and coping with stress); and three sessions on making non-drug use choices (self-control skills, taking a moderate perspective, and decision-making and commitment).

The sample consisted of 29 school districts in a five-county region of southern California. Each district contained one Continuation High School for students unable to remain in the regular high schools for reasons including drug abuse. In follow-up 2863 students were contacted (75% of those enrolled). Pre-test data were obtained from 2,001 (70%). At one year 23% were still in the Continuation High School, and the other 77% were followed up by telephone, yielding a sample of 1074. There were no statistically significant differences on 31 items of drug use and psychosocial correlates between the sample and those measured at both pre-test and one year. The general level of substance use in Continuation High Schools is indicated by the fact that 57% used cigarettes, 64% alcohol, 55% marijuana, 21% stimulants, and 13% hallucinogens in the past month. Corresponding percentages for comprehensive high schools from overlapping school districts are 24%, 36%, 22%, 2% and 2%. Smoking was measured on an 11 point scale (from 0 to 91-100+ times/month), and expired air carbon monoxide was measured. SAS PROC MIXED ANCOVA analysis was used and corrections were made 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.

A second study (TND-I RHS) of three regular high schools (679 students) evaluated whether the curriculum could be used in regular high schools.

A third study (TND-II CHS) of 18 Continuation High Schools (715 students) evaluated the relative effectiveness of health-educator-led versus self-instruction curricula. At one year the process analysis for Study TND-I CHS showed that students attended two to three of the drug abuse sessions. Adherence by educators to planned lesson delivery was high (99-100% in 10 of 20 lessons) and 100% of class control and 100% of material appropriateness scores were five or above on a 1-7 scale. The results for study TND-I CHS at one year are that adjusted means for past 30 days cigarette smoking were 30.71 for the control group, 34.3 for the classroom group, and 33.08 for the classroom plus school-as-community groups (differences not statistically significant.). For study TND-II CHS there was a 27% relative reduction
in cigarette use in the health-educator-led group compared with self-instruction. For study TNM-1 RHS there were no differences between the classroom and control groups.

Category 2 Studies:

(2) Botvin (Botvin 1999) compared The LIFE SKILLS TRAINING PROGRAMME (LST) intervention with an information control group. The cigarettes, alcohol, and marijuana Life Skills Training intervention included 15 sessions plus 10 booster sessions, covering knowledge and skills to resist the social influences to use cigarettes, alcohol and marijuana, and to reduce the motivation to use these substances. The control group received 10 sessions plus three boosters of an information-only drug programme. The sample comprised 2690 seventh-grade girls from 29 New York City schools, and 2209 (82%) provided data in the eighth grade. Smokers had higher attrition rates, but there was no differential attrition between the experimental and control groups. Smoking was defined as a nine-point index from 1 (never) to 9 (more than one a day), and carbon monoxide samples were collected at pre- and post-test. Chi square and GLM ANCOVA were used to compare the experimental and control groups. Methodological issues were that at baseline the intervention group differed from the control, there was no power calculation, and there was no correction for clustering.

The results at one year were less lifetime and 30-day smoking, and less initiation and escalation from lifetime to monthly smoking in the experimental group compared with the control group. A logistic regression controlling for ethnicity, percentage of programme completed, and percentage receiving free lunches, showed that the experimental group, compared with the control group, had a risk of initiating smoking of 0.76 (95% CI 0.57-1.01), and of escalating smoking of 0.55 (95% CI 0.35-0.86).

(3) Josendal (Josendal 1998) compared an eight-session intervention with a control group. The intervention focused on personal freedom, the freedom to choose, freedom from addiction, making one's own decisions, tobacco-resistance skills, and the short-term consequences of smoking. It was not stated whether the control group received any intervention.

Schools were randomly selected from a list of all Norwegian schools in order of ascending zip-code, and 99 schools with 195 classes and 4441 students born in 1981 and who were in seventh grade (95% participation) were randomly assigned. This is the only study in this review based on a national sample. There were no baseline differences in smoking by gender or between groups. Smoking was defined as none, less than one cigarette a week, every week, and every day. A methodological problem was that the analysis was not adjusted for clustering.

At six months non-smokers declined from 93% to 85% in Group A (control), and from 93% to 91% in Group B (classroom-plus-parents-plus teacher-training) (p < 0.01). These differences were maintained for separate analyses on subgroups: high-sensation seekers (p < 0.05), those with strong expectations to smoke (p < 0.01), and with one parent who smoked (p < 0.05). However, for students categorized as low-sensation seekers, who had low expectations of smoking, and whose parents did not smoke, there were no differences in the percentage smoking. The changes from 92% to 87% in Group C (classroom-plus-parents) and from 90% to 84% in Group D (classroom programme-plus-teacher training) were not significantly different from control.

(4) Hanewinkel (Hanewinkel 1994) compared an intervention with control. The intervention included generic social skills training, homework assignments, relaxation exercises, tobacco refusal role-playing, comics, and games. Parents were invited to attend. For children already smoking 11 half-hour sessions used information about smoking, contract management, motivational analysis, relaxation exercises, tobacco refusal role-plays, and homework assignments, and students were taught cognitive, physiological and motor responses to difficult situations. Parents and teachers who smoked were offered a smoking reduction programme.

Of the 1299 available students (average age 14), 841 (65%) participated. Smoking was defined as in the last seven days. Methodological issues included the fact that one Gymnasium did not participate in the intervention phase for organizational reasons and that the experimental group 1 (two Hauptschulen) differed in student composition from the control group (one Hauptschule, two Realschulen, one Gymnasium). Methodological problems included no analysis of equivalence at baseline, 50% attrition at 16 months, no attrition analysis, no process analysis, no power calculation, and no correction for clustering.

At six months in the experimental group (Hauptschule 3, Realschule 1 and 2, and Gymnasium 1) 84% of the 519 were assessed at follow-up: 75% were non-smokers at baseline, and 84% post-intervention (p < 0.001). For the control group (Hauptschule 1 and 2) there were no significant differences in percentage smoking at baseline and follow-up. Figure 1 (no statistical analysis offered) shows that the results in the experimental group were due to changes in Hauptschule 1 (46% smokers at baseline, 34% post-intervention, and 33% at six months follow-up) and Realschule 1 (22% smokers at baseline, 8% post-intervention, and 14% at six month follow-up). The authors used a 'waiting list control design' in which all groups eventually received the intervention, with the control group receiving it later. The group which served as the control group to which experimental group one was compared was later designated as experimental group two, but no intervention results are shown for this experimental group. A personal communication from the author describes the study as a randomised controlled trial.

5) PROJECT TOWARDS NO TOBACCO USE (PROJECT TNT) (Sussman 1993) compared four interventions and a 'usual care' control group. The interventions were social influence resistance training; social influence information; physical consequences information and a combined intervention group. The duration of the intervention was 10 lessons in the seventh grade academic year. The control group received a 'usual care' stan-
standard health education programme: information usually provided in school assemblies on values clarification, the long-term consequences of smoking, and refusing to smoke. Five of the 16 control schools also received five sessions on substance abuse.

Schools were randomly assigned within a complex blocking system defined by: (1) region (urban, rural); (2) school type (middle school with 6th through 8th grades, junior high with 7th through 8th grades); (3) a variable which was a linear composite of school size, socio-economic status (Aid to Families with Dependent Children percentile rank, English as a second language percentile rank, median income in zip code); academic status (California Assessment Program reading, writing, and math percentage ranks); (4) demographic variables (percentage White, percentage growth of population in zip code, county name, median age in zip code); and (5) estimate of tobacco use prevalence based on school staff estimates and pilot data collected at the school.

The sample comprised 6716 students in 48 southern California junior high schools, increasing to 7052 at one year, and 7219 at two years, with results aggregated to the school level. Process implementation was similar across all experimental groups. For seventh grade students at 20 of the schools, data were collected for individuals, but for the second cohort students at the remaining 28 schools data were measured in repeated cross-sectional partial samples (three randomly selected classes in each school). Measures were aggregated to school level, and weighted by numbers of students. For the ANCOVA analysis the school was used as the level of analysis, and there were no school effects. The covariates were gender, the blocking assignment variables (composite, school type, region), and school turnover. The interaction terms between covariates and treatment were not significant. Methodological issues were that 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 that attrition from baseline was not estimated. Of uncertain methodological consequence is the use of two methods of data collection (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 three classes per school).

At 12 months the Informational Social Influence, Physical Consequences, and Combined groups had lower percentages who had ever tried a cigarette or smoked weekly than the Normative Social Influence and control groups. At 24 months the Combined group had a lower percentage who smoked weekly than did the other three experimental groups or the control group.

The results at 12 months for trial use of smokeless tobacco were that the Normative Social Influences, Physical Consequences, and Combined groups had lower rates than the Informational Social Influences and control groups. Females had higher trial use than males, but there were no differences in weekly use. At 24 months trial use was lower in the Physical Consequences compared with other experimental groups and the control group.

(6) Botvin (Botvin 1990a; Botvin 1995) compared two methods of delivering the Life Skills Training intervention with a ‘treatment as usual’ control group. The intervention included cognitive-behavioural skills for building self-esteem, resisting advertising pressure, managing anxiety, communicating effectively, developing personal relationships, asserting one’s rights, and developing specific skills to resist social influences to smoke, drink, or use drugs. The duration of the intervention was 12 lessons over 15 class periods for eight weeks in the seventh grade, 10 booster sessions in the eighth grade, and five in the ninth grade. The study is a direct comparison of type of provider training. In the first experimental group, providers received a formal one-day training and feedback on implementation. In the second experimental group, providers received two hours of training by videotape, with no feedback.

The sample comprised 5954 seventh-graders in 56 schools in New York State, and 4466 (75%) completed the post-test. Sixty-two per cent (the 3684 students who received at least 60% of the programme) were included in the analysis after one year, and 3597 (60%) were included in the five-year follow-up. Smoking frequency was measured on an eight-point scale (‘never’ to ‘a few times most days’), and the amount of smoking was measured on a seven-point scale (‘never’ to ‘more than a pack a day’). Breath samples were collected but not analysed. There were no significant differences among the groups at pre-test. The school was both the unit of treatment allocation and of analysis. School means were compared with least-squares regression. Methodological problems included no power calculation, 38% attrition at 36 months, differential attrition of smokers, 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.

At the end of the programme after three years, and using the school as the unit of analysis, experimental group one (in which teachers received a one-day workshop and feedback from project staff) had less smoking compared to the control group (p < 0.03), but there was no significant difference (p < 0.09) for experimental group two (in which teachers received videotape training and no feedback from project staff).

At five years expired air carbon monoxide levels correlated with self-reported smoking, r = 0.35 (p < 0.001). Using the school as the unit of analysis, for the full sample (n = 3597) for experimental group one compared with the control group there was less monthly smoking (27% vs 33%; p < 0.05), and less weekly smoking (23% vs 27%; p < 0.05). For experimental group two compared with the control group there was less monthly smoking (26% vs 33%; p < 0.01), less weekly smoking (21% vs. 27%; p < 0.05) and less pack-a-day smoking (9% vs. 12%; p < 0.05). For the high-fidelity sample (n = 2752) who received at least 60% of the intervention during the seventh, eighth and ninth grades, the results were nearly identical.

7) Botvin (Botvin 1990b) compared four methods of delivering THE LIFE SKILLS TRAINING PROGRAMME (LST) with a
no intervention control group. The intervention was a 30 session tobacco, alcohol and marijuana curriculum. In the seventh grade all experimental groups received a 20 session multi-component substance-abuse prevention curriculum focusing on social, psychological, cognitive, and attitudinal factors. It also covered the facilitation of basic life skills, improvement of personal competence, and social resistance skills. In the eighth 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.

The study compared peer-led delivery of the programme, peer-led plus eighth grade boosters, teacher-led and teacher-led plus eighth grade boosters. Peer leaders and teachers received a four-hour training workshop conducted by project staff. The control group received no intervention but received pre- and multiple post-tests.

The sample comprised 1311 eighth-graders from 10 suburban New York schools, and 998 (76%) remained at one year. There was no differential attrition among smokers and non-smokers. Smoking was defined on a five-point scale (never to every day). Methodological problems included 24% attrition at one year, no power calculation, and no correction for clustering. At one year in the peer-led booster group compared with the control group there were fewer students reporting monthly (12% vs. 23%), weekly (5% vs 16%), and daily smoking (3% vs. 13%), and on the index of smoking (0.40 vs. 0.74; p < 0.005). In the peer-led booster group compared with the teacher-led booster group there were fewer students reporting monthly (12% vs. 34%), weekly (5% vs 21%) and daily smoking (3% vs 16%), and on the index of smoking (0.40 vs 1.08). For the peer-led booster group compared to the peer-led non-booster group there were fewer students reporting monthly (12% vs. 31%), weekly (5% vs. 22%), and daily smoking (3% vs. 17%), and on the index of smoking (0.40 vs. 0.98). For the peer-led booster group compared with the teacher-led non-booster group fewer students reported monthly (12% vs. 26%), weekly (5% vs. 16%), and daily smoking (3% vs. 11%), and on the index of smoking (0.40 vs. 0.75).

(8) Gersick and Snow (Gersick 1988) compared a 12-session tobacco, alcohol, and drugs social cognitive skills intervention to a no intervention control group. The intervention included effective decision-making; assessing situations realistically, brainstorming alternatives, using a balance sheet to identify negative and positive consequences, and evaluating risk; role flexibility: peer influence and conflict resolution, and decisions about drugs, alcohol, and cigarettes; and enhancing support: basic concepts of social networks, and family and non-family support systems. The duration of the intervention was 40 minutes a week for 12 weeks. The control group received only the post-test.

The sample comprised 1372 sixth-graders in 32 classes in two New England U.S. towns, with 1075 (79%) remaining at 24 months. Smoking was defined on a seven-point scale (from 1 = never, to 7 = almost every day). Methodological problems included no power calculation, and differential attrition with drop-outs in the eighth grade more likely to be smokers.

The results at 12 months were that, using the individual as the unit of analysis, the experimental group used less tobacco (mean = 1.65 on a seven-point scale) than control group students (1.87; p < 0.02), had more non-smoking (66% vs 61%) compared to smoking ‘once a month to 2-3 times/week or more’ (8% vs 13%; p <.03), but there were no significant differences for a classroom-level analysis (p < 0.10). At 24 months there were no significant differences in smoking between intervention and control groups when corrected for classroom effects by MANOVA (p < 0.09). A post-hoc power computation showed that to achieve power greater than 80%, alpha would have to be set at .10 for MANOVA and logistic analyses.

(9) Gilchrist (Gilchrist 1987) compared a 10-session tobacco, alcohol, and drugs intervention to a control group. The intervention comprised myths about Native American 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 role of values in decision-making, and the SODAS model (Stop, consider Options, Decide, Act, and Self-praise). Students created a SODAS commercial on videotape, and an adult from the tribal alcohol treatment program was a guest speaker. Eighty-three per cent of students completed the intervention. Whether the control group received a programme was not stated.

The sample consisted of 102 Pacific Northwest Native American young people aged 11 years, of whom 83% in the intervention group completed the intervention. Methodological problems included a small sample size, no power calculation, and no correction for clustering.

After six months the authors state that: ‘Positive changes in tobacco use found at pre-test were not evident at follow-up’. Table 4 notes that from pre-test to post-test self-identification as a tobacco user decreased 31% in the experimental group and increased 5% in the control group (p < 0.001). However, from post-test to six month follow-up there were increases in both the experimental group (9%) and in the control group (7%) (n.s.).

(10) Botvin (Botvin 1983) compared two different methods of delivering THE LIFE SKILLS TRAINING PROGRAMME (LST) with an information control group. The 15-session Life Skills Training programme included the immediate physiologic effects of smoking, self-image, self-improvement, decision-making, advertising techniques, coping with anxiety, communication skills, social skills, assertiveness, and techniques for resisting peer pressure to smoke. The study is a direct comparison of the long versus short delivery format for LST. In the first experimental group, LST was taught in 15 one-hour sessions over 15 weeks as part of the science or health curriculum. In the second experimental group, LST was taught in an intensive mini-course format, with 15 sessions on consecutive days over about a month. One E2 school also received eight booster sessions between the post-test and the
The sample consisted of 902 seventh-graders in seven junior high schools in suburban New York. Smoking was defined as self-reported monthly, seven-day, and daily. Methodological problems included a lack of attrition data or analysis, and no correction for clustering in the analysis.

At 12 months for the baseline non-smokers in the mini-course experimental group rates were lower for monthly smoking (10% vs. 22%), for seven-day smoking (4% vs. 15%), and for daily smoking (3% vs. 11%) compared to the control group. There were no differences between the experimental group that received the integrated curriculum and the control group.

(11) Borvin (Botvin 1982) compared a 12-session Life Skills Training (LST) intervention over 12 weeks with a control group. The intervention included the physiological effects of smoking, teenage smoking rates, the LST smoking prevention programme (self-image, self-improvement, decision-making, independent thinking, advertising techniques, coping with anxiety, communication skills, social skills, and assertiveness), homework, and a self-improvement project. The intervention was delivered by high-schoolers from a neighbouring school recruited through advertisements. They received a four-hour training workshop and were supervised by a teacher and by project staff. The control group received existing school anti-smoking programmes, described as ‘minimal.’

The sample comprised 426 seventh-graders in two New York City suburban schools, with 74% non-smokers at baseline, and 80% of these baseline non-smokers were followed up one year later. The intervention was taught by non-smoking 11th- and 12th-graders. Non-smoking was defined as never smoking, and smoking as in the past month and week. Methodological problems were that only two schools were randomised, that only 80% of non-smokers were followed-up at one year; and there was no correction for clustering in the analysis.

At 12 months among the baseline non-smokers there were fewer monthly smokers in the experimental (23%) than in the control group (32%), and fewer weekly smokers (11% vs. 25%). Thiocyanate levels remained the same in the experimental group but increased in the control group.

(12) Borvin (Botvin 1980) compared a 10-lesson intervention with a control group. The intervention was over 12 weeks on 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. The students also had homework assignments and a self-improvement project. The intervention was delivered by outside specialists. The control group received no intervention. The study was similar to Botvin 1982, with similar methodological problems, and with attrition of 20% at six months. The results were that the experimental group had fewer monthly smokers at six months than the control group (6% vs 18%).

Category 3 studies:

(13) PROJECT SMART (Hansen 1988) compared social influences and affective education interventions with a no intervention control group. The social influences intervention included the health effects of smoking, training to resist offers to smoke, normative expectations about smoking, mass media, social activism, and a public commitment not to smoke. The affective education intervention included stress reduction, goal setting, decision-making, self-esteem, assertiveness, and a public commitment not to smoke. The 12-session interventions were delivered over one term by staff health educators and regular classroom teachers with the involvement of peer opinion-leaders in the schools.

The results at 12 months were that among baseline non-smokers the onset of smoking was less in the social group (12%) than in the control group students (18%), and fewer social group students (1.4%) smoked five or more cigarettes in the preceding days than control group students (6%).

(V) Social influences versus information-giving

Category 1:

(1) The ADOLESCENT ALCOHOL PREVENTION TRIAL (AAPT) (Hansen 1991) compared interventions providing information, resistance to social influences to smoke, and normative education. The information intervention included four 45-minute lessons about the social and health consequences of alcohol, tobacco, and drugs. The Resistance training intervention included four lessons on the consequences of using substances, and five lessons on resisting peer and media pressures to use alcohol, tobacco, and other drugs. The Normative Education intervention included four information lessons and five lessons on perceptions of the prevalence and acceptability of using alcohol, tobacco, and other drugs. The Combined Resistance Training and Normative Education intervention included four lessons of information, 3.5 of resistance skills, and 3.5 on conservative norms. The interventions were delivered by project staff with two weeks intensive training.
No effect of resistance training was found, but for those who received normative education there were significantly fewer smokers and users of alcohol and marijuana in the experimental group compared to those who received the information intervention.

(VI) Social influences versus social competence: No studies.

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

Category 1:

(1) PROJECT SIXTEEN (Biglan 2000) compared a school and a school plus media intervention. The interventions had a tobacco, alcohol, marijuana and anti-social behaviour focus. There was a 35-session intervention with components on information, social influences, community advocacy, media advocacy, youth activities, parental communication, and programmes for stores to reduce selling tobacco to minors. The sample consisted of eight Oregon communities, matched on community socio-economic status and population, with 2187 seventh grade and 2251 ninth grade students in Year 1 of the study, and 2045 seventh grade and 2120 ninth grade students in Year 5 (13.5% of students did not receive an assessment across all five years of the study). Randomisation to the school or school-plus-media programmes was by the flip of a coin. There were no differences at baseline between community pairs in size, per capita income, median household income, percentage below poverty level, percentage of minority students, or percentage of high school graduates. Smoking was defined as smoking in the last week, and carbon monoxide levels were unusually defined as a net carbon monoxide score (expired air minus classroom carbon monoxide level). 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. Methodological problems were that there was no assessment of differential attrition (with 13.5% of students not receiving an assessment across all five years of the study), and no power calculation. After one year in the communities which received the community-plus-school programme, the percentage smoking at baseline (measured by an index of weekly smoking) was 8.7% compared with 12.4% in the communities which received the school-only programme (p < 0.022). After five years, the weekly smoking index in the community intervention group was 12.4% and in the school intervention group was 13.8% (p < 0.038). Smokeless tobacco use in the community intervention communities decreased from 13.8% at baseline to 9.7% in Year 2 (p < 0.04), and in the school intervention communities increased from 11.4% to 13.6% (p > 0.05). However, there were no significant differences between the communities on expired carbon monoxide levels at any time.

(2) The CATCH STUDY (Elder 1996) compared an eight-session intervention directed towards tobacco, heart-healthy diet, and exercise with a control group. The intervention included information, social influences, and encouragement of policy change to tobacco-free schools components. The sample comprised cities in four states (Texas, Minnesota, California and Louisiana) and 24 elementary schools in each city, with 7827 fifth-graders, of whom 6527 completed questionnaires. Smoking was defined as ‘I have started to smoke a little.’ Analysis was by multiple logistical regression (including a school random effect), but school effects were not stated. The school was both the unit of treatment allocation and of analysis. Methodological issues included no power calculation; and incomplete delivery of the extra-curricular programme (only one-third of schools held assemblies about tobacco; only 40% participated in ‘Great American Smokeout’ activities; and only 25% sponsored anti-tobacco or anti-drug clubs). At 36 months 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 0.79-1.30). 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.

(3) The TELEVISION, SCHOOL, AND FAMILY SMOKING PREVENTION AND CESSATION PROJECT (TVSFP) (Flay 1995) is discussed above. Here we focus on the results for school-plus-TV versus school alone. The curriculum included correction of misperceptions about tobacco usage, awareness of peer influences to smoke, development of peer resistance skills, awareness of family influences to use tobacco, development of media influences resistance skills, social and physiological effects of smoking, and the development of decision-making skills. The control groups received no intervention. Schools were randomly assigned to either: the 10-session social resistance to tobacco curriculum in Los Angeles and San Diego; the 10-session curriculum plus a TV curriculum in Los Angeles; the TV curriculum only in Los Angeles; an attention-control placebo in Los Angeles; or to control groups in Los Angeles and San Diego which received no intervention. There were no differences between the school and school-plus-TV interventions on rates of non-smoking.

Category 2 and 3 studies: None.

DISCUSSION

Sixteen category one studies addressed the issue of whether school programmes to prevent tobacco are more effective than minimal or no intervention. There were no category one studies that addressed the effectiveness of information-giving alone. Of the four category two studies, one small study found an effect of information curricula and three larger studies did not. Of those studies that compared an information curriculum with other models of deliv-
ery, the information curricula were either less effective or showed no difference (Sussman 1993; Botvin 1999; Hansen 1988). In the absence of rigorous studies, it is difficult to exclude an effect of information about tobacco alone, but there is little positive available evidence to support this approach.

The largest group of studies included those drawing to a greater or lesser degree on social influence models. We identified fifteen category one trials in which social influences were the dominant mode of intervention. Of these, eight showed some positive effect of intervention on smoking prevalence ([AAPT trial (Hansen 1991); Biglan 1987a; Cameron 1999; De Vries 1994; Project ALERT (Ellickson 1990); Project TND-II CHS (Sussman 1995); Project SHOUT (Elder 1993); PROJECT SIXTEEN (Biglan 2000)].

Seven failed to detect an effect on smoking prevalence: [Aveyard 1999; CATCH Study (Elder 1996); Minnesota (Murray 1992); Nutbeam 1993; Hutchinson (Peterson 2000); Smoking or Health (Lloyd 1983); TVSFP (Flay 1995)].

Of these, however, one study 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. 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 reduced initiation of smoking and smokeless tobacco by 30% and weekly use by 60% across the 2-year junior high to senior high school period (Sussman 1993). These studies must be weighed against the findings of the Hutchinson Smoking Prevention Project which failed to find a sustained effect of a social influences intervention programme on smoking behaviour.

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 generalisability to other settings (Sussman 2001). Clayton (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 Hutchinson Smoking Prevention Project represents a definitive statement about the effectiveness of social influences programmes to prevent smoking.

There are limited data testing pure social competence interventions. One category 1 study (Kellam 1998) did, however, suggest that a programme directed towards classroom behaviour without a specific anti-smoking intervention might lead to lower short-term rates of smoking in the intervention group. A number of studies considered combinations of social influences and social competence models, such as 'life skills training'. A number of Category 2 studies suggested that these may have an effect on smoking prevalence. However, we identified no category 1 studies that tested this approach. 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.

Similarly, 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. Although there were three category 1 studies that tested such initiatives, they reached conflicting results about effects on the prevalence of smoking. The CATCH Study (Elder 1996) tested a multi-modal intervention, but did not test it against a purely social skills intervention. There were no differences in smoking in the intervention group compared with the control, but the percentage of schools with a no-smoking policy increased. On the other hand, Project Sixteen (Biglan 2000) found a lower prevalence rate in the group randomised to a school-plus-community intervention compared to school alone. Furthermore, 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 category 1 studies directly comparing different formats of intervention. Although no category 1 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 number of sessions as a mediating variable, at least in the context of social influence interventions. There was no category 1 study comparing peer with teacher delivery, or age-, gender-, or culture-specific interventions with standardised interventions.

One problem in interpreting the findings of the existing studies is how to characterise 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 characterising 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; Tobler 2000; Rooney 1996).

Bruvold (Bruvold 1993), for example, characterized interventions as having a ‘social reinforcement’ orientation, a ‘developmental or social norms’ orientation, or a ‘rational’ orientation.

By contrast, Rooney and Murray (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 standardised 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 (Tobler 2000) meta-analysis identified 207 school-based drug prevention programmes and within these identified 74 tobacco prevention programmes. The weighted mean effect size for the 6 tobacco prevention programmes with minimal student interaction was 0.05 (95%CI -0.04, 0.14) and for the 68 interactive programs 0.17 (95%CI 0.14, 0.20). For the subset of 30 high-quality programmes the weighted mean effect sizes for the 2 non-interactive programmes was 0.13 (95%CI 0.06, 0.31), and for the 28 interactive programmes 0.17 (0.13, 0.22). This meta-analysis included some studies excluded from this review on the ground that they were not randomised controlled trials. In addition, the results were based on shorter-term follow-up.

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, there have been further studies failing to detect a long term effect (Cameron 1999; Aveyard 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, policymakers need to weigh up not only the evidence for effectiveness but also the costs of implementing the intervention. Reid (Reid 1999) has, for example, argued that complex school-based interventions make unrealistic demands on teacher time, and hence cannot be sustained long-term. Policymakers 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 there is conflicting evidence about the effects of such programmes, the largest and most rigorous test of a social influence model, the Hutchinson Smoking Prevention Project (Peterson 2000), found no evidence of a sustained effect on smoking prevalence. It is possible that combining social influence 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 influence 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 time 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 analysed. 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.

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**Characteristics of included studies**

**Study** | **Abernathy 1992**
---|---
**Methods** | Country: Canada, Alberta  
Site: all schools in Calgary  
Focus: Smoking prevention:  
Design: Schools stratified into quintiles according to neighbourhood median income, randomly assigned to programme (94 schools) or control (96 schools).  
Analysis: X2 to compare proportions smoking in the three groups

**Participants** | Number at pre-test (1988): all 7,508 students registered  
Age: grade 6; Gender: 49% F  
Baseline never smoked: 67% males, 71% females.  
Differential attrition not discussed

**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 3 months  
Teachers were invited to in-service presentations about the PAL programme (attendance not stated)
Characteristics of included studies (Continued)

Control: no intervention

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: 1y (Grade 7, 1989), 2y (1990), 3y (1991)

Notes In the evaluation, intervention classes were divided into those in which teachers reported teaching all lessons,
and those where fewer were delivered.

Allocation concealment A

Study Andrews 1984

Methods Country: USA
Site: kindergartens in 2 New York school districts
Focus: Smoking prevention and positive health;
Design: random allocation by classroom, number of classrooms not stated
Analysis: comparison of student percentages smoking; percentages of parents smoking.

Participants Number at pre-test: 600
Age: kindergarten; Gender: not stated; Ethnicity: not stated:
Follow-up: 36 months; Attrition: not stated for students, 86% of the parents in the experimental group and
84% in the control group returned the parent survey; Differential attrition from baseline: not discussed.

Interventions Intervention: Primary Grades Health Curriculum Programme;
Duration: 'kindergarten through 3rd grade'
Control: standard teacher/text book programme in health education

Outcomes Self reported smoking. Survey of parents about changes in family health and smoking behaviour.

Notes

Allocation concealment A

Study Armstrong 1990

Methods Country: Australia, WA;
Site: 45 Primary schools in Nedlands
Focus: Smoking prevention
Design: Primary schools feeding randomly selected high schools stratified by class size & 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
Chi-Square (two sided); Effects of other variables controlled in separate logistic regressions (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): 2,366
Age: 7th grade (modal age 12 years); Gender: 49% F
Baseline smoking prevalence 24-37%, higher for boys than girls. No signif 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 conse-
quences; 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; de-
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."
### Characteristics of included studies (Continued)

<table>
<thead>
<tr>
<th>Duration: 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcomes</td>
</tr>
<tr>
<td>Definition of non smoking: had not smoked a single cigarette (not even a few puffs) in previous 12m.</td>
</tr>
<tr>
<td>Saliva samples collected but not analysed</td>
</tr>
<tr>
<td>Follow-up: 12m, 24m, 7 years from end of programme</td>
</tr>
<tr>
<td>Notes</td>
</tr>
<tr>
<td>No adjustment for intraclass correlation. Students had transferred to high school by time of 1 year follow-up.</td>
</tr>
</tbody>
</table>

#### Study: Aveyard 1999

| Country: UK |
| Site: 53 secondary schools, West Midlands |
| Focus: smoking prevention |
| Design: Schools sampled with probability proportional to size of year 9 enrolment; 89 schools approached, 53 agreed to participate. Randomised in 5 strata based year 9 size. |
| 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. |

| Participants: Number at pre-test (1997): 8352, 90% of potential participants |

#### Notes:

- Allocation concealment: B
**Characteristics of included studies (Continued)**

| Interventions | Intervention: 1 class lesson and 1 computer session per term for three terms based on Prochaska's transtheoretical 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 hour classroom transtheoretical model intervention. Teachers received a 2 day training course. Control: Normal health education on tobacco. Teachers provided with lesson plans and handouts but were not required to use them, and received no training. Duration: 6 hours over 3 terms. |
| Outcomes | Self reported behaviour: Ex-smoker. Smoker/ tried/ never. Primary outcome was smoking one or more cigarettes a week Questionnaires were confidential Follow-up: 12 months after start of intervention |
| Notes | 1 school dropped out after randomisation leaving 52 |

| Study | Biglan 1987a |
| Methods | Country: USA Site: 13 middle, junior & high schools, Oregon Focus: Preventing and reducing smoking Design: In one school district whole schools assigned to conditions. In 2 districts classes of teachers willing to use curriculum randomised. In an additional component students in 6 schools randomised individually Analysis: classroom unit of analysis, factorial analysis of covariance |
| Participants | Number at pre-test:3387 in 135 classrooms4.9% weekly smokers Age: 7-10th grades 51% F Majority white |
| Interventions | Expt: Training in refusal skills including modelling, rehearsal, reinforcement, practice. Video used. Other components: health and short term effects, addiction Duration: 5 sessions; 4 on consecutive days + booster at 2 weeks Providers: regular science or health teachers, trained for 2-3 hrs Control: no intervention In an additional intervention 7th grade students in 6 schools randomised to have 4 messages mailed to parents following programme |
| Outcomes | 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: 9 months & 1 year |
| Notes | Separate analyses for those reporting smoking in previous week at baseline and others. Similar programme to Biglan 1987A but with greater emphasis on refusal skills practice. A combined within- and between- schools design was used to investigate contamination effects |

| Allocation concealment | D |

| Study | Biglan 1987b |
| Methods | Country: USA Site: 3 high schools & 6 middle schools, Eugene, Oregon |
### Characteristics of included studies (Continued)

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: Chi-Square of proportions smoking in the two groups; ANCOVA of pretest smoking status, treatment condition, grade and gender (smoking rates log transformed to control skewness).

| Participants | Number at pre-test: 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 12 months
| 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 |

| Interventions | 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 2 weeks later
| Control: no intervention |

| Outcomes | Self-reported smoking (Pechacek's index) = a weighted average of the number of cigarettes 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 1 year
| Refusal skills assessed for a sample (Hops 1986) |

#### Study 1: Biglan 2000

Methods
- Country: USA
- Site: 8 Oregon communities
- Focus: tobacco, alcohol, marijuana, and anti-social behaviours
- Design: 8 communities were matched on community socioeconomic status and population. Allocation of treatment was by community for community intervention activities, and by schools for schools intervention activities. Randomisation 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: individual students were nested within communities, and community means were the unit of analysis.

Participants
- 2,187 grade 7 and 2,251 grade 9 in Year 1 of the study; and 2,045 in grade 7 and 2,120 in grade 9 in Year 5 (13.5% of students were not assessed across all 5 years 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 in the last week, and net carbon monoxide score (expired air – classroom carbon monoxide level).

#### Study 2: Botvin 1980

Methods
- Country: USA
**Characteristics of included studies (Continued)**

| 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 6 months; Differential attrition from baseline: not discussed.

**Interventions**
- Expt: 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 12 weeks
- Deliverer: outside specialist
- Control: no intervention

**Outcomes**
- Smoking: Self-reported smoking (last month, and last week). Pre-test smokers excluded from analysis
- Follow-up: 6 months from pre-test

**Notes**
- Delivered by outside health specialist - see Botvin 1982 for similar programme delivered by peer leaders and Botvin 1983 for delivery by classroom teachers

**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: chi-square.

**Participants**
- Number at pre-test: 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 pre-test
- Attrition: not discussed.

**Interventions**
- Expt: Physiological effects; teenage smoking rates; Life Skills Training (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: twelve 1hr sessions over 12 weeks
- Deliverer: Peers: high schoolers from a neighbouring school recruited through advertisement, 4hr training workshop. Supervised by a teacher and project staff.
- Control: no programme

**Outcomes**
- Smoking: Self-reported smoking (last month, and last week). Pre-test smokers excluded from analysis
- Saliva samples collected, 25% sub-sample analysed for thiocyanate
- Follow-up: 1 year after post-test
- Process: no data on programme adherence.

**Notes**
- Delivered by peers - see Botvin 1980 for similar programme delivered by outside health specialists and Botvin 1983 for delivery by classroom teachers

**Allocation concealment**
- D
### Characteristics of included studies (Continued)

Focus: smoking prevention  
Design: schools randomly assigned, 2 to each of two experimental and 3 to control  
Analysis: chi-square, ANCOVA

| Participants | Number at pre-test & post-test: 902, of whom 92% non-smokers  
Age: 7th grade; Gender: not stated; Ethnicity: 91% W  
Total at baseline not stated, no attrition analysis |
|------------------|-----------------------------------------------|
| Interventions | Direct comparison of long or short delivery format  
Life Skills Training (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  
Expt 1. LST taught in 15 1hr sessions as part of science or health curriculum, over 15 weeks  
Expt 2. LST in intensive minicourse format, 15 sessions, consecutive days over approx 1 month. (1 E2 school also had 8 session booster between post test and 1 year f-up)  
Delivered by classroom teachers, 1 day workshop training  
Control: received standard smoking education mandated by NY State |
| Outcomes | Self report of smoking (monthly recall; weekly recall; daily recall)  
Saliva samples collected but not analysed. |
| Notes | Delivered by classroom teachers - see Botvin 1980 for similar programme delivered by outside health specialists and Botvin 1982 for delivery by peer leaders |

### 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 pre-test smoking levels) randomized to one of 2 expt or a control group  
Analysis: General Linear Models; MANOVA, and ANOVA.

| Participants | Pretest (1985): 5,954  
Age: 7th graders  
Gender: 48% F; Ethnicity: 91% white, 2% Black, 2% Hispanic, 1% Native American  
No significant differences at pre-test  
Follow-up: 4,466 (75%) completed the posttest, and the 3,684 [=62%] students who received at least 60% of the programme were included in the analysis; Attrition: pretest smokers more likely to be lost but not differential across conditions |
|------------------|-----------------------------------------------|
| Interventions | Intervention: Life Skills Training (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)  
Expt 1. Formal (1 day) training of providers and feedback on implementation  
Expt 2. 2 hours of training of providers by videotape, and no feedback,  
Duration: 12 lessons over 15 class periods for 8 weeks in grade 7, 10 booster sessions in grade 8 and 5 in grade 9.  
Control: No intervention. |
| Outcomes | Smoking: 10 point scale: 1. never - 10. more than a pack a day. Breath samples were collected but not analysed  
Follow-up: 3 years (9th grade, end of programme) and 5-6 years (12th grade) from baseline |
| Notes |  
Allocation concealment B |

### Study  
**Botvin 1990b**

Methods  
Country: USA
Characteristics of included studies (Continued)

Site: 10 suburban New York junior high schools
Focus: substance abuse prevention
Design: 10 schools randomly assigned to 4 experimental and 1 control group (2 schools each)
Analysis: Attrition tested by ANOVA, treatment and control conditions compared using GLM. Students were unit of analysis

Participants
Number at pre-test: 1311
Age: 7th grade
Gender: 51% F at 1 year follow-up
Ethnicity: 13% B, 80% W, 2% H, 2% Oriental, 4% Other
Follow-up: 90% available for post-test, and 76% at 1 year follow-up
No differential attrition in pre-test smokers

Interventions
4 expt interventions, all using Life Skills Training approach. In 7th grade all expt 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)
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.
1. Peer led
2. Peer led plus 8th grade booster
3. Teacher led
4. Teacher led plus 8th grade booster
Peer leaders and teachers received a 4-hour training workshop conducted by project staff
Control: no intervention
5. pretest-posttest control

Outcomes
Smoking: monthly, weekly, & daily smoking dichotomous measures, and an index of smoking frequency (5-point scale: never to everyday). Results presented as adjusted response proportions
Saliva samples collected but not analysed
Follow-up: 4m post-test after 7th grade intervention and 1y, following 8th grade booster

Notes
Results at 4m post-test prior to booster reported in Botvin 1984, results at end of 8th grade reported in Botvin 1990

Allocation concealment
A

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: Chi square and GLM ANCOVA were used to compare the experimental and control groups.

Participants
2,690 7th. grade girls, and 2,209 (82%) provided data in the 8th. grade. Smokers had higher attrition rates (p <.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
15 session + 10 boosters Life Skills Training Programme (cigarettes, alcohol, and marijuana intervention). The control group received 10 sessions + 3 boosters of an information-only drug programme.

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

Notes
### Characteristics of included studies (Continued)

**Study** | **Bush 1989**
---|---
**Methods** | Country: USA  
Site: 9 schools, Washington, D.C.  
Focus: Prevent cigarette smoking, and improve fitness and nutrition., and involved parents and community physicians.  
Design: 9 schools ranked into tertiles by eligibility for Federal lunch programmes, randomly allocated to two experimental and a control group.  
Analysis: Mean differences; logistic regression was used to adjust for gender, age, SES, and baseline risk factors.

**Participants** | 1,234 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 2 years, similar across groups. Significantly more males, lower SES, and older students in control. Females were more likely to be available at the 2-year follow-up (p <.05). Serum thiocyanate in the baseline cohort was 34.2 micromoles/L and 33.3 in those lost to the 1-year follow-up (p <.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 recognised 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 PTA meetings. Teachers had four 3-hr training sessions. Adherence to curriculum and the quality of teaching 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 minute sessions per week throughout grades 4 to 6 through grades 7 to 9.

**Outcomes** | Definition of smoking: serum thiocyanate (>100 micromoles/L)  
Duration of follow-up: 2 years (but thiocyanate based on measurements after one year of intervention)

**Notes** | Similar programme to the two other “Know Your Body” studies (Walter 1985, Walter 1986)

**Allocation concealment** | D

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**Study** | **Cameron 1999**
---|---
**Methods** | Country: Canada  
Site: 100 elementary schools in 7 boards  
Focus: Smoking prevention  
Design: Ranked by school risk score and stratified by board, randomised to 5 expt conditions  
Analysis: logistic regression. Pearson goodness of fit used to allow for between school variation

**Participants** | 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

**Interventions** | 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, 1994. All sessions 40 min, taught over consecutive weeks; 6 lessons in grade 6 (information on the social consequences and short-term
### Characteristics of included studies (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Chatrou 1999</th>
</tr>
</thead>
</table>
| **Methods** | Country: Netherlands  
Site: 48 classes in 4 Brabant schools  
Focus: prevention of smoking onset  
Design: 48 classes randomised to treatment (13 classes, n = 284); treatment control (15 classes, n = 315),  
control (20 classes, n = 350)  
Analysis: Individual was unit of analysis; Chi-square; LR to predict smoking; no ICC |
| **Participants** | 949 12-14 year olds. At baseline treatment group had more non-smokers (93%) than control (89%) or active control (85%; p<.01); fewer intending to smoke (p<.01), fewer friends who smoked (p<.01), and the treatment groups had more males (47%) than the control (38%; p<.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 reevaluation 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** | Non-smoking = none in past month; smoking = regular (at least 1 cigarette/week) or experimental (< 1 cigarette/week) in past month |

<table>
<thead>
<tr>
<th>Study</th>
<th>Clarke 1986</th>
</tr>
</thead>
</table>
| **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 expt conditions and 4 to control |

---

physiological consequences of tobacco use, peer, parent and media influences on tobacco use; modelling and building resistance skills), 3 in grade 7 (review of Grade 6 programme, develop social norms supporting non-smoking, build awareness of the hazards of second-hand smoke, and develop self-efficacy for assertive behavior around the issue of second-hand smoke), 6 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 1 hour 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  
Expt 1: Nurse Workshop/ Expt 2: Nurse Self-Prep  
Expt 3: Teacher Workshop/ Expt 4: Teacher Self-Prep  
Duration: 15 lessons over grades 6-8  
Control: no intervention.  

| Outcomes | Smoking categories: Never/ tried once/ quit/ experimental (<1/ week)/ regular (weekly). Some analyses for smokers/non smokers separately. Pre-announced breath samples collected but not analysed. Social models risk score calculated from friends, older sibs, parents who smoked  
Follow-up: 3 years (end of grade 8) |
| Notes | School risk score derived using smoking rate of grade 8 students when cohort in grade 6, estimates of teacher smoking, and community socioeconomic status. Categorised as high, medium or low. |

| Allocation concealment | D |

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School-based programmes for preventing smoking (Review)  
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### Characteristics of included studies (Continued)

Analysis: ANCOVA for trends over time.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Number at pre-test (1980) 1,321</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>7th graders</td>
</tr>
<tr>
<td>Gender</td>
<td>N's not stated, but analysis by gender given</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>not stated</td>
</tr>
<tr>
<td>Prevalence of daily smoking at baseline ranged from 1-13% across treatment groups</td>
<td></td>
</tr>
<tr>
<td>Attrition</td>
<td>1-5% non-response at each testing; Differential attrition from baseline characteristics: not stated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Direct comparison of programme deliverer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social influences programme: sources of pressure to smoke, with videotapes, role playing, question periods, and resistance strategies</td>
<td></td>
</tr>
<tr>
<td>1. Peer-led (5-6 9th graders selected by school administrators, 1 days training)</td>
<td></td>
</tr>
<tr>
<td>2. Expert-led (professional health educator)</td>
<td></td>
</tr>
<tr>
<td>3. teacher-led (usual health teacher)</td>
<td></td>
</tr>
<tr>
<td>Duration: four days, one hour per day</td>
<td></td>
</tr>
<tr>
<td>Control: no intervention</td>
<td></td>
</tr>
</tbody>
</table>

| Outcomes | Smoking (a) Self-report of smoking last month, last week, or yesterday; (b) Saliva samples for thiocyanate testing. The authors state only: “saliva thiosalimatic tests were included in the evaluation procedure, though not with reliable results.” Follow-up: 1 year and 18 months after intervention |

| Notes | Allocation concealment A |

### Study | Clayton 1996

#### Methods
Country: USA  
Site: 31 schools in Lexington, Kentucky;  
Focus: Drug abuse prevention  
Design: All elementary schools in county used; 23 randomised to receive DARE, 8 to usual education (the school system would not permit more than 8 to receive only the control conditions)  
Analysis: three-stage mixed-effects regression modelling.

| Participants | Number at pretest: 2,071 (93% of all 6th. graders in community)  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>11-12 years</td>
</tr>
<tr>
<td>Gender</td>
<td>49% F</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>75% W; 22% African-American</td>
</tr>
<tr>
<td>Attrition by the 10th grade was 44.8%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interventions</th>
<th>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</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>1 hour/week x 17 weeks</td>
</tr>
<tr>
<td>Deliverers</td>
<td>Uniformed police officers</td>
</tr>
<tr>
<td>Control</td>
<td>usual drug education curricula, which varied by school</td>
</tr>
</tbody>
</table>

| Outcomes | Smoking; Number of cigarettes in past year.  
Follow-up: yearly for 5 years, 10 years (age 20). |

| Notes | Allocation concealment D |

### 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 randomised
## Characteristics of included studies (Continued)

**Analysis:** comparison of percentages remaining non-smokers and becoming smokers

| Participants | Number at pre-test: 226
7th or 8th graders. One school was 88% Black and the experimental group had a median age of 13 years and 56% never-smokers, and 14 years and 44% never-smokers in the control group. The other school was 89% White with a median age of 12 years and 54% never-smokers in the experimental and 60% in the control group.

| Interventions | Expt: social influences (peer pressure to smoke, advertising, role plays, and promoting group support for non-smoking). In one school positive reinforcement offered to the class with greatest reduction in smoking behaviour.
Duration: 8 sessions
Deliverer: 1st year 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: 12 months

| Notes | Allocation concealment D

---

**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: |

| Participants | 1,051 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; and (c) risk factors mailed to the parents. Students in the 5th grade received the nutrition programme (5 schools); in the 6th the blood pressure programme (5 schools); in the 7th the smoking prevention programme (3 schools). The smoking prevention programme was 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.
The comparison group received health curricula taught by teachers and received neither group discussion nor homeworks.

| Outcomes | Ever smoking: frequency of discussing smoking with parents in the past 6 months.

| Notes | Allocation concealment D

---

**Study**

| De Vries 1994 |

| Methods | Country: Netherlands
Site: 6 vocational and 8 high schools, Maastricht
Focus: smoking prevention
Design: 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 pre-test (1986) approx 1,784 (inferred from attrition rate)
Age: 2nd grade of secondary school (US 8th) |
Characteristics of included studies (Continued)

Gender: not stated
Follow-up: At 1 year attrition was 14% and did not differ between the experimental and control groups. More pretest smokers (27%) dropped out than non-smokers (13%; p < .001).

Interventions

Expt: 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 minute 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 carbon monoxide levels correlated with smoking (r = 0.79 to 0.85).
Duration of follow-up: 1 year from pretest (T3)

Notes
First author provided additional information that a table of random numbers used for school assignment.
Allocation concealment A

Study Denson 1981
Methods
Country: Canada
Site: 12 elementary schools in Saskatoon
Focus: smoking prevention
Design: selection of schools not described, matched on size and socio-economic characteristics and randomly assigned
Analysis: experimental and control cohorts followed from beginning of Grade 7 to end of Grade 8.

Participants
Number at pre-test (1976) 604
Age: grades 7-8
Gender: not stated; Ethnicity: not stated
In E schools 14% were regular smokers, in C school 10%
Follow-up: 88%
Differential attrition from baseline: not stated.

Interventions
Three lectures with films (drugs and the nervous system; choosing to smoke; advertising) over 2 school years. Particular emphasis on addictive nature of smoking.
Control: no intervention

Outcomes
Weekly smoking (>= 1 cigarette/week).
Duration of follow-up: Less than 2 years. The intervention began in 1976, but only the class which graduated in 1978 received the complete programme, and that is the group analysed. They were surveyed at the beginning of grade 7 and end of grade 8

Notes
Allocation concealment A

Study Dijkstra 1999
Methods
Country: Netherlands
Site: 20 of 62 health districts were approached, 15 agreed to participate, and health educators approached school boards to participate; 52 schools participated.
Focus: tobacco
Design: Gr 8 & 9 in 52 schools randomly assigned to social influence programme SI ( 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.
Characteristics of included studies (Continued)

Analysis: 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.

| Participants | N’s at Pre-test: Decision making (DM) group (n=1,381); Social Influences (n=1,221); Control (n=1,458). At T3: DM (n=460); DM+boosters (n=351); Social Influences (n=575); SI+boosters (n=526); Control (n=1,192). Attrition from pre-test to final follow-up 1 year later was 35%. Those less likely to drop out were: OR =0.85 for girls; 1.18 for younger students; 1.38 for non-smokers; 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 4-year 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 | 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 teh students in the SI+DM condition, 73% read 1 magazine, 58% 2 and 42% 3. |
| Allocation concealment | D |

Study | Eckhardt 1997

Methods | Country: USA  
Site: San Diego County, CA  
Focus: tobacco use prevention (Project SHOUT)  
Design: In the original SHOUT study schools were randomised to experimental and control (See Elder 1993 for initial design.) In the 11th grade follow-up participants agreeing to 11th grade intervention were individually randomised, stratified by original intervention or control  
Analysis: chi square |

Participants | 2051 students, 77% of 2,668 SHOUT cohort  
Av. age16 years, Gender: 54% F  
Ethnicity:, significant group differences (p<.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 two newsletters (tobacco company tactics to recruit new smokers; recent city, state and national tobacco legislation; secondhand smoke) and one 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 (cigarettes and smokeless) in past month and past week. Self-report survey by mail or phone.  
Duration of follow-up: 1 year after present intervention, over 4 years from SHOUT baseline. |

Notes | |
| Allocation concealment | D |
### Characteristics of included studies (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Elder 1993</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods</strong></td>
<td></td>
</tr>
<tr>
<td>Country: USA</td>
<td></td>
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<tr>
<td>Site: 22 junior high schools in San Diego County, CA</td>
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<tr>
<td>Focus: tobacco use prevention</td>
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</tr>
<tr>
<td>Design: random assignment of 11 schools (75 classrooms) to SHOUT programme and 11 control, matched on tobacco use (past week) &amp; school size</td>
<td></td>
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<tr>
<td>Analysis: percents, logistic regression and logit model odds ratios.</td>
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</tr>
<tr>
<td><strong>Participants</strong></td>
<td></td>
</tr>
<tr>
<td>Pre-test: 3655. Cohort of 2668, 73% of initial sample, 1,174 in Exp, 1,494 in Con surveyed 4 times: beginning of 7th (T1), end of 7th (T2), end of 8th (T3) end of 9th (T4)</td>
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<tr>
<td>Av. age 12 years (range 11-16), Gender: &quot;near equal proportions of M &amp; F&quot;</td>
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</tr>
<tr>
<td>Ethnicity: overall - 57% W/ non-H, 24% H, 19%, O, significant group differences (p&lt;.001)</td>
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<tr>
<td>Follow-up: 2,668; no differential attrition by condition across any relevant covariates.</td>
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<tr>
<td><strong>Interventions</strong></td>
<td></td>
</tr>
<tr>
<td>Expt: 7th grade: fall (6 lessons 1/week) videos of health consequences of tobacco use, celebrity endorsements of nonuse, psychosocial consequences, refusal skills, decision-making, skits; spring (4 lessons 1/month) review of refusal methods, discussion of tobacco addiction/cessation, public declarations of nonuse 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 Heart Health Programme protocol oriented toward newsletter material, refusal skills training and cessation support (79.9% call completion rate).</td>
<td></td>
</tr>
<tr>
<td>Deliverer: university undergraduates, 15 hours of training included videotaped role plays, Duration: 10 sessions in 7th grade, 8 sessions in 8th grade, mail &amp; telephone in 9th grade Control: no interventions</td>
<td></td>
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<tr>
<td><strong>Outcomes</strong></td>
<td></td>
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<tr>
<td>Smoking: any tobacco use (cigarettes and smokeless) in past month and past week. Self-report surveys under bogus pipeline conditions.</td>
<td></td>
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<tr>
<td>Follow-up: end of 7th, end of 8th, end of 9th grades</td>
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<tr>
<td><strong>Notes</strong></td>
<td></td>
</tr>
<tr>
<td>Elder 1993a and 1993b discrepant on number of sessions/year. See also Eckhardt 1997 which provided further intervention to the cohort.</td>
<td></td>
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<tr>
<td><strong>Allocation concealment</strong></td>
<td>A</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Study</th>
<th>Elder 1996</th>
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<tbody>
<tr>
<td><strong>Methods</strong></td>
<td></td>
</tr>
<tr>
<td>Country: USA</td>
<td></td>
</tr>
<tr>
<td>Sites: 96 schools in Texas, California, Louisiana and Minnesota;</td>
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<tr>
<td>Focus: cardiovascular health promotion Design: 10 schools at each site randomised to control, 7 to school-based intervention, 7 to school and family</td>
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<tr>
<td>Analysis: percentages in experimental and control groups; multiple logistic regression.</td>
<td></td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td></td>
</tr>
<tr>
<td>Number at end of 5th grade: 7,827, of whom 6,527 gave complete information</td>
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</tr>
<tr>
<td>Age:5th graders; Gender: 51% female ; Ethnicity: 71% W, 16% H; 14% African-Americans. Differential characteristics at baseline or differential attrition from baseline: not stated.</td>
<td></td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td></td>
</tr>
<tr>
<td>The Child and Adolescent Trial for Cardiovascular Health (CATCH) used social learning theory and organisational 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 (F.A.C.T.S. 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).</td>
<td></td>
</tr>
<tr>
<td>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 minute sessions.</td>
<td></td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Percentage of schools with smoke-free policies</td>
</tr>
</tbody>
</table>
### Characteristics of included studies (Continued)

**Smoking prevalence**
- Duration of follow-up: 3 years

**Notes**
- 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

**Allocation concealment**
- D

#### Study: Ellickson 1990

**Methods**
- Country: USA
- Site: 30 schools from 8 districts, California & Oregon
- Focus: Smoking, alcohol & marijuana prevention
- Design: 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)
- Analysis: X2, logistic regression, student level analyses to assess curriculum's effectiveness according to risk level (nonuser, 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)

**Participants**
- Number at pre-test: 6527 (1984) (14% baseline nonresponse due to parental refusals or absence)
- Age: 7th grade, 13-14 yrs; Gender: not reported
- Ethnicity: 9 of the schools had minority populations of 50% or more
- Follow-up: 2 years (9th grade) approx 72% of baseline
- 59% (n=3852) had data for 1st 4 points.
- By 10th-12th grade follow-up, 53-57% of baseline.
- No differential attrition across treatment groups, although students lost from the analysis tended to have baseline characteristics linked with later drug use.

**Interventions**
- Direct comparison of programme deliverer
- Project ALERT See Notes field for programme description
- Expt 1. Adult health educators taught the curriculum (10 schools)
- Expt 2. Older age peer teen leaders and teachers (10 schools)
- Duration: 8 lessons (1/week) in 7th grade and 3 booster sessions in 8th grade;
- Controls: no intervention or continuation of traditional drug education programmes (4/10 control schools did latter).

**Outcomes**
- Analysis based on 3 risk levels for future smoking at baseline (Nonuser - never/Experimenters - tried but <3 times in year before baseline and not in month prior to baseline/ Users - 3 times in past year and any use in prior month to baseline)
- Saliva cotinine levels obtained and analysed. At baseline and at 15 months, 95% of students with cotinine scores that identified them as recent tobacco users (N = 603) reported cigarette use in the past month.
- Follow-up: 3, 12 & 15m, 2y, 6y

**Notes**
- Project ALERT uses the social influence model, helping students to develop reasons not to use drugs, identifies pressures to use them, counter pro-drug measures, learn how to say no to internal and external pressures, understand most people do not use drugs, and recognize the benefits of resistance. It is a highly participatory curriculum, with question and answer sessions, small group exercises, role modelling, and repeated skills practices.

**Allocation concealment**
- D

#### Study: Ennett 1994

**Methods**
- Country: USA
- Site: 36 elementary schools, Illinois
- Focus: Drug abuse prevention

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*School-based programmes for preventing smoking (Review)*

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Characteristics of included studies (Continued)

Design: convenience sample of 18 pairs of schools matched on ethnic and SES, stratified by urban/suburban/rural status. 12 pairs of schools randomly assigned, 6 pairs in rural areas non randomly selected.

Analysis: 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 logistic regression with results expressed as odds ratios.

Participants
- Number at pre-test 1803
- 20% had smoked cigarettes.
- Sample characteristics at post-test: Age: 33% 5th & 67% 6th grade
- Gender 49% F
- Ethnicity 54% W, 22% African American, 9% H
- Attrition: 26% missing at one or more data collection point

Interventions
- DARE curriculum: see Clayton 1996
- Duration: 1 hour/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, 1 year (6th or 7th grade) and 2 years. Participants were tracked to their middle schools

Notes
- Analyses based on baseline behaviour, and expressed as adjusted odds ratios
- Allocation concealment: D

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 percents smoking in the experimental and control schools.

Participants
- Number at pre-test: 562
- Age: 15-17; Gender: 47% F; Ethnicity: not stated
- Follow-up: 93% at 1 year
- 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
- In intervention classes students coded and analysed the baseline questionnaire themselves
- Duration of follow-up: 12 months

Notes
- Allocation concealment: D

Study: Flay 1985

Methods
- Country: Canada, Ontario
- Site: 22 schools in 2 counties
Characteristics of included studies (Continued)

Focus: smoking prevention
Design: RCT for 16 of 22 schools. Schools matched on size, rural/urban location and socioeconomic status. 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: $X^2$, 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 6 year follow-up 90% of students were traced and data obtained from 80% of these.

Interventions
The Waterloo Smoking Prevention Programme: 6 1hr weekly sessions in Grade 6 on information and attitudes to smoking; family, peer and media influences on smoking; and decision-making and commitment.
2 maintenance session in grade 6, 2 booster sessions in 7th grade and 1 in 8th.
Duration: 11 sessions over 3 years
Control: usual health education

Outcomes
Self-reported smoking; never/ tried once/ quit/ experimenter/ regular
Regular smokers divided into $\leq$3/week; and $>3$/week
Saliva for thiocyanate levels.
Follow-up: 18m (end of grade 7, 5y (grade 11), 6 years (grade 8)

Notes
Allocation concealment D

Study Flay 1995

Methods
Country: USA
Site: 340 classes in 6 school districts with 35 Los Angeles & 12 San Diego schools.
Focus: Tobacco
Design: 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 multiattribute blocking approach.
Analysis: ML3 multilevel least squares, with adjustment for clustering

Participants
7,352 pretested (of whom 49.6% male, 35.5% Hispanic, 33.3% White, 13.9% African-American, 17.3% Other) and of whom 6,695 (91%) indicated gender, race and smoking status. No differences at pretest in smoking rates across conditions.

Interventions
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, and (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
Results were adjusted for clustering using ML3 multilevel analysis programme for unbalanced data that uses iterative generalised least-squares estimation.

Allocation concealment D

Study Focarile 1994

Methods
Country: Italy
Site: Health District of Rozzano, Milan
Focus: Smoking prevention
### Characteristics of included studies (Continued)

<table>
<thead>
<tr>
<th>Design: 53 classes stratified by baseline smoking and risk factors randomly allocated using table of random numbers. Analysis: logistic regression, binomial logistic regression</th>
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</thead>
<tbody>
<tr>
<td>Participants</td>
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<tr>
<td>Interventions</td>
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<tr>
<td>Outcomes</td>
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<tr>
<td>Notes</td>
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<tr>
<td>Allocation concealment</td>
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</tbody>
</table>

### 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 randomised to the intervention (52 schools, 5639 children); and a control group (56 schools, 6011 children). Analysis: X2 |
| Participants | Number at pre-test: 16,074 Age: age 9 and 10, 4th. year primary school Gender: Not possible to determine from data in Table 1. Number at follow-up: At the 4-year 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 & posters; poster of a famous non-smoking sportsperson & 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 cigarette/week); at least 1 cigarette/week, and at least 1 cigarette/day. Anonymous self-administered questionnaires. Duration of follow-up: 4 years |
| Notes | Allocation concealment D |

### 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 Design: post-test only, control group design, schools grouped into 2 clusters by SES and ethnicity; within clusters classrooms randomised to treatment and control. Analysis was both at the individual and classroom means levels. Analysis: t-tests and chi-square. |
### Characteristics of included studies (Continued)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participants</strong></td>
<td>Number: 1372 at post test</td>
</tr>
<tr>
<td></td>
<td>Age: 6th grade (2 cohorts, 80-81 and 81-82)</td>
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<tr>
<td></td>
<td>Gender: 49% female; 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</td>
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<tr>
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<td>Follow-up: (% of grade cohort participating)</td>
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<td>1y - 73% for 1st cohort, 90% for 2nd</td>
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<td></td>
<td>2y - 79%</td>
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<tr>
<td></td>
<td>No significant differences in absentee rate for intervention and controls</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td>Expt: 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 cigarettes); Enhancing support (basic concepts of social networks, family and nonfamily support systems). Duration: 40min/wk for 12 weeks</td>
</tr>
<tr>
<td></td>
<td>Control: no intervention.</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Student Drug Use Survey (self-report of 10 drugs including tobacco, with 7-point scale (1 never; 2 once or twice; 3 less than once/month; 4 once or twice/month; 5 once/week; 6 2 or 3 times/week; 7 almost every day). Follow-up: 1 year, 2 years</td>
</tr>
</tbody>
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| Notes                           | Allocation concealment A                                               |

| Study                           | Gilchrist 1986                                                         |

| Methods                         | Country: USA                                                           |
|                                 | Site: Middle schools, Seattle, Washington                             |
|                                 | Focus: smoking prevention                                              |
|                                 | Design: school selection not reported. N of schools not reported. Schools randomised to experimental, placebo or control conditions |
|                                 | Analysis: ANOVA                                                        |

| Participants                    | Pre-test: 741 5th and 6th graders, most were white, middle and lower-middle class families, 69% nonsmokers |
|                                 | Age: mean=11.4 years; Gender: 49% F;                                  |
|                                 | Follow-up: 94%, no differential attrition across conditions. Higher attrition amongst baseline smokers. |

| Interventions                   | Exp self-control group: 8, 60-minute sessions. Learned how to 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. Leaders showed videos of adolescents handling socially difficult situations. Students learned communication, self-instruction, self-reinforcement, and problem-solving skills. Leaders presented verbal and non-verbal communication skills. Subjects applied self-instruction and problem-solving skills in group exercises (SODAS: Stop, think about what you are going to do; Options, think of all the different things you can do; Decide, choose which options you will take; Act, implement the chosen option; and Self-Praise, compliment yourself. Placebo health education group: received 8, 60-minute sessions, in which leaders presented 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. |

| Outcomes                        | Smoking: never, experimental (tried at least once but had never smoked weekly), regular smokers (one or more cigs/week). Main outcome: Self-reported smoking of one or more cigarettes during past week, not grouped by baseline status |
|                                 | Saliva collected but not analysed.                                      |
**Characteristics of included studies (Continued)**

**Notes**
- Follow-up: 15 months from pre-test

<table>
<thead>
<tr>
<th>Study</th>
<th>Gilchrist 1987</th>
</tr>
</thead>
</table>
| 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 pre-test: 102  
Age: 11.2 years. Gender: 49% F  
Expt & Control similar in age, gender, substance use, % living with parents, and living on a reservation.  
Number at follow-up: 102 |
| Interventions | Expt: 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: ten 60 minute 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: 6 months. |

<table>
<thead>
<tr>
<th>Study</th>
<th>Hanewinkel 1994</th>
</tr>
</thead>
</table>
| Methods | Country: Germany  
Site: 2 Realschulen, 3 Hauptschulen and 1 Gymnasium in Schleswig-Holstein.  
Focus: Tobacco  
Design: E mail from Dr. Hanewinkel states design was an RCT, with the control group on a “waiting list” and later received the intervention.  
Analysis: X2 |
| Participants | 1,985 students average age 13.8 years, 1 gymnasium withdrew for organisational reasons, leaving 1,299 potential, of whom 650 completed the baseline questionnaire. |
| Interventions | 10 sessions: 1. confronting socially uncertain situations; 2 learning to differentiate facial expressions and feelings 3. understanding gestures 4. making demands, recognising others’ demands 5. accepting and working with criticism; 6 getting through difficult situations, self confidence in relations with others 8; coping with failure 9 fate and self-responsibility . Tobacco resistance training was discussed in sessions 4 and 6. There were also homeworks, 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 |

<table>
<thead>
<tr>
<th>Study</th>
<th>Hansen 1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td>Country: USA</td>
</tr>
</tbody>
</table>
### Characteristics of included studies (Continued)

| Site: 8 Junior high schools, Los Angeles  
Focus: Substance abuse prevention (Project SMART)  
Design: 8 schools randomly assigned to 2 expt groups (2 schools each) and control (4 schools)  
Analysis: aggregate classroom scores used (85 classes). Indices of use by ANOVA & ANCOVA using pretest scores as covariates. Dichotomous 30-day use by Fisher’s exact test. |
|---|
| Participants | 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) |
| Interventions | 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 one term  
Deliverer: staff health educators and regular classroom teachers with peer opinion leader involvement  
Control: No intervention |
| Outcomes | Smoking: Smoking index, with aggregated classroom means. Dichotomised on +/- 30 day use. Separate analysis for baseline non users, with onset to various levels of use.  
Saliva samples collected but not analysed.  
Follow-up: initial post test 1y after pre-test (grade 8), 2nd post test 2y |
| Notes | Project Smart involved a total of 44 randomised schools, Hansen 1988 reports only on first 7th grade cohort.  
See Graham 1990 for further SMART results |

### Study Hansen 1991

| Methods | Country: USA, California  
Site: 12 Junior high schools in LA and Orange County  
Focus: Preventing onset of alcohol abuse, marijuana and tobacco use  
Design: (no statement on how schools were selected) 12 schools stratified by size, test scores and ethnic composition, randomly assigned to one of 4 expt groups  
Analysis: cohorts followed, with individual index of smoking (none or only puffs vs. whole cigarettes). General linear model analysis of covariance approach was used with classroom means for each composite index and for each dichotomous item. |
| Participants | Number at pre-test (1987) 3,011  
Age: 7th graders; Gender: 48-55% F; Ethnicity (range by intervention group): Asian 9% - 26% (sig diffs); Black 1-3%; Hispanic 11-43% (sig diffs); White 33-52%  
Follow-up: 80%; Differential attrition from baseline: attrition among students who received resistance training 18% vs 21.6% other conditions (p<.01). |
| Interventions | Direct comparison of social influences programme components  
Expt 1: Information (32 classrooms): four 45-minute lessons about the social and health consequences of alcohol, tobacco and drugs  
Expt 2: Resistance training RT (33 classrooms): 4 lessons on consequences of using substances, 5 on resisting peer and media pressures to use ATOD.  
Expt 3: Normative Education NE (27 classrooms): 4 information lessons , 5 lessons on perceptions on prevalence and acceptability of using ATOD.  
Expt 4: Combined programme of NE and RT (26 classrooms): 3 information, 3.5 resistance skills, 3.5 conservative norms. |
### Characteristics of included studies (Continued)

| Duration: 9-10 sessions (Only 4 for Information) Deliverers: Project staff with 2 weeks intensive training |

| Outcomes | Smoking index, and never/ever smoking/ 30 day smoking Follow-up: 8th grade, 1 year from baseline |

| Notes | Analyses based on cohort followed up. Primary outcome was alcohol use Part of Adolescent Alcohol Prevention Trial (AAPT) |

| Allocation concealment | D |

#### 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 expt, 6 control)
  - Analysis: correlation, chi-square, ANCOVA

- **Participants**
  - Number at pre-test: 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
  - Differential drop-out between groups (Exp: 11.6%, C: 20.5%, p<.01). No differences in characteristics between groups at baseline.

- **Interventions**
  - Expt: 15 minute 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.
  - Duration: 3 45 min sessions during 1 week
  - 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.

- **Outcomes**
  - Self-reported smoking (0 tries; 1 try; 2+ tries; smoked in past month; smoked in past week)
  - Follow-up: 6 & 18 months;

- **Notes**
  - Allocation concealment A

#### Study

**Hort 1995**

- **Methods**
  - Country: Germany
  - Site: 19 secondary schools in Duesseldorf
  - Focus: reduce current and new onset smoking
  - Design: Schools matched on student enrollments and social composition of catchment areas, randomised to intervention (9 schools) or control (10 schools)

- **Participants**
  - Pre-test: 878, 93% of eligible poppn.
  - Age: 13 years: Gender: 38% F; Ethnicity: not stated
  - 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.
## Characteristics of included studies (Continued)

### Interventions

**Expt:** Year 1, 6-week period. Classroom teachers (2 hours) explained how the lung and heart functioned, and how advertisers encouraged children to smoke (1 hour). The authors (physicians) discussed (2 hours) body function, protective mechanisms of the airways, heart attack, cancer. Students in groups simulated how cilia in an airway remove particles. Nonsmoking students of German language and Media Studies participating in a course on how to teach theatre at the University of Duesseldorf conducted role-plays (2 hours) with the students on how to refuse a cigarette without feeling uncomfortable. Excerpts from the role-plays developed in the first hour were videotaped and used in the second hour. Competition for an advertisement against smoking. Year 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.

**Duration:** 2 year programme = 15 hours.

**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.

**Exp intervention for smokers (35 students in 4 schools);** 11 one-hour sessions: Each cigarette smoked was recorded; and stories suitable for the age group were told to provide relaxation.

### Outcomes

Never smoker (never or only 1 cigarette); Non-smoker (never smoker, or had not smoked for more than half a year); Smokers (precise number of cigarettes 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:** 24 months

### Notes

**Allocation concealment A**

### Study: Howard 1996

| Methods | Country: USA  
Site: a convenience sample of 98 students in one school.  
Focus: cardiovascular risk reduction programme  
Design: One class within each of grades 4 to 6 randomly assigned to experimental and one to control group.  
Analysis: ANCOVA |
|---------|------------------------------------------------ |
| Participants | Number at pre-test: 98  
Age: 9-12 years (average 10.4) 4th-6th grade  
Gender: 46% female  
Attrition not stated. |
| Interventions | Expt: 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 minute sessions  
Control: no intervention relevant to smoking and cardiovascular health. |
| Outcomes | Current or experimental smoking  
Duration of follow-up: 1 year |
| Notes |  |
| Allocation concealment | D |

### Study: Josendal 1998

| Methods | Country: Norway  
Site: nationwide sample of 4,441 students in 195 classes in 99 schools  
Focus:  
Design: From a listing of all Norwegian secondary schools listed in order of zip code a school was randomly chosen, then the next three 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 logistic regression for changes in smoking rates.

**Participants**
4,441 students, of whom 4,215 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**
8 sessions on personal freedom, freedom to choose, freedom from addiction, make own decisions, tobacco resistance skills, short-term consequences of smoking.

**Outcomes**
Daily, weekly, less than weekly, and non-smoking.

**Notes**
Allocation concealment D

<table>
<thead>
<tr>
<th>Study</th>
<th>Kaufman 1994</th>
</tr>
</thead>
</table>
| **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 7th graders. Pretest information available on 131 (75%) in the experimental and 76 (75%) in the control schools. |
| **Interventions** | 7 session school intervention (information about smoking, problem solving skills, pressures in environment to smoke, public commitment not to smoke, homeworks with parents, a video of a peer refusing to smoke, tobacco refusal skills) based on the American Lung Association’s “Smoking Deserves a Smart Answer” delivered to all 472 public elementary schools in Chicago. The Media intervention was a curriculum in the Chicago Defender, 8 public service smoking radio announcements, and a Rap Contest. |
| **Outcomes** | Botvin’s Usage Scale |
| **Notes** | |
| Allocation concealment | D |

<table>
<thead>
<tr>
<th>Study</th>
<th>Kellam 1998</th>
</tr>
</thead>
</table>
| **Methods** | Country: USA.  
Site: 19 elementary schools in Baltimore.  
Focus: Smoking prevention by changing behaviour predicting later smoking uptake.  
Design: Five 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** | Pre-test: 2,311 1st grade 1985 or 1986. Analysis limited to 1,604 non-smokers at baseline.  
Age: 5-6  
Gender: 49.6% F.  
Follow-up: 69%, attrition unrelated to intervention status |
| **Interventions** | Compared two 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 minutes 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. |
| **Notes** | |
| Allocation concealment | D |
### Characteristics of included studies (Continued)

| Control group: | "customary school programs." |
| Duration: | 2 years (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 | Effects of clustering accommodated by presorting students into strata defined by school attended in the first grade. |

| Allocation concealment | D |

### Study: Laniado-Laborín 1993

| Methods | Country: Mexico |
| 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 logistic regression |

| Participants | Baseline: 168 6th grade |
| Average age: | 12 |
| Gender: | 46% M, 63% never smokers at baseline |

| Interventions | 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 |

| Outcomes | Smoking: past year/ past week/ past 24 hours |
| Saliva samples collected and tested for nicotine/cotinine. |
| Follow-up: | 10 months |

| Notes | |

| Allocation concealment | B |

### Study: Lloyd 1983

| Methods | Country: Australia |
| Site: | 88 primary schools in NSW |
| Focus: | smoking prevention |
| Design: | schools matched on size and SES variable, pair randomised |
| Analysis: | Chi-square and multiple regression. A power computation to detect differences of 5% smoking levels (two-tailed test) and 80% power required 720 children per group. |

| Participants | Number at pretest (1979): 6299 |
| Age: | Years 5 and 6 |
| Gender: | approx 50% F |
| Ethnicity: | not stated |
| There were baseline differences in smoking behaviour with more girls in year 6 smoking in treatment schools |
| Differential composition at baseline or differential attrition: | not stated. |

| Interventions | "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: | 6 weeks, 90 minutes/week |
| Control: | no intervention |

| Outcomes | Never-smoker; or smoked in the past 4 weeks. |
| Participants were assured of confidentiality and surveys were identified by numbers and not names. |
### Characteristics of included studies (Continued)

Follow-up: 12 months

#### Notes

Allocation concealment  
D

#### Study  
**MacPherson 1980**

**Methods**  
Country: USA.  
Site: 8 school superintendencies in Vermont out  
Focus: Prevention of smoking by past and current cigarette smokers.  
Objective: To test the effectiveness of two curricula and the two curricula combined.  
Design: 8 school superintendencies in Vermont selected to be representative of wealth, attendance, number of school nurses, expenditures per student, and educational staff. Two withdrew, 6 randomly allocated to expt and control using table of random numbers. One superintendency received only a post-test.  
Analysis: SPSS, using classes as the unit of analysis.

| Participants | Number at pre-test: 1,750 students in 85 classrooms (82% of eligible).  
Age: Not stated.  
Gender: Not stated.  
Number at follow-up: 79% |
|--------------|---------------------------------------------------------------------|

| Interventions | Experimental groups: (1) The Mobile Unit Programme was presented by a mobile van with lung samples and X-rays from healthy, cancerous and emphysematous patients. Students heard the wheezing and whistling sounds of pulmonary disease through stethoscopes. A smoking machine demonstrated the accumulation of tar and nicotine. Air pollution monitors were demonstrated. Students could analyse 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: 6 months. |
|-----------|--------------------------------------------------------------------------------|

#### Notes

Allocation concealment  
D

#### Study  
**Murray 1984**

**Methods**  
Country: USA  
Site: 8 junior high schools in Minneapolis (Study 1)  
Focus: Smoking prevention  
Design: 8 schools, randomized to 4 expt conditions  
Analysis: logistic regression for dichotomous smoking incidence and prevalence dependent variables, ANOVA for intensity of smoking. Adjustments made for baseline differences

| Participants | Number at pre-test, 1979: 3184 7th graders (94% of enrolled 7th graders)  
49-62% were non smokers at baseline  
Age: 12; Gender: 50% female; 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 exp 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 6 months

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 1 year f-up. Outcome assessed for baseline non smokers and experimental smokers.

Follow-ups: posttest, 1 year (’81), 2 year (’82), 3 year (’83), 5 year (’85), 6 year (’85/’86)

Notes Large sample size, but small number of clusters.

Allocation concealment D

Study Murray 1992

Methods Country: USA
Site: Minnesota
Focus: compare 3 social influences anti-tobacco programmes with the existing curriculum.
Design: The principals of 112 schools in Minnesota were invited at random to participate, of whom 81 (72%) agreed to participate, forming 48 sampling units, with 8,992 students eligible for the 6th. grade baseline survey. The power analysis hypothesised 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. Within school ICC’s 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.

Participants The goal of the sampling plan was to give each 7th grader in Minnesota an equal chance of selection. Sampling units were designed to be 39% larger than required by the power analysis, to allow for absenteeism, and a 25% attrition rate over 2 years, thus requiring sampling units with 125 students. The 478 public schools in Minnesota were grouped into 390 sampling units, 112 schools were randomly selected to participate; 8,992 students were enrolled in 6th grade, of whom 8,271 (92%) participated, and of these 7,180 enrolled in 7th grade.
Those lost to follow up were more likely to report smoking by their father (p<.0005), mother (p=.0001), older siblings (p<.0024) and best friend (p<.0012).

Interventions 4 social influences anti-tobacco school programmes: (1) the 6 lesson Minnesota Prevention Program (MSPP) “based on the social influences model”; (2) the 3 lesson Smoke-Free Generation Program (SFG) “patterned after the Minnesota Smoking Prevention program but in a shorter form”; (3) the 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”; and (4) the Control/ Existing curricula. Teachers received a 2 hour instructional videotape.

Outcomes Smoking was defined as an Index of weekly smoking (number of cigarettes/week), and expired carbon monoxide was measured.

Notes

Allocation concealment D

Study Noland 1998

Methods Country: USA.
Characteristics of included studies (Continued)

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 expt and control.
Analysis: Mixed model ANOVA with school as the unit of analysis.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Number at pre-test: 3,588 Age: 12.4 years. Gender: 51% F Ethnicity: 92% W; 6% B; 2% O At the 24 month follow-up there were 3,072 students (14.4% attrition). The groups were similar at baseline on smoking status. There was no differential attrition from baseline between groups.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interventions</td>
<td>Expt: Social influences programme consisted of six 45-50 minute sessions in the 7th. grade (skills training in learning to recognise types of peer pressure, refusal skills, and assertiveness, recognising and countering advertising appeals, student pledges, the negative social and immediate physical consequences of using tobacco, and peer leaders were trained); and three similar sessions in the 8th. grade. Duration: nine sessions over 2 years. Control: usual health education</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Smoking: Ever, 30-day, 7-day, and 24-hour smoking. Expired air was collected and carbon monoxide content was analysed, but not reported. Duration of follow-up: 2 years from baseline.</td>
</tr>
</tbody>
</table>

Notes
Allocation concealment D

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: two projects integrated into classroom settings - one adapted from Norwegian family smoking education project (FSE) and the other was 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 two school-based smoking education programmes; Type of study: 39 secondary schools in 4 educational authorities (in 2 districts, schools were randomly selected, while in the remaining 2 districts schools were solicited based upon previous response to health education), schools were matched 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); Duration of stimulus: 3 months; Duration of follow-up: immediate posttest following programmes and 1 year after; Method of analysis: ANOVA, chi-square,and logistic regression, 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 years; Gender: 2188 females and 2347 males; Ethnicity: not stated; Follow-up: 4538 (89.4%) valid cases for analyses. Classroom teachers administered the programmes after a 1-day training session.

Interventions
Exp 1: Family Smoking Education Project (FSE) - 3 hours of teaching, booklet given to students, leaflet given to parents encouraging discussion of smoking, material focused on immediate health effects of smoking. Exp 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. Exp 3: FSE + SAM. Control group: no formal interventions.

Outcomes
Self-reported smoking (never; tried once or twice; < 1 cigarette/week; 1-6 cigarettes/week; > 6 cigarettes/week)
### Characteristics of included studies (Continued)

- 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
Of the 804 never-smokers in the control group, at 1-year follow-up 594 (73.9%) were never-smokers; of the 2120 never-smokers in the experimental groups, at 1-year follow-up 1444 (68.1%) were non-smokers [455/704 (64.6%) for FSE; 440/625 (70.4%) for SAM, and 549/791 (69.4%) for FSE+SAM].

### Allocation concealment
- C

<table>
<thead>
<tr>
<th>Study</th>
<th>Peterson 2000</th>
</tr>
</thead>
</table>
| **Methods** | Country: USA  
Site: 40 school districts in Washington state,  
Focus: Tobacco  
Design: districts randomised. Schools selected with < 35% attrition from Gr 3 to 7, 50-250 students/grade level, and within 200 miles of study headquarters, matched on high school smoking, size and location  
Power computation: based on no of districts, no of students, actual attrition, prevalence of daily smoking at Gr 12 + 2 years; programme exposure estimated at 0.745 due to outmigration, ICC’s of 0.01, and 2 sided alpha = .05, which was estimated to provide power to detect a 30% nominal relative reduction in daily smoking prevalence at the endpoint 2 years after high school. Analysis: randomization-based permutation inference, which requires no distributional or modeling assumptions, and accommodates ICC’s |
| **Participants** | 4,177 3rd graders in experimental and 4,211 in control; equivalent at baseline; at Grade 12 + 2 years 48 developmentally unable to participate, unable to locate 241, 181 no reply, 8 declined, yielding 7,864 (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; and (5) promoting self-confidence in the ability to refuse influences and pressure to smoke; and (6) enlisting positive family influences. Control schools continued usual health curricula. |
| **Outcomes** | Self-reported smoking in Gr 12 and Gr 12 + 2; saliva cotinine measured on a 12.6% random sample of Gr 12, and no differential bias in reporting between experimental and control groups |

### Allocation concealment
- D

<table>
<thead>
<tr>
<th>Study</th>
<th>Rabinowitz 1974</th>
</tr>
</thead>
</table>
| **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 pre-test: 758  
Age: grades 7-9.  
Gender: Not stated.  
Number at follow-up: 758. No statement about attrition. |
| **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.  
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 cigarettes/day.  
Duration of follow-up: 6m |
### Characteristics of included studies (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Schinke 1984</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods</strong></td>
<td>Country: USA</td>
</tr>
<tr>
<td></td>
<td>Site: Washington state</td>
</tr>
<tr>
<td></td>
<td>Focus: Smoking prevention</td>
</tr>
<tr>
<td></td>
<td>Design: Schools randomised to 2 expt and a control</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td>234 6th graders</td>
</tr>
<tr>
<td></td>
<td>No assessment of attrition.</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td>Compared a skills training intervention (8 sessions) to a general social influences intervention (8 sessions), and to control. Both experimental groups learned information about adolescent smoking from films and testimonials by Jr. high students, analysed advertisements, and did homework to note environmental events that stimulate or discourage smoking. The (8 sessions): Skills-building groups also practised refusal skills, viewed videotapes of peers refusing cigarettes, then practised refusals and received praise and coaching. The attitude-modification group also participated in quizzes, contests and debates to weigh the merits of nonsmoking, and made a public commitment not to smoke. There is no statement about whether the control group received a programme.</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Smoking: Cigarette use, not further specified. Saliva thiocyanate assessed.</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Study</th>
<th>Schinke 1985a</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods</strong></td>
<td>Country USA</td>
</tr>
<tr>
<td></td>
<td>Setting 9 elementary schools, Washington State</td>
</tr>
<tr>
<td></td>
<td>Focus: smoking prevention</td>
</tr>
<tr>
<td></td>
<td>Design: 3 schools randomised to each condition</td>
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<tr>
<td></td>
<td>Analysis: School as unit of analysis, Scheffe contrasts on percentage smoking in past week at each time</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td>Number at pretest 689</td>
</tr>
<tr>
<td></td>
<td>Age: 6th grade, mean 11.76</td>
</tr>
<tr>
<td></td>
<td>Gender: 53% F</td>
</tr>
<tr>
<td></td>
<td>Lower to middle SES</td>
</tr>
<tr>
<td></td>
<td>Follow-up 91% to 94% by condition. No differential attrition.</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td>Direct comparison of skills training and information</td>
</tr>
<tr>
<td></td>
<td>E1: Skills: problem solving, resistance, interpersonal pressure in addition to health information</td>
</tr>
<tr>
<td></td>
<td>E2: Information: Health information, debates, quizzes, antismoking skits.</td>
</tr>
<tr>
<td></td>
<td>Duration: 10 1hr weekly sessions</td>
</tr>
<tr>
<td></td>
<td>Providers: Graduate social workers leaders, 40 hrs training prior to randomisation to implement skills or information intervention</td>
</tr>
<tr>
<td></td>
<td>Control: measurement only</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Primary outcome was smoking in past week.</td>
</tr>
<tr>
<td></td>
<td>Saliva thiocyanate measured.</td>
</tr>
<tr>
<td></td>
<td>Follow-up: post-test, 6,12 &amp; 24 months</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study</th>
<th>Schinke 1985b</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods</strong></td>
<td>Country: USA</td>
</tr>
</tbody>
</table>
Characteristics of included studies (Continued)

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 significant differences |
| Interventions | Direct comparison of skills training and information  
E1: Skills building intervention: problem solving, resistance, interpersonal pressure in addition to health information  
E2: Attention placebo intervention: Health information, debates, quizzes, antismoking skits.  
Both interventions included films, peer testimonials and influence of media  
Duration: 10 1hr weekly sessions  
Providers: graduate assistants  
Control: pre- and post-measurement only |
| Outcomes | Main outcome was weekly smoking.  
Saliva samples analysed for thiocyanate.  
Process data collected on delivery of interventions and subject participation  
Follow-up: post-test, 6m, 1y, 2y |

Notes
Allocation concealment D

Study | Schinke 1985c
---|---
Methods | Country: USA  
Setting: 4 elementary schools, Washington state  
Focus: smoking and smokeless tobacco prevention  
Design: schools randomly selected and randomly assigned to 2 expt interventions, a pre- and post-test or post-test only controls
| Participants | Number at pretest 331  
Age: 6th grade  
Attrition: no significant differences |
| Interventions | Direct comparison of skills training and information  
E1: Skills: problem solving, resistance, interpersonal pressure in addition to health information  
E2: Health information, debates, quizzes, antismoking skits.  
Both interventions included films, peer testimonials and commitments to non-smoking  
Duration: 8 50min weekly sessions  
Providers: 4 pairs of graduate social workers leaders, 40 hrs training prior to randomisation to intervention  
Control 1: pre- and post-test only  
Control 2: post-test only |
| Outcomes | Main outcome was ever smoking, reported as change in percentage between test points.  
Follow-up: post-test, 6,12 &15 months |

Notes
Allocation concealment D

Study | Schinke 1986a
---|---
Methods | Country: USA  
Setting: 12 elementary schools, Washington state  
Focus: smoking and smokeless tobacco prevention  
Design: schools randomly selected and randomly assigned to 3 conditions
Characteristics of included studies (Continued)

Analysis: Duncan multiple-range comparisons

| Participants | Number at pretest 1281  
| Age: 5th & 6th graders  
| 4% smoked at baseline  
| Attrition: average at 2 years 10%, no group differences |

| Interventions | Direct comparison of discussion and skills training interventions. The discussion intervention group received 8 lessons on: information on smoking and the use of smokeless tobacco; peer testimonials noted alternatives to tobacco use; students debated the health, lifestyle and economic effects of tobacco use; games focused on negative aspects of tobacco use; parodies of TV quiz shows, skits on tobacco advertisements. Students also did homeworks. The skills intervention group received the same 8 lessons as the information group, but in addition they learned methods to deal with peer pressure and to use problem solving methods to identify peer pressure and personal temptation to use tobacco, generated solutions to such problems, and chose 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. |

| Outcomes | Primary outcome was smoking or smokeless tobacco use in previous 7 days.  
| 25% of saliva samples were tested for thiocyanate, and levels in micrograms/ml correlated 0.37 with reported tobacco use (p<.001).  
| Follow-up: post-test, 6, 12 & 24 months |

| Notes | Intervention similar to that used by Schinke 1985 etc |

| Allocation concealment | D |

| Study | Schinke 1986b |
| Methods | Country: USA  
| Setting 2 elementary schools, Washington state  
| Focus: smoking prevention  
| Design: 1 school randomly assigned to each of 2 interventions |

| Participants | Number at pretest 65  
| Age: 6th grade  
| 54% female  
| Attrition: not stated |

| Interventions | Direct comparison of skills training and information  
| E1: Skills: problem solving, resistance, interpersonal pressure, role play  
| E2: Health information, debates, quizzes, antismoking skits.  
| Duration: 8 50min weekly sessions for expt and placebo  
| Providers: pairs of graduate assistants |

| Outcomes | Weekly smoking.  
| Saliva samples analysed for thiocyanate.  
| Follow-up: post-test, 6m, 12m, 24m |

| Notes | Only one school per condition, very small Ns |

| Allocation concealment | D |

| Study | Schinke 1986c |
| Methods | Country: USA  
| Site: 3 schools in ?Seattle  
| Focus: Tobacco prevention  
| Design: schools randomly allocated. |

| Participants | 214 5th and 6th graders |
Characteristics of included studies (Continued)

There were no differences in smoking rates at baseline among the groups, and there was no differential attrition.

| Interventions | Skills training versus attention control  
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 minute sessions  
Control: no intervention, pre- and post test only |
|---------------|--------------------------------------------------------------------------------|

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Smoking behaviour. Saliva thiocyanate used for biochemical validation</th>
</tr>
</thead>
</table>

Notes

Allocation concealment D

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 11 years were randomised by reservation to intervention and control conditions.  
Analysis: ANOVA and MANOVA; Tukey-Kramer procedures for paired comparisons.  

Participants Number at pre-test: 137  
Age: 11.8 years. Gender: 54% F  
Expt and control groups were similar at baseline.  
At 6m follow-up attrition was 9%

Interventions Skills training  
Expt: 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: 6 months.

Notes

Allocation concealment D

Study Schinke 2000

Methods Country: USA  
Focus: tobacco, alcohol, and marijuana.  
Design: The control group received no intervention.  
Analysis: The treatment groups were compared with one-way ANOVA’s, with individuals as the unit. Significant omnibus F-ratios from the ANOVA’s were then tested with Scheffe’ post-hoc multiple comparison tests. There were no differences in baseline substance abuse levels between groups, and covariates were not included in subsequent analyses. 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.

Participants 1,396 3rd. to 5th. graders in 27 schools from 10 reservations in N. and S Dakota, Idaho, Montana, and Oklahoma.
### Characteristics of included studies (Continued)

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Native American Values, Community Involvement and Social Influences intervention (15 sessions and 12 boosters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcomes</td>
<td>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 $r = 0.53$.</td>
</tr>
<tr>
<td>Notes</td>
<td>Allocation concealment D</td>
</tr>
</tbody>
</table>

#### Study: Scholz 2000

| Methods | Country: Germany  
Site: 15 Gymnasien (with 59 classes) and 13 Realschulen (with 25 classes) in three towns (Hanau, Darmstadt, Offenbach) in Hesse.  
Design: Half of each class was randomised 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.  |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>1,956 13 year olds (98.3% of possible); 1,080 in the experimental, 876 in the control group.</td>
</tr>
</tbody>
</table>
| Interventions | Eight 60 minute 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 non-smokers, developed by the participants; (7) cigarette advertising; (8) quiz with small prizes.  
The control group received "no particular instruction."  |
| Outcomes | Smoking was defined as at least 1/week; at least 1 in the last 24 hours.  |
| Notes | Allocation concealment D |

#### Study: Severson 1991

| Methods | Country: USA  
Site: 22 schools (13 middle, 9 high) in Lane County, Oregon  
Focus: Smokeless tobacco (ST) and cigarette prevention/cessation  
Design: 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, logistic regression, with students as unit of analysis.  |
|---------|------------------------------------------------------------------------------------------------------------------|
| Participants | Pre-test: 2552 (1434 middle school, 1118 high school), 4.7% parental refusal, 2% of students chose not to complete questionnaire  
Age: 13 middle schools (7th and 8th graders) and 9 high schools (9th and 10th graders)  
Gender: approx 50/50  
Ethnicity: not reported  
Follow-up: 69%. Attrition analyses revealed no significant differences between groups, but fewer high school students than middle school students were available at follow-up  |
| Interventions | Expt: Project PATH (Programs to Achieve Teen Health); Social-influences model; overt and covert pressures to use tobacco. Refusal skills training. Seven videos standardized instruction and maintained students' interest.  
Parents sent 3 brochure messages. See Biglan studies for similar programme  
Deliverer: regular science or health teachers. 5 of the 7 sessions included activities led by peer leaders. Teachers received 2-3 hrs training; peer leaders received two half-days of training.  
Duration: 7 sessions over 2-3 weeks;  
Control: no intervention - usual curricula  |
**Characteristics of included studies (Continued)**

Outcomes

Expired air and saliva samples. A smoker was defined as a student with an expired air CO > 10ppm; self-report of no smoking but expired air CO > 20ppm reclassified as a smoker. Due to cost, saliva samples were not analysed. Self-report of daily, weekly, monthly and 6-monthly smoking. Index based on weighted average of use in the last day, week and month computed. Follow-up: 12 months

Notes

Allocation concealment A

**Study**

<table>
<thead>
<tr>
<th>Shaps 1986</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods</strong></td>
</tr>
<tr>
<td>Country: USA</td>
</tr>
<tr>
<td>Site: Napa Valley United School District, California</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>Design: Drug Education I and II randomised schools to treatments.</td>
</tr>
<tr>
<td>Analysis: not stated.</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
</tr>
<tr>
<td>250 students in the Drug Education I study; 237 in Drug Education II;</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
</tr>
<tr>
<td>For Drug Education Studies I and II: 12 session tobacco, alcohol, and marijuana intervention. Cohort I and II studies on drug addiction were quasi-randomised and are excluded here. The other 8 studies are classroom management techniques unrelated to addictions and are excluded here.</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
</tr>
<tr>
<td>Not stated.</td>
</tr>
<tr>
<td><strong>Notes</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shope 1996</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods</strong></td>
</tr>
<tr>
<td>Country: USA</td>
</tr>
<tr>
<td>Site: 179 classes in 6 school districts in Michigan</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
</tr>
<tr>
<td>Baseline: 4,730 6th. and 7th. grade students; There was an equal gender distribution in experimental and control groups at baseline. Ethnicity was not assessed at the request of school boards rural boards were predominantly White, and urban boards predominantly Black).</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
</tr>
<tr>
<td>30 lesson cigarettes, 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.</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
</tr>
<tr>
<td><strong>Notes</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sussman 1993</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods</strong></td>
</tr>
<tr>
<td>Country: USA</td>
</tr>
<tr>
<td>Site: 48 junior high schools in California</td>
</tr>
<tr>
<td>Focus: Tobacco use prevention (Project Towards No Tobacco Use (TNT))</td>
</tr>
<tr>
<td>Design: 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 one of 4 programme conditions or to a “usual-care” control group</td>
</tr>
</tbody>
</table>
### Characteristics of included studies (Continued)

#### Analysis:
tests and ANCOVA.

| Participants | 6,716 7th graders  
| Age: 12-13 year olds; Gender: 50% F  
| Ethnicity: (60% W, 27% H, 7% B, 6% Asian or other  
| Follow-up: 7,219 9th graders of which 65% (4,365) had attended a Project TNT school 2 years before. |

| Interventions | Social influence resistance training versus other approaches  
| Project Towards No Tobacco Use (TNT)]  
| Expt 1: Normative social influence (peer pressure) - refusal assertion skills training  
| Expt 2: Informational social influence - social image misperceptions of tobacco  
| Expt 3: Physical consequences of tobacco use  
| Exp 4: combined  
| Duration: 10 lessons in 7th grade academic year  
| Control: 'usual care' standard health education programme. |

| Outcomes | Trial cigarette use; weekly cigarette use; trial smokeless tobacco use; weekly smokeless tobacco use  
| Saliva or breath sample collected before each questionnaire administration, but not analysed.  
| Duration of follow-up: 24 months |

#### Notes

| Allocation concealment | A |

#### Study

**Sussman 1995**

| Methods | Country: USA  
| Study TND-I CHS: Site: 29 school districts in a 5-county region of southern California (each district contained one Continuation High School for students unable to remain in regular high schools for reasons including drug abuse).  
| Focus: Alcohol, tobacco and drugs.  
| Analysis: SAS PROC MIXED ANCOVA analysis was used and made corrections for estimated intraclass correlations 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.  
| 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.  
| 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. |

| Participants | TND- CHS trial: 2,863 students in 21 schools were contacted (75% of those enrolled). Pretest data were obtained from 2,001 (70%). There were no statistically significant differences on 31 items of drug use and psychosocial correlates between the pretest sample and those measured at both pretest and 1 year. In Continuation high schools in the past month 57% used cigarettes, 64% alcohol, 55% marijuana, 21 % stimulants, and 13% hallucinogens. Percentages for comprehensive high schools from overlapping school districts are 24%, 36%, 22%, 2% and 2%.  
| 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 tobacco, alcohol, marijuana, cocaine, and hallucinogen intervention. The control group received "standard care." |

| Outcomes | Smoking was measured on an 11 point scale (from 0 to 91-100+ times/month), and expired air carbon monoxide was measured. |

#### Notes

| Allocation concealment | D |
## Characteristics of included studies (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Telch 1990</th>
</tr>
</thead>
</table>
| **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 one school randomly assigned to one of two interventions or a control. Classes in other nontreated school were a non-random control  
Analysis: X2, no adjustment for clustering |
| **Participants** | Number at pre-test (1984) 540 7th graders in randomised classes, 234 in control school  
Age: 12 years. Approx 80% baseline never users in school 1  
Gender: 47% F; Ethnicity: 24% White, 17% Black, 19% Hispanic, 24% Asian, 16% Other  
Follow-up: complete pretest-posttest data from 81% in school 1; 58% from school 2 |
| **Interventions** | Direct comparison of programme deliverer  
Expt 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 1 hr training  
Expt 2: As Expt 1 without peer leaders  
Duration: 5 sessions over 3 weeks  
Con 1: survey only  
Con 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 (analysed but not reported) and saliva (bogus pipeline) Alcohol and marijuana use  
Duration of follow-up: 7 months (Oct - May) |
| **Notes** | Allocation concealment A |

<table>
<thead>
<tr>
<th>Study</th>
<th>Tell 1984</th>
</tr>
</thead>
</table>
| **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 expt and control, in 3rd the expt school assigned, due to existing relationship.  
Analysis: ANOVA. |
| **Participants** | Number at pre-test (1979): 828 (80% of eligible sample)  
Age: 10-15 years, 5th-7th grade.  
Gender: 50% F (of baseline nonsmokers at follow-up).  
Number at 2y follow-up: 486 baseline nonsmokers; some differential attrition across conditions. |
| **Interventions** | Expt: 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”). Two sessions based on US programmes, 8 were developed by the Oslo staff. Student leaders were non-smokers chosen by the staff and teachers. For cohort 1, the first 5 sessions were taught by student peer leaders; for cohorts 2 and 3 the first three sessions were taught by student leaders; sessions 6-10 were taught by the study staff.  
Control: not stated.  
Duration: 10 x 45 mins over 17 months |
| **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 <.001), |
but there was no relationship between thiocyanate levels and the number of cigarettes reportedly smoked the previous week.

### 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, 1,723 responses at conclusion of the study.
- Age: 12-14
- Gender: not stated
- Number at follow-up: 1,723
  - At baseline the exp group had slightly more one-time (p \( < .05 \)), regular smokers (p \( < .01 \)) and those who had purchased tobacco (p \( < .01 \)) than the control.

**Interventions**
- Expt: 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: 1 year

### Walter 1985

**Methods**
- Country: USA
- Site: 22 elementary schools in Bronx (NY)
- Focus: Prevent cigarette smoking and improve fitness & nutrition
  - Design: 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**
- 2,283 eligible subjects, baseline risk factors measured in 1,563 (68.5%)
  - Age: 4th graders
  - 25% W, 49% B, 23% Hi, 3% Asian or Pacific.
  - 1,115 (71.3%) at one year 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 micromoles/L for those examined at the 12 m vs. 35.0 (p \( < .036 \)) for subjects lost to follow up).

**Interventions**
- Intervention: "Know Your Body" programme addressed nutrition, physical fitness & smoking components with 5 teaching techniques (modeling of desired behaviours, behavioural rehearsal, goal specification, feedback of results, and reinforcement for favourable behavioural change).
  - Duration: 2 hours per week over school year, from 4th - 8th grade
  - Teachers received 1.5 days training, Teacher adherence to programme monitored.
Characteristics of included studies (Continued)

Control group received the results of their health screens and explanatory information (authors note that this may constitute a minor treatment effect)

Outcomes
Serum thiocyanate at first follow up, saliva cotinine subsequent
(Blind analysis of double samples correlated r = .97)
Follow-up 1 year (from start of programme), 5 years (Walter 1988).

Notes
Allocation concealment  D

Study  Walter 1986

Methods
Country: USA
Site: 22 schools in 6 districts, Westchester County NY.
Focus: Smoking prevention, improving nutrition and fitness
Design: Randomisation by district to intervention and control.
Analysis: comparison of means adjusted for risk factors, age, gender, and ethnic origin by multiple linear regression, adjustment for unit of analysis

Participants
1,822 eligible subjects in Westchester County, of whom baseline risk factors measured in 1,525 (84%), similar in both experimental and control groups. Age: 4th grade, 9.0 years.
Gender: 47% F
Ethnicity: 84% W, 9.5% B, 2% H, 4% Asian or Pacific.
Number at 12m follow-up: 1,215 (80%). No differences in health knowledge and behaviours at baseline among the groups.

Interventions
Intervention: “Know Your Body” programme to prevent smoking, and improve nutrition and fitness, see Walter 1985.
Duration: 2 class periods/week during the school year, 4th to 9th grade
Control: Control group received the results of their health screens and explanatory information.

Outcomes
Definition of smoking: serum thiocyanate at baseline and one year (cut off for smoking >=100nmol/L). At subsequent follow-ups saliva cotinine (cut off = any detectable levels).
Follow-up reported after 1 year from baseline, 5 years (Walter 1988), 6 years (Walter 1989). Later results for 15 schools in 4 districts

Notes
Allocation concealment  D

Abbreviations used in tables
Gender: F -female. Ethnicity: W -white; B -black; H -hispanic; O -other
X2 = chi-square. ICC = Intraclass correlation calculation. LR = logistic regression

Characteristics of excluded studies

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.
Arciri 1986  Not an RCT
Alfhauer 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.”
### Characteristics of excluded studies (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bloor 2000</td>
<td>No statement on randomisation; 3-month follow-up</td>
</tr>
<tr>
<td>Botvin 1989a</td>
<td>RCT; but only 3.5-month follow-up</td>
</tr>
<tr>
<td>Botvin 1989b</td>
<td>RCT; but only 4 month follow-up</td>
</tr>
<tr>
<td>Botvin 1992</td>
<td>RCT; but only pre-test and post-test measurements</td>
</tr>
<tr>
<td>Botvin 1997</td>
<td>Controlled trial, only 3 month follow-up</td>
</tr>
<tr>
<td>Botvin 2000</td>
<td>Data collected only on illicit drugs, not on smoking behaviour</td>
</tr>
<tr>
<td>Bowen 1991</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Burke 1989a</td>
<td>Not an RCT; and no smoking-related data reported</td>
</tr>
<tr>
<td>Burke 1992</td>
<td>Not an RCT; and no smoking related data</td>
</tr>
<tr>
<td>Calafat 1995</td>
<td>Programme description; no data on smoking behaviour reported.</td>
</tr>
<tr>
<td>Calman 1985</td>
<td>Pretest-posttest study with no follow-up.</td>
</tr>
<tr>
<td>Charlton 1986</td>
<td>Controlled trial, not randomised, only 4-month follow-up</td>
</tr>
<tr>
<td>Connell 1985</td>
<td>This study of the School Health Education Evaluation project involved 20,000 children in Grades 4-7 in 20 U.S. States but does not report if the study was randomised; and reports “self-reported health practices” but within this category tobacco use is not identified.</td>
</tr>
<tr>
<td>Davis 1995</td>
<td>Quasi-experimental; pretest, 13 week intervention, then post-test conducted only 3 weeks after the intervention.</td>
</tr>
<tr>
<td>De Jong 1987</td>
<td>Not an RCT; post-test only.</td>
</tr>
<tr>
<td>Del Greco 1986</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Dielman 1985</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Donato 1994</td>
<td>No mention of randomisation. “The other 632 students not involved in the programme formed the control group.”</td>
</tr>
<tr>
<td>Dupont 1984</td>
<td>Only drug use knowledge and attitudes reported, no smoking-related data, also N’s&lt;30.</td>
</tr>
<tr>
<td>Epstein 2000a</td>
<td>Longitudinal survey; no intervention.</td>
</tr>
<tr>
<td>Errecart 1991</td>
<td>Not an RCT; no smoker/nonsmoker N’s, no information on time/duration of intervention or follow-up.</td>
</tr>
<tr>
<td>Evans 1978</td>
<td>RCT; but only 10-week follow-up</td>
</tr>
<tr>
<td>Evans 1981</td>
<td>Not an RCT; “junior high schools were assigned to three experimental and four control groups.”</td>
</tr>
<tr>
<td>Flay 1987</td>
<td>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</td>
</tr>
<tr>
<td>Flynn 1992</td>
<td>Not an RCT; 2 pairs of US Standard Metropolitan Statistical Areas not randomised to treatments. Included in Cochrane review of mass media interventions for smoking prevention</td>
</tr>
<tr>
<td>Frydman 1985</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Gillies 1984</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Gislason 1995</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Gohlke 1989</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Gordon 1997</td>
<td>RCT; but school and community based; 6 month follow-up, but community interventions introduced throughout that period.</td>
</tr>
<tr>
<td>Gritz 1992</td>
<td>18-60 year old females; 18 year olds not separately analysed.</td>
</tr>
<tr>
<td>Hamm 1994</td>
<td>Does not report if the 1,320 seventh grade students in Omaha, Nebraska, were randomised 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-square 4.70, one-tailed test, no p value reported), but there were no differences in non-smokers staying non-smokers.</td>
</tr>
<tr>
<td>Hanewinkel 1996</td>
<td>Not an RCT; quasi-experimental pre-test post-test.</td>
</tr>
</tbody>
</table>
### Characteristics of excluded studies (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hansen 1982</td>
<td>No statement of randomisation; only 9 week follow-up.</td>
</tr>
<tr>
<td>Hansen 1988a</td>
<td>On page 96 the authors state that the study has a “quasi-experimental design,” schools are referred to as being “assigned,” and “rather than being pure controls, they are more appropriately viewed as standard treatment comparison schools.” However, on p. 111 the authors use the word random assignment.</td>
</tr>
<tr>
<td>Hansen 1996</td>
<td>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.</td>
</tr>
<tr>
<td>Hansen 1997a</td>
<td>Not an RCT; students tracked over time by school number only, with low tracking rates between grades.</td>
</tr>
<tr>
<td>Harmon 1993a</td>
<td>Quasi-experimental design.</td>
</tr>
<tr>
<td>Harmon 1993b</td>
<td>Controlled trial, not randomised</td>
</tr>
<tr>
<td>Harrell 1996</td>
<td>RCT; but only 8 week follow-up. Smoking rates low at baseline, and no change was reported.</td>
</tr>
<tr>
<td>Harrell 1998</td>
<td>RCT; no data reported on smoking behaviour, only on predictors of smoking</td>
</tr>
<tr>
<td>Higgs 2000</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Homel 1981</td>
<td>Controlled trial, not randomised</td>
</tr>
<tr>
<td>Hovell 1996</td>
<td>Not school-based.</td>
</tr>
<tr>
<td>Hurd 1980</td>
<td>Controlled trial, not randomised</td>
</tr>
<tr>
<td>Jason 1982</td>
<td>RCT; secondary prevention, no intervention for baseline nonsmokers</td>
</tr>
<tr>
<td>Johnson 1986</td>
<td>Controlled trial, not randomised</td>
</tr>
<tr>
<td>Kersch 1998</td>
<td>Not an RCT; the experimental groups were carefully “made parallel” on demographic and pedagogical variables, and then compared to a corresponding control population.</td>
</tr>
<tr>
<td>Killen 1988</td>
<td>RCT, but only a 4-month follow-up.</td>
</tr>
<tr>
<td>Killen 1989</td>
<td>RCT; but only 2 month follow-up</td>
</tr>
<tr>
<td>Kröger 2000</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Lammers 1984</td>
<td>Quasi-experimental non-equivalent pre-test post-test design.</td>
</tr>
<tr>
<td>Ledwith 1985</td>
<td>Controlled trial, not randomised</td>
</tr>
<tr>
<td>Lillington 1984</td>
<td>Those younger than 18 excluded.</td>
</tr>
<tr>
<td>Litrownik 2000</td>
<td>Pretest, 8 week intervention, then immediate post-test.</td>
</tr>
<tr>
<td>MacKinnon 1991</td>
<td>Not an RCT (the Kansas City part of the MPP was not randomised).</td>
</tr>
<tr>
<td>McAlister 1980</td>
<td>Controlled trial, not randomised</td>
</tr>
<tr>
<td>McFall 1993</td>
<td>Participants &gt; 18 years.</td>
</tr>
<tr>
<td>Moberg 1990</td>
<td>Not an RCT; control groups not randomised.</td>
</tr>
<tr>
<td>Moskowitz 1984</td>
<td>Not an RCT; non-equivalent control group. No smoking-related data (frequencies or %) reported.</td>
</tr>
<tr>
<td>Murray 1982</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Murray 1984a</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Olsen 1980</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Parcel 1995</td>
<td>Not an RCT; the adoption of the Smart Choices intervention programme was made by the school administrators.</td>
</tr>
<tr>
<td>Pederson 1981a</td>
<td>RCT; but no data on smoking behaviour reported.</td>
</tr>
<tr>
<td>Pederson 1981b</td>
<td>Not an RCT, no N's reported for smoker/nonsmoker groups, no follow-up</td>
</tr>
<tr>
<td>Pederson 1987</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Pentz 1989</td>
<td>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 randomised. Chou et al 1998 reports effects for baseline substance users only.</td>
</tr>
<tr>
<td>Perry 1980</td>
<td>Only 5-month follow-up.</td>
</tr>
</tbody>
</table>
### Characteristics of excluded studies (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perry 1990</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Perry 1992</td>
<td>Minnesota Heart Health Program was quasi-experimental.</td>
</tr>
<tr>
<td>Pfau 1994</td>
<td>No smoking-related data reported, only attitudes to smoking.</td>
</tr>
<tr>
<td>Philips 1990</td>
<td>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.</td>
</tr>
<tr>
<td>Piper 1971</td>
<td>Not an RCT. “we allocated two thirds of them [schools] to the study and one third to the control group.”</td>
</tr>
<tr>
<td>Pomrien 1995</td>
<td>Not an RCT: partial cross-sectional study, with no control group</td>
</tr>
<tr>
<td>Price 1992</td>
<td>No data on smoking behaviour; no control group, posttest or follow-up.</td>
</tr>
<tr>
<td>Price 1998</td>
<td>Controlled trial, not randomised. Reports no data on smoking behaviour; only knowledge, attitudes and smoking intentions.</td>
</tr>
<tr>
<td>Prokhorov 1994</td>
<td>Controlled trial, non random. Schools were randomly selected for intervention, but control schools were in a different district</td>
</tr>
<tr>
<td>Reimers 1990</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Ringwalt 1991</td>
<td>RCT; but only pre-test post-test design.</td>
</tr>
<tr>
<td>Robinson 1999</td>
<td>RCT; but no data on smoking behaviour.</td>
</tr>
<tr>
<td>Rohrbach 1993</td>
<td>No data on smoking behaviour.</td>
</tr>
<tr>
<td>Sarvela 1987</td>
<td>Controlled trial, not randomised</td>
</tr>
<tr>
<td>Schinke 1994</td>
<td>RCT; but pre-test post-test only.</td>
</tr>
<tr>
<td>Schinke 1996</td>
<td>RCT; but community intervention.</td>
</tr>
<tr>
<td>Scholz 1985</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Secker-Walker 1997</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Secker-Walker 1998</td>
<td>Females &lt; 18 not analysed separately from adults.</td>
</tr>
<tr>
<td>Seid 1994</td>
<td>RCT; but the control group schools were selected from a separate list; only 5 month follow-up; 70% attrition at 5 months.</td>
</tr>
<tr>
<td>Shaffer 1983</td>
<td>Only a 3-month follow-up.</td>
</tr>
<tr>
<td>Skinner 1985</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Steenkamp 1990</td>
<td>15-18 year olds not separately analysed from 19-64 year olds.</td>
</tr>
<tr>
<td>Stone 1978</td>
<td>Controlled trial, not randomised; no assessment of smoking behaviour</td>
</tr>
<tr>
<td>Sussman 2001B</td>
<td>Includes only smokers, without control or comparison group</td>
</tr>
<tr>
<td>Svoen 1999</td>
<td>Not an RCT; non-randomised selection of control group.</td>
</tr>
<tr>
<td>Szymborski 1999</td>
<td>No data on smoking behaviour; is a description of an anti-smoking programme for schools.</td>
</tr>
<tr>
<td>Tudor-Smith 1998</td>
<td>Quasi-experimental design</td>
</tr>
<tr>
<td>Turner 1993</td>
<td>No data on tobacco use, only on refusals of offers of tobacco immediately after three experimental stimuli.</td>
</tr>
<tr>
<td>Vartiainen 1990</td>
<td>The North Karelia project was a non randomised community intervention</td>
</tr>
<tr>
<td>Wahlgren 1997</td>
<td>Trial in orthodontists’ offices.</td>
</tr>
<tr>
<td>Werch 1991</td>
<td>Pre-test post-test design.</td>
</tr>
<tr>
<td>Williamson 1981</td>
<td>Controlled trial, not randomised; no assessment of smoking behaviour</td>
</tr>
<tr>
<td>Worden 1988</td>
<td>Not an RCT.</td>
</tr>
<tr>
<td>Young 1996</td>
<td>RCT; but pre-test post-test design; and no data on smoking behaviour.</td>
</tr>
<tr>
<td>Zoller 1986</td>
<td>RCT; but pre-test, post-test design with post-test only 2 weeks after the intervention.</td>
</tr>
</tbody>
</table>
Characteristics of excluded studies *(Continued)*

**ANALYSES**

**Comparison 01. Information giving curricula versus control**

<table>
<thead>
<tr>
<th>Outcome title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Results of Category 2 studies</td>
<td>Other data</td>
<td></td>
<td></td>
<td>No numeric data</td>
</tr>
<tr>
<td>02 Results of Category 3 studies</td>
<td>Other data</td>
<td></td>
<td></td>
<td>No numeric data</td>
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</tbody>
</table>

**Comparison 02. Social competence curricula versus control**

<table>
<thead>
<tr>
<th>Outcome title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Results of Category 1 studies</td>
<td>Other data</td>
<td></td>
<td></td>
<td>No numeric data</td>
</tr>
<tr>
<td>03 Results of Category 3 studies</td>
<td>Other data</td>
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</tbody>
</table>

**Comparison 03. Social influences curricula versus control**

<table>
<thead>
<tr>
<th>Outcome title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Results of Category 1 studies</td>
<td>Other data</td>
<td></td>
<td></td>
<td>No numeric data</td>
</tr>
<tr>
<td>02 Results of Category 2 studies</td>
<td>Other data</td>
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<td></td>
<td>No numeric data</td>
</tr>
<tr>
<td>03 Results of Category 3 studies</td>
<td>Other data</td>
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<td>No numeric data</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Outcome title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Results of Category 1 studies</td>
<td>Other data</td>
<td></td>
<td></td>
<td>No numeric data</td>
</tr>
<tr>
<td>02 Results of Category 2 studies</td>
<td>Other data</td>
<td></td>
<td></td>
<td>No numeric data</td>
</tr>
<tr>
<td>03 Results of Category 3 studies</td>
<td>Other data</td>
<td></td>
<td></td>
<td>No numeric data</td>
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</tbody>
</table>

**Comparison 05. Social influences versus information-giving**

<table>
<thead>
<tr>
<th>Outcome title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Results of Category 1 studies</td>
<td>Other data</td>
<td></td>
<td></td>
<td>No numeric data</td>
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</tbody>
</table>

**Comparison 06. Multi-modal programmes compared to single-component interventions**

<table>
<thead>
<tr>
<th>Outcome title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Results of Category 1 studies</td>
<td>Other data</td>
<td></td>
<td></td>
<td>No numeric data</td>
</tr>
</tbody>
</table>

**INDEX TERMS**

*Medical Subject Headings (MeSH)*

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

*MeSH check words*

Humans
<table>
<thead>
<tr>
<th><strong>Title</strong></th>
<th>School-based programmes for preventing smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Authors</strong></td>
<td>Thomas R</td>
</tr>
<tr>
<td><strong>Contribution of author(s)</strong></td>
<td>RT conceived the review, extracted data and wrote the text. keith Busby assisted with data extraction, analysis and interpretation in the early stages of the review.</td>
</tr>
<tr>
<td><strong>Issue protocol first published</strong></td>
<td>1998/4</td>
</tr>
<tr>
<td><strong>Review first published</strong></td>
<td>2002/4</td>
</tr>
<tr>
<td><strong>Date of most recent amendment</strong></td>
<td>14 November 2005</td>
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<tr>
<td><strong>Date of most recent SUBSTANTIVE amendment</strong></td>
<td>17 January 2002</td>
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<td><strong>What's New</strong></td>
<td>Information not supplied by author</td>
</tr>
<tr>
<td><strong>Date new studies sought but none found</strong></td>
<td>Information not supplied by author</td>
</tr>
<tr>
<td><strong>Date new studies found but not yet included/excluded</strong></td>
<td>Information not supplied by author</td>
</tr>
<tr>
<td><strong>Date new studies found and included/excluded</strong></td>
<td>17 January 2002</td>
</tr>
<tr>
<td><strong>Date authors' conclusions section amended</strong></td>
<td>Information not supplied by author</td>
</tr>
</tbody>
</table>
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| **DOI** | 10.1002/14651858.CD001293 |
| **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 2 studies
### Results of Category 2 studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Number followed-up</th>
<th>Early outcomes</th>
<th>Long term outcomes</th>
<th>Additional comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chatrou 1999</td>
<td>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.</td>
<td>6 months: No significant differences in smoking (defined as any smoking vs. experimental or regular) between the experimental and control groups.</td>
<td>18 months: No significant differences in smoking between the experimental and control groups.</td>
<td>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.</td>
</tr>
<tr>
<td>Denson 1981</td>
<td>Baseline approx 600 (numbers not precisely stated). Similar number responded at follow-up, but no evidence of tracking of individuals.</td>
<td>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 &lt;.001). Smoking prevalence rose from 14% to 17.5% in the experimental group and from 10.4% to 26% in the control (p &lt;.01).</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Gatta 1991</td>
<td>Baseline: 16,074; At 4 years 10,317 (36% attrition). No attrition analyses reported.</td>
<td>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 &lt; 0.19). There were no effects on the frequency of smoking.</td>
<td></td>
<td>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;</td>
</tr>
</tbody>
</table>
### Results of Category 2 studies  (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Number followed-up</th>
<th>Early outcomes</th>
<th>Long term outcomes</th>
<th>Additional comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hirschmann 1989</td>
<td>Baseline 315 (of whom 47% never smokers, 82% self labelled non smokers). Analysis based on the 266 students who attended 2 or more sessions.</td>
<td>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 &lt; .05). There were no statistically significant differences in the prevalence of smoking for the Exptl (15.3%) compared to the control (18.6%) group.</td>
<td>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&lt;.05) Overall prevalence: fewer in Exp group (19.1%) reported smoking in the past 6 months than controls (30.9%) (p&lt;0.1)</td>
<td>Methodological problems are that 15% attended only 1 session and these were more likely to have smoked in the past week (p &lt; .001); 20% in the control and 12% in the experimental group (p &lt; .01) missed 2 sessions; absentees at follow-up were more likely to have smoked in the past week (p &lt; .001); no biochemical validation; no statements about the method of randomisation, if blinded or concealed, no power computation; no ICC's; no statistical modeling. Most evidence for an effect was seen in those who reported trying one cigarette at baseline. This was consistent with programme aim of altering experience of cigarettes.</td>
</tr>
</tbody>
</table>
Analysis 01.02. Comparison 01 Information giving curricula versus control, Outcome 02 Results of Category 3 studies
<table>
<thead>
<tr>
<th>Study</th>
<th>Number followed-up</th>
<th>Early outcomes</th>
<th>Long term outcomes</th>
<th>Additional comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrews 1984</td>
<td>No statements about attrition and follow-up.</td>
<td>36m: Third graders who had been in the experimental group reported less smoking than controls (p &lt; .05).</td>
<td></td>
<td>Methodological problems are that the number of teaching sessions is not stated; no attrition analysis; no statements about method of randomisation, blinding or concealment; no power computation; the number of classes randomised is not stated; the correlation of parental and children’s reports of smoking status is not stated; no biochemical validation; no ICC’s; and no statistical modeling.</td>
</tr>
<tr>
<td>Figa-Talamanca 1989</td>
<td>Baseline: 562; Baseline never smoking rates varied 47-61% by city. Attrition at 12 months: 7%</td>
<td>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.</td>
<td>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.</td>
<td>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 possible misreporting.</td>
</tr>
<tr>
<td>Howard 1996</td>
<td>Baseline 98; No attrition reported. No smoking reported at baseline.</td>
<td>12m: 3 control students reported experimental smoking, no exp students reported any use (no statistical analysis provided).</td>
<td></td>
<td>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 computation, no biochemical validation, no statement about attrition or attrition analysis; no</td>
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### Results of Category 3 studies

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<thead>
<tr>
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<tr>
<td>MacPherson 1980</td>
<td>Baseline: 1750;</td>
<td>6m: Significant increase in the number of smokers in the traditional instruction group from 2.6% to 3.8% (+9%, p &lt; .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.</td>
<td></td>
<td>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 the effects of differences in allocation and analysis.</td>
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<td></td>
<td>Follow-up at 6 months: 79%.</td>
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<tr>
<td>Rabinowitz 1974</td>
<td>Baseline: 758.</td>
<td>6m: No statistically significant differences between experimental and control groups.</td>
<td></td>
<td>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.</td>
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<td>6 months: not stated.</td>
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### Analysis 02.01. Comparison 02 Social competence curricula versus control, Outcome 01 Results of Category 1 studies

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<tr>
<td>Kellam 1998</td>
<td>Baseline: 2311; Follow-up at 2 years: 69%. Attrition was unrelated to intervention status (p&gt;.25).</td>
<td>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</td>
<td>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).</td>
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### Analysis 02.03. Comparison 02 Social competence curricula versus control, Outcome 03 Results of Category 3 studies

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<tr>
<td>Shaps 1986</td>
<td>Baseline: Drug Education Study I = 250; Drug Education Study II = 237. Follow-up at 1 year: not stated.</td>
<td>1 year: No significant differences in smoking between the intervention and control group.</td>
<td></td>
<td>Methodological problems are: high attrition; differential attrition from 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: &quot;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.</td>
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### Results of Category 3 studies (Continued)

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<td></td>
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<td>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</td>
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#### Analysis 03.01. Comparison 03 Social influences curricula versus control, Outcome 01 Results of Category 1 studies
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<tr>
<td>Aveyard 1999</td>
<td>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.</td>
<td>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.</td>
<td>Two year follow-up scheduled.</td>
<td>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.</td>
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<tr>
<td>Biglan 1987a</td>
<td>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.</td>
<td>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&lt;.04). For baseline smokers, the intervention group had lower smoking rates (weighted mean index 19.4) than the control (29.6; p &lt;.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.</td>
<td></td>
<td>Methodological problems are that there were no statements about the method of randomisation; blinding or concealment; some schools and some classes were used as the unit of allocation, no power computation, no computation of ICC's; and no statistical modeling to account for differences in unit of allocation and analysis. Data were collapsed across method of assignment (by class or school)</td>
</tr>
<tr>
<td>Cameron 1999</td>
<td>Baseline: 4466; Follow-up at 3 years = 3972 (89%), with analysis based on 3821 who remained in same treatment condition. No difference in dropouts by condition or school risk score, but</td>
<td>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. When grouped by school risk score, no significant difference found</td>
<td></td>
<td>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 100% in 4 boards; student consent rate was 92% in boards with passive</td>
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### Results of Category 1 studies (Continued)

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<td>greater social models risk score and more baseline smoking amongst dropouts.</td>
<td>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.</td>
<td>consent and 70% in 1 board with active consent policy; differential loss for boys (p &lt;.05), for boards (p &lt;.05), for the group with high risk scores in the 6th. grade (p .001) and for smokers in the 6th. grade ( p &lt;.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.</td>
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<tr>
<td>De Vries 1994</td>
<td>1529 had data at both baseline and T3. 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).</td>
<td>1y: For baseline never-smokers, programme effect only for high schoolers (OR = 0.63; 95% CI 0.43-0.91, p &lt;.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 &lt; .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.</td>
<td>Methodological problems are that males (OR = 1.36) and older students (OR = 1.47) were more likely to drop out; no statements about blinding or concealment; and no power computation.</td>
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<td>Eckhardt 1997</td>
<td>(Continuation of Elder 1993)</td>
<td>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.</td>
<td>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% The Continued Intervention group had significantly lower smoking rates than the Continued Control group (p&lt;.05)</td>
<td>Methodological problems were: no power computation; no computation of ICC's and the effects of clustering in classes (schools were assigned to treatments).</td>
</tr>
<tr>
<td>Elder 1993</td>
<td>Baseline 3655; A cohort of 2,668 (73%) was surveyed at 4 follow-up points. The proportion lost to follow-up was similar for intervention and control, and there was no differential attrition across conditions.</td>
<td>At end of 7th grade (T2): monthly smokeless + cigarette prevalence 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%).</td>
<td>At end of the 9th grade (3 years of intervention): past month 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&lt;.05) at the school level and 0.72 (p&lt;.001) at the individual level. For cigarette smoking the Odds Ratios were 0.77 (p&lt;.05) at the school level and 0.79 (p&lt;.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&lt;.05) at the individual level.</td>
<td>Methodological problems are that the experimental and control groups differed in ethnic composition (p &lt;.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.</td>
</tr>
<tr>
<td>Ellickson 1990</td>
<td>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 15m: Little effect on nonusers, but significant reductions in experimenters: their weekly smoking declined 50% in teen-led group (p&lt;.006) and by 33% in health-led group (p&lt;.09). Daily use dropped by 50% in teen-led group (p&lt;.05). More experimenters reported no smoking 2y: (grade 9, Bell 1993) only 2 sig diffs (p&lt;.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.</td>
<td>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.</td>
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### Results of Category 1 studies

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<tr>
<td>Flay 1995</td>
<td>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.</td>
<td>Post-test: In Los Angeles at the post-test there was lower prevalence in the social resistance group (p&lt;0.0001) and television (p&lt;0.006) conditions. In San Diego at the post-test prevalence was lower in the social resistance groups (p&lt;0.0001).</td>
<td>At the 2 year follow-up in Los Angeles there was lower prevalence in the social resistance group (p&lt;0.0007) and in the television + social resistance group (p&lt;0.05). In San Diego at 1 year prevalence was lower in the social resistance group (p&lt;0.028).</td>
<td>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.</td>
</tr>
<tr>
<td>Hansen 1991</td>
<td>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.</td>
<td>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&lt;0.05) on the main cigarette index. There was no evidence of an effect of Resistance Training.</td>
<td></td>
<td>Methodological problems are: differential attrition in the Resistance Training (18%) compared to the other 3 experimental groups (21.6%, p&lt;0.01); 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.</td>
</tr>
<tr>
<td>Lloyd 1983</td>
<td>Baseline 6299; Attrition at 1 year: &lt;10%</td>
<td>1y: No significant differences. For older girls prevalence was lower in treatment schools, reversing the baseline difference. For boys, prevalence was non significantly higher in treatment schools Quitting rates generally higher in treatment group but diffs NS.</td>
<td></td>
<td>Methodological problems are that there were no statements about the method of randomisation, blinding 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</td>
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<td>Murray 1992</td>
<td>Baseline: 8,271 (= 92% of the 8,992 enrolled in 6th grade). 1 year: 7,180 (87% of 8,271)</td>
<td>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. 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.”</td>
<td>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</td>
<td>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.</td>
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### Results of Category 1 studies (Continued)

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<td>Peterson 2000</td>
<td>Baseline: 8388.</td>
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<td>Group (no signif diffs by Chi2). Using logistic regression to control for factorial</td>
<td>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 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 &amp; NCI-Expert Advisory Panel, and was well implemented by trained teachers teachers classroom teachers.</td>
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<td>7,910 (93.8%)</td>
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<td>design and confounders, FSE group significantly less likely to remain never-smokers (p &lt; 0.05).</td>
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<td>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 education; in 86% of the lessons observed teachers implemented the lesson activities.</td>
<td>At neither Grade 12 nor 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.</td>
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Analysis 03.02. Comparison 03 Social influences curricula versus control, Outcome 02 Results of Category 2 studies
### Results of Category 2 studies

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| Abernathy 1992 | Baseline: 7,508.   | 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. |

Based on matching of ID codes in each survey: 3,566 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.

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: 2,366 | 1yr: 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. |

48% 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.

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).

| Biglan 1987b | Baseline 1,730; 68% followed up at 12 months. | Overall smoking index rates were higher in the experimental group in | Methodological problems are that more high-rate smokers dropped |

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Results of Category 2 studies  (Continued)

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<tr>
<td>Bush 1989</td>
<td>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.</td>
<td>grade 7, but lower for experimental group in grades 9 &amp; 10. When analysed by baseline status there was no evidence of programme effect on never smokers. 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 &lt; .04), but more high-rate smokers dropped out of E than C.</td>
<td>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 &lt; .000). After adjustment, the difference was 15 micromoles/L (p &lt; .000). Significantly more nonsmokers (4.3%) in intervention group.</td>
<td>No statements about 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 &lt; .05); no discussion of method of randomization, blinding or concealment; no ICC's; and no assessment of clustering.</td>
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| Clarke 1986 | Baseline: 1321; with 1-5% non-response at each testing | For females the percentages saying they smoked yesterday changed from pretest to 20 month follow-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. | 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. | 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 or mailed survey. | 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- |
## Results of Category 2 studies (Continued)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Dijkstra 1999</strong></td>
<td>At baseline: 4,060.</td>
<td>6 months: less smoking in the decision-making (p&lt;.05) and social influences groups (p&lt;.01) compared to the control.</td>
<td>12 months: less smoking in: (1) SI + boosters compared to boosters (p&lt;.01) (2) SI+DM compared to control (p&lt;.05) (3) DM compared to control (p&lt;.005) (4) DM compared to SI (p&lt;.005) (5) DM+boosters compared to SI+boosters (p&lt;.005)</td>
<td>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.</td>
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<td></td>
<td>At 6 months: 4,060</td>
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<td>At 1 year: 3,655</td>
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<td>At 18 months: 3,104</td>
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<tr>
<td><strong>Gilchrist 1986</strong></td>
<td>Baseline: 741 (69% nonsmokers)</td>
<td>Fewer self-control skills subjects reported smoking one or more cigarettes in previous week compared to placebo and control conditions. (F(2,697) = 3.52, p&lt;.05), risk difference about 2%</td>
<td></td>
<td>There are 2 methodological problems: no power computation; and no ICC’s and no correction for clustering.</td>
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<td>Follow-up: 94%, no</td>
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<td>smokers</td>
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<tr>
<td><strong>Laniado-Laborín 1993</strong></td>
<td>Baseline: 168.</td>
<td>10m: smoking within past 12m declined in the expt group from 38% to 8% and in the control from 23% to 20% (p &lt;.05); smoking within past week declined in the</td>
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<td>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.</td>
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<td></td>
<td>No discussion of</td>
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<tr>
<td>Murray 1984</td>
<td>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).</td>
<td>Experimental group from 4% to 1% and in the control group increased from 5% to 8% (p &lt; .05); more quit in the experimented group (72%) than in the control (35%, p &lt; .01).</td>
<td>Posttest: For baseline non-smokers all 4 conditions similar. 1 year: For baseline non-smokers both peer-led groups had significantly lower (p &lt; .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 &lt; .01). For baseline experimenters, all four conditions appeared to produce equivalent short term results. At 2 &amp; 3 years no significant differences between conditions. For baseline non-smokers incidence of ever smoking was 47-49% at 3 years. At four years a posteriori tests found a modest effect on daily (p &lt; .05) and weekly (p &lt; .05) smoking for never smokers in the peer-led no video condition. At 6 years, there was no evidence for any intervention effect.</td>
<td>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.</td>
</tr>
<tr>
<td>Noland 1998</td>
<td>Baseline: 3588; of whom 86% present at all 3 assessments. The groups were similar at baseline on smoking status. No differential attrition from baseline.</td>
<td>Experimental group had lower rates than control for smoking in the last 30 days (34% vs. 44%, p &lt; .01); in the last 7 days (30% vs. 38%, p &lt; .01); and in the last 24 hours (22% vs. 28%, p &lt; .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 &lt; .01). For those involved in growing tobacco the results were significant for 30 day (p &lt; .01), 7 day (p &lt; .05) and 24-hour smoking (p &lt; .01).</td>
<td>From baseline to 2 years: Weekly</td>
<td>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.</td>
</tr>
<tr>
<td>Schinke 1985b</td>
<td>Baseline: 193.</td>
<td>Percentages smoking weekly:</td>
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</table>
### Results of Category 2 studies (Continued)

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<tr>
<td>Schinke 1986a</td>
<td>Baseline: 1281;</td>
<td>Attrition at 2 years: 10%. No differential attrition across groups.</td>
<td>Power computation; and no ICC's and no correction for clustering.</td>
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<td>2 yr: 1171</td>
<td>6 months: Percentages smoking were significantly lower in the skills group (5%: p &lt; .05) compared to the control (6%), but there were no significant differences from the discussion group (6%).</td>
<td>18 months: Percentages smoking were lower in the skills (8%; p &lt; .05) than in the discussion (10%) and control (11%) groups.</td>
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<td>12 Months: Percentages smoking were significantly lower in the skills group (6%; p &lt; .05) compared to the discussion (8%) and control (9%) groups.</td>
<td>2 years: Percentages smoking were lower in the skills (7%; p &lt; .05) than in the discussion (11%) and control (12%) groups. There were similar results for smokeless tobacco use.</td>
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<td>1 yr: 1200</td>
<td>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 &lt; .001).</td>
<td></td>
<td>Methodological problems are that there are no statements about method of randomisation, if blinded or concealed; no power computation; no ICC's; and no statistical modeling to assess effects of differences in allocation and analysis.</td>
</tr>
<tr>
<td>Schinke 1986c</td>
<td>Baseline: 214.</td>
<td>Attrition rates did not differ between groups.</td>
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<td></td>
<td>Number at 1 year follow-up: not stated.</td>
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<td>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.</td>
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</table>
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<tr>
<td>Schinke 1988</td>
<td>Baseline: 137</td>
<td>6m: expt had lower mean smoking (1.41) than control (2.37) and less smokeless tobacco use (2.56 vs. 4.11) (p &lt;.005).</td>
<td></td>
<td>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.</td>
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<td></td>
<td>Attrition at 6 mnoths: 8%</td>
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<tr>
<td>Schinke 2000</td>
<td>Baseline: 1396; Follow-up at 3.5 years: 1,177 (86%).</td>
<td>No differences between groups in cigarette smoking at the 6 or 12 month follow-ups.</td>
<td>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 &lt;.001).</td>
<td>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.</td>
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<td></td>
<td>Attrition on baseline and outcome variables was random.</td>
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<tr>
<td>Severson 1991</td>
<td>Baseline: 2552; Follow-up at 12 months: 1768 (69%).</td>
<td>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.</td>
<td></td>
<td>Analysis used students as the unit of analysis. &quot;We attempted to tabulate and analyse 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.&quot; 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.</td>
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<td>No differential attrition by condition.</td>
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<tr>
<td>Villalbi 1993</td>
<td>Basel: 2033. 12 month follow-up: 1723 with responses matched to those of the baseline group (approx 78% of target population).</td>
<td>12m: those admitting to having &quot;smoked once&quot; increased from 23% to 34% in the experimental group, and in the control from 19% to 34% (p &lt; .001); habitual smoking in the expt from 2.7% to 6.4% and in the control from 1% to 5.7% (p &lt; .001); and purchasing tobacco from 5% to 11.6% in the expt and 2.6% to 8.6% in the control (p &lt; .001).</td>
<td>Methodological problems are: at baseline the experimental group had more one-time (p &lt; .05) and regular smokers (p &lt; .01), and purchasers of tobacco (p &lt; .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</td>
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<tr>
<td>Walter 1985</td>
<td>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).</td>
<td>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 &lt;.008).</td>
<td>5y: (beginning of 9th grade), prevalence of smoking (Walter 1988, p. 1096) &quot;still too low to permit detection of an effect on the number of subjects who started to smoke&quot;. No biochemical measures reported.</td>
<td>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.</td>
</tr>
<tr>
<td>Walter 1986</td>
<td>Baseline: 1,525 Follow-up at 1 year: 80%. 5 year follow-up: 81% from 15 schools (84% of intervention, 77% of control). 6 year follow-up: 65% of subjects available (69% of intervention, 61% of control).</td>
<td>12m: serum thiocyanate increased more in the control (5.3 micromoles/L) than in the experimental group (0.6 micromoles/L), difference -4.7, (p = .000).</td>
<td>5y: (beginning of 9th grade), prevalence of smoking ‘still too low to permit detection of an effect on the number of subjects who started to smoke’. After six years (end of 9th grade): in intervention group significantly lower % of biochemically confirmed smoking for all smokers</td>
<td>Methodological problems are: no power computation; no ICC’s and no correction for clustering.</td>
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<td>between experimental schools (3.5%) and control schools (13.1%; p &lt; .005) and also for male smokers (0% vs. 12.4%; p &lt; .05) but no statistically significant differences for females. (p &lt; .005), although limited power given small number of schools.</td>
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Analysis 03.03.  Comparison 03 Social influences curricula versus control, Outcome 03 Results of Category 3 studies
### Results of Category 3 studies

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<tr>
<td>Ary 1990</td>
<td>Baseline: 7837</td>
<td>12m: No differences in effect of the intervention on pretest non smokers - 12% became smokers in both conditions.</td>
<td>No effect of messages to parents.</td>
<td>Methodological problems: no statements about the method of randomisation, if blinded or concealed; no power computation; 1 middle school not randomised; 20% 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 &amp; b. CO levels were higher in higher grades (p&lt;.002)</td>
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<tr>
<td>Coe 1982</td>
<td>Baseline: 226;</td>
<td>12m: no statistically significant differences between the intervention and control groups in smoking behaviour.</td>
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<td>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.</td>
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<td>Follow-up at 12 months: 66 (64%) of E, 84 (68%) of C. No attrition analysis</td>
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<tr>
<td>Cohen 1989</td>
<td>886 students received the interventions (no 8th graders received interventions). Number at follow-up not stated.</td>
<td>At 1 year: there were no statistically significant differences in percentages smoking (non-smoking vs. &quot;even smoked part of a cigarette&quot;) between the intervention and control group or by gender.</td>
<td></td>
<td>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.</td>
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### Results of Category 3 studies  
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<tr>
<td>Ennett 1994</td>
<td>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 students lost to follow up altogether.</td>
<td>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.</td>
<td>There was no effect on initiation of smoking, quitting or change in level of use at 2 years. Results were corrected for clustering.</td>
<td>Methodological problems: attrition: 26% missing at one or more data collection points; and no power computation.</td>
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<tr>
<td>Flay 1985</td>
<td>Baseline: 654; 76% present at the pretest and all subsequent tests up to 18m. 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.</td>
<td>18m: Among never smokers at baseline, at 18 months there were no significant differences in 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 &lt;.003).</td>
<td>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.</td>
<td>Methodological problems were: 3 schools were allocated by the School Superintendent; 24% attrition at 2 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.</td>
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<tr>
<td>Focarile 1994</td>
<td>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.</td>
<td>18m: Proportion of current non smokers 88% in exp and 80% in control (diff 7.4%, 95% CI 2.3; 12.5) no significant difference for never smokers.</td>
<td>36m: (selective follow-up) Proportion of current non smokers 55% in the exp 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</td>
<td>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</td>
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<tr>
<td>Hort 1995</td>
<td>Baseline: 878;</td>
<td>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 (X2 = 8.94, p &lt; 0.05).</td>
<td>2y: For boys, smoking in the control schools increased 11% more than in the intervention schools (p&lt;.02), and for girls increased 23% more (p&lt;.0001). For both genders 16% more (p&lt;.001). 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).</td>
<td>Methodological problems are that there was 26% attrition by 24 months, with no attrition analysis; 0.4% refusals in the intervention classes and 5.7% refusal in control classes. No further attrition analysis.</td>
</tr>
<tr>
<td>Kaufman 1994</td>
<td>Baseline: 276</td>
<td>6 months: No differences between experimental and control groups in smoking. Both groups significantly declined from pre-test (p&lt;.001). School + media group smoked more cigarettes at baseline than the media group (p&lt;.02).</td>
<td>It is not clear if Figure 1 shows absolute percentages or percentage changes (no commentary made in text). No definition of cigarette use.</td>
<td>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.</td>
</tr>
<tr>
<td>Schinke 1984</td>
<td>Baseline: 234.</td>
<td>Follow-up at 6 &amp; 12 months: not stated. No attrition analysis.</td>
<td>It is not clear if Figure 1 shows absolute percentages or percentage changes (no commentary made in text). No definition of cigarette use.</td>
<td>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.</td>
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<tr>
<td>Schinke 1985a</td>
<td>Baseline: 689; Follow-up at 24 months: attrition: less than 10%; No differences in attrition by school or condition.</td>
<td>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.</td>
<td>At 12 months: 6% of the skills, 9% of the 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).</td>
<td>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.</td>
</tr>
<tr>
<td>Schinke 1985c</td>
<td>Baseline: 331; Attrition at 154 months: not stated.</td>
<td>The percentage of subjects reporting ever smoking: 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. 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).</td>
<td>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).</td>
<td>There are 4 methodological problems: no power computation; no attrition analysis; no statistical analysis; and no ICC’s and no correction for clustering.</td>
</tr>
<tr>
<td>Schinke 1986b</td>
<td>Baseline: 65; Follow up at 12 months: no attrition</td>
<td>6 months: The percentage smoking weekly in the skills (2%) was lower</td>
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<td>There are 3 methodological problems: small sample size, no</td>
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### Results of Category 3 studies  
*(Continued)*

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<tr>
<td>Scholz 2000</td>
<td>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.</td>
<td>stated. than in the health education group (3%; p &lt; .01). Saliva thiocyanate levels correlated r = .52 (p &lt; .01) with self-reported smoking. nd 12 months: The percentage smoking weekly in the skills (3%) was lower than in the health education (5%; p &lt; .001) group.</td>
<td>(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 &lt; .05), with males (13% and 22%, p &lt; .01) showing less increase in the experimental group than females (21%, 28%, p &lt; .05). (b) Realschule students: the rates of new smokers for males was 17% in the experimental and 25% in the control (p &lt; .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 from 1% to 10.7% in the Control group (p &lt; .05) (b) Realschule students: no differences between experimental and control groups.</td>
<td>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.</td>
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### Results of Category 3 studies (Continued)

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<tr>
<td>Shope 1996</td>
<td>Baseline: 4,730 6th. &amp; 7th graders; 2nd. year: 4,116 (87%), and 3,112 (66%) for whom data were matched in all 3 years.</td>
<td>1 year: 8th. - 9th. graders in the programme had less tobacco use (p &lt; .0005) and smokeless tobacco use (p &lt; .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).</td>
<td>No programme effects by the 12th. grade for programme delivered in the 6th and 7th grades.</td>
<td>Methodological problems are: smoking was defined by 1 question on “current frequency of use;” Black students lost to attrition used more smokeless tobacco (p &lt; .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 &lt; 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.</td>
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<tr>
<td>Telch 1990</td>
<td>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 ext school 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 382 attended the screening sessions in Oslo, and there was substantial differential attrition by condition and baseline smoking status.</td>
<td>2 years: Significantly lower smoking amongst baseline nonsmokers in experimental (16.5%) compared to control (26.9%; p &lt; .001), with males E = 13% and C = 21%, and females E = 20.5% and C = 32.1% (no significant differences stated).</td>
<td>10 years: No significant differences in smoking rates between experimental and control groups. 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&lt;0.05). Daily smoking by baseline non smoking men was 31% vs 45% (p&lt;.06). The difference for women was in the opposite direction (E = 47%, C = 42%; NS).</td>
<td>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 &lt;.05); weekly smokers (OR = 1.99, 95%CI = 1.13, 3.51; p&lt;.05); and students from the reference rather than the intervention schools (OR = 1.56, 95%CI = 1.16, 2.10, p&lt;.01). There were no significant interactions between smoking category, treatment condition, and attrition. In the third pair of</td>
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results of category 3 studies (continued)

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<td>Tell 1984</td>
<td>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 382 attended the screening sessions in Oslo, and there was substantial differential attrition by condition and baseline smoking status.</td>
<td>2 years: Significantly lower smoking amongst baseline nonsmokers in experimental (16.5%) compared to control (26.9%; ( p &lt; .001 )), with males ( E = 13% ) and ( C = 21% ), and females ( E = 20.5% ) and ( C = 32.1% ) (no significant differences stated).</td>
<td>10 years: No significant differences in smoking rates between experimental and control groups. 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 &lt; 0.05 )). Daily smoking by baseline non smoking men was 31% vs 45% (( p &lt; .06 )). The difference for women was in the opposite direction ( E = 47% ), ( C = 42% ); NS).</td>
<td>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 &lt; .05) ); weekly smokers ( (OR = 1.99, 95% CI = 1.13, 3.51; p &lt; .05) ); and students from the reference rather than the intervention schools ( (OR = 1.56, 95% CI = 1.16, 2.10, p &lt; .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.</td>
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Analysis 04.01.  Comparison 04 Combined social competence and social influences curricula versus control, Outcome 01 Results of Category 1 studies

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<td>Sussman 1995</td>
<td>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.</td>
<td>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 reduction in cigarette use in health-educator led group compared to self instruction. Study TND-I RHS: no differences between classroom and control.</td>
<td>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 &quot;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 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.&quot;</td>
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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

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<tr>
<td>Botvin 1980</td>
<td>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</td>
<td>The experimental group had fewer monthly smokers at 6 months than the control (6% vs 18%, p&lt;0.05).</td>
<td></td>
<td>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.</td>
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<tr>
<td>Botvin 1982</td>
<td>Baseline 426; 84% followed-up at 1 year; of whom 74% were nonsmokers at pretest. No analysis of attrition.</td>
<td>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 &lt;.01); thiocyanate levels remained the same in the experimental group but increased in the control group (p &lt;.05).</td>
<td></td>
<td>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.</td>
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<tr>
<td>Botvin 1983</td>
<td>Baseline &amp; post-test: 902, of whom 831 were nonsmokers; approx 73% followed at 1 year.</td>
<td>1y: For non smokers at baseline, the smoking rates for both Expt groups compared to control were: monthly smoking 15% vs 22% (p&lt;.05); 7 day smoking 8% vs. 15% (p&lt;.004); and daily smoking 6% vs. 11% (p &lt;.03). The E2 minicourse group had lower rates of onset of monthly (p &lt;.005), weekly (p &lt;.0008), and daily smoking (p &lt;.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.</td>
<td>Secondary analysis using GLM to control for school effects also demonstrated a significant benefit from Exp 2</td>
<td>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.</td>
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## Results of Category 2 studies (Continued)

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<tr>
<td>Borvin 1990a</td>
<td>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 exp. conditions being exposed to 60% or more of the programme. Implementation was significantly related to outcome.</td>
<td>4 month post test after 7th grade programme; there was a lower</td>
<td>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 &lt;0.3), but there was no significant difference (p &lt;0.09) 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 &lt;0.001) 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 &lt;0.05), and weekly (23%, 27%; p &lt;0.05) smoking. For Experimental Group 2 (videotape training, no feedback by project staff), compared to the Control group there was less monthly (26%, 33%; p &lt;0.01), weekly (21%, 27%; p &lt;0.05) and pack-a-day (9%, 12%; p &lt;0.05) 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.</td>
<td>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.</td>
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<td>Borvin 1990b</td>
<td>Baseline: 1311; 998 (76%) followed at 1 year.</td>
<td>1 year: In the Peer-led booster group compared to the Control there were</td>
<td>Methodological problems are: 24% attrition at 12 months; saliva was</td>
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<td>No differential attrition by pre-test smoking status.</td>
<td>proportion of monthly smoking in the peer-led (15%) compared to the teacher led (22%, p &lt; .01) and control (21%, p &lt; .05). Weekly and daily measures in same direction (NS).</td>
<td>fewer students reporting monthly (12%, 23%; p &lt; .02), weekly (5%, 16%; p &lt; .005), and daily smoking (3%, 13%; p &lt; .005) and on the index of smoking (.40, .74; p &lt; .005). In the Peer-led booster group compared to the Teacher-led booster group there were fewer students reporting monthly (12%, 34%; p &lt; .0001), weekly (5%, 21; p &lt; .0001), daily (3%, 16%; p &lt; .0005) smoking and on the index of smoking (.40, 1.08; p &lt; .0001). For the Peer-led booster group compared to the Peer-led non-booster group there were fewer students reporting monthly (12%, 31%; p &lt; .0002), weekly (5%, 22%; p &lt; .0001), daily (3%, 17%; p &lt; .0002) smoking and on the index of smoking (.40, .98; p &lt; .0001), and also compared to the Teacher-led non-booster group on monthly (12%, 26%; p &lt; .002), weekly (5%, 16%, p &lt; .002), daily (3%, 11%; p &lt; .02) smoking and on the index of smoking (.40, .75; P &lt; .002). Because field staff observed that many teachers implemented the programme with a low degree of 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</td>
<td>collected for thiocyanate but no results are stated; no statements about the method of randomisation, if blinded or concealed; no power computation; and no ICC's and allowance for clustering. 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.</td>
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### Results of Category 2 studies

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<td>Botvin 1999</td>
<td>2,209 (82%) at 1 year. Smokers had higher attrition rates (p &lt; .0001), but no differential attrition by condition.</td>
<td>At 1 year: less lifetime smoking in the experimental (28%) vs. the control group (34.5%; p &lt; .001), 30-day (8.8%) vs. (12.3%; p &lt; .005), initiation (19.6%) vs. (23.9%; p &lt; .02) and escalation from lifetime to monthly (6.7%) vs. (9.9%; p &lt; .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).</td>
<td>considerably less weekly (12%, 17%; p &lt; .05), and daily (8%, 13%; p &lt; .05) smoking and on the index of smoking (p &lt; .05).</td>
<td>Methodological problems were that at baseline the intervention group had more Blacks (67%) than the control group (47%; p &lt; .001); more students receiving free lunches (47%) than the control group (38%; p &lt; .001); and lower self-reported grades (p &lt; .02); no power computation; no ICC's; and no statistical modeling to assess the effect of differences in the unit of allocation and analysis.</td>
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<td>Gersick 1988</td>
<td>No baseline measurements, 1372 at post test At 2 years, attrition 21% compared to post test. Dropouts were post test substance users</td>
<td>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 &lt; .02) for the individual level analysis, and for smoking “once a month to 2-3 times/week or more” (8%, 13%; p &lt; .03), but there were no significant differences for a classroom level analysis (p &lt; .10). 66% were never users in intervention group vs 61% in control.</td>
<td>At 24 months: No significant differences in smoking between intervention and control groups when corrected for classroom effects by MANOVA (p &lt; .09). A post-hoc power computation showed that to achieve power &gt; .80, alpha would have to be set at .10 for MANOVA and logistic analyses.</td>
<td>Design problems: dropouts in the 8th grade smoked more (p &lt; .006); those from married families were less likely to drop out (p &lt; .0001); no statements about the method of randomisation, if blinded or concealed; and no power computation. ICC’s were not computed.</td>
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<td>Gilchrist 1987</td>
<td>Baseline: 102; 6m: The text (p. 875) states:</td>
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<td>Methodological problems: no</td>
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<td>Hanewinkel 1994</td>
<td>Baseline: 1,299; Follow-up at 6 months: 650 (50%)</td>
<td>At 6 months: In the Experimental group (Hauptschule 3, Realschulen 1 and 2, Gymnasium 1) 75% were nonsmokers at baseline, 84% post-intervention (p&lt;.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 &quot;waiting list control design&quot; in which all groups eventually received the intervention, with the control</td>
<td></td>
<td>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&lt;.01) with expired CO COcarbon monoxide.</td>
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<td>Josendal 1998</td>
<td>Baseline: 4441; 2 years: 3,820 (92%)</td>
<td>groups receiving it later. The group which served as the Control group to which Experimental Group 1 was compared was later designated as Experimental Group 2, but no intervention results are shown for this experimental group. 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 &lt; .01). These differences were maintained for separate analyses on subgroups: high sensation seekers (p &lt; .05), those with strong expectations to smoke (p &lt; .01) and with 1 parent who smoked (p &lt; .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.</td>
<td>Methodological problems are: no power computation; and no ICC’s and no allowance for clustering.</td>
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<tr>
<td>Sussman 1993</td>
<td>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 1y: Prevalence of trial (p &lt; .05) and weekly (p &lt; .05) cigarette use rose significantly less from posttest in 3 of the curricula (informational social influence, physical consequences, combined) than control, absolute 2y: Prevalence of trial cigarette use rose significantly less (p &lt; .05) in all experimental curricula than control, absolute difference 6-10%. Weekly cigarette use was significantly lower (p &lt; .05) in the combined curriculum</td>
<td>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</td>
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<td>whom 65% had attended a Project TNT school 2 years before.</td>
<td>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 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.</td>
<td>than all other conditions and control. The combined curriculum reduced the increase in weekly prevalence by 56% compared to control.</td>
<td>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; no analysis of results at the student level.</td>
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Results of Category 3 studies

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<td>Hansen 1988</td>
<td>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 &quot;there is no strong reason to suspect that the results obtained were attributable to attrition artefacts.&quot;</td>
<td>1 yr: For baseline non-smokers the rate of onset (1 puff or more) was lower among Social curriculum (13%) than Control (18%) (p&lt;.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 &lt; .009).</td>
<td>2y: For baseline non-smokers Social curricula still better than control, but not significant for each measure. Affective curriculum significantly worse (p &lt; .0001) on all measures.</td>
<td>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 &lt; .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 &lt; .0001), of baseline smokers (p &lt; .0001), and greater total attrition in the Social and Control (60%) than in the Affective group (37%; p &lt; .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.&quot;</td>
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Results of Category 1 studies

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<thead>
<tr>
<th>Study</th>
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<th>Long term outcomes</th>
<th>Additional comments</th>
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<tr>
<td>Hansen 1991</td>
<td>Baseline: 3,011; 1 year: 2,416 (80%). Attrition amongst students who received resistance training was 18% vs. 22% in other conditions. Analysis</td>
<td>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</td>
<td></td>
<td>Methodological problems are: differential attrition in the Resistance Training (18%) compared to the other 3 experimental groups (21.6%, p &lt; .01); no</td>
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### Results of Category 1 studies  *(Continued)*

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<td></td>
<td>based on cohort followed.</td>
<td>smoking. ANCOVA showed a significant main effect for normative education (F 4.76, p&lt;0.05) on the main cigarette index. There was no evidence of an effect of Resistance Training</td>
<td></td>
<td>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.</td>
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#### Analysis 06.01. Comparison 06 Multi-modal programmes compared to single-component interventions, Outcome 01 Results of Category 1 studies
### Results of Category 1 studies

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<td>Biglan 2000</td>
<td>Baseline: 2231 seventh and 2251 ninth graders. Year 2: 2231 seventh and 2284 ninth graders. Year 3: 2170 seventh and 2255 ninth graders. Year 4: 2268 seventh and 2440 ninth graders. Year 5: 2045 seventh and 2120 ninth graders. Only 13.5% of students did not receive an assessment in all 5 years of the study.</td>
<td>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 &lt; .022). After 5 years: the Index of weekly smoking in the Community intervention group was 12.4% and in the Schools Intervention group was 13.8% (p &lt; .038). Smokeless tobacco use in the Community Intervention communities decreased from 13.8% at baseline to 9.7% in Year 2 (p &lt; .04), and in the School Intervention communities from 11.4% to 13.6% (n.s.) However, there were no significant differences between the communities on expired carbon monoxide levels at any time.</td>
<td>Methodological problems are: no assessment of differential attrition; and no power computation. 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.</td>
<td></td>
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<td>Elder 1996</td>
<td>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</td>
<td></td>
<td>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.</td>
<td>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. The study was not designed to find a difference in smoking prevalence. Logistic regressions with a school random effect and fixed and random...</td>
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### Results of Category 1 studies (Continued)

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<td>Flay 1995</td>
<td>At 2 years 3,155 (47%)</td>
<td>In Los Angeles at the post-test there was lower prevalence in the social resistance (p &lt; .00001) and television (p &lt; .006) conditions. In San Diego at the post-test prevalence was lower in the social resistance groups (p &lt; .00001).</td>
<td>At the 2 year follow-up in Los Angeles there was lower prevalence in the social resistance group (p &lt; .0007) and in the television + social resistance group (p &lt; .05). In San Diego at 1 year prevalence was lower in the social resistance group (p &lt; .028).</td>
<td>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.</td>
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