Evidence review

School-based interventions to prevent the uptake of smoking among children and young people: effectiveness review

November 2021: NICE guidelines PH23 (February 2010) and PH26 (June 2010) have been updated and replaced by NG209.
The recommendations labelled [2010] or [2010, amended 2021] in the updated guideline were based on these evidence reviews.
See www.nice.org.uk/guidance/NG209 for all the current recommendations and evidence reviews.

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School-based interventions to prevent the uptake of smoking among children and young people: effectiveness review

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West Midlands Health Technology Assessment Collaboration

The West Midlands Health Technology Assessment Collaboration (WMHTAC) is an organisation involving several universities and academic groups who collaboratively undertake research synthesis to produce health technology assessments. Most of our members are based in the Public Health, Epidemiology & Biostatistics Unit, University of Birmingham, but other members are drawn from a wide field of expertise including economists and mathematical modellers from the Health Economics Unit, University of Birmingham.

WMHTAC produce systematic reviews, health technology assessments and economic evaluations for NHS R&D HTA programme (NCCHTA), the National Institute for Health and Clinical Excellence (NICE), and for the health service in the West Midlands. WMHTAC also undertakes methodological research on research synthesis, and provides training in systematic reviews and health technology assessment.

Name of other institution(s) involved

WMHTAC works in close collaboration with the Peninsula Technology Appraisal Group (PenTAG) with respect to providing support to the NICE Centre for Public Health Excellence (CPHE). PENTAG however was not involved in this particular project. Colleagues from the University of Bath undertook the qualitative review related to this project (described in a separate report).

Contents

List of Appendices

List of Tables

List of Figures

Abbreviations and acronyms

CBA	controlled before-and-after
CI	confidence interval
ICC	intraclass correlation coefficient
OECD	organisation for economic co-operation and development
OR	odds ratio
RCT	randomised controlled trial
QOUROM	quality of reporting of meta-analyses

Executive summary

Introduction and aims

This systematic review examines the effectiveness of interventions delivered in schools and designed to prevent the uptake of smoking in children and young people. The systematic review also considers specific sub-questions related to the factors that might influence effectiveness and quantitative information on barriers to implementation.

Methods

A comprehensive literature search was conducted. Cochrane Library (Wiley) (CDSR, DARE, HTA and CENTRAL) Issue 4 , York CRD database (DARE and HTA) October 2008, MEDLINE (Ovid) , MEDLINE In Process, EMBASE (Ovid), ERIC (CSA), PsycINFO (Ovid), ASSIA (CSA), and HMIC (Ovid) databases were searched to November 2008. Reference lists of systematic reviews were checked and selected websites were searched. Experts were contacted for additional research. 10625 titles and abstracts were screened, 632 full papers were examined and 62 RCTs (128 papers) were selected for inclusion. A second reviewer independently checked 10% of the records and the degree of agreement was high. Inclusion criteria were studies conducted on schoolchildren and young people less than 19 years of age, who received interventions principally delivered in schools designed to prevent uptake of tobacco smoking compared to do nothing, usual education or any other suitable comparators. The principal outcome was smoking prevalence. Studies conducted in non-OECD countries, published before 1990 or not in English were excluded. Quality of included RCTs was assessed using the NICE public health checklist and data extracted on to a spreadsheet and into evidence tables. One reviewer conducted data extraction which was checked by a second reviewer. Meta-analyses, on outcomes

from school-based only versus usual education or no intervention RCTs, were conducted using STATA version 10.1.

Summary of findings

Sixty-four RCTs (including 53 cluster RCTs) were included, having between 500 and 17,446 participants and follow up between 6 months and 13 years. Additionally, 37 references for controlled before-and-after studies (non-randomised controlled trials) met all the selection criteria except for the study design. These studies were not included given the large volume of RCTs available. There was a wide variety of school-based interventions described in the studies; six included the family, two included the community and three included family, community and mass-media interventions. Thirty two RCTs had more than one intervention group. All except four RCTs had comparators of usual education. Smoking outcomes reported included weekly or monthly smoking rates, never smoked children becoming occasional or regular smokers, smoking initiation, lifetime involvement in cigarettes and smoking onset rates.

Evidence Statements

Are any school-based interventions more effective than usual practice, minimal or no intervention? This category includes aspects of study design that can influence the apparent effectiveness results seen. Findings include the following:

- ES1: There is evidence from 27 studies that provided usable data for meta-analysis that interventions may be effective.
- ES2: There is strong evidence from subgroup analysis that interventions show more pronounced effectiveness in studies with lower quality (as measured by ++, + and – grades).
- ES3: There is no evidence of the intervention having a differential effect according to whether a study used biochemical validation or not. Evidence

from subgroup analysis shows that the intervention does not have a more pronounced effect when self-reported smoking behaviour was validated using biochemical methods (by saliva thiocyanate or cotinine or expired air carbon monoxide levels) compared to questionnaire completion only.

- ES4: There is good evidence about the differential effect according to type of outcome measures (prevalence of regular or experimental smoking). Results from 16 RCTs that used prevalence of regular smokers provided evidence that interventions may be effective in reducing smoking uptake among children.Pooled result from 10 RCTs that used experimental smoking as the main outcome also found that interventions could be marginally effective in preventing smoking uptake. Programmes that used prevalence of regular smoking tended to produce statistically significant results but the size of combined effect was very similar to that for programmes that used experimental smoking as an outcome measure. The main difference between the two was the width of the confidence intervals, giving one as statistically significant but not the other, so this difference may be a statistical artefact.

- ES5: There is good evidence of the intervention having a differential effect according to the way the results were presented. It may be that adjusted results tended to produce more significant programme effectiveness, i.e. when RCTs adjusted for potential confounders such as baseline smoking rates, sex, and socioeconomic status. Many of the studies with adjusted results were of low quality.

1a. When appropriate interventions can be compared, which are most effective?

- ES6: There is conflicting evidence about the effectiveness of different conceptual models of school-based prevention programmes (social influence, social competence, information giving and combined interventions) and the interventions in many RCTs were not effective in preventing or delaying uptake of smoking in comparison with no programmes or in comparison to

other forms of prevention programmes. Therefore there is no clear evidence to suggest that any particular conceptual model intervention is more effective than any other conceptual model intervention compared usual education. There is evidence from 15 RCTs (two ++, Canada; two ++, USA; three +, UK; four +, USA; one -, Norway; one -, The Netherlands; and two -, USA) that social influence curricula may be effective in preventing smoking but the size of effect is small. Four RCTs (three -, The Netherlands and one -, USA) provided evidence that information giving curricula may be effective with a larger effect size. However, social competence (one -, UK) and combined (one +, USA and three -, USA) curricula detected no difference in smoking prevalence between those students in experimental and control conditions. These results may be confounded by RCT quality.

- ES7: There is moderate evidence indicating that multi-component interventions incorporating both school and community components (with or without an additional family component) are ineffective in preventing the uptake of smoking compared to usual education. Five RCTs provided evidence comparing a multi-component intervention that incorporates both school and community components to usual education: Sun et al. 2006 (+, USA), Piper et al. 2000 (+, USA), Schinke et al. 2000 (+, USA), Schofield et al. 2003 (-, Australia), Gordon et al. 1997 (-, UK). Four of the studies (Gordon et al. 1997, Schinke et al. 2000, Schofield et al. 2003, Sun et al. 2006) found no significant difference between the multi-component intervention group and the usual education group during a maximum follow-up between 6 months (Gordon et al. 1997) and 5 years (Sun et al. 2006). One study (Piper et al. 2000) found no difference at 3-year follow-up and small, marginally significant positive or negative intervention effects (depending on the school component) at 4-year follow-up.

- ES8: There is inconclusive evidence as to the effectiveness of interventions incorporating both school and family components in preventing the uptake of

smoking compared to usual education. Thirteen RCTs provided evidence comparing interventions that incorporate both school and family components to usual education: Storr et al. (-, USA), Elder et al. 1996 (+, USA), Nutbeam et al. 1993 (+, UK), de Vries et al. 2006 (-, EU + UK), Perry et al. 2003 (++, USA), Elder et al. 2002 (+, USA), Spoth et al. 2001 (+, USA), Ary et al. 1990 (-, USA), Spoth et al. 2002 (-, USA), Connell et al. 2007 (-, USA), Simons-Morton et al. 1996 (-, USA), Piper et al. 2000 (+, USA) and Schofield et al. 2003 (-, Australia). Three of the RCTs (Simons-Morton et al. 1996, Storr et al. 2002 and Spoth et al 2001) found a significant positive effect of family and schools intervention compared to usual education. Nine RCTs (Elder et al. 1996, Nutbeam et al. 1993, Piper et al. 2000, Schofield et al. 2003, de Vries et al. 2003, Ary et a. 1990, Connel el a. 2007, Elder et al. 2002 and Spoth et al. 2002) showed no significant difference between family and schools intervention and usual education. One RCT showed a significant effect in boys but not girls (Perry et al. 2003).

1b. Are the interventions delaying rather than preventing the onset of smoking?

- ES9: There is conflicting evidence whether school-based smoking prevention programmes are delaying rather than preventing smoking uptake in children. Results from Campbell et al. 2008 (+, UK) and Bond et al. 2004 (+, Australia) RCTs suggested an attenuation of programme effect over time. Crone et al. 2003 (-, The Netherlands) and Sussman et al. 2007 (-, USA) also provided evidence that a smoking prevention programme may be delaying smoking uptake. Evidence from Klepp et al 1994 (-, Norway) suggested that school-based education could have a positive short-term impact on smoking behaviour, but that these effects tended to disappear over time. Dent et al. (-, USA) provided evidence that the intervention may be effective in preventing smoking uptake, and, Elder et al. 1993 (-, USA) provided evidence that their school-based education programme tended to have a long-term impact on smoking behaviour. Nutbeam et al. 1993 (+, UK); Peterson et al. 2000 (++, USA); Eisen et al. 2003 (+, USA); Chatrou et al. 1999 (-, The Netherlands); Ennet et al.

1994 (-, USA) and Schinke et al. 2000 (+, USA) showed that school-based prevention was not effective in preventing smoking at all follow-up periods.

- ES10: There is no robust evidence indicating that any school-based intervention has long-lasting effects beyond school leaving age. One US study (Peterson 2000, ++) demonstrated that a comprehensive smoking prevention programme that adopted a social influences approach, started at age 8-9 and continued through to age 17-18 was ineffective when smoking prevalence was measured at age 20. Another US drug prevention programme (Lynam 1999, +) targeting children aged 12-13 also found no significant effect on smoking at age 20.

1c. Does effectiveness depend on status of the person (e.g., peer, teacher or external trainer/researcher) delivering it?

- ES11: It is not clear whether effectiveness of school-based smoking prevention programme depend on the status of the person delivering it. There is conflicting evidence whether peer-led programmes produced most effective intervention effects on smoking initiation. It is important to note that a peer-led programme may be differentially effective based on how leaders are selected and how groups are formed, and may be curriculum dependent. There is some evidence that teacher-led, health educator-led, and peer-led programme tend to be equally effective. Eight RCTs examined whether effectiveness of school-based smoking prevention programmes depend on the status of the person delivering it. One RCT (Campbell et al. 2008 +, UK) showed that smoking prevention program was much the same for peer supporters and non-peer supporters. Three other studies (one + and two -) provided evidence that peer-led interventions tend to enhance smoking prevention programmes. For example, results from Telch et al. 1990 (+, USA) showed a marked suppression in the onset of both experimental and regular smoking among those students exposed to the resistance training with peer involvement. Similarly, Botvin et al. 1990 (-, USA) found that a cognitive-behavioural approach when carried out by peer-leaders and when additional boosters are provided can reduce tobacco

use. Yet Valente et al. 2006 (+, USA) provided evidence that a peer-led programme will be differentially effective based on how leaders are selected and how groups are formed, and this effect may be curriculum dependent. In one RCT (Ellickson et. al. 1993 -, USA), there was no statistically significant difference in regular smoking rates among students taught by health educators and those taught by adult teachers assisted by older teens. Similarly, Armstrong et al. 1990 (-, Australia) confirmed non-superiority of peer-led programmes to teacher-led programmes. However, this result was gender-specific. Both the teacher-led and peer-led programmes reduced, to about the same degree, the uptake of smoking by girls while only the teacher-led programme appeared to be effective in boys. Cameron et al. 1999 (++, Canada) provided evidence that teachers and nurses were equally effective providers regardless of delivery method. While, Sussman et al. 2003 (-, USA) reported that students exposed to interactive health educator-led interventions were less likely to use tobacco compared those not exposed to health educator-led instruction.

1d. Does site/setting influence effectiveness?

- ES12: Evidence shows that site or setting may influence effectiveness. One UK RCT tended to have had a more significant effect in rural schools. Otherwise, there is conflicting evidence of interventions having a differential effect according to location (rural or urban) or country of the study. Evidence from one RCT (Campbell et al. 2008; +, UK) indicated that students from schools located in the South Wales valleys were less likely to be regular smokers. Another RCT (Sussman et al. 1993 -) conducted in USA found that trial of cigarette smoking use was higher in the rural schools than in the urban schools. Weekly use of tobacco products did not differ by place of residence. Yet another study (Elder 1996; +, USA) found that Louisianans were more likely to be ever smokers than students from Texas State. Noland et al. 1998 (++, USA) provided limited evidence of significant treatment effects for 30-day,

7-day, and 24-hour smoking for those involved in smoking. One RCT (Ausems et al. 2004 -, The Netherlands) specifically compared in-school and out-of-school smoking prevention. These RCTs found that smoking initiation was lowest in the out-of-school and highest among students in control condition. The European Smoking Prevention Framework Approach (ESFA) found evidence of the intervention differential effect according to the location (country) of the study (de Vries et al. 2006 -, EU). ESFA was effective in prevention uptake of smoking Spain, Finland, and Portugal and ineffective in Denmark and UK. ESFA showed more smoking in the intervention group in The Netherlands. Our planned subgroup analyses provided evidence of no differential effect according to the country.

1e. Does effectiveness depend on the intensity of the intervention?

- ES13: There is clear evidence that the addition of booster sessions enhanced effectiveness of main programmes. Four studies (one ++ and three -) analysed effectiveness of booster sessions. Evidence from Perry et. al., 2003 (++, USA) suggests that addition of booster sessions significantly enhanced the effectiveness of the main programme and was more effective than the delayed programme controls. Dijkstra et. al., 1999 (-, USA) found that boosters can be an effective tool for maintaining or increasing the effectiveness of smoking prevention programmes. Botvin et. al., 1990(a) (-, USA) revealed that addition of booster sessions to cognitive-behavioural approach can reduce tobacco use. Another study (Eckhardt et. al., 1997 -, USA) showed that continued intervention students reported significantly less smoking than lapsed intervention and continued control students.

1f. How does effectiveness vary according to the age, sex, ethnicity, sexual orientation, baseline risk factors or socioeconomic status of the target audience?

- ES14: It is not clear whether the age of the target audience has any impact on effectiveness of school-based prevention of smoking. There is inconclusive evidence whether the effectiveness of interventions depend on the age at which students were recruited and the age of students at maximum follow-up. There is conflicting evidence that age is an important predictor of smoking in school-based prevention programmes. Three studies (Dijkstra et al. 1999 (+, USA); Gatta et al. 1991; (+, Italy) and Ausems et al. 2004; (-,The Netherlands)) found that the risk of smoking increased linearly with increasing age of the participants. Three studies (Johnson et al. 2005; (+, USA); Elder et al. 2002; (+, USA); and Chatrou et al. 1999; (-, The Netherlands)) found no significant association between age and prevalence of smoking. One particular study (Ausems et al. 2004; (-,The Netherlands)), found that this association diminished and became non-significant with longer duration of follow-up. Contrary to this finding, another study (Chatrou et al. 1999; (-, The Netherlands)) found that age did not predict prevalence of smoking regardless of duration of follow-up. We found inconclusive evidence whether effect of intervention depended on the age at which students were recruited and age of students at maximum follow-up. There is limited evidence from subgroup analyses which revealed that intervention may be effective when students were recruited at 11 or 12 years old, and when students were 14 or 16 years at maximum follow-up.

- ES15: There is weak evidence (Kellam 1998, - USA; Storr 2002, - USA) indicating that school-based interventions that start soon after entry into primary schools and that target behaviour management in the classroom, poor academic achievement, and teacher-parent communication regarding behaviour management may be effective in reducing the uptake of smoking up to age of

14. Evidence for the effectiveness of such interventions beyond this age is lacking.

- ES16: Evidence regarding the effectiveness of school-based interventions starting between age 7 and 10 is inconclusive. Studies report either no significant effect or significant effects immediately post-intervention which diminish over time. Two interventions focusing on smoking prevention demonstrated no significant effects on smoking (Gatta 1991, + Italy; Peterson 2000, ++ USA). Three interventions focusing on drug (substance) use prevention reported either no effect (Ringwalt 1991, + USA); non-significant reduction in smoking prevalence (Schinke 2000, +USA) or significant reduction in smoking prevalence immediately after intervention period that was not sustained at subsequent follow-up (Ennet 1994, -USA). One health promotion program that included a smoking prevention component found no significant effect (Elder 1996, +USA).

- **ES17 :** Forty-six RCTs investigated the effectiveness of school-based interventions that started in secondary schools between ages 11 to 14. Quantitative analysis indicated that whilst the observed effect for individual RCTs did not achieve statistical significance in most cases, overall the interventions appear to have modest effect in preventing the uptake of smoking. There is significant heterogeneity in the results between studies, indicating that the findings may be specific to the context of individual studies/interventions.

- ES18: Evidence from seven studies conducted in North America regarding the effectiveness of school-based interventions that start from age 14 or later is inconclusive. One RCT (Sussman et al. 2003 -, USA) reported a significant reduction in the odds of smoking for an educator-led intervention whilst two RCTs (Dent et al. 2001 +, USA; Sun et al. 2006, +, USA) evaluating different versions of the same curriculum reported no significant intervention effect. Four other RCTs reported significant effects either for a specific subgroup

(Brown et al. 2000 ++, USA) or for outcomes that may be more relevant to smoking cessation than prevention (Brown et al. 2001 +, USA; Werch et al. 2005 +, USA; Winkleby et al. 2004 +, USA).

- ES19: There is conflicting evidence of differential effect of intervention according to the sex of the target audience. However, there is moderate evidence that sex is an important predictor of post-test smoking, but direction of effect (either in male or female student) is inconclusive. Furthermore, association of sex with smoking prevalence depends on how the outcome was measured. One recent study (Campbell et al. 2008 +, UK) found no significant difference in effectiveness of school-based intervention among male and female students. Another study (Peterson et al. 2000 ++, USA) provided no evidence of Hutchinson Smoking Prevention Project impact on the prevalence of daily smoking, either for girls or for boys. Three studies (Brown et al. 2002 ++, Canada; Abernathy & Bertrand 1992 +, Canada; and Kellam & Anthony 1998 -, USA) demonstrated that the intervention was more effective among male students; while only one study (Shean et al. 1994 -, Australia) found that both teacher-led and peer-led programmes reduced the uptake of smoking by girls to about the same degree. There was also conflicting evidence from nine studies whether sex was an important predictor of post-test smoking. Only one study (Chatrou et al. 1999 -, The Netherlands) provided evidence that sex was not associated with post-test smoking. Two studies (Johnson et al. 2005 +, USA and Simons-Morton et al. 2005 -, USA) found that female students were more likely than male students to have reported smoking at follow-up and only one study (Schofield et al. 2003 -, Australia) found that boys were less likely than girls to have reported smoking at follow-up. Yet, three studies (Elder et al. 1996 -, USA; Sussman et al. 2003 -, USA; Ausems et al. 2004 -, The Netherlands) revealed that males were more likely to be a smoker than their female counterparts. Another two studies (Elder et al. 2002 +, USA and Gatta et al. 1991 +, Italy), demonstrated that compared to male students, female students were less likely to have used tobacco.

- ES 20: There was no evidence about sexual orientation of participants and the impact of the interventions.

- ES21: There is moderate evidence that ethnicity is an important predictor of smoking behaviour, such that white students were less likely to be smokers. Similarly, there is moderate evidence that the observed association between race and smoking behaviour depend on how the outcome was measured. Four studies (two +, USA and two - USA) specifically looked at whether race or ethnic group is an important factor in predicting post-test smoking among students exposed to school-based smoking prevention programme. Only one study (Simons-Morton et al. 2005 (-), USA) demonstrated no association between ethnicity and smoking status. Three studies found that ethnicity was an important factor in predicting post-test smoking behaviour. For example, Elder 1996 (+, USA) provided evidence that white students were less likely to be classified as ever-smoker. Two studies (Johnson et al. 2005 (+), USA and Elder et al. 1993 (-), USA) revealed that ethnicity affects smoking prevalence depending on how the outcome was measured. One multi-country study (de Vries et al. 20066 -, EU) in six European countries, provided evidence that in The Netherlands there was differential significant effects for adolescents with a Dutch and non-Dutch origin. The Dutch ESFA programme was effective for non-native adolescents with fewer new weekly smokers compared to new weekly smokers in the control group. An opposite effect was found in native Dutch adolescents with more new weekly smokers in the experimental compared to new smokers in the control group.

- ES 22: There is no conclusive evidence about the variability of programme effectiveness in high risk individuals. Josendal et al. 1997 (++, Norway) showed positive effects of a school-based intervention at six months in certain high risk groups. Snow et al. 1992 (-USA) provided evidence that students from single parent households were less likely to have been positively affected by the intervention than those from two-parent households. The following factors

were also found to be associated with post-test smoking: Attitudes and smoking habits of family (Armstrong et al. 1990 -, Australia; Elder 1996 +, USA and Chatrou et al. 1999 , The Netherlands) attitudes and smoking habits of peers,(Armstrong et al. 1990 -, Australia; Chatrou et al. 1999 -, The Netherlands; Elder 1996 +, USA and Schofield et al. 2003 -, Australia) tobacco advertising (Armstrong et al. 1990 -, Australia), availability of cigarettes at home (Elder 1996 +, USA) involvement of students at school (Schofield et al. 2003 -, Australia) baseline smoking status (Chatrou et al. 1999 -, The Netherlands and Schofield et al. 2003 -, Australia) and future smoking intentions (Armstrong et al. 1990 -, Australia)

- ES23: One RCT (Campbell et al. 2008; + UK) found no association between the students' socioeconomic status and programme effect.

1g. Are there any adverse or unintended effects (negative) of the intervention?

- ES24: There is limited evidence on adverse or unintentional effect of school-based prevention of smoking uptake. No studies specifically examined adverse or unintentional effects of school-based smoking prevention programmes. One multi-country study (de Vries et al. 2006 -, EU) in six European countries found that adolescents in The Netherlands exposed to school-based smoking prevention programme were more likely to be a regular smoker than those in control condition. Piper, Moberg, & King 2000 (+, USA) provided evidence that age-appropriate intervention emerged as marginally harmful over the control condition.

2. Barriers and facilitators – Quantitative data

- ES25: An obvious barrier to interventions may be poor student attendance so that interventions, regardless of their value, will fail to have positive effects. In one RCT, a dose-response relationship was observed between programme participation and changes in smoking status.

- ES26: In one RCT, engagement with the intervention (reported programme interesting/very interesting and useful) was shown to be related to follow-up smoking status; those engaging being less likely to be smokers at 1 year.

1. Background

Smoking has been identified as a major risk factor in the development of cardiovascular disease and cancer and has a significant impact on overall life expectancy (Bjartveit & Tverdal 2005; Freund et al. 1993; Jacobs, Jr. et al. 1999; Streppel et al. 2007). It is estimated that, in the UK alone, smoking is responsible for over 100,000 deaths each year (Sandford 2008).

The National Institute for Health and Clinical Excellence (NICE) has been asked by the Department of Health (DoH) to develop guidance on public health interventions aimed at preventing the uptake of smoking among school children (National Institute for Health and Clinical Excellence 2008). This effectiveness review is part of the evidence review undertaken by the West Midlands Health Technology Assessment Collaboration (WMHTAC) and commissioned by NICE to support the development of this guidance. This report reviews existing evidence on the effectiveness of school-based interventions to prevent the uptake of smoking among children and young people. The findings of the report have been used to inform the development of a de novo economic modelling on this topic, which will be described in a separate report (the economic modelling report). These two reports are complemented by another review of evidence on the cost-effectiveness of school-based interventions (the cost-effectiveness review), and a further review of qualitative literature that explores facilitators and barriers to the successful delivery of these interventions (the qualitative review).

As this is a review of school-based public health interventions, it is important to compare school systems in different countries. **Table 1:1** shows the ages and grades for the UK, US, and Australia.

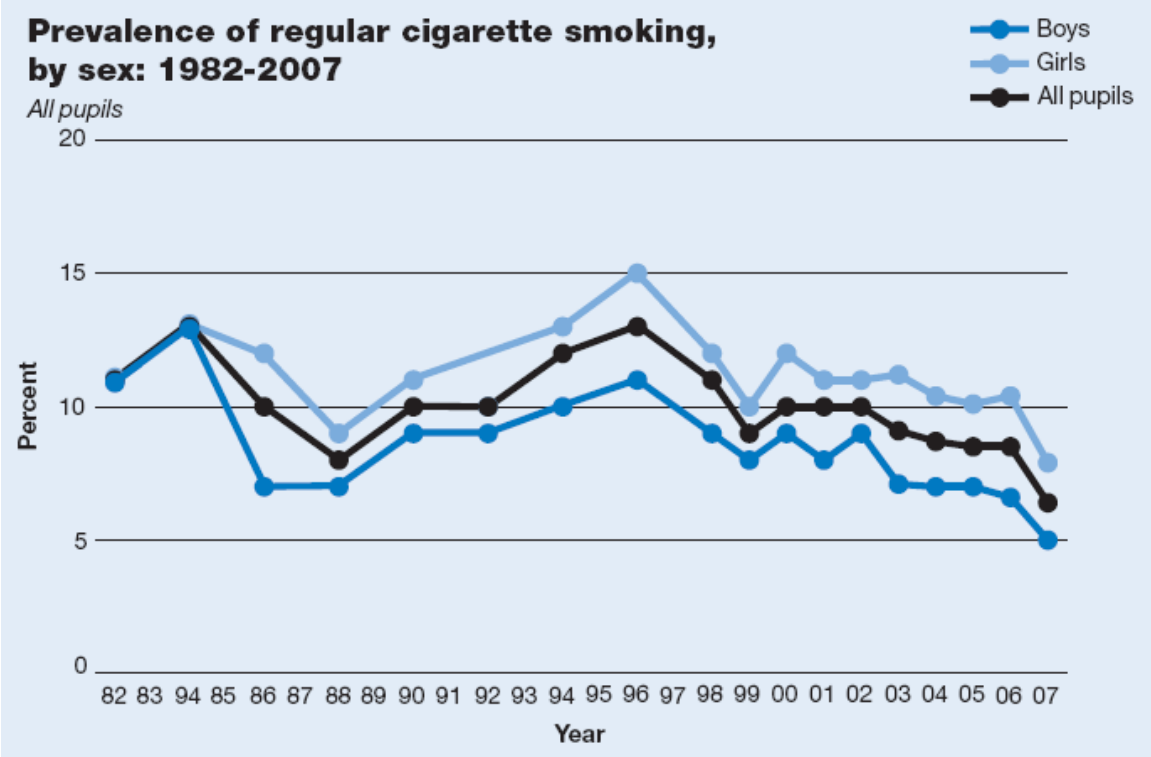
Table 1:1 School systems in the UK, US and Australia

Age (years)	UK	US	Australia
	Infant school		
5-6	Year 1	Kindergarten	Reception
		Elementary school	Primary school
6-7	Year 2	1st grade	Year 1
	Junior school		
7-8	Year 3	2nd grade	Year 2
8-9	Year 4	3rd grade	Year 3
9-10	Year 5	4th grade	Year 4
10-11	Year 6	5th grade	Year 5
	Secondary school	Middle school	
11-12	Year 7	6th grade	Year 6
			Secondary school
12-13	Year 8	7th grade	Year 7
13-14	Year 9	8th grade	Year 8
		High school	
14-15	Year 10	9th grade (Freshman)	Year 9
15-16	Year 11	10th grade (Sophomore)	Year 10
	Sixth form		
16-17	Year 12	11th grade (Junior)	Year 11
17-18	Year 13	12th grade (Senior)	Year 12

1.1. Smoking in children and adolescents

Smoking trends in UK school children are monitored on an annual basis and the most recent statistcs show that rates in children, as with adults, are decreasing.(Fuller 2008) For children aged 11-15 years, rates of regular (weekly) smoking have decreased in recent years (Figure 1:1). Although trends appear positive, they are not outside of the large variation in smoking rates observed. It was estimated that, in 2007, approximately 6% of 11-15 year olds were regular smokers.(Fuller 2008)

Figure 1:1 Trends in cigarette smoking in UK 11-15 year olds. The health and social Care Information Centre (Fuller 2008)



Early initiation of lifetime smoking increases the risk of developing later life lung cancer and heart disease (Muller 2007) and prevention of early teenage smoking may be important for reducing rates of life-long smoking and associated disease. In addition, it has been suggested that most adult smokers begin smoking before the age of eighteen (Jason et al. 1999) (US study) and this is supported by UK data.

Figure 1:2 shows current rates of regular smoking in children of different ages. At 15 years; approximately 15% of children are regular smokers. With the addition of some who may smoke less frequently at this age, it is easily perceivable that current rates of adult smoking (24% in 2005 and falling) (Office of National Statistics 2006) are largely attributable to smoking initiated in adolescence.

Figure 1:2 Current (2007) cigarette smoking in UK 11-15 year olds. The Health and Social Care Information Centre (Fuller 2008)

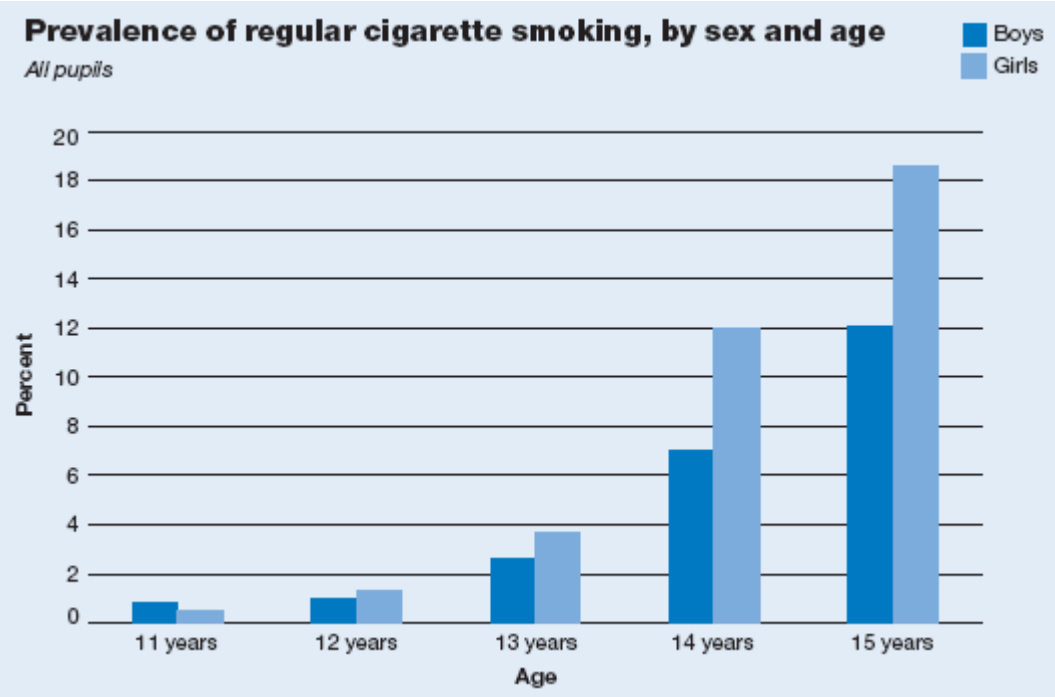


Figure 1:3 Trends in past month cigarette smoking in US high (15-18 years) and middle (11-14 years) school students. The department of Health and Human Services, Centres for Disease Control and Prevention (CDC 2006)

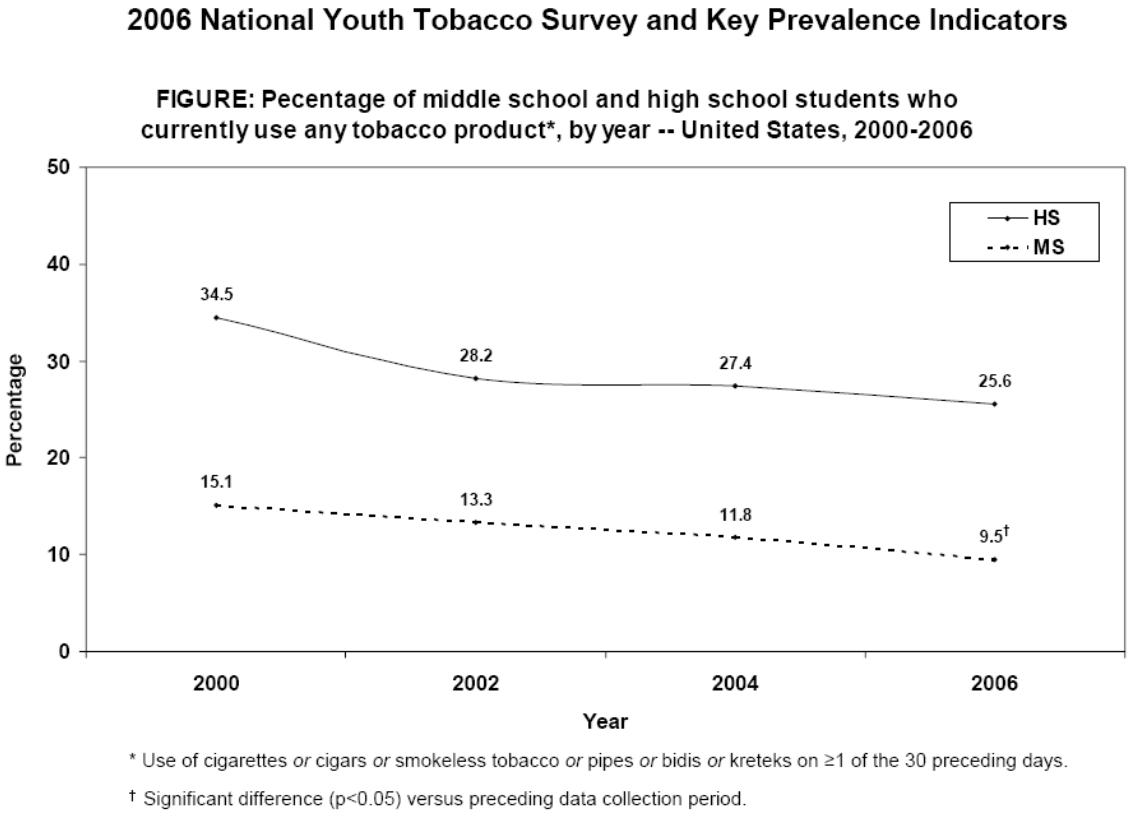
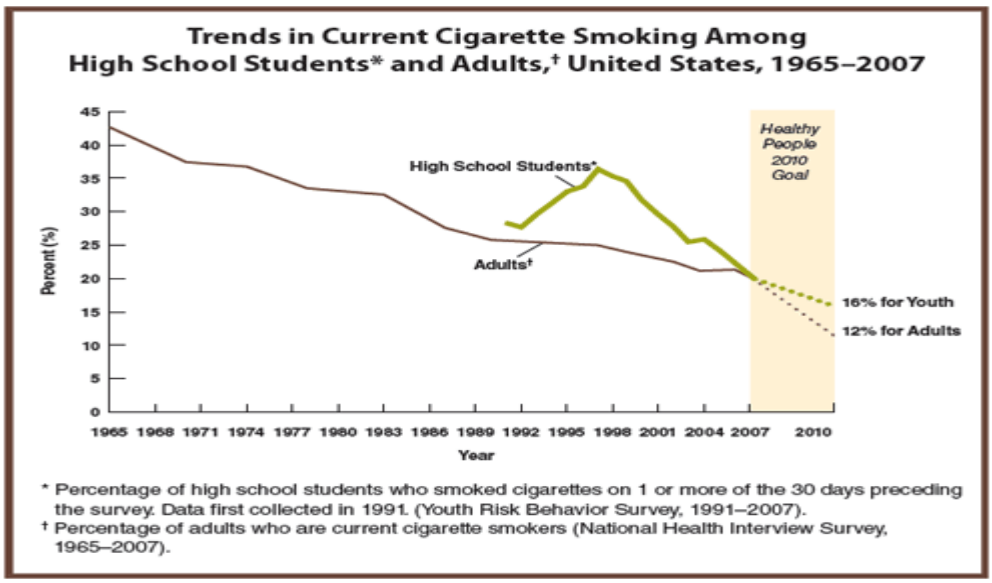


Figure 1:4 Trends in past month cigarette smoking in US high (15-18 years) and middle (11-14 years) school students. The department of Health and Human Services, Centres for Disease Control and Prevention(CDC 2009)



For this review, US trends are also relevant since many of the included studies were conducted in the United States. Here, trends in the US are briefly discussed. Figure 1:3 shows trends in US middle (11-14 years) and US high (14-18 years) school students since 2000(CDC 2006) and figure 4 shown trends in adults and high school students since the early 1990s (CDC 2009).

In 2006, 9.5% of US 11-14 year olds used tobacco (CDC 2006). This is slightly higher than the approximate 2006 UK level in 11-15 year olds (~8%) and, if 15 year olds had been included in the US survey, rates may have been even higher. The US survey measured monthly smoking whereas the UK survey measured weekly smoking. These uncertainties make it difficult to directly compare rates but it appears that they are reasonably similar.

From 2000, smoking has reduced in a similar way in 11-14 year old/middle school children in the US and the UK (Figure 1:1 and Figure 1:3). Trends in US high and middle school children appear to be similar (Figure 1:3) and it may therefore be reasonable to use earlier US high school data, from the 1990s (Figure 1:4), to compare with UK 11-15 year old data (Figure 1:1). Smoking trends in the US appear to show a similar pattern to the UK, with increases in rates in the 1990s (Figure 1:1 and Figure 1:3) and reductions since 2000 (Figure 1:1, Figure 1:3 and Figure 1:4).

1.2. Risk factors for childhood smoking

There are several factors that increase the risk of starting to smoke in childhood. Age will naturally play a part, with increasing smoking prevalence as adolescents progress into their teenage years (Figure 1:2), but gender, socioeconomic status and ethnicity are also important determinants of smoking initiation (Fuller et al. 2007; Fuller 2008). Paternal smoking, single parent families, parents divorce, death of a parent and migration to a town were also shown to be associated with teenage smoking (Isohanni et al. 1991) but, as with many potential risk factors, the possibility of confounding must be taken into consideration.

The influence of peer pressure is likely to play a major role in determining teenage smoking habits. In response to a survey, 45% of 11-15 year olds thought that, of people their own age, half smoked (Fuller et al. 2007). The real rate is well below this value, highlighting a teenage perception that smoking prevalence is high amongst their peers. This may increase the social pressure to smoke in order to conform to a perceived norm or that the surveys are undercounting the prevalence of smoking.

The importance of friendship group and social context to smoking habit were highlighted in a study of UK 15 year olds (Bell et al. 1999). Changing friendship groups, decisions on whether to start in further education, increased parental freedom and fluctuating income influenced smoking and decisions to initiate, continue or quit are likely to be complex and influenced by social circumstances.

School-based interventions may be important to provide an early grounding in education, encouragement and support to help adolescents negotiate current and future influences and pressures to smoke.

1.3. School-based interventions

Schools provide an attractive venue for smoking prevention interventions. The majority of children go to school. Schools are the primary sources of health-related education and they provide natural classroom settings for intervention delivery. Furthermore, schools-based intervention may reach and support children in one of their most vulnerable environments; grouped with other children and under the influence of their peers. Various approaches have been adopted in school-based interventions for preventing the uptake of smoking. These are mainly based on a few theoretical/conceptual frameworks:

1. Information-giving: school children are presented with information about smoking, including its prevalence and incidence and its short-term and long-term impact on health. Information is sometimes presented in ways that dramatise the dangers associated with smoking (or other substances) in an attempt to evoke fear

(Botvin & Griffin 2007). This approach assumes that information alone can influence behaviour.

2. Social competence: school children are taught generic personal and social skills, such as goal-setting, problem-solving and decision making; 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. This approach assumes that children and young people learn smoking through observing, imitation, modelling and reinforcement, and this process is influenced by their cognitions, attitudes and skills. Poor personal and social skills and poor self-concept increase their susceptibility to smoking (Thomas & Perera 2006).

3. Social influence: this approach adopts normative education, which aims to influence school children's perception of societal normality and correct the misconception that smoking among their peers (and adults) is normal and frequent. Methods used include presentation of survey data showing actual prevalence rates and guided class discussions on opinions toward smoking. This approach also aims to increase school children's awareness of influences from their peers, family and media on smoking, and to improve their recognition of high-risk situations for smoking uptake and their refusal skills when exposed to these situations.

These approaches are not mutually exclusive and have evolved over time. Whilst some early interventions (before 1990s) have focused on information-giving alone, subsequent interventions have adopted social competence and/or social influence approaches with or without retaining the information-giving component. Many interventions based on the social influence framework apply generic training of social competence skills to specific anti-tobacco (or other substance) contexts.

1.3.1 Important elements of a school-based intervention

One recent review of systematic reviews developed a nice summary of the effective ingredients of effective drug prevention programs (Flay BR 2009):

- Interactive delivery methods
- The use of the social influence model
- Including components on norms, commitment not to use, and intention not to use
- Add community components
- Including the use of peer leaders rather than relying totally on adult providers
- Including training and practice in the use of refusal and other life skills
- Programs that have more sessions, and that continue for multiple years are more effective

Interventions to prevent smoking in children and young people need not take place in schools. Various interventions that focus on parents (family) and community involvement have been developed and tested. These interventions are sometimes used in combination with school-based interventions in the hope of maximising the effectiveness of the interventions. Distinction between these types of interventions is not always clear. For example, school-based interventions may incorporate family components ranging from providing an information leaflet actively inviting parents to attend meetings and training. Family interventions that focus on parents may use schools as the medium for recruiting and liaising with parents, or simply use the school venue for delivering training programmes. For the purpose of this review, family/community interventions with at least some school component (explicit or implicit) are included. Those clearly without any school component are beyond the scope of this review and are not included.

1.4. Research questions for this review

Two key questions were specified in the scope published by NICE for developing this guidance (National Institute for Health and Clinical Excellence 2008):

- Which school-based interventions, or combination of school-based interventions, are effective and cost-effective in preventing children and young people from taking up smoking?
- What factors aid the delivery of effective school-based interventions to prevent the uptake of smoking? What are the barriers to successful delivery?

The four reports (cost-effectiveness review, effectiveness review, qualitative review and economic modelling report) that collectively form the evidence review undertaken by the WMHTAC address these questions.

For this effectiveness review, the primary question being addressed is:
Are any school-based interventions more effective than usual practice, minimal or no intervention, or other school-based interventions in preventing children and young people from taking up smoking?

Any studies that address the primary research question has been reviewed to identify evidence that helps answering one or more of the following sub-questions:

- When appropriate interventions can be compared, which are most effective?
- Are the interventions delaying rather than preventing the onset of smoking?
- Does effectiveness depend on the status of the person (e.g., peer, teacher or external trainer/researcher) delivering it?
- Does site/setting influence effectiveness?
- Does effectiveness depend on the intensity of the intervention (longer versus shorter duration programmes / booster sessions after programme completion versus no booster)?

- How does effectiveness vary according to the age, sex, ethnicity, or socio-economic status of the target audience?
- Are there any adverse or unintended effects (negative) of the intervention?

This review also covers quantitative evidence regarding factors that aid and barriers that hinder the successful delivery of effective school-based interventions to prevent the uptake of smoking. However the primary evidence relating to these is of qualitative nature and is covered in a separate qualitative review.

Previous relevant NICE public health guidance in this area include the following:

- Preventing the uptake of smoking by children and young people. NICE public health guidance 14 (2008). Available from: www.nice.org.uk/PH14
- Smoking cessation services. NICE public health guidance 10 (2008). Available from: www.nice.org.uk/PH10
- Social and emotional wellbeing in primary education. NICE public health guidance 12 (2008). Available from: www.nice.org.uk/PH12
- School-based interventions on alcohol. NICE public health guidance 7 (2007). Available from: www.nice.org.uk/PH7
- Varenicline for smoking cessation. NICE technology appraisal 123 (2007). Available from: www.nice.org.uk/TA123
- Brief interventions and referral for smoking cessation in primary care and other settings. NICE public health guidance 1 (2006). Available from: www.nice.org.uk/PH1

2. Methods

2.1. Literature search

2.1.1 Overview

To address the question "Which school-based interventions are effective and cost-effective in preventing young people from taking up smoking?" the following types of literature were targeted:

- Primary studies located via searches of bibliographic databases and selected websites.
- Primary studies identified from references in existing systematic reviews
- Studies suggested by experts/stakeholders.
- Studies obtained via public health and other appropriate websites

The searches of bibliographic databases involved: (1) an initial scoping search during which key references were identified and search strategies were refined; (2) a main search using the agreed search strategies to identify potentially relevant studies for all four reports (effectiveness review, cost-effectiveness review, economic modelling report and qualitative review). In addition, a cost-effectiveness search was conducted to facilitate the identification of economic studies. This separate search has been described in the cost-effectiveness review and will not be further described in this report.

2.1.2 Search process and methods

Bibliographic database search strategies

Our initial scoping searches targeted systematic reviews, evidence briefings and guidelines as well as a brief search for primary studies. A search strategy was developed and tested using a number of significant studies retrieved during this

scoping process. This strategy was then refined and expanded after discussion with information specialists at NICE. The key concepts of the search question are the intervention i.e. 'interventions used to prevent the uptake of smoking' and the population 'children/young people in school/educational settings'.

The databases and websites that were searched are described in subsequent sections. The final, full search strategy for the main search is detailed in Appendix 1. The search process has been clearly documented (databases searched, date searched, time span searched, results of individual searches) to ensure it is transparent and repeatable. Search results have been saved as text files and also stored in a Reference Manager database managed by the reviewers.

Bibliographic databases

The following electronic databases were searched:

- Systematic reviews and primary studies: Cochrane Library (Wiley) (CDSR, DARE, HTA and CENTRAL) 2008 Issue 4 , York CRD database (DARE and HTA) October 2008, MEDLINE (Ovid) 1950 – November week 1 2008 , MEDLINE In Process at 12 November 2008, EMBASE (Ovid) 1980 – 2008 week 45, ERIC (CSA) at 12 November 2008, PsycINFO (Ovid) 1987 – November week 2 2008, ASSIA (CSA) at 14 November 2008, and HMIC (Ovid) October 2008

As the searches sought to retrieve both quantitative and qualitative studies, no study design filter was employed. Instead all studies retrieved were sifted by the reviewers and tagged according to type of study. For the MEDLINE and EMBASE searches for systematic reviews the Haynes (Montori et al. 2005) optimised reviews filter was used to target such reviews in the initial scoping searches. Reviews published in the intervening period were tagged by the reviewers during the sifting process of the main search. The searches used the following limits: English language only and a date range of 1990-2008.

Selected websites

The database searches were also supplemented by searches of the following websites:

- ARIF website and database http://www.arif.bham.ac.uk/
- TRIP database http://www.tripdatabase.com/index.html
- Clinical Evidence http://clinicalevidence.bmj.com/ceweb/conditions/index.jsp
- Bandolier http://www.medicine.ox.ac.uk/bandolier/index.html
- Cochrane Public Health Group http://www.ph.cochrane.org/en/index.html
- The Campbell Collaboration http://www.campbellcollaboration.org/
- The Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre Social Science Research Unit Institute of Education, University of London) http://eppi.ioe.ac.uk/cms/
- The Trials Register of Promoting Health Interventions (TRoPHI) http://eppi.ioe.ac.uk/webdatabases/Intro.aspx?ID=5
- NICE public health guidance http://www.nice.org.uk/guidance/index.jsp?action=byType&type=5
- HDA publications via NICE website http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda_publications.jsp
- UK Public Health Association http://www.ukpha.org.uk/
- Websites of Public Health Observatories
- Department for Children Schools and Families http://www.dcsf.gov.uk/index.htm
- National Service Framework for Children, Young People and Maternity Services Case studies Database http://www.childrensnsfcasestudies.dh.gov.uk/children/nsfcasestudies.nsf
- Every Child Matters : Change for Children http://www.everychildmatters.gov.uk/
- Action on Smoking and Health (ASH) http://www.ash.org.uk/
- Quit http://www.quit.org.uk

- Centre for UK Tobacco Control Research http://www.ctcr.stir.ac.uk
- ASH Scotland website http://www.ashscotland.org.uk/ash/
- ASH Wales website http://www.ashwales.co.uk/
- Health Scotland http://www.healthscotland.com/

2.2. Selection of studies for inclusion

2.2.1 Identification of potentially relevant studies

Records retrieved from the main search of bibliographic databases were imported into a Reference Manager database, which detected and excluded some of the duplicated records during importing. Among 10,625 records imported, a further 1,601 duplicated citations were identified and deleted manually. The title and/or abstract of the remaining 9,024 records were screened by one reviewer (OU or IY) to identify potentially relevant studies (of any design) using a pre-designed checklist (see Appendix 2). Six hundred records were considered potentially relevant and full papers for these records were ordered. A second reviewer (YFC) independently checked 10% of the 9,024 records and found good agreement in the identification of potentially relevant articles (Kappa = 0.78, 95% CI 0.72-0.86). Thirty two further potentially relevant titles were identified through checking published systematic reviews and the reference lists of identified primary studies. Overall 632 articles were considered potentially relevant.

2.2.2 Applying inclusion/exclusion criteria

Full papers of potentially relevant articles were assessed for inclusion by one reviewer (OU) using the inclusion/exclusion criteria described below.

2.2.2.1 Population

Groups that are included in this review:

Children and young people under 19 years of age attending educational institutions including, but not limited to:

- State-sector primary and secondary schools
- 'Extended schools' where nursery or other informal education is provided
- City technology colleges, academics, grammar schools, further education colleges, special and independent primary and secondary schools and alternative centres of education (such as learning centres, secure training and local authority secure units)
- Consideration was given to disadvantaged and vulnerable groups

Groups that are not included in this review:

- Children under the age of 5 who do not attend an educational institution
- Children and young people who are educated at home
- Children and young people who are excluded from school
- Young people aged over 16 who are not in education
- Young people aged 19 and older

2.2.2.2 Intervention

Activities/interventions that are included in this review:

Any form of educational interventions principally delivered in schools designed to prevent uptake of tobacco smoking. These include, but are not limited to:

• Information giving, social competence, social influence, combined social influence and competence, or multimodal programmes

• Peer-led, teacher-led, health care worker-led or researcher-led programmes

• Tobacco-focused or tobacco together with other substances such as drugs and alcohol

School-based programmes that had, as one their goals, deterance of the uptake of tobacco smoking (e.g. programmes to prevent substance abuse including tobacco smoking) are included if outcomes related to tobacco smoking were measured and reported separately. Education or health promotion programmes that did not target tobacco smoking but included tobacco smoking as one of the outcome measures were excluded unless the authors explicitly clarified the relationship between the targeted behaviours and uptake of smoking.

Activities/interventions that are not included in this review:

Interventions with no school component, including:

- Mass-media and point-of-sales measures
- Community-based interventions
- Family interventions
- Interventions that challenge the social acceptability of smoking (such as smoke-free homes or cars)
- Interventions to encourage or support children and young people to quit smoking
- Interventions to discourage or reduce the uptake of tobacco chewing and the use of smokeless tobacco by children
- Tobacco pricing policies (e.g. tax increases) or measures to control tobacco smuggling
- Interventions to alter the prevalence of smoking substances other than tobacco (e.g. cannabis, opium, heroin, and crack cocaine)

2.2.2.3 Comparators

No intervention, usual education and other range of comparators, specific to studies.

2.2.2.4 Outcomes

Primary outcome

The primary outcome considered in this review is change in smoking prevalence. This can be attributed to either changes in the uptake of smoking among non-smokers (the main outcome of interest for this review) or changes in the cessation of smoking among existing smokers (beyond the scope of this review) or both together. The preference in this review is given to studies in which outcomes related to children who are non-smokers at baseline are reported. Studies which report changes in overall smoking prevalence without separating baseline non-smokers from smokers are included with the fact noted.

Multiple definitions of classifying a child as a smoker are used in the research literature. The preferred definition for this review is 'smoking one or more cigarettes per week'. Where studies use other definitions, such as:

- Smoking daily
- Smoking in the past month
- Experimentation with smoking

These are included and the definitions noted. Smoking status may be self-reported or biochemically validated.

Secondary outcomes

Secondary outcomes of interest include:

- Quantitative changes in knowledge and attitudes related to smoking
- Improved social skills (including refusal skills)
- An ability to cope with stress or peer pressure
- Improved self-esteem and self-efficacy

- Any adverse or unintended (positive or negative) effects of the intervention

A study needs to report a primary outcome to be included. Studies which report only secondary outcomes but do not report the primary outcome are excluded.

2.2.2.5 Language, time period and location

Studies conducted in OECD-listed countries (see Appendix 2), published from 1990 onwards and reported in English are included. Studies conducted in non-OECD countries, published before 1990 or published in non-English language are excluded.

2.2.2.6 Study types

Full papers that were retrieved for further assessment were tagged according to the design of the studies using a pre-defined checklist (see Appendix 3). The inclusion/exclusion criteria related to the types of study design are described below.

Review level studies

The main aim of searching for systematic reviews was to identify primary studies. These reviews were tagged and their reference lists checked but they were not included nor extracted. This prevented quoting duplicated evidence.

Primary studies

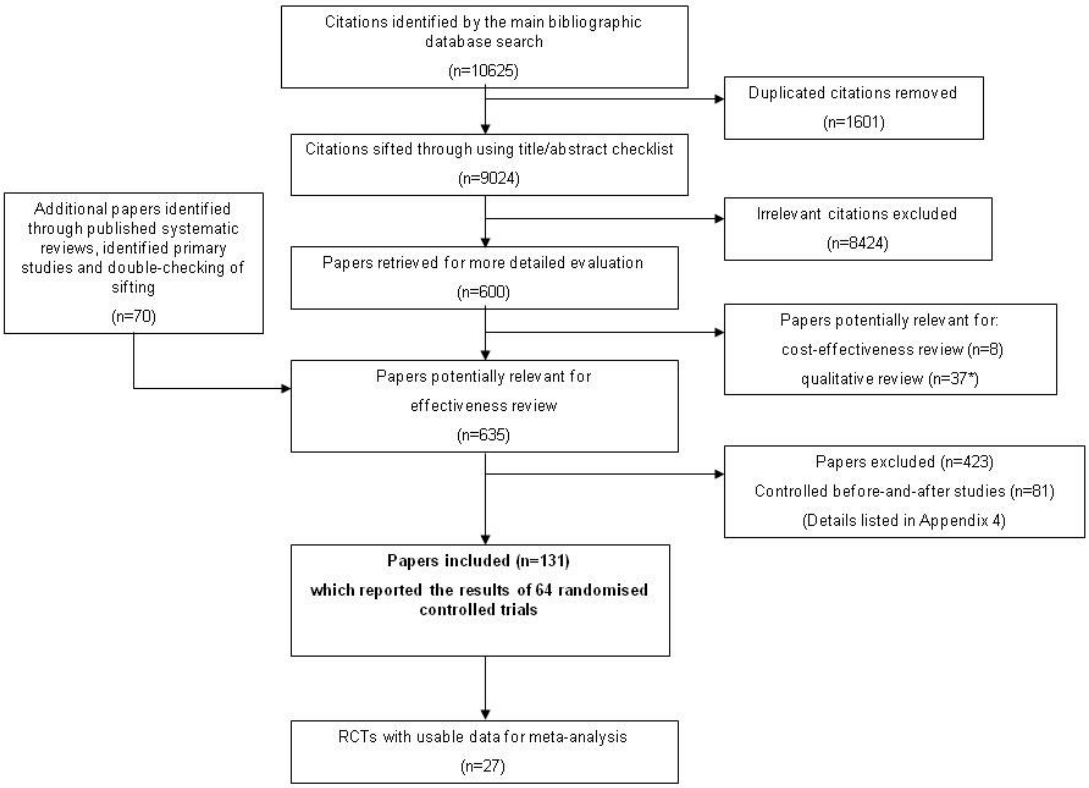
- Randomised controlled trials (RCTs): cluster RCTs that meet all the above inclusion criteria were tagged. RCTs with follow-up of six months or longer were tagged separately from those with follow-up of less than six months. RCTs with follow-up of ≥ 6 months and a sample size ≥ 500 were included. Small trials with sample size less than 500 lack statistical power and make it difficult to draw a reliable conclusion.

- Longitudinal intervention studies (i.e. non-randomised controlled trials or controlled before and after studies): these studies were tagged and divided according to duration of follow-up.
- Longitudinal observational studies such as cohort studies and case control studies, as well as before and after studies, and interrupted time series with no control group were tagged.
- Cross-sectional studies and ecological studies: these studies were excluded but were also tagged.
- Qualitative research: these studies were tagged but were not assessed in this review. All tagged qualitative researches were forwarded to the team who separately undertook the synthesis of qualitative evidence and compiled the qualitative review.
- Economic literature: these studies were tagged but were not assessed in this review. All tagged economic studies were forwarded to the team who compiled the cost-effectiveness review.
- Studies of unusual design that did not fit into any of the above categories were tagged and were excluded as so many good-quality large RCTs with long follow-up were found.

2.2.3 Results of study selection

Of the 635 articles that were considered potentially relevant, 131 papers met the above selection criteria and were included in this effectiveness review. A list of excluded studies and reasons for exclusion can be found in appendix 4. The overall study selection process is shown in Figure 2:1

Figure 2:1 Flow chart (QUOROM diagram) for the study selection process of the effectiveness review



Note:

*Ten of these also included quantitative data and thus were counted within the 128 papers included in this review

2.2.4 Data extraction

Data from each included studies were extracted into evidence tables based on the format suggested in the *Methods for the development of NICE public health guidance (2008)*. In addition, information on key variables and outcome measures was entered into an Excel spreadsheet, which can export data in various formats to facilitate graphical display of individual study results and quantitative data analysis. Data entered into the database were checked by a second reviewer and any discrepancies were resolved through discussion.

For the primary outcome, the preferred measure was prevalence of weekly smoking (smoked one cigarette or more per week) at follow-up(s) among children who were non-smokers at baseline. If this measure was not reported, alternative measures (e.g. daily smoking or experimenting with smoking; prevalence of smoking for all children including baseline smokers) were recorded. Odds ratios between intervention and comparator groups were the preferred format. Risk differences (i.e. differences in percentages/prevalence) between groups were also extracted. Data at multiple follow-ups, if available, were collected to allow assessment of possible change of effect over time. Analysis using the intention-to-treat population was preferred. Data extraction for secondary outcomes follows the same principles (i.e. preference for baseline non-smokers, odds ratios and intention-to-treat analysis) except that results were recorded only for the longest follow-up, with a note taken if the possibility of change of effect over time has been explored.

2.2.5 Quality assessment

Assessment of internal validity of included studies was carried out using the methodology checklist (randomised controlled trials) from the *Methods for development of NICE public health guidance* (National Institute for Health and Clinical Excellence 2006). An additional item 'contamination between groups acceptably low' was added

as this is considered important for clustered trials which constitute the vast majority of included studies. Overall assessment of internal validity was coded according the *Methods guidance* (National Institute for Health and Clinical Excellence 2006):

++ All or most of the criteria have been fulfilled. Where they have not been fulfilled the study conclusions are thought very unlikely to alter.

+ Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought unlikely to alter the study conclusions.

– Few or no criteria have been fulfilled. The study conclusions are thought likely or very likely to alter.

In view of the nature of school-based interventions, criteria related to 'allocation concealment' and 'blinding of study participants and investigators' were considered unimportant and the internal validity of a study was **not** downgraded simply because either of these criteria was not fullfiled.

External validity of each study was assessed according to the *Methods for development of NICE public health guidance* (National Institute for Health and Clinical Excellence 2006) and was coded in the evidence table as:

1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Assessment of internal and external validity was carried out by one reviewer and checked by another reviewer. Disagreements were discussed in order to reach a consensus.

2.3. Synthesis of evidence and reporting framework

Data extracted from individual studies were summarised and presented in Chapter 3 according to the following framework:

- Section 3.1 provides an overview of key features of included studies.
- Section 3.2 summarises evidence in relation to the overall question of whether any school-based interventions are more effective than usual education, minimum or no intervention.
- Section 3.3 to 3.9 examines each of the subquestions described in section1.4 regarding various factors that may influence the effectiveness of school-based interventions.
- Section 3.3.2 describes school-based interventions that include at least one non-school component such as a family and community component.
- Section 3.10 assesses quantitative data concerning the barriers and facilitators of school-based interventions.

Within each section, an evidence statement that summaries the key findings is presented at the beginning of each section. An overview of relevant evidence is first presented, followed by further description of details at individual study where necessary/appropriate. When studies could not be combined for meta-analysis due to diversity of interventions covered in the included studies, narrative syntheses were conducted and results of individual studies were displayed graphically to enable more succinct summary of evidence.

We performed meta-analyses on outcome data from school-based only versus usual education or no intervention studies. Studies with mixed interventions were included if data for the relevant school only versus usual education or no intervention can be extracted. For example:

- In one study (Cameron et al. 1999), schools were randomly assigned to conditions: (1) teacher/self preparation, (2) teacher/workshop, (3) nurse/self-preparatory, (4) nurse/workshop, and (5) control. In this study it was possible to extract data on all four treatment combined and control condition
- Sun et al. 2008 randomly assigned schools to one of the three conditions: (1) cognitive perception information curriculum, (2) cognitive perception information plus behavioural skills curriculum, (3) standard control. In this study, data from combined intervention and control was used in the meta-analysis
- Nutbeam et al. 1993 randomly allocated schools to one four groups: (1) family smoking education (FSE), (2) the smoke and me project (SAM - school-based), (3) both projects in sequence (FSE/SAM), or no intervention. Data from SAM and control condition were extracted for meta-analysis
- In one study (Johnson et al. 2005), students received the multicultural curriculum, a similar curriculum without reference to cultural issues (standard), or a control condition. Standard curriculum versus control was used for meta-analysis.

Meta-analysis of summary statistics from individual trials was performed with standard software (Stata 10.1 Stata Corporation, College Station, TX) using the METAN programme. The pooled effect (odds ratio) of each grouping of trials was derived from the point estimate for each separate trial. These were weighted using the generic inverse variance function, and random effects assumptions were employed. For inclusion of cluster randomized trials in meta-analyses, we adjusted the sample sizes of the intervention and control groups to take account of non-independence between individuals in the same cluster. Where published estimates of the intra cluster correlation coefficient were not available, we adjusted the analysis to take account of clustering using a value of 0.030 for the ICC. This was based on a published ICC from a recent study (Campbell et al. 2008). We did sensitivity analyses assuming a range of intracluster correlation coefficients from 0.00 to 2.00. We used extreme values for the ICC as used in a review of school-based programmes to prevent violence. To evaluate the stability of the results and to test whether one study

had an undue influence on the meta-analysis, leave-one-study-out sensitivity analysis was performed. The scope of this analysis was to evaluate the influence of individual studies, by estimating pooled estimate in the absence of each study. We assessed heterogeneity amongst trials by inspecting the forest plots and using the chi-squared test for heterogeneity with a 10% level of statistical significance, and using the I^2 statistic with a value of 50% representing moderate heterogeneity. Publication bias was examined by constructing Begg funnel plot and by testing for funnel plot asymmetry using Egger weighted regression. We performed the following post-hoc subgroup analyses: study quality, biochemical validation (yes or no), type of smoking outcome measure (regular or experimental), location of the study (country), age at which students were recruited, and age of the participant at maximum follow-up.

The summary of findings (Chapter 3) focuses on the primary outcome (smoking prevalence/actual tobacco smoking uptake). Data related to secondary outcomes (changes in knowledge, attitude etc) are presented in evidence tables of individual studies in Chapter 5 but are not described in Chapter 3 given the large volume of evidence available on the primary outcome and the uncertainty in the relationship between primary and secondary outcomes.

3. Summary of findings

3.1. Overview of identified literature

Sixty-four RCTs were included in this review based on selection criteria described in section 2.2.2. Additionally, 81 controlled before-and-after studies (non-randomised controlled trials) were found of which 37 met all the selection criteria except for the study design. These studies were not included given the large volume of RCTs available. They are separately listed in Appendix 5. Appendix 6 summarises the controlled before-and-after studies, the names (if available) of the interventions/programmes adopted in each study, together with some of the study characteristics.

Country

Only five RCTs were conducted in the UK (Aveyard et al. 2001; Campbell et al. 2008; de Vries et al. 2006; Gordon et al. 1997; Nutbeam et al. 1993), including one multinational European RCT (de Vries et al. 2006) that was carried out in Denmark, Finland, Netherlands, Spain, Portugal and the UK. The vast majority of the included RCTs were conducted in the USA (41) with the remaining in Australia (5), Netherlands (4), Canada (3), Norway (2), Germany (1) and Italy (1).

Time frame

Nine RCTs started in 2000 or later, 23 started during 1990-99, 19 during 1980-89, one during 1970-79 and 12 did not report this information (these studies were published between 1990 – 2007). The longest follow-up of each study ranged from 6-months (the cut-off of the inclusion criteria) to 13 years. Eleven studies reported follow-up of five years or longer (Connell et al. 2007; Elder 1996; Ellickson et al. 1993b; Kellam & Anthony 1998; Klepp et al. 1994; Lynam et al. 1999; Peterson et al. 2000a; Shean et al.

1994; Spoth et al. 2001; Storr et al. 2002; Sun et al. 2006). Four of these reported follow-up of ten years or longer (Kellam & Anthony 1998; Klepp et al. 1994; Lynam et al. 1999; Peterson et al. 2000a).

Trial design

The RCTs were predominantly clustered trials with schools as the unit of allocation. Other units of allocation used included school districts, classrooms and individual pupils. Sample size ranged from 572-19034 children / 6-190 schools.

Target population and focus

Eleven studies included interventions that covered children in primary (elementary) schools (up to age 10-11). Some of these interventions continued into secondary (high) schools. The majority of the studies (57) targeted children in secondary schools (age 11-18).

Twenty-nine RCTs focused on smoking prevention (Abernathy & Bertrand 1992; Armstrong et al. 1990; Ausems et al. 2004; Aveyard et al. 2001; Biglan et al. 2000; Brown et al. 2002; Buller et al. 2008; Cameron et al. 1999; Campbell et al. 2008; Chatrou et al. 1999; Crone et al. 2003; de Vries et al. 2006; Dent et al. 1995; Dijkstra et al. 1999; Elder et al. 1993b; Flay et al. 1995; Gatta et al. 1991; Gordon et al. 1997; Johnson et al. 2005; Josendal et al. 1997; Murray et al. 1992; Noland et al. 1998; Nutbeam et al. 1993; Peterson et al. 2000a; Shean et al. 1994; Sussman et al. 2007; Telch et al. 1990; Winkleby et al. 2004). F ive of these also targeted smokeless tobacco) (Biglan et al. 2000; Dent et al. 1995; Elder et al. 1993b; Murray et al. 1992; Noland et al. 1998). A few interventions covered both prevention and cessation of smoking (Aveyard et al. 2001; Brown et al. 2002; Dent et al. 1995; Flay et al. 1995; Sussman et al. 2007; Winkleby et al. 2004). Other RCTs had a broader focus of drug (substance) use prevention (Botvin et al. 1990b; Botvin et al. 1990a; Botvin et al. 2001; Connell et al. 2007; Dent et al. 2001; Eisen et al. 2003; Elder et al. 1993a; Elder et al. 2002; Ellickson et al. 1993b; Ellickson et al. 2003; Ennett et al. 1994; Hansen & Graham 1991; Lynam et al. 1999; Perry et al. 2003;

Ringwalt et al. 1991; Schinke et al. 2000; Simons-Morton et al. 2005b; Snow 1992; Spoth et al. 2001; Spoth et al. 2002; Sun et al. 2008; Sun et al. 2006; Sussman et al. 2003), promotion of cardiovascular health (Elder 1996) or health behaviour (Bond et al. 2004; Klepp et al. 1994; Piper et al. 2000; Schofield et al. 2003; Werch et al. 2005), or prevention of antisocial or other problematic behaviours (Kellam & Anthony 1998; Storr et al. 2002). Most RCTs have included general school populations. A few RCTs targeted children considered at high risk of smoking uptake, such as those attending alternative schools (e.g. continuation schools in the USA) which enrol children who are transferred from regular school systems due to various problems (Sun et al. 2008; Sun et al. 2006; Sussman et al. 2003; Sussman et al. 2007; Winkleby et al. 2004). A small number of RCTs targeted children of specific ethnic origins such as Hispanic immigrants [414 /id] and Native American youth (Schinke et al. 2000).

Types of intervention and comparator

Fifty three RCTs adopted interventions with predominantly school components. Fourteen RCTs had a family component added to the school components (Connell et al. 2007; de Vries et al. 2006; Elder et al. 1993a; Elder et al. 2002; Elder 1996; Nutbeam et al. 1993; Perry et al. 2003; Piper et al. 2000; Simons-Morton et al. 2005b; Spoth et al. 2001; Spoth et al. 2002; Storr et al. 2002) (Schofield et al. 2003); five RCTs had a community component added (Gordon et al. 1997; Piper et al. 2000; Schinke et al. 2000; Schofield et al. 2003; Sun et al. 2006). One RCT had more than two components, e.g. school plus family plus mass media (Flay et al. 1995). Further details regarding the characteristics of trials will be described in subquent sections and sub-sections of this chapter. Most RCTs had usual education/no intervention as the control group, the details of which were often poorly described. Approximately half (32) of the RCTs included more than one intervention arm and allowed direct comparison between different school-based interventions, different ways of delivering an intervention or interventions with different components.

Table 3:1 summarises the included RCTs, the names (if available) of the interventions/programmes adopted in each study, together with some of the aforementioned study charasteristics. The table is sorted according to the (youngest) age of the target population, focus of the intervention, year when the intervention started, and length of follow-up. Further details of each study can be found in Chapter 5 Evidence Tables (page 185) where studies are sorted by first author in alphabetic order and year according to the reference publication (the publication that reported the longest follow-up and/or that reported the primary outcome, e.g. smoking prevalence) of each trial. In addition, an index mapping the intervention/programme name to the reference publication of a trial and other publications related to the trial is provided in Appendix 8 to facilitate cross-referencing between interventions, RCTs and publications. Table 3:2 shows contents of trials with study quality (++).

Table 3:1 Overview of included RCTs

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Intervetions starting before age 7								
Kellam and Graham 1998 USA (Baltimore)	Good Behaviour Game (GBG) & Mastery Learning (ML)	6-7 (6-8)	Aggressive/ disruptive behaviour & poor academic achievement	1985	13 yrs	2311	41 classrooms within 19 schools	With 2 intervention arms (GBG, ML) vs control Grade 1 elementary school at study entry.
Storr et al. 2002 USA (Baltimore)	Classroom Centred (CC) intervention incorporating Good Behaviour Game (GBG) & Family-School Partnership (FSP) intervention	6-7	Classroom and behaviour management	1993	7 yrs	678	Not reported (classrooms within 9 schools)	With 2 intervention arms (CC, FSP) vs control. Grade 1 elementary school at study entry.
Interventions starting between age 7 and 10								
Peterson et al. 2000 USA (Washington)	Hutchinson Smoking Prevention Project (HSPP)	8-9 (8-18)	Smoking prevention	1984	12 yrs	8388	40 school districts	Grade 3 elementary school at study entry; curriculum covered grades 3-12

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Elder et al. 1996 (USA, California, Louisiana, Minnesota, Texas)	Child and Adolescent Trial for Cardiovascular Health (CATCH) incorporating Facts and Activities about Chewing Tobacco and Smoking (F.A.C.T.S. for 5) and 'The Unpuffables'	8-9 (8-11)	Cardiovascular Health	1991	5 yrs	6527	96 schools	With two intervention arms (school only, school + family) Grade 3 elementary school at entry. Curriculum covers grade 3-5.
Schinke et al. 2000 USA (North and South Dakota, Idaho, Montana, Oklahoma)	Life skills training tailored to Native American young people with community involvement	8-11	Prevention of substance use	Not reported (pre-1992)	3.5 yrs	1396	27 schools	With 2 intervention arms (skills only, skills-community) Grades 3-5 elementary school at study entry.
Gatta et al. 1991 Italy (Milan)	One-day lesson developed by the Italian League against Cancer (Milan Divison)	9-10	Smoking prevention	1982	4 yrs	17446 (10317)	163 schools	Single day lesson

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Ringwalt et al. 1991 US (North Carolina)	Project DARE (Drug Abuse Resistance Education)	10-12	Drug use prevention	1991	1 year	1402	20 elementary schools	Grades 5-6 elementary school at study entry
Ennet et al. 1994 US (Illinois)	Project DARE (Drug Abuse Resistance Education)	10 -12	Drug prevention	1990	2 years	(1334)	36 elementary schools	Grades 5-6 elementary school at study entry
Interventions starting between age 11 and 14								
Abernathy et al. 1992 Canada (Calgary)	The Peer Assisted Learning (PAL) smoking prevention programme	11-12	Smoking prevention	1988	2.5 yrs	7508	190 schools	
Nutbeam et al. 1993 UK	Family Smoking Education (FSE) Project & Smoking and Me (SAM) Project	11-12 (11-12 for FSE; 12-13 for SAM)	Smoking prevention	1988	1 yr	4538	39 schools	With 3 intervention arms (FSE, SAM, FSE + SAM) first year secondary school at study entry
Gordon et al. 1997 UK (Cardiff)	Stopping them Starting	11-12	Smoking prevention	1994	6 months	787	23 schools	Included a community component

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Johnson et al. 2005 USA (Southern California)	Fun, Learning About Vitality, Origins and Respect (FLAVOR) & Choosing Healthy Influences for a Positive Self (CHIPS)	11-12	Smoking prevention	2001	2 yr	3157	24 schools (84 classes?)	Grade 6 (first year middle school) at study entry With 6 intervention arms: two programmes (Flavor, Chips) with three implementation methods within each programme (peer-nominated leader + randomly assigned group, peer-nominated leader + assignment to nominated leader, teacher-nomiated leader + teacher assigned group)
Cameron et al 1999 Canada (Southwestern Ontario)	Waterloo Smoking Project	11-14	Smoking prevention	Not reported	3 yrs	4971	100 schools	With 4 (2 by 2) intervention arms: (classroom teacher vs public health nurse) by (intensive workshop training vs self-directed learning kit for providers)
Snow et al. 1992 USA (southern New England)	Adolescent Decision-Making (ADM) Programme	11-12 (11-17)	Prevention of substance use	1980	4 yrs	1360 (1075)	Not reported (randomed by classrooms)	Grade 6 at study entry. Intervention has three phases and covered: (I) grade 6; (II) grade 8-9; (III) grade 10-11

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Lynam et al. 1999 US	Project DARE	11-12	Drug prevention	1987	10 years	1429 (1002)	31 elementary schools	
Simons-Morton et al. 2005 USA (Maryland)	Going Places Programme	11-12 (11-14)	Prevention of substance use and antisocial behaviour	1996	3 yrs	2651 (1484)	7 schools	Grade 6 at study entry; curriculum covered grades 6-8
Eisen et al. 2003 USA (4 large metropolitan areas)	Lions–Quest Skills for Adolescence	11-12 (12-13)	Prevention of substance use	1998	2 yrs	7426 (5694)	34 schools	Grade 6 (age 11-12) at study entry but curriculm was implemented in Grade 7
Spoth et al. 2001 USA (a Midwestern state)	The Preparing for the Drug Free Years (PDFY); The Iowa Strengthening Families Programme (ISFP)	11-12	Prevention of substance use	Not reported	6 yrs	667 (447)	33 schools	With two intervention arms: PDFY, ISFP. Both were family focused.

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Connell et al. 2007 USA (Northwest region)	Adolescent Transitions Programme (ATP) incorporating the Family Check-Up (FCU) and SHAPe Curriculum, a reduced version of Life Skills Training	11-12	Antisocial behaviour and substance use	Not reported	5 yrs	998	Not applicable (individually randomised)	Grade 6 (first year middle school) at study entry
Piper et al. 2000 USA (Wisconsin)	Healthy for Life:	11-12 (11-14)	Health promotion (tobacco, alcohol, marijuana, nutrition, sexuality)	1988	4 yrs	2483	21 middle schools	With two intervention arms: Intensive version, Age Appropriate version. Grade 6 at study entry. Curriculum covered either grade 7 (Intensive) or grades 6-8 (Age Appropriate)
Buller et al. 2008a US (Colorado and New Mexico)	The Consider This Programme	11-13	Smoking prevention	2001	6-12 months	1234 (1004)	21 schools	Grades 6 and 7 at study entry

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Klepp et al. 1994 Norway (Oslo)	The Oslo Youth Study	11-14	Health education on eating patterns, physical activity levels and cigarette smoking	1979	12 years	827 (711)	6 schools	
Elder et al. 2002 USA (California)	Sembrando Salud (sowing the seeds of health), a culturally sensitive intervention focusing on Hispanic migrant adolescents	Adolescents	Tobacco and alcohol use prevention	1996	2 yrs	660	22 schools	Family-based intervention using school as the unit of allocation and venue for delivering the programme.
Ary et al. 1990 USA (Oregon)	Oregon Research Institute (ORI) Project PATH (Programmes to Advance Teen Health)	11-17 (11-16)	Substance use prevention	Not reported	1 yr	7837	37 schools	Grade 6-11 at study entry. Intervention covered grades 6-10 but only results for grades 6-9 were presented. Also assessed the effectiveness of parent message within the trial.

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Biglan et al. 2000 US (Oregon)	Project SixTeen; school component based on Project Programmes to Advance Teen Health (PATH)	11-18	Tobacco use prevention	1991	4 yrs*	Not stated	16 communities	Curriculum covered grades 6 to 12. School vs School + Community
Brown 2005, USA (Washington DC)	Raising Healthy Children	11 to 14	Substance use		48 months	1040	10 schools	
Schulze 2006, Germany	Smoke-Free Class Competition	11 to 15	Smoking prevention	1998	18 months	4048	172 classes	
Byrne 2005, Australia		11 to 17	Smoking prevention		12 months	2719		
Shean et al. 1994 Australia	Modified from the Minnesota smoking prevention programme	12 -13	Smoking prevention	1981	7 years	2366 (1647)	18 schools	With two intervention arms: (1) teacher-led and (2) peer-led; Year 7 (last year of primary school) at study entry
Armstrong et al. 1990 Australia	Modified from the Minnesota smoking prevention programme	12-13	Smoking prevention	1981	2 yrs	2366	45 schools	With two intervention arms: peer-led; teacher-led. Year 7 (last year primary school) at study entry.

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Telch et al. 1990 USA (California)	Project C.L.A.S.P.	12-13	Smoking prevention	1984	7 months	572	15 classrooms	With two intervention arms: (1) videotape social pressure resistance training with peer leader involvement and (2) videotape social pressure resistance training alone
Flay et al. 1995 US (San Diego and Los Angeles)	Television, School, and Family Project (TVSFP)	12-13	Smoking prevention and cessation	1986	2 years	7351	340 classrooms	With four intervention arms: (1) a social-resistance classroom curriculum, (2) a media (television) intervention, (3) a health-information based attention-control curriculum and (4) a social-resistance classroom curriculum combined with a mass-media intervention

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Murray et al. 1992 USA	(1) Minnesota Smoking Prevention programme (MSPP); (2) The Smoke Free Generation (SFG); (3) The Minnesota Department of Education's Guidelines (MDEG)	12-13	Tobacco use prevention	1987	3 yrs	7180	81 schools (48 sampling units)	With three intervention arms: MSPP, SFG, MDEG
Elder et al. 1993 US (California)	Student Helping Others Understand Tobacco (Project SHOUT)	11-12	Smoking (+smokeless tobacco) prevention	1988	3 years	3655 (2668)	22 schools	
Noland et al. 1998 USA (Kentucky)	Kentucky Adolescent Tobacco Prevention Project	12-13	Tobacco use prevention	1992	2 yrs	3588	19 schools	Adolescents living in a Tobacco-producing region
Jøsendal et al. 1998 Norway	BE smoke FREE With three components: (1) classroom programme, (2) parent involvement, (3) teacher training	12-13 (12-15)	Smoking prevention	1994	2.5 yrs	4441	99 schools	With three intervention arms: (1)+(2)+(3) vs (1)+(2) vs (1)+(3) Grade 7 at study entry. Intervention covered grades 7-9.

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
de Vries et al. 2006 Six European countries (including UK)	The European Smoking Prevention Framework Approach (ESFA)	12-13 (12-15)	Smoking prevention	1997	3 years	(2212)	41 schools in UK	
Ausems et al. 2004 The Netherland (Maastricht)	Healthy Schools and Stimulants Programme	12-13	Smoking prevention	1997	18 months	1910	36 schools	With three intervention arms: In-school, Out-of-school, In-school + Out-of-school. Grade 7 (first year vocational school) at study entry.
Crone et al. 2003 Netherlands	Intervention developed by Stivoro and Trimbos Institute	12-13	Smoking prevention	1998	20 month	2562	26 schools	1st year secondary school at study entry
Campbell et al. 2008 UK	ASSIST (A Stop Smoking In Schools Trial)	12-13	Smoking prevention	2001	2 yrs	11043	66 (59*) schools	UK year 8 at study entry *

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Dent et al. 1995 US (Southern California)	Project Towards No Tobacco Use	12-13	Tobacco use prevention and cessation	N/A	2 years	6716	48 junior high schools	With four intervention arms: (1) informational social influence, (2) normative social influence, (3) physical consequences, and (4) combined
Ellickson et al. 1993 USA (California and Oregon)	Project ALERT	12-13	Drug prevention	1984	5 yrs	6527	30 schools	Curriculum covered Grades 7-8 Grade 7 (2nd year middle school) at study entry
Botvin et al. 1990b US (New York)	The Life Skills Training (LST) programme	12 to 13	Substance use prevention	1985	3 years	5954 (3684)	56 schools	With two intervention arms: (1) prevention programme with a 1-day teacher workshop and implementation feedback by project staff and (2) prevention programme with teacher training provided by video tape and no implementation feedback by project staff

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Hansen & Graham 1991 US (California)	Adolescent Alcohol Prevention trial	12 -13	Drug prevention	1987	1 year	3011 (2135)	12 junior high schools	With four intervention arms: (1) information only, (2) resistance training, (3) normative education, and (4) combined programme
Ellickson et al. 2003 USA (South Dakota)	(Revised) Project ALERT and ALERT Plus	12-13 (12-16)	Drug prevention	1997	1.5 yrs	5412	48 school clusters (55 schools)	With two intervention groups: Revised ALERT (covered grades 7-8) vs Revised ALERT + ALERT Plus (covered grades 9-10) Grade 7 (2nd year middle school) at study entry
Perry et al. 2003 USA (Minnesota)	Project DARE and Project DARE Plus	12-13	Drug use prevention and violent behaviour	1999	2 years	6237	24	With two intervention arms: (1) DARE only; (2) DARE + DARE Plus
Botvin et al. 1990a US (New York)	N/A	12 to 13	Substance use prevention		1 yr	1311 (1185)	10 schools	With four intervention arms: Peer-led, Peer-led with booster sessions, Teacher-led, and Teacher-led with booster sessions.

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Spoth et al. 2002 USA (a Midwestern state)	Strengthening Families Programme: For Parents and Youth 10-14 (SFP 10-14) + Life Skills Training (LST)	12-13 (12-14)	Prevention of substance use	Not reported	1 yr (from intervention post-test)	1673	36 schools	With two intervention arms (LST + SFP 10-14, LST only) Grade 7 at study entry (2nd year middle school); intervention covered grades 7 and 8
Botvin et al. 2001 US (New York City)	Life Skills Training (revised for use with minority youth)	12-13 (12-14)	Substance use prevention	N/A	1 year	3621	29 schools	
Chatrou et al. 1999 Netherlands	The Brabant smoking prevention programme	12-14	Smoking prevention	1987	1.5 yrs	949	48 classes	With two intervention groups: emotional/self groups
Schofield et al. 2003 Australia	Health Promoting Schools (HPS)	12-14	Health promotion (reducing smoking, unsafe drinking, sun exposure)	1995	2 yrs	4841 (1852)	22 schools	Year 7 & 8 (1st & 2nd year of secondary school at study entry)

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Buller et al. 2008b Australia (Victoria and South Australia)	The Consider This Programme	12-15	Smoking prevention	2001	6-12 monts	2077	25 schools	Grades 7 to 9 at study entry
Dijkstra et al. 1999 Netherlands	Social influence (SI) programme, SI programme with a decision-making component (SI^{DM})	13-15	Smoking prevention	1990	1.5 yrs	4060	52 schools	With two intervention arms: SI, SI^{DM}
Ayeyard et al. 2001 UK (West Midlands)	N/a	13-14	Smoking prevention	1997	2 years	8352 (6817)	53 schools (one school drop-out after randomisation)	
Bond et al. 2004 Australia	Gatehouse Project	13 to 14 (13 to 15)	Promoting emotional and behavioural wellbeing	1997	3 yrs	2678	26 schools (16 educational districts	Year 8 (2^{nd} year of secondary school)

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Sussman et al. 2007 USA (South California)	Project EX-4	13-19	Smoking prevention and cessation	Not reported	1 yr	1367 (1097)	12 continuation high schools*	*Alternative high schools that enrolled students who were transferred out of the regular high schools due to various problems
Sun et al. 2008 US (California)	Project Towards No Drug Abuse (TND-4)	13-19	Drug prevention	1997	1 year	2734 (2608)	18 schools	
Interventions starting from age 14 or later								
Brown et al. 2002 Canada	Extracurricular activities approach	14-15 (14-16)	Smoking prevention (and cessation)	Not reported	2 yrs	3028	30 high schools	Grade 9 (1st year high school) at study entry. Intervetion covered Grades 9-10.
Werch et al. 2005 USA (Florida)	Project SPORT	14-15, 16-17	Health promotion (multi-health behaviour)	2002	1 yr	604	Randomised individuals	Grades 9 & 11high school (1st & 3rd year) at study entry
Dent et al. 2001 USA (Los Angeles)	Project Towards No Drug Abuse (Project TND) – First Curriculum Version – Continuation High School Trial (TND-1 RHS)	14-17	Drug prevention	1995	1 yr	1208 (679)	26 classes from 3 schools	Grades 9-11 at study entry

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Brown et al. 2001 US	Project Chrysalis	14-17	Reducing negative consequences of childhood abuse	1995	2 yrs	1108 (723)	Individually randomised	Targeted female adolescents with histories of physical, sexual or emotional abuse.
Sussman et al. 2003 USA (South California)	Towards No Drug Abuse – Second Curriculum Version – Continuation High School Trial (TND-2 CHS)	14-19	Drug prevention	1997	2 yrs	1037	18 continuation high schools*	With 2 intervention arms (health educator-led, health educator-assisted self-instruction) *Alternative high schools that enrolled students who were transferred out of the regular high schools due to various problems
Sun et al. 2006 USA (South California)	Project Towards No Drug Abuse (Project TND) – First Curriculum Version – Continuation High School Trial (TND-1 CHS)	14-19	Drug prevention	1994	5 yrs	1578	21 continuation high schools*	With 2 intervention arms (classroom only, school-as-community) *Alternative high schools that enrolled students who were transferred out of the regular high schools due to various problems

Author/year of publication Country	Name of the project / intervention	Age of recruited cohort (age covered by intervention, if different)	Focus of intervention	Year of intervention	Longest follow up	N randomised/ consented (analysed)	Number of clusters	Comment/additional information
Winkleby et al. 2004 USA (Northern California)	Advocacy intervention	16-18	Smoking prevention and cessation	2000	6 months (post intervention)	813	10 continuation schools	Grades 11-12 at study entry; comparator was a modified version of TND

Table 3:2 Contents of high quality trials (internal validy, ++)

Study	Delivered by	Interactive	MaterialsNovel methods		Intervention	Information
Brown et a. 2002 Canada	Peers, teachers, researchers, and nurses	no	Newsletter	Extracurricular activities	Not reported	
Biglan et al. 2000 USA	Peers, teachers, and community coordinators	yes	newspaper articles, radio announcements	Video assisted instructions	Contact period: 5 years	health facts, refusal skills
Peterson et al. 2000 USA	Teacher	no	newspaper, posters	No	Duration: 30-50 minutes Number of sessions: 65 Contact period: 10 years Total exposure 2805 minutes	refusal skills
Cameron et. al. 1999 Canada	Teachers and public health nurses	yes	Videotapes		Duration: 40 minutes Contact period: 3 years	self-efficacy
Noland et al. 1998 USA	Peers, teachers, and researchers	no				refusal skills, assertiveness
Perry et al. 2003 USA	Peers an d police officers	yes	teen magazine		Duration: 45-50 minutes Number of sessions: 10 Contact period: 2 years	influences and skills related to peers, social groups, media, and role models
Buller et al 2008 USA	Teachers	yes		online activities	Duration: 45-60 minutes, number of sessions: 5	self-efficacy, positive outcome expectancies for not smoking, negative outcome expectations for smoking
Jøsendal et al. 1998 Norway	Teachers	no	Brochures			refusal skills, personal freedom, freedom to choose, freedom from addition, short-term consequences of smoking

3.2. Are any school-based interventions more effective than usual practice, minimal or no intervention?

3.2.1 Overall effectiveness

ES1 Evidence statement:

There is evidence from 27 studies that provided usable data for meta-analysis that interventions may be effective. Meta-analysis of 27 RCTs demonstrated a significant intervention effect for school-based intervention for preventing uptake of smoking among children. There was moderate statistical heterogeneity between the trial results (X^2= 40.58; df = 26; p = .034) with the degree of heterogeneity quantified by the I^2 at 35.9%.**Applicability:** Most of the studies took place outside of the UK It is not clear if these findings are directly applicable to the UK

We combined the odd ratios estimates at maximum follow up for 27 studies in a meta-analysis using available case analyses using the random effects model (see Figure 3.1). See appendix 9 from the numeric results for non-meta-analysed studies. The meta-analysis demonstrated statistically significant superiority of school-based smoking prevention over usual education or no intervention (odds ratio [OR] = 0.83; 95% confidence interval [CI] 0.76 to 0.91) with evidence of moderate heterogeneity. Figure 3:2 shows results of leave-one-study-out sensitivity analyses. No study had undue influence on pooled odds ratio, thus confirming the stability of the results.

Figure 3.3 shows results of sensitivity analyses assuming a range of intracluster correlation coefficients (ICC). Increasing ICC value had minimal effect on pooled estimates. Figure 3:4 displays the funnel plot of precision by log odds ratio. As shown in the figure, there was asymmetry of funnel. In addition, significant publication bias was found by both Egger and Begg tests. Two factors may be responsible for this significant publication bias. First, we included only studies published in English language. Second, we excluded studies with sample size less than 500. Figure displays asymmetry with a suggestive lack of smaller studies in the bottom of the plot.

Figure 3:1 Forest plot of the odds ratios (ORs) and 95% confidence intervals (CIs) of individual trials and pooled data for prevalence of smoking. Pooled effect estimate is from random-effects model

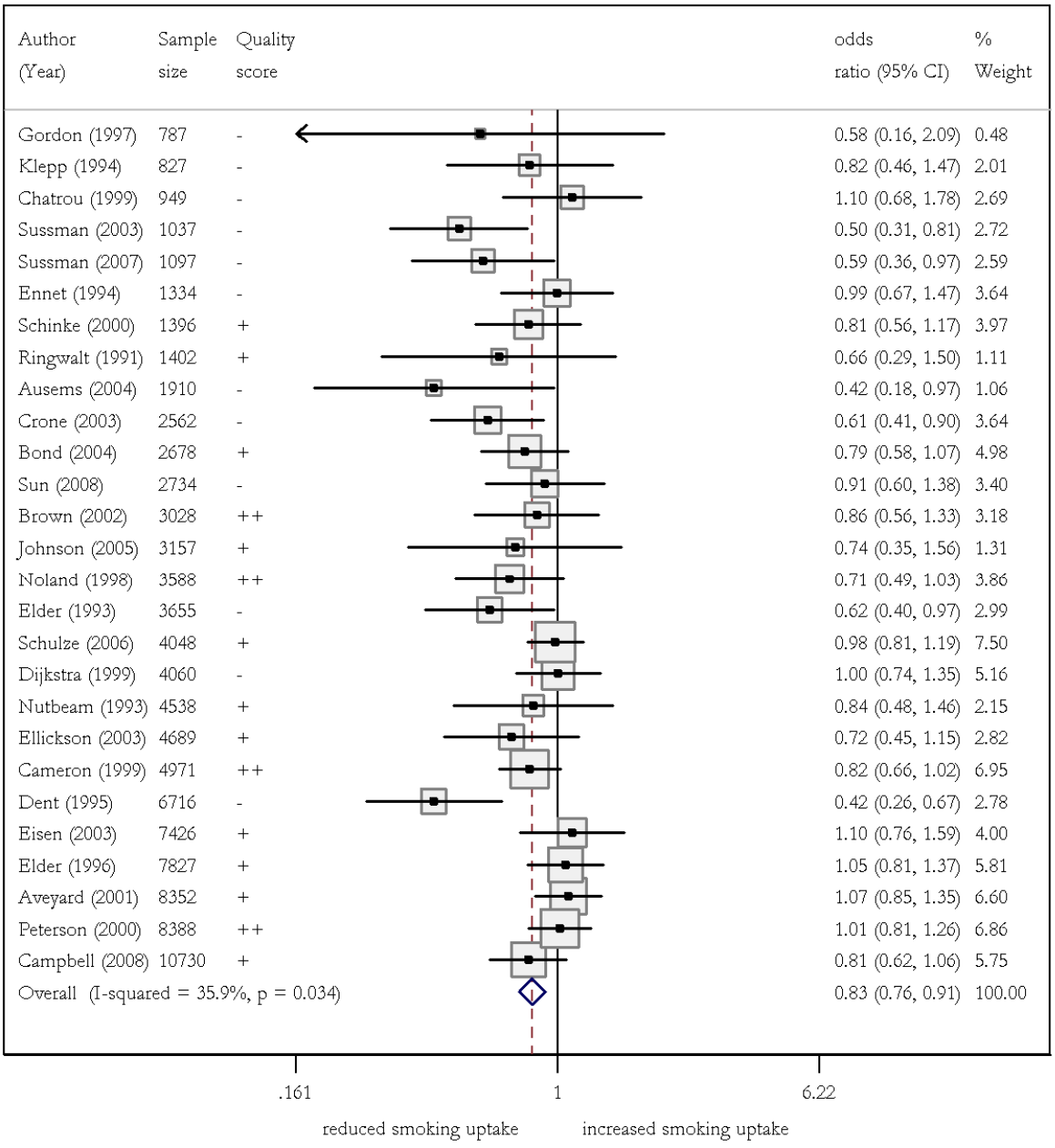


Figure 3:2 Leave-one-out sensitivity analysis – plot indicating the influence of each country on the pooled result, given named study is omitted.

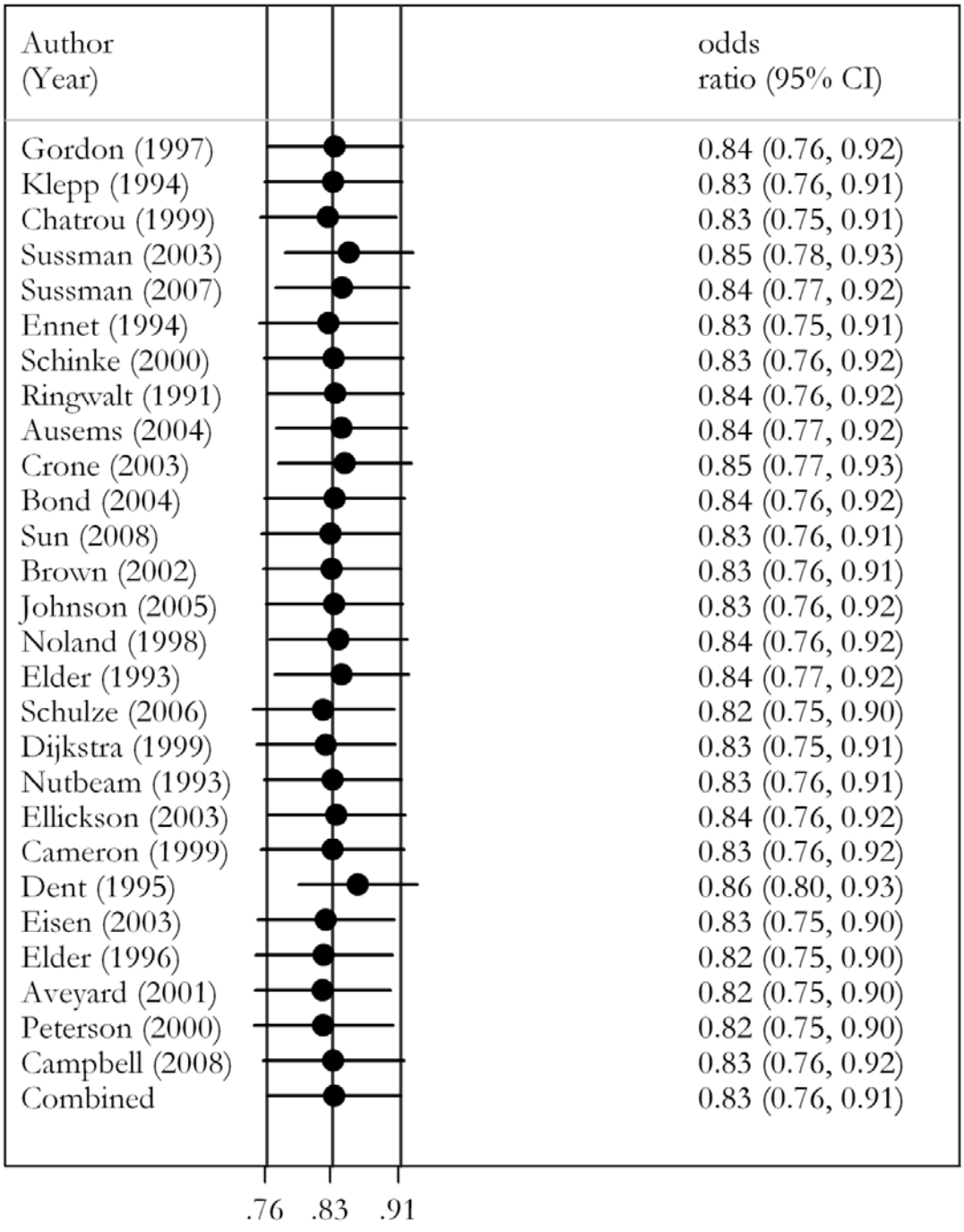


Figure 3:3 Sensitivity analyses: Intracluster correlation coefficient (ICC)

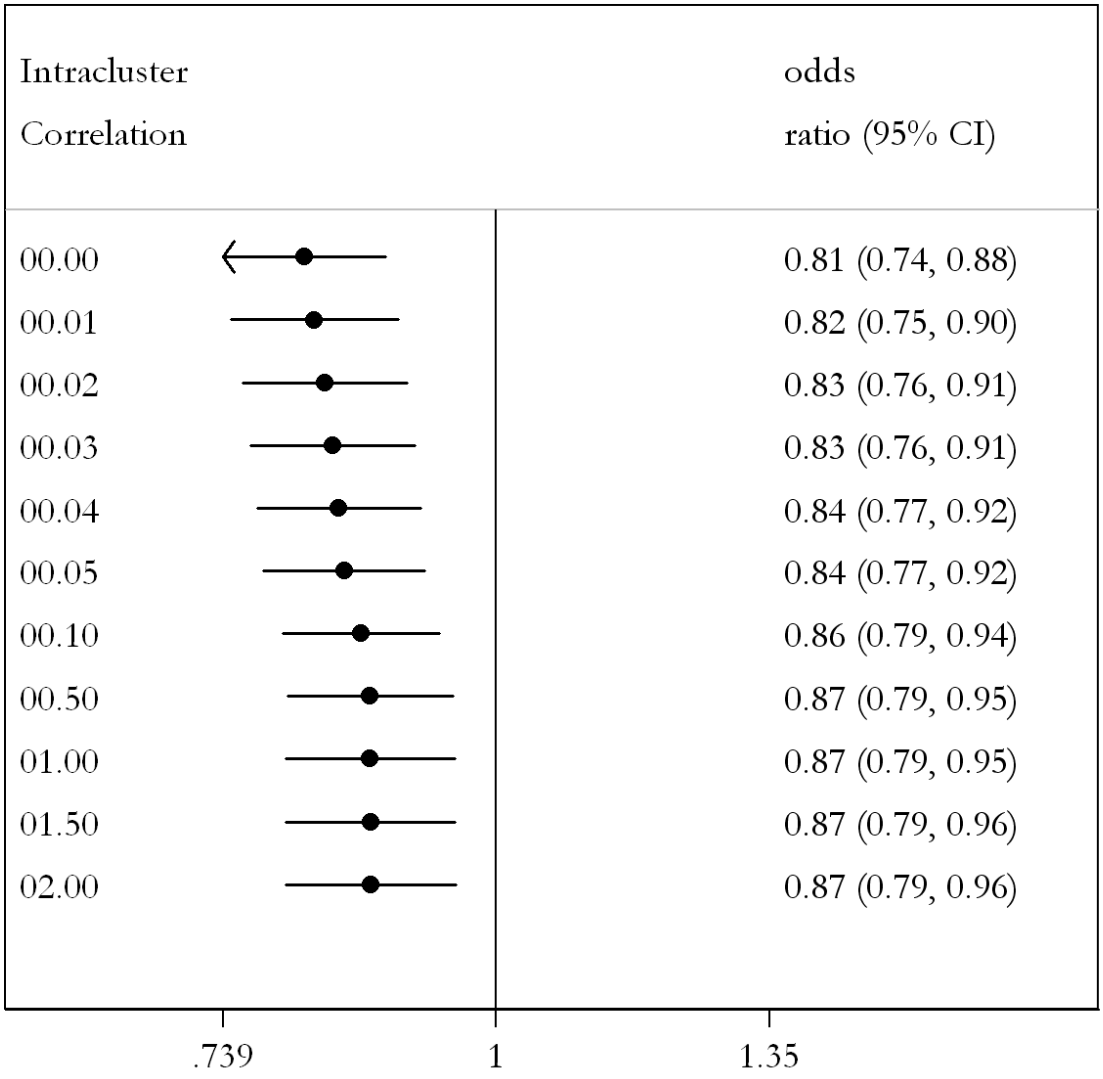
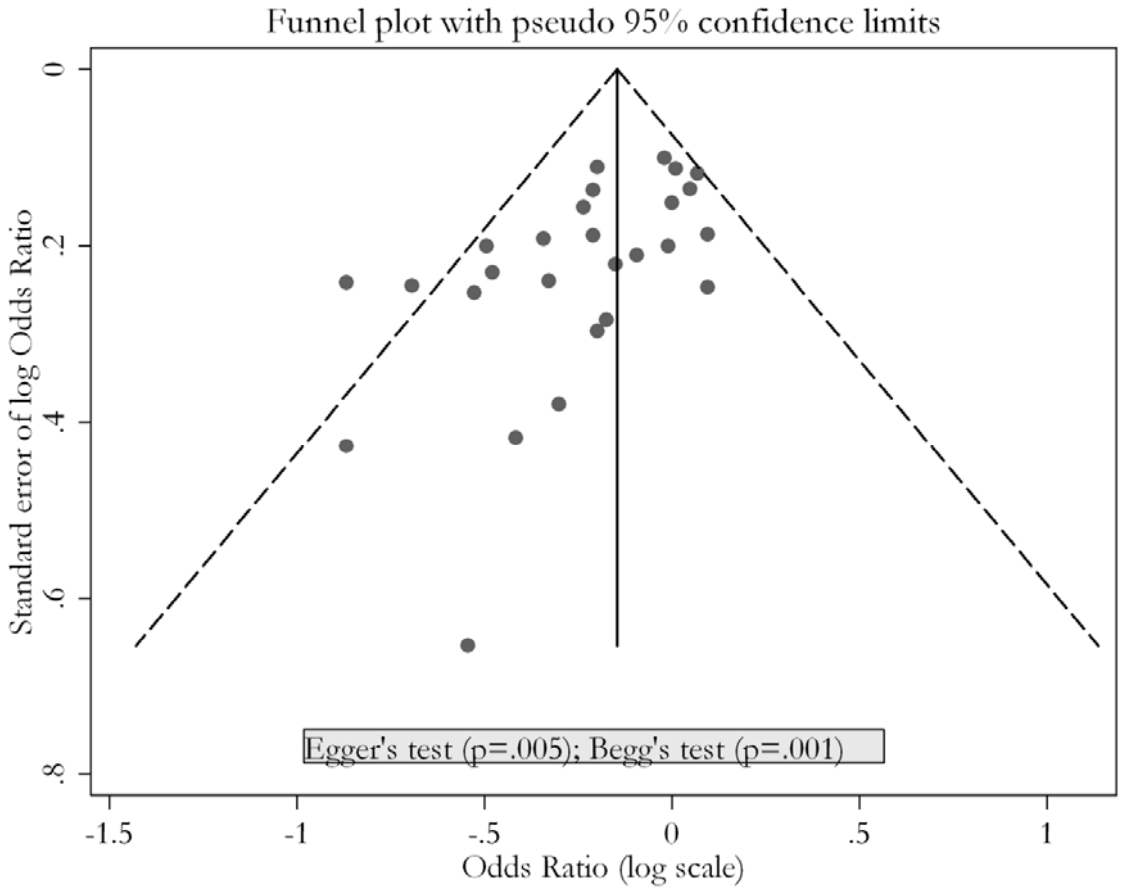


Figure 3:4 Funnel plot of the odds ratio of smoking, by the standard error, for all 27 studies with usable data included in the meta-analysis.



3.2.2 Study quality

Subgroup analyses were performed to determine if the results were influenced by study characteristics. Sections 3.2.2 to 3.2.5 considered all included RCTs that compared a school-based intervention to usual practice or no intervention as a whole and explores the potential influences of study characteristics on estimated effectiveness.

ES2 Evidence statement: There is strong evidence from subgroup analysis that interventions show more pronounced effectiveness in studies with lower quality (as measured by ++, + and – grades).

Applicability: Most of the studies took place outside of the UK. It is not clear if these findings are directly applicable to the UK

We undertook a subgroup analyses to examine whether there is evidence of differential effect according to the study quality (internal validity). Using estimated odds ratios for prevalence of smoking for 26 studies that compared school-based only programme with usual education or no intervention (see Figure 3:5), we found that RCTs with lower quality tended to produce statistically significant programme effects. Results from 12 RCTs with internal validity (-), provided evidence that school-based education was effective in reducing smoking uptake among children (pooled odds ratio [OR] =0.71; 95% confidence interval [CI] 0.59 to 0.87; with evidence of statistically significant moderate heterogeneity, I^2=50.0%, p=0.024). Whereas, studies with higher quality scores did not produce statistically significant results: studies with (+) quality score (11; pooled OR=0.93; 95% CI 0.84 to 1.02; with evidence of no statistically significant heterogeneity, I^2=0.0%, p=0.604) and studies with (++) quality score (four;

pooled OR=0.87; 95% CI 0.76 to 1.01; with evidence of no statistically significant heterogeneity, I^2=4.9%, p=0.369).

Figure 3:5 Forest plot of the odds ratios (ORs) and 95% confidence intervals (CIs) of individual trials and pooled data for prevalence of smoking; subgroup analysis according to study quality

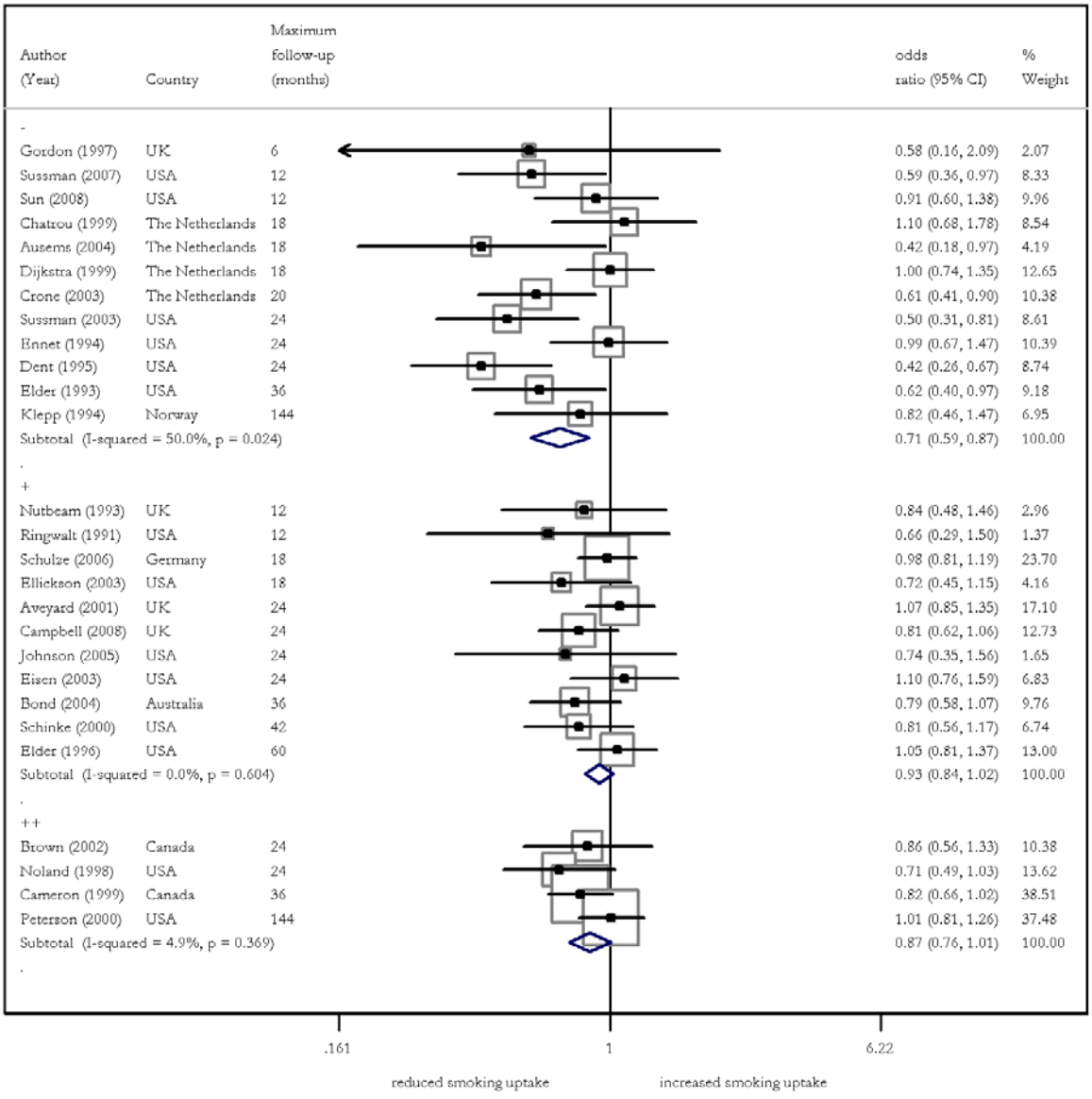


Table 3:3 shows result of meta-regression where the natural log of the odds ratio was the outcome and study quality was explanatory factor. We found that worse quality studies tended to provide evidence that intervention was more effective than better quality studies (OR=0.81; 95% CI 0.67 to 0.99; p=.036).

Table 3:3 Results from univariable meta-regression: study characteristics

Study quality	**Number of studies**	**Ratio of odds ratio (95% confidence interval)**	**p-value**	**R^{2*}**
Study quality				
+/++	15	1 (reference)		
-	12	0.81(0.67 to 0.99)	.036	38.2
Biochemical validation				
No	16	1 (reference)		
Yes	11	0.96(0.78 to 1.17)	.697	00.0
Type of smoking outcome				
Experimental smokers	11	1 (reference)		
Regular smokers	16	0.93(0.76 to 1.14)	.465	00.0
Type of results presented				
Unadjusted	9	1 (reference)		
Adjusted	18	0.93(0.75 to 1.16)	.531	00.0

*Percentage of total variability in log odds ratio of outcome explained by model

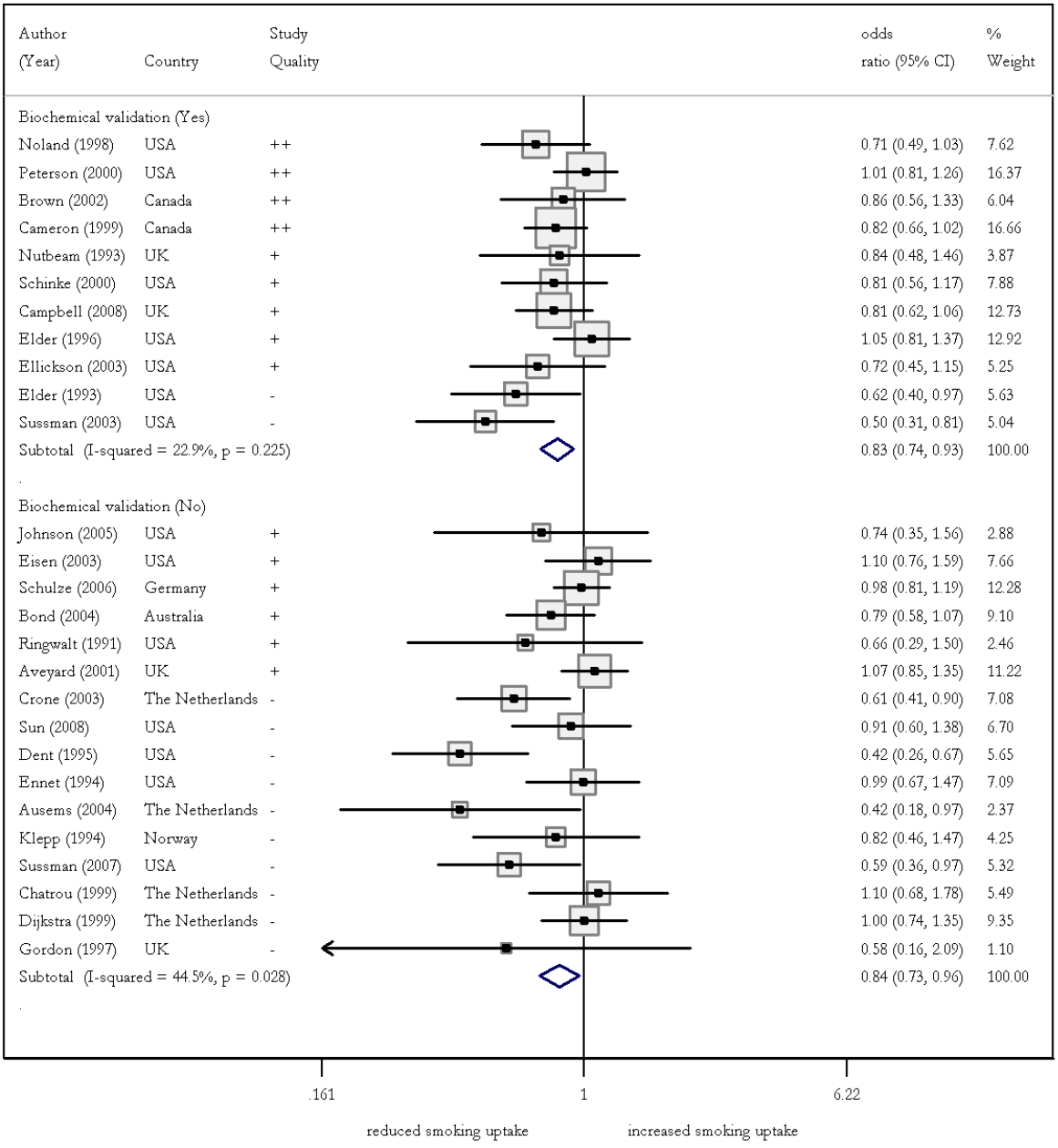
3.2.3 Biomedical validation

ES3 Evidence statement: There is no evidence of the intervention having a differential effect according to whether a study used biochemical validation or not. Evidence from subgroup analysis shows that the intervention does not have a more pronounced effect when self-reported smoking behaviour was validated using biochemical methods (by saliva thiocyanate or cotinine or expired air carbon monoxide levels) compared to questionnaire completion only.

Applicability: Most of the studies took place outside of the UK. It is not clear if these findings are directly applicable to the UK

Pooled results from subgroup analysis provided evidence that regardless whether a study used biochemical validation or not, intervention showed a similar reduction in odds of smoking (see Figure 3:6): studies with biochemical validation (11; pooled OR=0.83; 95% CI 0.74 to 0.93; with evidence of no statistically significant heterogeneity, I^2=22.9%, p=0.225) and studies without biochemical validation (16; pooled OR=0.84; 95% CI 0.73 to 0.96; with evidence of statistically significant moderate heterogeneity, I^2=44.5%, p=0.028). Similarly, results from univariable meta-regression confirmed that there is no evidence of the intervention having a differential effect according to whether a study used biochemical validation or not (**Table 3:3**).

Figure 3:6 Forest plot of the odds ratios (ORs) and 95% confidence intervals (CIs) of individual trials and pooled data for prevalence of smoking; subgroup analysis according to whether study used biochemical validation



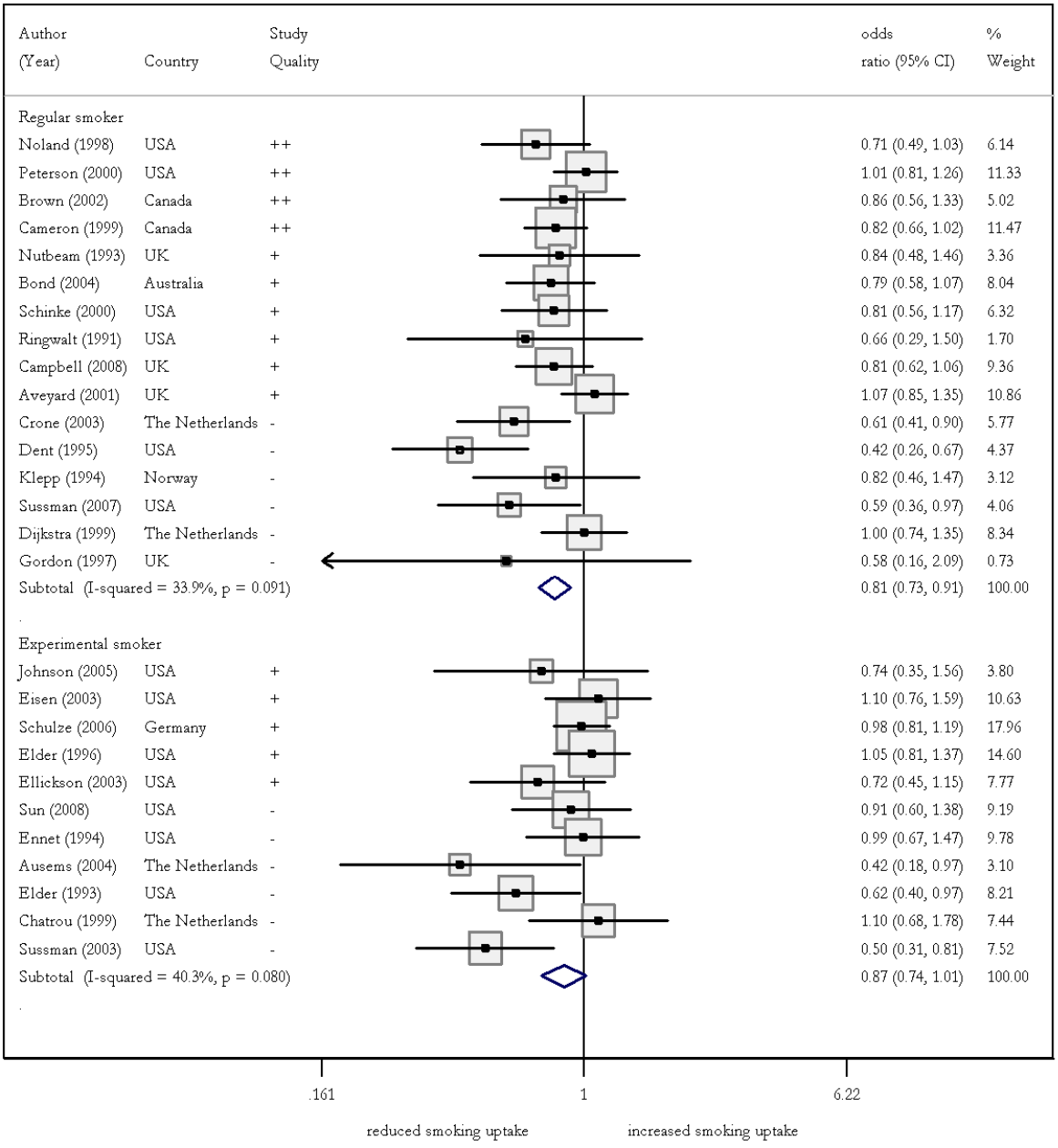
3.2.4 Type of outcome measure

ES4 Evidence statement: There is good evidence about the differential effect according to type of outcome measures (prevalence of regular or experimental smoking). Results from 16 RCTs that used prevalence of regular smokers provided evidence that interventions may be effective in reducing smoking uptake among children. Pooled results from 10 RCTs that used experimental smoking as the main outcome also found that interventions could be marginally effective in preventing smoking uptake. Programmes that used prevalence of regular smoking tended to produce statistically significant results but the size of combined effect was very similar to that for programmes that used experimental smoking as an outcome measure. The main difference between the two was the width of the confidence intervals, giving one as statistically significant but not the other, so this difference may be a statistical artefact.

Applicability: Most of the studies took place outside of the UK. It is not clear if these findings are directly applicable to the UK.

We found that studies that used prevalence of smoking in the past week (regular smokers) as the primary outcome tended to produce a statistically significant programme effect (see Figure 3:7). Results from 16 RCTs that used prevalence of regular smokers provided evidence that school-based education was effective in reducing smoking uptake among children (pooled OR=0.81; 95% CI 0.73 to 0.91; with evidence of statistically significant moderate heterogeneity, I^2=33.9%, p=0.091). RCTs that used prevalence of experimental smoking (30-day smoking and ever-smoker) tended not to have significant programme effect (11; pooled OR=0.87; 95% CI 0.74 to 1.01; with evidence of statistically significant moderate heterogeneity, I^2=40.3%, p=0.080). Results from meta-regression confirmed that there is no evidence of the intervention having a differential effect according to type of outcome measures (**Table 3:3**)

Figure 3:7 Forest plot of the odds ratios (ORs) and 95% confidence intervals (CIs) of individual trials and pooled data for prevalence of smoking; subgroup analysis according to whether study used type of outcome measure



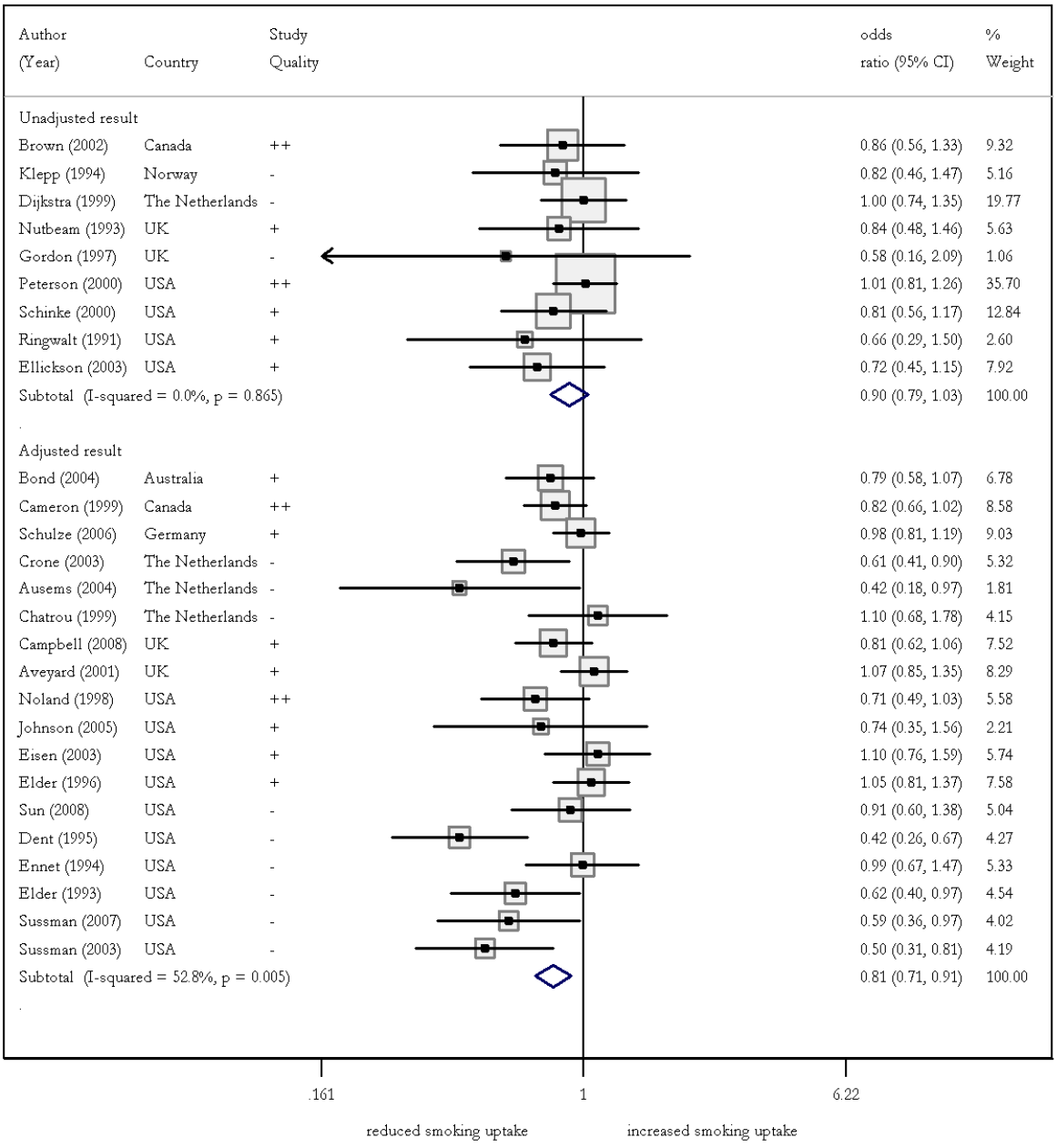
3.2.5 Adjustment for potential confounders

ES5 Evidence statement: There is good evidence of the intervention having a differential effect according to the way the results were presented. It may be that adjusted results tended to produce more significant programme effectiveness, i.e. when RCTs adjusted for potential confounders such as baseline smoking rates, sex, and socioeconomic status. Many of the studies with adjusted results were of low quality.

Applicability: Most of the studies took place outside of the UK. It is not clear if these findings are directly applicable to the UK

We found that RCTs that adjusted results for potential confounders tended to produce statistically significant programme effectiveness (see Figure 3:8). Results from 18 RCTs that presented adjusted results provided evidence that school-based education was effective in reducing smoking uptake among children (pooled OR=0.81; 95% CI 0.71 to 0.91; with evidence of statistically significant moderate heterogeneity, I^2=52.8%, p=0.005). Whereas, studies that presented unadjusted results tended to not produce statistically significant results (9, pooled OR=0.90; 95% CI 0.79 to 1.03; with evidence of no statistically significant heterogeneity, I^2=0.0%, p=0.865). Results from univariable meta-regression confirmed that there is no evidence of the intervention having a differential effect according to type of results presented (**Table 3:3**)

Figure 3:8 Forest plot of the odds ratios (ORs) and 95% confidence intervals (CIs) of individual trials and pooled data for prevalence of smoking; subgroup analysis according to whether study used type of results presented (adjusted or unadjusted)



3.3. When appropriate interventions can be compared, which are most effective?

3.3.1 Conceptual models

ES6 Evidence statement: There is conflicting evidence about the effectiveness of different conceptual models of school-based prevention programmes (social influence, social competence, information giving and combined interventions) and the interventions in many RCTs were not effective in preventing or delaying uptake of smoking in comparison with no programmes or in comparison to other forms of prevention programmes. Therefore there is no clear evidence to suggest that any particular conceptual model intervention is more effective than any other conceptual model intervention compared to usual education.

There is evidence from 15 RCTs (two ++, Canada; two ++, USA; three +, UK; four +, USA; one -, Norway; one -, The Netherlands; and two -, USA) that social influence curricula may be effective in preventing smoking but the size of effect is small. Four RCTs (three -, The Netherlands and one -, USA) provided evidence that information giving curricula may be effective with a larger effect size. However, social competence (one -, UK) and combined (one +, USA and three -, USA) curricula detected no difference in smoking prevalence between those students in experimental and control conditions. These results may be confounded by RCT quality.

Applicability: Most of the studies took place outside of the UK. It is not clear if these findings are directly applicable to the UK.

Social influence

There was evidence from three UK (three +) (Campbell 2008, Nutbeam 1993, Aveyard et al. 2001), one EU+UK RCT (-) (de Vries et al. 2006), 19 US (two ++, twelve +, five -) (Noland 1998, Peterson 2000, Ellickson 2003, Johnson 2005, Schinke 2000, Eisen 2003, Winkleby 2004, Piper 2000, Flay 1995, Murray 1992, Telch 1990, Lynam 1999, Botvin 2001, Brown 2001, Elder 1993, Ellickson 1993, Ary 1990, Hansen & Graham 1991, Ennet 1994), three Canadian (two ++, one +) (Cameron 1999, Brown 2002, Abernathy 1992), one Norwegian (-) (Klepp 1994), one Netherlands (-) (Dijkstra 1999) and three Australian (three -) (Schofield et al. 2003, Shean 1994, Armstrong 1990) RCTs on the social influence model of intervention. They gave a mixed picture of its effectiveness compared to usual education. Two RCTs (Winkleby 2004, Flay 1995) gave no smoking-related outcomes and two RCTs (Armstrong 1990, Abernathy 1992) only gave subgroup results.

- One RCT (Elder 1993) showed a significant improvement in past month smoking for the intervention but no difference in past week smoking.
- One RCT (Noland 1998) showed a significant improvement in 24 hour, seven day and thirty day cigarette use but no difference in ever cigarette use compared to control. One RCT (Piper 2000) showed a significant improvement in cigarette use in the past month for the intervention group compared to control.
- For frequency of last month cigarette, one RCT (Lynam 1999) found no significant difference between intervention and control groups.
- For the proportion of new smokers, one RCT (Ellickson 2003) reduced the proportion in the intervention group compared to control. One RCT (Ennet 1994) found no difference in cigarette initiation and one RCT (Brown 2001) gave mixed results depending on the number of activities attended.
- For never smokers becoming ever smokers, one RCT (de Vries) found no difference between intervention and control group.

- For children who had never smoked becoming a smoker, one RCT (Johnson 2005) found a significant improvement for the intervention but only in the multicultural group and one RCT (Nutbeam 1993) found no difference between school versus control and school plus family versus control. One RCT (Shean 1994) found no difference in teacher led intervention for both boys and girls but a significant improvement for peer-led intervention for girls but not boys.
- For children who had never smoked becoming a regular smoker, two RCTs (Campbell et al. 2008, Aveyard et al. 2001) found no difference between intervention and control groups.
- For smoking rates, one RCT (Schinke 2000) found no difference between school intervention versus usual education, school plus community intervention versus usual education and school versus community interventions. Six RCTs (Cameron 1999, Klepp 1994, Eisen 2003, Schofield et al. 2003, Ellickson 1993, Telch 1990) found no difference between interventions and control. One RCT (Botvin 2001) found significant improvements in both smoking frequency and smoking quantity for the intervention compared to control.
- For smoking rates in children who were smoking at the start of the trial, one RCT (Ary 1990) found a higher adjusted covariate rate in the intervention group. One RCT (Murray 1992) found higher incidence and prevalence of smoking for the three different intervention groups compared to control.
- For never smoked rates, one RCT (Brown 2002) found a significant improvement for the intervention compared to control for boys but not for girls or for the whole group overall.
- For ever smoking rates, one RCT (Hansen & Graham 1991) had a lower smoking rate in the normative education group compared to control.

Social competence

There were four US (one ++, 3 -) and one Australian (+) RCTs (Simons-Morton 2005, Storr 2002, Buller 2008a, Kellam 1998, Buller 2008b) that used a social competence type intervention and gave a mixed picture of its effectiveness compared to usual education. One RCT (Simons-Morton 2005) did not report a smoking outcome.

- For initiation of smoking at follow up, one RCT (Storr 2002) showed a statistically significant difference in favour of the intervention, One RCT (Buller 2008a) showed no difference and one RCT (Kellam 1998) showed no difference for girls but a significant improvement for boys at follow up.
- For smoking in the last 30 days, one RCT (Buller 2008b) showed no difference between intervention and control.

Information giving

There were three Netherlands (three -) three US (two +, one -) and one Italian (+) RCTs (Ausems 2004, Crone 2003, Chatrou 1999, Sussman 2007, Sun 2006, Dent 2001, Gatta 1991) that used a predominantly information giving intervention and gave a mixed picture of its effectiveness of compared to usual education.

- For being a smoker at follow up, two RCTs (Ausems 2004, Crone 2003) showed statistically significant differences in favour of the interventions and three RCTs showed no significant difference (Chatrou 1999,Dent 2001, Gatta 1991)
- For weekly smoking, one RCT (Sussman 2007) showed a statistically significant improvement for the intervention group at follow up.
- For adjusted mean level of 30-day cigarette use, one RCT (Sun 2006) showed no significant differences between school plus family, school and control groups at follow up.

Combined

There were 10 US (four +, six -) and 1 Norwegian (++) RCTs (Dent 1995, Sussman 2003, Sun 2008, Elder 1996, Werch 2005, Spoth 2002, Spoth 2001, Botvin 1990a, Botvin 1990b, Snow 1992, Jøsendal 1998) that used a combined conceptual model intervention and gave a mixed picture of its effectiveness of compared to usual education. Two RCTs (Werch 2005, Botvin 1990a) did not report smoking related results. One RCT (Snow 1992) reported overall substance use rather than smoking so results are not presented here.

- For weekly cigarette use at follow up, one RCT (Dent 1995) showed a statistically significant difference in favour of the intervention.
- For being a smoker at follow up, one RCT (Sussman 2003) showed a statistically significant difference in favour of the intervention and one RCT (Sun 2008) showed no significant difference. One RCT (Botvin 1990b) showed an overall significant difference between teacher led, video and control. One RCT (Jøsendal 1998) found that the percentage of smokers was significantly higher in the control group at follow up than the school plus family intervention group.
- For ever smoking, one RCT (Spoth 2001) showed a statistically significant improvement in favour of the intervention and one RCT (Elder 1996) showed a non-significant increase for the intervention (school plus some family) compared to usual education.
- For new user rates, one RCT (Spoth 2002) showed no significant differences for school compared to usual education and school plus family compared to usual education.

Unclear or not reported

There were one UK (-), 6 US (three ++, two +, one -), one Australian (+) and one Netherlands (-) RCTs (Gordon 1997, Ringwalt 1991, Connell 2007, Elder 2002, Biglan

2000, Perry 2003, Bond 2004) that were too unclear about the description of the intervention for us to assign a conceptual model. One RCT (Connell 2007) did not report smoking-related outcomes.

We undertook a subgroup analysis to examine whether there is evidence of differential effect according to the conceptual model adopted by the study. Results of subgroup analyses provided evidence that RCTs that used social influence and combined curricula tended to give statistically significant results (Figure 3:9). For example, pooling results from 16 RCTs that used social influence curricula, we found that school-based education may be effective in preventing smoking (pooled OR=0.91; 95% CI 0.84 to 0.98; with evidence of no statistically significant heterogeneity, I^2=0.0%, p=0.614). Similarly, pooled result from information giving curricula demonstrated that school-based education may be effective in preventing smoking (four -, pooled OR=0.67; 95% CI 0.47 to 0.96; with evidence of statistically significant moderate heterogeneity, I^2=47.1%, p=0.129). We found evidence that combined (-, OR=0.58; 95% CI 0.16 to 2.09) and social competence (five, pooled OR=0.69; 95% CI 0.46 to 1.02; with evidence of statistically significant substantial heterogeneity, I^2=74.0%, p=0.004) curricular may not be effective in preventing smoking among children.

Table 3:4 shows result of meta-regression where the natural log of the odds ratio was the outcome and conceptual model was explanatory factor. Using social influence as referent, we found that location of study was not an important factor in explanation prevalence of smoking (joint test for all covariates; F(3,22)=1.53; p=.235).

Figure 3:9 Forest plot of the odds ratios (ORs) and 95% confidence intervals (CIs) of individual trials and pooled data for prevalence of smoking; subgroup analysis according to conceptual model

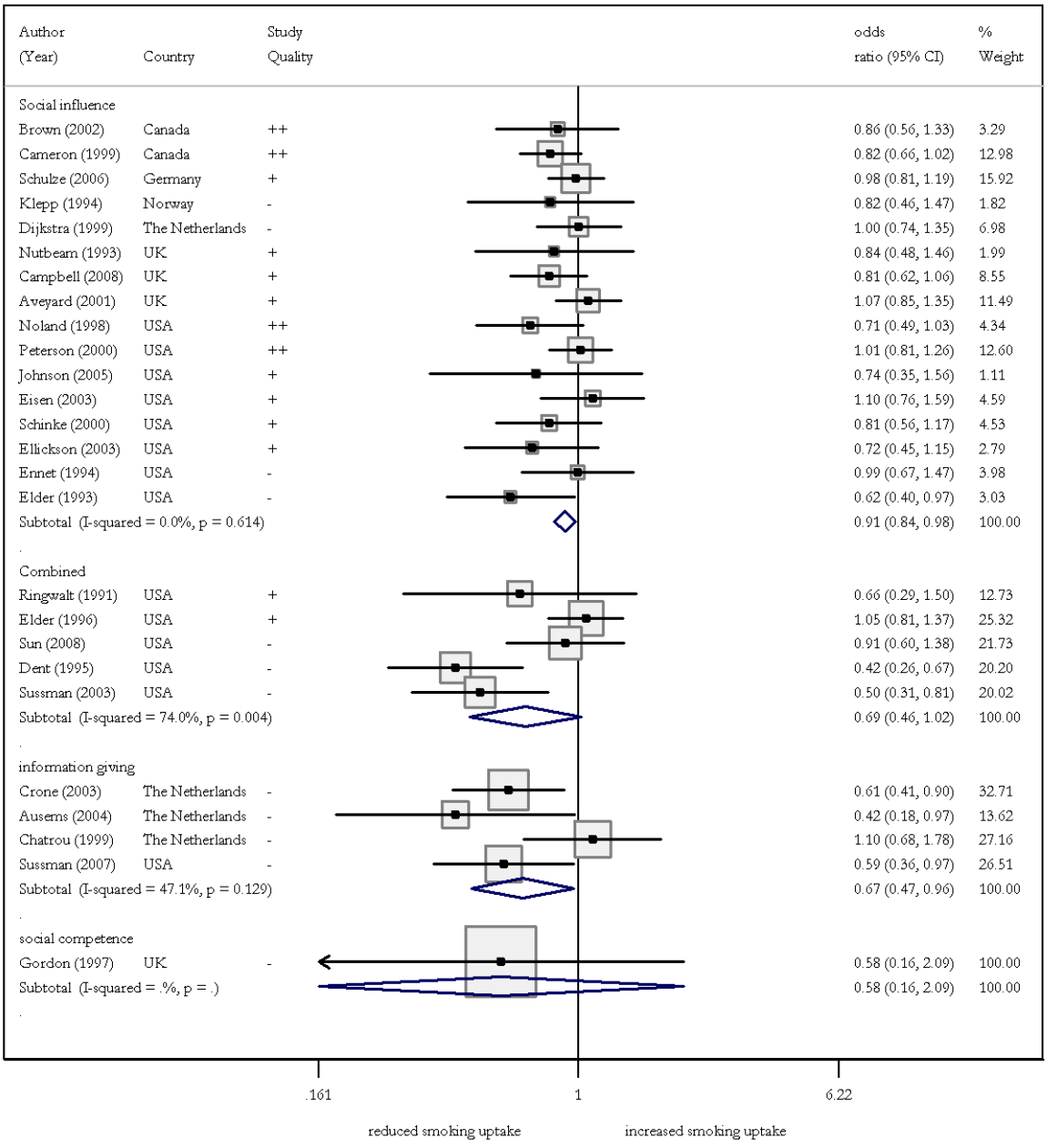


Table 3:4 Results from univariable meta-regression analysis, Conceptual model

Conceptual model	Number of studies	Ratio of odds ratio (95% CI)	P-value
Social influence	16	Reference	
Information giving	4	0.77(0.55 to 1.06)	.104
Social competence	1	0.65(0.16 to 2.64)	.533
Combined	5	0.83(0.63 to 1.09)	.165

R^2=15.5% (percentage of total variability in log odds ratio of outcome explained by model)

3.3.2 Adding a school-based component to other smoking prevention programme

Multi-component school-based interventions with a community component

ES7 Evidence statement: There is moderate evidence indicating that multi-component interventions incorporating both school and community components (with or without an additional family component) are ineffective in preventing the uptake of smoking compared to usual education. Five RCTs provided evidence comparing a multi-component intervention that incorporates both school and community components to usual education: Sun et al. 2006 (+, USA), Piper et al. 2000 (+, USA), Schinke et al. 2000 (+, USA), Schofield et al. 2003 (-, Australia), Gordon et al. 1997 (-, UK). Four of the studies (Gordon et al. 1997, Schinke et al. 2000, Schofield et al. 2003, Sun et al. 2006) found no significant difference between the multi-component intervention group and the usual education group during a maximum follow-up between 6 months (Gordon et al. 1997) and 5 years (Sun et al. 2006). One study (Piper et al. 2000) found no difference at 3-year follow-up and small, marginally significant positive or negative intervention effects (depending on the school component) at 4-year follow-up.

Applicability: The applicability of the non-UK studies to current UK context is unclear due to differences in location, nature of the communities, as well as targeted populations. The UK study (Gordon et al. 1997) had short duration of follow-up and the risk of bias was considered high due to methodological considerations.

Five RCTs provided evidence comparing a multi-component intervention that incorporates both school and community components to usual education: Sun et al. 2006 (+, USA), Piper et al. 2000 (+, USA), Schinke et al. 2000 (+, USA), Schofield et al. 2003 (-, Australia), Gordon et al. 1997 (-, UK). All studies except Schinke et al. 2000 included secondary school children. Sun et al. 2006 targeted students in continuation high schools whereas Schinke et al. 2000 targeted Native American children in

primary (elementary) schools. The interventions focused on smoking (Gordon et al. 1997), substance use prevention (Schinke et al. 2000; Sun et al. 2006) or health promotion (Piper et al. 2000; Schofield et al. 2003).

A wide range of school components and community components were used. Two of the studies also included a family component (Piper et al. 2000; Schofield et al. 2003). Except for Piper et al. 2000, none of the studies found a significant difference between the multi-component intervention group and the usual education group at any time point during a maximum follow-up between 6 months (Gordon et al. 1997) and 5 years (Sun et al. 2006). Piper et al. 2000 had two intervention arms: one was an intensive school curriculum (delivered within one year) combined with community and family components; the other was an 'age appropriate' school curriculum (delivered over three years) combined with the same community and family components. There was no significant difference between the intervention arms and the control at 3-year follow-up. Marginally significant differences between groups were observed at 4-year follow-up: the smoking prevalence (past month cigarette use) was 30% in the control group, 36% in the age appropriate group and 28% in the intensive group. The negative effect (higher prevalence) for the age appropriate group compared to control group was not statistically significant ($p<0.10$) and the positive effect for the intensive group compared to control group was statistically significant ($p<0.05$) after adjusted for baseline demographics.

Multi-component school-based interventions with a family component

ES8 Evidence statement: There is inconclusive evidence as to the effectiveness of interventions incorporating both school and family components in preventing the uptake of smoking compared to usual education.

Thirteen RCTs provided evidence comparing interventions that incorporate both school and family components to usual education: Storr et al. (-, USA), Elder et al.

1996 (+, USA), Nutbeam et al. 1993 (+, UK), de Vries et al. 2006 (-, EU + UK), Perry et al. 2003 (++, USA), Elder et al. 2002 (+, USA), Spoth et al. 2001 (+, USA), Ary et al. 1990 (-, USA), Spoth et al. 2002 (-, USA), Connell et al. 2007 (-, USA), Simons-Morton et al. 1996 (-, USA), Piper et al. 2000 (+, USA) and Schofield et al. 2003 (-, Australia). Three of the RCTs (Simons-Morton et al. 1996, Storr et al. 2002 and Spoth et al 2001) found a significant positive effect of family and schools intervention compared to usual education. Nine RCTs (Elder et al. 1996, Nutbeam et al. 1993, Piper et al. 2000, Schofield et al. 2003, de Vries et al. 2003, Ary et a. 1990, Connel el a. 2007, Elder et al. 2002 and Spoth et al. 2002) showed no significant difference between family and schools intervention and usual education. One RCT showed a significant effect in boys but not girls (Perry et al. 2003).

Applicability: The applicability of the non-UK studies to current UK context is unclear due to differences in the location and nature of the communities.

Thirteen RCTs provided evidence as to the effectiveness of combined school and family-based programmes compared to usual education: Storr et al. (-, USA), Elder et al. 1996 (+, USA), Nutbeam et al. 1993 (+, UK), de Vries et al. 2006 (-, EU + UK), Perry et al. 2003 (++, USA), Elder et al. 2002 (+, USA), Spoth et al. 2001 (+, USA), Ary et al. 1990 (-, USA), Spoth et al. 2002 (-, USA), Connell et al. 2007 (-, USA), Simons-Morton et al. 1996 (-, USA), Piper et al. 2000 (+, USA) and Schofield et al. 2003 (-, Australia). All studies included secondary school children and interventions included some element of parental/home-based intervention.

Some studies using combined schools and family-based intervention did suggest positive effects. The Going Places Program included a schools curriculum combined with parent education and school environment enhancement. Parents were sent a video on authoritative parenting, a guidance booklet and periodic newsletters (Simons-Morton et al. 2005b). Growth in the prevalence of 30-day cigarette smoking was significantly lower for the treatment compared to the control group (added growth factor=-0.124, $p < 0.05$) (Simons-Morton et al. 2005b).

Storr et al. studied the effect of an intervention that provided education and support to parents (Storr et al. 2002). Trained teachers gave nine workshops aimed at establishing good parent-school communication and to teach effective strategies for discipline. Children of intervention parents showed a significantly reduced risk of smoking initiation compared to controls (RR=0.69; 95% CI 0.50 to 0.97).

A study by Spoth et al. describes two parent/student interventions in 11-12 year olds (Spoth et al. 2001). The Preparing for the Drug Free Years (PDFY) intervention gave education over 5 training sessions, primarily to parents but with one session for both parents and children. The Iowa Strengthening Families Program (ISFP) included seven sets of parental training sessions with separate, concurrent sessions for children, followed by a joint training session. Four years after intervention, the proportion of children who had ever smoked cigarettes were significantly lower for the ISFP (33 vs. 50%, p<.01) but not the PDFY (44 vs. 50%, p<.01) interventions compared to the control (Spoth et al. 2001). At six years, there were statistically significant slower overall growths in lifetime cigarette use among ISFP (growth rate = -2.95, p<.01) and PDFY (growth rate = -2.94, p<.01) intervention adolescents compared to controls (Spoth et al. 2001).

However, in another study of the same ISF programme, later renamed the Strengthening Families Program, when added to a comprehensive schools-based intervention in 10-14 year olds, there were no significant differences for smoking initiation in new users for the combined school/family intervention compared to the control (12.1% vs 16.7%, ns) (Spoth et al. 2002).

In one study significant effects were found only in boys, but not girls. The D.A.R.E Plus intervention in 12-13 year olds, involved a 4-session classroom education programme and the intervention material (a magazine) contained activities related to classroom themes for students to complete at home with their parents (Perry et al. 2003). Growth rates of smoking over the 2 year intervention period were significantly lower in intervention compared to control boys (0.18±0.05 vs. 0.31±0.05, p=.02) but not girls (0.22±0.07 vs. 0.28±0.07, p=0.25) (Perry et al. 2003).

The majority of studies showed no significant effect of combined school/family-based interventions. As part of the Childhood and Adolescent Trial for Cardiovascular Health (CATCH) (Elder 1996), smoking intervention involved the provision of smoke-free schools, classroom teaching and home-based intervention. Students were given materials to complete 4 exercises at home, to complement lessons at school. Prevalence of smoking in intervention compared to control schools was not significantly different at 1 (4.5 vs. 5.9%), 2 (11.2 vs. 10.2%) or 3 (16.2 vs. 15.6%) years follow-up.

In the study by Nutbeam et al., one intervention arm was given the classroom based 'smoking and me' intervention as well as a family smoking education intervention (Nutbeam et al. 1993). The proportion of children who had never smoked at follow-up was lower, but not significantly so, 12 months post-intervention (69.4 vs. 73.9%, ns).

The Healthy for Life Program included family and community elements in addition to the schools interventions (Intensive or Age Appropriate) (Piper et al. 2000). Prior to the programme, parents were given an orientation session. Three home mailings were given and children were encouraged to interview parents/adults as homework assignments. At 3 years, the Intensive condition significantly reduced the likelihood of smoking in 10^{th} grade (beta= -0.38±0.17; $p<0.05$), but not in 9^{th} grade (beta= -0.30±0.17; p=ns) but the Age Appropriate condition showed no significant benefit of intervention in 9^{th} (beta=0.18±0.12, p=ns) or 10^{th} (beta=0.41±0.20, p=ns) grade (Piper et al. 2000).

The Health Promoting Schools (HPS) intervention provided information leaflets and biweekly school newsletters for parents as well as implementing a formal schools curriculum (Schofield et al. 2003). After 2 years, there was no difference in the pre-post intervention changes in weekly smoking for intervention compared to control groups (9.7% vs. 10.0% increases in smoking, ns) (Schofield et al. 2003).

In the multi-national European Smoking prevention Framework Approach (ESFA) (de Vries et al. 2003), a school-based programme (varied between counties) was supported through community action and the majority of parents received letters about the project. When the whole European sample was analysed, intervention did

not appear to affect the proportion of baseline non-smokers becoming weekly smokers after 1 (8.5% vs. 9.0% OR 0.98 CI 0.86-1.11, p ns) or 2 (18.4% vs. 18.8% OR 0.97 CI 0.69-1.08, p=0.62) years but showed significant positive effects after 2.5 years (21.9% vs. 23.4% OR 0.89 CI 0.80-0.99, p=0.03). However, for the restricted UK sample, there were no significant effects at 2 (17.7% vs. 18.8% OR 1.00 CI 0.75-1.25, p=0.99) or 2.5 (21.2% vs. 23.6% OR 0.91 CI 0.73-1.14, p=0.42) years and, at the first 1 year evaluation, had shown a significant negative programme effect (9.0% vs. 9.0% OR *1.27 (1.0-1.162, $p<0.05$).

Another schools-based programme in 11-12 year olds consisted of five taught lessons and parents were sent brochures to promote parent/child discussion of views and rules relating to cigarette use (Elder et al. 1993a). At one year, among pre-test smokers, the number of cigarettes smoked per month was not different in the intervention compared to the control (111.6 vs. 76.6) (Elder et al. 1993a).

Another predominantly family orientated intervention offered a family check-up (FCU) to families of 12-14 year old children considered to be high risk (Connell et al. 2007). The 3-session intervention, consisted of an initial interview, assessment session and feedback and families were offered relevant services such as consultations, feedback on school behaviour, video/book resources and individual/family therapy. There was no significant difference between treatment and control groups for nicotine abuse/dependence (X^2=3.09, p=ns) over the 5 year evaluation period (Connell et al. 2007).

An intervention in adolescents considered to be at high risk of smoking initiation (hispanic migrants), used structured education of parents as well as children (Elder et al. 2002). For each child given the intervention, teaching was given to one of their adult caregivers on communication skills such as listening, confirmation and reassurance. Reduction in 30-day cigarette use was not significantly different in intervention compared to controls at 1 (3.3 vs. 4.7%, ns) or 2 (2.9 vs. 3.5%, ns) years of intervention.

3.4. Are the interventions delaying rather than preventing the onset of smoking?

3.4.1 Change of effect over time

ES9 Evidence statement: There is conflicting evidence whether school-based smoking prevention programmes are delaying rather than preventing smoking uptake in children. Results from Campbell et al. 2008 (+, UK) and Bond et al. 2004 (+, Australia) RCTs suggested an attenuation of programme effect over time. Crone et al. 2003 (-, The Netherlands) and Sussman et al. 2007 (-, USA) also provided evidence that a smoking prevention programmes may delay smoking uptake. Evidence from Klepp et al 1994 (-, Norway) suggested that school-based education could have a positive short-term impact on smoking behaviour, but that these effects tended to disappear over time. Dent et al. (-, USA) provided evidence that intervention may be effective in preventing smoking uptake, and, Elder et al. 1993 (-, USA) provided evidence that a school-based education programmes tended to have a long-term impact on smoking behaviour. However, Nutbeam et al. 1993 (+, UK); Peterson et al. 2000 (++, USA); Eisen et al. 2003 (+, USA); Chatrou et al. 1999 (-, The Netherlands); Ennet et al. 1994 (-, USA) and Schinke et al. 2000 (+, USA) showed that school-based prevention was not effective in preventing smoking at all follow-up periods.

Applicability: The majority of the studies took place outside of the UK. It is not clear if findings are applicable to the UK. However, the Campbell et al. 2008 (+, UK) and Nutbeam et al. 1993 (+, UK) findings are directly applicable.

It is not clear whether smoking prevention programmes are delaying rather than preventing smoking uptake in children. Estimated odds ratios from studies with multiple follow-ups were used to examine change in programme effectiveness over time. There was inconsistent evidence from studies with two, three or four follow-ups

that school-based smoking prevention programmes were delaying rather than preventing smoking uptake. For example, using data from studies with two follow-ups, Crone et al. 2003 (-, The Netherlands) and Sussman et al. 2007 (-, USA) provided evidence that smoking prevention programmes may be delaying smoking uptake (Figure 3:10). Crone et al. 2003 (-, The Netherlands) found that intervention was effective in preventing uptake after eight months of follow-up, but the association disappeared at 20 months follow-up period when students were 14 years old. Sussman et al. 2007 (-, USA) also found that intervention was only effective after six months follow-up and became marginally effective after 12 months follow-up. Yet, Dent et al. (-, USA) provided evidence that intervention may be effective in preventing smoking uptake. In this study, the programme effect was sustained both after 12 and 24 months follow-up. However, in three studies (Nutbeam et al. 1993 (+, UK); Peterson et al. 2000 (++, USA); Eisen et al. 2003 (+, USA)) the intervention did not produce statistically significant results at either follow-up.

Figure 3:10 Programme effects – odds ratios with 95% confidence interval – from studies with two follow-ups

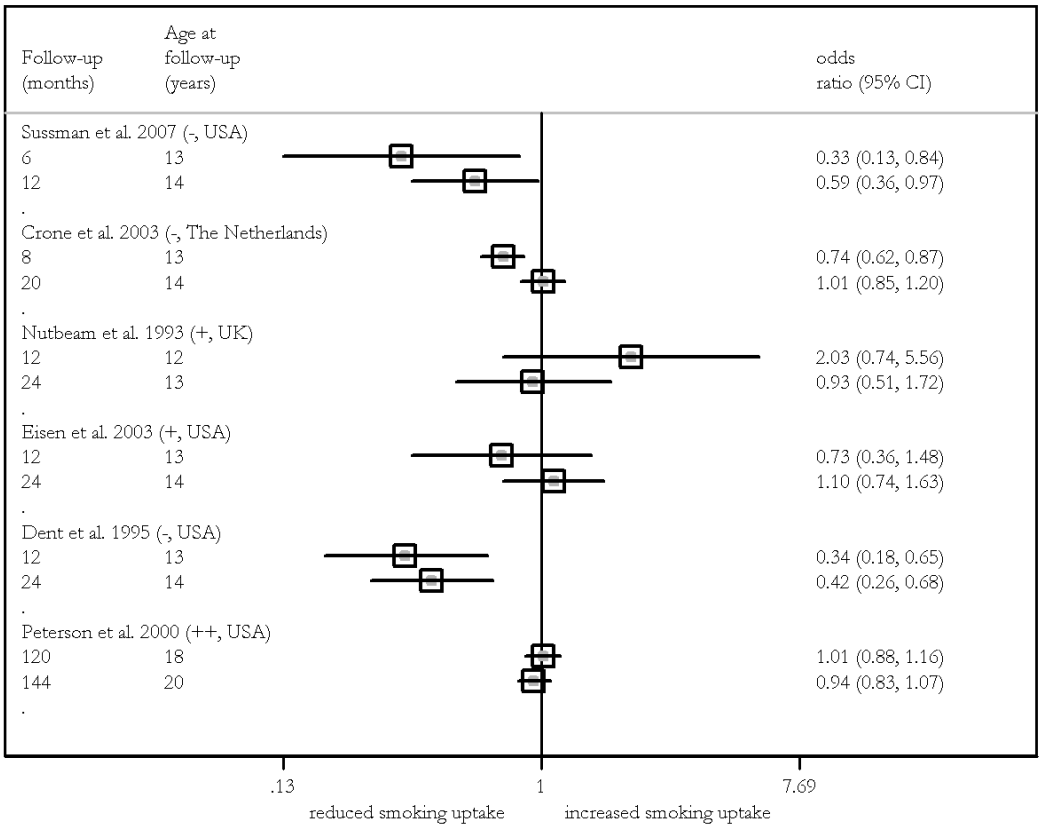
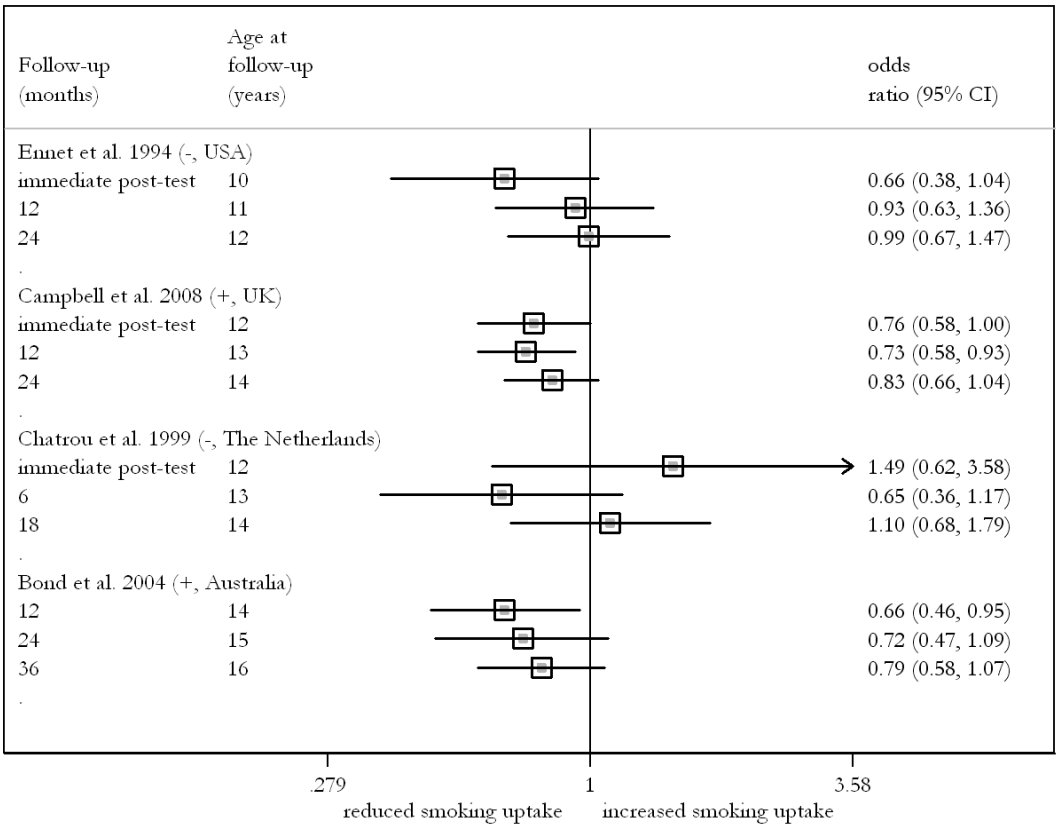


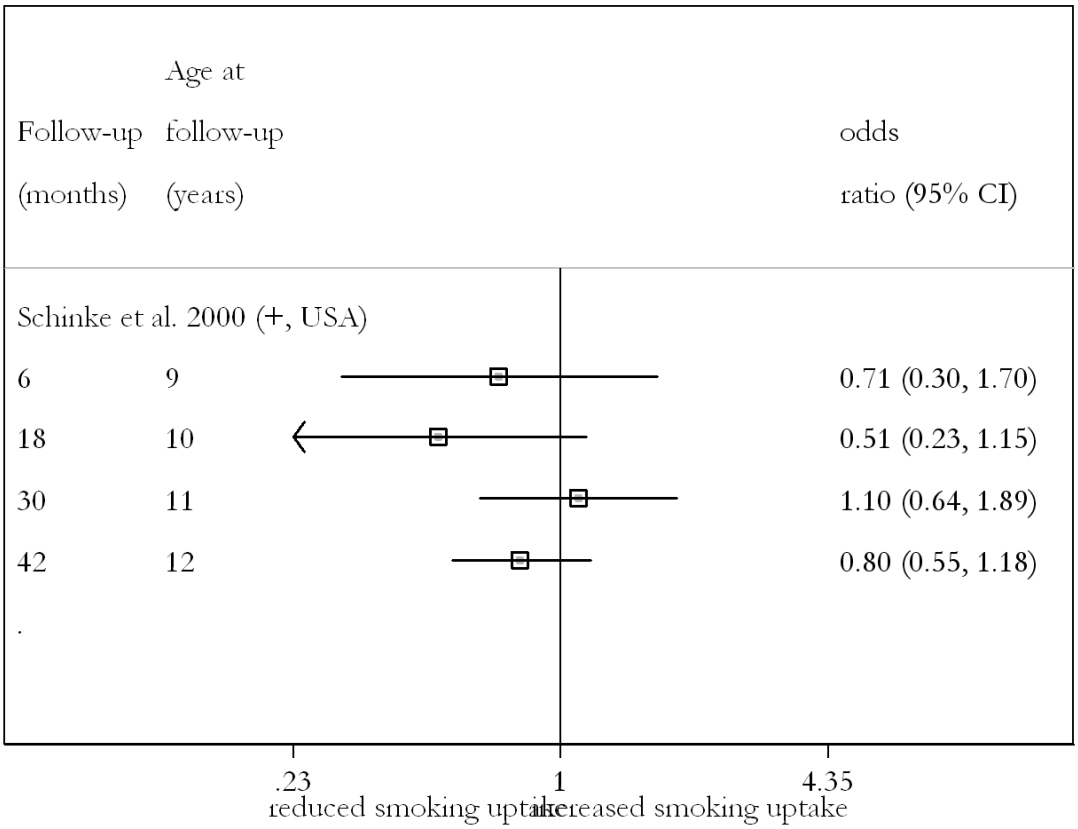
Figure 3:11 shows programme effectiveness from studies with three follow-ups. Results from Campbell et al. 2008 (+, UK) and Bond et al. 2004 (+, Australia) suggest an attenuation of programme effect over time. However, in two studies, Chatrou et al. 1999 (-, The Netherlands) and Ennet et al. 1994 (-, USA) the intervention did not produce statistically significant results at all three follow-ups.

Figure 3:11 Programme effects – odds ratios with 95% confidence interval – from studies with three follow-ups



Only Schinke et al. 2000 (+, USA) provided usable estimated odds ratio for four follow-up periods (Figure 3:12). Similarly, in this study school-based prevention was not effective in preventing smoking at all four follow-up periods.

Figure 3:12 Programme effects – odds ratios with 95% confidence interval – from studies with four follow-ups (Shinke et al. 2000 +, USA)

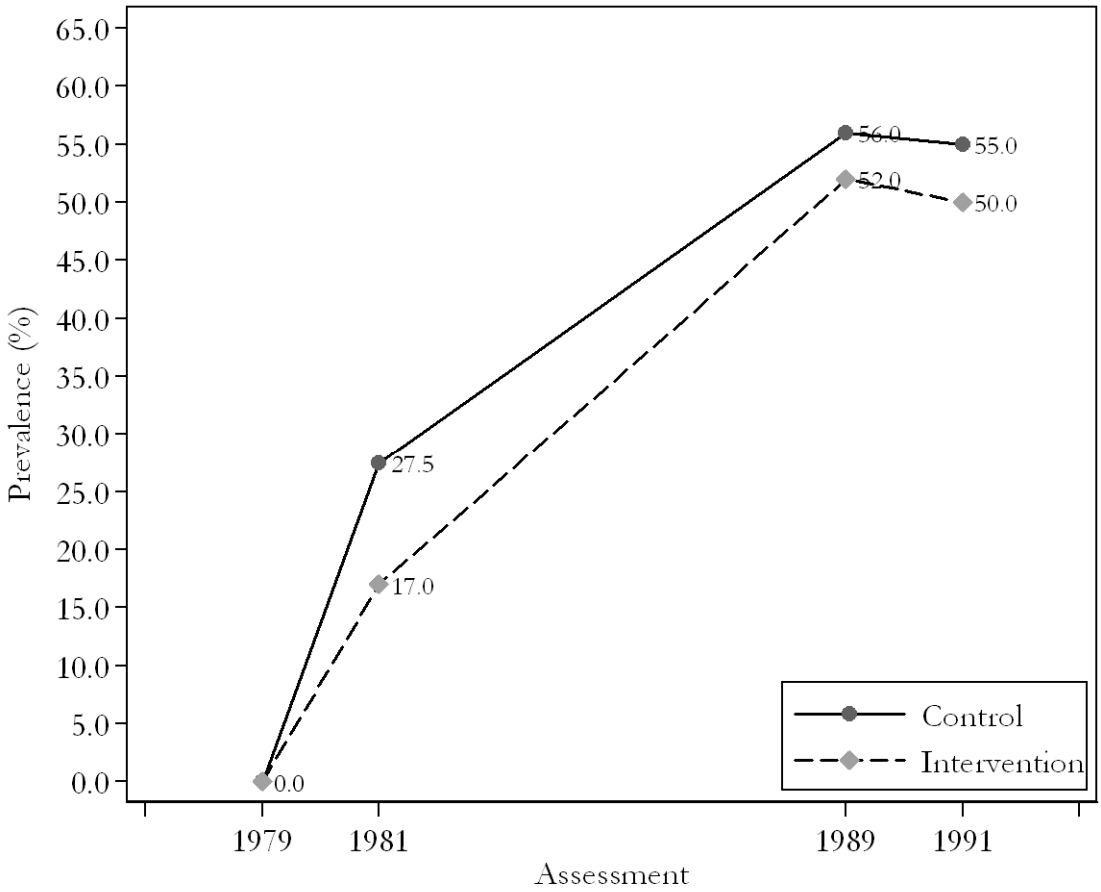


Klepp et al 1994 (-, Norway) provided evidence that school-based education can have a positive short-term impact on smoking behaviour, but that these effects tend to disappear over time. The design of this 12 year follow-up Oslo Youth Study is shown in Table 3:5. Figure 3:13 shows the smoking onset rate (daily and occasionally smoking) from 1979 to 1991 for men and women combined. As seen in the Figure 3:13, smoking onset rates for those students exposed to intervention and those in the control group diverged slightly between 1979 and 1981. The programme reached largest difference after two years from pre-test. Thereafter, the differences in smoking onset rates tended to disappear over time.

Table 3:5 Design of the Oslo Youth study 1979 – 1991 (adapted from Klepp et al 1994 -, Norway)

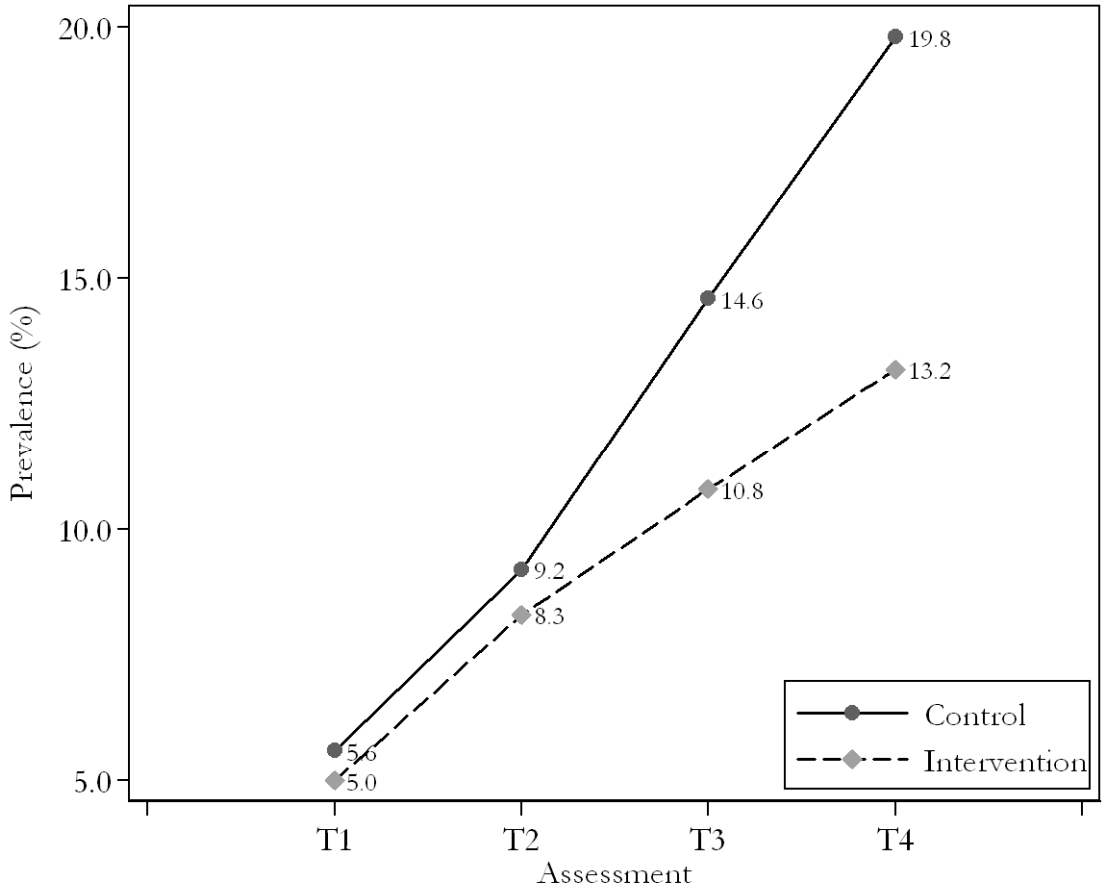
Period	*Activity*
Spring 1979	Baseline
Autumn 1979 – 1980	Health education programme
Spring 1981	Follow-up Survey I
Autumn 1989	Follow-up Survey II
Autumn 1991	Follow-up Survey III

Figure 3:13 Figure Smoking onset rate (adapted from Klepp et al 1994 -, Norway)



Contrary to this, Elder et al. 1993 (-, USA) provided evidence that their school-based education programme tended to have a long-term impact on smoking behaviour. In this RCT, students were surveyed four times during 3-year period, including baseline assessment at the beginning of seventh grade (T1), and post-test assessments at the end of grades seven (T2), eight (T3), and nine (T4). Figure 3:14 depicts the prevalence of past month tobacco use measures at the four measurement periods. As can be seen in Figure 3:14 past month tobacco use rates for control and intervention conditions ran roughly parallel between the first two observation periods (T1 and T2), diverged slightly between the second and third periods (T2 and T3), then reached their largest difference at the final follow-up (T4).

Figure 3:14 Prevalence of past month smoking (adapted from Elder et. al. 1993 -, USA)



3.4.2 Effects beyond school leaving age

ES10 Evidence Statement: There is no robust evidence indicating that any school-based intervention has long-lasting effects beyond school leaving age. One US study (Peterson 2000, ++) demonstrated that a comprehensive smoking prevention programme that adopted a social influences approach, started at age 8-9 and continued through to age 17-18 was ineffective when smoking prevalence was measured at age 20. Another US drug prevention programme (Lynam 1999, +) targeting children aged 12-13 also found no significant effect on smoking at age 20.
Applicability: The applicability of these findings to current UK settings is unclear. No UK study has followed children beyond school leaving age.

Four studies (Klepp et al. 1994, Shean et al. 1994, Lyman et al 1999, Perterson et al. 2000) followed participants until after school-leaving age. The Hutchinson Smoking Prevention Project (Peterson et al. 2000a)(++, USA) started at age 8-9 and the intervention continued through age 8-18 (3rd year elementary school through middle school to final year high school). Final follow-up at the age of 20 (two years after students left high schools) showed no significant difference in smoking prevalence (at least weekly smoking) between intervention and control groups (33.0% vs 34.3%, RD=-1.3%, 95%CI -4.1% to 2.0%).

Follow-up at age of 20 from Project DARE (Lynam et al. 1999)(+, USA), a drug prevention programme that targeted age 11-12 (first year middle school), also showed that the intervention had no effect on the frequency of past month cigarette use (beta coefficient/standardised effect size =0.101, P>0.05).

The Oslo Youth Study (Klepp et al. 1994) (-, Norway) was a health education programme that covered cigarette smoking, nutrition and physical activity and delivered the interventions to children predominantly aged 11-14 over 15 months. At 12-year follow-up (mean age 25), no significant difference in the prevalence of daily smoking between cross-sectional samples of intervention and control groups was found (44% vs 48%, P=0.10).

Follow-up at age of 18-19 from a brief 5-session smoking prevention programme (Shean et al. 1994)(-, Australia) targeting age 12-13 (last year primary school) found significant protective effect among baseline non-smoking girls (daily smoking OR = 0.53, 95%CI 0.27 to 1.01 for teacher-led group vs control; OR = 0.50, 95% CI 0.26 to 0.98 for peer-led group vs control) but not among baseline non-smoking boys ((daily smoking OR = 0.87, 95%CI 0.39 to 1.96 for teacher-led group vs control; OR = 1.10, 95% CI 0.53 to 2.28 for peer-led group vs control).

The study had high attrition rate at this long-term follow-up of 63% and the gender difference in the effectiveness was an unexpected finding.

All the above studies were initiated more than two decades ago, between 1979 (Klepp et al. 1994) and 1987 (Lynam et al. 1999). None were conducted in the UK. The applicability of the results to current UK settings is uncertain.

3.5. Does effectiveness depend on status of the person (e.g., peer, teacher or external trainer/researcher) delivering it?

ES11 Evidence statement: It is not clear whether effectiveness of school-based smoking prevention programmes depend on the status of the person delivering it. There is conflicting evidence whether peer-led programmes produced most effective intervention effects on smoking initiation. It is important to note that a peer-led programme may be differentially effective based on how leaders are selected and how groups are formed, and may be curriculum dependent. There is some evidence that teacher-led, health educator-led and peer-led programme tend to be equally effective.

Seven RCTs examined whether effectiveness of school-based smoking prevention programmes depend on the status of the person delivering it. Three other studies (Botvin et al. 1990; Telch et al. 1990; Valente et al.2006) provided evidence that peer-led interventions tend to enhance smoking prevention programmes. For example, results from Telch et al. 1990 (+, USA) showed a marked suppression in the onset of both experimental and regular smoking among those students exposed to the resistance training with peer involvement. Similarly, Botvin et al. 1990 (-, USA) found that a cognitive-behavioural approach when carried out by peer-leaders and when additional boosters are provided can reduce tobacco use. Yet Valente et al. 2006 (+, USA) provided evidence that a peer-led programme will be differentially

effective based on how leaders are selected and how groups are formed, and this effect may be curriculum dependent. In one RCT (Ellickson et. al. 1993 -, USA), there was no statistically significant difference in regular smoking rates among students taught by health educators and those taught by adult teachers assisted by older teens. Campbell et al. 2008 (+, UK) found that the effect of ASSIST intervention was much the same for peer supporters and non-peer supporters. Similarly, Armstrong et al. 1990 (-, Australia) confirmed non-superiority of peer-led programmes to teacher-led programmes. This result was gender-specific. Both the teacher-led and peer-led programmes reduced, to about the same degree, the uptake of smoking by girls while only the teacher-led programme appeared to be effective in boys. Cameron et al. 1999 (++, Canada) provided evidence that teachers and nurses were equally effective providers regardless of delivery method. While, Sussman et al. 2003 (-, USA) reported that students exposed to interactive health educator-led interventions were less likely to use tobacco compared to those not exposed to health educator-led instruction.

Applicability: Most of the studies were conducted in the USA. It is not clear if these findings are directly applicable to the UK since the interventions under investigation are specific to USA. Furthermore, demographics of the participants are different from those in the UK. Only study Campbell and colleagues is likely to be directly applicable.

One UK study (RCT+) assessed the effectiveness of a peer-led intervention that aimed to prevent smoking uptake in secondary schools (Campbell et al. 2008). Schools were randomly assigned to either intervention condition or to continue their usual smoking education. The intervention, ASSIST (A Stop Smoking In School Trial) consisted of training influential students to act as peer supporters during informal interactions outside the classroom with the aim of encouraging their peers not to smoke. Results of the planned subgroup analysis provided evidence of no differential effect of the intervention according to peer-supporter status (ratio of OR=0.90; 95% CI 0.72 to 1.21).

The authors concluded that the effect of ASSIST intervention was much the same for peer supporters and non-peer supporters.

Telch and colleagues examined whether use of same-age peer leaders enhanced social influence smoking prevention programme (Telch et al. 1990). Seventh grade students were randomly assigned by classrooms to: (a) videotape instruction, (b) videotape instruction plus peer leader involvement, or (c) survey only control schools (control 1 and control 2). The researchers found that peer-led intervention enhanced effects of the programme on smoking adoption: transition from non-smoking to experimental smoking and transition from non-smoking to regular smoking. There was statistically significantly lower onset rate for experimental smoking ($\chi^2(1) = 4.4$, $p<0.05$). The experimentation (defined as smoking less than once per week) onset rates at post-test were lowest for the tape programme with peers (2.1%), followed by the tape programme without peers (7.4%), control 1 (8.0%), and control 2 (10.1%).

Students randomised to the Tape programme with peers were less likely to have reported regular smoking (i.e. at least once per week) at post-test than those exposed to the Tape programme without peers ($\chi^2(1) = 4.7$, $p<0.05$) and two control conditions ($\chi^2(1) = 4.6$, $p< 0.05$). Overall, results from this study lend support for the use of peer-led social pressure resistance training in suppressing the adoption of cigarette smoking among junior high school students. The authors concluded by explaining the possible processes by which peer leaders enhanced school-based smoking prevention programmes. Firstly, the use of peer leaders may increase programme credibility and enhanced students' attention to the pressure resistance skills being taught. Secondly, the use of peer-leaders may serve to facilitate normative changes concerning cigarette smoking.

Ellikson and co-researchers from RAND examined whether the effectiveness of the project ALERT (Adolescent Learning Experiences in Resistance Training) curriculum

depends on the status of the person delivering it (Ellickson, Bell, & McGuigan 1993 -, USA). Schools were randomised to two treatment groups and one control group. In half of the treatment schools, student were taught by adult health educators while in other half older teens assisted adult teachers in delivering the lessons. The findings from the study revealed that regular smoking rates were not significantly different among the three experimental groups. The researchers concluded that once the lessons stopped, the programme's effect on drug use stopped regardless of who delivered it.

Armstrong and colleagues studied how effective peer-led programmes were in preventing the uptake of smoking by children (Armstrong et al. 1990 -, Australia). The programme was based on social consequences curriculum and schools were randomised to one of three groups: control group (no planned intervention); peer-led programme; and teacher-led programme. The proportion of girls who started to smoke increased in the second year of follow-up but remained lower in both intervention groups than in the control group (χ^2=6.7; df = 2; p=0.03). The results of this study revealed that both the teacher-led and peer-led programmes reduced, to about the same degree, the uptake of smoking by girls while only the teacher-led programme appeared to be effective in boys.

Botvin and co-researchers examined effects of status of person delivering a cognitive-behavioural approach to substance abuse (Botvin et al. 1990 -, USA). The study was a five-arm trial: (1) peer-led intervention, (2) peer-led intervention with booster sessions, (3) teacher-led intervention, (4) teacher-led intervention with booster sessions, and (5) control. The study found that there were significantly fewer students in the peer booster condition reporting cigarette smoking than in the teacher booster condition on the monthly measure (p<0.0001), the weekly measure (p<0.0001), and the daily measure (p<0.0005). The researchers concluded that cognitive-behavioural approach when carried by peer-leaders and when additional boosters are provided can reduce tobacco use.

One study (Valente et al. 2006 +, USA) compared the effects of three leader and group selection methods within the context of two tobacco prevention programmes: a social influences programme (Chips) and multicultural emphasis (Flavor). Students were randomly assigned to one of three leader and group creation conditions: (i) leaders were defined as those who received the most nominations by students and groups created randomly (random group), (ii) same as (i) but groups created by assigning students to the leaders they nominated (network), and (iii) leaders and groups created by teachers (teacher). The study found that main effects of the curriculum and network assignments were non-significant on smoking initiation when entered alone. There was no statistically significant difference in smoking initiation between those students in Flavor and Chip groups (OR=1.24; 95% CI 0.67 to 2.27). It is important to note that the network condition in Chips (the reference curriculum) was associated with a higher smoking initiation rate (OR= 1.22; 95% CI 1.06 to 1.40) compared to the random condition. Interaction terms of curriculum and assignment methods were significant.

The network and teacher conditions were less effective than the random group condition with Chips, and more effective than random group condition with Flavor. Student in Teacher Flavor (OR=0.41; 95% CI 0.19 to 0.89) and network Flavor (OR=0.50; 95% CI 0.27 to 0.92) significantly reduced smoking initiation. The authors concluded by emphasizing that school-based prevention programmes should be evaluated in light of who implements the programme and that a peer-led programme will be differentially effective based on how leaders are selected and how groups are formed, and this effect may be curriculum dependent.

Cameron et al. 1999 (++, Canada) determined the effect of provider (nurse or teacher) and training method (workshop or self-preparation) on outcomes of a social influences smoking prevention programme. Students from elementary schools were stratified by risk score and assigned randomly to one of the five experimental conditions: (1) teacher-led and self-preparation; (2) teacher-led and workshop; (3)

nurse-led and self-preparation; (4) nurse-led and workshop; and (5) control. The study found that in high risk schools, both teacher and nurse provider conditions, regardless of the training method, resulted in significantly lower smoking rate relative to control schools (smoking rates of 16.0% in intervention and 26.9% in control schools). In low-risk schools (i.e. schools with low smoking rates in the senior class), regardless of training method, neither nurses nor teachers achieved results that were statistically significant different from those of control condition. Because of these findings, Cameron concluded that teachers and nurses were equally effective providers.

Sussman et al. 2003 (-, USA) examined whether messages from a health educator can affect effectiveness of a drug abuse prevention programme (Project Towards No Drug Abuse). Schools were randomly assigned by block to one of three conditions – standard care (control), health educator-led classroom programme, and self-instruction classroom programme.

The RCT found that students in the health educator-led group were 50% less likely to use tobacco compared to those who did not receive health educator-led instruction (OR=0.50; 95% CI 0.31 to 0.81). This RCT revealed that health educator-led version of project TND showed maintenance of effect on cigarette smoking after 2-year follow-up.

3.6. Does site/setting influence effectiveness?

ES12 Evidence statement: Evidence shows that site or setting may influence effectiveness. One UK RCT tended to have had a more significant effect in rural schools. Otherwise, there is conflicting evidence of interventions having a differential effect according to location (rural or urban) or country of the study.

Evidence from one RCT (Campbell et al. 2008; +, UK) indicated that students from schools located in the South Wales valleys were less likely to be regular smokers. Another RCT (Sussman et al. 1993 -) conducted in USA found that trial of cigarette smoking use was higher in the rural schools than in the urban schools. Weekly use of tobacco products did not differ by place of residence. Yet another study (Elder 1996; +, USA) found that Louisianans were more likely to be ever smokers than students from Texas State. Noland et al. 1998 (++, USA) provided evidence that intervention had no differential effect on students who raised tobacco than those not involved in tobacco production. One RCT (Ausems et al. 2004 -, The Netherlands) specifically compared in-school and out-of-school smoking prevention. These RCTs found that smoking initiation was lowest in the out-of-school and highest among students in the control condition. The European Smoking Prevention Framework Approach (ESFA) found evidence of the intervention differential effect according to the location (country) of the study (de Vries et al. 2006 -, EU). ESFA was effective in prevention uptake of smoking in Spain, Finland, and Portugal and ineffective in Denmark and UK. ESFA showed more smoking in the intervention group in The Netherlands. Our planned subgroup analyses provided evidence of no differential effect according to the country.

Applicability: The majority of the studies took place outside of the UK in a wide range of countries; including Denmark, Finland, The Netherlands, Portugal, and Spain. However, it is likely that their findings are applicable to the UK. Only the UK study by Campbell and colleagues is likely to be directly applicable.

Four RCTs specifically examined whether effectiveness of school-based prevention programmes depend on the location of the school. For example, one recent RCT (Campbell et al. 2008 +, UK) found statistically significant differences between schools located in towns or cities and those located in the South Wales valleys. Students from schools located in South Wales valleys were less likely to be a regular smoker (OR=0.52; 95% CI 0.34 to 0.78); while the intervention was not effective in reducing prevalence of regular smoking among students from towns or cities (OR=0.89; 95% CI 0.71 to 1.11) in fully adjusted model.

Sussman et al. 1993; (-, USA) demonstrated that smoking prevalence was higher in the rural schools than in the urban schools. In this RCT, students from rural schools were more likely to have reported trial use of tobacco than their counterparts from urban schools immediately post-test (43% versus 35%; $p<0.05$) and after 1-year follow-up (50% versus 44%; $p<0.05$). There was no statistically significant difference between rural and urban schools when prevalence of weekly tobacco use was used as the outcome.

One RCT (Elder 1996 +, USA), the CATCH (Child and Adolescent Trial for Cardiovascular Health) examined the effects of school environment, class curricula, and family intervention components in promoting the cardiovascular health of elementary school students. In this multistate field trial, using Texas as referent, Louisianans were more likely to be ever smokers (OR=1.60; 95% CI 1.12 to 2.30). There was no statistically significant difference between students from California, Minnesota and Texas State.

Another RCT (Noland et al. 1998 ++, USA) investigated the efficacy of a Social-Influences Tobacco Prevention Programme conducted with adolescent living in a high tobacco producing area. This study revealed that after 2-year of follow-up, significant

effects were found for 30-day (experiment versus control: 36.8% vs. 51.8%; p<0.01), 7-day (34.2% vs. 45.6%; p<0.05) and 24-hour (25.7% vs. 36.9%; p<0.01) smoking for those involved in raising tobacco. Amongst those not involved, there was a significant effect for 30-day (experiment versus control: 29.8% vs. 35.1%; p<0.05) smoking, along with a marginally significant effect for 7-day (25.2% vs. 29.9%; p=.067) smoking. However, when analysis was conducted to determine whether the intervention had a differential effect on students who raised tobacco; no significant treatment and involvement interaction effects were found.

One RCT (Ausems et al. 2004 -, The Netherlands) specifically evaluated the additional effectiveness of out-of-school smoking prevention on an existing in-school programme. In this RCT, students were randomly allocated to one of four research conditions: (a) the in-school condition, (b) the out-of-school condition, computer-tailored letters sent to the students' home; (c) the in-school and out-of-school, a combined approach; and (d) the control condition. Ausems et al. 2002 (-, The Netherlands) found that smoking initiation was lowest in the out-of-school condition (10.4%), followed by in-school condition (14.9%) and the in-school and out-of-school (15.2%); while the highest smoking initiation was observed in control condition (18.1%). With other factors controlled for statistically, the out-of-school programme tended to prevent pretest never smokers from uptake of smoking (OR=0.73; 95% CI 0.50 to 1.03; p=0.08). Ausems et al. 2004 assessed the percentage of pre-test never-smoking students who indicated to have started smoking at *post-test 1* (6 months after pretest), *post-test 2* (12 months after pretest), and *post-test 3* (18 months after pretest). This study found that *Post-test 1* showed that smoking initiation among pre-test never-smokers was lowest in the out-of-school condition (16.8%) and highest in the in-school condition (27.4%). At *post-test 2*, smoking initiation among pre-test never-smokers was lowest in the out-of-school smoking sample (25%) and highest in the control condition (40.9%). At *post-test 3*, smoking initiation among pre-test never-smokers was lowest in the out-of-school condition (27.2%) and highest in the control condition (47.9%). There were no significant interaction factors between the in-school and out-of-school for smoking initiation at *post-test 1*, implying that the effect of 'in

and out' was not larger than the sum of the effects of the in-school and the out-of-school programme.

The in-school and the out-of-school programmes did not show a significant effect on smoking *initiation.* Similarly, at *post-test 2*, there were no significant 'in and out' interactions. However, at *post-test 3*, significant 'in and out' interactions were found for smoking initiation. Students in the out-of-school condition were less likely to have initiated smoking at post-test 3 than students in the control condition (OR=0.42; 95% CI 0.18 to 0.96).

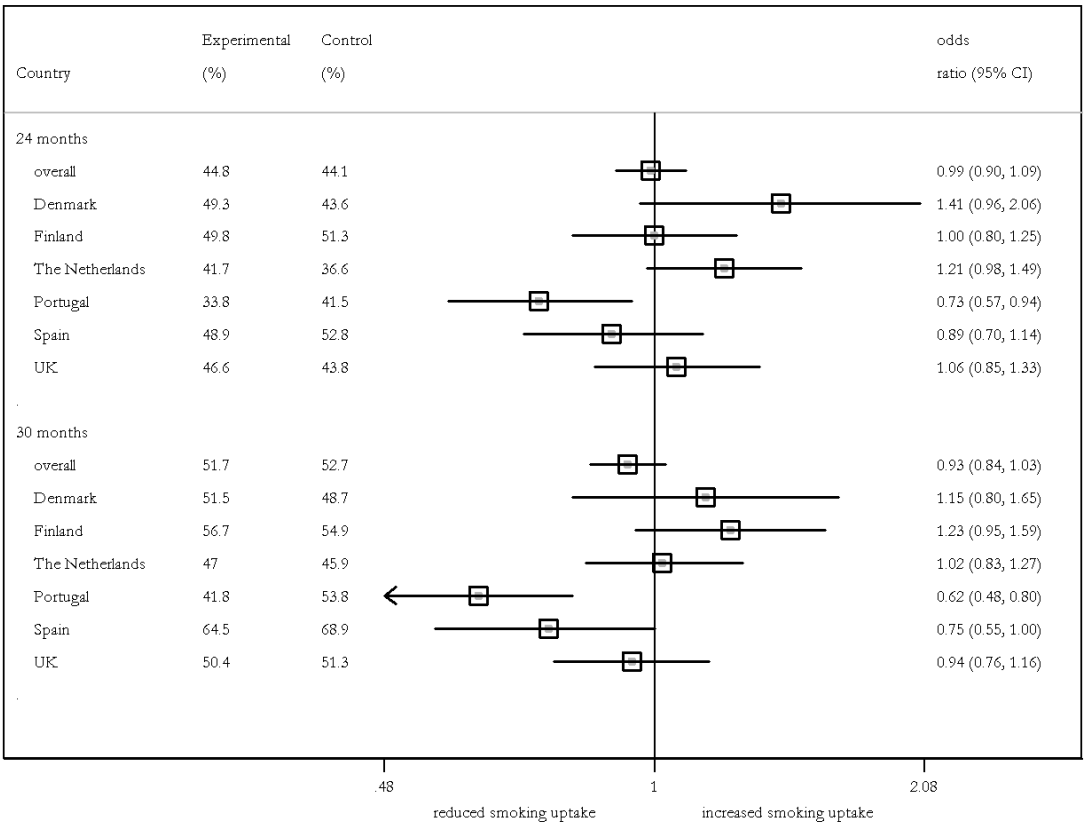
The European Smoking Prevention Framework Approach (ESFA) study in six countries tested the effects of a comprehensive smoking prevention programme after 24 and 30 months (de Vries et al. 2006 -, EU). The programme targeted four levels, i.e. adolescents in schools, school policies, parents and communities. The results of ESFA having differential effect according to the study sites (countries) are presented below, see Figure 3:15 and Figure 3:16.

Pretest never smokers to ever smokers

After 24 months: Significantly fewer ever-smokers were found in the Portuguese experimental group than the control group (OR=0.73; 95% CI 0.57 to 0.94). A borderline counter-effect was found in The Netherlands, with slightly more ever-smokers in the experimental condition than in the control condition (OR=1.21; 95% CI 0.98 to 1.49; p=0.07). A similar trend was observed in Denmark (OR=1.41; 95% CI 0.96 to 2.06; p=0.08)

After 30 months: There were fewer ever-smokers in the experimental condition in Portugal (OR=0.62; 95% CI 0.48 to 0.80; p<0.001) and Spain (OR=0.75; 95% CI 0.55 to 1.00; p=0.05).

Figure 3:15 Never smokers to ever-smokers after 24 and 30 months (de Vries et al. 2006 -, EU)

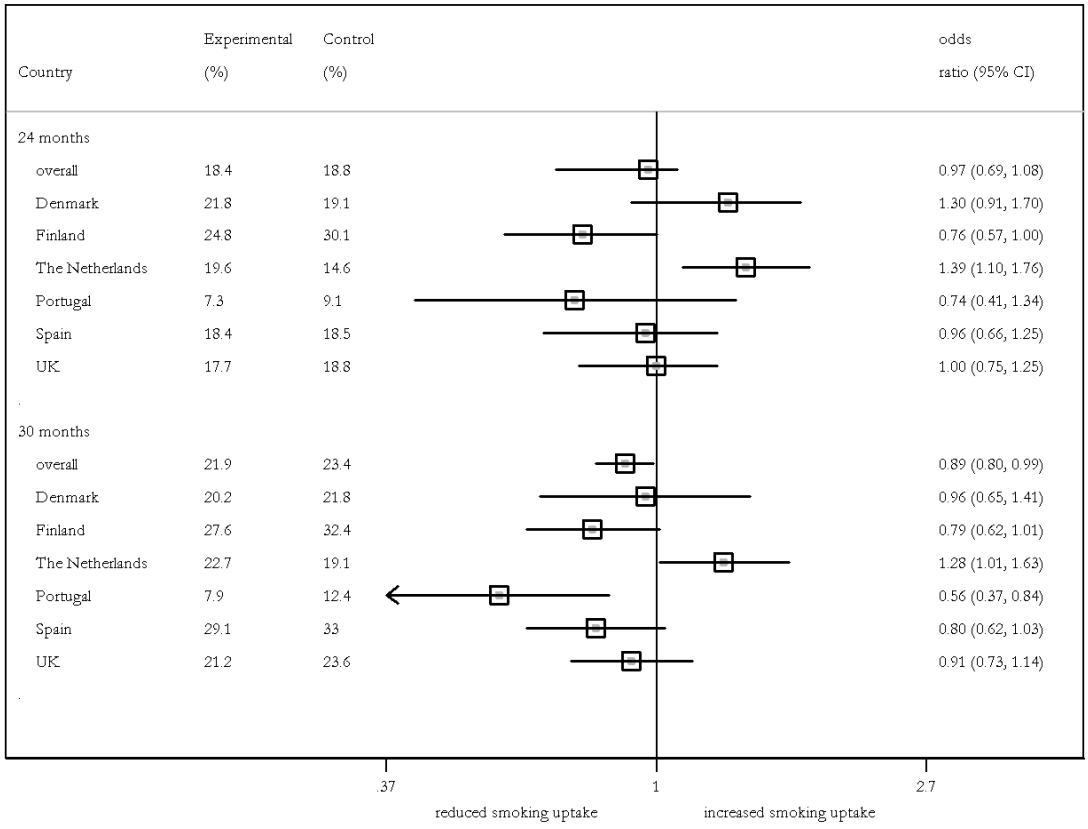


Pretest non-smokers becoming weekly-smokers

After 24 months: The lowest percentage of weekly smoking was observed in Portugal (7.3% in the experimental group versus 9.1% in the control group). The highest percentages were found in Finland (24.8% in the experimental group versus 30.1% in the control group). There were significant differences in weekly smoking between the experimental and control groups in Finland (OR=0.76; 95% 0.57 to 1.00; p=0.05). A significant counter-effect was found in The Netherlands in that more adolescents smoked regularly in the experimental condition than in the control condition (OR=1.39; 95% CI 1.10 to 1.76).

After 30 months: Significant differences were found in Portugal with fewer new weekly smokers in the experimental group than in the control group (OR=0.56; 95% CI 0.37 to 0.84). Borderline effects were found in Finland with 27.6% new smokers in the experimental condition versus 32.4% in the control group (OR=0.79; 95% CI 0.62 to 1.01; p=0.06) and in Spain with 29.1% new smokers in the experimental condition versus 33.0% new smokers in the control group (OR=0.80; 95% CI 0.62 to 1.03; p=0.08). A significant counter-effect was found in The Netherlands in that more adolescents smoked regularly in the experimental condition than in the control condition (OR= 1.29; 95% CI 0.73 to 1.14).

Figure 3:16 Never smokers to weekly smokers after 24 and 30 months (de Vries et al. 2006 -, EU)



We undertook a planned subgroup analyses to examine whether there is association between location of the study (country) and programme effects on prevalence of

smoking. Using estimated odds ratios for prevalence of smoking for 26 studies that compared school-based only programmes with usual education or no intervention, we found inconsistent association between location of the study and programme effects. Figure 3:17 shows the pooled estimates for prevalence of smoking by subgroup categories - countries. Not unexpectedly, the pooled results from 14 USA studies provided evidence that the intervention was effective in reducing prevalence of smoking (pooled OR=0.78; 95% CI 0.67 to 0.92; with evidence of statistically significant substantial heterogeneity, I^2=50.7%, p=0.015). The intervention was not effective in preventing smoking uptake when students were recruited from Australia, Canada, Germany, Norway, The Netherlands, and United Kingdom. The results of the subgroup analysis revealed that the effect of school-based prevention programme was not statistically significantly different from that of usual education or no intervention when students were recruited from: Australia (+; OR=0.79; 95% CI 0.58 to 1.07); Canada (two ++: pooled OR=0.83; 95% CI 0.68 to 1.01; with evidence of no statistically significant heterogeneity I^2=0.0%, p=0.847); Germany (+; OR= 0.98; 95% CI 0.81 to 1.19); Norway (-; OR= 0.82; 95% CI 0.46 to 1.47); The Netherlands (three + and one -; pooled OR=0.79; 95% CI; 0.55 to 1.14; with evidence of statistically significant substantial heterogeneity I^2=61.0%, p=0.053); and); UK (three + and one -; pooled OR=0.93; 95% CI 0.78 to 1.10; with evidence of no statistically significant heterogeneity I^2=2.6%, p=0.379). Table 3:6 shows result of meta-regression where the natural log of the odds ratio was the outcome and study location was explanatory factor. Using USA as referent, we found that location of study was not an important factor in explanation prevalence of smoking (joint test for all covariates; F(6,20)=0.24; p=.958).

Figure 3:17 Forest plot of the odds ratios (ORs) and 95% confidence intervals (CIs) of individual trials and pooled data for prevalence of smoking; subgroup analysis according to study location (country)

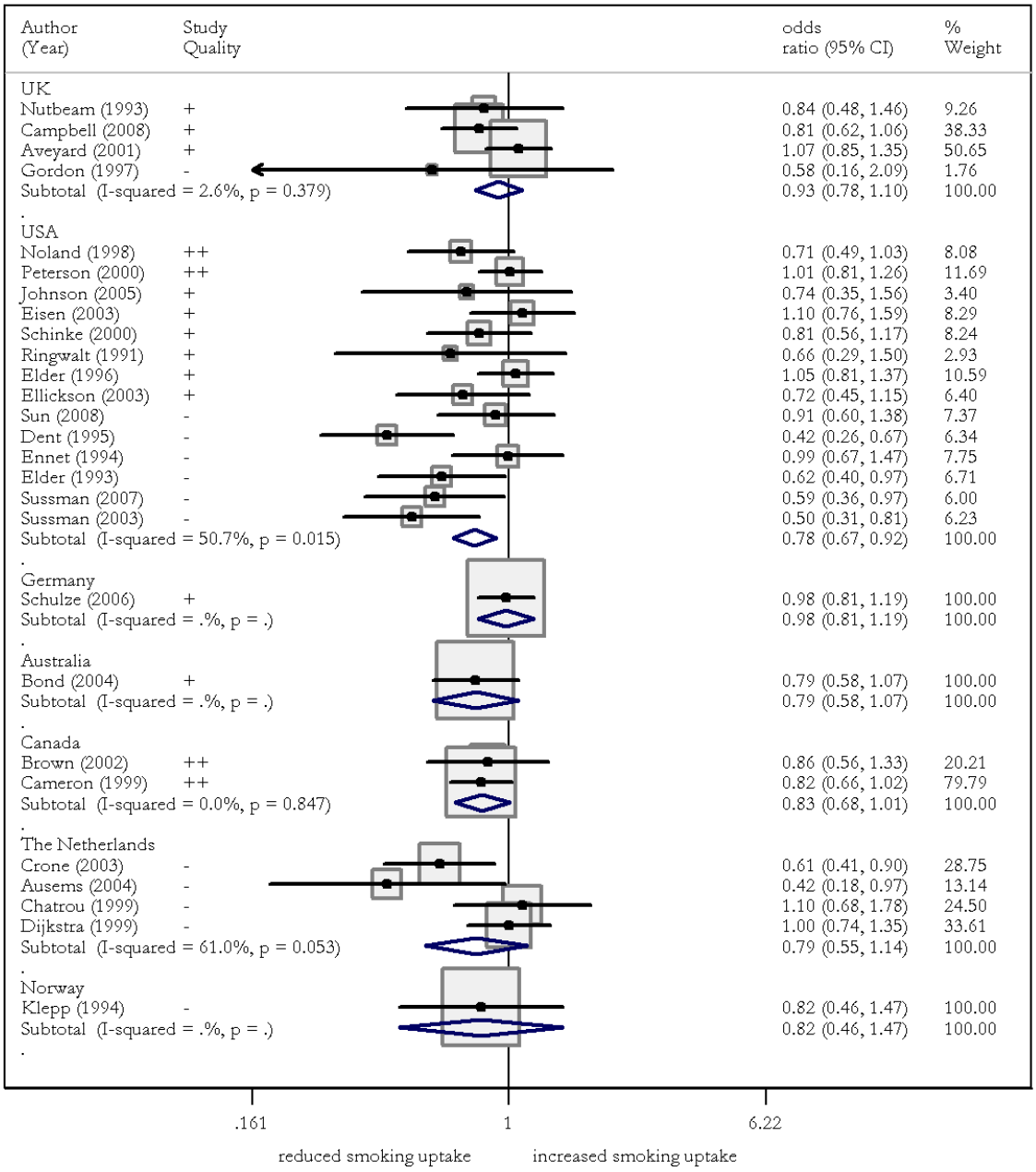


Table 3:6 Results from univariable meta-regression analysis, Country

Variable	Number of studies	Ratio of OR (95% CI)	P-value
Australia	1	1.01(0.59 to 1.73)	.985
Canada	2	1.06(0.71 to 1.59)	.760
Germany	1	1.25(0.71 to 2.01)	.349
Norway	1	1.04(0.49 to 2.22)	.908
The Netherlands	4	1.03(0.72 to 1.46)	.862
United Kingdom	4	1.14(0.81 to 1.61)	.418
USA	14	Reference	

R^2=0.00% (percentage of total variability in log odds ratio of outcome explained by model)

3.7. Does effectiveness depend on the intensity of the intervention?

ES13 Evidence statement: There is clear evidence that the addition of booster sessions enhanced effectiveness of main programmes.

Four studies (one ++ and three -) analysed effectiveness of booster sessions. Evidence from Perry et. al., 2003 (++, USA) suggests that addition of booster sessions significantly enhanced the effectiveness of the main programme and was more effective than the delayed programme controls. Dijkstra et. al., 1999 (-, USA) found that boosters can be an effective tool for maintaining or increasing the effectiveness of smoking prevention programmes. Botvin et. al., 1990(a) (-, USA) revealed that addition of booster sessions to cognitive-behavioural approach can reduce tobacco use. Another study (Eckhardt et. al., 1997 -, USA) showed that continued intervention students reported significantly less smoking than lapsed intervention and continued control students.

Applicability: All four studies were conducted in USA. It is not clear if the findings are directly relevant to the UK context

Perry and colleagues evaluated the effect of the middle and junior high school Drug Abuse and Resistance Education (D.A.R.E.) and D.A.R.E. plus programmes on drug use and violence (Perry et al. 2003 ++, USA). The D.A.R.E only was taught by police officers and consisted of a ten session curriculum. The D.A.R.E. programme provided skills in resisting influences to use drugs and in handling violent situations. The D.A.R.E. plus condition provided an extra 4-session programme carried out by trained teachers once a week for 4 weeks and extracurricular activities for students. The study found that those in the D.A.R.E. Plus schools were less likely than those in the control schools to show increases in current smoking, tobacco use behaviour and intentions. The growth rate for current smokers was lowest among students in

D.A.R.E. Plus (0.18), followed by students in D.A.R.E (0.28) and control condition (0.31). The authors concluded that the D.A.R.E. Plus Project demonstrated that a multi-component intervention and addition of extra sessions significantly improved the D.A.R.E. middle and junior high school D.A.R.E. curriculum and became an effective intervention for reducing increases in multidrug use.

In another study (Dijkstra et al. 1999 -, USA), the authors examined the contribution of boosters on two smoking prevention programmes, a social influence (SI) and an SI programme with an additional decision-making component (SI^{DM}). Using self-reported smoking behaviour, the study showed that at 12 months after pre-test the SI programme was only effective when boosters were included in the programme; however SI^{DM} without boosters was effective. Students randomised to SI+Booster were less likely to be a smoker compared to those students randomised to SI only (OR=0.41; 95% CI 0.26 to 0.63) or students randomised to control conditions (OR=0.44; 95% CI 0.30 to 0.65). At 18 months follow-up, the SI programme with boosters remained effective. Students randomised to SI+Booster were less likely to be a smoker compared to those students randomised to SI only (OR=0.62; 95% CI 0.43 to 0.90) or students randomised to control conditions (OR=0.62; 95% CI 0.45 to 0.87). The authors concluded that booster sessions should be included in SI programmes.

Botvin et al. 1990 (-, USA) compared the effectiveness of cognitive-behavioural skills training approach with and without booster sessions. The study was a five-arm trial: (1) peer-led intervention, (2) peer-led intervention with booster sessions, (3) teacher-led intervention, (4) teacher-led intervention with booster sessions, and (5) control. Students in the four treatment conditions received 20-session substance abuse prevention programme during the seventh grade. Students in booster conditions participated in a 10-session booster programme during the eighth grade. Smoking status was determined by means of three dichotomous self-reported measures: a

monthly recall measure, a weekly recall measure, and a 24-hour recall measure. The study findings indicated that there was a significantly lower proportion of smokers in the peer-led booster condition when compared to the control condition for the monthly measure ($p<0.02$), the weekly measure ($p<0.005$), and the daily measure ($p<0.005$). There were also significantly fewer students in the peer booster condition reporting smoking than in the peer non-booster condition for the monthly measure ($p<0.0002$), the weekly measure ($p<0.0002$), and the daily measure ($p<0.001$).

Eckhardt and colleagues examined the relative effectiveness of continued, lapsed, and delayed smoking prevention intervention among senior high school students (Eckhardt 1997 -, USA). The original intervention was conducted during grades 7 to 9. The Intervention was reintroduced in the 11th grade to some students (continued intervention), was withdrawn from some other students (lapsed intervention), and was initiated with some control students (delayed intervention). Using past month smoking rates as main outcome, the study found that the continued intervention group (7%) had the lowest smoking rate, followed by the delayed intervention (9.4%), lapsed intervention (10.8%), and continued control (12.8%). Overall, the authors emphasized the importance of continuing smoking prevention activities.

3.8. How does effectiveness vary according to the age, sex, ethnicity, sexual orientation, baseline risk factors or socioeconomic status of the target audience?

3.8.1 Age

ES14 Evidence statement: It is not clear whether the age of the target audience has any impact on effectiveness of school-based prevention of smoking. There is inconclusive evidence whether the effectiveness of interventions depend on the age at which students were recruited and the age of students at maximum follow-up.

There is conflicting evidence that age is an important predictor of smoking in school-based prevention programmes. Three studies (Dijkstra et al. 1999 (+, USA); Gatta et al. 1991; (+, Italy) and Ausems et al. 2004; (-,The Netherlands)) found that the risk of smoking increased linearly with increasing age of the participants. Three studies (Johnson et al. 2005; (+, USA); Elder et al. 2002; (+, USA); and Chatrou et al. 1999; (-, The Netherlands)) found no significant association between age and prevalence of smoking. One particular study (Ausems et al. 2004; (-,The Netherlands)), found that this association diminished and became non-significant with longer duration of follow-up. Contrary to this finding, another study (Chatrou et al. 1999; (-, The Netherlands)) found that age did not predict prevalence of smoking regardless of duration of follow-up. We found inconclusive evidence whether effectiveness of the intervention depends on the age at which students were recruited and age of students at maximum follow-up. There is limited evidence from subgroup analyses that intervention may be effective when students were recruited at 11 or 12 years old, and when students were 14 or 16 years at maximum follow-up.

Applicability: None of the studies were conducted in the UK. It is not clear if these findings are directly applicable to the UK since the interventions under investigation

are specific to USA. Furthermore, demographics of the participants are different from those in the UK.

The main question to be answered for this sub-section is whether interventions started at younger ages is more or less effective compared to interventions started at older ages. Six RCTs specifically assessed whether age of the participant is an important predictor of smoking initiation in school-based prevention of smoking uptake. Four of these RCTs found that older students had a significantly increased risk of smoking at post test. Dijkstra and colleagues found that for each one year increase in student age, the risk of smoking increased by 25% (OR=1.25; 95% CI 1.06 to 1.47) after 12 months follow-up (Dijkstra et al. 1999). Another study (Gatta et al. 1991, + Italy), found that prevalence of smoking was lower in children aged less than 14 years compared to those students older than 14 years (relative risk = 0.86, $p<0.05$). Ausems and colleagues found that smoking initiation increased with age of the student (Ausems et al. 2004). At six-months post-test, for each one year increase in age of participants, the odds of smoking initiation increased by 69% (OR=1.69; 95% CI 1.21 to 2.46). After one-year post-test, the effect diminished and became non-significant (OR=1.33; 95% CI 1.00 to 1.78).

Three studies (two + and one -) found age was not significantly associated with prevalence of smoking. For example Johnson and co-researchers (Johnson et al. 2005) found no statistically significant association between age and prevalence of ever-smoking (OR=1.02; 95% 0.78 to 1.34). The study also found that age was not a significant predictor of past-month smoking (OR=1.18; 95% CI 0.85 to 1.65). One study (Elder et al. 2002, + USA) revealed that smoking was not related to students' age (OR=1.14; 95% CI 1.00 to 1.29). Another RCT (-, The Netherlands) found that prevalence of smoking was not associated with age of participant regardless of the duration of follow-up (Chatrou et al. 1999). With other factors controlled, Chatrou and

colleagues found that age was not an important predictor of prevalence of smoking immediate post-test (OR=1.02; 95% CI 0.55 to 1.88), after 6-months follow-up (OR=1.43; 95% CI 0.91 to 2.23), and after 18-months follow-up (OR=0.99; 95% CI 0.66 to 1.48).

We examined whether there is an association between age at which students were recruited into the programme and age of the students at maximum follow-up using sungroup analyses. Using estimated odds ratios for prevalence of smoking for 26 studies that compared school-based only programme with usual education or no intervention, we found an inconsistent association between starting age and prevalence of post-test smoking and no age-related trend. Figure 3:18 shows pooled estimates for prevalence of smoking by age at which studies were recruited. Results from this subgroup analysis provided evidence that intervention was effective in reducing prevalence of smoking when the students were recruited at 11 and 12 years old. Results from seven studies showed that when students were recruited at 11 years old, the intervention was able to reduce the smoking prevalence by 14% (pooled OR=0.86; 95% CI 0.76 to 0.98; with evidence of no statistically significant heterogeneity, I^2=0.0%, p=0.615). Similarly, results from another seven studies (++, USA; +, UK; two +, USA; two -, The Netherlands; and -, USA) showed that when students were recruited at 12 years old, the intervention was able to reduce prevalence of smoking by 25% (pooled OR = 0.75; 95% CI 0.60 to 0.94; with evidence of statistically significant moderate heterogeneity, I^2=56.4%, p=0.911). The intervention was not effective in preventing smoking uptake when students were recruited into the study at 8, 10, 13, and 14 years old. The results of the subgroup analysis revealed that the effect of school-based prevention programme was not statistically significantly different from that of usual education or no intervention when students were recruited at: 8 years old (four studies [++, USA; two +, USA]; pooled OR=0.98; 95% CI 0.84 to 1.15; with evidence of no statistically significant heterogeneity I^2=0.0%, p=0.508); 10 years old (two studies [+, USA and -, USA]; pooled OR=0.92; 95% CI 0.64

to 1.31; with evidence of no statistically significant heterogeneity I^2=0.0%, p=0.911); 13 years old (six studies [+, UK; +, Australia; two -, The Netherlands; and two -, USA]; pooled OR= 0.86; 95% CI 0.70 to 1.05; with evidence of statistically significant moderate heterogeneity I^2=46.2%, p=0.098); and 14 years old (two studies [++, Canada and -, USA]; pooled OR=0.66; 95% CI; 0.39 to 1.13; with evidence of statistically significant moderate heterogeneity I^2=63.0%, p=0.100).Result from meta-regression (Figure 3:19) revealed that age at which students were recruited was not an important factor in explanation prevalence of smoking (ratio of odds ratio = 0.96; 95% CI 0.91 to 1.01; p=.144).

Figure 3:18 Forest plot of the odds ratios (ORs) and 95% confidence intervals (CIs) of individual trials and pooled data for prevalence of smoking; subgroup analysis according to age at which students were recruited subgroups.

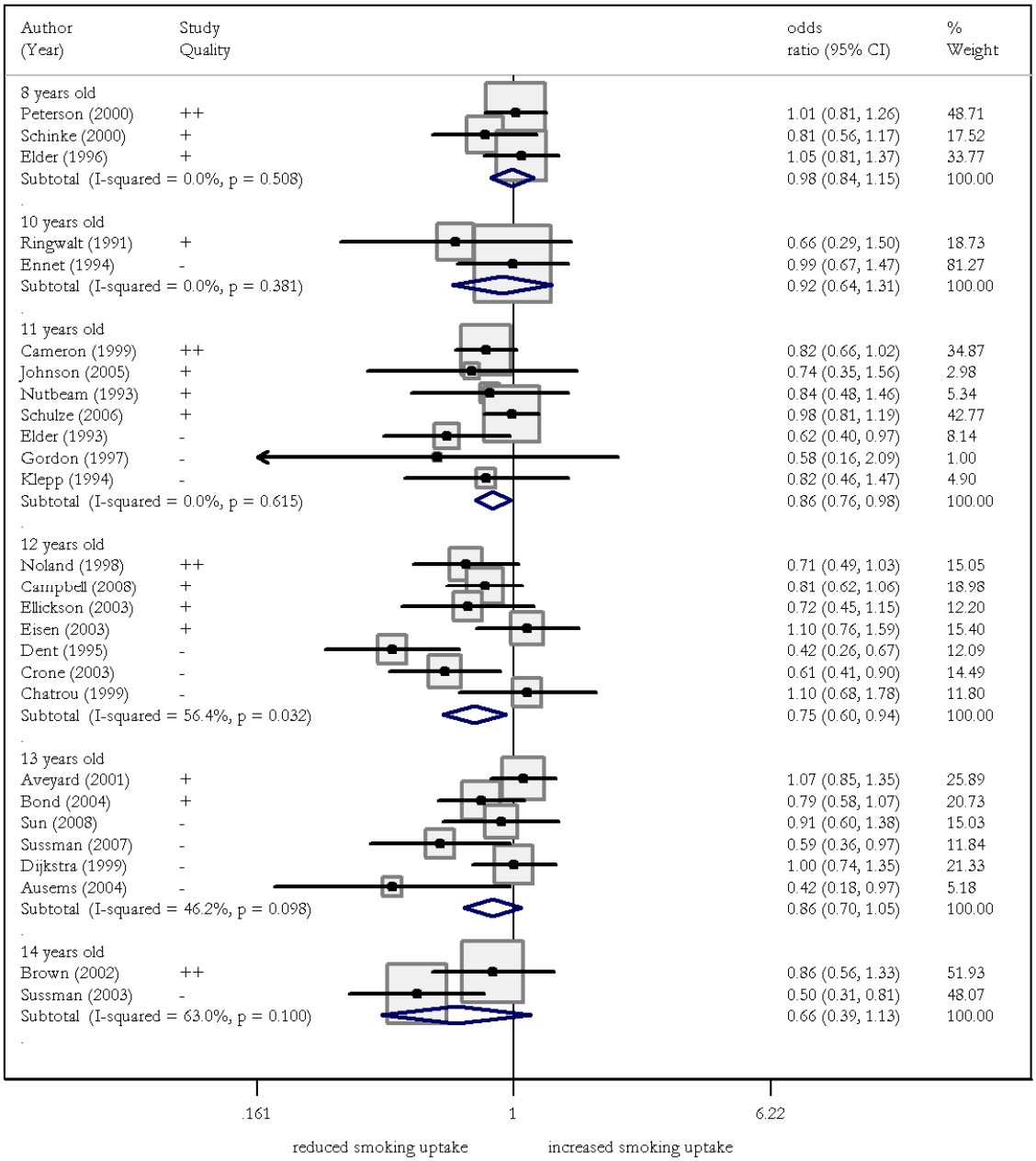


Figure 3:19 Predicted log odds ratio of smoking prevalence as function of age at which students were recruited

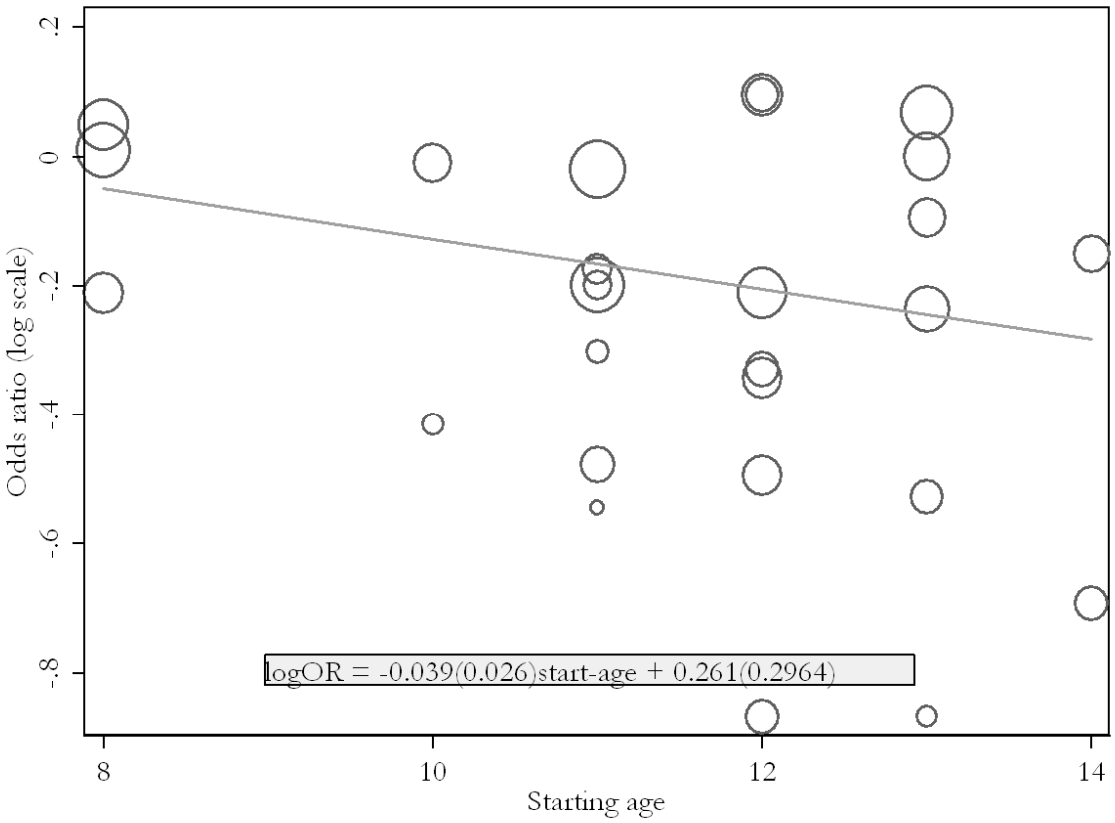


Figure 3:20 shows pooled estimates for prevalence of smoking by age of students at maximum follow-up. Results from this subgroup analysis provided evidence that the intervention was effective in reducing prevalence of smoking when the students were 14 and 16 years old after maximum follow-up. Results from 11 RCTs (++, Canada; ++, USA; +, UK; two +, USA; two -, The Netherlands; and four -, USA) showed that when students were 14 years old after maximum follow-up, the intervention was able to reduce the smoking prevalence by 24% (pooled OR=0.76; 95% CI 0.65 to 0.88; with evidence of moderate statistically significant heterogeneity, I^2=40.2%, p=0.081). Similarly, results from three studies (++, Canada; + Australia; and -, USA) showed that when students were 16 years old after maximum follow-up, the intervention was able to reduce prevalence of smoking by 28% (pooled OR = 0.72; 95% CI 0.54 to 0.96; with evidence of statistically significant moderate heterogeneity, I^2=37.3%, p=0.203). The intervention was not effective in preventing smoking uptake when students were 11, 12, 13, 15, 20, and 23 years old after maximum follow-up. The results of the subgroup analysis revealed that the effect of school-based prevention programme was not statistically significantly different from that of usual education or no intervention when students were: 11 years old (+, USA; OR=0.66; 95% CI 0.29 to 1.49); 12 years old (four studies [+, UK; -UK; +, USA and -, USA]; pooled OR=0.87; 95% CI 0.68 to 1.10; with evidence of no statistically significant heterogeneity I^2=0.0%, p=0.811); 13 years old (three studies; pooled OR= 0.99; 95% CI 0.85 to 1.16; with evidence of no statistically significant heterogeneity I^2=0.0%, p=0.675); 15 years old (three studies [+, UK and two -, The Netherlands]; pooled OR=0.93; 95% CI; 0.68 to 1.28; with evidence of statistically significant moderate heterogeneity I^2=55.1%, p=0.108); 20 years old (++, USA; OR=1.01; 95% CI 0.81 to 1.26) and 23 years old (-, Norway; OR=0.82; 95% CI 0.46 to 1.47) at maximum follow-up. Figure 3:21 shows result of meta-regression result where the natural log of the odds ratio was the outcome and age at maximum follow-up was explanatory factor. We found that age of students at maximum follow-up was not statistically significant factor in explanation prevalence of smoking (ratio of odds ratio = 1.01; 95% CI 0.96 to 1.05; p=.723).

Figure 3:20 Forest plots of pooled estimated odds ratio of smoking prevalence by age of students at maximum follow-up subgroups.

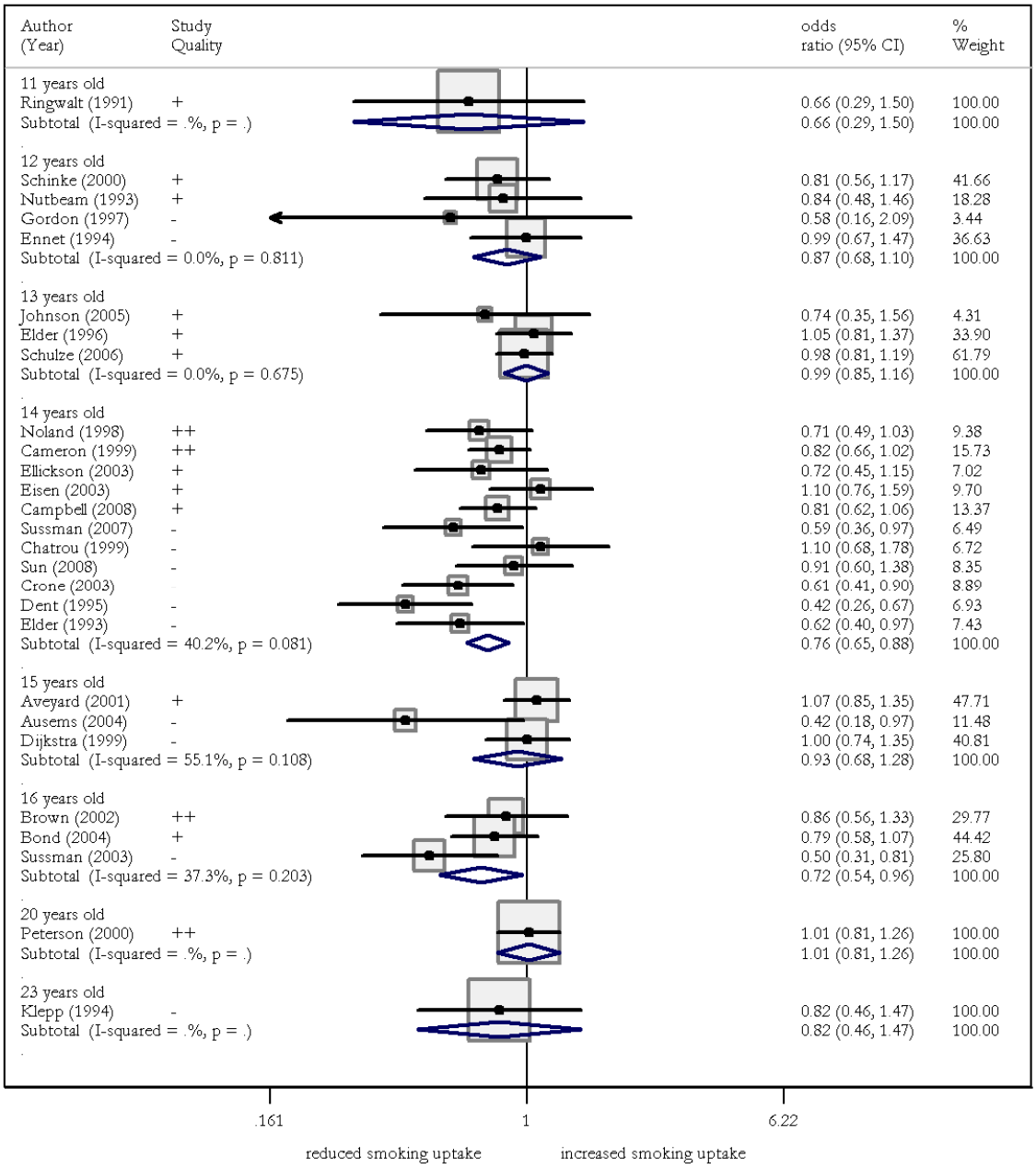
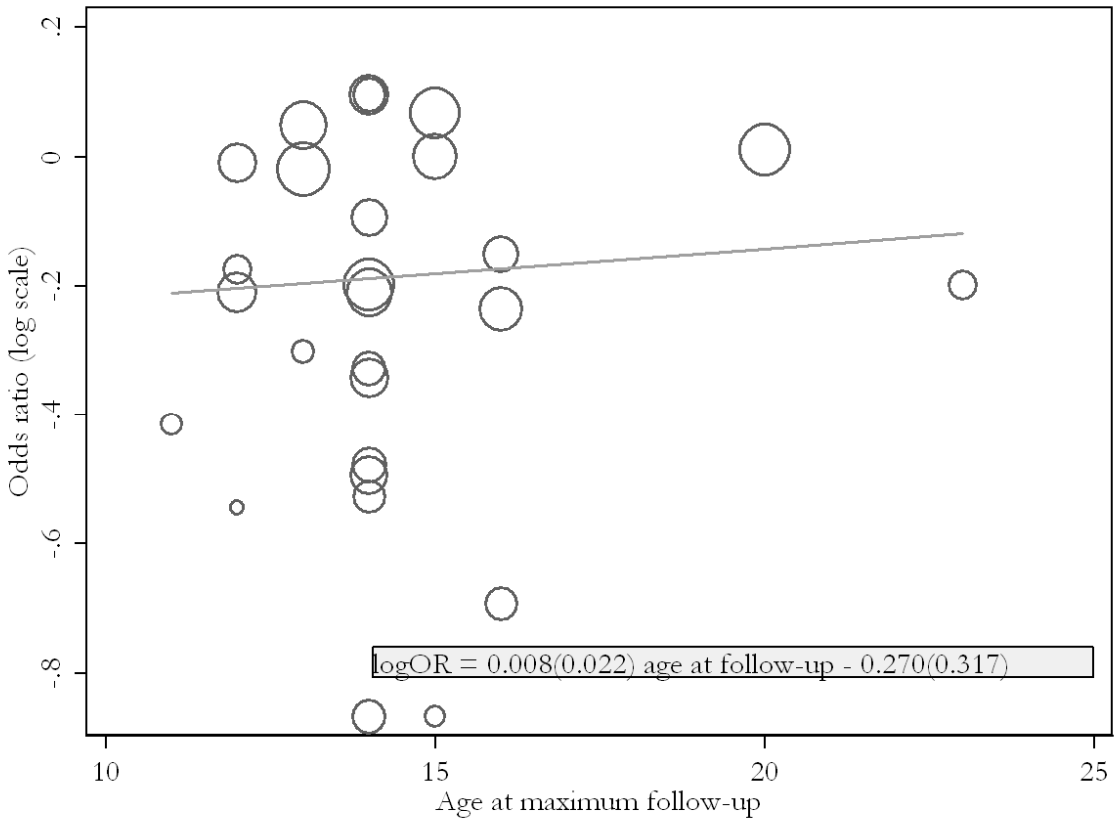


Figure 3:21 Predicted log odds ratio of smoking prevalence as function of age of students at maximum follow-up



3.8.2 Interventions starting in primary schools

Eight studies assessed the effectiveness of school-based interventions that started before age 11 (corresponding to primary school population in England and Wales). Interventions started before age 7 (corresponding to Key Stage 1 in England) were evaluated in two of the studies and interventions started between age 7 and 10 (corresponding to Key Stage 2) were investigated in six of the studies.

Interventions starting before age 7

ES15 Evidence statement: There is weak evidence (Kellam 1998, - USA; Storr 2002, - USA) indicating that school-based interventions that start soon after entry into primary schools and that target behaviour management in the classroom, poor academic achievement, and teacher-parent communication regarding behaviour management may be effective in reducing the uptake of smoking up to age of 14. Evidence for the effectiveness of such interventions beyond this age is lacking.

Applicability: Both studies were conducted in the USA during 1980s-1990s. It is not clear whether the evidence is directly applicable to current UK setting.

Two studies (Kellam 1998, - USA; Storr 2002, - USA) tested interventions starting at age 6 (grade 1, first year of elementary school). Interventions tested in both studies focused on management of aggressive and other risk behaviours known to be associated with later substance use but did not directly address smoking. Kellam et al 1998 compared two different interventions to a control of no intervention: the 'Good Behaviour Game' that aimed at preventing and/or better management of aggressive/disruptive classroom behaviour, and 'Mastery Learning' that targeted poor academic achievement. Both interventions were delivered over two years (grade 1 and 2). Follow-up at age 14 found that boys in Good Behaviour Game classrooms had a

significantly lower risk of starting to smoke than boys in control classrooms (RR=0.62, 95%CI 0.40 to 0.97, p=0.04). No significant effect on the initiation of smoking among girls was found (Good Behaviour Game vs control, RR=0.90, 95% CI 0.57 to 1.42). Result for the Mastery Learning intervention showed some non-significant trend risk reduction. Significant reduction in the risk was found only in the subgroup of boys from one of the two cohorts participated in the study (RR=0.46, 95% CI 0.24 to 0.87, p=0.017).

The same research group (Storr et al 2002) subsequently carried out a study comparing a usual control group to two different interventions: a classroom-centred (CC) intervention that built upon both the Good Behaviour Game and Mastery Learning, and a Family-School Partnership (FSP) intervention that aimed at improving school achievement and reducing early aggression, shy behaviour and concentration problems by enhancing parent-teacher communication and providing parents with effective teaching and child behaviour management strategies. Both interventions were implemented over one year (grade 1). Results from follow-up six years later (age 12-13) showed that both interventions reduced the risk of smoking initiation compared to control condition (CC vs control adjusted RR=0.57, 95% CI 0.34 to 0.96, p=0.03; FSP vs control adjusted RR=0.69, 95%CI 0.50 to 0.97, p=0.03). No differential effect between boys and girls was found.

Interventions starting between age 7 and 10

ES16 Evidence statement: Evidence regarding the effectiveness of school-based interventions starting between age 7 and 10 is inconclusive. Studies have reported either no significant effect or significant effects immediately post-intervention which diminish over time. Two interventions focusing on smoking prevention demonstrated no significant effects on smoking (Gatta 1991, + Italy; Peterson 2000, ++ USA). Three interventions focusing on drug (substance) use prevention reported either no effect (Ringwalt 1991, + USA); non-significant reduction in smoking prevalence (Schinke 2000, +USA) or significant reduction in smoking prevalence immediately after intervention period that was not sustained at subsequent follow-up (Ennet 1994, -USA). One health promotion program that included a smoking prevention component found no significant effect (Elder 1996, +USA).

Applicability: None of the studies were carried out in the UK. Whether the findings are applicable to current UK context is unclear.

Seven studies investigated school-based interventions that started between age 7 and 10 (Elder 1996, + USA; Ennet 1994, - USA; Gatta 1991,+ Italy; Klepp 1994, - Norway; Peterson 2000, ++ USA; Schinke 2000, + USA; Ringwalt 1991, +USA). The focus of the interventions was smoking prevention in two studies (Gatta et al 1991, Perterson et al 2000), drug/substance use prevention in three studies (Ennet et al 1994, Ringwalt et al 1991, Schinke et al 2000), and health promotion that included a smoking prevention component in two studies (Elder et al 1996, Klepp et al 1994). The interventions varied substantially in terms of contents, duration and intensity. Two studies reported results from follow-ups of longer than 10 years from baseline (Klepp et al 1994, Pererson et al 2000).

Smoking prevention programmes

Peterson et al (2000, ++ USA) conducted the Hutchinson Smoking Prevention Project, a vigorous evaluation of a comprehensive school-based smoking prevention programme based on social influence model. The intervention started at age 8-9 (grade 3) and covered every school year through to age 18. Follow-ups 10-12 years after the start of the programme (with an exceptionally low attrition rate of 7%) showed no significant intervention effect (difference in the prevalence of weekly smoking, intervention versus control: 0.2%, -3.1% to 3.9% at age 18 and -1.3%, -4.1% to 2.0% at age 20).

The intervention tested by Gatta et al (1991, + Italy) was a single day lesson focusing on cigarette smoking and was implemented during aged 9-10 (Gatta 1991). Follow-up at four years showed a non-significant reduction in the risk of being a smoker for intervention group compared to control group (RR=0.92, 0.79 to 1.06).

Drug (substance) use prevention programmes

The intervention assessed by Ringwalt et al (1991, + USA) in North Carolina and Ennet et al (1994, -USA) in Illinois was the Project Drug Abuse Resistance Education (DARE), which was a programme that adopted social influences approach and involved 17 weekly classroom sessions delivered by uniformed police officers to students aged between 10 to 12. Ringwalt et al (1991) found the intervention changed students' drug-related attitudes and their assertiveness but did not significantly influence lifetime involvement with cigarette (prevalence changed from 18.2% to 22.3% in the intervention group and from 16.0% to 22.1% in the control group). Ennet et al (1994) found an effect in reducing the initiation of smoking immediately post-intervention (OR=0.63, 0.38 to 1.04). The effect was however not maintained at 12 months (OR=0.93, 0.63 to 1.36) and 24 months (OR=0.99, 0.67 to 1.47).

Schinke et al (2000, + USA) investigated the effectiveness of a Life Skills Training (LST) programme based on social competence approach aiming to prevent substance use including tobacco, alcohol and marijuana. The programme was tailored and delivered to a cohort of Native American youths. Fifteen weekly classroom sessions were delivered to a cohort of Native American children aged between 8 and 11. Cigarette smoking at 42 months was lower in the intervention group compared to control (24.4% vs. 28.6%) but the difference was not statistically significant.

Health promotion programme

Elder et al (1996, + USA) conducted the Childhood and Adolescent Trial for Cardiovascular health (CATCH) among a cohort of children aged 8-9 (grade 3). The smoking prevention component of the cardiovascular health promotion programme was delivered during the third year of the programme (grade 5) and included classroom sessions, activities to be completed with parents and promotion of smoking-free policy at school levels. No significant differences between intervention and control groups were found during follow-ups at grades 6, 7 and 8 (prevalence of ever smoking 16.2% vs 15.6% for intervention vs control).

3.8.3 Interventions starting in secondary schools

Interventions starting between age 11 to 14

ES17 Evidence statement: Forty-six RCTs investigated the effectiveness of school-based interventions that started in secondary schools between ages 11 to 14. Quantitative analysis (see Figure 3:18) indicated that whilst the observed effect for individual RCTs did not achieve statistical significance in most cases, overall the interventions appear to have modest effect in preventing the uptake of smoking. There is significant heterogeneity in the results between studies, indicating that the findings may be specific to the context of individual studies/interventions.

Applicability: results from the five UK studies are directly applicable to UK settings. However the smoking prevalence and general social environment with regard to smoking has changed since the studies were conducted hence there remains some uncertainty with regard to the generalisability of the result to current UK context. The applicability of studies carried outside the UK is unclear.

The vast majority (54/62) of included studies investigated interventions that started from age 11 onwards (equivalent to secondary school in England and Wales). Forty-six of these studies evaluated interventions that started between age 11 to 14 (equivalently to Key Stage 3). A few studies conducted in Australia (Armstrong et al 1990; Shean et al 1994), Canada (Abernathy et al 1992; Cameron et al 1999), Norway (Klepp et al 1994) and the USA (Ary et al 1990; Lynam et al 1999) included primary (elementary) school children as some elementary schools in these countries included grades that covered pupils up to age 13-14. The RCTs are Aveyard et al. 2001; (+, UK), Campbell et al. 2008; (+, UK), Nutbeam et al. 1993; (+, UK), De Vries et al. 2006, (-, UK and EU), Gordon et al. 1997 (-, UK), Bond et al. 2004 (+, Australia), Buller et al. 2008b (+, Australia), Armstrong et al. 1990 (-, Australia), Schofield et al. 2003 (-, Australia), Shean et al. 1994 (-, Australia), Cameron et al. 1999 (++, Canada), Abernathy et al. 1992

(+, Canada), Ausems et al. 2004 (-, Netherlands), Chatrou et al. 1999 (-, Netherlands), Crone et al. 2003 (-, Netherlands), Dijkstra et al. 1999 (-, Netherlands), Jøsendal et al. 1998 (++, Norway), Klepp et al. 1994 (-, Norway), Biglan et al. 2000 (++, USA), Buller et al. 2008 (++, USA), Noland et al. 1998 (++, USA), Perry et al. 2003 (++, USA), Botvin et al. 2001 (+, USA), Eisen et al. 2003 (+, USA), Elder et al. 2002 (+, USA), Ellickson et al. 2003 (+, USA), Flay et al. 1995 (+, USA), Hansen & Graham 1991 (+, USA), Johnson et al. 2005 (+, USA), Lynam et al. 1999 (+, USA), Murray et al. 1992 (+, USA), Piper et al. 2000 (+, USA), Spoth et al. 2001 (+, USA), Spoth et al. 2002 (+, USA), Telch et al. 1990 (+, USA), Ary et al. 1990 (-, USA), Botvin et al. 1990a (-, USA), Botvin et al. 1990b (-, USA), Connell et al. 2007 (-, USA), Dent et al. 1995 (-, USA), Elder et al. 1993 (-, USA), Ellickson et al. 1993 (-, USA), Simons-Morton et al. 2005 (-, USA), Snow et al. 1992 (-, USA), Sun et al. 2008 (-, USA), Sussman et al. 2007 (-, USA).

Given the large volume of evidence, the results of five UK studies are summaried below. The remaining studies were not individually summarised but their details can be found in the Evidence Tables in section 5.

Summary of UK-based studies

The study by Nutbeam et al (1993, +UK) evaluated the effectiveness of the Family Smoking Education project (FSE), the Smoking And Me project (SAM) and the combination of both (FSE+SAM) compared to no intervention in 39 schools in England and Wales. The FSE targeted first year secondary school pupils (aged 11-12). It focuses on the immediate health impact of smoking on the pupils and included both classroom lessons and a leaflet to encourage parents to reinforce the messages from school and to show disapproval of smoking. The SAM was a British version of the Minnesota smoking prevention program (see Murray et al 1992) and targeted second year secondary school pupils (aged 12-13). It involved pupil-led lessons focusing on the social consequences of smoking and peer, family and media influences on smoking as well as practising skills for managing social situations in which smoking occurs. At 2-year follow-up, there was no significant difference in the percentage of

baseline never smokers who remained never smoking between the four groups (FSE 64.6%, SAM 70.4%, FSE+SAM 69.4%, control 73.9%; χ^2_{adj}=6.1, df=3, p=0.1).

The intervention assessed by Gordon et al (1997, -UK) in Cardiff was a combined school and community based intervention, which is further described in section 3.3.2. The school component targeted Year 7 pupils and involved the provision of a booklet and a 'take-home' worksheet developed according to the requirements of the National Curriculum. There was no significant difference between the intervention and control groups in the percentage of non-smoker at 6-month follow-up: intervention 53% (baseline 63%), control 54% (baseline 70%).

Campbell et al (2008, +UK) assessed a school-based intervention among Year 8 (age 12-13) pupils in the west of England & Southeast Wales in the ASSIST (A Stop Smoking In Schools Trial) study. The intervention was led by trained influential students and was carried out over a 10-week period during informal interactions outside the classroom such as on the school bus, during lunchtime, after school and free time. The intervention was effective in reducing smoking uptake (intervention vs control, 1- year OR=0.77, 0.59 to 0.99, p=0.043; 2-year OR=0.85, 0.72-1.01 p=0.067).

Aveyard et al (2001, +UK) evaluated a school-based intervention that focused on both smoking prevention and cessation among Year 9 (age 13-14) pupils in the West Midlands. The intervention was based on the transtheoretical model and included both classroom lessons and computer sessions. The intervention was found to be ineffective in preventing the uptake of smoking (weekly smoking among baseline non-smokers, intervention vs control: 1-year follow-up OR=1.16, 0.89 to 1.50; 2- year follow-up OR = 1.07, 0.85 to 1.35).

de Vries et al (2006, - Europe) initiated the European Smoking Prevention Framework Approach (ESFA) in six European countries (Denmark, Finland, the Netherlands, Portugal, Spain, UK) in 1997. The programmes under ESFA were developed with the same collective objectives but each country used/developed their own materials and strategies for the intervention. The programmes targeted adolescents in schools, school policies, parents and the communities. Conflicting results were observed between the countries (described in further detail in section 3.6). In the UK no significant difference in the risk of becoming weekly smoker was observed at one-year (intervention vs control, 9.0% vs 9.0% - although the adjusted OR was statistically significant towards the unexpected direction of negative effect, OR=1.27, 1.00 to1.62, $p<0.05$), two-year (17.7% vs 18.8%, OR 1.00, 0.75 to 1.25, $p=0.99$) and 30-month (21.2% vs 23.6%, OR=0.91, 0.73 to 1.14, $p=0.42$).

Interventions starting from age 14 or later

Seven studies assessed interventions that started after age 14 (equivalent to Key Stage 4 / GCSE onwards).

ES18 Evidence statement: Evidence from seven studies conducted in North America regarding the effectiveness of school-based interventions that start from age 14 or later is inconclusive. One RCT (Sussman et al. 2003 -, USA) reported a significant reduction in the odds of smoking for an educator-led intervention whilst two RCTs (Dent et al. 2001 +, USA; Sun et al. 2006, +, USA) evaluating different versions of the same curriculum reported no significant intervention effect. Four other RCTs reported significant effects either for a specific subgroup (Brown et al. 2000 ++, USA) or for outcomes that may be more relevant to smoking cessation than prevention (Brown et al. 2001 +, USA; Werch et al. 2005 +, USA; Winkleby et al. 2004 +, USA).

Applicability: none of the RCTs were conducted in the UK. Some of the studies targeted specific populations such as continuation schools in the USA (Sun et al. 2006; Sussman et al. 2003) and female adolescents who were subject to childhood abuse (Brown et al. 2001). It is unclear whether the evidence is directly applicable to current UK context.

Seven RCTs evaluated school-based interventions that started from age 14 or later (Brown et al. 2002 ++, Canada; Brown et al. 2001 +, USA; Dent et al. 2001 +, USA; Sun et al. 2006 +, USA; Sussman et al. 2003 -, USA; Winkleby et al. 2004 +, USA; Werch et al. 2005 +, USA). Two studies focused on smoking prevention and cessation (Brown et al. 2002; Winkleby et al. 2004). three focused on drug (substance) use prevention (Dent et al. 2001; Sun et al. 2006; Sussman et al. 2003). One study had a broader focus of health promotion incorporating physical activities and alcohol/substance use prevention (Werch et al. 2005) and another focused specifically at reducing negative consequences of childhood abuse (Brown et al. 2001).

Smoking prevention and cessation programmes

Brown et al. 2002 (++, Canada) evaluated an extra curricular activity-based intervention that aimed to mobilise staff and students and involve as many students as possible in activities inconsistent with smoking to strengthen non-smoking as a school social norm. The intervention targeted grade 9 students (age 14 to 15) and was implemented during grades 9 and 10. At the end of grade 10 no overall difference in regular smoking was found between the intervention and control groups (24.9% vs 25.7%). Significant lower smoking prevelance was found among male baseline non-smokers (9.8% vs 16.4%, p=0.02) but not female baseline non-smokers (16.7% vs 14.2%, n.s.). It is not clear whether the subgroup analysis was carried out post hoc and no plausible reason for differential effect between male and female was provided.

Winkleby et al. 2004 (+, USA) compared the effectiveness of an advocacy intervention to a modified version of Toward No Drug Abuse curriculum (see Sun et al. 2006) among 11th and 12th grades (age 16 to 18) continuation high school students. Students attended a day-long session for advocacy skills and then developed and implemented their chosen advocacy project relating to smoking prevention in their community. The intervenion significantly reduced the percentage of regular smokers but had no significant effect on the percentage of nonsmokers.

Drug use prevention programmes

Three studies evaluated different versions of Towards No Drug Abuse (TND) curriculum (Dent et al. 2001, +; Sun et al. 2006, +; Sussman et al. 2003, -). The TND curriculum adopted a motivation-skills-decision-make model and involved 11 to 15 classroom sessions. One study (Dent et al. 2001) was conducted in regular high schools and two studies (Sun et al. 2006; Sussman et al. 2003) were conducted in continuation high schools. Two of the studies found no statistically significant programme effect on cigarette smoking at follow-ups between one year (Dent et al.

2001; Sun et al. 2006) and up to five years (Sun et al. 2006). Sussman et al. (2003) compared two methods of delivering the curriculum (educator-led versus educator-assisted self-instruction) to a standard care control. The educator-led condition significantly reduced the odds of smoking at 2-year follow-up (OR=0.50, 0.31 to 0.81, p=0.016, one-tailed test and confidence interval) but the self instruction condition did not significantly reduce the odds of smoking (OR=0.88, 95% CI 0.63 to 1.12, one-tailed test and confidence interval).

Health promotion and other programmes

Werch et al. 2005 (+, USA) assessed the effectiveness of a multihealth behaviour intervention 'Project SPORT', which involved an in-person health behaviour screen, a one-on-one consultation with a trained fitness specialist and a take-home fitness prescription targeting adolescent health promoting behaviours and alcohol use risk and protective factors. At one-year follow-up, youths in the intervention group smoked less frequently than youths in the control group who were given generic alcohol prevention and health promotion booklets and pamphlets ($F(1, 509)=8.72$, $p=0.003$), and were less advanced in their stage of initiation cigarette smoking ($F(1,423)=12.39$, $p=0.000$).

Brown et al. 2001 (+, USA) evaluated Project Chrysalis, a school-based intervention aiming at reducing the negative consequences (including tobacco use) of childhood abuse among female adolescents with histories of physical, sexual and emotional abuse. At baseline more than 80% of participants already had tried tobacco at least once in their lifetime. The main intervention was school-based support groups run by school counsellors in collaboration with therapists from a community-based child abuse treatment agency. Two years following the programme treatment, 62.5% of participants who attended >11 activities reported less likely to try tobacco compared to 27.3% among those attended <11 activities and 30% among those in the control group (statistical significance not given).

3.8.4 Sex

ES19 Evidence statement: There is conflicting evidence of differential effect of intervention according to the sex of the target audience. There is moderate evidence that sex is an important predictor of post-test smoking, but direction of effect (either in male or female student) is inconclusive. Furthermore, association of sex with smoking prevalence depends on how the outcome was measured. One recent study (Campbell et al. 2008 +, UK) found no significant difference in effectiveness of school-based intervention among male and female students. Another study (Peterson et al. 2000 ++, USA) provided no evidence of Hutchinson Smoking Prevention Project impact on the prevalence of daily smoking, either for girls or for boys. Three studies (Brown et al. 2002 ++, Canada; Abernathy & Bertrand 1992 +, Canada; and Kellam & Anthony 1998 -, USA) demonstrated that the intervention was more effective among male students; while only one study (Shean et al. 1994 -, Australia) found that both teacher-led and peer-led programmes reduced the taking up of smoking by girls to about the same degree. There was also conflicting evidence from nine studies whether sex was an important predictor of post-test smoking. Only one study (Chatrou et al. 1999 -, The Netherlands) provided evidence that sex was not associated with post-test smoking. Two studies (Johnson et al. 2005 +, USA and Simons-Morton et al. 2005 -, USA) found that female students were more likely than male students to have reported smoking at follow-up and only one study (Schofield, Lynagh, & Mishra 2003 -, Australia) found that boys were less likely than girls to have reported smoking at follow-up. Yet, three studies (Elder et al. 1996 -, USA; Sussman et al. 2003 -, USA; Ausems et al. 2004 -, The Netherlands) revealed that males were more likely to be a smoker than their female counterparts. Another two studies (Elder et al. 2002 +, USA and Gatta et al. 1991 +, Italy), demonstrated that compared to male students, female students were less likely to have used tobacco.

Applicability: Most of the studies were conducted in the USA. It is not clear if these findings are directly applicable to the UK since the interventions under investigation are specific to the USA. Furthermore, demographics of the participants are different from those in the UK. Campbell et al. 2008 is likely to be directly applicable.

Several studies discussed sex based differences in the effectiveness of school-based prevention programme. Six studies (two ++, two +, and two -) specifically conducted sub-group analyses to determine whether there is evidence of differential effects according to sex of the target audience. The findings from these studies were not consistent. Three studies found that intervention was more effective among male students. It turned out in another study the exact opposite was the case. Evidence from one recent trial (Campbell et al. 2008 +, UK) provided no evidence of the intervention having a differential effect according to sex of the students (ratio of odds ratio = 0.90; 95% CI 0.72 to 1.13). Yet another study (Peterson et al. 2000 ++, USA) provided no evidence of Hutchinson Smoking Prevention Project impact on the prevalence of daily smoking, either for girls or for boys. In one three-arm study (RCT - , Australia) that randomized students to either peer-led programme, teacher-led programme or control condition suggests that educational programmes had a lasting preventive effect on taking up of smoking by girls (Shean et al. 1994). The study found that both teacher-led and peer-led programmes continued to reduce the taking up of smoking by girls to about the same degree after one and two year follow-up. Whereas in boys, the teacher-led programme appeared to be effective after one year but neither programme was effective after two years.

Three studies (one ++, Canada; one +, Canada; and one -, USA) provided evidence that a school-based programme tended to be effective only for male students. For example (Brown et al. 2002), one study (++, Canada) found that after two years follow-up never smokers and regular smoking rates were significantly lower for males from

intervention schools (9.8% versus 16.2%, p=0.02). There were no significant differences in smoking rates for females. Another study (+, Canada) that evaluated Peer Assisted Learning (PAL) prevention programme suggested that the programme has some use in preventing the uptake of tobacco use among young males and that the efficacy with female was negligible (Abernathy & Bertrand 1992). In this study, students were followed yearly for three consecutive years. Across each of these three follow-ups, males who had been exposed to the complete PAL programme were significantly more likely to report that they had never smoked than were males in the control group (Post-test 1 (χ^2=14.06, df=1, p<.001); Post-test 2 (χ^2=5.07, df=1, p<.05); and Post-test 3 (χ^2=6.36, df=1, p<.05)). However, comparable effects for females were non-significant across all testings (Post-test 1 (χ^2<1, df=1, ns); Post-test 2 (χ^2<1, df=1, ns); and Post-test 3 (χ^2<1, df=1, ns)). Yet, another study (Kellam & Anthony 1998 -, US) provided evidence that smoking initiation was reduced for boys assigned to behavioural intervention. Kellam and Anthony conducted a cluster RCT to examine whether The Good Behavioural Game aimed at aggressive/disruptive classroom behaviour and poor academic achievement would reduce the incidence of smoking initiation. Two consecutive cohorts of first grade children were recruited. The study found that boys in Good Behaviour Game classrooms had a lower risk of starting to smoke than boys in control classrooms (estimated relative risk [RR] = 0.62; 95% CI 0.40 to 0.97). The estimated risks for girls in Good Behaviour Game classrooms and control classrooms were essentially the same (RR=0.90; 95% CI 0.57 to 1.42).

Seven studies examined whether sex of the students was an important predictor of post-test prevalence of smoking. Most of the studies provided evidence that female students were less likely to have reported smoking than their male counterparts. Chatrou and colleagues (-, The Netherlands) found regardless of the length of follow-up, there was no significant difference in the prevalence of smoking among boys and girls (Chatrou et al. 1999): immediate post-test (OR=0.94; 99% CI 0.36 to 2.42); 6-month follow-up (OR=0.75; 99% CI 0.39 to 1.45); and 18-month follow-up (OR=0.78; 99% CI

0.44 to 1.35). One study (Johnson et al. 2005 +, USA) provided evidence that sex will affects smoking prevalence depending on how the outcome was measured. This study found that female students were more likely to have reported past-month smoking (OR=1.69; 95% CI 1.03 to 2.77). The association between sex and prevalence of never smokers, however, was not significant (OR=0.88; 95% 0.69 to 1.14). Yet another study (-, USA), analyzed effects of the Going Places Programme on early adolescent substance use and antisocial behaviour using latent growth curve modeling (Simons-Morton et al. 2005). In this study, sex of the study was considered an added growth factor in the model. The study revealed that girls progressed relatively faster than boys in smoking. Another study (Schofield, Lynagh, & Mishra 2003 -, Australia) provided evidence that male students were about 45% less likely to have smoked in the last 7 days (OR=0.55; 95% CI 0.35 to 0.87). Three studies found that male students were more likely to have reported tobacco use: Sussman et al. 2003 (-, USA OR=1.94; 95% CI 1.14 to 3.33); Ausems et al. 2004 (-, The Netherlands OR=1.81; 95% CI 1.26 to 2.59); and Elder 1996 (+, USA OR=1.45; 95% CI 1.14 to 1.85). Similarly, two other studies provided evidence that female students were less likely to have reported tobacco use: Elder et al. 2002 (+, USA OR=0.72; 95% CI 0.55 to 0.95) and Gatta et al. 1991 (+, Italy RR=0.84; $p<0.05$)

3.8.5 Sexual orientation

ES20 Evidence statement: There was no evidence about sexual orientation of participants and the impact of the interventions

3.8.6 Ethnicity

ES21 Evidence Statement: There is moderate evidence that the ethnicity is an important predictor of smoking behaviour, such that white students were less likely to be smokers. Similarly, there is moderate evidence that the observed association between ethnicity and smoking behaviour depend on how the outcome was measured.

Four studies (two +, USA and two - USA) specifically studied whether ethnicity is an important factor in predicting post-test smoking among students exposed to school-based smoking prevention programmes. Only one study (Simons-Morton et al. 2005 (-), USA) demonstrated no association between ethnicity and smoking status. Three studies found that ethnicity was important factor in predicting post-test smoking behaviour. For example, one study (Elder 1996 (+), USA) provided evidence that white students were less likely to be classified as smoker. Two studies (Johnson et al. 2005 (+), USA and Elder et al. 1993 (-), USA) revealed that ethnicity affects smoking prevalence depending on how the outcome was measured. One multi-country study (de Vries et al. 2006 -, EU) in six European countries, provided evidence that in The Netherlands there was differential significant effects for adolescents with a Dutch and non-Dutch origin. The Dutch ESFA programme was effective for non-native adolescents with fewer new weekly smokers compared to new weekly smokers in the control group. An opposite effect was found in native Dutch adolescents with more new weekly smokers in the experimental compared to new smokers in the control group.

Applicability: None of the studies were conducted in the UK. It is not clear if the USA/EU findings are directly applicable to the UK since the school-based prevention programmes under investigation are specific to USA. Furthermore, demographics of the participants are different from those in the UK.

Four studies (two +, USA and two - USA) specifically studied whether race or ethnic group is an important factor in predicting post-test smoking among students exposed to a school-based smoking prevention programme. One study (-, USA) using data from the Going Places Programme, that included classroom curricula, parent education, and school environment components, demonstrated that ethnicity was not a significant predictor of growth factor in smoking state (Simons-Morton et al. 2005). Three studies found that ethnicity was an important factor in predicting post-test prevalence of smoking. For example, the CATCH (Child and Adolescent Trial for Cardiovascular Health) study demonstrated a statistically significant association between ethnicity and smoking status (Elder 1996). The CATCH study was a USA multistate field trial that examined the effects of school environment, classroom curriculum, and family intervention components in promoting the cardiovascular health among elementary school students. Using Hispanic students as a referent, Caucasian were less likely to be classified as ever smoker (OR=0.66; 95% CI 0.45 to 0.96). African-American students smoked at slightly (but not significantly) higher rates than other students (OR=1.08; 95% CI 0.69 to 1.67).

Elder and colleagues provided evidence that ethnicity affects smoking prevalence depending on how the outcome was measured (Elder et al. 1993). In a subgroup analysis using past month tobacco as the outcome, this study found that statistically significant results were achieved at an individual level only among White students (OR=0.76; $p<0.05$), although calculated odds ratios were similar for White and Hispanic students (OR=0.77; ns). At school level, there were no statistically significant results for both White (OR=0.72; ns) and Hispanic (OR=0.62; ns) students. However, when past week tobacco use was used as the outcome, this study found that statistically significant results at individual (OR=0.45, $p<0.001$) and school (OR=0.40; $p<0.05$) levels was attained for smoking tobacco use among Hispanics but not among Whites and others. Yet another study (+, USA) (Johnson et al. 2005) confirm that the association between ethnicity and post-test smoking depend on how the outcome was

measured. For example, this study found no association between ethnicity and prevalence of ever smokers. When White students was used as a referent, Hispanic students were more likely to have reported past-month smoking (OR=1.69; 95% CI 2.03 to 2.77) and Asian students were less likely to have reported past-month smoking (OR=0.27; 95% CI 0.07 to 0.98). One multi-country study (de Vries et al. 2006 -, EU) in six European countries, also provided evidence of the intervention having a differential effect according to ethnicity of the students. The European Smoking Prevention Framework Approach (ESFA) provided evidence that, in The Netherlands, there were differential significant effects for adolescents with Dutch and non-Dutch origins. The Dutch ESFA programme was effective for non-native adolescents (*N* = 289) with 11.4% new weekly smokers compared to 19.9% new weekly smokers in the control group (OR=0.34; 95% CI 0.15 to 0.78). An opposite effect was found in native Dutch adolescents (*N* = 2012) with 19.0% new weekly smokers in the comparison group compared to 24.0% new smokers in the experimental group (OR=1.29; 95% CI 1.02 to 1.63).

3.8.7 Baseline risk factors (high risk groups)

ES22 Evidence statement: There is no conclusive evidence about the variability of programme effectiveness in high risk individuals.

Josendal et al. 1997 (++, Norway) showed positive effects of a school-based intervention at six months in certain high risk groups. Snow et al. 1992 (-USA) provided evidence that students from single parent households were less likely to have been positively affected by the intervention than those from two-parent households. The following factors were also found to be associated with post-test smoking: Attitudes and smoking habits of family (Armstrong et al. 1990 -, Australia; Elder 1996 +, USA and Chatrou et al. 1999 , The Netherlands) attitudes and smoking habits of peers,(Armstrong et al. 1990 -, Australia; Chatrou et al. 1999 -, The Netherlands; Elder 1996 +, USA and Schofield, Lynagh, & Mishra 2003 -, Australia) tobacco advertising (Armstrong et al. 1990 -, Australia), availability of cigarettes at home (Elder 1996 +, USA) involvement of students at school (Schofield, Lynagh, & Mishra 2003 -, Australia) baseline smoking status (Chatrou et al. 1999 -, The Netherlands and Schofield, Lynagh, & Mishra 2003 -, Australia) and future smoking intentions (Armstrong et al. 1990 -, Australia).

Campbell et al. 2008 (+, UK) found no evidence that intervention had a more beneficial effect on students who were identified as occasional, experimental or ex-smoker at baseline.

Applicability: Most of the studies were conducted in the USA. It is not clear if these findings are directly applicable to the UK since the interventions under investigation are specific to the USA. Furthermore, demographics of the participants are different from those in the UK. Only study Campbell and colleagues is likely to be directly applicable.

It may be anticipated that programmes for the prevention of smoking will be less effective in students considered to be 'high risk'. For example, those with parents/siblings/friends that smoke, those of lower educational attainment etc. Many studies provide data on the relationship between smoking risk factors and rates of baseline/follow-up smoking. Attitudes and smoking habits of family (Armstrong et al. 1990 -, Australia; Elder 1996 +, USA and Chatrou et al. 1999 , The Netherlands) attitudes and smoking habits of peers,(Armstrong et al. 1990 -, Australia; Chatrou et al. 1999 -, The Netherlands; Elder 1996 +, USA and Schofield, Lynagh, & Mishra 2003 -, Australia) tobacco advertising (Armstrong et al. 1990 -, Australia), availability of cigarettes at home (Elder 1996 +, USA) involvement of students at school (Schofield, Lynagh, & Mishra 2003 -, Australia) baseline smoking status (Chatrou et al. 1999 -, The Netherlands and Schofield, Lynagh, & Mishra 2003 -, Australia) and future smoking intentions (Armstrong et al. 1990 -, Australia)were related to rates of baseline/follow up smoking. Although these factors may act as influencers of student smoking status at any particular time, they do not necessarily act to influence programme effectiveness i.e. although baseline and end point rates may be higher, programmes may give similar risk reductions in high or low risk children.

A study of secondary school students showed positive effects of a school-based intervention at six months in certain high risk subgroups. (Josendal et al. 1997) The main intervention (there were also 2 other interventions) was significantly effective compared to the control in high sensation seekers ($p<0.05$), those with high outcome expectancies (did not think smoking would have big negative effects) ($p<0.001$) and those who reported having at least one parental smoker ($p<0.05$).(Josendal et al. 1997) For those who might be considered at low risk of smoking (low sensation seekers, low smoking outcome expectancies and no parental smoking) there was no significant intervention effect compared to the control.

Generally, caution should be taken in interpretation of subgroup analysis, however, in this case, subgroup analysis does not appear to have been solely post-hoc since questionnaires relating to sensation seeking, outcome expectancy and parental smoking were administered prior to intervention and analysis. At further follow-up, results for high risk groups for this study were not presented (Josendal et al. 2004) suggesting that these effects may not have been observed in the long-term.

In another study, where schools intervention reduced net smoking prevalence at two years,(Snow 1992) there was a significant interaction between intervention group and parental marital status ($F=3.46$ (2,1060), $p<0.04$) i.e. students from single parent households were less likely to have been positively affected by the intervention than those from two-parent households. Authors suggest that students from single parent families may be more likely to be absent from school and may have received less exposure to the intervention.(Snow 1992). At four years, although intervention again reduced rates of smoking compared to control, the interaction between parental marital status ($F=4.07(1,623)$, $p<0.03$) was in the opposite direction i.e. the intervention was likely to be *more* effective in students from single-parent households.(Snow et al. 1997) In this later paper, authors suggest that the reason for this finding may be that, in this high risk group, where drug use rates may increase more quickly, intervention may have more opportunity to take effect compared to lower risk groups (authors do not cross refer to the previous study).(Snow et al. 1997)

These observations suggest the importance of caution in the interpretation of subgroup analysis and indeed in the interpretation of any individual study. In this case, despite significant trends in specific studies, there does not appear to be conclusive evidence about the variability of programme effectiveness in high risk individuals. Trends may be random, changeable and dependent on many external factors and should be interpreted in the context of wider knowledge and literature review.

3.8.8 Socioeconomic status

ES23 Evidence statement: One RCT (Campbell et al. 2008; + UK) found no association between the students' socioeconomic status and programme effect.

Applicability: This UK RCT is directly applicable to UK context.

The results of study (+, UK) conducted by Campbell and colleagues provided no evidence of the intervention having a differential effect according to the socioeconomic status of the students. The RCT used percentage of students entitled to free school meal as proxy for socioeconomic status. There was no statistically significant difference in the odds of smoking among students from low (OR=0.79; 95% CI 0.60 to 1.03) and high (OR=0.78; 95% CI 0.57 to 1.07) socioeconomic status. Similarly, the difference between these two subgroups was not statistically significant (ratio of odds ratio = 0.99; 95% CI 0.65 to 1.51).

3.9. Are there any adverse or unintended effects (negative) of the intervention?

ES24 Evidence statement: There is limited evidence on adverse or unintentional effect of school-based prevention of smoking uptake. No studies specifically examined adverse or unintentional effects of school-based smoking prevention programmes. One multi-country study (de Vries et al. 2006 -, EU) in six European countries found that adolescents in The Netherlands exposed to school-based smoking prevention programme were more likely to be a regular smoker than those in control condition. Piper, Moberg, & King 2000 (+, USA) provided evidence that age-appropriate intervention emerged as marginally harmful over the control condition.

Applicability: It is not clear if findings are directly applicable to UK

No RCTs specifically examined adverse or unintentional effects of school-based smoking prevention programmes. Piper, Moberg, & King 2000 (+, USA) provided evidence that age-appropriate intervention emerged as marginally harmful over the control condition. This programme (The Healthy for Life Project) was designed to positively influence the health behaviours of middle school students in five related areas: tobacco, alcohol, marijuana use, nutrition, and sexuality; and four social networks influencing adolescent behaviour were addressed: school, peers, family, and community. Students were randomized to one of the three experimental conditions: age appropriate, intensive, and control conditions. In unadjusted analysis, those in the schools receiving age-appropriate condition were more likely than other group to smoke (age appropriate (36%), intensive (28%), and control (30%); significantly different at $p<0.01$). However, with other factors controlled for statistically, age appropriated was marginally harmful over control condition (coefficient (SE) = 0.41(0.20); $p<0.10$).

Another study (de Vries et al. 2006 -, EU), The European Smoking Prevention Framework Approach (ESFA) provided evidence that school-based smoking prevention could be harmful. In this study, in The Netherlands, more adolescents smoked regularly in experimental condition than in the control condition after 24 (OR=1.39; 95% CI 1.10 to 1.76) and 30 (OR=1.24; 95% CI 1.01 to 1.63) months.

3.10. Barriers and facilitators – Quantitative data

Barriers

ES25 Evidence statement: An obvious barrier to interventions may be poor student attendance so that interventions, regardless of their value, will fail to have positive effects. In one RCT, a dose-response relationship was observed between programme participation and changes in smoking status.

Facilitators

ES26 Evidence statement: In one RCT, engagement with the intervention (reported programme interesting/very interesting and useful) was shown to be related to follow-up smoking status; those engaging being less likely to be smokers at 1 year.

Included RCTs had some information relating to potential barriers and facilitators to programme implementation and effectiveness. Student participation and engagement and the fidelity of programme implementation may act as barriers or facilitators to the effectiveness of intervention programmes.

3.10.1 Participation

An obvious barrier to these types of interventions may be poor student attendance so that interventions, regardless of their value, will fail to have positive effects. In one study, a dose-response relationship was observed between programme participation and changes in smoking status.(Buller et al. 2008)

If the numbers of students randomised is considered to represent total numbers of eligible students and baseline data collection is taken as a proxy for average class attendance, the approximate proportion of pupils attending intervention classes may be calculated (where data is available). For studies in the current review, this calculation showed that, on average, 81.6% (SD 12.7%) of students can be estimated to have attended intervention classes. This may suggest that low student participation was not a major barrier to programme effectiveness.

Participation may continue to be an issue if the types of students who do not attend classes are those at high risk of smoking initiation/continuation. For example, the study by Aveyard et al.(Aveyard et al. 1999) found that smokers were less likely to attend classes compared to non-smokers. Participation for these children may be particularly important and for consideration in schools-based intervention.

3.10.2 Engagement

In one study,(Aveyard et al. 2003) engagement with the intervention (reported programme interesting/very interesting and useful) was shown to be related to follow-up smoking status, those engaging being less likely to be smokers at 1 year (OR 0.74, CI 0.68-0.82, $p<0.001$) and 2 years (OR 0.81, CI 0.74-0.88, $p<0.001$). To account for possible confounding effects, investigators adjusted for gender, ethnicity, age, parental, sibling and best friend smoking, socio-economic deprivation, contact with

parents and baseline smoking status and conclude that confounding was unlikely to be an explanation for the observed effect.

Overall, this intervention programme was not effective.(Aveyard et al. 2001) It is therefore unlikely that positive programme effects were related to student engagement with the programme since this would also mean assigning any negative programme effects to non-engagement i.e. non-engaged students were more likely to take up smoking than those not taking part in the programme. What may be more likely is that, in agreement with study investigators, disengagement with the programme was a marker for general disengagement with school and the authors identify school disengagement as a possible independent risk factor for smoking. They suggest that, in these type of pupils, even generally effective programmes may not be successful and a non-didactic, pupil engaging approach may be more effective.(Aveyard et al. 2003)

3.10.3 Fidelity of intervention

The degree to which a given intervention is implemented as per the stated protocol may have some impact on programme effectiveness. In one educational intervention study, after adjusting to account for multiple statistical testing, programme integrity was shown to be related to knowledge of resistance skills and to the acceptability of the programme.(Hansen et al. 1991) In a substance abuse prevention intervention, field staff judged that many teachers had not implemented the programme with fidelity to the protocol(Botvin et al. 1990b) and only 37% (372/998) of pupils were considered to have received the intended intervention. In the restricted sample, positive programme effects were observed whereas, in the whole sample there were no significant effects on substance use.

In a study by Abernathy et al., investigators judged that, many teachers had not taught all (six) intervention lessons properly and only 40% (488/1180) of students were assessed to have been exposed to each intervention class.(Abernathy & Bertrand 1992) Analysis was based on only the 40% receiving all intervention lessons and showed positive programme effects in boys but these effects were not observed in those assessed to receive incomplete intervention.

In these studies, sub-group analysis should be interpreted with care, especially since there is no evidence to show that the process of designating 'properly implemented' classes was blinded. However, findings suggest that programme fidelity may be an important factor for programme effectiveness.

A number of studies report process evaluation data, giving details of numbers of classes implemented, the amount of course material covered, attendance levels and the general acceptability of classes. Although some studies suggested that course material was not properly taught (Botvin et al. 1990a; Botvin et al. 2001) in most, the majority of project material was deemed to have been covered in classes (Ausems et al. 2004; Dent et al. 1998; Dijkstra et al. 1999; Longshore et al. 2007; Simons-Morton et al. 2005a) and, in studies reporting the information, classes were thought to have run smoothly.(Ausems et al. 2004; Dent et al. 1998; Simons-Morton et al. 2005a)

The fidelity of programme implementation will inevitably depend on the workload and circumstances of teachers or external staff. Proper support and discernment as to the limitations of teachers' capacity may improve planning and the degree of proper programme implementation.

4. Discussion

4.1. Summary of results

Sixty-four RCTs (including 53 cluster RCTs) were included, having between 500 and 17,446 participants and follow up between 6 months and 13 years. Additionally, 81 controlled before-and-after studies (non-randomised controlled trials) were found of which 37 met all the selection criteria except for the study design. These studies were not included given the large volume of RCTs available. There was a wide variety of school-based interventions described in the studies; six also included the family, two included the community and three included family, community and mass-media interventions. Ten RCTs had more than one intervention group. All except four RCTs had comparators of usual education. Smoking outcomes reported included weekly or monthly smoking rates, never smoking children becoming occasional or regular smokers, smoking initiation, lifetime involvement in cigarettes and smoking onset rates. The main findings from the systematic review are as follows:

1. Are any school-based interventions more effective than usual practice, minimal or no intervention? This category includes aspects of study design that can influence the apparent effectiveness results seen. Findings include the following:

- There is strong evidence from subgroup analysis that interventions show more pronounced effectiveness in studies with lower quality (as measured by ++, + and – grades).
- There is no evidence of the intervention having a differential effect according to whether a study used biochemical validation or not. Evidence from subgroup analysis shows that the intervention does not have a more pronounced effect when self-reported smoking behaviour was validated using biochemical

methods (by saliva thiocyanate or cotinine or expired air carbon monoxide levels) compared to questionnaire completion only.

- There is good evidence about the differential effect according to type of outcome measures (prevalence of regular or experimental smoking). Results from 16 RCTs that used prevalence of regular smokers provided evidence that interventions may be effective in reducing smoking uptake among children. However, pooled result from 10 RCTs that used experimental smoking as the main outcome also found that interventions could be marginally effective in preventing smoking uptake. Programmes that used prevalence of regular smoking tended to produce statistically significant results but the size of combined effect was very similar to that for programmes that used experimental smoking as an outcome measure. The main difference between the two was the width of the confidence intervals, giving one as statistically significant but not the other, so this difference may be a statistical artefact.

- There is good evidence of the intervention having a differential effect according to the way the results were presented. It may be that adjusted results tended to produce more significant programme effectiveness, i.e. when RCTs adjusted for potential confounders such as baseline smoking rates, sex, and socioeconomic status. However, many of the studies with adjusted results were of low quality.

1a. When appropriate interventions can be compared, which are most effective?

- There is conflicting evidence about the effectiveness of different conceptual models of school-based prevention programmes (social influence, social competence, information giving and combined interventions) and the interventions in many RCTs were not effective in preventing or delaying uptake of smoking in comparison with no programmes or in comparison to other forms of prevention programmes. Therefore there is no clear evidence to suggest that any particular conceptual model intervention is more effective

than any other conceptual model intervention compared usual education. There is evidence from 15 RCTs (two ++, Canada; two ++, USA; three +, UK; four +, USA; one -, Norway; one -, The Netherlands; and two -, USA) that social influence curricula may be effective in preventing smoking but the size of effect is small. Four RCTs (three -, The Netherlands and one -, USA) provided evidence that information giving curricula may be effective with a larger effect size. Social competence (one -, UK) and combined (one +, USA and three -, USA) curricula detected no difference in smoking prevalence between those students in experimental and control conditions. These results may be confounded by RCT quality.

- There is moderate evidence indicating that multi-component interventions incorporating both school and community components (with or without an additional family component) are ineffective in preventing the uptake of smoking compared to usual education. Five RCTs provided evidence comparing a multi-component intervention that incorporates both school and community components to usual education: Sun et al. 2006 (+, USA), Piper et al. 2000 (+, USA), Schinke et al. 2000 (+, USA), Schofield et al. 2003 (-, Australia), Gordon et al. 1997 (-, UK). Four of the studies (Gordon et al. 1997, Schinke et al. 2000, Schofield et al. 2003, Sun et al. 2006) found no significant difference between the multi-component intervention group and the usual education group during a maximum follow-up between 6 months (Gordon et al. 1997) and 5 years (Sun et al. 2006). One study (Piper et al. 2000) found no difference at 3-year follow-up and small, marginally significant positive or negative intervention effects (depending on the school component) at 4-year follow-up.

- There is inconclusive evidence as to the effectiveness of interventions incorporating both school and family components in preventing the uptake of smoking compared to usual education. Thirteen RCTs provided evidence comparing interventions that incorporate both school and family components

to usual education: Storr et al. (-, USA), Elder et al. 1996 (+, USA), Nutbeam et al. 1993 (+, UK), de Vries et al. 2006 (-, EU + UK), Perry et al. 2003 (++, USA), Elder et al. 2002 (+, USA), Spoth et al. 2001 (+, USA), Ary et al. 1990 (-, USA), Spoth et al. 2002 (-, USA), Connell et al. 2007 (-, USA), Simons-Morton et al. 1996 (-, USA), Piper et al. 2000 (+, USA) and Schofield et al. 2003 (-, Australia). Three of the RCTs (Simons-Morton et al. 1996, Storr et al. 2002 and Spoth et al 2001) found a significant positive effect of family and schools intervention compared to usual education. Nine RCTs (Elder et al. 1996, Nutbeam et al. 1993, Piper et al. 2000, Schofield et al. 2003, de Vries et al. 2003, Ary et a. 1990, Connel el a. 2007, Elder et al. 2002 and Spoth et al. 2002) found showed no significant difference between family and schools intervention and usual education. One RCT showed a significant effect in boys but not girls (Perry et al. 2003).

1b. Are the interventions delaying rather than preventing the onset of smoking?

- There is conflicting evidence whether school-based smoking prevention programmes are delaying rather than preventing smoking uptake in children. Results from Campbell et al. 2008 (+, UK) and Bond et al. 2004 (+, Australia) RCTs suggested an attenuation of programme effect over time. Crone et al. 2003 (-, The Netherlands) and Sussman et al. 2007 (-, USA) also provided evidence that a smoking prevention programme may be delaying smoking uptake. Evidence from Klepp et al 1994 (-, Norway) suggested that school-based education could have a positive short-term impact on smoking behaviour, but that these effects tended to disappear over time. Dent et al. (-, USA) provided evidence that the intervention may be effective in preventing smoking uptake, and, Elder et al. 1993 (-, USA) provided evidence that their school-based education programme tended to have a long-term impact on smoking behaviour. Nutbeam et al. 1993 (+, UK); Peterson et al. 2000 (++, USA); Eisen et al. 2003 (+, USA); Chatrou et al. 1999 (-, The Netherlands); Ennet et al.

1994 (-, USA) and Schinke et al. 2000 (+, USA) showed that school-based prevention was not effective in preventing smoking at all follow-up periods.

- There is no robust evidence indicating that any school-based intervention has long-lasting effects beyond school leaving age. One US study (Peterson 2000, ++) demonstrated that a comprehensive smoking prevention programme that adopted social influences approach, started at age 8-9 and continued through to age 17-18 was ineffective when smoking prevalence was measured at age 20. Another US drug prevention programme (Lynam 1999, +) targeting children aged 12-13 also found no significant effect on smoking at age 20.

1c. Does effectiveness depend on status of the person (e.g., peer, teacher or external trainer/researcher) delivering it?

- It is not clear whether effectiveness of school-based smoking prevention programme depend on the status of the person delivering it. There is conflicting evidence whether peer-led programmes produced most effective intervention effects on smoking initiation. It is important to note that a peer-led programme may be differentially effective based on how leaders are selected and how groups are formed, and may be curriculum dependent. There is some evidence that teacher-led, health educator-led, and peer-led programme tend to be equally effective. Eight RCTs examined whether effectiveness of school-based smoking prevention programmes depend on the status of the person delivering it. One RCT (Campbell et al. 2008 +, UK) showed that effectiveness of peer-led school-based smoking prevention programme was the same as non-peer led programme. Three other studies (one + and two -) provided evidence that peer-led interventions tend to enhance smoking prevention programmes. For example, results from Telch et al. 1990 (+, USA) showed a marked suppression in the onset of both experimental and regular smoking among those students exposed to the resistance training with peer involvement. Similarly, Botvin et al. 1990 (-, USA) found that a cognitive-behavioural approach when carried out by peer-leaders and when additional

boosters are provided can reduce tobacco use. Yet Valente et al. 2006 (+, USA) provided evidence that a peer-led programme will be differentially effective based on how leaders are selected and how groups are formed, and this effect may be curriculum dependent. In one RCT (Ellickson et. al. 1993 -, USA), there was no statistically significant difference in regular smoking rates among students taught by health educators and those taught by adult teachers assisted by older teens. Similarly, Armstrong et al. 1990 (-, Australia) confirmed non-superiority of peer-led programmes to teacher-led programmes. This result was gender-specific. Both the teacher-led and peer-led programmes reduced, to about the same degree, the uptake of smoking by girls while only the teacher-led programme appeared to be effective in boys. Cameron et al. 1999 (++, Canada) provided evidence that teachers and nurses were equally effective providers regardless of delivery method. While, Sussman et al. 2003 (-, USA) reported that students exposed to interactive health educator-led interventions were less likely to use tobacco compared those not exposed to health educator-led instruction.

1d. Does site/setting influence effectiveness?

- Evidence shows that site or setting may influence effectiveness. One UK RCT tended to have had a more significant effect in rural schools. Otherwise, there is conflicting evidence of interventions having a differential effect according to location (rural or urban) or country of the study. Evidence from one RCT (Campbell et al. 2008; +, UK) indicated that students from schools located in the South Wales were less likely to be regular smokers. Another RCT (Sussman et al. 1993 -) conducted in USA found that trial of cigarette smoking use was higher in the rural schools than in the urban schools. Weekly use of tobacco products did not differ by place of residence. Yet another study (Elder 1996; +, USA) found that Louisianans were more likely to be ever smokers than students from Texas State. Noland et al. 1998 (++, USA) provided limited evidence of significant treatment effects for 30-day, 7-day, and 24-hour

smoking for those involved in smoking. One RCT (Ausems et al. 2004 -, The Netherlands) specifically compared in-school and out-of-school smoking prevention. These RCTs found that smoking initiation was lowest in the out-of-school and highest among students in control condition. The European Smoking Prevention Framework Approach (ESFA) found evidence of the intervention differential effect according to the location (country) of the study (de Vries et al. 2006 -, EU). ESFA was effective in prevention uptake of smoking Spain, Finland, and Portugal and ineffective in Denmark and UK. ESFA showed more smoking in the intervention group in The Netherlands. Our planned subgroup analyses provided of evidence of no differential effect according to the country.

1e. Does effectiveness depend on the intensity of the intervention?

- There is clear evidence that the addition of booster sessions enhanced effectiveness of main programmes. Four studies (one ++ and three -) analysed effectiveness of booster sessions. Evidence from Perry et. al., 2003 (++, USA) suggests that addition of booster sessions significantly enhanced the effectiveness of the main programme and was more effective than the delayed programme controls. Dijkstra et. al., 1999 (-, USA) found that boosters can be an effective tool for maintaining or increasing the effectiveness of smoking prevention programmes. Botvin et. al., 1990(a) (-, USA) revealed that addition of booster sessions to cognitive-behavioural approach can reduce tobacco use. Another study (Eckhardt et. al., 1997 -, USA) showed that continued intervention students reported significantly less smoking than lapsed intervention and continued control students.

1f. How does effectiveness vary according to the age, sex, ethnicity, sexual orientation, baseline risk factors or socioeconomic status of the target audience?

- It is not clear whether the age of the target audience has any impact on effectiveness of school-based prevention of smoking. There is inconclusive

evidence whether the effectiveness of interventions depend on the age at which students were recruited and the age of students at maximum follow-up. There is conflicting evidence that age is an important predictor of smoking in school-based prevention programmes. Three studies (Dijkstra et al. 1999 (+, USA); Gatta et al. 1991; (+, Italy) and Ausems et al. 2004; (-,The Netherlands)) found that the risk of smoking increased linearly with increasing age of the participants. Three studies (Johnson et al. 2005; (+, USA); Elder et al. 2002; (+, USA); and Chatrou et al. 1999; (-, The Netherlands)) found no significant association between age and prevalence of smoking. One particular study (Ausems et al. 2004; (-,The Netherlands)), found that this associated diminished and became non-significant with longer duration of follow-up. Contrary to this finding, another study (Chatrou et al. 1999; (-, The Netherlands)) found that age did not predict prevalence of smoking regardless of duration of follow-up. We found inconclusive evidence whether effective of intervention depend on the age at which students were recruited and age of students at maximum follow-up. There is limited evidence from subgroup analyses revealed that intervention may be effective when students were recruited at 11 or 12 years old, and when students were 14 or 16 years at maximum follow-up.

- There is weak evidence (Kellam 1998, - USA; Storr 2002, - USA) indicating that school-based interventions that start soon after entry into primary schools and that target behaviour management in the classroom, poor academic achievement, and teacher-parent communication regarding behaviour management may be effective in reducing the uptake of smoking up to age of 14. Evidence for the effectiveness of such interventions beyond this age is lacking.

- Evidence regarding the effectiveness of school-based interventions starting between age 7 and 10 is inconclusive. Studies have report either no significant effect or significant effects immediately post-intervention which diminish over

time. Two interventions focusing on smoking prevention demonstrated no significant effects on smoking (Gatta 1991, + Italy; Peterson 2000, ++ USA). Three interventions focusing on drug (substance) use prevention reported either no effect (Ringwalt 1991, + USA); non-significant reduction in smoking prevalence (Schinke 2000, +USA) or significant reduction in smoking prevalence immediately after intervention period that was not sustained at subsequent follow-up (Ennet 1994, -USA). One health promotion program that included a smoking prevention component found no significant effect (Elder 1996, +USA).

- Forty-six RCTs investigated the effectiveness of school-based interventions that started in secondary schools between ages 11 to 14. Quantitative analysis indicated that whilst the observed effect for individual RCTs did not achieve statistical significance in most cases, overall the interventions appear to have modest effect in preventing the uptake of smoking. There is significant heterogeneity in the results between studies, indicating that the findings may be specific to the context of individual studies/interventions.

- Evidence from seven studies conducted in North America regarding the effectiveness of school-based interventions that start from age 14 or later is inconclusive. One RCT (Sussman et al. 2003 -, USA) reported a significant reduction in the odds of smoking for an educator-led intervention whilst two RCTs (Dent et al. 2001 +, USA; Sun et al. 2006, +, USA) evaluating different versions of the same curriculum reported no significant intervention effect. Four other RCTs reported significant effects either for a specific subgroup (Brown et al. 2000 ++, USA) or for outcomes that may be more relevant to smoking cessation than prevention (Brown et al. 2001 +, USA; Werch et al. 2005 +, USA; Winkleby et al. 2004 +, USA).

- There is conflicting evidence of differential effect of intervention according to the sex of the target audience. There is moderate evidence that sex is an important predictor of post-test smoking, but direction of effect (either in male

or female student) is inconclusive. Furthermore, association of sex with smoking prevalence depends on how the outcome was measured. One recent study (Campbell et al. 2008 +, UK) found no significant difference in effectiveness of school-based intervention among males and females students. Another study (Peterson et al. 2000 ++, USA) provided no evidence of Hutchinson Smoking Prevention Project impact on the prevalence of daily smoking, either for girls or for boys. Three studies (Brown et al. 2002 ++, Canada; Abernathy & Bertrand 1992 +, Canada; and Kellam & Anthony 1998 -, USA) demonstrated that the intervention was more effective among male students; while only one study (Shean et al. 1994 -, Australia) found that both teacher-led and peer-led programmes reduced the taking up of smoking by girls to about the same degree. There was also conflicting evidence from nine studies whether sex was an important predictor of post-test smoking. Only one study (Chatrou et al. 1999 -, The Netherlands) provided evidence that sex was not associated with post-test smoking. Two studies (Johnson et al. 2005 +, USA and Simons-Morton et al. 2005 -, USA) found that female students were more likely than male students to have reported smoking at follow-up and only one study (Schofield, Lynagh, & Mishra 2003 -, Australia) found that boys were less likely than girls to have reported smoking at follow-up. Yet, three studies (Elder et al. 1996 -, USA; Sussman et al. 2003 -, USA; Ausems et al. 2004 -, The Netherlands) revealed that males were more likely to be a smoker than their female counterparts. Another two studies (Elder et al. 2002 +, USA and Gatta et al. 1991 +, Italy), demonstrated that compared to male students, female students were less likely to have used tobacco.

- There is moderate evidence that ethnicity is an important predictor of smoking behaviour, such that white students were less likely to be a smoker. Similarly, there is moderate evidence that the observed association between ethnicity and smoking behaviour depend on how the outcome was measured. Four studies (two +, USA and two - USA) specifically studied whether race or ethnic group is an important factor in predicting post-test smoking among students exposed

to school-based smoking prevention programme. Only one study (Simons-Morton et al. 2005 (-), USA) demonstrated no association between ethnicity and smoking status. Three studies found that ethnicity was important factor in predicting post-test smoking behaviour. For example, one study (Elder 1996 (+), USA) provided evidence that White students were less likely to be classified as ever-smoker. Two studies (Johnson et al. 2005 (+), USA and Elder et al. 1993 (-), USA) revealed that ethnicity affects smoking prevalence depending on how the outcome was measured. One multi-country study (de Vries et al. 2006 -, EU) in six European countries, provided evidence that in The Netherlands there was differential significant effects for adolescents with a Dutch and non-Dutch origin. The Dutch ESFA programme was effective for non-native adolescents with fewer new weekly smokers compared to new weekly smokers in the control group. An opposite effect was found in native Dutch adolescents with more new weekly smokers in the experimental compared to new smokers in the control group.

- There is no conclusive evidence about the variability of programme effectiveness in high risk individuals. Josendal et al. 1997 (++, Norway) showed positive effects of a school-based intervention at six months in certain high risk groups. Snow et al. 1992 (-USA) provided evidence that students from single parent households were less likely to have been positively affected by the intervention than those from two-parent households. The following factors were also found to be associated with post-test smoking: Attitudes and smoking habits of family (Armstrong et al. 1990 -, Australia; Elder 1996 +, USA and Chatrou et al. 1999 , The Netherlands) attitudes and smoking habits of peers,(Armstrong et al. 1990 -, Australia; Chatrou et al. 1999 -, The Netherlands; Elder 1996 +, USA and Schofield, Lynagh, & Mishra 2003 -, Australia) tobacco advertising (Armstrong et al. 1990 -, Australia), availability of cigarettes at home (Elder 1996 +, USA) involvement of students at school (Schofield, Lynagh, & Mishra 2003 -, Australia) baseline smoking status (Chatrou et al. 1999 -, The

Netherlands and Schofield, Lynagh, & Mishra 2003 -, Australia) and future smoking intentions (Armstrong et al. 1990 -, Australia)

- There was no evidence about sexual orientation of participants and the impact of the interventions
- There is limited evidence that socioeconomic status of the participant had no impact on the effectiveness. There is evidence from one RCT (Campbell et al. 2008; + UK) that there is no evidence association between the students' socioeconomic status and programme effect.

1g. Are there any adverse or unintended effects (negative) of the intervention?

- There is limited evidence on adverse or unintentional effect of school-based prevention of smoking uptake. No studies specifically examined adverse or unintentional effects of school-based smoking prevention programmes. One multi-country study (de Vries et al. 2006 -, EU) in six European countries found that adolescents in The Netherlands exposed to school-based smoking prevention programme were more likely to be a regular smoker than those in control condition. Piper, Moberg, & King 2000 (+, USA) provided evidence that age-appropriate intervention emerged as marginally harmful over the control condition.

2. Barriers and facilitators – Quantitative data

- An obvious barrier to interventions may be poor student attendance so that interventions, regardless of their value, will fail to have positive effects. In one RCT, a dose-response relationship was observed between programme participation and changes in smoking status.
- In one RCT, engagement with the intervention (reported programme interesting/very interesting and useful) was shown to be related to follow-up smoking status; those engaging being less likely to be smokers at 1 year.

4.2. Strengths limitations and uncertainties

A major strength of this systematic review is that only evidence from RCTs is included. It is acknowledged that there is evidence from non-randomised studies which may have potentially contributed evidence. The volume of RCTs investigating the effectiveness of school-based interventions to prevent smoking with similar outcome measures is considerably larger than most of other public health interventions. Some of the RCTs included in this review were of very high quality and followed up children for over ten years. Non-RCT evidence has a greater potential for bias which would have made accurate interpretation of results far more difficult. It is therefore unlikely that inclusion of non-RCTs in the review would have significantly altered our conclusions.

This evidence review searched and included studies published from 1990 onwards, in accordance with the recommendation from the *Methods for development of NICE public health guidance (2006)*. RCTs of school-based interventions that were conducted before or during the 1980s were not included in this review. These studies were carried out more than two decades ago, and thus their generalisability to current situation is questionable. It is also anticipated that the findings and experiences from early RCTs would have been used to inform the design and conduct of later RCTs included in this review. Indeed this was mentioned in the manuscripts of most of the included RCTs. Therefore focusing the review on more recent literature is unlikely to have missed conceptual frameworks and/or important components of school-based interventions that have been shown to be potentially effective. The possibility of missing some evidence regarding what did not work, however, cannot be ruled out.

4.2.1 Limitations

The limitations in the conduct of the systematic review need to be distinguished from the limitations in the evidence base.

Approximately half of the RCTs included more than one intervention arms, which potentially allowed direct comparison between the effectiveness of different school-based interventions or different ways of delivering/implementing these interventions. Given the relatively small (if any) overall intervention effects observed among individual studies, it is likely that most studies were insufficiently powered to detect potentially important difference in effects between different school-based interventions or different ways of delivery/implementation. Findings based on statistical significance of separate comparisons between intervention and control groups (e.g. concluding two interventions have differing effects based on $p<0.05$ for one intervention compared to control whilst $P>0.05$ for another intervention compared to control without confirmation by an appropriate statistical test between the interventions) need to be treated with great caution as chance alone may account for such findings. The same caution applies to differences observed between subgroups defined by study participants' characteristics or other factors.

As expected smoking outcomes were measured and presented differently in the RCTs. This has restricted the possibility of graphically summarising study findings for all studies and has also introduced another source of heterogeneity when quantitative data from different studies are compared or combined. For this review which focuses on the prevention of uptake of smoking, further difficulties were encountered as the majority of studies did not analyse/report findings for baseline non-smokers separately. Using overall prevalence to calculate potential uptake by subtracting baseline prevalence from post-intervention involves assumptions that baseline smokers remain as smokers and all increases in prevalence are due to uptake post-baseline. The validity of such an assumption and its impact on the size of estimated effect may need further exploration.

The results section includes subgroup analyses of RCTs. These analyses, particularly when conducted post-hoc, may produce spurious results due to the increased chance of false positive findings (concluding there is a significant difference when in fact there is not). If multiple subgroup analyses are carried out, particular attention is paid to ascertain whether the subgroup analyses were planned in advance, whether

appropriate statistical methods (e.g. 'test for interaction') have been used and where a difference is found, whether the plausibility of the finding is discussed.

One exception to the above is the sub-section where the effectiveness of various interventions is examined in relation to the age of the children when the interventions started. It is generally recognised that an intervention needs to be tailored to suit the age of its target population, therefore few studies have applied the same intervention to different age groups and compared the effectiveness between different age groups. Instead the main question to be answered for that sub-section is whether interventions started at younger ages is more or less effective compared to interventions started at older ages.

A major limitation of the systematic review is publication bias. The search strategy agreed with NICE had the requirement to only include English language papers. As a result we do not know if we have missed RCTs published in France, Germany or the Netherlands that would be very generalisable to the UK. The systematic review has included one RCT conducted in Native Americans which has very limited generalisability to the UK context. We also excluded studies with sample size less than 500. Findings from leave-one-out sensitivity analyses demonstrated that the studies with larger sample sizes had no undue influence on the pooled estimates. It is therefore unlikely that exclusion of smaller studies in the review would have significantly altered our conclusion.

4.2.2 Uncertainties

Despite the large volume of RCT evidence found, it is still very difficult to provide a firm answer to many of the questions regarding the effectiveness of these interventions due to the nature of their complexity and the context (e.g. time and location) in which these studies were carried out.

RCTs included in this review were carried out over the past three decades, during which there were significant amount of activities and changes in policies related to smoking. The impact of these changes to the evidence-base is uncertain and needs to be taken into account when interpreting the evidence.

Most studies included a control group which received 'no intervention' and/or 'usual education'. Although these are usually not well described, it is likely that the quantity and nature of education/intervention received by control groups varies over time and differs between countries. This increases the 'noise' in estimating effectiveness of school-based interventions in question, and may explain at least partly the heterogeneity in the findings between studies. The lack of significant effect of many tested interventions does not necessarily prove their inefficacy. Rather these findings indicate that these school-based interventions were not significantly more effective than existing school education/intervention already in place, or alternatively were not more effective that other policy/environmental changes happening outside schools

It is uncertain why RCTs presenting adjusted results are more likely to show significant differences than those presenting unadjusted results. Similarly, it is uncertain why programmes that used prevalence of regular smoking as an outcome tended to produce statistically significant results whereas those that used prevalence of experimental smoking did not. It is possible that the drivers for experimental smoking are different to those for regular smoking. On the other hand, it could be a statistical artefact.

4.3. Conclusion

The systematic review of 62 large RCTs investigating the effectiveness of school-based prevention of smoking has provided few insights into what works and for whom. Most variations in participants, intervention, comparators and outcomes do not appear to have much impact on effectiveness. Apart from quality issues, the main exceptions are weak evidence indicating that school-based interventions starting soon after entry into primary schools may be effective in reducing the uptake of smoking

up to age of 14, and strong evidence that booster sessions enhance effectiveness of main programmes.

4.3.1 Further research

The finding that interventions are apparently more effective in RCTs with lower quality suggests that it is essential that new research is done to the highest quality possible and reported well. Otherwise, any apparent effectiveness may be an artefact of the RCT conduct and report rather than the actual effectiveness of the intervention. On the other hand, it does not seem to matter if biochemical validation is used or not. This is surprising because much medical research tends to rely on objective rather than self-report measures. The systematic review assessed research employing a wide variety of different interventions. What would be most useful would be further research to determine exactly which components are the most effective and which are least effective in children at risk of smoking uptake.

5. Evidence Tables

Table 5:1 Abernathy et al. 1992

	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
The Peer Assisted Learning (PAL) smoking prevention programme **Authors:** Abernathy **Year:** 1992 **Aim of study:** To examine the effectiveness of a smoking prevention programme in school children	**Source population/s:** Schools in Calgary **Country:** Canada **Study year:** 1988 (began) **Eligible population:** Calgary board & Calgary Catholic board schools (190 schools) **Selected population:** 190 schools **Age:** 11-12 years at	**Method of allocation:** Cluster randomisation. Schools stratified into quintiles according to neighbourhood mean income and randomly assigned to control or intervention. **Measures to minimise confounding:** Not reported **Intervention/s** Based on a social influence approach, the PAL programme aimed to prevent children ever starting smoking. Intervention provided children with information about the benefits of not smoking and taught interpersonal skills necessary to resist peer pressure to smoke (no further intervention details reported). **Intervention category:** School based **Intervention period:**	**Primary Outcomes:** Numbers of students who had never smoked **Adverse events:** **Secondary outcomes:** None **Follow-up periods:** 6 months and 1.5 and 2.5 years after the end of intervention **Evaluation:** Health behaviour questionnaires were given at baseline and at ~6 months, ~1.5 years and ~2.5 years post intervention by teachers trained in their content and methods for administration. **Method of analysis:** Not ITT, analysis only	**Primary outcomes:** Numbers of students who had never smoked (intervention vs control). NB only includes students in classes where intervention was considered to be properly implemented: <u>Males</u> 6m: 87.9% vs 77.3% (X^2=14.06, p<0.001) 1.5y: 71.5% vs 63.8% (X^2=5.07, p<0.05) 2.5y: 68.6% vs 59.6% (X^2=6.36, p<0.05) <u>Females</u> 6m: 78.9% vs 80.7%	**Limitations identified by author:** None **Limitations identified by review team**: Data were only presented for students who had never smoked. This is only a subset of the data and, for transparency, all data should have been presented. The full data set may not have shown the same effects. Separation of the intervention group into those who were thought to have had or not had all 6 intervention lessons may have been subjective. There is no evidence that this process was undertaken with investigators 'blinded' and this may give less confidence in the findings. **Evidence gaps and/or recommendations for future**

	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Study design: Cluster RCT Internal validity[§]: + **External validity[†]: 3**	start of intervention **Female:** 49% **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:** **Setting:** Classrooms	~3 months **Comparator/s** No intervention **Sample sizes:** **Total n=** 190 schools, 7508 students **Intervention n=** 94 schools **Control n=** 96 schools **Baseline comparisons:** Pre-test smoking rates very similar in intervention/control schools. Other baseline comparisons not reported. **Study sufficiently powered?** Not reported	conducted on students (unit of analysis) who were present for each survey. Only results for those 'never smoking' at each survey presented. Students in classes where teachers were thought to have properly implemented each intervention lesson analysed separately from those considered not to have implemented all lessons. X^2 tests used to test for significance.	(X^2<1, ns) 1.5y: 60.7% vs 62.3% (X^2<1, ns) 2.5y: 50.1%vs 52.9% (X^2<1, ns) **Secondary outcomes:** None **Attrition details:** 53% (by posttest 3)	**research:** Long-term evaluations of PAL is needed. **Source of funding:** National Health Research and Development Programme

§ The internal validity score of a study may vary depending on the reliability and validity of the outcome measures of interest. Score for internal validity: ++ All or most of the criteria have been fulfilled. Where they have not been fulfilled the study conclusions are though **very unlikely** to alter. + Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought **unlikely** to alter the study conclusions. – Few or no criteria have been fulfilled. The study conclusion are thought **likely or very likely** to alter.

† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:2 Armstrong et al. 1990

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Armstrong **Year:** 1990 **Aim of study:** To increase children's knowledge of the effects of smoking, their awareness of non-smoking and to provide them with training in ways to resist pressures to smoke. **Study design:** RCT **Internal validity[§]: -** **External validity[†]: 3**	**Source population/s:** Schools in Australia **Country:** Australia **Study year:** July to December 1981 **Eligible population:** Not reported **Selected population:** Students in last year of primary school, in 45 schools **Age:**	**Method of allocation:** Each school was assigned at random to one of the three interventional groups: control group (no planed intervention), peer-led programme, and teacher-led programme. **Measures to minimise confounding:** The schools were stratified by size of class and regional location before randomization to ensure as far as possible, equal numbers of children and uniformity of socioeconomic status across the three intervention groups. **Intervention/s** The intervention consisted of five sessions. Two versions of which were developed; the first was led by peers of the same age while the second was led by the teachers. In the first session, students gave the estimates for children who smoke, listed the negative consequence of smoking and why students smoke.	**Primary Outcomes:** Prevalence Smoking **Adverse events:** Not reported **Secondary outcomes:** Knowledge attitude refusal skill **Follow-up periods:** Follow ups were conducted 12 and 24 months after intervention **Evaluation** Base line survey was conducted in June 1981 and follow up surveys in December 1982 and 1983. The questionnaire collected information on smoking habits of students, parents, friends and siblings, knowledge of and attitude to smoking. Those who conducted the	**Primary outcomes:** gender-specific results (one-year follow-up) Girls: Control-33.1%; teacher led-25.0%; Peer led-23.2% Boys: Control-29.4%; teacher led-15.4%; Peer led-34.7% (Two-year follow-up) Girls: Control-49.7%; teacher	**Limitations identified by author:** At the time of assessment, the original classes had been 'mixed up' reducing the between-to-within group differences. Data that identified each child's school were erased shortly after the initial survey and were not available for analysis **Limitations identified by review team**: High loss to follow up **Evidence gaps and/or recommendations for future research:** Further research to identify the determinants of peer group influences. **Source of funding:**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	12-13 years (modal age, 12 years) **Female:** 48.9% White **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:** None **Setting:** Not reported	The effect of smoking on the health was also introduced. The second session gave accurate information on the proportion of children who smoked, while the students also gave an account when they experienced social pressure to smoke and refusal techniques were practiced. The third session involved students preparing and discussing arguments in supports of non-smoker's rights and the developments of arguments which that countered the arguments they give. The fourth session examined the family and its role in influencing smoking behaviour. In the fifth session, the students wrote a short essay to give reasons why they remained non-smokers. **Intervention category:** School based **Intervention period:** Not reported **Comparator/s** Control group (no planned intervention) **Sample sizes:**	survey were blind to school treatment status. **Method of analysis:** Comparisons among the proportion of students in the different intervention groups who took up smoking were tested using person chi square. The effects of other variables that were collected (uptake of smoking and on the effect of interventions) were examined by logistic regression. Analysis was carried out separately for boys and girls and for each year of follow-up.	led-37.8%; Peer led-37.8% Boys: Control-33.5%; teacher led-25.9%; Peer led-41.9% **Secondary outcomes:** No **Attrition details:** 36%	Not reported

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Total n= 2366 **Intervention n=** 1585 **Control n=** 781 **Baseline comparisons:** Dissimilar gender, intervention group **Study sufficiently powered?** Not reported			

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† Score for external validity:

1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:3Ary et al. 1990

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Ary **Year:** 1990 **Aim of study:** To evaluate the incremental effect of school based social influence intervention compared to standard care curricula. **Study design:** RCT Internal validity[§]: - **External validity[†]:3**	**Source population/s:** schools **Country:** USA **Study year:** Not reported **Eligible population:** schools from 13 districts in Oregon **Selected population:** 22 middle or elementary schools & 15 high schools **Age:** 11 to 12 years **Female:** Not reported **Race/ethnicity:**	**Method of allocation:** cluster randomisation **Measures to minimise confounding:** adjusted for demographic factors **Intervention/s** Programme consisted of curricular materials for five classroom sessions in each grade, 6 through 10. Each session was taught over one week. Each level of the curriculum consisted of four strands 1) awareness of social influences to engage in substance abuse 2) refusal skill training 3) health facts and 4) contracting or other public commitments not to use cigarettes. Programme was taught by class teachers, while peer leaders presented some activities in two grades. Teachers were taught by project staff in single session lasting 2 to 3 hours while peer leaders were trained by project staff during a half day meeting. The curriculum involves social influences to use tobacco as well refusal skills training. Information on the short and long term effects of smoking were also highlighted as well as other activities designed to prompt students to make explicit commitments not to use the substances. Parents were also sent brochure to discuss views and rules about	**Primary Outcomes:** Smoking Prevalence **Adverse events:** Not reported **Secondary outcomes:** Not reported **Follow-up periods:** 12 months **Evaluation:** Questionnaire included items on the respondent's socioeconomic status, smoking history and attitudes toward cigarette as well as smoking behaviour of parents, siblings and friends. A composite measure of smoking was also developed based on weighted combination of subject's responses regarding the number of cigarettes smoked. Carbon monoxide was collected in order to enhance the accuracy of self reporting. **Method of analysis:** Analysis of variance was conducted on mean substance use in each	**Primary outcomes:** Proportion of pretest nonsmokers who reported smoking at follow-up: 12% for both intervention and control The group whose parents received parent message did not differ significantly from the group whose parents did not receive parent message. 1-year covariate adjusted smoking rate among pre-test smoker: intervention vs. control (111.6 cigarettes vs. 76.6 cigarettes) **Secondary outcomes:** Not reported	**Limitations identified by author:** High level of smoking curriculum was offered in the control schools. Relying only on teachers reports of curricular intervention. Inability of the study to have effect on pre-test non smokers. **Limitations identified by review team**: Differential attrition in participants lost to follow up and those who remained in the study. **Evidence gaps and/or recommendations for future research:** Need to report and assess level of tobacco related education in both control and intervention school. Evaluation should be based on assessing the

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	89.2% **Socioeconomic status:** 91% parents had graduated from high schools **Excluded population:** None **Setting:** schools in rural and urban settings	the use of cigarette. The efficacy of parent message (brochure) was tested in 12 of the intervention schools by random assignment to receiving or not receiving the messages. **Intervention category:** Multimodal **Intervention period:** Not reported **Comparator/s** Control condition **Sample sizes:** **Total n=** 7837 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported	school at one year	**Attrition details:** Treatment =24.4% Control= 24.6%	incremental effect of the interventions rather than evaluating the effect of intervention versus no intervention. **Source of funding:** Grants from the National Cancer Institute and the National Institute of Drug Abuse.

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
that have not been fulfilled or not adequately described are thought **unlikely** to alter the study conclusions. – Few or no criteria have been fulfilled. The study conclusion are thought **likely or very likely** to alter. † Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:4 Ausems et al. 2004

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
(Ausems et al. 2004) **Author:** Ausems **Year** 2004 **Aim of study:** To test the effectiveness of in-school and out-of-school	**Source population/s:** Dutch vocational schools **Country:** Netherlands **Study year:** 1997 **Eligible population:** All vocational schools within the six local health department regions **Selected population:** 36 schools	**Method of allocation:** 19 schools already receiving in-school programme randomised within regionally defined blocks to intervention 1 or 3. The remaining 17schools were randomly assigned to intervention 2 or control. **Measures to minimise confounding:** Not reported **Intervention/s** 1) In-school intervention 2) Out-of-school intervention 3) In and out-of-school intervention The in-school intervention used the "Healthy Schools and Stimulants Programme", designed by the 'Trimbos	**Primary Outcomes:** Smoking initiation amongst non-smokers, Smoking continuation amongst smokers **Adverse events:** Not reported **Secondary outcomes:** None **Follow-up periods:** Directly after the end of intervention (posttest 1) and 6 months after end of intervention (posttest 2). At 12 months after	**Primary outcomes:** <u>Prevalence data</u> (none significant compared to control) **Post test 1** Prevalence of pre-test never smoker becoming smoker: 1) 27.4% (CI 15.4-39.4) 2) 16.8% (CI 4.9-28.7) 3) 17.5% (CI 8.1-26.9) Control: 24.0% (CI 6.8-41.1) Prevalence of pre-test smokers continuing: 1) 34.6% (CI 18.8-48.3) 2) 33.8% (CI 25.2-42.3)	**Limitations identified by author:** Poor data collection in some cases. **Limitations identified by review team**: Allocation between in-school and out-of-school condition was not random. Multiple outcomes were tested and this increased the likelihood of obtaining some significant results. Attrition rates were different in different intervention groups. In the analysis, those leaving the

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
interventions on smoking prevention in vocational school students **Study design:** RCT **Internal validity[§]: -** **External validity[†]: 2**	**Age:** Average 13.1 years **Female:** 47.9% **Race/ethnicity:** 73% had both parents Dutch **Socioeconomic status:** 68.7% had father with paid job **Excluded population:** Not reported **Setting:** Classroom and home setting	Institute'. Intervention consisted of 3 lessons (50 min). Each lesson comprised a teacher introduction, class discussion, a workbook task and an additional task that summarised the main lesson points. The out-of-school intervention consisted of 3 tailored letters with smoking prevention messages, mailed at 3 week intervals. Using the pre-test questionnaire, letters were tailored to students attitudes, self-efficacy, smoking intention etc and boys and girls received different messages. The content of letter messages was based on Social Inoculation Theory, the Theory of Reasoned Action and Bandura's Social Cognitive Theory. The first letter gave information on beliefs and short term and social consequences. The second letter focused on the effects of the social environment and the third described refusal techniques. With each letter, a competition was included - to complete "I don't want that cigarette because…" (CD prize). **Intervention category:** School based/Out of school **Intervention period:** ~5 months	end of intervention, only those receiving out-of-school intervention followed up (posttest 3). **Evaluation:** Written surveys were undertaken at baseline, directly after and at 6 and 12 months after intervention to assess attitudes, social influence, self-efficacy, intention to smoke and smoking behaviour. No details of questionnaire procedure here. **Method of analysis:** Multilevel regression Unclear whether schools or individuals were the unit of analysis. Not intention to treat.	3) 26.8% (CI 7.1-36.6) Control: 29.9% (CI 14.4-45.4) **Post test 2** (6 months) Prevalence of pre-test never smoker becoming smoker: 1) 28.0% (CI 18.6-37.4) 2) 25.0% (CI 13.6-36.6) 3) 29.4% (CI 20.3-38.5) Control: 40.9% (CI 24.8-56.9) Prevalence of pre-test smokers continuing: 1) 29.4% (CI 16.9-42.0) 2) 37.0% (CI 21.3-52.6) 3) 45.0% (CI 37.0-53.1) Control: 42.2% (CI 35.2-49.2) **Post test 3** (12 months) Prevalence of pre-test never smoker becoming smoker: 2) 27.2% (CI 8.8-53.5) 3) 40.0% (CI 29.4-50.6) Control: 47.9% (CI 29.1-66.6) Prevalence of pre-test smokers continuing: 2) 37.0% (CI 22.3-51.7) 3) 40.4% (CI 34.0-46.9) Control: 46.9% (CI 33.7-60.1) MIXOR analysis No significant effects except	study were shown to be different in respect to age, number of parents and contact with smokers and differential attrition could have resulted in different types of students remaining in study groups. **Evidence gaps and/or recommendations for future research:** None give **Source of funding:** European Commission and the Dutch Cancer Foundation.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Comparator/s No intervention **Sample sizes:** **Total n=** 36 schools (2,376 students) Intervention 1 n= 9 (525) Intervention 2 n= 8 (513) Intervention 3 n= 10 (829) Control n= 9 (509) **Baseline comparisons:** Children in intervention 2) more often from one-parent families (OR=0.76; 95% CI 0.67-0.97) and older than control (OR=1.27; 95% CI 1.03-1.57) **Study sufficiently powered?** Yes		for: Smoking continuation at posttest 2 intervention 1 vs control: OR=0.49 (0.29-0.84) Smoking initiation at posttest 3 intervention 2 vs control: OR=0.42 (0.18-0.96) **Secondary outcomes:** None **Attrition details:** Posttest 1: Schools 5.6%, students 19% Posttest 2: Schools 8.3% students 27% Posttest 3: Schools 18.5%	

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† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:5 Aveyard et al. 2001

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Aveyard et al.(Aveyard et al. 2001) **Year:** 2001 **Aim of study:** To examine whether a year long programme based on the transtheoretical model of behaviour change, incorporating three sessions using an expert system computer programme and three class lessons, could reduce the prevalence of teenage smoking **Study design:** RCT	**Source population/s:** Schools **Country:** UK **Study year:** 1997 **Eligible population:** 89 schools in the West Midlands region **Selected population:** 52 schools (58.4%) **Age:** 13 to 14 years **Female:** 49.7% **Race/ethnicity:** 82.6% White **Socioeconomic**	**Method of allocation:** Clustered randomisation. **Measures to minimise confounding:** Schools were stratified according to number of students in year 9. **Intervention/s** Six sessions of two types: one computer session and one class lesson for each of the three terms of year 9. The computer programme was based on that developed by Prochaska and colleagues, containing questionnaires measuring the key concepts of the transtheoretical model. After each questionnaire students received feedback both through the headphones and on screen of how their temptations, for example, compared to stage based data (normative feedback) and in second and third sessions, what change had occurred since last time (ipsative feedback). The questionnaires	**Primary Outcomes:** Prevalence of regular smoking (one or more cigarettes per week) **Adverse events:** not reported **Secondary outcomes:** Regular daily smoking; change of stage **Follow-up periods:** 12, 24 months from	**Primary outcomes:** Weekly smoking Year 1 OR = 1.16 (0.89 to 1.50); Year 2 OR = 1.07 (0.85 to 1.35) **Secondary outcomes:** Daily smoking Year 1 OR = 1.21 (0.91 to 1.60) Year 2 OR = 1.07 (0.85 to 1.36) Positive change of stage: Year 1 OR = 1.35 (0.99 to 1.85); Year 2 OR = 1.30 (0.88 to 1.91)	**Limitations identified by author:** The intervention was didactic and lack young people's involvement. Disengagement from the computer programme, which may reflect disengagement from the school in general, predicted smoking uptake. **Limitations identified by review team:** Difficult to ascertain what health education was delivered in the control group. **Evidence gaps and/or recommendations for future research:**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Internal validity[§]: + **External validity[†]:** 2	**status:** Townsend score 1.65 (intervention), 0.62 (control) **Excluded population:** 37 schools not agreeing to participate; also about 8% of registered pupils did not participate in the randomised schools **Setting:** see above	were inter-spersed with video clips of young people talking about their thoughts about smoking that were relevant to the stage of change of the student concerned. The other transtheoretical model intervention was a one hour lesson delivered by ordinary class teachers. The teachers attended a two day training course organised by Public Management Associates, who had developed licensed training and lesson plans in consultation with Prochaska and colleagues. The three lessons developed the young people's understanding of the stages of change and how the pros and cons of smoking would vary in different stages, and the lessons got young people to use these concepts. **Intervention category:** single (social influence) **Intervention period:** autumn 1997 to summer 1998 **Comparator/s** Normal health education on tobacco, which is part of the English national curriculum. As a reward for participation, teachers in control group schools were given three lesson plans and handouts on smoking. These lessons consisted of quizzes on facts about tobacco and one lesson on different	baseline **Method of analysis:** Multilevel analysis. ITT and various sensitivity analyses were carried out.	**Attrition details:** 10.9% for year 1 (intervention 10.7% vs control 11.0%); 18.3% for year 2 (intervention 14.0% vs control 22.6%)	Research into school disengagement. **Source of funding:** Health authorities of the West Midlands

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		ways of persuading someone to stop smoking. The content of the lessons was all taken from generally available teaching support material. The lesson plans and materials were provided to all control group schools, but teachers in these schools received no training in smoking issues or delivery of the lessons and it was up to the individual schools whether or not they used the materials. **Sample sizes:** **Total n=** 8352 (52 schools) **Intervention n=** 4125 (26 schools) **Control n=** 4227 (26 schools) **Baseline comparisons:** The intervention group had slightly fewer never smokers (51.8% vs 54.8%), fewer boys (48.4% vs 52.1%) and slightly more children whose parents also smoked compared to the control group. **Study sufficiently powered?** Yes			

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† Score for external validity:

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:6 Biglan et al. 2000

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Project SixTeen **Authors:** Biglan **Year:** 2000 **Aim of study:** To compare the effectiveness of a community wide programme to prevent adolescent tobacco use in addition to school-based intervention	**Source population/s:** Communities in Oregon ranging from 1,700 to 13,500 people **Country:** US **Study year:** Not reported **Eligible population:** Communities that share no common high schools & at least 20 miles apart **Selected population:** Students in schools in 16	**Method of allocation:** Pairs of communities matched for socioeconomic status and population, one from each pair randomised to intervention or control. **Measures to minimise confounding:** adjusted for parent separation, grade point average, parental smoking status **Intervention/s** School based intervention took place in intervention and control community schools over 6 years. Students in	**Primary Outcomes:** Smoking prevalence **Adverse events:** **Secondary outcomes:** None **Follow-up periods:** ~12, 24, 36, 48 months after start of intervention **Evaluation:** 5 annual cross sectional assessments of school students in the 7th and 9th grades in intervention/control communities. First survey	Results are for changes from baseline relative to control community changes (net) **Primary outcomes:** Net adjusted *decrease in smoking prevalence at: 1 yr: 4.5% SE 1.7% (p=0.022) 2 yr:1.8% SE 1.3% (p=0.212) 3 yr: 2.4% SE 1.3% (p=0.077)	**Limitations identified by author:** Involved communities were not ethnically diverse and largely only rural so not that generalisable. **Limitations identified by review team**: Results maybe misleading. Intervention group had a high baseline prevalence of smoking and, because all follow up results are compared with baseline, this acted to make intervention appear more favourable. Figure 2 in this paper (showing trends in each

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Study design: RCT **Internal validity[§]: ++** **External validity[†]: 2**	communities (8 intervention, 8 control) **Age:** 11-18 (grade 6-12) received school based intervention. 12-13 and 14-15 years (grades 7 and 9) took part in programme evaluation **Female:** 48% (baseline) **Race/ethnicity:** 85% White, 7% Hispanic, 6% native American, 1% African American , 1% Asian (baseline) **Socioeconomic status:** Not reported **Excluded population:** Students not in grades 7 and 9 **Setting:** Rural communities, intervention set in communities and schools	grades 6-12 received education over a 1 week period each year. Specific components: health facts and smoking effects, refusal skills training, video modelling of refusal skills, public commitment regarding attitude to tobacco use, peer-led discussions. Teachers received 2-3 hour training. Community intervention only took place in intervention communities. Conducted by paid coordinator and youth and adult volunteers. Media publicity of tobacco problem included newspaper articles, presentations, mailings to community leaders, advertisements, radio announcements and billboards. Community activities aimed specifically at youth included sidewalk art, T shirt design, free gifts, games, presentations, quizzes etc. Activities designed to promote parent/youth discussion of tobacco use included pamphlets, letters and a youth-parent quiz. To decrease the number of shops	acted as baseline. Questionnaires asked about tobacco and other substance use, other behaviours and peer and family relations. Expired carbon monoxide samples taken. Questionnaires also mailed out to random selection of 30% of parents of participating students with $10 'compensation' for completing the questionnaire. **Method of analysis:** Effects assessed with community as the unit of analysis. Intention to treat. Pair-wise comparison of the effect of intervention from baseline to surveys 2, 3, 4 and 5. Comparison of trends in prevalence over time in intervention/control communities.	4yr: 3.8% SE 1.6% (p=0.038) * NB smoking rates increased in both groups but net rates decreased due to bigger control group increases **Secondary outcomes:** none **Attrition details:** NA (cross sectional surveys) Average ~86% response rate for students. Average 78.6% response rate for parent surveys.	group) appears to show very little difference in intervention vs control effects. Investigators remove results for the second time point in their comparison of intervention/control prevalence slopes. No proper justification for removal is given and, in the analysis where it is included, net trend was no longer significant. **Evidence gaps and/or recommendations for future research:** Findings should be replicated in larger and more ethnically diverse communities. **Source of funding:** National Cancer Institute, National Institute on Drug Abuse

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		selling tobacco to those underage, activities aimed to mobilise community support, educate vendors, reward ID requesting, give positive publicity for ID requesting and feed back to managers about underage sales. **Intervention category:** Community/school based **Intervention period:** Over 6 years. **Comparator/s** School based intervention programme **Sample sizes:** **Total n=** 16 communities (4438, 4515, 4425, 4708, 4165 students in surveys 1-5 respectively) **Intervention n=** 8 communities **Control n=** 8 communities **Baseline comparisons:** Similar at baseline **Study sufficiently powered?** Not reported			

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
criteria have been fulfilled. Where they have not been fulfilled the study conclusions are though **very unlikely** to alter. + Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought **unlikely** to alter the study conclusions. – Few or no criteria have been fulfilled. The study conclusion are thought **likely or very likely** to alter. † Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:7 Bond et al. 2004

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
The Gatehouse project **Authors:** Bond Year: 2004 **Aim of study:** To examine the effectiveness of a school intervention for wellbeing and	**Source population/s:** Metropolitan Melbourne and rural districts **Country:** Australia **Study year:** 1997 **Eligible population:** Schools in 12 districts in two education	**Method of allocation:** Cluster randomisation of metropolitan education districts to intervention (n=6) or control (n=6). Schools within these 'intervention' or 'control' districts were then randomly selected to take part. Additionally, schools from 4 regional districts were sampled for control and intervention 'country' schools. **Measures to minimise confounding:** adjusted for baseline substance use, demographic factors	**Primary Outcomes:** Smoking Prevalence (any smoking or regular smoker) **Adverse events:** **Secondary outcomes:** None **Follow-up periods:** 1, 2 and 3 years from baseline **Evaluation:** Using laptop computers,	**Primary outcomes:** Prevalence of any smoking (intervention vs control): Year 1 22.0% vs 24.9%; OR 0.89 (95% CI 0.72-1.12) Year 2 25.0% vs 28.7%; OR 0.92 (95% CI 0.63-1.33) Year 3 24.9% vs 28.2%; OR 0.91 (95% CI 0.67-1.24)	**Limitations identified by author:** The small number of schools in the trial limits the effectiveness of the randomisation process. **Limitations identified by review team**: Although it is implied that schools

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
health risk behaviours **Study design:** Cluster RCT Internal validity[§]: + **External validity[†]:3**	regions in Melbourne and schools in 4 rural districts **Selected population:** 26 metropolitan government, independent and catholic schools and country schools **Age:** 13-14 years (year 8) **Female:** 53.2% **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:** **Setting:** Classrooms in government, independent and catholic metropolitan schools and country schools.	**Intervention/s** Intervention involved institutional and individual-based components based on an understanding of mental health and risk behaviours that derive from social environments. Priority areas were to build a sense of security, trust and positive regard and to increase skills and opportunities for good communication. On a whole school level, intervention involved establishing an 'adolescent health team' to identify effective strategies to address risk issues. The teaching part of the intervention was delivered over 10 weeks in 2 school years (years 8 and 9). A project 'school liaison team' provided professional development and ongoing support for schools. **Intervention category:** School based **Intervention period:** 10 weeks during 2 years **Comparator/s** No intervention. **Sample sizes:** **Total n=** 26 schools, 2678 students **Intervention n=** 12 **Control n=** 14	students completed questionnaires at baseline (beginning of year 8) and were followed up at 1 (end of year 8), 2 (end of year 9) and 3 years (end of year 10). Absent students were surveyed at a later date or telephoned (along with students who had left the schools). **Method of analysis:** Multivariate analysis. Stated that analysis was intention to treat but it appears that only students that took part in each measurement stage were included in the analysis.	Prevalence of regular smoking: Year 1 4.9% vs 8.3%; OR 0.66 (95% CI 0.46-0.95) Year 2 7.7% vs 11.9%; OR 0.72 (95% CI 0.47-1.09) Year 3 11.8% vs 15.6%; OR 0.79 (95% CI 0.58-1.07) NB ORs adjusted for baseline measurements and gender, family structure, Australian born and parental structure. **Secondary outcomes:** None **Attrition details:** Year 1: 3% Year 2: 8% Year 3: 10%	were the unit of randomisation, randomisation was primarily by district. It is unclear if this was taken into account in the analysis. **Evidence gaps and/or recommendations for future research:** Research to investigate specific mechanisms that affect change. **Source of funding:** The Queens Trust for Young Australians, Victorian Health Promotion Foundation, National Health and Medical research Council, Department of Human Services, Murdoch Children's Research Institute, Sydney Myer Fund and the Catholic Education Office.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Baseline comparisons: The intervention group reported slightly lower levels of parental smoking and parental separation. **Study sufficiently powered?** Not reported			

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2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
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Table 5:8 Botvin et al. 1990a

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Botvin **Year:** 1990a **Aim of study:** To compare school-based interventions for smoking, alcohol and Marijuana use. **Study design:** Cluster RCT **Internal validity[§]: -** **External validity[†]: 3**	**Source population/s:** New York schools **Country:** US **Study year:** Not given **Eligible population:** Children in 7th and 8th grade of 10 selected schools **Selected population:** 10 suburban schools **Age:** 7th and 8th graders (12-14 years) **Female:** 51% **Race/ethnicity:** 13% black, 80% White, 2% hispanic, 2% oriental, 4% other	**Method of allocation:** Cluster randomisation of schools **Measures to minimise confounding:** adjusted for sex **Intervention/s** The 10 schools were randomised to receive either: 1) Peer-led prevention programme 2) Teacher-led prevention programme 3) Peer-lead prevention programme with booster 4) Teacher-led prevention programme with booster 5) Control Conditions 1-4 received 20 sessions of peer/teacher led intervention whilst in grade 7. In grade 8, those in conditions 3 and 4 received an additional 10 session 'booster' (similar in nature). Curriculum included material on: consequences of smoking and its social acceptability, decision-making and independent thinking, resisting social influences, self-directed behaviour change, cognitive behavioural techniques for coping with anxiety, communication skills, general interpersonal skills and assertiveness.	**Primary Outcomes:** Proportions smoking monthly, weekly and daily. **Adverse events:** **Secondary outcomes:** Knowledge and attitudes **Follow-up periods:** Immediately post-intervention and 1-2 years after intervention (depending on which intervention received). **Evaluation:** Surveys taken at baseline, immediately after the intervention and at the end of grade 8 (2 years after the main intervention and 1 year after the booster). **Method of analysis:** ttests for significance of different interventions. Numbers in main analysis not stated.	**Primary outcomes:** Proportion smoking weekly at follow up (significance verses control): 1) 0.22 (NS) 2) 0.16 (NS) 3) 0.05 (lower, p<0.005) 4) 0.21 (NS) 5) 0.16 (control) **Secondary outcomes:** Smoking knowledge score. For all interventions, significantly better compared to control (p<0.0001): 1) 7.95 2) 7.36 3) 8.50 4) 8.55 5) 6.74 (control) Attitudes to smoking scores. (significance verses control): 1) 37.84 (NS) 2) 38.29 (p<0.01)	**Limitations identified by author:** Unit of assignment was the school whilst unit of analysis was the individual, results in possible confounding by other school-related factors. Findings may not be generalisable to other populations. Sample was middle class and predominantly White. The majority of teachers did not implement the programme as per the protocol and it was difficult to determine which portions of the intervention were implemented. Study team did not participate in the selection of teachers and they may not have been enthusiastic/confident /adequately trained **Limitations identified by review team**: Self-reported measures of smoking may be affected by intervention i.e. students may feel more pressure to report favourable status with more recent education or depending on who delivers the intervention.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Socioeconomic status: Middle class families. Mothers and fathers well educated (65% mothers and 70% fathers had attended college). **Excluded population: NA** **Setting:** Classrooms in suburban schools	The emphasis of the programme content was on developing general personal and social competence and to develop skills for coping with direct social pressure. **Intervention category:** School based **Intervention period:** Over 1 (conditions 1 and 2) or 2 years (conditions 3 and 4) **Comparator/s** No intervention **Sample sizes:** **Total n=** 1,311 at baseline, 1,185 at grade 7 test, 998 at grade 8 test **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported	'Restricted sample' subgroup analysis of subjects whose teachers 'were judged by field staff to have implemented the intervention with a reasonably high degree of fidelity' (unplanned analysis). For data from end of grade 8 test. Analysis to assess the impact of attrition.	3) 38.95 ($p<0.001$) 4) 37.19 (NS) 5) 37.29 (control) **Restricted sample** (intervention n=145, control n=227). Proportion smoking weekly: 4) 0.12 ($p<0.05$) 5) 0.17 (control) Smoking knowledge score: 4) 7.76 ($p<0.0001$) 5) 6.76 (control) Attitudes to smoking scores: 4) 38.56 ($p<0.01$) 2) 37.08 (control) **Attrition details:** End of grade 7 test 10%, end of grade 8 test 24%	**Evidence gaps and/or recommendations for future research:** Study of additional follow-up to test durability of findings. Studies in other, high risk, populations **Source of funding:** National Institute on Drug Abuse

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
† Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:9 Botvin et al. 1990b

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Botvin **Year:** 1990 **Aim of study:** To determine the effectiveness of smoking prevention interventions by teachers who had received face to face training and by those who had be trained by watching a video	**Source population/s:** New York state schools **Country:** US **Study year:** 1985 **Eligible population:** Schools in 3 geographic regions of New York **Selected population:** 56 schools **Age:** 12-13 years at baseline	**Method of allocation:** Cluster randomisation. Schools within each region were randomised in blocks defined by school-wide smoking rates to one of the interventions: 1) Workshop 2) Video, or the control. **Measures to minimise confounding:** adjusted for demographic factors **Intervention/s** All intervention schools implemented 'The Life Skills Training (LST)' program, consisting of ~15 school classes (~2 per week over 1 term) taught	**Primary Outcomes:** Smoking index **Adverse events:** **Secondary outcomes:** Smoking-related knowledge and attitudes refusal skill **Follow-up periods:** 1, 2 and 3 years from baseline measurement **Evaluation:** Project staff administered questionnaires immediately prior to	**Primary outcomes:** Smoking index (p for intervention vs control). **At 1 year**: 1) 1.97 (ns) 2) 1.92 (ns) Control= 1.96 **At 3 years** (±SE): 1) 1.46±0.04 (p<0.001) 2) 1.50±0.04 (p<0.01) Control= 1.63±0.03 **Secondary outcomes:** Knowledge of smoking prevalence index. **At 1 year**: 1) 1.15 (p<0.0001)	**Limitations identified by author:** The study sample consisted of predominantly white, middle class, suburban and rural students and may limit generalisability. There were high rates of attrition amongst substance users. Although this did not differ in experimental groups, it may limit external validity. **Limitations identified by review team**: Only data from students in classes where at least 60% of intervention activities were

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Study design: Cluster RCT **Internal validity[§]: -** **External validity[†]: 2**	(grade 7) **Female:** 48% **Race/ethnicity:** 90% White, 3% black, 2% hispanic **Socioeconomic status:** 58% of the fathers attended at least 1 year of college **Excluded population:** Not reported **Setting:** Class rooms in predominately suburban/rural schools	in 12 units. Each unit gave teachers major goals to be achieved, student objectives, curriculum content and classroom activities. The major programme purpose was the development of students' personnel and social skills with an emphasis on skills for coping with social influences: cognitive behavioural skills for building self-esteem, resisting advertising pressure, coping with anxiety, communication skills, developing personal relationships and asserting their rights. Rather than teaching on long-term consequences, the programme concentrated on immediate negative consequences and decreasing social acceptability. A combination of demonstration, in class practice, feedback and reinforcement and behavioural 'homework' were used. Booster sessions were provided in grades 8 (10 classes) and 9 (5 classes) to renew and reinforce learning. Programmes in intervention schools were delivered by teachers trained by either: 1) Workshop - a one-day	program implementation (beginning of grade 7) and at the end of grades 7, 8 and 9 during a 40-45 min lesson period. Breath samples taken to increase the validity of self-reported measures. **Method of analysis:** MANCOVA with pre-test scores used as covariates. Individual as unit of analysis, not ITT.	2) 1.18 (p<0.0001) Control= 0.94 **At 3 years** (±SE): 1) 1.10±0.28 (p<0.0001) 2) 1.16±0.28 (p<0.0001) Control= 0.93±0.25 Knowledge of smoking consequences index: **At 1 year**: 1) 4.70 (p<0.0001) 2) *4.50 (p<0.0001) Control= 4.03 **At 3 years**: 1) 4.80±0.04 (p<0.0001) 2) 4.60±0.04 (p<0.0001) Control= 4.13±0.04 Attitude to smoking index **At 1 year**: 1) 41.34 (ns) 2) 41.44 (ns) Control= 41.43 **At 3 years**: 1) 41.13±0.23 (ns) 2) 41.42±0.23 (p<0.01) Control= 40.63±0.21 No differences between intervention groups except for *(significantly lower than intervention 1).	judged to have taken place were included in the 3 year analysis (82%). There is nothing to suggest that researchers were blind in these decisions and they could potentially have influenced results. **Evidence gaps and/or recommendations for future research:** Research into the effectiveness of intervention in people at high risk of substance use using more aggressive follow-up techniques. Research into methods for improving completeness of programme implementation by identifying the characteristics of effective programme providers etc **Source of funding:** National Heart, Lung and Blood Institute, the New York State Division of Substance Abuse Services

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		workshop where programme rational explained and unit by unit review of course material. Ongoing project staff consultation. 2) Video - a 2 hour training video accompanied by written instructions, similar in content and structure to the workshop. **Intervention category:** School based **Intervention period:** ~3 months in grade 7, 8 and 9. **Comparator/s** No intervention **Sample sizes:** **Total n=** 56 schools, 5,954 **Intervention n=** **Control n=** **Baseline comparisons:** No significant differences in primary behavioural outcomes. **Study sufficiently powered?** Not reported		**Attrition details:** 25% at 3 years	

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
thought **likely or very likely** to alter. † Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:10 Botvin et al. 2001

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Botvin **Year:** 2001 **Aim of study:** To examine the effectiveness of a school-based drug abuse prevention programme.	**Source population/s:** New York city schools **Country:** US **Study year:** Not reported **Eligible population:** New York public schools **Selected population:** 29 New York public	**Method of allocation:** Cluster randomisation of schools in blocks according to high/medium/low prevalence of smoking **Measures to minimise confounding:** adjusted for demographic factors **Intervention/s** Intervention used a cognitive behavioural approach and involved 15 sessions in the 7th grade and	**Primary Outcomes:** Smoking frequency index, smoking quantity index **Adverse events:** **Secondary outcomes:** Subgroup analysis of girls only and high risk pupils Smoking knowledge, behavioural intention and anti-smoking attitude index **Follow-up periods:** Immediately after intervention and 12 months from end of intervention **Evaluation:** Students received a baseline	**Primary outcomes:** Intervention vs control outcomes (±SE) at 1 year follow up. Smoking frequency index: 1.73±0.04 vs 1.94±0.05 (p=0.012) Smoking quantity index: 1.19±0.02 vs 1.32±0.02 (p=0.0001) **Secondary outcomes:** Smoking knowledge index: 37.4±0.57 vs 32.2±0.71 (p=0.011) Behavioural intention index:	**Limitations identified by author:** Follow up was only at 12 months and longer-term follow up would be desirable to determine durability of prevention effects. All data was self-reported. The study focuses on black and Hispanic youth and results may not be generalisable to other minority populations. Different

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Study design: Cluster RCT **Internal validity[§]: +** **External validity[†]: 3**	schools **Age:** 12 -13 (7th grade) at baseline **Female:** 53% **Race/ethnicity:** 61% African American, 22% Hispanic, 6% Asian, 6% White and 5% mixed/other. **Socioeconomic status:** Economically disadvantaged, 62% received free lunch **Excluded population:** Not reported **Setting:** Urban middle schools	10 booster sessions in the 8th grade (implemented by school teacher). The programme taught drug resistance skills, antidrug norms and personnel and social skills using group discussion, demonstration, modelling, behavioural rehearsal and assignments for out of class practice. Minimal information on long term health consequences was conveyed but more emphasis put on immediate negative consequences, decreasing social acceptability and actual prevalence rates. **Intervention category:** School based **Intervention period:** 3 months **Comparator/s** The programme that was 'normally in place in New York City schools' **Sample sizes:** **Total n=** 29 schools, 5,222 pupils	questionnaire immediately prior to the grade 7 intervention and then a survey immediately after intervention (3 months later) and another one year post 7th grade-intervention (end of 8th grade). Questionnaires were administered by project data collectors in classes within school hours. Carbon monoxide in breath was collected at all assessments to enhance validity of self-reports. **Method of analysis:** ANCOVAs used to compare programme effects, adjusting for baseline scores. Gender, race and free school lunch status were included as control variables in all regression analysis. Subgroup analysis was conducted on girls only and on a 'high risk' sample. These students (21% of full sample) were considered to be more likely to start smoking (had substance using peers or had poor academic performance).	1.62±0.03 vs 1.80±0.03 (p=0.0028) Anti-smoking attitude index: 86.9±0.40 vs 85.7±0.50 (p=0.013) **Girls only** Prevalence of past month smoking: 8.8% vs 12.3% (p=0.005) Smoking initiation since baseline: 19.6% vs 23.9% (p=0.02) Escalation to monthly smoking since baseline: 6.7% vs 9.9% (p=0.009) Smoking knowledge index: 36.12±0.70 vs 30.19±0.84 (p=0.0001) Anti-smoking attitude index: 87.23±0.51 vs 86.34±0.62 (p=0.34) Drug refusal skills: 76.5 vs 72.40 (p=0.029) **High risk** Smoking use index at follow-up: 1.79±0.08 vs 2.13±0.09 (p=0.006)	ethnic minority groups may respond differently. **Limitations identified by review team**: Attrition of students was high (31%). It is not possible to tell whether these were lost from intervention or control groups and selective drop out may have influenced study results. **Evidence gaps and/or recommendations for future research:** Research to examine the durability of programme effects and to what extent they are generalisable to other populations.. Research examining whether targeted approaches or universal approaches are better for reaching ethnic minority youth. Research to find the effectiveness of this approach in heavy smokers.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Intervention n= 16 schools **Control n=** 13 schools **Baseline comparisons:** No difference in baseline use of any substance. No difference in gender but more black students and less Hispanic students in intervention group ($p<0.001$ for both). A higher proportion of control students received free school lunches ($p<0.001$). **Study sufficiently powered?** Not reported		**Attrition details:** 31% (main sample)	**Source of funding:** National Institute for Drug Abuse

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† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:11 Brown et al. 2001

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Brown **Year:** 2001 **Aim of study:** To demonstrate the effectiveness of a comprehensive school-based intervention aimed at reducing the negative consequences (including tobacco use) of childhood abuse among female adolescents with histories of physical, sexual and emotional abuse. **Study design:** RCT	**Source population/s:** schools **Country:** USA **Study year:** 1995 **Eligible population:** elementary schools with similar socioeconomic and racial/ethnic profiles **Selected population:**	**Method of allocation:** randomisation **Measures to minimise confounding:** Not reported **Intervention/s** School-based support groups were the primary intervention. School counsellors in collaboration with therapists from a community-based child abuse treatment agency delivered the curriculum for those support groups. Intervention strategies for the support groups were to (a) impact cognitive distortions with new information gained from exercises and discussions, (b) provide a safe, confidential environment for support group members to tell their life stories and receive support and validation, (c)	**Primary Outcomes:** Percentage **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods:** 12, 24 months **Evaluation** The research question was addressed by both qualitative and quantitative methods. The qualitative method provided descriptive information about the programme procedures, processes and structures.	**Primary outcomes:** % less likely to try tobacco 2 years following the programme treatment (attended >11 activities vs. attended <11 activities) vs control (62.5% vs. 27.3%) vs 30% **Secondary outcomes:** No **Attrition details:** 33%	**Limitations identified by author:** Contamination of the control group (who were allowed to access certain components of the intervention) led to unmeasurable effects on outcomes that ultimately weakened the effects attributable to definable programme components. **Limitations identified by review team**: The reported smoking outcome was not well defined. It is not clear whether it was a measure of self-reported smoking or was a measure of attitude.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Internal validity[§]: - **External validity[†]: 4**	12 high schools **Age:** 14 to 17 years **Female:** 100% **Race/ethnicity:** (White) Cohort 1= 74% Cohort 2= 69.6% Cohort 3= 70.9% Cohort 4= 56.9% **Socioeconomic status:** Not reported **Excluded population:** Not reported **Setting:** Not reported	practice identification and expression of feelings in a nonjudgmental setting, (d) decrease isolation through interaction with others, (e) learn differing coping skills and learn to choose from a variety of options, (f) increase self-confidence and trust in others, and (g) raise awareness about the dangers of using alcohol and other drugs, especially by individuals who had suffered early childhood abuse. Students assigned to the programme condition could participate in all Project Chrysalis activities, including the school based support groups, case management, open educational sessions, Girls empowerment and the Challenge Course. **Intervention category:** Single **Intervention period:** not reported **Comparator/s** Control condition could choose to attend the open educational sessions and received case management on request. **Sample sizes:**	Research staff interviewed programme participants and staff and also observed programme activities. **Method of analysis:** linear stepwise regression analyses and logistic regression analyses		**Evidence gaps and/or recommendations for future research:** Curriculum to be introduced to abused females in early adolescence, developing strategies to increase programme attendance and defining a more appropriate comparison group. **Source of funding:** Centre for substance abuse prevention under the grant programme Substance Abuse Prevention Demonstration for high risk youth populations

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Total n= 1108 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** No significant baseline differences between the two study groups with regard to history of abuse, number of risk factors, prevalence of suicidal tendencies, tobacco use, or sexual activity **Study sufficiently powered?** Not reported			

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Table 5:12 Brown et al. 2002

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Brown **Year:** 2002 **Aim of study:** To evaluate a high school, extracurricular activity-based smoking reduction intervention **Study design:** Cluster RCT **Internal validity[§]: ++** **External validity[†]: 3**	**Source population/s:** High schools **Country:** Canada **Study year:** Not reported **Eligible population:** 35 highs schools **Selected population:** 30 schools **Age:** Grades 9 (14-15 years) **Female:** 50% **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:**	**Method of allocation:** Cluster randomisation of matched pairs **Measures to minimise confounding:** Not reported **Intervention/s** A teacher from each intervention school facilitated students, staff and community participants in planning and implementing prevention and cessation activities. Activities were tailored to each school with research staff providing consultation, workshops (for student and teacher leaders), resources, newsletters and $1,000 to each school. Intervention occurred when students were in grades 9 and 10. **Intervention category:** School-based (mentioned that community personnel involved in planning) **Intervention period:** Not reported **Comparator/s** "Usual care" **Sample sizes:** **Total n=** 3028 students eligible, 2,776 agreed to	**Primary Outcomes:** Smoking prevalence **Adverse events:** **Secondary outcomes:** Subgroup analysis of students who were never smokers or who were smokers at the end of grade 8. **Follow-up periods:** Midway through intervention (~12 months) and after intervention (~24 months) **Evaluation** Surveys taken at the end of grade 8 (baseline) and the end of grades 9 and 10 (mid-way and after intervention). Students asked about initial smoking experiences and current smoking patterns and were classified into smoking categories. Surveys undertaken by independent	All outcome given for end of intervention (end grade 10) as intervention vs control **Primary outcomes:** All students: Total: 24.9% vs 25.7%, ns Female: 28.3% vs 24.8%, ns Male: 21.1% vs 26.4%, ns **Secondary outcomes:** Subgroup, students who had never smoked: Total: 13.4% vs 15.2%, ns Female: 16.7% vs 14.2%, ns Male: 9.8% vs 16.4%, p=0.02 Sub-group, students who were smokers pre-intervention: Total: 51.5% vs 50.1%, ns Female: 56.2% vs 53.0%, ns Male: 46.7% vs 47.5%, ns **Attrition details:** 4.8% of those who consented	**Limitations identified by author:** Programme development, implementation and evaluation occurred at the same time. A more 'mature' programme may have been more effective. It was not possible to evaluate the relative effect of different intervention activities. Reliable data on attendance at intervention activities was not available. **Limitations identified by review team**: It is not stated whether subgroup analysis was pre-specified although this acts as the main focus for discussion. Appropriate test of interaction for the subgroup effect was not done and no plausible reason for differential effect between male and female was provided.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	None **Setting:** High schools	participate (92%) **Intervention n=** 1563 **Control n=** 1465 **Baseline comparisons:** Similar in grade 8 smoking status, grade 8 social models risk score and level of elementary school risk but intervention schools had slightly greater (NS) proportion of students who had had previous intervention in elementary school (p=0.1). **Study sufficiently powered?** Not reported	data collectors who were blind to school treatment status. **Method of analysis:** In analysis, to account for cluster randomisation a variance term was used appropriate to the randomisation of schools (rather than individuals) within pars to intervention or control conditions. Not ITT, analysis on those remaining in the study (95.2%).		**Evidence gaps and/or recommendations for future research:** Further research to identify which intervention activities have the greatest impact and to identify if particular activities have direct links with behaviour change. Research into the impact of gender on programme effectiveness. **Source of funding:** NHLBI, The Canadian Cancer Society, National Cancer Institute of Canada and the Heart and Stroke Foundation of Ontario

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† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:13 Brown et al. 2005

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Brown 2005 **Year:** 2005 **Aim of study:** to test efficacy of Raising Healthy Children intervention on rates of substance use during early-to-middle adolescence **Study design:** RCT Internal validity[§]: ++ **External validity[†]: 3**	**Source population/s:** Schools **Country:** USA **Study year:** **Eligible population:** (1) students had to remain in their school throughout the entire 1st of their participation in study and (2) have a parent who spoke English, Spanish, Korean, or Vietnamese **Selected population:** 10 public elementary schools in a suburban school district of Seattle, Washington **Age:** 11 to 14 **Female:** 46%	**Method of allocation:** schools were matched and randomly assigned to either intervention or control condition **Measures to minimise confounding:** adjusted for sex and socioeconomic status **Intervention/s:** Individual student intervention strategies consisted of volunteer student participation in after-school tutoring sessions and study clubs during Grades 4–6 and individualized booster sessions and group-based workshops during middle and high school years. Family intervention strategies consisted of multiple-session parenting workshops (e.g., "Raising Healthy Children," "How to Help Your Child Succeed in School," and "Preparing for the Drug Free Years") and in-home services for selected families. Family	**Primary Outcomes:** Frequency of cigarette use **Adverse events:** Not reported **Secondary outcomes:** Not reported **Follow-up periods:** 48 months **Method of analysis:** Two-part latent growth model	**Primary outcomes:** No significant differences were found in cigarette use growth rates between intervention and controls. **Secondary outcomes:** Not reported **Attrition details:** 8% lost to follow-up	**Limitations identified by author:** Generalizability of results are limited by relying solely on adolescent self-reported substance use. The study did not exhaustively examine other explanatory variables. **Limitations identified by review team**: **Evidence gaps and/or recommendations for future research:** The study did not control for clustering effect at school-level. **Source of funding:** National Institute on Drug Abuse

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Race/ethnicity: 82% European American **Socioeconomic status:** 28% were from low-income households **Excluded population:** not reported **Setting:** not reported	intervention strategies were delivered to families in group and individual sessions during Grades 1–8. **Intervention category:** multi-component **Intervention period:** **Comparator/s:** usual education **Sample sizes:** **Total n=** 1040 **Intervention n=** **Control n=** **Baseline comparisons:** (similar/dissimilar) **Study sufficiently powered?** Not reported			

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
thought **likely or very likely** to alter. † Score for external validity: 5. Likely to be applicable across a broad range of populations and settings. 6. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 7. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 8. Applicable only to settings or populations included in the studies.					

Table 5:14 Byrne 2005

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Byrne 2005 **Year: 2005** **Aim of study:** to examine the relative long-term efficacy of three specifically focussed prevention strategies directed at the onset of adolescent smoking	**Source population/s:** schools **Country:** Australia **Study year:** not reported **Eligible population:** not reported **Selected population:** adolescents in grades 7-10 in Canberra high schools	**Method of allocation:** whole classes were randomly assigned **Measures to minimise confounding:** None **Intervention/s** Health programme: (a) the biological effects of cigarette smoking, (b) the relationships between smoking and various illnesses, (c) the toxicity of cigarette smoke and	**Primary Outcomes:** Rate of smoking behaviour **Adverse events:** Not reported **Secondary outcomes:** Not reported **Follow-up periods:** 12 months **Method of analysis:** cross-tabulation	**Primary outcomes:** all interventions strategies were significantly better than control cohort in controlling overall smoking behaviour **Secondary outcomes:** Not reported **Attrition details:** 35.4% lost to follow-up	**Limitations identified by author:** Control group was not specifically collected for this study. High attrition rate may have resulted in an under-estimation of adolescent smoking rates **Limitations identified by**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Study design: RCT Internal validity[§]: - **External validity[†]: 2**	**Age:** 11 – 17 **Female:** 48% **Race/ethnicity:** not reported **Socioeconomic status:** not reported **Excluded population:** not reported **Setting:** not reported	its effects, (d) rates of smoking in the Australian community (and worldwide) in relation to illness, (e) smoking as an addiction, and (f) effects of smoking prevention/cessation on health. Fitness programme: (a) the biological effects of cigarette smoking, (b) smoking and fitness (e.g. aerobic capacity, exercise tolerance), (c) smoking and impaired sports ability, (d) smoking/non-smoking among professional athletes, and (e) smoking and the sporting ''image''. Social skills and stress management programme: (a) smoking and self-esteem and perceived maturity, (b) smoking as a social behaviour, (c) peer/exemplar pressure			**review team**: Unit of analysis error, class-room was unit randomisation and analysis was at student level **Evidence gaps and/or recommendations for future research:** There is a need for studies with longer follow-up. **Source of funding:** DGB and Health Research Foundation of Australia

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		to smoke, (d) media influences on smoking, (e) stress and smoking, (f) smoking and social confidence, (g) alternatives to smoking in personal presentation (e.g. dress, conversation, social confidence) and (h) life skills and resistance to peer pressure, stress management and facilitation of social confidence **Intervention category:** single-component **Intervention period:** **Comparator/s: usual** education **Sample sizes:** **Total n=** 9129 **Intervention n=** 2719 **Control n=** 6410			

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Baseline comparisons: (similar/dissimilar) Age group differs at baseline **Study sufficiently powered?** Not reported			

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† Score for external validity:

9. Likely to be applicable across a broad range of populations and settings.
10. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
11. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
12. Applicable only to settings or populations included in the studies.

Table 5:15 Buller et al. 2008

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Buller **Year:** 2008 **Aim of study:** To evaluate the effect of Internet based programme to reduce expectations concerning smoking and smoking prevalence among school children. **Study design:** RCT **Internal validity[§]: America=++ Australia=+** **External validity[†]: 2**	**Source population/s:** Schools in America & Australia **Country:** USA and Australia **Study year:** 2001 **Eligible population:** Not reported **Selected population:** 21 schools is Colorado and New Mexico (USA) 25 schools in Australia **Age:**	**Method of allocation:** pair-matched, group randomized, pretest-posttest controlled design **Measures to minimise confounding:** Schools were paired on geographical location; size of school; proportion of female and minority students. Multi-level analysis. **Intervention/s** "Consider this programme" contained 73 online activities organized into six modules: Introduction, media literacy, relationships, mind and body, decision making, and resistance strategies. Instructions on resisting influences to smoke was taught strategies for coping with group-conformity pressures and maintaining positive relationships when refusing to smoke as well as traditional skills for refusing direct offers. Programme progression was controlled by the teachers who had ability to release modules for use by distributing each module's password to students. **Intervention category:** Single **Intervention period:**	**Primary Outcomes:** Prevalence of smoking **Adverse events:** Not reported **Secondary outcomes:** Knowledge attitude Refusal skill Cope with peer pressure Self esteem efficacy **Follow-up periods:** Not reported **Evaluation** The main primary outcome of interest was 30-day smoking prevalence. Other questions of interest were potential moderators and mediators of programme effects.	**Primary outcomes:** **American Trial** estimate=0.0247, p=0.122 **Australian Trial** Pre-test: Intervention vs. Control= 13.1% vs. 11.2% Post-test: Intervention vs. Control= 12.7%% vs. 14.3% **Secondary outcomes:** Perception of smoking **American Trial** Intervention: Pretest M=6.84, SD=2.58, posttest M=6.47, SD=2.48; Control: pretest M=6.16, SD=2.45, posttest M=6.32, SD=2.24; estimate =-0.6029, p=0.034 **Australian Trial** Intervention: Pretest 3.31(0.76), posttest 3.36(0.76); Control: pretest 3.34(0.73), posttest 3.33(0.77); group difference =0.0498,	**Limitations identified by author:** Matching of schools failed leading to dropout. Control school had fewer children who had ever smoked than intervention schools. Selection bias introduced by active consenting procedures employed. The intervention may not be designed to address issues that promote smoking among early adopters. **Limitations identified by review team**: Nothing to add **Evidence gaps and/or recommendations for future research:** The content of the intervention was not tested outside of the internet environment so its effect in changing the mediators of

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	11 to 13 years **Female:** America: 51.2% Australia: 51.5% **Race/ethnicity:** (White) America: 51.7% Australia: 72.2% **Socioeconomic status:** students who received free or reduced-fee meals **Excluded population:** None **Setting:** Not reported	45-60 minutes **Comparator/s** Standard health education **Sample sizes:** **America** **Total n=** 1004 **Intervention n=** 640 **Control n=** 364 Australia **Total n=** 1510 **Intervention n=** 754 **Control n=** 756 **Baseline comparisons:** Similar demographics, computer/internet use, smoking history **Study sufficiently powered?** Not reported	**Method of analysis:** bivariate linear mixed models, multivariate analysis, intention to treat analysis	p=0.227 **Attrition details:** **American** 17.3% of which 8.9% was due to entire class dropping out and 8.4% due to being absent due to individual reasons. **Australian** 26.9%. 10 % of which was class dropouts while the remaining 16.9% were individual dropouts.	smoking is unknown. **Source of funding:** Funded by a grant from the U.S. National Cancer Institute, the Cancer Council of Victoria and the South Australian Department of Human Services.

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
that have not been fulfilled or not adequately described are thought **unlikely** to alter the study conclusions. – Few or no criteria have been fulfilled. The study conclusion are thought **likely or very likely** to alter. † Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:16 Cameron et al. 1999

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Cameron **Year:** 1999 **Aim of study:** To determine the effect of provider (nurse or teacher) and training method (workshop or self preparation) on outcomes	**Source population/s:** Schools **Country:** Canada **Study year:** Not reported **Eligible population:** Students from 10	**Method of allocation:** Schools were assigned randomly to 1 of the 5 experimental conditions **Measures to minimise confounding:** Not reported **Intervention/s** The programme is	**Primary Outcomes:** Prevalence of smoking **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods:** 12, 24 months post programme **Evaluation:** A questionnaire to assess smoking behaviour, reasons for smoking, and	**Primary outcomes:** 2 years follow-up Intervention reduced smoking rates (experimental + regular) in high-risk schools (16.0% vs 26.9%) but not in low-risk schools. A significant interaction between intervention condition and senior smoking rate (which was used to generate school risk score) was found (F4,84 =3.88, p=0.006). The overall difference between	**Limitations identified by author:** None **Limitations identified by review team**: Differential attrition may bias results. **Evidence gaps and/or recommendations for future research:** There is a need for further studies to evaluate long term effect of the programme

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
of a social influence smoking prevention programme **Study design:** RCT Internal validity[§]: **++** **External validity[†]: 2**	elementary school boards and 5 health units in 5 communities in southwestern Ontario **Selected population:** 100 schools **Age:** 11 to 14 **Female:** Not reported **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:** Not reported **Setting:** Not reported	based on social influences. Providers: nurses and teachers **Intervention category:** Single **Intervention period:** The grade 6 unit had six 40-min lessons, 1 week apart; the 7 unit had three 40-min lesions 1 week apart; and grade 8 unit had 6 weekly 40-min classes **Comparator/s** Not described **Sample sizes:** **Total n=** 4971 **Intervention n=** Not reported **Control n=** Not reported **Baseline**	other student characteristics was administered to the students by trained data collectors who used standardized procedures at 3 time points: before the curriculum was delivered in grade 6, at the end of grade 7, and at the end of grade 8,. At the time of data collection, preannounced breath samples were collected to enhance the accuracy of self-reported smoking behaviour. Students who had left the study schools received the questionnaire by mail but did not provide a breath sample. **Method of analysis:** logistic regression analysis	comined intervention groups and control group was not statistically significant (17.9% vs 21.0%). **Secondary outcomes:** no **Attrition details:** 10.2% Sex, social models risk score and smoking status at baseline	**Source of funding:** National Heart, Lung, and Blood Institute

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		comparisons: Similar smoking status, gender **Study sufficiently powered?** Not reported			

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† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:17 Campbell et al. 2008

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Campbell et al **Year:** 2008 **Aim of study:** To test the effectiveness of peer-led school intervention for smoking prevention **Study design:** Cluster RCT **Internal validity[§]: +** **External validity[†]: 2**	**Source population/s:** Schools in England & Wales **Country:** UK **Study year:** 2001 **Eligible population:** 223 schools in the west of England & Southeast Wales **Selected population:** 59 schools **Age:** 12 to 13 **Female:** 49% **Race/ethnicity:** nr **Socioeconomic status:** Individual-level socioeconomic status was measured using family affluent score and family vehicle ownership. Two or more family cars 57% intervention, 49% control	**Method of allocation:** Stratified block cluster randomisation **Measures to minimise confounding:** multilevel analysis to adjust for clustering, stratification by risk group **Intervention/s** The ASSIST (A stop smoking in schools trial) programme. Not classroom based. Influential students trained to act as peer supporters during informal interactions outside of the classroom to encourage peers not to smoke. Influential students identified through student questionnaires and asked, with parental consent, to act as peer supporters. Peer supporters received 2-day training by those experienced in youth work and health promotion specialists. Training aimed to provide peer supporters with information on risks, environmental and economic benefits of not smoking, communication and listening skills, expression of feelings and ideas, ways of giving and receiving information, conflict resolution etc and to increase their confidence, self-esteem, empathy and sensitivity, assertiveness, decision making and prioritisation skills. Intervention implemented over 10 weeks with informal conversations outside of classroom settings: School bus, lunchtime,	**Primary Outcomes:** Prevalence of weekly smoking amongst all students and Prevalence of weekly smoking amongst all students classed at "high-risk" of smoking **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods**: Directly after intervention and at 12 and 24 months **Method of analysis:** Individual level, multilevel analysis, sub-group analysis of students who were occasional/experimental/ex-smokers, intention to treat basis	**Primary outcomes:** *Odds (OR) of smoking in the past week - Post intervention: 0.75 (CI 0.55-1.01) p=0.058 At 1 year post-intervention: 0.77 (CI 0.59-0.99) p=0.043 2 year follow-up: 0.85 (CI 0.72-1.01) p=0.067 **Secondary outcomes:** In subgroup of occasional, experimental or ex-smokers. *Odds (OR) of smoking in the past week - Post intervention: 0.79 (CI 0.55-1.13) p=0.189 At 1 year post-intervention: 0.75 (CI 0.56-0.99) p=0.046 2 year follow-up: 0.85 (CI 0.70-1.02)	**Limitations identified by author:** None **Limitations identified by review team**: Some of the students included in follow-up surveys were not at the school at the time of the intervention. **Evidence gaps and/or recommendations for future research:** The programme was only implemented in one year group in each school and authors suggest that effects on cultural norms could be achieved with intervention in all age groups. **Source of funding:** Medical Research Council

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Excluded population: **Setting:** England and southeast Wales	after school and free time. A note of conversations had was recorded by peer supporters. Four school visits by trainers within intervention period to support and advise peer supporters. **Intervention category:** Single **Intervention period:** 10 weeks **Comparator/s** No intervention **Sample sizes:** **Total n=** 10730 **Intervention n=** 50% of 10730 **Control n=** 50% of 0730 **Baseline comparisons:** Dissimilar in family affluence score **Study sufficiently powered?** yes		p=0.087 *Adjusted for baseline smoking and stratifying variables **Attrition details:** Post intervention: ~6% 1 year: ~6% 2 year:8% But, some students that were included had not undergone the intervention	

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
† Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:18 Chatrou et al. 1999

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
The Brabant smoking prevention programme(Chatrou et al. 1999) **Authors:** Chatrou **Year:** 1999 **Aim of study:** To evaluate the effectiveness of a school-based school smoking prevention programme **Study design:**	**Source population/s:** Dutch schools **Country:** Netherlands **Study year:** 1987 **Eligible population:** First and second year classes from 4 schools: 1 junior secondary vocational, 1 junior general secondary, 1 senior general secondary and 1 pre-university school.	**Method of allocation:** Cluster randomisation. Classes were randomised to receive control or one of 2 interventions. **Measures to minimise confounding:** adjusted for demographic factors **Intervention/s** Three lessons were given to first or second year pupils in 3 consecutive weeks. A video presentation was given with class discussions. Adults were trained by research staff to give classes. The 2 interventions were: 1) Emotional/self group: Intervention aimed at providing non-smoking adolescents with knowledge on	**Primary Outcomes:** Smoking prevalence **Adverse events:** **Secondary outcomes:** Intention to smoke **Follow-up periods:** Immediately post test and at 6 and 18 months. **Evaluation:** Questionnaires were taken at baseline, just prior to intervention, one week after the 3 week intervention and 6 and 18 months post	**Primary outcomes:** Prevalence of smoking (p vs control). Immediately post-intervention: 1) 8.8% (ns) 2) 13.8% (ns) Control= 9.6% 6 months: 1) 11.9% (ns) 2) 19.4% (ns) Control= 15.2% 18 months: 1) 20.2% (ns)	**Limitations identified by author:** Using a more restrictive level for significance testing ($p<0.01$) and the low study power may have been responsible for the lack of apparent intervention effect. A small number of students overall made a transition from non-smoking to smoking during the study period and this may have made it more difficult to detect programme effects. The intervention might have been more successful if it had been peer-led or if it had been longer. Using an emotion type approach

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Cluster RCT Internal validity§: - **External validity†: 3**	**Selected population:** 48 classes from 4 schools **Age:** 12 -14 years **Female:** 56% **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:** **Setting:** Classroom in junior secondary vocational/junior general secondary/senior general secondary/pre-university schools.	smoking effects as well as exploring the emotional aspects of risky behaviour. Classes gave students opportunities to discuss their own experiences of smoking. 2) Health/technical group: These students were shown the same video as treatment group 1 but discussions centred on the health and technical aspects of smoking. **Intervention category:** School based **Intervention period:** 3 weeks **Comparator/s** Standard information about smoking if it was included by chance in their regular curriculum. **Sample sizes:** **Total n=** 48 classes, 949 pupils **Intervention 1 n=** 13 classes, 284 pupils **Intervention 2 n=** 15 classes, 315 pupils **Control**= 20 classes, 350 pupils **Baseline comparisons:** Groups differed significantly at baseline in smoking behaviour, intention to smoke, friends smoking behaviour, gender age and school type.	intervention. **Method of analysis:** One-way analysis of variance. Logistic regression used to test for predictors of smoking behaviour/intention to smoke. Individuals were the unit of analysis.	2) 25.6% (ns) Control= 20.9% 1) vs control: adjusted OR (99%CI) for smoking: post-intervention: 1.49 (0.48 to 4.76) 6 months: 0.65 (0.30-1.41) 18 months: 1.10 (0.58 to 2.08) **Secondary outcomes:** High intention to smoke Immediately post-intervention: 1) 11.6% (ns) 2) 19.5% (ns) Control= 20.3% 6 months: 1) 17.5% (ns) 2) 23.6% (ns) Control= 28.9% 18 months: 1) 26.2% (ns) 2) 37.0% (ns)	may not be effective in Dutch adolescents. Interventions that cover more areas of life, not just school may be more effective. **Limitations identified by review team**: There may have been contamination between treatment/control classes within the same schools. There were evident differences between groups at baseline, although these were adjusted for in the analysis. The analysis did not seem to have adjusted for clustering effect. Tables 4 and 5 appear to present wrong values for % intention to smoke and smoking prevalence (inconsistent with n values given and %s do not add up to 100%). For this work, %s have been calculated from the presented n values. **Evidence gaps and/or recommendations for future research:** None

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Study sufficiently powered? Not reported		Control= 28.9% **Attrition details:** 5.5%	**Source of funding:** Netherlands Heart Foundation, Dutch Foundation on Smoking and Health

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1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
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Table 5:19 Connell et al. 2007

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Connell **Year:** 2007	**Source population/s:** Ethnically diverse metropolitan community in the Northwest region of the US	**Method of allocation:** Randomisation (individual families) **Measures to minimise confounding:** adjusted for demographic factors **Intervention/s**	**Primary Outcomes:** Nicotine abuse/dependence **Adverse events:** Not reported **Secondary outcomes:**	**Primary outcomes:** Nicotine abuse/dependence in treatment vs control: X^2=3.09, p=ns CACE analysis showed	**Limitations identified by author:** There is reliance on self reported behaviour by youths. **Limitations identified by**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Aim of study: To assess the impact of an adaptive family intervention in public schools on substance use and antisocial behaviour **Study design:** RCT **Internal validity[§]: -** **External validity[†]: 3**	**Country:** US **Study year:** not reported **Eligible population:** 6th grade students (11-12 years) from 3 middle schools in Northwest United States **Selected population:** 998 adolescents and their families **Age:** 11 to 12 years (at start of intervention) and their families **Female:** 47.3% **Race/ethnicity:** 42.3% White, 29.1% African-Americans, 6.8% Latinos, 5.2% Asian-American, 16.4% other. **Socioeconomic status:** Not reported **Excluded population:** **Setting:** Family resource centres in middle	Intervention followed The Adolescent Transitions Programme (ATP), a model that tailors the type and intensity of intervention to the needs of a family. A family resource centre (FRC) was established in each of the participating schools and the parent-centred services were available to all intervention students and their families. The FRC consultant conducted 6 class lessons (the SHAPe curriculum) for students with focus on: school success, health decisions, building positive pier groups, the cycle of respect, coping with stress and anger and solving problems peacefully. When children were in grades 7 and 8, families were offered a family check-up (FCU) (particularly families of youth considered high risk). The brief 3-session intervention, based on motivational interviewing, consisted of an initial interview, an assessment session and a feedback session. Families were videoed at home to aid assessment. Discussion with the family was used to identify relevant services on offer at the FRC. Services included brief consultations with parents, telephone consultations, feedback to parents of students school-time behaviour, access to videos and books, group therapy for parents and individual and family therapy.	Uptake of FCU part of intervention **Follow-up periods:** 12, 24, 36, 60 months **Evaluation** Students surveyed at baseline (beginning of grade 6) and at the beginning of grades 7, 8, 9 and 11 and paid $20 for each survey. **Method of analysis:** ITT. Main analysis focused on comparison of students taking part in FCU versus those who did not. Lots of correlation analysis of predictors of substance use etc in those taking part and not taking part in an FCU. Evaluated intervention effect using Complier Average Causal Effect (CACE) analysis between 'engager' families and 'non-engager' families.	that within 'engagers', family participation in the FCU inhibited growth in tobacco use from ages 12 to 17 years. **Secondary outcomes:** 115 families (23%) elected to receive the FCU and 88 (18%) received further FRC services. **Attrition details:** 20.5%	**review team**: Little of the analysis was relevant to outcomes of interest **Evidence gaps and/or recommendations for future research:** Additional research needed into specific mechanisms by which intervention influences behaviour. **Source of funding:** National Institute on Drug Abuse and the National Institute on Alcohol abuse and Alcoholism.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	schools	**Intervention category:** Family **Intervention period:** Whilst students were in grades 6-8 (11-14 years) **Comparator/s** None stated **Sample sizes:** **Total n=** 998 (agreed to participate) **Intervention n=** 500 students and their families **Control n=** 498 students and their families **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported			

§ The internal validity score of a study may vary depending on the reliability and validity of the outcome measures of interest. Score for internal validity: ++ All or most of the criteria have been fulfilled. Where they have not been fulfilled the study conclusions are though **very unlikely** to alter. + Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought **unlikely** to alter the study conclusions. – Few or no criteria have been fulfilled. The study conclusion are thought **likely or very likely** to alter.

† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:20 Crone et al. 2003

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Crone **Authors:** Crone **Year:** 2003 **Aim of study:** To assess the effect of an anti smoking intervention in lower secondary school adolescents **Study design:** Cluster RCT	**Source population/s:** Schools from 54 (all but 3) community health services in the Netherlands. **Country:** Netherlands **Study year:** 1998 **Eligible population:** Any school in 54 health services that provided lower education **Selected population:**	**Method of allocation:** Size stratified cluster randomisation **Measures to minimise confounding:** adjusted for background characteristics **Intervention/s** Intervention was developed and delivered by The National Institute against Smoking (Stivoro) and the National Institute on Mental Health. Three lessons on knowledge, attitudes and social influence were given followed by a class agreement not to start, or to stop, smoking for the next 5 months. There was an optional extra of two video lessons on smoking and social influence. Intervention was part of a competition where classes could win 220-450 euro for a photo expressing the idea of a non-smoking class. Admission to the competition required that <10% of the	**Primary Outcomes:** Smoking prevalence **Adverse events:** Not reported **Secondary outcomes:** None **Follow-up periods:** Immediately post-intervention and at 1 year after intervention **Evaluation** Anonymous questionnaires were administered immediately before and after intervention on demographics, smoking behaviour, attitudes, perceived social influences,	**Primary outcomes:** Odds ratio for non-smokers becoming smokers (n=1388) post-intervention: *0.61 (95% CI 0.41-0.90) Odds ratio for smoking (n=1669) post-intervention: *0.62 (95% CI 0.43-0.90) *Adjusted for smoking at baseline **Secondary outcomes:** At 1 year follow up, differences were no longer significant. No difference in	**Limitations identified by author:** Intervention and control were different at baseline, especially regarding gender but adjusted for in analysis. All information was self-reported and there may have been information bias. **Limitations identified by review team**: Competition run con-currently with intervention in intervention schools. The financial incentive for having low rates of smoking may have made people in these schools more likely to report more favourable results than controls. Authors say that "Incentive effect" was not

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Internal validity[§]: - **External validity[†]: 2**	26 schools **Age:** Average 13 years **Female:** ~45% **Race/ethnicity:** ~12% non-Dutch **Socioeconomic status:** ~79% full-time job **Excluded population:** Not reported **Setting:** Classroom lessons	class were non smokers at 5 months. Stivoro researchers trained intervention schools, supported in activities checked protocol adherence and collected competition registration forms and pictures. **Intervention category:** School-based **Intervention period:** 1998-1999 **Comparator/s** Some schools in both intervention and control continued to use a national drug education programme. **Sample sizes:** **Total n=** 2562 (completed baseline questionnaires) **Intervention n=** 1444 **Control n=** 1118 **Baseline comparisons:** Dissimilar in sex, ethnicity, religion and age at baseline **Study sufficiently powered?** yes	self efficacy and intention to remain a non-smoker. Smokers defined as those experimenting with smoking or weekly/daily smokers. Another questionnaire was undertaken 1 year after intervention. **Method of analysis:** Multilevel analysis to account for clustering with adjustments for baseline demographic differences. Main analysis not ITT (65% of baseline sample) but ITT analysis conducted to asses potential effects of drop-out.	attitudes or self-efficacy. Odds radio for perceived change in social pressure of classmate: 0.42 (95% CI 0.05-0.79) **Attrition details:** Post-intervention measurement: intervention 32%, control 39%. 1 year follow-up: intervention 63%, control 64%.	controlled for. Including those 'experimenting with smoking' as smokers may not have been appropriate as this might be more subjective and affected by whether students are in intervention or control schools. **Evidence gaps and/or recommendations for future research:** Intervention should have been extended to the following school years as booster education may reinforce the message and give longer-term effects. May use a different approach of focusing on cognitive and social outcomes rather than achievement of specific behavioural outcomes. **Source of funding:** None
§ The internal validity score of a study may vary depending on the reliability and validity of the outcome measures of interest. Score for internal validity: ++ All or most of the					

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
criteria have been fulfilled. Where they have not been fulfilled the study conclusions are though **very unlikely** to alter. + Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought **unlikely** to alter the study conclusions. – Few or no criteria have been fulfilled. The study conclusion are thought **likely or very likely** to alter. † Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:21 de Vries et al. 2006

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
The European Smoking prevention Framework Approach (ESFA) – Overall and UK specific results **Author/Year:** de Vries 2003, de	**Source population/s:** Schools in Denmark, Finland, The Netherlands, Spain, Portugal and the UK **Country:** EU (+UK) **Study year:**	**Method of allocation:** Cluster randomisation of schools or regions within each country apart from Dutch schools where there was non-random allocation and Spanish schools where controls were matched to previously selected intervention schools. **Measures to minimise confounding:** adjustment for demographic factors, attitudes	**Primary Outcomes:** Proportion of baseline non-smokers becoming weekly smokers. **Adverse events:** **Secondary outcomes:** None	**Primary outcomes:** Proportion of baseline non-smokers becoming weekly smokers (intervention vs control, adjusted odds ratios, 95% CIs). <u>1y from baseline</u> Overall:	**Limitations identified by author:** Random allocation was impossible in The Netherlands and Spain. Self-reported smoking could not be validated. A peer-led approach was not possible.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Vries 2006 **Aim of study:** To evaluate the effectiveness of a policy and school, home and community based intervention for prevention of smoking in adolescents **Study design:** Cluster RCT **Internal validity[§]: -** **External validity[†]: 2**	Began 1997 **Eligible population:** Schools in Denmark, Finland, The Netherlands, Spain, Portugal and the UK **Selected population:** Overall: ~255 schools in EU UK: 41 schools in two health authority regions **Age:** Age 12-13 in Spain, grade 7 (mean age 13.8) in Finland at study entry. Not reported for other countries **Female:** Overall 50.2% **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:** Not reported	**Intervention/s** With the same collective objectives, each country used/developed their own materials and strategies for intervention. Overall: In the first intervention year, all countries developed a school based programme (predominantly teacher led) including information on social influences and training in refusal skills. Most schools implemented smoke free school policies. Most parents received letters about the project and, in some countries, brochures were sent out. In most counties, posters were displayed in the community. UK: In the UK, teaching did not include refusal skills training or discussion of social pressures (as did teaching in other countries), but concentrated on examining the power of advertisement, decision making skills and learning about tobacco and the environment. **Intervention category:** School based/home/community/policy **Intervention period:** 3 years **Comparator/s** No intervention **Sample sizes:** **Total n=** Overall: ~255 schools, 19,034 non-smoking students (baseline) UK: 41 schools, non-smoking UK students at T4: Intervention n= 1,108	**Follow-up periods:** 1, 2, and 2.5 years from baseline **Evaluation:** Students completed confidential questionnaires at baseline (T1) and 1 (T2), 2 (T3) and 3 (T4) years from baseline. Non smokers defined as any students smoking <weekly. **Method of analysis:** Logistic regression analysis. Covariates included to correct for potential baseline differences. Final models run using multi-level analysis. Only baseline non-smokers included in the analysis, Not ITT.	8.5% vs 9.0% OR 0.98 (0.86-1.11, p ns) UK: 9.0% vs 9.0% OR *1.27 (1.00-1.62, p<0.05) *with adjusted OR, counter-productive effect <u>2y from baseline</u> Overall: 18.4% vs 18.8% OR 0.97 (0.69-1.08, p=0.62) UK: 17.7% vs 18.8% OR 1.00 (0.75-1.25, p=0.99) <u>2.5y from baseline</u> Overall: 21.9% vs 23.4% OR 0.89 (0.80-0.99, p=0.03) UK: 21.2% vs 23.6% OR 0.91 (0.73-1.14, p=0.42) **Secondary outcomes:**	Some teachers had negative attitudes toward implementing the programme. Teacher training varied widely and poorer training may have been associated with smaller effects. The development of out-of-school activities was not very successful. Delays in project funding stalled programme development. **Limitations identified by review team**: Large attrition may have impacted results. **Evidence gaps and/or recommendations for future research:** Research utilising different designs to identify which intervention methods are effective and under which circumstances.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Setting: Schools/home/ community	Control n= 959 **Baseline comparisons:** Overall: No difference in whether lived in disrupted family, amount of pocket money, being religious, weekly alcohol consumption but control slightly older ($p<0.05$). Intervention students were more likely to be in the lower 3rd of their class and were more likely to be non-native ($p<0.001$), and more likely to drink alcohol during the week ($p<0.001$). **Study sufficiently powered?** Not reported		None **Attrition details:** Overall: T2 23.5% T3 41.6% T4 43.5% UK: T2 32.3% (T3 and T4 not reported)	Research on the out-of-school access points to reach children e.g. sports clubs, cafes etc. **Source of funding:** European Commission (The Tobacco and Information Fund)

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Table 5:22 Dent et al. 1995

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Project Towards No Tobacco Use (Project TNT) **Author/Year:** Dent 1995 **Aim of study:** To determine the effectiveness of three particular components of a social influences programme **Study design:** RCT **Internal validity[§]: -** **External validity[†]: 3**	**Source population/s:** Californian junior high schools **Country:** US **Study year:** Not reported **Eligible population:** Schools in 27 southern Californian districts **Selected population:** 48 schools **Age:** 12 to 13 (7th grade) **Female:** 50% **Race/ethnicity:** 60% White,27% Hispanic, 7% black, 6% Asian or	**Method of allocation:** Block randomisation with blocks balanced for region (urban vs rural) and school type (middle school vs junior high school) **Measures to minimise confounding:** adjusted for gender, region, school turn over **Intervention/s** 8 schools were assigned to each of the 4 intervention conditions and 16 schools to the standard curriculum control. Interventions given in 7th grade: 1) Counteract normative social influence i.e. provision of refusal skills so that students are able to resist peer group pressure. 2) Counteract informational social influence i.e. information given about modelling and advertising influences so that students are best about to resist social/cultural influences. 3) Counteract lack of knowledge. Students taught about physical consequences and misconceptions. 4) A combination of interventions 1-3. Each intervention group received 10 lessons that included similar motivational and commitment elements but other different	**Primary Outcomes:** Smoking Prevalence **Adverse events:** Not reported **Secondary outcomes:** None **Follow-up periods:** 12 and 24 months after intervention **Evaluation:** Self report questionnaires administered immediately prior to intervention, immediately after and at 1 and two year follow up. Students in 20 schools were followed up as a cohort (4 schools for each intervention). Students in the remaining 28 schools were evaluated using cross sectional surveys (~3 randomly selected classes per school evaluated, 4 schools from each intervention). **Method of analysis:** One-way analysis of covariance (ANCOVA) used to examine effects of	**Primary outcomes:** Change in prevalence of weekly cigarette use over 1 year (significance vs control): 1) 5.3% (ns) 2) 3.2% ($p<0.05$) 3) 2.6% ($p<0.05$) 4) 2.0% ($p<0.05$) Control = 5.6% Change in prevalence of weekly cigarette use over 2 years (significance vs control): 1) 9% (ns) 2) 12% (ns) 3) 8% (ns) 4) 4% ($p<0.05$) Control = 9% **Secondary outcomes:** none **Attrition details:**	**Limitations identified by author:** There may have been many normative social influence type programmes around in the general media at the time and led to lack of engagement with this type of intervention **Limitations identified by review team**: Unclear how study investigators have dealt with cohort and cross sectional data. Appears to have been merged. Teachers were 'least enthusiastic' about teaching the intervention aimed at counteracting normative social influence. Preferences and perspectives of teachers may influence how well any particular intervention is implemented. Multiple testing between intervention conditions may lead to spurious significant findings (only significance compared to control given here). **Evidence gaps and/or recommendations for future research:** Research on the best methods of implementation as well as the content of intervention programmes.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	other **Socioeconomic status:** Not reported **Excluded population:** **Setting:** Half rural, half urban schools, Classroom education	components depending on intervention group. A booster session was delivered in the 8th grade in line with the original intervention. **Intervention category:** School based **Intervention period:** 2 weeks **Comparator/s** Standard curriculum **Sample sizes:** **Total n=** 48 (schools unit of analysis) (6716 pupils immediately post-test, 7219 at 2 year follow up, 65% reported taking part in intervention) **Intervention n=** 8 schools (x4 intervention groups) **Control n=** 16 schools **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported	intervention on tobacco outcomes with school as the unit of analysis. Intention to treat.	Not reported	Intervention materials should be updated to be applicable to present social situations of high school students. **Source of funding:** National Cancer institute and National Institute on Drug Abuse

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
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Table 5:23 Dent et al. 2001

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Project towards no drug abuse **Authors:** Dent Year: 2001 **Aim of study:** To examine the effectiveness of a classroom based prevention	**Source population/s:** Los Angeles general high schools **Country:** US **Study year:** Not reported **Eligible population:** 78 Los Angeles	**Method of allocation:** Randomisation (of classes) **Measures to minimise confounding:** adjusted for pretest use **Intervention/s** 9 session classroom-based programme consisting of three 50 minute sessions per week for 3 consecutive weeks. Week 1: Lesson 1: elicited cooperation and instructs on communication and listening skills. Lesson 2: attempted to motivate by	**Primary Outcomes:** Cigarette use **Adverse events:** None **Secondary outcomes:** None **Follow-up periods:** 12 months after end of intervention **Evaluation**	**Primary outcomes:** Cigarette use F(1,24)=1.16, p=0.64) **Secondary outcomes:** None **Attrition details:**	**Limitations identified by author:** None **Limitations identified by review team**: There may have been contamination between classes receiving intervention/control within the same schools.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
programme in high schools **Study design:** Cluster RCT **Internal validity[§]:** **+** **External validity[+]:3**	general high schools **Selected population:** 26 classes from 3 randomly selected general public senior high schools **Age:** 14-17 years **Female:** 53% **Race/ethnicity:** 34% White, 38% Latino, 26% African American, 2% other **Socioeconomic status:** Not reported **Excluded population:** None **Setting:** Classrooms, general public schools	providing stereotype information (that people believe senior high school students are drug abusers) and facilitating disagreement with stereotype. Lesson 3: information given regarding self-defeating myths about drug use. Week 2 included teaching on chemical dependency, perspectives over negative consequences and learning how to change behaviour. The third week concentrated on increasing self-control and encouraging students to make a decision and commitment regarding drug use. **Intervention category:** School-based **Intervention period:** 3 weeks **Comparator/s** Standard care **Sample sizes:** **Total n=** 1208 (baseline sample) **Baseline comparisons:** Similar demographic factors **Study sufficiently powered?** Not reported	Survey conducted at baseline and at 1 year follow up. Pencil and paper surveys administered by project staff (not involved in education of those students). At follow up, students who had moved school (19%) were surveyed by telephone using the same questionnaire. **Method of analysis:** Possible effects of bias from attrition tested for using ttests and X^2. Baseline variables tested using X^2. ANOVA used to assess programme effects on drug use. Class used as unit of analysis.	37%	**Evidence gaps and/or recommendations for future research:** None **Source of funding:** Not detailed

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
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Table 5:24 Dijkstra et al. 1999

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Dijkstra **Year:** 1999 **Aim of study:** To evaluate two smoking prevention programmes, a social influence and a social influence with an additional decision-making component. The contribution of boosters was	**Source population/s:** schools **Country:** Netherlands **Study year:** 1990 **Eligible population:** 20 districts health centres were approached	**Method of allocation:** Schools were randomly assigned to three experimental conditions **Measures to minimise confounding:** adjustment for pre-treatment measures of attitude, social norms, pressure, perceived behaviour, self-efficacy and intention **Intervention/s** Peer-led activities were conducted in small groups consisting of four or five students. The peer-leader was a	**Primary Outcomes:** smoking prevalence (never, initial, occasional, weekly, and daily smoker) **Adverse events:** Not reported **Secondary outcomes:** Knowledge, attitude, refusal skill, self-esteem and efficacy **Follow-up periods:** 6, 12, 18 months	**Primary outcomes:** SI approach was effective in reducing onset of smoking. At short term (6 months after pre-test) both SI and SI with booster programmes were effective for the non-smokers [SI vs no treatment OR=0.54; 95% CI 0.35 to 0.83]. At 12 months after the pre-test the SI programme was only effective when boosters were included [SI+Booster vs SI OR=0.44; 95% CI 0.30 to 0.65]. At 18 months follow-up, only the SI programme with	**Limitations identified by author:** Self-reports on smoking behaviour were not validated. Another limitation is that no further long-term follow-ups could be implemented, precluding conclusions on the longer-term effectiveness of the programmes. **Limitations identified by review team**: The multiple testing used may have led to an increased risk of type I errors. The authors do not reported

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
assessed as well. **Study design:** RCT **Internal validity[§]: -** **External validity[†]: 2**	**Selected population:** 52 schools from 15 district health centres **Age:** 13 to 14 (grade 8) **Female:** nr **Race/ethnicity:** nr **Socioeconomic status:** nr **Excluded population:** Not reported **Setting:** Not reported	non-smoking student from the same class as the students. Teachers coordinated the lessons, stimulated students and assisted peer-leaders. The student manual for the lesson of the social influence and decision making programme discussed five steps towards making a decision. These five steps were based on the five decision-making stages described by Janis and Mann: (1) appraising the challenge, (2) surveying alternatives, (3) weighing alternatives, (4) deliberating about commitment and (5) adhering despite negative feedback. **Intervention category:** Single **Intervention period:** Five lessons, each lasting 45 min were given in weekly sessions in grades 8 and 9 **Comparator/s** No treatment	**Evaluation:** In the Netherlands, school starts around September and ends in July. The pre-test (T1) was late October 1990, programme implementation took place during November and December (grade 8). The first post-test (T2) was in April 1991. The first booster was given late September 1991 (grade 9). The second post-test (T3) was in October 1991, and the second and third boosters were given beginning January and late March 1992. The boosters were disseminated with a 3 months interval. In April 1992, the third post-test (T4) was conducted. Questionnaires for the effect and process evaluation among students were distributed by teachers. **Method of analysis:** multilevel analysis	boosters remained effective [SI+Booster vs no treatment OR=0.62; 95% CI 0.45 to 0.87]. **Secondary outcomes:** Students with a positive attitude and intention towards smoking, students with important people in their social environment who smoke (perceived behaviour), and students who perceived pressure to smoke had an increased risk of being smokers at 6 months. **Attrition details:** 23.5%, differential attrition Attrition analysis from pre-test to post-test 1 (6 months) suggested that girls, younger students, students in the SI plus decision making programme and in the SI programme compared with control group students were less likely to drop out. Attrition analysis from pre-test to post-test 2 (12 months) suggested that girls, younger students, non-smokers, second grade students and 4-year	results of regression diagnostic tests, there may be problem of multi-collinearity. **Evidence gaps and/or recommendations for future research:** Further research should determine whether boosters with decision-making related issues, e.g. issues based on the five steps to make a decision, contribute to the longer-term preventive effects of the decision-making programme. Additional research is also needed to assess the long-term effects of the SI programme with boosters, and to examine if a more intensive use of them is necessary and even more effective. **Source of funding:** Dutch Cancer Foundation

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Sample sizes: **Total n=** 4060 **Intervention n=** not reported **Control n=** not reported **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported		education students were less likely to drop out at the second post-test. Attrition from pre-test to post-test 3 (18 months) suggested that girls, younger students, non-smokers, students in the control group compared with students in the SI plus decision making programme students in the SI programme compared with control group students, 4-year education students and students with a negative intention to start smoking were less likely to drop out at time of the third post-test.	

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Table 5:25 Eisen et al. 2003

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Eisen **Year:** 2003 **Aim of study:** To compare the effectiveness of skills for adolescent against "standard" drug prevention in preventing or delaying the onset of students' tobacco, alcohol, and illegal substance use **Study design:** RCT **Internal validity[§]: +** **External validity[+]: 2**	**Source population/s:** schools **Country:** US **Study year:** 1997 **Eligible population:** Middle schools from four school districts in three major metropolitan areas that met the following eligibility criteria: (1) contained Grades 6 through 8 or 7 through 9; (2) had an enrolment of at least 200 students by the end of the eighth or ninth grade; and (3) were not using SFA at that time. **Selected population:** 34 schools **Age:** 11 to 12	**Method of allocation:** Schools were randomised to two experimental conditions **Measures to minimise confounding:** Adjustment was made for study site, demographic covariates, and baseline use of other relevant substances **Intervention/s** SFA utilizes a comprehensive array of strategies to teach social competency and refusal skills. SFA programme elements and processes utilize social influence and social cognitive approaches to teach cognitive-behavioural skills for building self-esteem and personal responsibility, communicating effectively, making better decisions, resisting social influences and asserting rights, and increasing drug use knowledge and consequences **Intervention category:**	**Primary Outcomes:** 30-day smoking prevalence **Adverse events:** **Secondary outcomes:** knowledge attitude refusal skill cope with peer pressure self esteem efficacy **Follow-up periods:** 12, 24 months **Evaluation:** All consented students were surveyed annually from the sixth through the eighth grade; all seventh-grade students attending the experimental schools were offered the SFA curriculum regardless of their evaluation consent status. Annual surveys were group administered in classrooms by trained interviewers using	**Primary outcomes:** 30-day cigarette smoking among baseline nonuser was significantly lower in experimental schools than control school after 1-year follow-up (2.9% vs 3.9%, p<.05). No significant main effect was found after two use 2-years follow-up. **Secondary outcomes:** There were no significant effects on students' smoking behaviour intention [3.49 (0.03) vs 3.48 (0.03), p=.877]; perceived harm [12.72 (0.12) vs 12.76 (0.13), p=.842]; refusal self-efficacy [4.28 (0.06) vs 4.39 (0.06), p=.842]; perceived peer use [4.02 (0.06) vs 4.08 (0.06), p=.443] **Attrition details:**	**Limitations identified by author:** Self-report bias, schools were reluctant to implement individualized drug use detection procedure (CO testing). Those students whose parents failed to return the consent form or denied consent cannot be assumed to be the same as those students with more compliant parents. **Limitations identified by review team**: Differential attrition, not random **Evidence gaps and/or recommendations for future research:** There is a need for studies with longer follow-up. **Source of funding:** National Institute on Drug Abuse

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Female: 52% **Race/ethnicity:** 41% **Socioeconomic status:** Not reported **Excluded population:** Not reported **Setting:** Not reported	Single **Intervention period:** 40 sessions (35 – 45 min per session) **Comparator/s** Standard education **Sample sizes:** **Total n=** 7426 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Similar in age, sex, drug use **Study sufficiently powered?** Not reported	standard protocols and questionnaires adapted or developed for this evaluation. Additional in-school make-up sessions were conducted for students who were absent initially. Tobacco, alcohol, and illegal drug use prevalence rates were assessed through a set of standard items that was modified, when necessary, following pretesting with the target population. **Method of analysis:** multivariate analysis, mixed method	16% and 23% after 1 and 2-years follow-up respectively Multivariate attrition analysis revealed that more of those who had not recently used marijuana remained in the study than those who had (85% vs. 72%, P<.001). Being non-Hispanic American; coming from a two-parent household; not having taken a make-up survey; and reporting fewer friends who smoke cigarettes were also associated with study retention.	

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
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Table 5:26 Elder et al. 1993

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Project SHOUT (Students helping others understand tobacco) **Authors/Year:** Elder 1993 **Aim of study:** To evaluate the effectiveness of a long-term, peer-led tobacco prevention programme **Study design:**	**Source population/s:** Junior high schools **Country:** US **Study year:** 1988 (started) **Eligible population:** Junior high schools **Selected**	**Method of allocation:** Cluster randomisation. Schools matched for tobacco use (in past week) and school size and, within each pair, randomised to control or intervention. **Measures to minimise confounding:** adjusted for demographics and parental smoking **Intervention/s** Undergraduate college students recruited to be 'change agents'. They were trained and then delivered the intervention of 6 autumn term lessons (once a week) and 4 spring term lessons (once a month) during the 7th grade, 8 lessons (once a month) in 8th grade, a telephone/mail intervention in 9th	**Primary Outcomes:** Smoking Prevalence **Adverse events:** **Secondary outcomes:** Smoking refusal score **Follow-up periods:** 1 (T2), 2 (T3), 3 (T4) and ~5 (T5) years from baseline. **Evaluation:** Students were surveyed at the beginning of grade 7 (baseline-T1) and at the end of grades 7 (T2), 8	**Primary outcomes:** <u>At T4 follow-up</u> Odds of past month smoking - School level analysis: OR=0.77, p<0.05 Individual level analysis: OR=0.79, p<0.05 Odds of past week smoking - School level analysis: OR=0.69, ns Individual level analysis:	**Limitations identified by author:** In the 11th grade assessment, there was a low response rate. There may also have been self selection bias in responding to that survey as there was less response from those who had been smokers in 9th grade. The 11th grade intervention may have been too short. Validity of the 'smoking refusal score' used in the high risk subsample maybe questioned. **Limitations identified by review team**: Results are presented in the main paper at the 3 year final follow up but not the 1 or 2 year follow up although

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
RCT **Internal validity[§]:** - **External validity[†]:** 3	**population:** 22 schools **Age:** Average age 12 years at baseline (grade 7) **Female:** ~50% **Race/ethnicity:** 57% White, 24% Hispanic, 19% other **Socioeconomic status:** Not reported **Excluded population:** Not reported **Setting:** School class rooms and at home	grade and a booster intervention in half the students in the 11th grade: 7th grade: video on health consequences, reading celebrity endorsements of non-use, discussions of social consequences, addiction and cessation, methods for resisting peer pressure, practiced decision making, writing letters to tobacco companies and performing a skit to class-mates on refusing tobacco, received free tshirts and given opportunity to publically declare they would not smoke. 8th grade: Demonstration and rehearsal of refusal skills, estimation of own health risk, writing letters to magazine etc protesting against advertising, participating in community action projects, leaning assertive communication skills and debating issues. 9th grade: Tailored tobacco prevention messages communicated by telephone/mail by 'change agents'. 5 newsletters sent giving information regarding events, legislation, research, cessation tips etc and 2 newsletters sent to parents of intervention students. Each student received 2 phone calls (average 5 min) per semester where newsletter used to promote discussion and gave plug for local cessation helpline. 11th grade: A shortened version of the 9th grade intervention consisting of 2 newsletters and 1 phone call to only half of	(T3) and 9 (T4). Surveys conducted in the class room and, in cases of absence, surveys mailed to students homes. The final survey, around the start of grade 11, was mailed to participants homes. If the survey was not returned, attempts were made to collect information by telephone. **Method of analysis:** Individual-level (not intention to treat) and school-level logistic regression analysis. Chi-square analysis for 11th grade results.	OR=0.75, p<0.05 <u>At T5</u> In students receiving continued 11th grade booster, prevalence of past month smoking vs control: 7% vs 12.6% (p<0.05) Vs those without 11th grade booster: 7% vs 10.8% (ns) **Secondary outcomes:** Subgroup analysis of high risk group (experimenters or those thought likely to experiment): Smoking refusal score vs control: 1.81 (SD 0.40) vs 1.73 (SD 0.35) (p=0.04). **Attrition details:** Main sample: 27% (at T4)	these surveys were undertaken. Authors commented that 'at the end of the eight grade, no statistically significant treatment effects between conditions were detected'. Selective reporting of only 3 year follow up data may be misleading. **Evidence gaps and/or recommendations for future research:** Comparison of the effectiveness of interventions using recruited college 'change agents' with teachers and similar age peers. The central theoretical role of peer pressure resistance in smoking should be re-examined. **Source of funding:** National Cancer Institute

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		the intervention students. **Intervention category:** School based/home **Intervention period:** 3 years **Comparator/s** No intervention **Sample sizes:** **Total n=** 22 schools, 3,655 students **Intervention n=** 11 schools **Control n=** 11 schools 11th grade total n= 2,051 students High risk sub sample n= 389 **Baseline comparisons:** Groups differed only in respect to ethnicity ($p<0.001$) **Study sufficiently powered?** Not reported		11th grade sample: 25% (T5)	

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
4. Applicable only to settings or populations included in the studies.					

Table 5:27 Elder et al. 1996

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
The Childhood and Adolescent Trial for Cardiovascular health (CATCH) **Authors/year:** Elder 1996 **Aim of study:** To examine the effectiveness of a cardiovascular disease programme, with a classroom/home based smoking prevention strategy component, on tobacco use **Study design:** Cluster RCT **Internal validity[§]: +**	**Source population/s:** Schools in 4 US states **Country:** US **Study year:** 1994 **Eligible population:** All schools in 4 states with grades 3-5, a food service programme, on-site food preparation and that were publically funded. **Selected population:** 96 schools **Age:** 8-9 years (grade 3) at study entry, 10-11 years	**Method of allocation:** Cluster randomisation. In each of the 4 states, 10 schools randomly assigned to control and 14 to intervention. **Measures to minimise confounding:** adjusted for demographic, parental, sibling, & friend smoking status **Intervention/s** Based on principles derived from Social Learning Theory and Organizational change, intervention addressed heart-healthy diets, physical activity levels and the prevention of smoking. The smoking prevention intervention started in grade 5, later than the other CVD intervention, and included the promotion of smoke-free schools, a classroom teaching curriculum and home-based intervention. The classroom intervention, Facts and Activities about Chewing Tobacco and Smoking (FACTS), consisted of four 50 min	**Primary Outcomes:** Smoking Prevalence **Adverse events:** Not reported **Secondary outcomes:** None **Follow-up periods:** Baseline and 1, 2 and 3 years post intervention. **Evaluation** Questionnaires were conducted in grade 5 (smoking baseline) and in grade 6, 7 and 8. At baseline, smoking was assessed as: 'I have started to smoke a little' and, at follow up, as 'I have smoked on 2 or more of the last 30 days'.	**Primary outcomes:** Prevalence of smoking (intervention vs control) Baseline: 6.2% vs 6.3% 1 year: 4.5% vs 5.9% 2 years: 11.2% vs 10.2% 3 years: 16.2% vs 15.6% No significant differences between intervention and control group. **Secondary outcomes:**	**Limitations identified by author:** None **Limitations identified by review team**: Different questions were used to asses smoking prevalence at baseline and during follow up. **Evidence gaps and/or recommendations for future research:** None **Source of funding:** National Heart, Lung and Blood Institute

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
External validity†: 3	at start of smoking intervention (grade 5) **Female:** 51% **Race/ethnicity:** 71% Caucasian, 15% Hispanic, 14% African Americans **Socioeconomic status:** Not reported **Excluded population:** **Setting:** Publically funded schools/Home	lessons focussing on dangers, cost, benefits of not using and poor acceptability. Students were encouraged to make a commitment to remain tobacco-free. The home-based intervention was 4 sessions to complement school lessons. It used 'The Unpuffables'; stories about adolescent characters were the basis for games/ activities to be done with parents. The policy-level intervention included monitoring for compliance for schools in school smoke free states and other schools encouraged to be tobacco-free. **Intervention category:** School based/Home/Policy **Intervention period:** 1 year (the smoking part of curriculum only began in the 5th grade although CVD/physical activity intervention had already been running for 2 years) **Comparator/s** No intervention **Sample sizes:** **Total n=** 96 schools, 5,106 grade 3 students (only grade 3 followed up 3 years after intervention) **Intervention n=** 56 schools **Control n=** 40 schools **Baseline comparisons:** Not reported	**Method of analysis:** Multivariable logistic regression with school included as a random effect. Analysis was not ITT.	None **Attrition details:** 27% at 3 year follow up	

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Study sufficiently powered? Not reported			

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† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:28 Elder et al. 2002

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Elder **Year:** 2002 **Aim of study:** To evaluate community-based tobacco and alcohol use–prevention	**Source population/s:** Schools **Country:** US **Study year:** 1996	**Method of allocation:** Schools were randomly assigned to experimental conditions **Measures to minimise confounding:** Adjusted for age, gender and baseline acculturation	**Primary Outcomes:** Prevalence of 30-day smoking **Adverse events:** **Secondary outcomes:** susceptibility to smoke	**Primary outcomes:** There was no statistically significant between intervention and control in reduction 30-day cigarette use from post-test to final follow-up. **Secondary outcomes:**	**Limitations identified by author:** Poverty of participants and families limits the purchase and consumption of alcohol and

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
programme that targets high-risk migrant adolescents who typically are not exposed to cancer-prevention programmes. **Study design:** RCT **Internal validity[§]: +** **External validity[†]: 4**	**Eligible population:** 17 schools districts in San Diego County whose students were predominant oriented toward the Mexican culture **Selected population:** Students from 22 schools **Age:** Adolescent **Female:** 49% **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:** Not reported **Setting:** Not reported	**Intervention/s** Through presentation of information, modelling, and behavioural rehearsal, the adolescents were exposed to how problems could be identified and analyzed; solutions generated; and decisions made, implemented, and evaluated. The other unique component of this programme was the specific focus on developing parental support for the healthy decisions and behaviours of the adolescents through enhanced parent–child communication. Parental communication skills, such as listening (e.g., verbal and nonverbal attention); confirmation (e.g., accepting messages); and re-assurance (e.g., expressing care and concern), were developed and reinforced through behavioural methods of modelling, role playing, and behaviour rehearsal. After the intervention sessions, the participants received three "booster" telephone calls at <1 month and at 14 months after the last group session; calls were designed to reinforce the information taught in the sessions. Each telephone booster lasted	**Follow-up periods:** post-test, 12, 24 months **Evaluation:** Prior to implementing the programme at a given school, all baseline surveys were completed within a 2- to 6-week time period, depending on the number of participating families. Post-assessments (M2) were conducted using the baseline survey on 637 participating families following completion of the group educational sessions, and to 587 and 537 participants who could be located at the 1- and 2-year follow-ups (M3 and M4). The surveys were administered in person at M1 and M2 and via phone at M3 and M4. At M2, evaluation assistants again scheduled appointments at the school or at the participants? homes to conduct the survey, with a 2-month window in which to complete all surveys at a given school.	The intervention was not successful in preventing susceptibility to smoking (OR=0.87; 95% CI 0.66 to 1.14). **Attrition details:** 18.6%	tobacco **Limitations identified by review team**: Findings may not be easily replicated **Evidence gaps and/or recommendations for future research:** None **Source of funding:** National Cancer Institute

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		approximately 5 to 10 minutes and contained specific information taught at the group sessions. **Intervention category:** Multimodal **Intervention period:** A total of seventy 8-week intervention groups (37 tobacco and alcohol, and 33 first aid/home safety) **Comparator/s** Attention control **Sample sizes:** **Total n=** 660 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported	**Method of analysis:** Generalised estimating equations were used to account for repeated measure		

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
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Table 5:29 Ellickson et al. 1993

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Ellickson **Year:** 1993 **Aim of study:** Long term effects of drug use prevention programmes	**Source population/s:** schools **Country:** USA **Study year:** Not reported **Eligible population:**	**Method of allocation:** cluster randomisation **Measures to minimise confounding:** adjusted for demographic factors **Intervention/s** Eight lessons during grade 7 and three additional lessons in grade 8 designed to build the motivation and skills needed for effective resistance to prodrug pressures. Thee highly participatory classroom lessons allowed teachers	**Primary Outcomes:** Smoking Prevalence **Adverse events:** Not reported **Secondary outcomes:** Knowledge attitude **Follow-up periods:** 3, 12, 15, 24, 36, 60 months	**Primary outcomes:** Weekly smoking: Teen-leader effect vs. control= 8.3% vs. 9.7% Adult- only effect vs. control=	**Limitations identified by author:** The programme's impact on drug use stopped once the lessons stopped. **Limitations identified by review team**: High loss to follow up **Evidence gaps and/or**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
targeted at young adolescents **Study design:** RCT **Internal validity[§]:** - **External validity[†]:** 3	8 high diverse west coast communities **Selected population:** 30 schools **Age:** 12 to 13 years **Female:** 48% **Race/ethnicity:** 67% **Socioeconomic status:** Father not a high school graduate (24%) **Excluded population**: Not reported **Setting:** schools from urban,	to adjust programme content to classrooms with diverse drug experience and knowledge while ensuring that all students received the essential motivational and skill-building activities. **Intervention category:** Single **Intervention period:** Not reported **Comparator/s** **Sample sizes:** **Total n=** 6527 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported	**Evaluation** Questionnaire about drug use and related attitudes and behaviour**.** Seven surveys were conducted: before and after the 7th curriculum, before and after the 8th grade booster lessons and once each during grades 9, 10, and 12. The questionnaire collected data related to use and frequency of use of cigarette, as well as cognitive risk factors. **Method of analysis:** Multivariable logistic regression to assess the impact of the programme on drug use for binary outcomes while linear regression was used for non binary cognitive outcomes.	9.1% vs. 9.7% **Secondary outcomes:** No **Attrition details:** Grades 10= 47% Grades 12= 43%	**recommendations for future research:** Need for different approaches and to assess how well they work with older teens. **Source of funding:** Grant from the Conrad N. Hilton Foundation.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	suburban and rural communities				

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2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
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Table 5:30 Ellickson et al. 2003

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Ellickson **Year:** 2003 **Aim of study:** To evaluate the revised project ALERT drug prevention	**Source population/s:** schools **Country:** USA **Study year:**	**Method of allocation:** Cluster randomisation: blocking by geographical region and community size was used. While when randomly assigning schools to the treatment condition, restricted assignment was used. **Measures to minimise confounding:**	**Primary Outcomes:** Smoking Prevalence **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods:**	**Primary outcomes:** Revised Project ALERT reduced the proportion of new smoker: Baseline non-smokers, 18-month follow-up, weekly	**Limitations identified by author:** Long term effectiveness of ALERT not reported. **Limitations identified by review team**: Nothing to add

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
programme across a wide variety of Mid western schools and communities. **Study design:** RCT **Internal validity[§]: +** **External validity[†]:2**	Not reported **Eligible population:** Not reported **Selected population:** 48 schools **Age:** 12 to 13 years **Female:** 50% **Race/ethnicity:** 87.5% White **Socioeconomic status:** Not reported **Excluded population:** Not reported **Setting:** urban, suburban and rural.	Adjusted for demographic factors and other multiple baseline covariates including prior use of cigarette, intentions and belief about use, perceived peer and adult use, parental monitoring. **Intervention/s** Two intervention arms: adult health educators in the first arm, while older teens assisted the adult teachers in half of the 7th grade lessons in the second arm. Three theories of behavioural change 1) health belief model: focuses on cognitive factors that motivate healthy behaviour. 2.) The social learning model: emphasizes social norms and significant others as key determinants of behaviour. 3) Self-efficacy theory of behaviour change: belief that one can accomplish a task as essential to effective action. The curriculum is made of 11 lessons in 7th grade and three lessons in 8th grade. The first treatment group benefit from revised project ALERT in the 7th and 8th grade while the second treatment group receive the revised middle school curriculum in the 7th and 8th grades as well as booster sessions in the 9th and 10th grades. **Intervention category:** Single **Intervention period:**	18 months **Evaluation** Surveys were conducted before the intervention and 18 months later. The questionnaire asked about use and frequency of use of cigarette within the past month and past year, as well as cognitive risk factors for use. Validity of self reported use was evaluated using physiological tests and consistency of self reports within and across data collection waves. Teachers were trained to deliver the curriculum across the state. Additional post training materials were provided by the teacher's manual and videotaped lessons. **Method of analysis:** Generalized estimating equation.	smoking: intervention 4.0% vs control 6.6% (P<0.05) Ever smoking (initiated post-baseline): intervention 25.5% vs control 31.6%; relative reduction 19% (p<.01) **Secondary outcomes:** No **Attrition details:** 8.81%	**Evidence gaps and/or recommendations for future research:** If high school booster lessons help maintain and enhance the middle school reductions in use. **Source of funding:** National Institute on Drug Abuse, The BEST foundation for a Drug-Free Tomorrow and The Conrad N. Hilton foundation.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Not reported **Comparator/s** Control schools continued other prevention curricula already in place. **Sample sizes:** **Total n=** 4689 **Intervention n=** 2810 **Control n=** 1879 **Baseline comparisons:** Similar demographic factors and baseline substance use **Study sufficiently powered?** Not reported			

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Table 5:31 Ennet et al. 1994

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Ennet **Year:** 1994 **Aim of study:** DARE's impact on adolescent drug use, as well as on related social and psychological factors immediately 1 year, and 2 years after completion of programme. **Study design:** RCT **Internal validity[§]: -** **External validity[†]:3**	**Source population/s:** schools **Country:** USA **Study year:** 1990 **Eligible population:** Elementary schools in northern and central Illinois **Selected population:** 36 schools **Age:** 10 to 12 years **Female:** 49% **Race/ethnicity:** 54% **Socioeconomic status:** Low-income families: percentage of students in school who were	**Method of allocation:** Cluster randomisation: Stratification by metropolitan status. School pairs were then matched by ethnic composition, number of students with limited English proficiency and percentage from low-income families within strata. Six pairs of schools in urban and suburan areas were randomly assigned to DARE or control, but six pairs of schools in rural areas were assigned using a nonrandom procedure because of the travel times and scheduling requirement of the DARE officers in the more geographically dispersed districts. **Measures to minimise confounding:** adjusted for demographic factors **Intervention/s** Consisted of 17 lessons offered once a week for 45 to 60 minutes. It is based on social influence approach to drug use prevention **Intervention category:** Single **Intervention period:** 45-60 minutes	**Primary Outcomes:** Smoking Prevalence **Adverse events:** Not reported **Secondary outcomes:** Yes **Follow-up periods:** Immediate post intervention , 12 months and, 24 months **Evaluation** Pre test survey was conducted before the implementation of DARE curriculum. Post test survey took place immediately after curriculum, one year after pre testing and two years after pre testing. The questionnaire was self-administered and was read orally by the study staff. Questions captured were on drug use behaviours and social and psychological variables **Method of analysis:** logistic regression	**Primary outcomes:** Cigarettes initiation Immediate Post intervention: OR=0.63, 0.38 to 1.04 At 12 months: OR=0.93, 0.63 to 1.36 At 24 Months: OR=0.99, 0.67 to 1.47 **Secondary outcomes:** Peer resistance skills Regression coefficients(SE)= 0.086(0.062) **Attrition details:** Overall- 26%	**Limitations identified by author:** The sample used was not a nationally representative sample of schools. The programme was not randomly assigned to schools in the rural areas. **Limitations identified by review team**: High level of contamination from the mixture of intervention and control students after completion of elementary school. **Evidence gaps and/or recommendations for future research:** Need for continued evaluation to test the effectiveness of the programme based on the recent modification to the core curriculum. **Source of funding:** Grant R01 DA07037-01

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	eligible to for free or reduced-price lunch programme of US Department of Agriculture **Excluded population:** Not reported **Setting:** urban, suburban and rural.	**Comparator/s** No intervention **Sample sizes:** **Total n=**1334 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Dissimilar sociodemographic characteristics **Study sufficiently powered?** Not reported			from the National Institute on drug Abuse of the U.S Department of Health and Human Services and a grant from the Illinois State Police.

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2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
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Table 5:32 Flay et al. 1995

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Flay **Year:** 1995 **Aim of study:** To report the results of a large-scale smoking prevention and cessation trial, the Television, school, and family Project, on student smoking and mediating variables. **Study design:** RCT **Internal**	**Source population/s:** Schools in South California **Country:** USA **Study year:** 1986 **Eligible population:** **Selected population:** 340 classrooms within 35 Los Angeles and San Diego Schools within 6 schools **Age:** 12 to 13 years **Female:** 50.9% **Race/ethnicity:** 33.3% White	**Method of allocation:** randomised multiattribute blocking **Measures to minimise confounding:** multilevel analysis to adjust for clustering **Intervention/s** The three study factors are classroom curriculum, media intervention and site (San Diego or Los Angeles). The central study design investigates the relative effectiveness of social-resistance classroom curriculum, media intervention, health information-based attention-control curriculum, social resistance classroom curriculum combined with a mass-media intervention **Intervention category:** Multimodal **Intervention period:** Not reported **Comparator/s** No treatment control group **Sample sizes:** **Total n=** 7351 (340 classrooms within 47 schools) **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** No significant differences in smoking rates across any of the	**Primary Outcomes:** Smoking Prevalence **Adverse events:** Not reported **Secondary outcomes:** Knowledge attitude Refusal skill Cope with peer pressure **Follow-up periods:** 12, 24 months **Evaluation** Questionnaire was used to collect information on tobacco and health information, social influences/resistance information, coping effort, refusal self efficacy, prevalence estimates and behavioural intentions. Questionnaire was administered by trained data collectors. Expired air samples were collected to increase the validity of self-reports of cigarette use. **Method of analysis:** **1)** Differences across the five	**Primary outcomes:** LOS ANGELES: Information based control (mean , SD)(19.68,6.41), control group (20.04, 6.70), social resistance (18.35,6.96), TV (20.30, 6.44), TV+social resistance (19.39, 6.85). SAN DIEGO- control group (18.36, 6.04), social resistance(18.01, **Secondary outcomes:** Refusal/self efficacy scale LOS ANGELES: Information based control (mean, SD)(7.83, 1.64), control group (7.47, 1.91), social	**Limitations identified by author:** Lack of effects on intentions and behaviour. Floor effect minimizes the chances of finding programme effects on intentions and behaviours. High subject attrition among youth at higher risk may have attenuated any beneficial effects among those subjects for whom the programme could have its greatest impact. **Limitations identified by review team**: **Evidence gaps**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
validity[§]: + **External validity[†]: 3**	**Socioeconomic status:** father's occupational status **Excluded population:** None **Setting:** Not reported	seven conditions. **Study sufficiently powered?** Not reported	conditions in Los Angeles were tested and results were replicated in San Diego. 2) In the presence of significant condition-related effect, priori comparisons across treatment conditions were made: four priori comparisons for Los Angeles and two for San Diego 3) Analysis was based on statistical problems encountered: a. Differential effectiveness of treatment for different subpopulations- treatment interaction was tested for statistically using likelihood ratio. b. Inferences of individual change when random assignment is at school level: multilevel analysis. c. Models for categorical and non normally distributed data: d. Redundancy in measure: examined correlations between all outcome variables e. Attrition: pretest means/percentages for subjects with complete data at two waves were compared with the means/percentages for subjects with data only at pretest.	resistance (7.70, 1.71), TV (7.68, 1.84), TV+social resistance (7.65, 1.71). SAN DIEGO- control group (7.80, 1.64), social resistance(7.53, 1.88) **Attrition details:** Not reported	**and/or recommendations for future research:** Need to be explicit whether they are testing experimental interventions against attention controls, treatment as usual, or the best available treatment. Need for larger sample studies (to ensure statistical power) and longer follow-ups (to reduce the chances of floor effect). **Source of funding:** National Institute of Drug Abuse grant

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
criteria have been fulfilled. Where they have not been fulfilled the study conclusions are though **very unlikely** to alter. + Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought **unlikely** to alter the study conclusions. – Few or no criteria have been fulfilled. The study conclusion are thought **likely or very likely** to alter. † Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:33 Gatta et al. 1991

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Gatta **Year:** 1991 **Aim of study:** To evaluate brief informative antismoking campaign for 4th year primary school children **Study design:** RCT	**Source population/s:** Schools **Country:** ITALY **Study year:** 1982 **Eligible population:** Milan states schools **Selected population:**	**Method of allocation:** Schools were randomised to three conditions **Measures to minimise confounding:** Not reported **Intervention/s** One-day lesson carried out by the Italian League against Cancer (Milan Division). Education intervention consisted of a single day lesson and focused on simple notions of physiology and pathology of the human respiratory tract and on the	**Primary Outcomes:** Prevalence of ever smoking **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods:** 48 months **Evaluation:** The effect of the education intervention	**Primary outcomes:** Sporadic education intervention has no impact in preventing cigarettes smoking in teenagers (RR=0.92; 95% CI 0.79 to 1.06) **Secondary outcomes:** No **Attrition details:** 41%	**Limitations identified by author:** Prevalence of smoking could be underestimated when using a questionnaire to collect habit. **Limitations identified by review team**: High lost to follow-up **Evidence gaps**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Internal validity[§]: + **External validity[†]: 2**	163 schools **Age:** 9 to 10 **Female:** 50% **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:** Not reported **Setting:** Not reported	harmful effects of cigarettes smoking. **Intervention category:** Single **Intervention period:** Single day lesson **Comparator/s** No intervention **Sample sizes:** **Total n=** 17446 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** similar demographic factors **Study sufficiently powered?** Not reported	was evaluated 4 years later when the children were 13 and 14 years old, in their 8th school year. Anonymous self-administered questionnaire was distributed to all these school. **Method of analysis:** mantel-Hansel chi square test		**and/or recommendations for future research:** None reported **Source of funding:** Milan Division of the Italian League Against Cancer

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
thought **likely or very likely** to alter. † Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:34 Gordon et al. 1997

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Gordon **Year:** 1997 **Aim of study:** To evaluate programme aimed to delay the onset of smoking through combination of school-based education and community intervention **Study design:** RCT	**Source population/s:** Schools **Country:** UK **Study year:** 1994 **Eligible population:** 23 LEA secondary schools in Cardiff county **Selected population:** 19 schools **Age:**	**Method of allocation:** Schools were randomly selected and assigned to control and intervention groups. **Measures to minimise confounding:** None, unadjusted results were presented **Intervention/s** School-based and community intervention The 'Stopping them Start' project provided educational materials for schools and support of a health-promotion specialist to encourage community-based activities and remind retailers of their obligations	**Primary Outcomes:** Smoking prevalence **Adverse events:** **Secondary outcomes:** intention **Follow-up periods:** 6 months after pre-test survey **Evaluation:** Questionnaires were administered to pupils prior to intervention and following a six-month intervention period. The questionnaire was	**Primary outcomes:** There was no significant differences in prevalence rates over the six months: odds of non-smoker starting smoking OR=1.04(0.78 to 1.40) **Secondary outcomes:** The number of students who indicated they did not intent to try smoking fell by 8% in the intervention group and by 17% in the control group (p=0.01) **Attrition details:** Not reported	**Limitations identified by author:** The study period was insufficient to allow conclusive statement about the effects of the community initiatives to be made **Limitations identified by review team**: Inadequate description of baseline variables. Attrition rate was

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Internal validity[§]: - **External validity[†]: 1**	11 to 12 **Female:** not reported **Race/ethnicity:** not reported **Socioeconomic status:** not reported **Excluded population:** not reported **Setting:** not reported	with regard to under-age sales of cigarettes. **Intervention category:** Multimodal **Intervention period:** not reported **Comparator/s** Control groups not described **Sample sizes:** **Total n=** 787 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported	designed to ascertain smoking behaviours, knowledge of facts about smoking, and attitudes to smoking **Method of analysis:** Cross-tabulation		not reported. **Evidence gaps and/or recommendations for future research:** There is a need for study with a longer follow-up period **Source of funding:** Not reported

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
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Table 5:35 Hansen & Graham 1991

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Hansen **Year:** 1991 **Aim of study:** To evaluate two strategies for preventing the onset of alcohol abuse, marijuana, and	**Source population/s:** Schools in Los Angeles and Orange Counties, California (USA) **Country:** USA **Study year:** 1987	**Method of allocation:** Schools were stratified by size, test scores, and ethnic composition and then randomly assigned to receive one of four intervention programmes **Measures to minimise confounding:** Adjusted for sex, ethnicity,	**Primary Outcomes:** Prevalence of 30-day cigarette use **Adverse events:** **Secondary outcomes:** No **Follow-up periods:**	**Primary outcomes:** Normative education classes had lower rates of ever smoking cigarettes (8.1% vs 10.3%, p=0.0311) **Secondary outcomes:** No **Attrition details:**	**Limitations identified by author:** The sample was not equivalent across groups **Limitations identified by review team**: Reliance on self-reported substance use **Evidence gaps and/or**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
cigarette use **Study design:** RCT **Internal validity[§]:** **External validity[†]: 3**	**Eligible population:** **Selected population:** 12 Junior high Schools in Los Angeles and California **Age:** 12 to 13 **Female:** 55.4% **Race/ethnicity:** 38.8% **Socioeconomic status:** family income **Excluded population:** Not reported **Setting:** Not reported	and family income **Intervention/s** The first programme (Information) consisted of four 45-min lessons about the social and health consequences of using alcohol and other drugs. The second programme (Resistance Training) consisted of four lessons about the consequences of using substances plus five lessons that taught students to identify and resist peer and advertising pressure to use alcohol and other substances. The third programme (Normative Education) included four information lessons plus five lessons that corrected erroneous perceptions of the prevalence and acceptability of alcohol and drug use among peers and established a conservative normative school climate	12 months **Evaluation:** Students were pretested using a questionnaire that assessed their use of alcohol, marijuana, and cigarettes. For each of these substances, subjects were asked to report on cumulative lifetime consumption and use during the 30 days prior to the survey. Cigarette responses were framed in terms of numbers of cigarettes. **Method of analysis:** general linear model analysis of covariance	20%	**recommendations for future research:** There is a need for further studies to study the long-term effect of the programme **Source of funding:** National Institute on Alcohol Abuse and Alcoholism

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		regarding substance use. The fourth programme (Combined) included three lessons about information, three and one-half lessons teaching resistance skills, and three and one-half lessons establishing conservative norms. **Intervention category:** Single **Intervention period:** Not reported **Comparator/s** Usual education **Sample sizes:** **Total n=** 3011 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Dissimilar in ethnicity **Study sufficiently powered?**			

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Not reported			

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† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:36 Johnson et al. 2005

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Johnson **Year:** 2005 **Aim of study:**	**Source population/s:** schools **Country:** US **Study year:** 2000	**Method of allocation:** Clusters of public schools were identified and grouped together based on similar ethnic composition and geographic location. Schools within each	**Primary Outcomes:** Prevalence of past month smoking **Adverse events:** **Secondary outcomes:**	**Primary outcomes:** 1-year follow-up Overall, the programme effect was not significant	**Limitations identified by author:** Self-reported reports not validated by biochemical measures.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
To evaluate a multicultural smoking prevention curriculum in ethnically diverse Southern California middle schools **Study design:** RCT **Internal validity[§]: +** **External validity[†]: 4**	**Eligible population:** Schools were eligible to participate if their student population was at least 25% Hispanic and/or at least 25% Asian American **Selected population:** 36 public and private schools in Los Angeles metropolitan area **Age:** 11 to 12 **Female:** 52.4% **Race/ethnicity:** 0% **Socioeconomic status:** Median household income was US$44,590 **Excluded population:** Not reported **Setting:**	cluster were randomly selected to receive the experimental conditions **Measures to minimise confounding:** Adjusted for age, gender, ethnicity, generation in the United States, school-level smoking prevalence, composite SES score, parents' smoking, parental monitoring, communication with parents, best friends' smoking, perceived access to tobacco, prevalence estimate of peer smoking, cognitive susceptibility, and depressive symptoms. **Intervention/s** Two curricula were based on social influences models of prevention, which have been effective in preventing smoking in multiple studies. The multicultural curriculum was called Project FLAVOR (Fun Learning About Vitality, Origins, and Respect). Project FLAVOR was developed with consultation from an advisory group of cultural experts and multiple rounds of pilot testing of activities and lessons. Lessons addressed acculturative	No **Follow-up periods:** 12, 24 months **Evaluation:** Students completed self-administered paper-and-pencil surveys in their classrooms during a single class period. Students completed a follow-up survey using the same procedure used in the baseline survey. **Method of analysis:** multilevel logistic regression analysis	(OR=0.75; 95% CI 0.48 to 1.18). The multicultural curriculum prevented smoking initiation among Hispanic boys (OR=0.49; 95% CI 0.27 to 0.88) 2-years follow-up Multicultural programme was effective only among Hispanic students in Hispanic schools (OR=0.63; 0.50 to 0.79); and standard programme was effective only among Asian students in Asian/ multicultural schools (OR=0.60; 95% CI 0.48 to 0.75). **Secondary outcomes:** No **Attrition details:** 24% lost to follow-up after two years. Attrition did differ significantly by	**Limitations identified by review team**: Differential attrition **Evidence gaps and/or recommendations for future research:** Further research is needed to determine the independent effects of the socioeconomic context and the ethnic context on the effectiveness of prevention curricula **Source of funding:** National Institutes of Health and the California Tobacco-Related Disease Research Programme

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Not reported	stress, discrimination, and family conflicts that can occur during the acculturation process. Project FLAVOR also incorporated images of multicultural characters and referenced the history of multiple Pacific Rim nations. The standard curriculum was called Project CHIPS (Choosing Healthy Influences for a Positive Self). Projecct CHIPS was a version of Project SMART **Intervention category:** Single **Intervention period:** eight classroom activities **Comparator/s** Wait-list control **Sample sizes:** **Total n=** 3157 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** similar in demographic factors, socioeconomic status, smoking		smoking status	

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		prevalence **Study sufficiently powered?** Not reported			

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Table 5:37 Jøsendal et al. 1998

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
BE smokeFREE (Jøsendal et al. 1998; Jøsendal et al. 2005)	**Source population/s:** Nationally representative sample of schools in	**Method of allocation:** Cluster allocation. Schools were selected and assigned to 1 of 3 intervention groups or control using a post-code ranked list of all Norwegian schools. Process appears semi-random but some investigator	**Primary Outcomes:** Weekly smoking prevalence **Adverse events:** Not reported **Secondary outcomes:**	**Primary outcomes:** Prevalence of weekly smoking (adjusted odds ratios and 95% CIs for 1 vs control) 6 months:	**Limitations identified by author:** Circumstances in Norway may be favourable for school-based intervention because teachers are familiar with educational approaches etc and the results may not be fully applicable to other

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Jøsendal **Year:** 1998 **Aim of study:** To examine the effectiveness of a school based smoking prevention intervention **Study design:** Cluster RCT **Internal validity[§]: ++** **External validity[†]: 3**	Norway **Country:** Norway **Study year:** 1994 (intervention began) **Eligible population:** All schools in Norway **Selected population:** 99 nationally representative schools **Age:** 12-13 years (grade 7) at baseline **Female:** 49.4% **Race/ethnicity:** Not reported **Socioeconomic status:**	influence. **Measures to minimise confounding:** Not reported **Intervention/s** Intervention was based on the Social Influence model, focusing on the opportunities of students to make their own choices. Interventions were: 1) School classes, teacher training, parent involvement 2) School classes, parent involvement 3) School classes, teacher training School classes were given in grades 7-9 with 8, 5 and 6 hours of teaching respectively. In grades 7 and 8, main themes were personal freedom to choose, freedom from addiction, social skills training and short term consequences of smoking. (all intervention groups) Teachers were trained in a 2 day course and given a detailed program manual (intervention 1 and 3). Parental involvement consisted of brochures brought home by students for discussion. Parent-teacher discussions were used where appropriate and non-smoking contracts were signed by parents and students. (intervention 1 and 2) **Intervention category:** School based	None **Follow-up periods:** 6, 18 and 30 months from baseline **Evaluation:** Anonymous surveys were conducted during 45 min classroom sessions at baseline and at 6 months and 1.5 and 2.5 years from baseline. Blood samples were taken from a random sample of non-smoking students (n=89) for validation of self-reported smoking. **Method of analysis:** Cross-tabulation with X^2 to test for significance, corrected by design effect. Multivariate multiple logistic regression adjusted for age, gender and baseline smoking. Statistical comparisons only made between the control and the most comprehensive intervention group (1).	1) 1.5% 2) 1.1% 3) 2.6% Control= 3.1% OR 0.32 (0.17-0.59) 18 months: 1) 5.9% 2) 8.2% 3) 6.8% Control 9.3% OR 0.53 (0.36-0.77) 30 months: 1) 4.1% 2) 5.9% 3) 5.4% Control 6.2% OR 0.65 (0.46-0.91) **Secondary outcomes:** None **Attrition details:** 11.2% (intervention) and 5.8% (control) at final follow up. Smokers were more likely to drop out compared to non-smokers.	countries. **Limitations identified by review team**: The method of allocation is semi-randomised but there was some subjective input (schools approximately the same size allocated to each group) and no evidence that investigators were blind to study groups when undertaking the process. Attrition was greater in the intervention group and smokers were more likely to leave the study. This differential drop-out could have favoured the intervention group. **Evidence gaps and/or recommendations for future research:** More aggressive follow-up techniques should be used to ensure smokers do not leave studies so that the external validity is maintained. Analysis of mediating factors towards programme effectiveness. **Source of funding:** Norwegian Cancer Society

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Not reported **Excluded population:** Not reported **Setting:** Classrooms in nationally representative schools	**Intervention period:** Over 3 years in grades 7 (8 hours), 8 (5 hours) and 9 (6 hours). **Comparator/s** Normal smoking and health teaching (~half the hours of the intervention groups). **Sample sizes:** **Total n=** 99 schools, 4441 students **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Similar in baseline smoking status, demographics not reported. **Study sufficiently powered?** Yes			

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Table 5:38 Kellam and Graham 1998

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Good Behaviour Game & Master Learning **Authors:** Kellam **Year:** 1998 **Aim of study:** To examine whether interventions aimed at aggressive/disruptive classroom behaviour and poor academic achievement would reduce the incidence of initiation of smoking **Study design:** RCT **Internal validity[§]:** - **External validity[†]:**	**Source population/s:** schools **Country:** US **Study year:** 1985 **Eligible population:** Students from five large urban areas of Baltimore City elementary schools **Selected population:** 19 schools **Age:** 6 to 7 **Female:** 49% **Race/ethnicity:** Not reported **Socioeconomic status:**	**Method of allocation:** Teacher/classrooms were randomly assigned to experimental conditions **Measures to minimise confounding:** Adjusted for age, sex, level of aggression in first grade **Intervention/s** The programme focused on social context of the classroom, to socialize children into the role of student and to teach them to regulate their own and their classmates' behaviour through a process of interdependent team behaviour-contingent reinforcement **Intervention category:** Single **Intervention period:** 2 years exposure to the intervention	**Primary Outcomes:** Smoking Prevalence **Adverse events:** **Secondary outcomes:** No **Follow-up periods:** 12, 24, 36, 48, 60 Months **Evaluation:** At the end of the first quarter of first grade, prior to implementation of the interventions, each teacher rated each child in the classroom in a standardized 2-hour interview using the Teacher Observation of Classroom Adaptation-Revised. Outcome measured were assessed using a 90-min long telephone interview. **Method of analysis:**	**Primary outcomes:** Boys in interventions group had a lower risk of starting to smoke than boys in control group (RR=0.62, 0.40 to 0.97, p=.04); no programme effect was observed among girls (RR=0.90, 0.57 to 1.42, p=.66)] **Secondary outcomes:** No **Attrition details:** 26.9%, control classrooms had significantly higher rates of missing data	**Limitations identified by author:** Reliance on self-reported data **Limitations identified by review team**: High attrition rate and differential attrition **Evidence gaps and/or recommendations for future research:** **Source of funding:** National Institute of Mental Health and National Institute on Drug Abuse

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Not reported **Excluded population:** Not reported **Setting:** Not reported	**Comparator/s** Standard care **Sample sizes:** **Total n=** 2311 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Depression symptoms more common among control group **Study sufficiently powered?** Not reported	standard life table and survival analysis		

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
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Table 5:39 Klepp et al. 1994

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Klepp **Year:** 1994 **Aim of study:** To evaluate the impact of a school-based health education programme targeting students' eating patterns, physical activity levels and cigarette smoking **Study design:** RCT	**Source population/s:** schools **Country:** Norway **Study year:** 1979 **Eligible population:** Not reported **Selected population:** 6 schools in Oslo **Age:**	**Method of allocation:** Schools were randomly assigned t experimental conditions **Measures to minimise confounding:** Adjusted for demographic variables, baseline measures **Intervention/s** The health education programme focused on cigarettes smoking, nutrition, and physical activity. The programme was led, in part, by older	**Primary Outcomes:** Prevalence of daily smoking **Adverse events:** Not reported **Secondary outcomes:** no **Follow-up periods:** 2-, 10-, and 12- years after pre-test survey **Evaluation:** Smoking-related measures were collected at baseline, 2-, 10-, and 12-years. These include, questions regarding knowledge about smoking	**Primary outcomes:** Overall Smoking onset was significantly lower in the intervention group compared to control group at 2-year follow-up: 16.5% vs 26.9%, p<0.01. The significant difference was not maintained at 10-year follow-up (onset of weekly smoking, 44.5% vs 51.2%, n.s.) Subgroup by gender Adjusting for baseline differences, baseline non-smoking men who had participated in the programme reported less smoking than did baseline non-smoking men from the	**Limitations identified by author:** The study took place in inner-city setting with particular high smoking rates. Need for booster sessions. Recall bias, some participants had problems remembering whether or not they had participated in the programme. **Limitations identified by review team**: Allocation was not completely random – one school was assigned to intervention group 'due to the existing relationship between the school and study staff'. Study cohorts were defined according to participation in a

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Internal validity[§]: - **External validity[†]: 4**	10 to 15 years (range; predominantly 11 to 14 years, grades 5-7) **Female:** 51.6% **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:** Not reported **Setting:** Not reported	students and included training to resist social pressures to smoke, personalized role models, public commitment to remain a non-smoker and discussions on the social, political and health aspects of smoking. **Intervention category:** Single **Intervention period:** 10 sessions over 15 months **Comparator/s** Usual education **Sample sizes:** **Total n=** 827 **Intervention n=** not reported **Control n=** not reported **Baseline comparisons:** Not reported **Study sufficiently**	and health, acceptability of smoking, parental involvement in health issues, and friends' and siblings' smoking behaviour. **Method of analysis:** Cross tabulation and analysis of covariance	comparison group after 10 years (ever smoking, 41.6% vs 55.8%, $p<0.05$) and 12 years (daily somoking, 31% vs 45%, $p<0.06$). No similar long term effect was seen for women (baseline non-smokers, daily smoking at 12-year follow-up, intervention vs control: 47% vs 42%). **Secondary outcomes:** no **Attrition details:** 4% at 10 years, 14% at 12 years Greater attrition among reference schools compared to intervention schools. Greater attrition among males than among females.	series of baseline and follow-up surveys. It is not clear whether eligible students who did not participate in the baseline survey (213/1040, 20.5%) were exposed to the school-based intervention / counted as controls. Only respondents to the surveys were included in the analyses, hence these were not 'intention-to-treat'. This, combined with differential attrition at follow-ups, reduces the validity of the conclusion. Differential effects between men and womean was unexpected and was not observed at 2-year follow-up. A hypothesis was generated at 10-year follow-up that women's smoking behaviour might have been associated with attempts to lose weight. Results from 12-year follow-up found no difference in attempts to lose weight between treatment and control groups and no association between smoking status and attempts to lose weight. **Evidence gaps and/or recommendations for future research:** There is a need for further

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		powered? Not reported			development and refinement of school-based smoking prevention programmes and for supportive community-based activities. **Source of funding:** Norwegian Cancer Society and Research Centre for Health Promotion, University of Bergen

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Table 5:40 Lynam et al. 1999

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Lynam **Year:** 1999	**Source population/s:** schools **Country:**	**Method of allocation:** cluster randomisation **Measures to minimise confounding:**	**Primary Outcomes:** Smoking Prevalence **Adverse events:** Not reported	**Primary outcomes:** frequency of past-month cigarette use (DARE status beta=0.101, ns)	**Limitations identified by author:** The Police officers responsible for delivering the programme failed to execute it as intended. There was no comparison with a

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Aim of study: To evaluate the impact of project DARE, 10 years after administration **Study design:** RCT **Internal validity[§]: +** **External validity[†]: 3**	USA **Study year:** 1987 **Eligible population:** Lexington-Fayette county public schools **Selected population:** 31 elementary schools **Age:** 11 to 12 years. **Female:** 49% **Race/ethnicity:** 75% White **Socioeconomic status:** 46% eligible for free lunch **Excluded population:** None	adjusted for demographic and school-level factors **Intervention/s** Data were collected before and after the administration of DARE and follow up questionnaire data at six different times as indicated in the follow-up periods. Intervention was delivered by police officers. The curriculum focused on teaching students the skills needed to recognize and resist social pressures to use drugs **Intervention category:** Single **Intervention period:** Not reported **Comparator/s** Standard drug education curriculum **Sample sizes:** **Total n=**2071 **Intervention n=** Not reported **Control n=** not reported **Baseline comparisons:** Similar demographic factors, baseline substance use	**Secondary outcomes:** Knowledge attitude Refusal skill Cope with peer pressure **Follow-up periods:** 12, 24, 36, 48, 60, 120 months **Evaluation** Questions about alcohol, tobacco, marijuana and illegal drug use were asked. Questions on positive and negative consequences of use of the drugs were also asked **Method of analysis:** multilevel analysis	**Secondary outcomes:** positive expectancies toward cigarettes (b=0.053, ns); negative expectancies toward cigarettes (b=-0.152, ns) **Attrition details:** 51.6%	no-intervention condition **Limitations identified by review team**: The large differences between the sample size of initial participants and those used for the 10 year follow up. **Evidence gaps and/or recommendations for future research:** Not reported **Source of funding:** Grant DA05312-10 from the National Institute on Drug Abuse and by General Clinical research Centre Grant M01 RR026202 from the National Institute of health.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Setting: Urban and suburban population	**Study sufficiently powered?** Not reported			

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Table 5:41 Murray et al. 1992

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Murray **Year:**	**Source population/s:** Schools in America **Country:**	**Method of allocation:** cluster randomisation **Measures to minimise confounding:**	**Primary Outcomes:** Smoking Prevalence **Adverse events:** Not reported	**Primary outcomes:** Self-reported weekly smoking Prevalence:	**Limitations identified by author:** Inadequate implementation of the interventions.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
1992 **Aim of study:** To compare the incidence of and prevalence of adolescent tobacco use in schools randomised to the three middle school interventions that were most widely adopted as a result of the legislation or to an existing curriculum control group **Study design:** RCT **Internal validity[§]: +** **External validity[†]: 3**	USA **Study year:** 1986 **Eligible population:** 478 public schools were combined into sampling units of 390 **Selected population:** 81 schools comprised of 48 sampling units. **Age:** 12 to 13 years **Female:** Approximately 50% **Race/ethnicity:** Not reported **Socioeconomic status:** Not reported **Excluded population:**	adjusted for baseline covariates **Intervention/s** The three interventions are: 1) Minnesota Smoking Prevention programme (MSPP): a six-lesson curriculum based on the social influence model 2) The Smoke Free Generation (SFG) programme is a three-lesson curriculum patterned after the Minnesota Smoking Prevention programme but in a shorter form 3) The Minnesota Department of Education's Guidelines (MDEG) were developed by the department of Education and provide written guidelines and a workshop to help teachers adapt existing programmes to incorporate components of the social influences model. Separate teacher training workshops were held for the seventh grade teachers from Schools assigned to the MSPP and MDEG. Teachers in schools assigned to the SFG received a 2 hour instructional videotape along with their curricular materials. **Intervention category:** School based **Intervention period:** Not reported **Comparator/s** Existing curriculum **Sample sizes:**	**Secondary outcomes:** knowledge attitude refusal skill cope with peer pressure self esteem efficacy **Follow-up periods:** 12months, 24months and 36 months **Evaluation:** Surveys were conducted in April and May of each of the follow-up years. Questionnaire assessed subject's demographics, cigarette smoking use, and exposure to educational programmes. Information on perceptions of smoking by models was also collected. **Method of analysis:** Tabulations (adjusted for demographic factors and smoking pattern) and ANCOVA	MSPP;13.8, SFG;13, MDEG;11.6, EC;10.6 Incidence: MSPP;10.5, SFG;10.1, MDEG;9.5, EC;7.9 **Secondary outcomes:** Not reported **Attrition details:** 1988: MSPP (5.5%), SFG (3.7%), MDEG (3%), EC (5%) 1989: MSPP (16.4%), SFG (14.5%), MDEG (11.6%), EC (14.5%) 1990: MSPP (22.4%), SFG (20.2%), MDEG (18.6%), EC (18.9%)	Combination of contamination or compensatory rivalry in the existing curriculum control condition. **Limitations identified by review team**: High loss to follow up during the final survey. **Evidence gaps and/or recommendations for future research:** Need for studies that are properly implemented and with long follow up. **Source of funding:** Grant from the National Cancer Institute.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	None **Setting:** Not reported	**Total n=** 7180 **Intervention n=** 5344 **Control n=** 1836 **Baseline comparisons:** Similar baseline demographic characteristics and smoking status **Study sufficiently powered?** Not reported			

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Table 5:42 Noland et al. 1998

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Noland **Year:** 1998 **Aim of study:** To investigate efficacy of a social-influences tobacco prevention programme conducted with adolescents living in a high tobacco production area **Study design:** RCT **Internal validity[§]: ++** **External validity[†]: 4**	**Source population/s:** schools **Country:** US **Study year:** 1992 **Eligible population:** Students living in rural, tobacco raising areas from 14 counties **Selected population:** Students from 19 schools **Age:** Mean age = 12.4 **Female:** 50.8% **Race/ethnicity:** 92% **Socioeconomic status:**	**Method of allocation:** Random allocation of entire schools to study conditions **Measures to minimise confounding:** Adjusted for baseline smoking status **Intervention/s** The social-influences prevention programme included skills training (specifically, learning to recognize types of peer pressure, refusal skills, and assertiveness), recognizing and countering advertising appeals, trained peer leaders, student pledges not to use tobacco, and negative consequences for using tobacco (with a specific focus on undesirable social consequences and immediate physical consequences). Undesirable social consequences included stained teeth, bad breath, and holes burned in clothes. **Intervention category:** Single **Intervention period:**	**Primary Outcomes:** smoking prevalence **Adverse events:** **Secondary outcomes:** no **Follow-up periods:** 12, 24 months **Evaluation:** Surveys on tobacco use (smokeless tobacco and cigarettes) and other variables were administered in the classroom by trained project staff. A test for carbon monoxide in expired air was also administered individually to students at a private location. **Method of analysis:**	**Primary outcomes:** 1-year follow-up: Programme effects were found for the prevalence of eighth-grade students who had smoked in the previous 7 days (22% vs 28%, $p<0.05$) and in the previous 30 days (28% vs 33%, $p<0.05$). No significant effects were found for 24-hour smoking or lifetime smoking. 2-years follow-up: Significant effects were found for 24-hour (22% vs 28%, $p<0.05$), 7-day (30% vs 38%, $p<0.01$), and 30-day (34% vs 44%, $p<0.01$) smoking but not for lifetime smoking. **Secondary outcomes:**	**Limitations identified by author:** None **Limitations identified by review team**: It may be difficult to replicate the findings from this study. **Evidence gaps and/or recommendations for future research:** There is a need for studies with longer follow-up period **Source of funding:** National Cancer Institute

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Not reported **Excluded population:** Not reported **Setting:** Not reported	Six sessions. Sessions lasted 45 to 50 minutes, delivered by trained classroom teachers. Additional three sessions were delivered by trained educators **Comparator/s** Control condition not described **Sample sizes:** **Total n=** 3588 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Similar baseline smoking status **Study sufficiently powered?** Not reported	mixed-model analysis of variance	no **Attrition details:** 14.4% after 2 years with no differential attrition between the control and experimental groups.	

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† Score for external validity:

1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:43 Nutbeam et al. 1993

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Nutbeam **Year:** 1993 **Aim of study:** To assess the effectiveness of two schools based smoking education projects in delaying onset of smoking behaviour and in improving health knowledge, beliefs, and values. **Study design:** RCT **Internal validity[§]: +** **External validity[†]: 2**	**Source population/s:** schools **Country:** UK **Study year:** 1988 **Eligible population:** Not reported **Selected population:** 39 mixed sex state comprehensive schools in four different education authorities in Wales and England **Age:** 11 to 12 years **Female:** 52.8% **Race/ethnicity:** Not reported **Socioeconomic status:** Unemployed father	**Method of allocation:** cluster randomisation **Measures to minimise confounding:** Adjusted for potential confounders **Intervention/s** Three arm intervention group: Family smoking education programme only, smoking and me project only and both projects in sequence. **Intervention category:** Multimodal **Intervention period:** **Comparator/s** Control- No planned intervention **Sample sizes:** **Total n=** 4538 **Intervention n=** 3309 **Control n=** 1229 **Baseline comparisons:**	**Primary Outcomes:** smoking prevalence **Adverse events:** **Secondary outcomes:** knowledge attitude self esteem efficacy health values **Follow-up periods:** post-intervention, 12 months **Evaluation** A self administered questionnaire was completed on three occasions: before the commencement of smoking intervention in February to March 1988, while the first and second follow up took place in March 1989 and March 1990 respectively. The questionnaires addressed smoking behaviour, educational objectives and knowledge elements of the projects. In order to improve the accuracy of self reported smoking status, bogus pipeline technique was used. The teachers supervised the completion of questionnaire. **Method of analysis:**	**Primary outcomes:** Never smoker: school vs. control (70.4% vs. 73.4%, p=.1), family vs. control (64.4% vs. 73.9%, p=.1), school+family vs. control (69.4% vs. 73.9%) **Secondary outcomes:** No **Attrition details:** 16.6%	**Limitations identified by author:** Projects passed through limited field testing to examine teacher and pupil acceptability before widespread dissemination. **Limitations identified by review team**: Exposure of the control schools to some incidental and unplanned smoking education. Some schools in two of the areas were not selected randomly **Evidence gaps and/or recommendations for future research:** Need for formally field tested effective school based health education project before widespread dissemination.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	(7.4% to 8.2%) **Excluded population:** Not reported **Setting:** Not reported	dissimilar baseline smoking status **Study sufficiently powered?** Not reported	logistic regression (cluster analysis)		Need for British based research into the ways of influencing smoking among school children. **Source of funding:** Not reported

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Table 5:44 Perry et al. 2003

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Perry **Year:** 2003 **Aim of study:** To evaluate the effect of the middle and junior high school drug abuse resistance education (DARE) and DARE plus programmes on drug use and violence. **Study design:** RCT **Internal validity[§]: ++** **External validity[+]: 2**	**Source population/s:** schools **Country:** USA **Study year:** 1999 **Eligible population:** schools in Minnesota that had middle and junior high schools with 7th-grade of at least 200 **Selected population:** 24 schools **Age:** 12 to 13 years **Female:** 48.4% **Race/ethnicity:** 67.3% **Socioeconomic status:** Not reported **Excluded population:** None **Setting:** Not reported	**Method of allocation:** cluster randomisation **Measures to minimise confounding:** adjusted for demographic factors, stratification by sex **Intervention/s** Intervention was made of two arms: 1) DARE only: a 10 session curriculum which provided skills in resisting influences to drug use and handling violent situations. 2) DARE curriculum and DARE Plus programme. First component is a classroom based, peer led, parental involvement programme focused on influencing skills related to peers, social groups, media and role models. The second component involved extracurricular activities	**Primary Outcomes:** smoking prevalence **Adverse events:** **Secondary outcomes:** intention **Follow-up periods:** 12, 24 months **Evaluation:** Surveys were conducted in fall 1999 (baseline) and spring 2000 (first follow up) among all seventh grade students, and in spring 2001(final follow-up) among eight grade students in the same school. The police officers who taught the middle and junior high school programme received training according to the DARE requirement. Questionnaire collected information on cigarette, alcohol and marijuana use and violent conduct among students **Method of analysis:** multilevel, growth curve analysis	**Primary outcomes:** current smoker - boys : school vs. control (ns); school+family vs. control (0.18 vs. 0.31, p=.02); school+family vs. school (ns); girls school vs. control (ns); school+family vs. control (ns); school+family vs. school (ns) **Secondary outcomes:** intention - boys : school vs. control (ns); school+family vs. control (0.68 vs. 0.96, p=.04); school+family vs. school (ns); girls school vs. control (ns); school+family vs. control (ns); school+family vs. school (ns) **Attrition details:** 16%	**Limitations identified by author:** Intervention was more effective in boys. **Limitations identified by review team**: Nothing to add **Evidence gaps and/or recommendations for future research:** Need for study of a longer intervention and follow-up. The effect of the programme on those who were lost to follow-up would be useful to examine the larger results of an intervention. A study with an additional intervention arm "DARE plus components alone" to understand the effect of the added intervention components.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		for students. The third component involved neighbourhood action teams, formed to address neighbourhood and school wide issues related to drug use and violent behaviour. **Intervention category:** Multimodal **Intervention period:** Not reported **Comparator/s** Delayed programme control conditions **Sample sizes:** **Total n=** 6237 **Intervention n** DARE=2226 DARE Plus= 2221 **Control n** =1790 **Baseline comparisons:** similar in demographic factors **Study sufficiently powered?**			Further research to understand why DARE plus was more effective in boys. **Source of funding:** Grant DA11994-02 from the National Institute on Drug Abuse.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Yes			

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Table 5:45 Peterson et al. 2000

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Peterson et al **Year:** 2000 **Aim of study:** To attain the most rigorous randomised trial possible to determine the long-term	**Source population/s:** Schools **Country:** US **Study year:** 1984 **Eligible population:** school districts within 200 miles of the Fred Hutchinson Cancer	**Method of allocation:** Matched-pair randomisation by computerised coin flip that was performed openly, witnessed and recorded. **Measures to minimise confounding:** school districts were matched on prevalence of high school tobacco use,	**Primary Outcomes:** smoking prevalence (daily smoking and other smoking measures) at grade 12 and 2 years after that. **Adverse events:** not reported	**Primary outcomes:** at least weekly smoking, intervention vs control, 10 year follow-up: 0.2% (-3.1% to 3.9%); 12 year follow-up: -	**Limitations identified by author:** Substantial variation in smoking prevalence between school districts at follow-up. **Limitations identified**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
impact of a theory-based, social-influences, smoking prevention intervention that spans the elementary, junior high and high school grades on smoking prevalence among youth **Study design:** RCT **Internal validity[§]: ++** **External validity[†]:** 2	Research Center, with 50-250 students per grade level, with a self-contained feeder system consisting of at least one elementary and at least one junior high/middle school and only one high school, and with a pre-trial grade 3–7 attrition of less than 35% **Selected population:** Two consecutive, entire 3rd grade enrolments in 40 (out of 41 invited) Washington school districts **Age:** 8 to 9 **Female:** 49.2% **Race/ethnicity:** 89.8% White **Socioeconomic status:** 8% below poverty level, 25% household rentals **Excluded population:** 42 children considered by their schools to be developmentally unable to learn **Setting:** Small to medium communities located in rural or suburban	school district size, and location (i.e. east or west of Washington's Cascade Mountains). **Intervention/s** Hutchinson Smoking Prevention Project (HSPP) uses an enhanced social-influences approach that includes the 15 "essential elements" for school-based tobacco prevention recommended by a national Expert Advisory Panel convened by the National Cancer Institute. In accordance with the social-influences approach, the intervention's behavioural components feature 1) skills for identifying social influences to smoke; 2) skills for resisting influences to smoke; and 3) information for correcting erroneous normative perceptions regarding smoking and for promoting tobacco-free social norms. Three additional components extend the standard social influences approach: 1) motivating students to want to be smoke free as a precursor to skills training and distinguishing between what the adolescent "wants to do" and what he/she is "able to do"; 2) promoting self-confidence in one's own abilities to refuse pressures or influences to smoke (i.e., self-efficacy); and 3) enlisting positive family	**Secondary outcomes:** None **Follow-up periods:** 120, 144 months **Method of analysis:** group-randomisation-based permutation inference that accounts for intraclass correlation of endpoint between individuals within school district; intention to treat analysis	1.3% (-4.1% to 2.0%) **Secondary outcomes:** None **Attrition details:** 10 year follow-up: intervention 6.9%, control 7.1%; 12 year follow-up: intervention 6.2%, control 6.3%	**by review team**: this trial was exceptionally well designed and conducted. The internal validity should be high. **Evidence gaps and/or recommendations for future research:** Search of new models and approach **Source of funding:** National Cancer Institute, and the Northern Life Insurance Company

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	setting throughout Washington State	influences. The intervention's theoretical design incorporates multiple social learning constructs and the concept, from attribution theory These theories guided all intervention development, including the teacher-training programme designed to enhance teacher motivation, compliance, and fidelity. The intervention is a teacher-led, grade 3–10 tobacco use prevention curriculum together with unit-specific teacher training. There are a total of 65 classroom lessons in the curriculum: nine lessons in each of grades 3 - 5, 10 lessons in each of grades 6 and 7, eight lessons in grade 8, and five lessons in each of grades 9 and 10. (There are no classroom lessons in grades 11 and 12.) The length of the classroom lessons varies with the lesson and the grade, ranging from 30 to 50 minutes; the total classroom minutes in grades 3 -10 is 2805 (46.75 hours). The curriculum is supplemented by two additional high school components: 1) self-help tobacco use cessation materials to help motivate smokers in grades 9 - 12 to think about quitting and to make attempts to quit and 2) biannual newsletters informing high school teachers about tobacco education resources and tobacco			

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		current events as well as about ways to incorporate these resources into various course subjects in high school. The intervention targets each of the stages of the smoking acquisition process and addresses age-specific interests and developmental capabilities of students. The curriculum is designed for all students, not just students at high risk for smoking. Nonetheless, some content is designed to influence high-risk youth. To engage students, address varied learning styles, and encourage students to express their own opinions and feelings about tobacco, lessons rely on a variety of creative communication methods and direct student involvement. **Intervention category:** Single **Intervention period:** 10 years spanning across grades 3-12 **Comparator/s** health curricula normally offered in schools. During the implementation period of the trial (1984 through 1997), tobacco control in Washington State consisted primarily of the following: 1)			

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		tobacco-free school grounds, implemented in 1991; 2) statewide compliance checks to educate cigarette retailers about avoiding sales to minors, begun in 1989; and 3) local health department sponsorship of community-based activities (e.g., youth peer leadership training) using funds from the American Stop Smoking Intervention Study. The state did not require schools to teach tobacco use prevention **Sample sizes:** **Total n=** 8388 **Intervention n=** 4177 (20 school districts) **Control n=** 4211 (20 school districts) **Baseline comparisons:** Similar in experimentation prior to 3rd grade, parental smoking rate, single-parent household, ongoing non-HSPP tobacco prevention efforts **Study sufficiently powered?** yes			

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
thought **likely or very likely** to alter. † Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:46 Piper et al. 2000

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Piper 2000 **Year:** 2000 **Aim of study:** To evaluate efficacy of the healthy for life health promotion programme **Study design:** RCT Internal validity§: + **External validity†: 3**	**Source population/s:** schools **Country:** US **Study year:** 1988 **Eligible population:** middle schools in suburbs, small cities and towns in Wisconsin **Selected population:** 21 schools **Age:** 11 to 12 **Female:**	**Method of allocation:** Stratified random assignment of schools to one of the three conditions **Measures to minimise confounding:** Adjusted for parental education, two-parent family, ethnicity **Intervention/s** The design of Healthy For Life (HFL) was derived from the social influences model, a theoretical perspective that views adolescent health behaviour as determined within	**Primary Outcomes:** Prevalence of past month smoking **Adverse events:** None **Secondary outcomes:** None **Follow-up periods:** 36 and 48 months **Evaluation:** The primary instrument was an annual self-report survey. Self-reports behaviour were validated	**Primary outcomes:** The Intensive condition significantly reduced the likelihood of smoking in 10th grade (3-year follow-up, beta (SE) = -0.38 (0.17); p<.05), but this effect did not reach statistically significance in 9th grade (3-year follow-up, beta (SE) = -0.30(0.17); p=ns). The age appropriate condition emerged as marginally (p<.10) harmful over the control condition. **Secondary outcomes:** none	**Limitations identified by author:** Quantitative experimental designs may not be appropriate in evaluating multifaceted programme's impact on complex constellations of social behaviours. The results may not be generalizable to people of colour

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Race/ethnicity: 94% **Socioeconomic status:** Percent with mothers with college education (control =30%, age approp = 27%, intensive = 35%) Percent with fathers with college education (control =35%, age approp = 30%, intensive = 40%) Percent with fathers working full time (control =74%, age approp = 73%, intensive = 78%) Percent with mothers working full time (control =37%, age approp = 40%, intensive = 48%) **Excluded population:** Not reported **Setting:** Not reported	the context of social interactions. The HFL School Component utilized eight teaching strategies considered most effective in the health promotion field for young adolescents and in addressing their unique developmental and learning needs These include: (1) social inoculation in which youth are provided exposure to social settings which carry heavy pressure to engage in high-risk health behaviours, with practice of refusal skills; (2) the use of elected peer leaders to deliver HFL messages; (3) use of parent-adult interviews as homework to facilitate sharing of family values and ground rules; (4) health advocacy including the selection, planning and implementation of a health promotion event which targets the entire community as part of the HFL programme; (5) an emphasis on short-term effects associated with the five targeted behaviours as opposed to the long-term health effects; (6)	by assessing carbon monoxide levels in expired air samples given by the students. **Method of analysis:** Multivariate multilevel analysis of covariance	**Attrition details:** 20%	or urban centres **Limitations identified by review team**: High attrition rate **Evidence gaps and/or recommendations for future research:** **Source of funding:** National Institute on Drug Abuse and Robert Wood Johnson Foundation

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		analyzing the influences of advertising and media on student behaviours; (7) encouraging students to make public commitments to behave in healthy ways and create a classroom climate of positive reinforcement and peer support; and (8) an emphasis on peer norms by providing accurate data on health behaviours in each school. The Family Component enhanced and strengthened the curriculum by facilitating communication between the young teens and one significant family member or other adult. This component included a Parent Orientation Session at each school prior to the beginning of the programme; Home Mailings three times during the programme; and the Parent/Adult Interviews which were "homework assignments." The HFL Community Component ran simultaneously with the other components. The Community Component			

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		had two goals: (1) to create a highly visible cadre of community people actively working to reinforce the behavioural messages of the school Component and, in so doing, (2) launch an attack on the pervasive double messages about the target behaviours which most communities transmit to young people via overt and subtle cultural norms and values. **Intervention category:** Multimodal **Intervention period:** The Age-Appropriate Version: The HFL Age-Appropriate curriculum provided 20 lessons to one cohort of 6th graders, 19 lessons to that same cohort of students as 7th graders, and 19 lessons to that same cohort as 8th graders. The lessons were delivered in sequence everyday for four weeks to the entire grade in a 43 minute class period. The Intensive Version: The Intensive curriculum took the Age-Appropriate version,			

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		minus the 7th and 8th grade introductory lessons, and delivered it in one sequential twelve week block to an entire cohort of 7th graders. **Comparator/s** Usual education **Sample sizes:** **Total n=** 2483 **Intervention n=** (age appropriate =827) / (Intensive = 758) **Control n=** 898 **Baseline comparisons:** Similar baseline characteristics **Study sufficiently powered?** Yes			

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:47 Ringwalt et al. 1991

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Ringwalt **Year:** 1991 **Aim of study:** To evaluate effects of Drug Abuse Resistance Education (DARE) project in fifth and sixth graders in North Carolina **Study design:** RCT **Internal validity[§]: +** **External validity[†]: 2**	**Source population/s:** schools **Country:** US **Study year:** 1988 **Eligible population:** North Carolina elementary schools **Selected population:** 20 schools **Age:** 10 to 12 **Female:**	**Method of allocation:** Schools were randomly assigned to experimental conditions **Measures to minimise confounding:** School and baseline differences were covariates **Intervention/s** Project DARE focused primarily on training students to resist social pressures to use drugs. Through discussion, role playing, behavioural modelling and extended practice, students are taught to recognize and resist pressures that can lead to experimentation with drugs	**Primary Outcomes:** prevalence of lifetime cigarette use **Adverse events:** **Secondary outcomes:** Knowledge and attitude **Follow-up periods:** 6 months **Evaluation:** Pre- and post-test were orally administered to students. Teachers read aloud all questions and each set of response options at least once. Teachers remained at the head of the classroom to avoid the risk that they might observe student responses.	**Primary outcomes:** No effect on adolescents' use of cigarettes (4.10% vs 6.10%, p=ns) **Secondary outcomes:** No effect on adolescents' future intention to use cigarette **Attrition details:** 9.4%, no evidence of differential attrition	**Limitations identified by author:** The study may not be adequately powered to detect any difference. Use of only self-reported measures of substance abuse **Limitations identified by review team**: Baseline dissimilarities **Evidence gaps and/or**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	52% **Race/ethnicity:** 40% **Socioeconomic status:** Not reported **Excluded population:** Not reported **Setting:** Not reported	**Intervention category:** Single **Intervention period:** Intervention was delivered from August 1988 through December 1988 by a uniformed law officer in 17 weekly sessions of 45-60 min **Comparator/s** No intervention **Sample sizes:** **Total n=** 1402 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Students exposed to DARE reported greater lifetime involvement with alcohol, although they did not differ on current alcohol use or either current or lifetime use of cigarettes or inhalants. DARE students also reported a more positive general attitude toward drugs and perceived peers as having a more positive attitude toward drug use. They	**Method of analysis:** Multivariate analysis of covariance		**recommendations for future research:** There is a need for further studies with longer follow-up period **Source of funding:** Alcohol and Drug Defense Programme of the North Carolina Department of Education

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		reported fewer costs of using alcohol and did not believe the media portrayed beer drinking. In addition, students receiving DARE were more likely to be older and blacks were disproportionately represented. **Study sufficiently powered?** Not reported			

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Table 5:48 Schinke et al. 2000

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Schinke Year:2000 **Aim of study:** To determine whether the skills approach with and without community mobilization approach had a demonstrable long term impact on smoked and smokeless tobacco consumption, alcohol drinking and marijuana smoking among native American youth. **Study design:** RCT **Internal validity[§]: +** **External validity[†]: 3**	**Source population/s:** Schools **Country:** USA **Study year:** Not reported **Eligible population:** Socioeconomically comparable native American communities **Selected population:** Native American youths from 10 reservations **Age:** 8 to 11 years **Female:** 49% **Race/ethnicity:** Not reported	**Method of allocation:** Cluster randomisation **Measures to minimise confounding:** Not reported **Intervention/s** Was a conventional theoretical model of life skills training tailored towards the young native Americans in the target area. Two interventional arms made of 15 sessions each delivered weekly. Each session last about 50 minutes each. Delivered during the spring term and each session involved instruction, modelling, and rehearsal in cognitive-behavioural skills associated with substance abuse prevention. The second intervention arm also involves community component in addition to the skills component. The community component involves mobilizing Native American constituents in youth communities to support substance abuse prevention. The people involved are youths' families, teachers and school guidance counsellors, neighbourhood residents, law enforcement officials and	**Primary Outcomes:** Smoking prevalence **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods:** 6, 18, 30, 42 months **Evaluation** Data on cigarette smoking was collected before the intervention and at each post intervention period (6 months, 18 months, 30 months and 42 months). Saliva sample was also collected at each point to provide evidence of accuracy for the self reported use of tobacco use. Cigarette smoking was defined as seven or more cigarettes smoked in the week prior to each outcome measurement. **Method of analysis:** One-way ANOVA tests among the interventional	**Primary outcomes:** cigarette smoking @42 months: school vs. control (24.4% vs. 28.6%,ns); school+community vs. control (26.4% vs. 28.6%,ns); school vs. community (24.4% vs. 26.4%,ns) **Secondary outcomes:** No **Attrition details:** 14.1%	**Limitations identified by author:** The analysis used may not account for school and other nested group effect. **Limitations identified by review team**: Differential sample size not reported. **Evidence gaps and/or recommendations for future research:** Use of analytical methods that can be used to calculate intra class correlation coefficient which can then be used to analyse study outcomes through random effects modelling or random coefficient modelling. Studies to confirm or refute the use of intervention tailored towards specific ethnic group. **Source of funding:** National Cancer Institute and National Institute on

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Socioeconomic status: Not reported **Excluded population:** None **Setting:** Not reported	commercial establishments frequented by youths **Intervention category:** Multimodal **Intervention period:** 50 minutes weekly sessions **Comparator/s** Control **Sample sizes:** Total n= 1396 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported	arms, with individual youths as the analytic unit.		Drug Abuse.

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
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Table 5:49 Schofiel et al. 2003

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Schofield **Year:** 2003 **Aim of study:** To evaluate the effectiveness of a 2-year collaborative community-based Health Promoting Schools (HPS) in improving health knowledge, attitudes and practice among a cohort of young adolescents in New South Wales secondary schools **Study design:**	**Source population/s:** schools **Country:** Australia **Study year:** 1997 **Eligible population:** 31 schools in the Hunter and Taree school districts in New South Wales **Selected population:** 22 schools **Age:** 12 to 14 **Female:**	**Method of allocation:** Schools were randomly allocated to control and intervention group **Measures to minimise confounding:** adjustment for school, age, gender, country of birth of mother and father, father's occupation, parents' risk status, sibling risk status, peer risk status, family rules about risk behaviours, knowledge and attitudes, expectations about future smoking, and attitudes towards school **Intervention/s** Key interventions included development of a minimum set of health promotion actions for schools which targeted knowledge and skills, availability of products, the environment, and role models.	**Primary Outcomes:** smoking prevalence **Adverse events:** **Secondary outcomes:** knowledge, attitudes **Follow-up periods:** 24 months (pre-test to post-test) **Evaluation:** A pre-test survey of all consenting Year 7±8 students was conducted in November 1995, and a post-test survey of the same cohort in November 1997 when they were in Years 9± 10. Surveys were	**Primary outcomes:** There was no pre-post difference in the proportion of students who had smoked in the last week by experimental group (9.7% vs 10.0% increase in intervention and control groups, respectively) **Secondary outcomes:** Intervention resulted in increase of smoking knowledge (pre to post-test increase of 12% in intervention groups versus 7% in the control group, p=0.001). There was no significant differences	**Limitations identified by author:** Intervention needs to occur earlier before students reach high, attitudes may have developed by the beginning of year 8 to 9. The time frame of the pre-post evaluations was considered minimal in terms of influencing smoking behaviour. The use of randomised controlled study in evaluating the effectiveness of the HPS programme is questionable.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
RCT **Internal validity[§]: -** **External validity[†]: 2**	55% **Race/ethnicity:** Not reported **Socioeconomic status:** The occupational status of fathers was: lower status (61%), middle status (35%) and high status (7%) **Excluded population:** None **Setting:** None	Strategies included ensuring that a formal school curriculum adequately addressed health risks associated with smoking, information leaflets and biweekly school newsletters for parents, letters to tobacco retailers, smoke-free school policy development, encouragement of non-smoking parents, peers and teachers as role models, peer influence programmes, and incentive programmes. A four-stage model was developed: (1) establishing baseline health risk behaviours and gaining school-wide commitment to HPS, (2) identifying key individuals and the optimal HPS structure for each school, (3) planning, implementing and monitoring HPS strategies, and (4) ongoing support and maintenance of HPS structures and activities. **Intervention category:** Single **Intervention period:** Not reported **Comparator/s**	completed in classrooms under supervision of teaching and research staff. Surveys were anonymous, and matched on gender, age, school, school year and first three letters of first name. A similar procedure was implemented at post-test. **Method of analysis:** Multivariable logistic regression was used to estimate the independent effects of explanatory variables after adjustment for all other factors.	at either pre- or post-test for the perceived positives or negatives of smoking **Attrition details:** 62% of the pre-test sample	**Limitations identified by review team**: Low baseline consent rate (60%) and high lost to follow up (62%). Higher baseline smoking rates among intervention group. **Evidence gaps and/or recommendations for future research:** Further research is needed to examine the effect of varying the intensity of the intervention package and the components addressing peer influence, as well as exploring measurement issues. **Source of funding:** The National Health and Medical

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Control schools were not offered any of the resources or actions to reduce smoking; however, if they requested assistance, then the project team offered support for other health-related issues and promised smoking-specific support at the completion of the study period. **Sample sizes:** **Total n=** 4841 **Intervention n=** 2573 **Control n=**2268 **Baseline comparisons:** Difference in baseline smoking rates, control group had higher smoking rate than the intervention group (10.5% versus 7.8%) **Study sufficiently powered?** Not reported			Research Council (Australia) and the Hunter Centre for Health Advancement.

§ The internal validity score of a study may vary depending on the reliability and validity of the outcome measures of interest. Score for internal validity: ++ All or most of the criteria have been fulfilled. Where they have not been fulfilled the study conclusions are though **very unlikely** to alter. + Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought **unlikely** to alter the study conclusions. – Few or no criteria have been fulfilled. The study conclusion are thought **likely or very likely** to alter.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
† Score for external validity: 1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:50 Schulze et al. 2006

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Schulze 2006 **Year: 2006** **Aim of study:** examines the effectiveness of the school-based campaign "Smoke-Free Class Competition" as a means of preventing young non-smokers from taking up smoking **Study design:** RCT	**Source population/s:** schools **Country:** Germany **Study year:** 1998 **Eligible population:** (1) the school classes decide to be a non-smoking class for a period of six months; (2) the school classes monitor their (non)smoking behaviour and report it regularly to the organizers of the competition; (3) less than	**Method of allocation:** Matched pairs of schools were formed and randomly assigned to intervention and control group **Measures to minimise confounding:** Adjusted for sex, age and school-type **Intervention/s:** information about the health effects of smoking, how to quit smoking, how to deal with peer pressure and the strategies of the tobacco industry. **Intervention category:** Single	**Primary Outcomes:** Smoking prevalence **Adverse events:** not reported **Secondary outcomes:** not reported **Follow-up periods:** 18 months **Method of analysis:** Logistic regression	**Primary outcomes:** no statistically difference between intervention and control groups (OR=0.98; 95% CI 0.81 to 1.20) **Secondary outcomes:** Not reported Attrition details: 54% were lost to follow-up	**Limitations identified by author:** (1) Selection bias: some systematic differences between intervention group and control group in relation to age and smoking status could be detected at the baseline; (2) Attrition bias: overall attrition rate of 54% from the baseline to the follow-up measurement; (3) Cluster effects: as the intervention is a class-based program, the random assignment to control and intervention group had to be made on the class level; (4) Social desirability bias: Self-reported smoking behaviour may be biased by social

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Internal validity§: + **External validity†: 2**	10% of its pupil are smoking **Selected population:** students enrolled in Heidelberg Children's Panel Study **Age:** 11 – 15 years **Female:** 48.0% **Race/ethnicity:** not reported **Socioeconomic status:** not reported **Excluded population:** not reported **Setting:** not reported	**Intervention period:** **Comparator/s:** no intervention **Sample sizes:** **Total n=** 4048 **Intervention n=** 2168 **Control n=** 1880 **Baseline comparisons:** (similar/dissimilar) At baseline, control group were more likely to be smoker than intervention group **Study sufficiently powered? Not reported**			desirability **Limitations identified by review team**: There is a need for studies with longer follow-up periods **Evidence gaps and/or recommendations for future research:** There is a need for studies with longer follow-up **Source of funding:** German Cancer Research Center and Child Health Foundation

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† Score for external validity:
13. Likely to be applicable across a broad range of populations and settings.
14. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
15. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
16. Applicable only to settings or populations included in the studies.					

Table 5:51 Shean et al. 1994

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Shean **Year:** 1994 **Aim of study:** To describe long-term follow-up of smoking education programme for children in western Australia **Study design:** RCT **Internal validity[s]: -**	**Source population/s:** school **Country:** Australia **Study year:** 1981 **Eligible population:** Not reported **Selected population:** 45 school **Age:** Modal age, 12 years **Female:** 52% **Race/ethnicity:** Not reported	**Method of allocation:** Schools were randomly assigned to the three experimental conditions **Measures to minimise confounding:** Stratification by gender **Intervention/s** The programme was based on the social consequences curriculum, designed to increase children's knowledge of the effects of smoking and their awareness of the benefits of not smoking. The programme also trained students how to resist pressures to smoke **Intervention category:** Single **Intervention period:** Five sessions conducted over 6 months period **Comparator/s** No intervention	**Primary Outcomes:** smoking prevalence **Adverse events:** Not reported **Secondary outcomes:** no **Follow-up periods:** 1-, 2-, and 7- years post-intervention **Evaluation:** In June 1982, all students were surveyed by questionnaire to collect baseline information on smoking habits. In 1988, a third follow-up was carried out when subjects were 18 or 19 years old. **Method of analysis:** logistic regression	**Primary outcomes:** Peer-led intervention appeared to have preventive effect on taking up smoking by girls who were initially non-smokers (OR=0.50, 0.26 to 0.98); while teacher-led was not effective (OR=0.53, 0.27 to 1.01) There was no effect of either intervention on boys who were initially non-smokers [(teacher led OR=0.87, 0.39 to 1.96), peer-led OR=1.10, 0.53 to 2.28] **Secondary outcomes:** no **Attrition details:** 32% lost to follow-up after 7 years. Multivariable attrition analysis revealed that being male, being control group, positive intention to smoke, thinking most adults smoked, their mother smoker and a	**Limitations identified by author:** Poor response and tracing rate. Differential response bias could create an apparent beneficial effect of the intervention. **Limitations identified by review team**: High loss to follow-up and differential attrition. **Evidence gaps and/or recommendations for future research:** Future studies should confirm this gender-specific effect of educational programme **Source of funding:** Not reported

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
External validity†: 2	**Socioeconomic status:** Not reported **Excluded population:** Not reported **Setting:** Not reported	**Sample sizes:** **Total n=** 2366 **Intervention n=** **Control n=** **Baseline comparisons:** similar in demographic, baseline smoking status **Study sufficiently powered?** Not reported		brother smoked were statistically significant with non-response	

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† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:52 Simons-Morton et al. 2005

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Simons-Morton **Year:** 2005 **Aim of study:** To evaluate the effects of a school-based intervention on growth trajectories of smoking, drinking, and antisocial behaviour among early adolescents. **Study design:** RCT Internal validity[§]: - **External validity[†]: 2**	**Source population/s:** **Country:** US **Study year:** 1996 **Eligible population:** Students from middle schools in one Maryland school district **Selected population:** 7 schools **Age:** 11 to 12 **Female:** 57% **Race/ethnicity:** 71% White **Socioeconomic status:** Not reported	**Method of allocation:** Schools were randomised to experimental conditions **Measures to minimise confounding:** Adjusted for gender and ethnicity **Intervention/s** School plus community plus family The Going Places programme includes a social skills curriculum, parent education, and school environment enhancement designed to increase academic engagement and commitment to school; alter perceptions, attitudes, and expectations about substance use and antisocial behaviour; and reduce multiple problem behaviours. The foci of the curriculum sessions are problem solving, self-control, communication, and conflict resolution skills. The enhanced school environment component included social marketing strategies to improve school climate, establish pro-social norms, establish a positive image for the school, reinforce student achievement, and extend exposure to Going Places curriculum concepts. Activities designed to extend the classroom lessons to the larger school	**Primary Outcomes:** Prevalence of 30-day smoking **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods:** 12, 24, 36 months **Method of analysis:** latent growth curve modelling	**Primary outcomes:** There was additional decrease in the rate of smoking progression for the treatment group relative to the control group (added growth factor=-0.124, $p < 0.05$) **Secondary outcomes:** No **Attrition details:** 21%	**Limitations identified by author:** None **Limitations identified by review team**: Low long-term follow-up rate **Evidence gaps and/or recommendations for future research:** Not reported **Source of funding:** Not reported

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Excluded population: Not reported **Setting:** Not reported	environment included informational "roll-outs" preceding each unit; posters and short video segments presented in the cafeteria and display areas; "travellers' checks" awarded to students by teachers for applying skills learned in a Going Places lesson; and special activities, such as assemblies and a year-end field trip, which students could earn the right to attend by participating in class activities and demonstrating skills outside the classroom, which were systematically rewarded. The parent education component was designed to increase parental monitoring, involvement, and expectations regarding academic engagement and problem behaviour. Parents received in the mail a 20-min instructional video on authoritative parenting and a 20-page booklet entitled Attentive Parenting: The Going Places Guide for Parents of Middle School Students and periodic newsletters. **Intervention category:** Multimodal **Intervention period:** 18 sessions were offered in sixth grade, 12 in the seventh grade, and six in the eight grade **Comparator/s**			

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Not reported **Sample sizes:** **Total n=** 2651 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported			

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† Score for external validity:

1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:53 Snow et al. 1992

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Snow **Year:** 1992 **Aim of study:** To evaluate a two-year follow-up of a social-cognitive intervention to prevent substance use **Study design:** RCT Internal validity[§]: - **External validity[†]: 2**	**Source population/s:** Schools **Country:** US **Study year:** 1980 **Eligible population:** Students from public schools of two southern New England towns **Selected population:** **Age:** 11 to 12 **Female:** 48.5% **Race/ethnicity:** Not reported **Socioeconomic status:**	**Method of allocation:** Class rooms were randomly assigned to experimental conditions **Measures to minimise confounding:** Not reported **Intervention/s** Adolescent Decision-Making programme is based on a social-cognitive approach to substance use which involves teaching (1) decision making skills, (2) group process skills, and (3) social network utilization skills Intervention I consisted of 12 forty-minute weekly classroom sessions. Intervention II also consisted of 12 forty-minute weekly classroom sessions which reinforced and extended the social-cognitive skill domains taught in grade 6. **Intervention category:** school-based **Intervention period:** Interventions were successively	**Primary Outcomes:** Prevalence of smoking **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods:** 2, 4 years **Evaluation:** Drug surveys were administered to all eight grade students. The substance use survey assessed level of substance use by respondents' rate of the frequency with which they had used, during the past year. **Method of analysis:** Multivariate analysis of variance	**Primary outcomes:** Students who had participated in the intervention had a lower mean use of tobacco after 2-year follow-up ($F=2.87$ (11073), $p<0.09$). **Secondary outcomes:** No **Attrition details:** 21% lost to follow-up, control dropouts reported higher mean use of tobacco than control stayers, programme dropouts and programme stayers.	**Limitations identified by author:** Attrition limited internal and external validity of the study. Reliance on self-reported data. **Limitations identified by review team**: Low follow-up rate and differential attritions **Evidence gaps and/or recommendations for future research:** Not reported **Source of funding:** National Institute on Drug Abuse and National Institute of Mental Health

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Not reported **Excluded population:** Not reported **Setting:** Not reported	delivered at: (I) grade 6; (II) grade 8/9; (III) grade 10/11. **Comparator/s** **Sample sizes:** **Total n=** 1360 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Not reported **Study sufficiently powered?** Not reported			

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† Score for external validity:

1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
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4. Applicable only to settings or populations included in the studies.

Table 5:54 Spoth et al. 2001

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Spoth **Year:** 2001 **Aim of study:** To examine brief family focused interventions on the trajectories of substance initiation **Study design:** RCT **Internal validity[§]: +** **External validity[†]: 3**	**Source population/s:** Schools **Country:** USA **Study year:** Not recorded **Eligible population:** Families of sixth graders enrolled in 33 rural schools in 19 contiguous counties in a Midwestern state. Schools were selected on the basis of school lunch programme eligibility(15% or more eligible for free meals) and community size (populations of 8500 or fewer) **Selected population:** 33 rural schools **Age:**	**Method of allocation:** Schools were randomly assigned to experimental conditions **Measures to minimise confounding:** Not reported **Intervention/s** Interventions were designed to strengthen parent and child skills that have been found to delay the onset or to reduce the use of substances The Preparing for the Drug Free Years (PDFY) intervention was delivered in five 2-hour training sessions held on weekday evenings once per week for 5 consecutive weeks. Four sessions were for parents only; children and parents both attended a session focusing on peer-resistance skills. Fifteen 2-person group leader teams conducted 19 groups in the 11 PDFY-condition schools. The Iowa Strengthening Families Programme (ISFP) included seven	**Primary Outcomes:** Prevalence of past month smoking **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods:** 18, 30, 48 and 72 months **Evaluation:** Data were collected through a written questionnaire administered to family members in their homes by trained interviewers. **Method of analysis:** multilevel analysis	**Primary outcomes:** 4-years follow-up New user proportions were significantly lower for ISFP (33 vs 50, p<.01) and PDFY (44 vs 50, p<.01) conditions adolescents than for control group adolescents for cigarette use 6-years follow-up There were statistically significant slower overall growths in lifetime cigarette use among ISFP- (growth rate = -2.95, p<.01) and PDFY- (growth rate = -2.94, p<.01) condition adolescents relative to controls. The statistically significant program effect became non-significant when other factors were controlled for statistically. **Secondary outcomes:** No **Attrition details:**	**Limitations identified by author:** Reliance on self-reported data. Degree to which the study findings generalize to more diverse or urban populations is unclear **Limitations identified by review team**: High attrition rate **Evidence gaps and/or recommendations for future research:** None reported **Source of funding:** National Institute on Mental Health and National Institute on Drug

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	11 to 12 **Female:** 55% **Race/ethnicity:** 99 **Socioeconomic status:** median annual income ($34,000) **Excluded population:** Not reported **Setting:** Not reported	sets of sessions offered once per week over a period of 7 consecutive weeks in the evenings. ISFP included separate, concurrent 1-hour training sessions for parents and children, followed by a joint 1-hour family session **Intervention category:** Multimodal **Intervention period:** **Comparator/s** Minimal contact-control **Sample sizes:** Total n= 667 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Similar baseline characteristics **Study sufficiently powered?** Yes		33%	Abuse

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes

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† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:55 Spoth et al. 2002

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Spoth **Year:** 2002 **Aim of study:** To evaluate effects of intervention combing family and school-based	**Source population/s:** Schools **Country:** US **Study year:** Not reported **Eligible population:** 20% or more of	**Method of allocation:** Schools were matched and randomly assigned **Measures to minimise confounding:** Adjusted for dual biological parent families **Intervention/s** With two intervention arms:	**Primary Outcomes:** Self-reported lifetime use of cigarettes **Adverse events:** Not reported **Secondary outcomes:** No	**Primary outcomes:** There was no statistically significant difference in the percentage of users initiated between the post-test and follow-up 12 months later between interventions and control groups : school vs control (13.9% vs 16.7%, ns); school+family vs control (12.1% vs 16.7%, ns); school vs school+family (13.9% vs 12.1%,	**Limitations identified by author:** Low base rates in substance use in all study conditions. Generalizations to populations with different demographic compositions should be made with caution. Missing should be considered and all measures were self-reported. **Limitations identified by**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
competence-training on substance initiation **Study design:** RCT **Internal validity[§]:-** **External validity[†]: 4**	household in the school district with 185% of the federal poverty level, school district enrolment under 1200, and all middle school grades (6-8) taught at one location **Selected population:** 36 rural schools in 22 contiguous counties in a midwestern state **Age:** 12 to 13 **Female:** 46.7% **Race/ethnicity:** 96.8% **Socioeconomic status:** 24% eligible for free meal **Excluded population:** Not reported **Setting:** Not reported	combined school and family-based / school-based only. School-component: Life Skills Training (LST) was a universal preventive intervention based on social learning theory and problem behaviour theory. Family-component: Strengthening Families Programme For Parents and Youth 10-14 (SFP 10-14) was based on the biopsychological model and other empirically based family risk and protective factor models. **Intervention category:** Multimodal **Intervention period:** School: 15-session conducted during 40 to 45 min classroom period during 7th grade. Additional five booster sessions in the 8th grade. Family: sessions were conducted in the evening once each week for 7 consecutive weeks when the youths were in the second semester of grade	**Follow-up periods:** 12 months (pre- to post-test) **Evaluation:** The in-school data collection conducted in classrooms required 40-45 min to complete. Two forms of the questionnaires with identical questions in varying order were administered in each classroom to enhance the privacy of the respondents. In addition, each student exhaled into a balloon that was then connected to a carbon monoxide meter to provide a carbon monoxide reading. The same data collection procedures were used across all data collection points. **Method of analysis:** multilevel (mixed model) analysis of covariance	ns) **Secondary outcomes:** No **Attrition details:** 17.6%, no evidence of differential attrition	**review team**: Significant difference between intervention and control groups at baseline. Use post-intervention data as baseline in the analysis, which ignores possible effects during intervention. The reported outcome is difficult to interpret as post-test prevalence was not stated. **Evidence gaps and/or recommendations for future research:** Future studies should follow-up youths for longer period **Source of funding:** National Institute on Drug Abuse and National Institute of Mental Health

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		7. Four booster sessions were organized for the families while the youths were in the eighth grade. **Comparator/s** Control condition not described **Sample sizes:** **Total n=** 1664 **Intervention n=** school+family (549); school only (621) **Control n=** 494 **Baseline comparisons:** Control group tend to live with both parents **Study sufficiently powered?** Not reported			

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† Score for external validity:

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
1. Likely to be applicable across a broad range of populations and settings. 2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:56 Storr et al. 2002

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Storr **Year:** 2002 **Aim of study:** To assess impact of two universal grade 1 preventive interventions on the onset of tobacco smoking **Study design:** RCT **Internal validity[§]: -**	**Source population/s:** Schools **Country:** US **Study year:** 1993 **Eligible population:** Baltimore city public primary schools **Selected population:** 9 schools **Age:**	**Method of allocation:** A randomized block design with schools serving as a blocking factor, within each school, children and teachers were randomly assigned to one of two intervention or control classrooms. **Measures to minimise confounding:** Adjusted for age, race, parental monitoring and supervision, family tobacco use, and teacher rating of the Teacher Observation of Classroom Adaptation-Revised score	**Primary Outcomes:** Prevalence of ever smoking **Adverse events:** **Secondary outcomes:** No **Follow-up periods:** 6 years after the end of	**Primary outcomes:** Relative to control, a modest attenuation in the risk of smoking initiation was found for students assigned to either school-based (RR=0.57; 95% CI 0.34 to 0.96) or family based (RR=0.69; 95% CI 0.50 to 0.97) intervention classrooms. **Secondary outcomes:** None **Attrition details:** 19% was lost to follow-up after six years. No evidence of differential attrition	**Limitations identified by author:** Not certain if these results can be replicated elsewhere. Community-based randomized preventive trials represent an especially difficult form of biomedical and public health research. The combination of the full classroom-based and family partnership Grade 1 interventions described in this paper might lead to additive or synergistic effects in terms of later socially adaptive behaviours. In turn, one also might find greater impact in

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
External validity†: 3	6 to 7 **Female:** 49% **Race/ethnicity:** 11.4% **Socioeconomic status:** 62% received free or reduced lunch **Excluded population:** Not reported **Setting:** Not reported	**Intervention/s** The classroom-centred (CC) intervention consisted of three components: (1) curriculum enhancements; (2) enhanced behaviour management practices; and (3) back-up strategies for children not performing adequately. The Family School Partnership intervention was designed to improve achievement and reduce early aggression, shy behaviour and concentration problems by enhancing parent–teacher communication and providing parents' with effective teaching and child behaviour management strategies. The major mechanisms for achieving those aims were: (1) training for teachers and other relevant school staff in parent–teacher communication and partnership building; (2) weekly home-school learning and communication activities; and (3) a series of nine workshops for parents lead by the first	intervention **Evaluation:** Youth's self-reported use of tobacco was assessed 6 years after the end of the intervention year when they were 12 years old on average. Audio computer-assisted self interview (ACASI) method was used to collect information from youths. **Method of analysis:** Cox regression models for		terms of the primary prevention or delay of onset of first use of tobacco. **Limitations identified by review team**: High attrition rate **Evidence gaps and/or recommendations for future research:** Future research will be needed replicate the findings from this study, and future research can clarify whether larger impact is gained by strengthening these Grade 1 interventions (e.g. via booster sessions). Additional follow-up is warranted in several more years after the entire cohort has passed their peak onset incidence years. **Source of funding:** National Institute on Drug Abuse and National Institute of Mental Health

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		grade teacher and the school psychologist or social worker. **Intervention category:** Multimodal **Intervention period:** One year, through grade 1 academic year **Comparator/s** Usual education **Sample sizes:** **Total n=** 678 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Children in the control group were somewhat less likely to be male and to be of African–American heritage, as compared with children in the intervention conditions. They were somewhat more likely to come from two-parent households. The teacher ratings	time-to-event data		

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		of problem behaviour (TOCA-R summary score) is modestly larger for CC children. **Study sufficiently powered?** yes			

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1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

Table 5:57 Sun et al. 2006

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Sun **Year:** 2006 **Aim of study:** To test long-term impact of Project Towards No Drug (TND) Abuse among continuation high schools youths **Study design:** RCT **Internal validity[§]: +** **External validity[†]:** 3	**Source population/s:** schools **Country:** US **Study year:** 1994 **Eligible population:** 29 schools districts from a five-county region of southern California **Selected population:** 21 continuation high schools **Age:** 14 to 19 **Female:** 38% **Race/ethnicity:** 37% **Socioeconomic status:** Modal occupations among mothers were minor professionals or small	**Method of allocation:** Schools were randomised to three experimental conditions **Measures to minimise confounding:** Adjusted for propensity score **Intervention/s** The project TND curriculum provides a health motivation-social-skills decision making approach to drug abuse prevention The school-as-community was derived from several theories that suggest that preventive effects can be obtained through encouraging students to engage in more healthful interconnections with others at the school and beyond its borders. **Intervention category:** Multimodal **Intervention period:** Nine-session, which consisted of three 50-min sessions per week for 3-consecutive weeks	**Primary Outcomes:** Prevalence of 30-day smoking **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods:** 12, 24, 36, 48, 60 months post-programme **Evaluation:** The pretest data collection involved the collection of paper-and-pencil questionnaires and breath samples analyzed for carbon monoxide content. One-year follow-up surveys were administered. Telephone surveys were used because research with groups including high-risk youth. **Method of analysis:** multilevel analysis	**Primary outcomes:** There were no statistically significant programme effect at short-, middle-, and long-term follow-up **Secondary outcomes:** No **Attrition details:** 32%, 33%, and 54% lost to follow-up after 1-, 3-, and 5-years follow-up, with no evidence of difference attrition	**Limitations identified by author:** Boosters may be a necessary component for effective programmes. Problem with interval validity, post-tests were assessed on the basis of telephone interviews. **Limitations identified by review team**: Low long-term follow-up rate **Evidence gaps and/or recommendations for future research:** **Source of funding:** National Institute

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	business owners (31%) and unskilled labourers or house workers (25%). Modal occupations among fathers were skilled or semiskilled labourers (42%) and minor professionals or small business owners (34%). **Excluded population:** Not reported **Setting:** Continuation high school (youth transferred out of regular school system due to functional problems (e.g. lack of credits, drug use)	**Comparator/s** Standard care **Sample sizes:** **Total n=** 1578 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Similar baseline characteristics **Study sufficiently powered?** Not reported			on Drug Abuse

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2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 4. Applicable only to settings or populations included in the studies.					

Table 5:58 Sun et al. 2008

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Sun **Year:** 2008 **Aim of study:** To examine the relative effectiveness of two curricula comprised of different theory-based components of project TND-4 (Towards No Drug abuse) **Study design:** RCT **Internal**	**Source population/s:** schools **Country:** US **Study year:** 1997 **Eligible population:** A total of nine schools districts from two counties in southern California (Los Angeles and Ventura). Only districts that contained at least one continuation high school, and only schools that included a minimum of 50 students and a maximum of 2000 students were included.	**Method of allocation:** Schools were randomly assigned to one of the three experimental conditions. Prior assignment, schools were blocked by estimates of drug use prevalence, ethnic compositions, student enrolment, school type and size. **Measures to minimise confounding:** Adjusted for age, gender, ethnicity, school type, and a propensity score for attrition. **Intervention/s** Two curricula, one that included the cognitive misperception information component only and one that combined the cognitive misperception and behavioural skills components. **Intervention category:** Single	**Primary Outcomes:** Prevalence and frequency of 30-day use of cigarettes **Adverse events:** Not reported **Secondary outcomes:** No **Follow-up periods:** 12 months **Evaluation:** Pretest and one-year follow-up measures were collected from students using a standardized, self-report, close-ended response, written questionnaire which were administered over one class period. Those absent	**Primary outcomes:** The programme failed to statistically reduce the prevalence of 30-day cigarette use: cognitive vs control (OR=1.35, 0.93 to 1.95); combined vs control (OR=0.91; 0.60 to 1.37); combined vs cognitive (OR=0.68, 0.46 to 0.98) **Secondary outcomes:** No	**Limitations identified by author:** Various substance use prevention programmes are being delivered to students in elementary, middle, and high schools throughout California and this mix of interventions might have induced a reduction in substance use overall. Changes in organizational climate in senior high schools might have caused students and staff to be less receptive to school-based prevention programming. In addition, exam

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
validity[§]: - **External validity[†]:** 2	**Selected population:** Students from nine regular and nine continuation high schools **Age:** 13 to 19 **Female:** 47.9% **Race/ethnicity:** 18.2% White **Socioeconomic status:** 50% of youths' fathers and 56youths' mothers completed high school **Excluded population:** Not reported **Setting:** Not reported	**Intervention period:** Four-week period **Comparator/s** Standard care **Sample sizes:** **Total n=** 2734 **Intervention n=** not reported **Control n=** not reported **Baseline comparisons:** Dissimilar: ethnicity and school type ethnicity, baseline smoking status **Study sufficiently powered?** Not reported	from the classroom on testing days were left absentee packets containing the questionnaire and instructions. At the one-year follow-up, students who failed to return the absentee survey were contacted by telephone for survey administration. **Method of analysis:** Two level random coefficients generalized mixed-linear modeling using school districts as a random factor was used for analysis. The analysis with dichotomous outcomes was converted to linear models with logit link function. The analysis with ordinal count measures was completed by using a zero-inflated negative binomial distribution modeling procedure	**Attrition details:** 24.5%, differential attrition: the retained sample was slightly younger, less likely to smoke cigarettes, less likely to be male, less likely to be African American and more likely to be Latino, and more likely to live with both parents	preparation worries may make schools less receptive to consideration of other types of programming. The items used to assess programme-specific knowledge may have been too difficult for students, these items may have lacked validity, or the instruction might have been deficient. There was a lack of statistical power to detect the main effect. Data used in this study were generated from self-report surveys, the accuracy of which could not be independently verified. Thus, it is impossible to assess the extent to which such data may be biased. **Limitations identified by review team**: **Evidence gaps and/or**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
					recommendations for future research: Future studies should examine the effects of an extended behavioural skills-only programme and use of booster programmes **Source of funding:** National Institute on Drug Abuse

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Table 5:59 Sussman et al. 2003

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Sussman **Year:** 2003 **Aim of study:** To describe 2-year follow-up of drug abuse prevention programme **Study design:** RCT **Internal validity[§]:** - **External validity[†]: 3**	**Source population/s:** schools **Country:** US **Study year:** 1997 **Eligible population:** Continuation high schools in southern California **Selected population:** 18 schools **Age:** 14 to 19 **Female:** 46% **Race/ethnicity:** 45%	**Method of allocation:** cluster randomisation **Measures to minimise confounding:** Adjusted for sex, pre-test use, and propensity score **Intervention/s** Project Towards No Drug Abuse (TND) was a finite session classroom programme to provide preventive intervention on drug use among continuation (alternative) high school youth. The two treatment conditions consisted of an	**Primary Outcomes:** Prevalence of 3-day smoking **Adverse events:** **Secondary outcomes:** No **Follow-up periods:** 24 months **Evaluation:** Pretest data collection took place between October 1997 and June 1998. Questionnaires at each time point took approximately 40 minutes to complete. The pretest data collection involved the collection of paper and pencil questionnaires and breath samples analyzed for carbon monoxide (CO) content, by staff that did not instruct students at that school. Pretest	**Primary outcomes:** In one-tailed significance tests, health educator-led condition significantly reduced the odds of smoking (OR=0.50; 95% CI 0.31 to 0.81) ; while self instruction condition did not significantly reduced the odds of smoking (OR=0.88; 95% CI 0.63 to 1.12) **Secondary outcomes:** No **Attrition details:** 45% was lost to follow-up after 2-years with no evidence of differential attrition	**Limitations identified by author:** None **Limitations identified by review team**: High attrition rate. The reported 95% CIs and p-values for intervention conditions were from one-tailed tests (rather than the usual two-tailed tests). . **Evidence gaps and/or recommendations for future research:** There is a need for more studies with longer follow-up period **Source of funding:** National Institute on Drug Abuse

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Socioeconomic status: Modal occupations among mothers were minor professionals or small business owners (30%) and unskilled labourers or house workers (25%). Modal occupations among fathers were skilled or semiskilled labourers (40%) and minor professionals or small business owners (34%). **Excluded population:** Not reported **Setting:** Not reported	efficacy condition (health educator-led classroom programme) and a treatment effectiveness condition (health educator-assisted self-instruction programme). The self-instruction materials were designed to reflect key aspects of self-instructional programmed learning. At the beginning of each session a list of goals for the session was stated. At regular intervals review questions were placed to encourage approximations of the desired behaviour.	measures were collected during single classroom sessions during regular school hours. Two-year follow-up surveys were administered only by telephone or by mail because, by that time, fewer than 5% of the targeted students were still enrolled at the continuation high school. All collection efforts were stopped after 4 months of attempting to follow up subjects from a given school, utilizing classroom, mail-out, and telephone tracking protocols. **Method of analysis:** multilevel analysis		

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Intervention category: Single **Intervention period:** 12 sessions **Comparator/s** 'Standard care control condition' **Sample sizes:** **Total n=** 1037 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Not reported **Study sufficiently powered?**			

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Not reported			

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Table 5:60 Sussman et al. 2007

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Sussman **Year:** 2007 **Aim of study:** **Study design:** RCT **Internal validity[§]: -** **External validity[†]: 2**	**Source population/s:** schools **Country:** US **Study year:** n/r **Eligible population:** three counties in southern California **Selected population:** 12 continuation high school **Age:** 13 to 19 **Female:** 37.3% **Race/ethnicity:** 16.4%	**Method of allocation:** The schools were randomly assigned to one of two experimental conditions. Schools were blocked prior to assignment by school size, ethnicity composition, average social economic status, and % of students in classes with English as second language. **Measures to minimise confounding:** adjusted for in the analyses included age, gender, ethnicity, and modified Fagerstrom nicotine dependence level **Intervention/s** The first four sessions	**Primary Outcomes:** Prevalence of weekly use of cigarettes **Adverse events:** Not reported **Secondary outcomes:** knowledge and smoking intention **Follow-up periods:** 1.5, 6, 12 months after pre-test survey **Evaluation:** Pretest and three posttest (immediate, 6 month, and 1 year) measures were collected from students using a self-report, closed-ended and fill-in-the-blank response questionnaire. Questionnaires were administered over one class period. A pipeline assessment protocol was conducted, where self-reported weekly and monthly cigarette use were measured together with CO level, which was assessed with the	**Primary outcomes:** Intervention statistically reduced weekly smoking at immediate post-test (beta (SE)=-6.6(2.9), p=0.038), 6 months [OR=0.33, 0.13 to 0.84), and 1-year (OR= 0.59, 0.36 to 0.97) **Secondary outcomes:** The programme was found to be statistically significant in reducing smoking intention (beta (SE)=-0.21(0.10), p=0.023) and increasing knowledge (beta (SE)=5.5(1.1), p=0.0003) immediate post-test **Attrition details:** 21% and 35% after 6 months and 1- year respectively. Retained sample differed from the lost-to-follow-up sample at the six-month survey on age, ethnicity, gender, living situation, parents' education level, and cigarette smoking prevalence.	**Limitations identified by author:** The classroom adaptation has not been attempted in regular high school settings. **Limitations identified by review team**: Differential attrition. One-sided tests (rather than the usual two-sided tests) were used. The results of weekly smoking at 6-month and 1-year would have just failed to reach statistical significance if two-sided tests were used. **Evidence gaps and/or recommendations for future research:** Future studies should follow-up youths for longer period. **Source of funding:** Tobacco-Related Disease Research Programme

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Socioeconomic status: mother's occupation: 39.% semi-skilled worker **Excluded population:** Not reported **Setting:** Not reported	are held in a two-week period. During that time, students are prepared to strengthen their resolve not to use tobacco in the future. The second four sessions are held approximately once per week during the following month and are focused on intentions not to use tobacco, or quit-attempts. **Intervention category:** Single **Intervention period:** eight sessions delivered over six-week period **Comparator/s** Usual education **Sample sizes:** **Total n=** 1097	use of a vitalograph **Method of analysis:** generalized mixed-linear model		

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		Intervention n= Not reported **Control n=** Not reported **Baseline comparisons:** dissimilar in ethnicity **Study sufficiently powered?** Not reported			

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Table 5:61 Telch et al. 1990

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Telch Year: 1990 **Aim of study:** Cigarette smoking adoption among adolescents cold be suppressed by providing school-based videotape instruction for resisting social influences to smoke **Study design:** RCT **Internal validity[§]: +** **External validity[†]: 3**	**Source population/s:** Schools in South California **Country:** USA **Study year:** 1984 **Eligible population:** Not reported **Selected population:** Seventh grade students in two junior high schools in southern California **Age:** 12 to 13 years **Female:** 46.8% **Race/ethnicity:**	**Method of allocation:** Students in social studies classes in one of the schools were randomly assigned by classroom across three conditions. **Measures to minimise confounding:** Not reported **Intervention/s** 1) Videotape social pressure resistance training alone Videotape. It consisted of five-session interactive videotape programme. In The first session students learned of the negative consequences of smoking and on the social pressure s which influences smoking. The second session showed video of examples of pressure to smoke from peers, media and older role models. The students were then made to rehearse their own counter arguments to various inducements to smoke. In the third session students were presented with three types of counter arguing strategies for resisting smoking appeals from peers and were made to enact the three types of the strategies in front of the class. In the fourth session, students learned about pressures from cigarette advertisements and what they could do to resist media appeals. While in the fifth session, the principles from the previous four lessons were reviewed. 2) Social pressure resistance training with peer leader involvement: Same as the first intervention but in addition, students same age peer leaders were used to provide popular role models advocating a non smoking position.	**Primary Outcomes:** Smoking Prevalence **Adverse events:** Not reported **Secondary outcomes:** Not reported **Follow-up periods:** 7 months **Method of analysis:** cross-tabulation	**Primary outcomes:** tape programme with peers (2.3%), tape programme without peers (9.5%), control 1 (11%), control 2 (11.1) $p<0.001$) **Secondary outcomes:** No **Attrition details:** 19%	**Limitations identified by author:** Interventions were implemented in only one school. The short term follow up **Limitations identified by review team**: Nothing to add **Evidence gaps and/or recommendations for future research:** Need to establish the effect of the intervention in a long term follow up **Source of funding:** Not reported

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	24.1% **Socioeconomic status:** parent's education **Excluded population:** Not reported **Setting:** Not reported	Subjects were administered a 13 page questionnaire to asses their tobacco, alcohol and marijuana use. It also included question on demographic information, peer or parental smoking, beliefs concerning tobacco and self efficacy for resisting pressures to use tobacco. **Intervention category:** Single **Intervention period:** October 1984 to May 1985 **Comparator/s** 1) Intervention school control: students in this category were those enrolled in the randomly selected social studies classes within the treatment school. They completed the questionnaire and the carbon monoxide and saliva test but did not receive the prevention curriculum 2) Survey only control school: Students in the second secondary school in which the smoking prevention survey was not offered. They also completed the questionnaire and carbon monoxide and saliva test **Sample sizes:** **Total n=** 572 **Intervention n=** 237 **Control n=** 335 **Baseline comparisons:** Race (White): Tape programme with peers (18.2) vs. Tape programme without peers (22.4) vs. control 1 (24) vs.			

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		control 2 (31.9) Father's education: Tape programme with peers (35.5%) vs. Tape programme without peers (37.9%) vs. control 1 (39.5%) vs. control 2 (26.7%) Mother's education: Tape programme with peers (38%) vs. Tape programme without peers (46%) vs. control 1 (40.5%) vs. control 2 (36.3%) No significance difference in age and sex across the intervention groups. **Study sufficiently powered?** Not reported			

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Table 5:62 Werch et al. 2005

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Authors: Werch **Year:** 2005 **Aim of study:** To test the efficacy of a brief, multi-health behaviour intervention integrating physical activity and alcohol use prevention messages for high school aged adolescents. **Study design:** RCT Internal validity[§]: + **External validity[†]: 3**	**Source population/s:** Schools **Country:** US **Study year:** 2002 **Eligible population:** Suburban high school in the northeast Florida region **Selected population:** Not reported **Age:** 12 to 13 **Female:** 56% **Race/ethnicity:** 51% **Socioeconomic status:** free meal - 13% **Excluded population:**	**Method of allocation:** Participating students randomly assigned by computer to either the intervention or control group. **Measures to minimise confounding:** Adjustment for baseline substance use scores **Intervention/s** The Project SPORT consultation consisted of an in-person health behaviour screen, a one-on-one consultation, a take-home fitness prescription targeting adolescent health promoting behaviours and alcohol use risk and protective factors, and a flyer reinforcing key content provided during the consultation mailed to the home. These brief prevention technologies and strategies are based on the Integrative Behaviour-Image Model (BIM), which asserts that positive personal and social images, serve as both key motivators for health development, and the glue for unifying health promoting and health risk habits within single	**Primary Outcomes:** 30-day frequency of cigarette smoking **Adverse events:** **Secondary outcomes:** No **Follow-up periods:** 3, 12 months **Evaluation:** The Youth Alcohol and Health Survey was used to collect data on alcohol and drug consumption. Drug use behaviours measured included 30-day frequency of cigarette smoking. Multiple procedures were used to ensure the most reliable and valid data possible **Method of analysis:** Multiple analysis of	**Primary outcomes:** Youth who received SPORT smoked less frequently than control youth ($F(1, 509)=8.72$, $p=0.003$); and were less advanced in their stage of initiation cigarette smoking ($F(1,423)=12.39$, $p=0.000$) **Secondary outcomes:** no **Attrition details:** 15% lost to follow-up after one year, with no evidence of differential attrition	**Limitations identified by author:** Only suburban students included in the study. Lack of measures of factors mediating cigarette use. **Limitations identified by review team**: Short duration of follow-up **Evidence gaps and/or recommendations for future research:** Further research is needed to validate these results. Longer-term follow-up study to evaluate delayed effects of the brief intervention.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Not reported **Setting:** Not reported	interventions. The brief, seven-item Health and Fitness Screen was developed to provide tailored feedback on six health behaviour related areas, and was administered to participants individually during regularly scheduled school hours just prior to implementing the fitness consultation. **Intervention category:** Single **Intervention period:** 12-min one-one consultation **Comparator/s** Minimal Intervention Control: consisted of two commercially prepared generic alcohol prevention and health promotion print materials. The first was a booklet titled: "What Everyone Should Know ABOUT WELLNESS," which included information about wellness, smoking, alcohol, exercise, nutrition, and stress management. The second material contained six-	covariance		There is also need for further study to study effects of addition of booster sessions or re-intervention to extend the effects of brief intervention. Future studies should include students from both urban and rural areas **Source of funding:** National Institute on Alcohol Abuse and Alcoholism

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
		panel pamphlet titled: "For Teens Only: Staying Healthy and Fit," included information about fitness, nutrition, stress management, alcohol and drugs, and changing unhealthy habits. **Sample sizes:** **Total n=** 604 **Intervention n=** Not reported **Control n=** Not reported **Baseline comparisons:** Similar demographic, baseline substance use **Study sufficiently powered?** Not reported			

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Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
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Table 5:63 Winkleby et al. 2004

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
(Winkleby et al. 2004) **Authors:** Winkleby **Year:** 2004 **Aim of study:** To determine the effectiveness of community activity intervention	**Source population/s:** Continuation high Schools in North California **Country:** US **Study year:** 2000 **Eligible population:** 10 continuation high schools in San Francisco - San Jose area	**Method of allocation:** Cluster randomisation. Schools randomised to intervention (n=5) or control (n=5). From each school, 25 students, volunteering to take part, received intervention/control intervention depending on their school. Intervention and control classes were given once a week by research staff at the research centre. **Measures to minimise confounding:** Not reported **Intervention/s** The advocacy intervention used individual and group actions to write and/or speak in support of issues. The curriculum was based on Social Learning and the empowerment theory and aimed to impact social influences, to build awareness of environmental issues such as tobacco advertising and to engage youth in	**Primary Outcomes:** Prevalence of light and regular smoking and non-smoking. **Adverse events:** **Secondary outcomes:** None **Follow-up periods:** Post-intervention and 6 months after the end of intervention. **Evaluation:** Questionnaires were administered by support staff, not affiliated with the curriculum, at baseline, directly after the	Net changes i.e. change in intervention – change in control used to assess intervention effect. **Primary outcomes:** Prevalence of regular smokers: **Baseline to post-intervention**: Intervention: Before 25.1% (7.3) After 21.3% (7.5) Control: Before 25.2% (5.5) After 26.7% (4.8) Net change -5.3% ($p<0.001$) **Post-intervention to 6 month follow-up**:	**Limitations identified by author:** Results are for students that specifically volunteered to take part in this study and results may therefore not be generalisable to other students. **Limitations identified by review team**: The validity of self-reported measures of smoking in the intervention group may be particularly questioned since, the nature of the intervention required students to take an anti-smoking stance. **Evidence gaps and/or**

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
for reducing smoking **Study design:** Cluster RCT Internal validity[§]: + **External validity[‡]: 4**	of northern California **Selected population:** 10 schools **Age:** 16-18 years (11th and 12th grade) **Female:** 56.5% **Race/ethnicity:** 43.5% Latino, 20.9% White, 15.3% mixed ethnicity, 12.6% Asian or Pacific Islander, 4% African American, 3.7% other **Socioeconomic status:** 30.5% had father with education level less than high school **Excluded**	devising strategies to modify environmental influences. Students attended a day-long session aimed to help them develop advocacy skills, practice persuasive communication and present results from community tobacco assessments. Students each chose an advocacy project to implement in their community where they researched issues, developed educational materials, talked with relevant people in power and implemented and evaluated the projects progress. **Intervention category:** Community/school based **Intervention period:** 4 'phases', each given over 1 semester during the 2 intervention years. **Comparator/s** Existing drug and alcohol abuse prevention curriculum was taught to students volunteering in control schools. This was a modified version of the Towards No Drug Abuse programme, focussing on health motivation, social skills and decision making regarding drug and alcohol use. **Sample sizes:** **Total n=** 10 schools, 813 pupils **Intervention n=** 5 schools **Control n=** 5 schools **Baseline comparisons:**	intervention semester and 6 months after the end of the intervention semester. **Method of analysis:** School used as the unit of analysis. Two-tailed, 2-sample t tests used to test net changes	Intervention: After 20.3% (5.7) Control: After 25.6% (4.9) Net change 0.1% (p=0.97) Prevalence of light smoking (SD): **Baseline to post-intervention**: Intervention: Before 36.6% (2.4) After 36.8% (3.2) Control: Before 42.2% (3.9) After 37.3% (3.4). Net change 5.1% (p=0.13) **Post-intervention to 6 month follow-up**: Intervention: After 35.1% (7.4) Control: After 35.3% (5.6) Net change 0.3% (p=0.95) **Secondary outcomes:** None **Attrition details:**	**recommendations for future research:** None **Source of funding:** National Institute on Drug Abuse

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	population: Not reported **Setting:** Schools and communities in San Jose, northern California	There were differences in baseline rates of smoking and in socio demographics but details are not given. **Study sufficiently powered?** Not reported		16%	

§ The internal validity score of a study may vary depending on the reliability and validity of the outcome measures of interest. Score for internal validity: ++ All or most of the criteria have been fulfilled. Where they have not been fulfilled the study conclusions are though **very unlikely** to alter. + Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought **unlikely** to alter the study conclusions. – Few or no criteria have been fulfilled. The study conclusion are thought **likely or very likely** to alter.

† Score for external validity:
1. Likely to be applicable across a broad range of populations and settings.
2. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted.
3. Applicable only to populations or settings included in the studies – the success of broader application is uncertain.
4. Applicable only to settings or populations included in the studies.

6. References

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Appendix 1 Search strategies

Cochrane Library (Wiley) 2008 Issue 4

#1 young next people*

#2 young next person*

#3 young next adult*

#4 adolescent*

#5 youth*

#6 teenage*

#7 girl*

#8 boy*

#9 MeSH descriptor Adolescent explode all trees

#10 child*

#11 (#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10)

#12 school*

#13 academy

#14 academies

#15 city next technology

#16 sixth next form*

#17 education next centre*

#18 secure next unit*

#19 training next unit*

#20 secure next training

#21 referral next unit*

#22 offender near/1 institute*

#23 further next education

#24 MeSH descriptor Schools explode all trees

#25 (#12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24)

#26 health next promotion

#27 health next education

#28 primary next prevention

#29 MeSH descriptor Health Education explode all trees

#30 MeSH descriptor Health Promotion explode all trees

#31 MeSH descriptor Primary Prevention explode all trees

#32 campaign* or teach* or advis* or counsel* or promot* or encourag*

#33 programme* or lectur* or train* or workshop* or seminar* or lesson* or learn* or curricul* or course* or educat*

#34 (#26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33)

#35 (#11 AND #25 AND #34)

#36 smoking

#37 MeSH descriptor Smoking explode all trees

#38 smok*

#39 tobacco*

#40 cigarette*

#41 nicotine*

#42 (prevent* or abstain* or abstin* or stop* or discourag* or anti* or no or non) near/2 (smok*)

#43 (#36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42)

#44 (#35 AND #43)

#45 <nothing>, from 1990 to 2008

#46 (#44 AND #45)

Database: Ovid MEDLINE(R) <1950 to November Week 1 2008>

Search Strategy:

---

1 young people.mp.

2 young person$.mp.

3 young adult$.mp.

4 adolescent$.mp.

5 youth$.mp.

6 teenage$.mp.

7 girl$.mp.

8 boy$.mp.

9 exp Adolescent/

10 Child/

11 child$.mp.

12 or/1-11

13 exp Schools/

14 academy.mp.

15 academies.mp.

16 city technology.mp.

17 sixth form$.mp.

18 education centre$.mp.

19 secure unit$.mp.

20 training unit$.mp.

21 secure training.mp.

22 referral unit$.mp.

23 school$.mp.

24 (offender$ adj institute$).mp.

25 further education.mp.

26 or/13-25

27 26 and 12

28 health promotion.mp. or exp Health Promotion/

29 health education.mp. or exp Health Education/

30 primary prevention.mp. or exp Primary Prevention/

31 (campaign or teach$ or advis$ or counsel$ or promot$ or encourag$).mp.

32 (programme$ or lectur$ or train$ or workshop$ or seminar$ or lesson$ or learn$ or curricul$ or course$ or educat$).mp.

33 or/28-32

34 27 and 33

35 exp Smoking/ or smoking.mp.

36 smok$.mp.

37 tobacco$.mp.

38 cigarette$.mp.

39 nicotine$.mp.

40 ((prevent$ or abstain$ or abstin$ or stop$ or discourag$ or anti$ or no or non) adj2 smok$).mp.

41 or/35-40

42 34 and 41

43 limit 42 to (english language and yr="1990 - 2008")

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <November 12, 2008>

Search Strategy:

---

1 young people.mp.

2 young person$.mp.

3 young adult$.mp.

4 adolescent$.mp.

5 youth$.mp.

6 teenage$.mp.

7 girl$.mp.

8 boy$.mp.

9 child$.mp.

10 or/1-9

11 school$.mp.

12 academy.mp.

13 academies.mp.

14 city technology.mp.

15 sixth form$.mp.

16 education centre$.mp.

17 secure unit$.mp.

18 training unit$.mp.

19 secure training.mp.

20 referral unit$.mp.

21 (offender$ adj institute$).mp.

22 further education.mp.

23 or/11-22

24 health promotion.mp.

25 health education.mp.

26 primary prevention.mp.

27 (campaign or teach$ or advis$ or counsel$ or promot$ or encourag$).mp.

28 (programme$ or lectur$ or train$ or workshop$ or seminar$ or lesson$ or learn$ or curricul$ or course$ or educat$).mp.

29 or/24-28

30 23 and 10 and 29

31 smoking.mp.

32 smok$.mp.

33 tobacco$.mp.

34 cigarette$.mp.

35 nicotine$.mp.

36 ((prevent$ or abstain$ or abstin$ or stop$ or discourag$ or anti$ or no or non) adj2 smok$).mp.

37 or/31-36

38 37 and 30

39 limit 38 to (english language and yr="1990 - 2008")

Database: EMBASE <1980 to 2008 Week 45>

Search Strategy:

---

1 young people.mp.

2 young person$.mp.

3 young adult$.mp.

4 Adolescent/

5 adolescent$.mp.

6 youth$.mp. or exp Juvenile/

7 teenage$.mp.

8 girl$.mp. or exp GIRL/

9 boy$.mp. or exp BOY/

10 Child/

11 child$.mp.

12 or/1-11

13 school$.mp.

14 academy.mp.

15 academies.mp.

16 city technology.mp.

17 sixth form$.mp.

18 education centre$.mp.

19 secure unit$.mp.

20 training unit$.mp.

21 secure training.mp.

22 referral unit$.mp.

23 (offender$ adj institute$).mp.

24 further education.mp.

25 or/13-24

26 health promotion.mp. or exp Health Promotion/

27 health education.mp. or exp Health Education/

28 primary prevention.mp. or exp Primary Prevention/

29 (campaign$ or teach$ or advis$ or counsel$ or promot$ or encourag$).mp.

30 (programme$ or lectur$ or train$ or workshop$ or seminar$ or lesson$ or learn$ or curricul$ or course$ or educat$).mp.

31 or/26-30

32 25 and 31 and 12

33 exp SMOKING/ or smoking.mp.

34 smok$.mp.

35 tobacco$.mp.

36 cigarette$.mp.

37 nicotine$.mp.

38 ((prevent$ or abstain$ or abstin$ or stop$ or discourag$ or anti or no or non) adj2 smok$).mp.

39 or/33-38

40 32 and 39

41 limit 40 to (english language and yr="1990 - 2008")

Database: PsycINFO <1987 to November Week 2 2008>

Search Strategy:

---

1 young people$.mp.

2 young person$.mp.

3 young adult$.mp.

4 adolescent$.mp.

5 youth.mp.

6 teenage$.mp.

7 girl$.mp.

8 boy$.mp.

9 child$.mp.

10 or/1-9

11 school$.mp. or exp Schools/

12 academy.mp.

13 academies.mp.

14 city technology.mp.

15 sixth form$.mp.

16 education centre$.mp.

17 secure unit$.mp.

18 training unit$.mp.

19 secure training.mp.

20 referral unit$.mp.

21 or/11-20

22 21 and 10

23 health promotion.mp. or exp Health Promotion/

24 health education.mp. or exp Health Education/

25 primary prevention.mp.

26 (campaign$ or teach$ or advis$ or counsel$ or promot$ or encourag$).mp.

27 (programme$ or lectur$ or train$ or workshop$ or seminar$ or lesson$ or learn$ or curricul$ or cours$ or educat$).mp.

28 or/23-27

29 22 and 28

30 smoking.mp. or exp Tobacco Smoking/

31 smok$.mp.

32 tobacco$.mp.

33 cigarette$.mp.

34 exp Nicotine/ or nicotine$.mp.

35 ((prevent$ or abstain$ or abstin$ or stop$ or discourag$ or anti or no or non) adj2 smok$).mp.

36 or/30-35

37 36 and 29

38 limit 37 to (english language and yr="1990 - 2008")

Database: HMIC Health Management Information Consortium < October 2008 >

Search Strategy:

---

1 young people$.mp. or exp YOUNG PEOPLE/

2 young person$.mp.

3 young adult$.mp. or exp YOUNG ADULTS/

4 adolescent$.mp.

5 youth.mp.

6 teenage$.mp.

7 girl$.mp. or exp GIRLS/

8 boy$.mp. or exp BOYS/

9 child$.mp.

10 or/1-9

11 exp schools/

12 school$.mp.

13 academy.mp.

14 academies.mp.

15 city technology.mp.

16 sixth form$.mp.

17 education centre$.mp.

18 secure unit$.mp.

19 training unit$.mp.

20 secure training.mp.

21 referral unit$.mp.

22 or/11-21

23 22 and 10

24 health promotion.mp. or exp HEALTH PROMOTION/

25 health education.mp. or exp HEALTH EDUCATION/

26 primary prevention.mp.

27 (campaign$ or teach$ or advis$ or counsel$ or promot$ or encourag$).mp.

28 (programme$ or lectur$ or train$ or workshop$ or seminar$ or lesson$ or learn$ or curricul$ or course$ or educat$).mp.

29 or/24-28

30 22 and 29

31 exp ANTI SMOKING CAMPAIGNS/ or exp SMOKING/ or smoking.mp.

32 smok$.mp.

33 tobacco$.mp.

34 cigarette$.mp.

35 nicotine$.mp.

36 ((prevent$ or abstain$ or abstin$ or stop$ or discourag$ or anti or no or non) adj2 smok$).mp.

37 or/31-36

38 37 and 30

39 limit 38 to yr="1990 - 2008"

Wed Nov 12 6:21:52 EST 2008

CSA

Database: ERIC

Query: (young people or young person* or young adult* or adolescent* or youth or teenage* or girl* or boy* or child*) and (school* or academy or academies or city technology or sixth form* or education centre* or secure unit* or training unit* or secure training or training unit* or secure training or referral unit*) and (health promotion or health education or primary prevention or campaign* or teach* or advis* or counsel* or promot* or encourag* or programme* or lecture* or train* or workshop* or seminar* or lesson* or learn* or curricul* or course* or educat*) and (smok* or smoking or tobaccco* or cigarette* or nicotine*) or (prevent* or abstin* or stop* or discourag* or anti or no or non) and (smok*)

Limit to : English language and yr= 1990-2008

Fri Nov 14 7:54:50 EST 2008

CSA

Database: ASSIA: Applied Social Sciences Index and Abstracts

Query: ((young people) or (young person*) or (young adult*) or adolescent* or youth or teenage* or girl* or boy* or child*) and (school* or academy or academies or (city technology) or (sixth form*) or (education centre*) or (secure unit*) or (training unit*) or (referral unit*)) and ((health promotion) or (health education) or (primary prevention) or campaign* or teach* or advis* or counsel* or promot* or encourag* or programme* or lecture* or train* or workshop* or seminar* or lesson* or learn* or curricul* or course* or educat*) and (smok* or smoking or tobacco or cigarette* or nicotine*) or (prevent* or abstin* or stop* or discourag* or anti or no or non) and smok*

Limit to : English language and yr= 1990-2008

Appendix 2 Sifting checklist – criteria for identifying potentially relevant articles using title/abstract

School-based intervention to prevent smoking sifting criteria – applied to title and abstract of search results

Q1	Is the full paper in English and published from 1990 onwards?	YES / UNCLEAR	Go to Q2	**Reference Manager labelling**
		NO	Exclude	
Q2	Does the study address prevention of uptake of smoking in children?	YES / UNCLEAR	Go to Q3	
		NO	Exclude	
Q3	Was the study carried out in an OECD country?	YES / UNCLEAR	Go to Q4	
		NO	Exclude	
Q4	Is it a school-based intervention or is there a school-based component within a combined intervention?	YES / UNCLEAR	Go to Q5	
		NO	Exclude	
Q5	Is there reporting of outcomes (quantitative or qualitative)?	YES / UNCLEAR	RELEVANT (TAG)	USER DEF 2= get paper
		NO	Exclude	

Member countries of the Organisation for Economic Co-operation and Development (OECD

Australia	Austria
Belgium	Canada
Czech Republic	Denmark
Finland	France
Germany	Greece
Hungary	Iceland
Ireland	Italy
Japan	Korea
Luxembourg	Mexico
Netherlands	New Zealand
Norway	Poland
Portugal	Slovak Republic
Spain	Sweden
Switzerland	Turkey
United Kingdom	United States

Source: http://www.oecd.org/

Appendix 3 Full paper checklist for tagging potentially relevant primary studies

				Reference Manager labelling
Q1	Is the full text **in English**?	Yes	go to Q2	
		No	Exclude	UD[1] 2 = EXCLUDED UD 3 = LANGUAGE
Q2	Was the paper published **1990 onwards**?	Yes	go to Q3	
		No	Exclude	UD 2 = EXCLUDED UD 3 = DATE
Q3	Was the location an **OECD[2] country**?	Yes	go to Q4	
		Unclear[3]	go to Q4	UD 4 = LOC
		No	Exclude	UD 2 = EXCLUDED UD 3 = LOC
Q4	**Population:** is the study concerning children **under 19 years** of age?	Only children under 19	go to Q5	
		Not restricted to children under 19[4]	go to Q5	UD 4 = AGE
		Unclear[3]	go to Q5	UD 4 = AGE
		No	Exclude	UD 2 = EXCLUDED

[1] UD – User Defined field

[2] The list provided with the title and abstract screening checklist also applies here

[3] If a study meets all inclusion criteria except that information is unclear for one or more criteria, the study will be provisionally included and further information obtained

				UD 3 = AGE
Q5	Is it a **school-based intervention** or is there a school-based component within a combined intervention?	School-based only	go to Q6	
		School-based + others[4]	go to Q6	UD 4 = SCH
		Unclear[3]	go to Q6	UD 4 = SCH
		No-school component	Exclude	UD 2 = EXCLUDED UD 3 = SCH
Q6	**Intervention:** does the study address **prevention of uptake** of smoking?	Yes, only uptake	go to Q7	
		Yes, uptake + others (e.g. cessation)[4]	go to Q7	UD 4 = PREV
		Unclear[3]	go to Q7	UD 4 = PREV
		Cessation only	Exclude	UD 2 = EXCLUDED UD 3 = QUIT
		Anything else not addressing prevention of uptake	Exclude	UD 2 = EXCLUDED UD 3 = PREV
Q7	Is the intervention exclusively one of the following: • Interventions to discourage or reduce the uptake of tobacco chewing and the use of smokeless tobacco by children • Tobacco pricing policies or measures to control tobacco smuggling • Interventions to alter the prevalence of smoking substances other than tobacco	No	go to Q8	
		Unclear	go to Q8	UD 4 = INT
		Yes	Exclude	UD 2 = EXCLUDED UD 3 = INT
Q8	The **comparator** was[5]:	Described	go to Q9	

[4] If a study meets all inclusion criteria except that it is unclear if the mixed population, intervention and/or comparator can be disaggregated, the study will be provisionally included and further assessed

		Unclear[3]	go to Q9	UD 4 = COM
		Not described	Exclude	UD 2 = EXCLUDED UD 3 = COM
Q9	Is there reporting of **outcomes** (quantitative or qualitative)?	Yes	go to Q10	
		Unclear[3]	go to Q10	UD 4 = OUT
		No	Exclude	UD 2 = EXCLUDED UD 3 = OUT
Q10	**Study type**[5]	RCT	Include	UD 2 = INCLUDED UD 3 = RCT
		Controlled before and after	TBD[6]	UD 2 = TBD UD 3 = CBA
		Before and after	TBD[6]	UD 2 = TBD UD 3 = BA
		Cohort study	TBD[6]	UD 2 = TBD UD 3 = CH
		Case control	TBD[6]	UD 2 = TBD UD 3 = CC
		Interrupted time series	TBD[6]	UD 2 = TBD UD 3 = ITS
		Other longitudinal[7]	TBD[6]	UD 2 = TBD UD 3 = OTHER
		Systematic review	Tag for reviews	UD 2 = TAG UD 3 = SR
		Economic	Tag for economics	UD 2 = TAG UD 3 = ECON
		Qualitative	Tag for Review 2	UD 2 = TAG UD 3 = QUA

[5] Tentative inclusion criteria which will be discussed with CPHE at a later stage

[6] To be discussed with CPHE

[7] There is at least one follow up measure after baseline and not covered by any of the designs above

		Other[3]	TBD[6]	UD 2 = TBD UD 4 = DES

Appendix 4 List of excluded studies and reasons for exclusion

Articles excluded based on design

(these articles did not describe a randomised controlled trial or a non-randomised controlled trial; for example, before-and-after studies without control groups, cross-sectional surveys, qualitative studies, systematic reviews)

1. 1993, *California Program To Prevent and Reduce Drug, Alcohol, and Tobacco Use among In-School Youth: An Interim Report about Tobacco Use. Report No. 2*.

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Articles excluded based on intervention:

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Articles excluded based on population:

(these studies did not aim at children and younger people under 19 years of age attending educational institutions, for example young people aged 19 and older)

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Appendix 6 Overview of Controlled Before and After studies

Table 6:1 Overview of controlled before and after studies

Author/year of publication Country	Project name	Target age (age covered by intervention)	Focus of intervention	Year of intervention	Longest follow up	N sample size	Components	Comment/additional information
Lennox 2008 US	The NARCONON drug education	14 - 20	Drug prevention	2004	6 months	995		
Slater 2006 US		11 – 18	Drug prevention	1999	2 years	4216		with three treatment arms: 1) school+media, 2) media-only, 3) school-only
Cote 2006 Canada		10 to 12	Smoking (tobacco) prevention	1997	26	1173		

Author/year of publication Country	Project name	Target age (age covered by intervention)	Focus of intervention	Year of intervention	Longest follow up	N sample size	Components	Comment/additional information
Josendal 2004 Norway	BE smokeFREE	12 – 13	smoking prevention	1994	3 years	4441	social influence	with three treatment arms: (1) classroom curriculum+teacher course+parental involvement, (2) classroom curriculum+parental involvement, and (3)classroom curriculum+teacher course
Hanewinkel 2004 Germany		10 – 12	smoking prevention	1999	15 months	1858		
Zollinger 2003 US	The Marion County (Indiana) Tobacco-Free Youth Initiative	13 – 14	Smoking (tobacco) prevention	1997	4 years	1598		Components of the intervention: school-based, community-based, and multimedia public education

Author/year of publication Country	Project name	Target age (age covered by intervention)	Focus of intervention	Year of intervention	Longest follow up	N sample size	Components	Comment/additional information
Cuijpers 2002 Netherlands	Healthy School Drug	12	Drug prevention		3 years	1930		
Edvardsson 2000 Sweden	A Non-Smoking Generation	9 to 12	smoking prevention	1994	2 years	2015	school-only	
Svoen 1999 Norway		12 – 15	smoking prevention	1992	3 years	551		
Moon 1999 UK	The Wessex Healthy Schools Award	11 to 16	health promotion: smoking, diet, and sport	1995	3 years		school-only	
Vartianen 1997 Finland	North Karelia Youth Project	12 – 13	Health promotion: smoking, diet, and cardiovascular	1978	15 years	903	social influence	Components of the intervention: school-based, community-based, and mass communication

Author/year of publication Country	Project name	Target age (age covered by intervention)	Focus of intervention	Year of intervention	Longest follow up	N sample size	Components	Comment/additional information
Tang 1997 Australia		10 – 12	smoking prevention	1994	1 year	5270	school-only	Components of the intervention: school-based, community-based, and parental support
Flynn 1997 US		9 to 12	smoking prevention	1985	4 years	2860		media intervention added to school-based versus school-only
Donaldson 1994 US	Adolescent Alcohol Prevention Trial	10 – 13	Drug prevention		2 years	3077		
Perry 1992 US	Minnesota Heart and Health Program	11 – 18	Cardiovascular disease prevention	1983	6 years	2401		Components of the intervention: school-based, community-based, and mass communication

Author/year of publication Country	Project name	Target age (age covered by intervention)	Focus of intervention	Year of intervention	Longest follow up	N sample size	Components	Comment/additional information
Pentz 1990 US	The Midwestern Prevention Program	11 – 13	Drug prevention	1984	2 years	5378		Intervention components: school-based, parent program, community organization, health policy change, and mass media coverage
Johnson 1990 US	The Midwestern Prevention Program	11 – 13	Drug prevention	1984	3 years	1607		Intervention components: school-based, parent program, community organization, and mass media. Control components: community organization, and mass media
Johnson 2007 US		11 – 14	smoking prevention	2000	2 years	3358	school-only	

Author/year of publication Country	Project name	Target age (age covered by intervention)	Focus of intervention	Year of intervention	Longest follow up	N sample size	Components	Comment/additional information
Griffin 2006 US		12 – 13	Drug prevention		2 years	1538	school-only	
Robinson 2003 US		14 – 17	Drug prevention		2 years	2114	school-only	
Vartiainen 1996 Finland	No Smoking Class' competition	13 – 14	smoking prevention	1989	1 year	23012	school-only	
Hawthorne 1996 Australia	Life Education	11 to 12	Drug prevention	1992	5 years	1721	school-only	
De Vries 1994 Netherlands			smoking prevention	1986	1 year	1529	school-only	

Author/year of publication Country	Project name	Target age (age covered by intervention)	Focus of intervention	Year of intervention	Longest follow up	N sample size	Components	Comment/additional information
Hecht 2006 US	Keepin' it REAL	12 – 13	Drug prevention	1998	14	6298	school-only	
MMWR 2001 US	Tobacco Prevention and Education Program	12 – 13	Smoking (tobacco) prevention	1997	2 years	5556	school-only	
Wilborg 2002 Germany	Be Smart - Don't Start	Av age = 12.9	smoking prevention	1998	1 year	2142	school-only	
Gonzales 2004 US		17 to 18	Smoking (tobacco) prevention	2000	1 year	609	social influence	media literacy school-based health education

Author/year of publication Country	Project name	Target age (age covered by intervention)	Focus of intervention	Year of intervention	Longest follow up	N sample size	Components	Comment/additional information
Meshack 2004 US		11 – 12	Smoking (tobacco) prevention	2000	6 months	3618		Intervention components: school-based, parent program, community organization. Control components: mass media
Fraguela 2003 Spain		14 - 16	Drug prevention		4 years	1029	school-only	
Sussman 1993	Project SHOUT	12 – 13	Smoking (tobacco) prevention		5 years	4852	social influence	
Flynn 1995 US		10 – 15	smoking prevention		6 years	5458		school-based plus mass media versus school-based

Author/year of publication Country	**Project name**	**Target age (age covered by intervention)**	**Focus of intervention**	**Year of intervention**	**Longest follow up**	**N sample size**	**Components**	**Comment/additional information**
Lammers 1996 US	The Growing Healthy Curriculum	13 – 14	health education	1994	4 years	7237	school-only	
Shope 1998 US		11 – 13	Drug prevention	1993	5 years	1057	school-only	
MacKinnon et al. 1991 US (Kansas)	School component of the Midwestern Prevention Project	11 – 13	Drug prevention	1991	1 year	5065		First year transition from elementary school to middle or junior high school

Follow-up less than 6 months

Beltramini 2001

Brown 2007

Chen 2001

Hamm 1994

Doi 1993

Amtman 1990

Kalke 2004

Harmon 1993

No relevant outcome

Yoffe 1992

Yoffe 1994

Pinkleton 2007

Botvin 1995

Stevens 1996

Elias 1991

Langlois 1999

Sample size less than 500

Zaveli 2004

Webster 2002

Webster 2002

Webster 2002

Perry 1999

Price 1998

Shope 1996

Prince 1995

Morgan 1994

Elder 1993

Wiist 1991

Morberg 1990

Kishcuk 1990

Perry 1990

Lee 2007

Aslan 2007

Tatchel 2004

Austin 2005

Reinert 2003

Reinert 2004

Cherry 1997

Price 1998

Prilli 2000

Non-OECD

Nihiokan 2005

Table 6:2 Evidence table: UK – CBA study – Wessex Healthy Schools Award

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
Wessex Healthy Schools Award (WHSA) **Authors: Moon et al** **Year: 1999** **Aim of study:** To examine effectiveness of the WHSA intervention in changing health promotion policy & practice in school, and in influencing health-related knowledge, attitudes and behaviour of pupils **Study design:** CBA **External validity[†]:** **1**	**Source population/s:** secondary schools **Country:** UK **Study year:** Autumn 1995 **Eligible population:** 11 – 16 year-old age **Selected population:** students from secondary school **Age:** 11 - 16 **Female:** **Race/ethnicity:** 1 to 20% Asian; 1 to 2% Afro-Caribbean **Socioeconomic status:** 4 to 49% received free school meals **Excluded population:** Not reported	**Method of allocation:** Quasi-experimental, 11 intervention and 5 control schools **Measures to minimise confounding:** Not reported **Intervention/s** Curriculum covers: a smoke-free school, healthy food choices, physical activity, responsibility for health, health promoting workplace, environment and equal opportunities and access to health. **Intervention category:** school-based **Intervention period:** Not reported **Comparator/s** No intervention **Sample sizes:** **Total n=** 2286	**Primary Outcomes:** Smoking prevalence (current) **Adverse events:** not reported **Secondary outcomes:** Knowledge scores, school performance **Follow-up periods:** 15 months **Method of analysis:** Mean difference	**Primary outcomes:** Change in current smokers from baseline MD(SD): Males [intervention = -4.4(12.9); control=2.6(8.7)] and Females [intervention=-5.8(21.3); control=5.5(6.7)] **Secondary outcomes:** Not reported **Attrition details:** **76% lost to follow-up**	**Limitations identified by author:** Difficulty in recruiting control schools and low power to detect statistically significant difference. The research did not specifically explore extent to which the intervention schools achieved a whole school approach to health promotion. The observation tool did not prove to be a reliable indicator of change.

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
	Setting: Not reported	**Intervention n=** 942 **Control n=** 1344 **Baseline comparisons:** (similar/dissimilar) **Study sufficiently powered?**			**Limitations identified by review team**: Short follow-up period **Evidence gaps and/or recommendations for future research:** Need for further investigation of evaluation methodology issues for healthy environments **Source of funding:** South West Regional Research and Development Directorate

§ The internal validity score of a study may vary depending on the reliability and validity of the outcome measures of interest. Score for internal validity: ++ All or most of the criteria have been fulfilled. Where they have not been fulfilled the study conclusions are though **very unlikely** to alter. + Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought **unlikely** to alter the study conclusions. – Few or no criteria have been fulfilled. The study conclusion are thought **likely or very likely** to alter.

† Score for external validity:

Study details	Population and setting	Method of allocation to intervention/control	Outcomes and methods of analysis	Results	Notes
17. Likely to be applicable across a broad range of populations and settings. 18. Likely to be applicable across a broad range of populations and settings, assuming it is appropriately adapted. 19. Applicable only to populations or settings included in the studies – the success of broader application is uncertain. 20. Applicable only to settings or populations included in the studies.					

Appendix 7 Quality assessment of included randomised controlled trials

authors	Appropriate and clearly focused question	Random assignment	Adequate concealment method	Blind subjects and investigators about intervention allocation	Groups similar at baseline	The only difference between groups is the intervention	Relevant outcomes measured in a standard, valid and reliable way	Drop out rate <20% and similar drop out between groups?	Intention-to-treat analysis	Results are comparable for all sites	Contamination between groups acceptably low	Internal validity
Abernathy 1992	yes	yes	ct	no	ct	yes	yes	yes	no	yes	yes	+
Armstrong 1990	yes	yes	ct	no	no	yes	yes	no	no	yes	no	-
Ary 1990	yes	yes	ct	no	ct	yes	yes	no	no	yes	yes	-
Ausems 2002	yes	yes	ct	no	yes	yes	yes	yes	no	yes	yes	++
Ausems 2004	yes	partly	ct	ct	no	yes	yes	no	no	yes	yes	-
Aveyard 2001	yes	yes	ct	no	no	yes	yes	yes	yes	yes	yes	+
Biglan 2000	yes	yes	ct	ct	yes	yes	yes	yes	no	ct	yes	++
Bond 2004	yes	yes	ct	no	no	yes	yes	yes	yes	yes	Yes	+
Botvin 1990a	yes	yes	ct	no	no	yes	yes	no	ct	yes	Yes	-
Botvin 1990b	yes	yes	ct	ct	ct	yes	yes	no	no	yes	Yes	-

Botvin 2001	yes	yes	ct	ct	yes	yes	yes	no	ct	yes	Yes	+
Brown 2001	yes	yes	ct	no	yes	yes	yes	no	ct	yes	No	+
Brown 2002	yes	yes	ct	ct	yes	yes	yes	yes	ct	yes	Yes	++
Brown 2005	Yes	Yes	ct	No	Ct	yes	Yes	Yes	No	Yes	Yes	++
Buller 2008a	yes	yes	ct	no	yes	yes	yes	yes	ct	yes	Yes	++
Buller 2008b	yes	yes	ct	no	yes	yes	yes	no	ct	yes	Yes	+
Byrne 2005	Yes	Yes	Ct	No	No	Yes	Es	No	No	Yes	No	-
Cameron 1999	yes	yes	ct	no	yes	yes	yes	yes	yes	ct	Yes	++
Campbell 2008	yes	yes	yes	no	no	yes	yes	yes	yes	ct	Yes	+
Chatrou 1999	yes	yes	ct	no	no	yes	yes	yes	no	yes	No	-
Connell 2007	yes	yes	ct	no	no	yes	yes	no	ct	ct	Yes	-
Crone 2003	yes	yes	ct	no	no	yes	yes	no	yes	yes	Yes	-
de Vries 2006	yes	yes	ct	ct	ct	yes	yes	no	no	ct	Yes	-
Dent 1995	yes	yes	ct	ct	ct	yes	yes	ct	ct	ct	Yes	-
Dent 2001	yes	yes	ct	ct	yes	yes	yes	no	yes	yes	yes	+
Dijkstra 1999	yes	yes	ct	ct	ct	yes	yes	no	no	ct	yes	-
Eisen 2003	yes	yes	ct	no	yes	yes	yes	no	no	yes	yes	+
Elder 1993	yes	yes	ct	ct	no	yes	yes	no	ct	yes	yes	-
Elder 1996	yes	yes	ct	ct	ct	yes	yes	yes	yes	yes	yes	+
Elder 2002	yes	yes	ct	yes	ct	yes	yes	yes	yes	yes	yes	+
Ellickson 1993	yes	yes	ct	no	ct	yes	yes	no	no	yes	yes	-

Ellickson 2003	yes	yes	ct	no	no	yes	yes	yes	no	ct	yes	+
Ennet 1994	yes	partly	ct	no	no	yes	yes	no	no	yes	yes	-
Flay 1995	yes	yes	ct	no	yes	yes	yes	no	ct	yes	yes	+
Gatta 1991	yes	yes	ct	no	yes	yes	yes	no	ct	yes	yes	+
Gordon 1997	yes	yes	ct	no	ct	yes	yes	ct	ct	yes	yes	-
Hansen & Graham 1991	yes	yes	ct	no	no	yes	yes	yes	ct	yes	no	+
Johnson 2005	yes	yes	ct	no	yes	yes	yes	no	yes	ct	no	+
Jøsendal 1998	yes	yes	ct	ct	yes	yes	yes	yes	ct	yes	yes	++
Kellam 1998	yes	yes	ct	ct	no	yes	yes	no	no	yes	no	-
Klepp 1994	yes	partly	no	no	no	yes	yes	no	no	ct	yes	-
Lynam 1999	yes	yes	ct	no	yes	yes	yes	no	no	yes	yes	+
Murray 1992	yes	yes	ct	no	yes	yes	yes	no	ct	yes	yes	+
Noland 1998	yes	yes	ct	ct	yes	yes	yes	yes	no	ct	yes	++
Nutbeam 1993	yes	yes	ct	ct	no	yes	yes	yes	ct	ct	yes	+
Perry 2003	yes	yes	ct	no	yes	yes	yes	yes	ct	yes	yes	++
Peterson 2000	yes	yes	no	no	yes	yes	yes	yes	yes	no	yes	++
Piper 2000	yes	yes	ct	no	yes	yes	yes	no	no	ct	yes	+
Ringwalt 1991	yes	yes	ct	ct	no	yes	yes	yes	no	yes	yes	+
Schinke 2000	yes	yes	ct	ct	ct	yes	yes	yes	ct	ct	yes	+
Schofield 2003	yes	yes	ct	no	ct	yes	yes	no	ct	ct	yes	-
Schulze 2006	Yes	Yes	Ct	No	No	Yes	Yes	No	No	Yes	Yes	+

Shean 1994	yes	yes	ct	ct	ct	yes	yes	no	ct	ct	yes	-
Simons-Morton 2005	yes	yes	ct	no	ct	yes	yes	no	no	ct	yes	-
Snow 1992	yes	yes	ct	no	ct	yes	yes	no	ct	yes	yes	-
Spoth 2001	yes	yes	ct	no	yes	yes	yes	no	ct	yes	yes	+
Spoth 2002	yes	yes	ct	no	no	yes	no	yes	yes	yes	yes	-
Storr 2002	yes	yes	ct	no	no	yes	yes	yes	ct	yes	no	-
Sun 2006	yes	yes	ct	ct	yes	yes	yes	no	no	yes	yes	+
Sun 2008	yes	yes	ct	no	no	yes	yes	no	no	yes	yes	-
Susanne 2003	yes	yes	ct	ct	ct	yes	yes	no	no	yes	yes	-
Sussman 2007	yes	yes	ct	no	no	yes	yes	no	no	ct	yes	-
Telch 1990	yes	yes	ct	no	no	yes	yes	yes	ct	yes	no	+
Werch 2005	yes	yes	ct	no	yes	yes	yes	yes	no	yes	no	+
Winkleby 2004	yes	yes	ct	no	no	yes	yes	yes	no	yes	yes	+

Appendix 8 Index of interventions, reference publications and related publications

School-based interventions evaluated in included RCTs are listed alphabetically according to the name/acronym of the programme/trial. (Please note that the word 'Project' may be omitted for the purpose of indexing, for example, Project Towards No Drug Abuse (TND) is indexed under T rather than P).

Adolescent Alcohol Prevention Trial (AAPT)

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
AAPT	**(Hansen & Graham 1991)**	629	Included	Main report, results for the 7th grade students
	(Hansen et al. 1991)	10657	Included	Program effectiveness based on the quality of the program delivery: results based on the 5th grade students
	(Taylor et al. 2000)	10658	Included	Further analysis (5-year follow up) based on growth curve modelling approach
	(Donaldson et al. 2000)	2172	Included	Further analysis using reciprocal best friend reports for verifying self-reported substance use
	(Palmer et al. 1998)	498	Included	Methodological paper applying multilevel analytic strategies using the trial data (first

				and second year follow up measures taken in the fall of 1988 and 1989)

Study name	Population	Intervention	Outcome
Adolescent Alcohol Prevention Trial (Hansen & Graham 1991)	-12 junior high schools in Los Angeles and California -students in grade 7 (12 to 13 years) - 55.4% female and 38.8% white	-social influence -The first program (information) consisted of four 45-min lessons about social and health consequences of using alcohol and other drugs. The second program (Resistance Training) consisted of four lessons about the consequences of using substances plus five lessons that taught students to identify and resist peer and advertising pressure to use alcohol and other substances. The third program (Normative Education) included four information lessons plus five lessons that corrected erroneous perceptions of the prevalence and acceptability of alcohol and drug use among peers and established a conservative normative school climate regarding substance use. The fourth program (Combined) included three lessons about information, three and one-half lessons teaching resistance skills, and three and one-half lessons establishing conservative norms.	Normative education classes had lower rates of ever smoking cigarettes (8.1% vs. 10.3%, p=0.0311

Adolescent Decision-Making (ADM) Program

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment

ADM Program	**(Snow 1992)**	10393	Included	2-year follow-up, intervention I (grade 6)
	(Snow et al. 1997)	10656	Included	4-year follow-up assessing both intervention I and intervention II (grade 8/9)

Study name	**Population**	**Intervention**	**Outcome**
Adolescent Decision-Making (ADM) Program (Snow 1992)	-schools in grade six (11 to 12 years) -48.5% female	-based on social cognitive approach to substance use -intervention 1) 12 forty minutes weekly classroom session 2) 12 forty minutes weekly classroom sessions to reinforce and extend social-cognitive skills domain taught in grade six	-intervention was effective: those in intervention group had lower use of tobacco after 2-year follow-up (F=2.87 (11073), p<0.09)

Adolescent Transition Program (ATP)

Study name (if available)	**Author year**	**Ref ID**	**Inclusion/exclusion**	**Comment**
ATP Incorporating the Family Check-up (FCU) and SHAPe curriculum, a reduced version of Life Skills Training	**(Connell et al. 2007)**	204	Included	Main report, 5 year-follow-up

Study name	**Population**	**Intervention**	**Outcome**
Adolescent Transition Program (ATP) Incorporating the Family Check-up (FCU) and SHAPe curriculum, a reduced version of Life Skills Training	-3 middle schools -students in 6th grade (11 to 12 years) - 47.3% female and 42.3%	- the intervention followed the adolescent transition program (ATP) -family resource centre (FRC) was made available for the students in school while the parent centered service were made available to	- students whose parents engaged in family check up exhibited less growth in tobacco

(Connell 2007)	white	all intervention students and their families -the SHApe curriculum is made of 6 class lessons -families were offered family check up when students were in grade 7 and 8: brief 3-session intervention	

ALERT

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Project ALERT	**(Ellickson et al. 1993b)**	601	Included	5-year follow-up
	(Ellickson 1998)	8571	Included	Book chapter summarising lessons learnt from the project
	(Bell et al. 1993)	595	Included	24-month follow-up
	(Ellickson et al. 1993a)	3189	Included	Multivariate analysis using 15-month data
	(Ellickson & Bell 1990)	2895, 9538	Included	15-month follow-up
Revised Project ALERT/ ALERT Plus	**(Ellickson et al. 2003)**	370	Included	18-month follow-up
	(Orlando et al. 2005)	293	Included	18-month follow-up, analysis of mediation variables (secondary outcomes)
	(Ghosh-Dastidar et al. 2004)	333	Included	18-month follow-up, subgroup analysis (high, moderate, low risk)
	(Longshore et al. 2007)	222	Included	30-month follow-up (from the baseline of the Revised Project ALERT)

Study name	Population	Intervention	Outcome
Project ALERT (Ellickson 1993)	-30 California and Oregon schools from rural, suburban and urban communities -Grade 7 (12 to 13 years) students -48% female and 67% white	-Social influence model - one treatment groups treated by adult health educators while older teens assisted adult teacher -students received eight lessons in grade seven and three additional in grade eight	Program was effective in reducing uptake of smoking. Teen-leader effect vs. control=8.3% vs. 9.7%. Adult- only effect vs. control= 9.1% vs. 9.7%
Revised Project ALERT (Ellickson 2003)	- 55 South Dakota middle schools -Grade 7 (12 to 13 years) students -50% female and 87.5% white	- Same as Ellickson 1993 - In addition students received three additional lessons to the eight lessons in grade seven -the first treatment groups did not receive booster sessions in grades nine and ten while the second treatment group did receive booster sessions	Project ALERT reduced the proportion of new smoker (ever use) by 19% (p<.01). It also held down both current and regular smoking by 23% (p<.01)

ASSIST (A Stop Smoking In Schools Trial)

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
ASSIST	**(Campbell et al. 2008)**	187	Included	Main report, 2 year-follow-up

Study name	Population	Intervention	Outcome
ASSIST (A Stop Smoking In Schools Trial)	- 59 secondary schools in England and Wales	-social influence -training influential students to act as peer	- Odds (OR) of smoking in the past week -At 1 year post-intervention:

(Campbell 2008)	- (students in year 8) 12 to 13 years - 49% female	supporters during informal interactions outside the classroom to encourage peers not to smoke -10-week intervention period during which peer supporters undertook informal conversation about smoking with peers	0.77 (CI 0.59-0.99) p=0.043 -2 year follow-up: 0.85 (CI 0.72-1.01) p=0.067

BE smokeFREE

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
BE smokeFREE	**(Josendal et al. 1997)**	8603	Included	Main report, 3 year follow up
	(Josendal et al. 2004)	8171	Included	

Study name	Population	Intervention	Outcome
BE smokeFREE (Josendal 1998)	-99 schools in Norway -students in grade 7 (12 to 13 years) -49.4% female	-intervention based on social influence -consisted of eight sessions for the school year -themes were personal freedom, freedom to choose, freedom from addiction, to make own decision, training social skills to resist smoking pressure and short term consequences of smoking - The intervention were 1) School classes, teacher training, parent involvement 2) school classes, parent involvement 3) school classes, teacher training	-intervention was effective -control=6.2%, p<0.05 -school classes, teacher training, parent involvement=(4.1%, p<0.05) - school classes, parent involvement=(5.9%, p<0.05) -school classes, teacher training =(5.4%, p<0.05)

The Brabant smoking prevention programme

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
The Brabant smoking prevention programme	**(Chatrou et al. 1999)**	10649	Included	Main report, 1 year follow-up

Study name	Population	Intervention	Outcome
The Brabant smoking prevention programme (Chatrou 1999)	-48 schools -Ages 12 to 14 years (transition between elementary and high schools) -56% female	-information giving -three lessons given to first or second year pupils in three consecutive weeks -the two intervention were 1) emotional/self group: intervention aimed at providing non-smoking adolescents with knowledge on smoking effects as well as exploring the emotional aspects of risky behaviour 2) Health/technical group: students shown same video as treatment group 1 but discussions centred on the health and technical aspects of smoking.	-Program was not effective through out the follow up period. -6 months: 1) 11.9% (ns) 2) 19.4% (ns) Control= 15.2% -18 months: 1) 20.2% (ns) 2) 25.6% (ns) Control= 20.9%

Child and Adolescent Trial for Cardiovascular Health (CATCH)

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment

CATCH	**(Elder 1996)**	8667	Included	2.5 year follow-up
	(Johnson et al. 2003)	10655	Included	7-year follow-up (survey of teachers) regarding use of the CATCH materials; did not report smoking outcomes
	(Johnson et al. 2002)	9836	Include	5-year follow-up
	(Nader et al. 1999)	494	Included	3-year follow-up
	(Nader et al. 1996)	548	Included	2.5 year follow-up; did not report smoking outcomes
	(Edmundson et al. 1996)	550	Included	1.5 year follow-up; did not report smoking outcomes

Study name	**Population**	**Intervention**	**Outcome**
Child and Adolescent Trial for Cardiovascular Health (CATCH) (Elder 1996)	-96 elementary schools - students in grade 5 (10 to 11 years) - 51% female and 71% Caucasians	-based on principle derived from Social Learning theory and Organizational change -intervention started in grade five: it included promotion of smoke-free schools, classroom teaching curriculum, and home based intervention - class room intervention: four 50minutes lessons focusing on dangers, cost, benefits of not using and poor acceptability -home based intervention: 4 sessions to complement school lessons -Policy-level intervention: to promote the adoption of a formal policy to be tobacco free within the intervention schools.	No significant differences between intervention and control group.

Project Chrysalis

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Project Chrysalis	**(Brown 2001)**	8468	Included	2 year follow-up

Study name	Population	Intervention	Outcome
Project Chrysalis (Brown 2001)	-12 elementary high schools -ages 14 to 17 years -100% female	-social influence -school based support groups were the primary intervention -school counselors in collaboration with therapists from a community-based child abuse treatment agency delivered the curriculum for those support groups	% less likely to try tobacco 2 years following the programme treatment (attended >11 activities vs. attended <11 activities) vs. control (62.5% vs. 27.3%) vs. 30%

Classroom Centred (CC) intervention incorporating the 'Good Behavior Game' & Family-School Partnership (FSP) intervention

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Classroom Centred (CC) intervention incorporating the 'Good Behavior Game' & Family-School Partnership (FSP) intervention	**(Storr et al. 2002)**	409, 4212, 8381	Included	6-year follow-up
	(Furr-Holden et al. 2004)	1824	Included	7-year follow-up

Study name	Population	Intervention	Outcome
Classroom Centered (CC) intervention incorporating the 'Good Behavior Game' & Family-School Partnership (FSP) intervention (Storr 2002)	-9 primary schools in Baltimore - 6 to 7 years -49% female and 11.4 5 white	-social competence -Classroom centered intervention consisted of three components: Curriculum enhancements, enhanced behaviour management practices, back-up strategies for children not performing adequately - Family school partnership intervention was designed to improve achievement and reduce early aggression, shy behaviour and concentration problems by enhancing parent–teacher communication and providing parents' with effective teaching and child behaviour management strategies.	- reduction in the risk of smoking initiation for students in the two intervention compared to the control: School based: (RR=0.57; 95% CI 0.34 to 0.96) Family based: (RR=0.69; 95% CI 0.50 to 0.97)

Project CLASP

CLASP	**(Telch et al. 1990)**	649	Included	Preliminary result, 7 months follow-up

Study name	Population	Intervention	Outcome
Project CLASP (Telch 1990)	-2 junior high schools -students in 7th grade (14 to 17 years) -46.8% female and 24.1% white	-social influence -social resistance training: five-session interactive videotape program over three week period -social resistance training with same age peer leaders	-program was effective -tape program with peers (2.3%), tape program without peers (9.5%), control 1 (11%), control 2 (11.1) $p<0.001$)

Consider This Program

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Consider This Program	**(Buller et al. 2008)**	3365	Included	Internet delivered smoking prevention program in two countries (Australia and USA)

Study name	Population	Intervention	Outcome
Consider This Program (Buller 2008)	-21 schools in USA and 25 in Australia - Students in grade six to nine (11 to 13 years) -51.2% female in America and 51.5% in Australia -51.7% white in America and 72.2% in Australia	Social competence model. 73 online activities organized into six modules: Introduction, media literacy, relationships, mind and body, decision making, and resistance strategies. Each session lasted 45 to 60 minutes Students in control group received standard health education.	-The program was not effective in America while it was effective in Australia. -American Trial estimate=0.0247, p=0.122 -Australian Trial Pre-test: Intervention vs. Control= 13.1% vs. 11.2% Post-test: Intervention vs. Control= 12.7%% vs. 14.3%

DARE

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Project DARE (Drug Abuse Resistance Education)	**(Lynam et al. 1999)**	2316	Included	10 year follow-up
	(Dukes et al. 1997)	2915	Included	6 year follow-up
	(Clayton et al. 1996)	549	Included	5 year follow-up
	(Wysong & Wright 1995)	10651	Included	General overview

Project DARE	**(Ringwalt et al. 1991)**	2848	Included	Main report
Illinois DARE Study	**(Ennett et al. 1994)**	2713	Included	2-year follow up
	(Rosenbaum et al. 1994)	574	Included	Main report, 1-year follow-up
Project DARE and DARE plus	**(Perry et al. 2003)**	1923	Included	Main report, 2 year-follow-up
	(Perry et al. 2000)	10661	Included	Overview of the study

Study name	**Population**	**Intervention**	**Outcome**
Project DARE (Lynam 1999)	- 31 elementary schools - Lexington-Fayette county public schools - grade six (11 to 12 years) - 49% female and 75% white	- same as Ringwalt 1991 -information about drugs, teaching decision-making skills, building self esteem & alternatives to drug use - Delivered by police officers in 1-hour sessions over 17 weeks after going through 80 hour training course -control group received drug education delivered by health teachers -focused on identification and harmful effects of drugs, peer pressure and videos often shown	DARE had no effect on cigarette use after 10 years of follow up.

Project DARE (Ringwalt 1991)	-20 North Carolina elementary schools -Grades five and six (10 to 12 years) -52% female and 40% white	-based on social influence model - 17 weekly lessons offered once a week for 45 to 60 minutes -officers received 2 weeks intensive training	DARE had no statistically significant effect on cigarette use. Pre-test: DARE vs. control= 18.2% vs. 16% Post-test: DARE vs. control=22.3% vs. 22.1%
Illinois DARE (Ennett 1994)	-36 elementary schools in Northern and central Illinois stratified by metropolitan status (Urban, suburban and rural) - grades five or six (11 to 12 year old students) -49% female and 54% white	- same as Ringwalt 1991	DARE had no statistically significant effect immediately after DARE, 1 year or 2 years later. Immediate Post DARE:OR=0.63, 0.38 to 1.04 At 12 months: OR=0.93, 0.63 to 1.36 At 24 Months: OR=0.99, 0.67 to 1.47
Project DARE and DARE plus (Perry 2003)	-24 middle and junior high schools in Minnesota -Grade seven students -48.4% female and 67.3% white	1)DARE middle and junior high school -focused on skills in resisting influences to drug use, handling violent situations, character building and citizenship skills -10 session curriculum delivered by police officers -Officers to have received training in elementary school DARE curriculum, taught at least 2 semesters of DARE, received training in middle and junior high school curriculum 2)DARE Plus: First Component: classroom based, peer-led,	-Only DARE plus intervention was effective -DARE plus vs. control= 0.18 vs. 0.31, p=0.02

		parental involvement program -4 session program implemented by trained teachers once a week for 4 weeks -focused on influences and skills related to peers, social groups, media and role models -includes classroom activities led by trained peer leaders and home team activities for students to complete with their parents. Second components: extra curricular activities for students Third components: Neighborhood action teams to address neighborhood and school wide issues related to drug use and violent behaviour	

European Smoking Prevention Framework Approach (ESFA)

Study name (if available)	**Author year**	**Ref ID**	**Inclusion/exclusion**	**Comment**
ESFA	**(DeVries et al. 2006)**	8086, 267	Included	30 months follow-up
	(De et al. 2003)	8901, 1831	Included	Main report, short term effects (1 year follow-up)
	(Ariza et al. 2008)	798	Included	Further analysis on a subset (Spain) of the sample population
	(Vartiainen et al. 2007)	228	Included	Further analysis of 3 year follow up on a subset (Finland) of the sample population.

Study name	Population	Intervention	Outcome
ESFA- European Smoking prevention Framework Approach (De Vries 2006)	-Schools within designated countries: Finland (27), Denmark (30), UK (43), Portugal (25), Netherland (33), Spain (47) -The average age of students was between 12 and 13 years	-Social influence approach - With the same collective objectives, each country used/developed their own materials/strategies for intervention. - All countries developed a school based programme (predominantly teacher led) including information on social influences and training in refusal skills. - The interventions were developed for four levels: the individual adolescent level, the school level, the parental level and out-of-school level (community)	Overall, no statistically significant result at 24 months but there was significant overall effect at 30 months: (Proportion of baseline non smokers becoming weekly smokers) 21.9% new smokers in experimental group vs. 23.4% new smokers in the control group.

Project EX-4

Project EX-4	**(Sussman et al. 2007)**	225	Included	6-month and 1-year follow-up
	(Sun et al. 2007)	224	Included	6-week follow-up immediately after the program

Study name	Population	Intervention	Outcome
Project EX-4 (Sussman 2007)	-12 continuation high schools in South California - 13 to 19 years -37.3% female and 14.4% white	- information giving -adapted from project EX clinic program -eight sessions delivered over six-week period -first four sessions held in a two week period: students prepared to strengthen their resolve not to use tobacco in the future	- intervention effective in reducing weekly smoking at immediate post-test - at 6 months: OR= 0.33, 0.13 to 0.84 -at 1-year : OR= 0.59, 0.36 to 0.97

		-second four sessions held once per week during the following month and focused on intentions not to use or quit attempts.	

Extracurricular activities approach

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Extracurricular activities approach	**(Brown et al. 2002)**	407	Included	Main report, 2 year-follow-up

Study name	Population	Intervention	Outcome
Extracurricular activities approach (Brown 2002)	-30 elementary schools -Students in grade 9 (14 to 15 years) - 50% female	-Social influence model -the approach focused on extracurricular interventions and treated the student body of each school as a community -mobilizing staff and students, and involving as many students as possible in activities inconsistent with smoking, to build commitment to nonsmoking and to strengthen nonsmoking as a school social norm.	The effect of the intervention at the end of the follow up period was not statistically significant

Family Smoking Education (FSE) Project & Smoking and Me (SAM) Project

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
FSE & SAM Project	**(Nutbeam et al. 1993)**	598	Included	Main report, 1-year follow-up
	(Newman et al. 1991)	7751	Excluded	Qualitative study of teachers' views of the

				SAM project
	(Newman & Nutbeam 1989)	10672	Excluded	Pre-1990. Qualitative study of teachers' views of the FSE project

Study name	**Population**	**Intervention**	**Outcome**
Family Smoking Education (FSE) Project & Smoking and Me (SAM) Project (Nutbeam 1993)	-39 comprehensive schools in England and Wales - 11 to 12 years - 52.8% female	-Social influence -schools allocated to one of four groups: 1) FSE 2) SAM 3) FSE and SAM 4) no intervention -average of three hours of lessons over a series of classroom lessons -lessons reinforced by booklet for students and a separate leaflet for parents	Percentage of never smokers (12 months follow-up): 1) 64.6% 2) 70.4% 3) 69.4% 4) 73.9%

FLAVOR (Fun, Learning About Vitality, Origins and Respect) & CHIPS (Choosing Healthy Influences for a Positive Self)

Study name (if available)	**Author year**	**Ref ID**	**Inclusion/exclusion**	**Comment**
FLAVOR & CHIPS	**(Johnson et al. 2005)**	303	Included	Main report, 2-year follow-up. No mention of comparison of three implementation methods
	(Carolan et al. 2007)	9371	Included	Further analysis of 1-year follow-up data examining interaction between group assignment method and program
	(Valente et al. 2006)	270	Included	1-year follow-up examining both the effect of program (FLAVOR vs. CHIPS) and the effect of implementation (random vs. network vs. teacher)

	(Unger et al. 2004)	340	Included	1-year follow-up. No mention of comparison of three implementation methods
	(Valente et al. 2003)	363	Included	Preliminary results examining networking effect

Study name	**Population**	**Intervention**	**Outcome**
FLAVOR (Fun, Learning About Vitality, Origins and Respect) & CHIPS (Choosing Healthy Influences for a Positive Self) (Johnson 2005)	-24 middle schools in California -students in grade 6 (11 to 12 years) -52.4% female	-social influence model -two curricula each consisting of eight classroom activities - multicultural curriculum (FLAVOR); designed to include cultural values from Hispanic and Asian cultures -standard curriculum (CHIPS); a version of project SMART, modified to focus on tobacco use rather than multiple substance use.	1 year follow-up: Overall, program effect was not significant. 2 year follow-up: Multicultural program was effective only among Hispanic students in Hispanic schools (OR=0.63; 0.50 to 0.79) and standard program was effective only among Asian students in Asian/multicultural schools (OR=0.60; 95% CI 0.48 to 0.75).

Gatehouse project

Study name (if available)	**Author year**	**Ref ID**	**Inclusion/exclusion**	**Comment**
Gatehouse project	**(Bond et al. 2004)**	353	Included	Main report, 3 year-follow-up

Gatehouse project (Bond 2004)	-26 secondary schools -13 to 14 years of age (year 8)	-Primary prevention program including both institutional and individual focused components -intervention was based on an understanding of risk processes for adolescent mental health and risk behaviours that derive from social	Prevalence of regular smoking: Year 1: 4.9% vs. 8.3%; OR 0.66 (95% CI 0.46-0.95)

	-53.2% female	environments	Not statistically significant at 2nd and 3rd year follow-up

Going Places Program

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Going Places Program	**(Simons-Morton et al. 2005b)**	305	Included	Main report, 3-year follow-up
	(Simons-Morton et al. 2005a)	291	Included	Impact analysis and medication of outcomes, 3-year follow-up

Study name	Population	Intervention	Outcome
Going Places Program (Simons-Morton 2005)	-7 middle schools - students in 6th grade (11 to 12 years) -57% female and 71% white	-social competence -includes social skills curriculum, parent education and school environment enhancement designed to increase academic engagement and commitment to school -the foci of curriculum are problem solving, self control, communication and conflict resolution skills -Consisted of 18 session in the sixth grade, 12 in the seventh grade, and six in the eight grade -The enhanced school environment included social marketing strategies to improve school climate, establish pro-social norms, positive	- decrease in the rate of smoking progression for the treatment group relative to the control group (added growth factor=-0.124, $p < 0.05$)

		image for school, reinforce students achievement -the parent education component was designed to increase parental monitoring, involvement, and expectations regarding academic engagement and problem behaviour.	

Good Behavior Game & Mastery Learning

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Good Behavior Game & Mastery Learning	**(Kellam & Anthony 1998)**	7236	Included	7-year follow-up
	(Kellam et al. 2008)	895	Included	13-year follow-up

Study name	Population	Intervention	Outcome
Good Behavior Game & Mastery Learning (Kellam 1998)	-19 elementary schools -students in 1st grade (6 to 7 years) -49% female	-social competence - program focused on social context of the classroom, to socialize children into the role of student and to teach them to regulate their own and their classmates' behaviour through a process of interdependent team behaviour-contingent reinforcement -control school received customary school programs	- Program was effective in boys only. -boys in intervention school had lower risk of initiating smoking than control group (RR=0.62, 0.40 to 0.97, p=.04 - female: (RR=0.90, 0.57 to 1.42, p=.66)]

Healthy for Life (HFL) health promotion program

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
HFL health promotion program	**(Piper et al. 2000)**	466	Included	Main report, four year old follow-up

Study name	Population	Intervention	Outcome
Healthy for Life (HFL) health promotion program (Piper 2000)	-21middle schools -11 to 12 years -94% white	-social influence model -four social networks influencing adolescent behaviour were addressed: 1) school component; 54-lesson curriculum delivered in one sequential 12-week block or three four-week segments 2) Peer component: three peer leaders who involved in one third of the curriculum 3) family component: enhanced and	The Intensive condition significantly reduced the likelihood of smoking in 10th grade (3-year follow-up, beta (SE) = -0.38 (0.17); p<.05), but this effect did not reach statistically significance in 9th grade (3-year follow-up, beta (SE) = -0.30(0.17); p=ns). The age appropriate condition emerged as marginally (p<.10) harmful over the control condition

		strengthened the curriculum by facilitating communication between students and adult family member 4) the community component: -two versions of the HFL school based curriculum were designed: 1) Age appropriate version: 20 lessons at grade 6, 19 lessons at grade 7 and 8. Delivered in sequence every day for four weeks. 2) Intensive version: took the age appropriate version minus the 7th and 8th grade introductory lessons, and delivered it in one sequential 12 week block to an entire cohort of 7th graders.	

Healthy Schools and Stimulants Program/In-School and Out-of-School Interventions.

Study name (if available)	**Author year**	**Ref ID**	**Inclusion/exclusion**	**Comment**
Healthy Schools and Stimulants Program/In-School and Out-of-School Interventions.	**(Ausems et al. 2004)**	6519	Included	Main report
	(Ausems et al. 2002)	411	Excluded	Follow up less than 6 months

Study name	**Population**	**Intervention**	**Outcome**
Healthy Schools and Stimulants Program/In-School and Out-of-School Interventions.	-36 1st grade vocational schools -Average age of 13.1 years	-information giving - interventions giving were 1) In-school intervention- it used the "healthy	-program was effective. - in-school intervention was successful after 12 months: OR= 0.49; 0.29 to 0.84

(Ausems 2004)	-47.9% female and 73% Dutch	schools and stimulants program". Consisted of 3 lessons (50mins) 2) Out-of-school intervention- consisted of three tailored letters with smoking prevention messages mailed at 3-week intervals based on social inoculation theory 3) In and out-of-school intervention-	-out-of-school was effective after 18 months : OR= 0.42; 0.18 to 0.96

The Hunter Region Health Promoting Schools (HPS)

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
HPS	**(Schofield et al. 2003)**	366	Included	Main report, 2-year follow-up
	(Lynagh et al. 1999)	484	Excluded	Qualitative study of the trial and its pilot

Study name	Population	Intervention	Outcome
The Hunter Region Health Promoting Schools (HPS) (Schofield 2003)	-22 secondary schools in Australia -12 to 14 years -55% female	-social influence -A four-stage model was developed: (1) establishing baseline health risk behaviors and gaining school-wide commitment to HPS, (2) identifying key individuals and the optimal HPS structure for each school, (3) planning, implementing and monitoring HPS strategies, and (4) ongoing support and maintenance of HPS structures and activities -strategies included ensuring formal school curriculum adequately addressed health risks associated smoking, information leaflets and biweekly school newsletters for parents letters to tobacco retailers, smoke-free school policy development, encouragement of non-smoking	- No statistical difference between intervention and control group at the end of the study.

		parents, peers and teachers as role models, peer influence programs, and incentive programs.	

Hutchinson Smoking Prevention Project (HSPP)

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
HSPP	**(Peterson et al. 2000a)**	455	Included	Main report; 12-year follow-up
	(Mann et al. 2000)	467	Excluded (but accessed for baseline characteristics)	Design and baseline characteristics – did not report outcomes
	(Peterson et al. 2000b)	453	Excluded	Design and methods – did not report outcomes

Study name	Population	Intervention	Outcome
Hutchinson Smoking Prevention Project (HSPP) (Peterson 2000)	-40 Washington school district -Students in grade 3 (8 to 9 years) -49.2% female and 89.9% white	-social influence approach -15 essential elements for school based tobacco prevention -a teacher-led, grade 3-10 tobacco use prevention curriculum together with unit-specific teacher training -a total of 65 classroom lessons in the curriculum: nine lessons in each of grades 3 to 5, 10 in each of grades 6 and 7, eight lessons in grade 8, and five lessons in each of grades 9 and 10 -curriculum is supplemented by two additional high school components : self help tobacco use cessation materials and biannual news letters	at least weekly smoking, intervention vs. control, 10 year follow-up: 0.2% (-3.1% to 3.9%); 12 year follow-up: -1.3% (-4.1% to 2.0%)

		informing teachers about tobacco education resources		

Kentucky Adolescent Tobacco Prevention project

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Kentucky Adolescent Tobacco Prevention project	**(Noland et al. 1998)**	512	Included	Main report, 2 year follow-up

Study name	Population	Intervention	Outcome
Kentucky Adolescent Tobacco Prevention project (Noland 1998)	-19 schools -Students in 7th grade (mean age 12.4 years) -female 50.8% and white 92%	-6-session social influences prevention programme -included skills training, recognizing and countering advertising appeals, trained peer leaders, student pledges not too use tobacco and negative consequences for using it -sessions lasted 45 to 50 minutes and delivered by trained classroom teachers -eight grade curriculum was a 3-session booster program included similar concepts and delivered by trained educators that were part of project staff	-program was effective after 2 years of follow-up -Significant effects were found for 24-hour (22% vs. 28%, $p<0.05$), 7-day (30% vs. 38%, $p<0.01$), and 30-day (34% vs. 44%, $p<0.01$) smoking but not for lifetime smoking.

Life Skills Training (LST) Program

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment

LST (Botvin et al. 1990a)	**(Botvin et al. 1990b)**	2893	Included	Main report
LST (Botvin et al. 1990b)	**(Botvin et al. 1990a)**	3287	Included	3 year follow-up
	(Botvin 1990)	8747	Included	1 year follow-up
	(Scheier et al. 2001)	429	Included	Further analysis of the effect of preventive intervention on drug use
LST tailored to Native American young people	**(Schinke et al. 2000)**	460	Included	3.5-year follow-up
	(Moncher & Schinke 1994)	10650	Included	2-year follow-up
LST	**(Botvin et al. 2001)**	4268	Included	Main report, 1-year-follow-up
	(Botvin et al. 1999)	488	Included	Further analysis on a subset of sample population (girls)
	(Griffin et al. 2003)	362, 8340	Included	Further analysis on a subsample of youth (21%) identified as high risks for substance use initiation

Study name	**Population**	**Intervention**	**Outcome**
Life Skills Training Program Botvin 1990a	-10 suburban New York high schools -Students in grade 7 and 8 (12 to 14 years)	-Schools randomized into 4 treatment condition 1) Peer-led prevention programme 2) Teacher-led prevention program 3) Peer-lead prevention program with booster 4) Teacher-led prevention program with booster and a control condition.	-there was significantly lower proportion of smokers in the peer-led booster condition when compared to the control condition for the weekly measure. - Proportion smoking weekly at follow up

	-51% female and 80% white	-Conditions 1-4 received 20 sessions of peer/teacher led intervention whilst in grade 7. In grade 8, those in conditions 3 and 4 received an additional 10 session 'booster' (similar in nature).	(significance verses control): 1) 0.22 (NS) 2) 0.16 (NS) 3) 0.05 (lower, p<0.005) 4) 0.21 (NS) 5) 0.16 (control)
Life Skills Training Program Botvin 1990b	-56 schools from three geographical regions of New York -students in grade 7 (12 to 13 years) -48% female and 90% white	- Life skills training programme -facilitate development of personal and social skills with particular emphasis on the development of skills for coping with social influences to smoke, drink or use drugs -12 curriculum units to be taught in 15 class periods -Booster sessions in grade 8 (10 classes) and 9 (5 classes) to renew and reinforce learning. -2 arm intervention group 1) 1-day teacher workshop with implementation feedback by project staff and 2) teacher training provided by videotape with no implementation feedback) -1 comparison control group	Intervention effective only at 3-years follow-up: Smoking index (p for intervention vs. control). At 1 year: 1) 1.97 (ns) 2) 1.92 (ns) Control= 1.96 At 3 years (±SE): 1) 1.46±0.04 (p<0.001) 2) 1.50±0.04 (p<0.01) Control= 1.63±0.03
life skills training tailored to Native American young people (Schinke et al. 2000)	-students in 3rd, 4th and 5th grade (8 to 11 years) -49% female	-social influence model -a conventional theoretical model of life skills training tailored towards the native Americans -Two interventional arms made of 15 sessions each delivered weekly. -each session last about	- The intervention was not effective at the end of follow up

		50 minutes each. Delivered during the spring term and each session involved instruction, modelling, and rehearsal in cognitive-behavioural skills associated with substance abuse prevention. -the second intervention arm also involves community component in addition to the skills component. -the community component involves mobilizing Native American constituents in youth communities to support substance abuse prevention.	
Life Skills Training Program Botvin 2001	-29 New York public schools -students in grade 7 (12 to 13 years) -53% female and 6% white	- cognitive-behavioural approach to drug abuse prevention -intervention group received 15 sessions in the seventh grade and 10 booster sessions in the eight grade -intervention was taught by the classroom teacher -Intervention was not provided to the control group	The intervention had a significant effect on substance use after 1-year follow-up. Intervention vs. control outcomes (±SE) at 1 year follow up. Smoking frequency index: 1.73±0.04 vs. 1.94±0.05 (p=0.012) Smoking quantity index: 1.19±0.02 vs. 1.32

Lions-Quest Skills for Adolescence

Study name (if available)	**Author year**	**Ref ID**	**Inclusion/exclusion**	**Comment**
Lions-Quest Skills for Adolescence	**(Eisen et al. 2003)**	365	Included	Main report, 2 year-follow-up

	(Eisen et al. 2002)	399	Included	1 year follow-up

Study name	**Population**	**Intervention**	**Outcome**
Lions-Quest Skills for Adolescence (Eisen 2002)	-34 middle schools - students in grade 6 (11 to 12 years) -52% female and 41% white	-utilize social influence and social cognitive approaches to teach cognitive-behaviour skills -a condensed , 40-session (35-45 minutes per session) version of the comprehensive curriculum -included three sessions on the challenges involved in entering the teen years, four on building self-confidence and communication skills, five on managing emotions in positive ways, eight on improving peer relationships and 20 on living healthy and drug-free.	30 day cigarette smoking: 1 year-follow-up; (2.9% vs. 3.9%, $p<0.05$) 2 year-follow-up; no significant main effect

The Minnesota Smoking Prevention Program (MSPP); The smoke Free generation (SFG); The Minnesota Department of Education's Guidelines (MDEG)

Study name (if available)	**Author year**	**Ref ID**	**Inclusion/exclusion**	**Comment**
MSPP; SFG; MDEG	**(Murray et al. 1992)**	618	Included	Main paper, Six year follow-up

Study name	**Population**	**Intervention**	**Outcome**
The Minnesota Smoking Prevention Program (MSPP); The smoke Free generation (SFG); The Minnesota Department of Education's Guidelines (MDEG)	-81 schools -students in grade six (12 to 13 years) - 50% female	-social influence -the three interventions : 1) Minnesota Smoking Prevention program (MSPP): a six-lesson curriculum based on the social influence model 2) The Smoke Free Generation (SFG) program: a three-lesson curriculum patterned after the	No statistical significant difference between intervention groups.

(Murray 1992)		Minnesota Smoking Prevention program but in a shorter form 3) The Minnesota Department of Education's Guidelines (MDEG): to help teachers adapt existing programs to incorporate components of the social influence model	

Modified from the Minnesota smoking prevention programme

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Modified from the Minnesota smoking prevention programme	(Shean et al. 1994)	584	Included	Main report, seven year old-follow-up

Study name	Population	Intervention	Outcome
Modified from the Minnesota smoking prevention programme (Shean 1994)	-45 schools - Year seven students (modal age of 12 years) - 52% female	-social influence -consisted of five sessions -based on social consequences curriculum -designed to increase students knowledge of the effects of smoking and awareness of the benefits of not smoking -trained students how to resist pressures not to smoke -two versions developed: peer led and teacher led	-Only the peer led intervention was effective among girls alone -preventive effect on smoking uptake by girls: (OR=0.50, 0.26 to 0.98) -teacher led: (OR=0.53, 0.27 to 1.01) Boys; [(teacher led OR=0.87, 0.39 to 1.96), peer-led OR=1.10, 0.53 to 2.28]

One-day lesson; developed by the Italian league against Cancer

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
One-day lesson; developed by the Italian league against Cancer (Milan Division)	**(Gatta et al. 1991)**	631	Included	Main report, four year follow-up

Study name	Population	Intervention	Outcome
One-day lesson; developed by the Italian league against Cancer (Milan Division) (Gatta 1991)	-163 state schools - ages 9 to 10 years -50% female	-information giving -education intervention consisted of a single day lesson and focused on pathology/physiology of human respiratory tract and on the harmful effects of cigarettes smoking	-Intervention had no impact on teenagers -RR=0.92; 95% CI 0.79 to 1.06

Oslo Youth Study

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Oslo Youth Study – part of the WHO Collaborative Study on Health Promotion in Youth	**(Klepp et al. 1994)**	592	Included	12-year follow-up
	(Oygard et al. 1995)	2647	Excluded	Further analysis of 10 year follow-up data to determine parental and peer influences on smoking
	(Klepp et al. 1993)	2746	Included	10-year follow-up
	(Tell et al. 1984)	10673	Excluded	Accessed for information regarding methods

Study name	Population	Intervention	Outcome
Oslo Youth Study – part of the WHO Collaborative Study on Health Promotion in Youth (Klepp 1994)	-6 schools elementary and junior high schools -students in 5th , 6th and 7th grade (10 to 15 years) - 51.6% female	-social influence -10 session smoking education programme - health education focused on three areas; cigarette smoking, nutrition and physical activity - The programme was led, in part, by older students and included training to resist social pressures to smoke, personalized role models, public commitment to remain a non-smoker and discussions on the social, political and health aspects of smoking.	-No significant difference in daily smoking rate between intervention and comparison group. However, program was only effective in men only after adjusting for baseline differences. -Men who participated reported less daily smoking than the comparison group after 10 years (41.6% vs. 55.8%, $p<0.05$) and 12 years (36% vs. 49%, $p<0.05$).

The Peer Assisted Learning (PAL) smoking prevention programme

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
The PAL smoking prevention programme	**(Abernathy & Bertrand 1992)**	2804	Included	Main report, 4-year-evaluation
	(Bertrand & Abernathy 1993)	9281	Included	Further analysis using cross-sectional and longitudinal approaches.

Study name	Population	Intervention	Outcome
The Peer Assisted Learning (PAL) smoking prevention programme (Abernathy 1992)	-190 schools -students in grade six (11 to 12 years) -49% female	-based on social influence approach -provided information about benefits of not smoking and taught intervention skills to resist peer pressure to smoke	-intervention was only effective among boys -follow-up after 2.5 years (numbers who had never smoked) intervention vs. control= 68.6% vs. 59.6% (X^2=6.36, $p<0.05$)

Sembrando Salud (Sowing the seeds of health)

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Sembrando Salud (Sowing the seeds of health)	**(Elder et al. 2002)**	414	Included	2 year-follow-up

Study name	Population	Intervention	Outcome
Sembrando Salud (Sowing the seeds of health) (Elder 2002)	-22 schools -average age of 13 years -49% female	-involves presentation of information, modeling and behavioural rehearsal -focus on developing parental support for healthy decisions and behaviours of the adolescents through enhanced parent-child communication -participants received three booster telephone calls lasting 5 to 10 minutes, at least one month and at 14 months after last group session	- intervention was not effective in reducing 30-day cigarette use

Project SixTeen (based on Project /Programs to Advance teen health (PATH)

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Project SixTeen (based on Project PATH	**(Biglan et al. 2000)**	442	Included	Main report, 4 year-follow-up
	(Elder et al. 1993a)	608	Included	1-year follow-up

Study name	Population	Intervention	Outcome
Project SixTeen (based on Project /Programs to Advance teen health (PATH)) (Biglan 2000)	- high schools -students in grade 7 and 9 (12 to 15 years) -48% female and 85% white	-social influence -school based intervention took place in intervention and control community schools -students in grade 6 to 12 received education over a 1 week period each year -community intervention only took place in intervention communities	- Net adjusted *decrease in smoking prevalence at: 1 yr: 4.5% SE 1.7% (p=0.022) 2 yr:1.8% SE 1.3% (p=0.212) 3 yr: 2.4% SE 1.3% (p=0.077) 4yr: 3.8% SE 1.6% (p=0.038) - *NB smoking rates increased in both groups but net rates decreased due to bigger control group increases

Smoking and Me (SAM) Project

See Family Smoking Education project (Nutbeam et al 1993). Also the Smoking and Me project is a British version of the Minnesota smoking prevention programme, Murray et al (1992).

Social Influence (SI) program, with a decision making component (SI^{DM})

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
SI with a decision making component (SI^{DM})	**(Dijkstra et al. 1999)**	478	Included	Main report, 18 months follow-up

Study name	Population	Intervention	Outcome
Social Influence (SI) program, with a decision making component (SI^{DM}) (Dijkstra 1999)	-52 schools - Students in grades 8 and 9 (13 to 15 years)	-social influence -schools randomized to either social influence program, or social influence with additional decision-making component or a control group. -programs consisted of five lessons, each lasting 45 minutes, give weekly in grades 8 and 9. -half of the treatment schools were assigned to the booster condition while the other did not	- SI program was effective in significantly lowering increase in smoking rate. -At 12 months and 18months SI program was only effective when booster were included: 12 months: [SI+Booster vs. SI OR=0.44; 95% CI 0.30 to 0.65]. 18 months: [SI+Booster vs. no treatment OR=0.62; 95% CI 0.45 to 0.87].

Project SPORT

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Project SPORT	(Werch et al. 2005)	275	Included	Main report, 1 year old, follow-up

Study name	Population	Intervention	Outcome
Project SPORT (Werch 2005)	-a suburban high school -students aged 12 to 13 years -56% female and 51% white	- the prevention technologies and strategies are based on the Integrative Behavior-Image Model (BIM), -consisted of an in-person health behaviour screen, a one-on-one consultation, a take-home fitness prescription targeting adolescent health promoting behaviours and alcohol use risk and protective factors, and a flyer reinforcing key	- Youth who received SPORT, smoked less frequently than control youth ($F(1, 509)=8.72$, $p=0.003$);

		content provided during the consultation mailed to the home		

Stopping them Starting

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Stopping them Starting	**(Gordon et al. 1997)**	7355	Included	Main report, 6months follow-up

Study name	Population	Intervention	Outcome
Stopping them Starting (Gordon 1997)	-19 secondary schools - students in year 7 (11 to 12 years)	-provided educational material for schools and support of a health-promotion specialist to encourage community-based activities -remind retailers of their obligations with regard to under-age sales of cigarette	- No significant difference between intervention and control group after six months : odds of non-smoker starting smoking OR=1.04(0.78 to 1.40)

Strengthening Families Program (SFP)

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
The Iowa SFP (ISFP)/ Preparing for the Drug Free Years (PDFY)	**(Spoth et al. 2001)**	433, 8443	Included	Main report, 4-year follow-up. Compared ISFP to Preparing for the Drug Free Years (PDFY)
	(Guyll et al. 2004)	327	Included	Further analysis of 4-year follow-up data
	(Zuckerman 1991)	10662	Included	6-year follow-up

SFP + Life Skills Training (LST)	**(Spoth et al. 2002)**	405	Included	Main report, 1 year-follow-up

Study name	**Population**	**Intervention**	**Outcome**
The Iowa Strengthening Families Program (ISFP) (Spoth 2001)	-33 schools -students in 6th grade (11 to 12 years) -55% female and 99% white	- PDFY- social development model: an integration of social control theory and social learning theory; ISFP - biopsychsocial model and other empirically based family risk and protective factor models (resiliency model and social ecology model of adolescent substance use) -The Iowa Strengthening Families Program (ISFP) included seven sets of sessions offered once per week over a period of 7 consecutive weeks in the evenings. ISFP included separate, concurrent 1-hour training sessions for parents and children, followed by a joint 1-hour family session -PDFY intervention was delivered in five 2-hour training sessions held on weekday evenings once per week for 5 consecutive weeks. Four sessions were for parents only; children and parents both attended a session focusing on peer-resistance skills. Fifteen 2-person group leader teams conducted 19 groups in the 11 PDFY-condition schools	-programme was effective -There were statistically significant slower overall growths in lifetime cigarette use among ISFP- (growth rate = -2.95, p<.01) and PDFY- (growth rate = -2.94, p<.01) condition adolescents relative to controls after six years of follow up.
Strengthening Families Program (SFP) + Life Skills Training (LST) (Spoth 2002)	-36 middle schools -students in seventh grade (12 to 13 years) -46.7% female and 96.8% white	-SFP: based on biopsychosocial model and other empirically based family risk and protective factor models -LST: based on social learning and problem behaviour theory. - assignments to 1) LST + SFP 2) LST only 3) control condition	- No statistical significant results after 12-months follow-up

Student Helping Others Understand Tobacco (Project SHOUT)

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
Project SHOUT	**(Elder et al. 1993b)**	607	Included	Main report, 3 year follow-up
	(Elder et al. 1994)	577	Included	Further analysis on a subset of sample population (high risks adolescents)
	(Eckhardt et al. 1997)	527 (9526)	Included	Further analysis based on continued, lapsed and delayed smoking prevention intervention

Study name	Population	Intervention	Outcome
Student Helping Others Understand Tobacco (Project SHOUT) (Elder 1993)	-22 junior high schools -students in grade 7 (12 years) -50% female and 57% white	- Social influence - six fall lessons (once a week) and four spring lessons (once a month) during the seventh grade year - eight lessons scheduled once a month in the eight grade - tailored tobacco prevention message communicated by telephone/mail in the ninth grade - a shortened version of the ninth grade was delivered in the 11th grade.	- Odds of past week tobacco use at final follow-up: School level analysis: OR=0.69, ns Individual level analysis: OR=0.75, p<0.05 In students receiving continued 11th grade booster, prevalence of past month smoking vs. control: 7% vs. 12.6% (p<0.05) Vs those without 11th grade booster: 7% vs. 10.8% (ns)

Television, School, and Family project (TVSFP)

Study name (if available)	Author year	Ref ID	Inclusion/exclusion	Comment
TVSFP	**(Flay et al. 1995)**	567	Included	Main report, 2-year-follow-up

Study name	Population	Intervention	Outcome
Television, School, and Family project (TVSFP) (Flay 1995)	-47 schools in Los Angeles and San Diego -students in grade seven (12 to 13 years) -50% female and 33.3% white	-social influence -the three study factors are classroom curriculum, media intervention and site (San Diego or Los Angeles). -study design investigates the relative effectiveness of social-resistance classroom curriculum, media intervention, health information based attention control curriculum , social resistance classroom curriculum combined with a mass-media intervention	-programme was effective up till 2 year follow in Los Angeles while it was only effective only at immediate post intervention in San Diego. -Los Angeles; 2 years post test: N=1246; X^2=14.5; df=1;p<0.00014)

PROJECT TOWARDS ~

Project Towards No Tobacco Use (Project TNT)	**(Dent et al. 1995)**	568	Included	Main report, 5-year follow-up
	(Sussman et al. 1993b)	602	Included	1-year-follow-up
	(Sussman et al. 1993a)	603	Included	Implementation, process and post-test knowledge evaluation
Towards No Drug Abuse – First Curriculum Version – Regular	**(Dent et al. 2001)**	431	Included	1-year follow-up

High School Trial (TND-1 RHS)				
Towards No Drug Abuse – Second Curriculum Version – Continuation High School Trial (TND-2 CHS)	**(Sussman et al. 2003)**	376, 8279	Included	2-year follow-up
	(Sussman et al. 2002a)	10666	Included	Development of self-instruction curriculum and immediate outcomes
	(Doll & HILL 1950)	10667	Included for information only	Quantitative evaluation of activities and selection of lessons (separately from the trial)
Project Towards No Drug Abuse (Project TND – First Curriculum Version – Continuation High School Trial (TND-1 CHS)	**(Sun et al. 2006)**	261, 8082	Included	5-year follow-up
	(Breslau & Peterson 1996)	10664	Included	1-year follow-up; only reported outcomes on violence-related behaviour
	(Sussman et al. 2002b)	4164, 8373	Included	Overview of findings of three TND trials (TND-1 CHS, TND-1 RHS, TND-2 CHS)
	(Dent et al. 1998)	506	Included	Implementation, process and immediate outcomes of the classroom curriculum.
	(Sussman et al. 1998)	510	Included	1-year follow-up
	(Sussman et al. 1997b)	10668	Included	Implementation and process evaluation of the school-as-community component

	(Sussman et al. 1997a)	10665	Included for information only	Development (activity selection) of the school-as-community component
	(Dent et al. 1996)	10663	Included for information only	Use of 'theme study' for curriculum development
	(Sussman et al. 1995)	10669	Included for information only	Interview of staff and students for developing the curriculum
Project Towards No Drug Use Abuse (TND 4)	**(Sun et al. 2008)**	789	Included	1-year-follow-up

Study name	**Population**	**Intervention**	**Outcome**
Project Towards No Tobacco Use (Project TNT) (Dent 1995)	-48 junior high schools - 7th grade students (12 to 13 years) -50% female and 60% white	-social influence program -schools assigned to each of the 4 intervention conditions 1) Normative social influence 2) Informational social influence 3) Misperceptions regarding physical consequences 4) A combination of the three interventions - Curriculum were delivered to 7th grade students -Booster session with contents tied to the original curriculum delivered at 8th grade	Change in prevalence of weekly cigarette use over 2 years was significant in the combined intervention group: 4% <0.05

Towards no Drug Abuse- First Curriculum Version- Regular High School Trial. TND-1 RHS (Dent 2001)	-26 classes from 3 randomly selected general public senior high schools -Students in grades 9, 10 and 11 (14 to 17 years) -53% female and 34% white	Same as Sun 2006	No significant effect of the program on cigarette use. F(1,24)=1.16, p=0.64)
Towards No Drug Abuse – Second Curriculum Version – Continuation High School Trial. TND-2 CHS (Sussman 2003)	-18 continuation (alternative) high schools in southern California - 14 to 19 years of age -46% female and 45% white	-Same as Sun 2006 In addition - Three additional sessions were added to focus on marijuana use prevention, tobacco use cessation and providing additional material on self-control for drug abuse and violence prevention. - Two treatment arm of efficacy condition (health educator-led classroom program) and a treatment effectiveness condition (health educator-assisted self-instruction program) with a standard care control program.	Efficacy condition arm significantly reduced the odds of smoking (OR=0.50; 95% CI 0.31 to 0.81), while the treatment effectiveness arm did not.
Project Towards No Drug Abuse (Project TND) - First Curriculum version- Continuation High School Trial. TND-1 CHS (Sun 2006)	-21 continuation (alternative) high school from Southern California. - 14 to 19 years of age -38% female and 37% white	- provides a health motivation-social-skills decision making approach to drug abuse prevention - School wide implementation of a Nine-session classroom based drug abuse prevention program, which consisted of three 50-min sessions per week for 3-consecutive weeks -The first trio session motivates to develop effective listening skills -The second trio session is on chemical dependency issues and alternative coping skills	- There were no statistically significant program effect at short-, middle-, and long (5 years)-term follow-up

		-The third trio sessions encourages making non-drug-use choices - Two treatment arm (classroom only and classroom plus a semester-long school-as-community component) and a control arm (standard care).	
Project Towards No Drug Use Abuse (TND 4) (Sun 2008)	-18 high schools (regular and continuation) in South California -13 to 19 years of age -47.9% female and 18.2% white	-Each curriculum included 12 sessions -Three arm trial: cognitive perception information curriculum, cognitive perception information+ behavioural skills curriculum or standard care control program.	The program failed to statistically reduce the prevalence of 30-day cigarette use: Cognitive vs. control (OR=1.35, 0.93 to 1.95); combined vs. control (OR=0.91; 0.60 to 1.37); combined vs. cognitive (OR=0.68, 0.46 to 0.98)

Transtheoretical model

Study name (if available)	**Author year**	**Ref ID**	**Inclusion/exclusion**	**Comment**
TTM	**(Aveyard et al. 2001)**	437	Included	Updated result, 2 year follow-up
	(Aveyard et al. 1999)	477	Included	Main report, 1 year follow-up
	(Aveyard et al. 2003)	385	Included	Further analysis of 2 year follow-up data.
	(Markham et al. 2008)	987	Included	Further analysis of 2 year follow-up data to show the effect of higher examination pass and lower truancy rates on smoking.

Study name	**Population**	**Intervention**	**Outcome**

Transtheoretical model (TTM) (Aveyard 2001)	-52 schools in West midlands -students in year 9 (13 to 14 years) -49.7% female and 82.6% white	-social influence -All students received smoking related education as part of science at key stage 2 (ages 7-11) and key stage 4 (ages 14-16) controlled by the Government in England. In addition, all states schools provide personal, social and health education throughout all key stages. -The intervention group in addition to the above received six sessions of two types: one computer session and one class lesson for each of the three terms of year 9.	-The intervention was not effective. - Weekly smoking Year 1 OR = 1.16 (0.89 to 1.50); Year 2 OR = 1.07 (0.85 to 1.35)

Waterloo Smoking Project

Study name (if available)	**Author year**	**Ref ID**	**Inclusion/exclusion**	**Comment**
Waterloo Smoking Project	**(Cameron et al. 1999)**	479	Included	Main report,
	(Sashegyi et al. 2000)	444	Included	Methodological paper demonstrating a generalised random effects regression model using the trial data
	(Santi et al. 1992)	10653	Included	Detailed methods (not yet assessed)

Study name	**Population**	**Intervention**	**Outcome**
Waterloo Smoking Project (Cameron 1999)	-100 elementary schools -students in grade 6, 7 and 8 (11 to 14 years)	-social influence model -study compared program outcome as a function of 2 training methods: 1) an intensive workshop and 2) self-directed learning kit for providers -the design involved 2(provider type: classroom	-Intervention effective only in the high risk schools. -After two years, Intervention reduced smoking rates in high-risk schools (16% vs. 26%)

		teacher vs. public health nurse) by 2(training type: workshop vs. self preparation) experimental study, with a fifth usual care control group	

Appendix 9 Numeric results from non-meta-analysed RCTs

Study	Numeric results
Abernathy 1992	Males 6m: 87.9% vs 77.3% (X^2=14.06, p<0.001) 1.5y: 71.5% vs 63.8% (X^2=5.07, p<0.05) 2.5y: 68.6% vs 59.6% (X^2=6.36, p<0.05) Females 6m: 78.9% vs 80.7% (X^2<1, ns) 1.5y: 60.7% vs 62.3% (X^2<1, ns) 2.5y: 50.1%vs 52.9% (X^2<1, ns)
Armstrong 1990	(one-year follow-up) Girls: Control- 33.1%; teacher led-25.0%; Peer led- 23.2% Boys: Control- 29.4%; teacher led-15.4%; Peer led- 34.7% (Two-year follow-up) Girls: Control- 49.7%; teacher led-37.8%; Peer led- 37.8% Boys: Control- 33.5%; teacher led-25.9%; Peer led- 41.9%
Ary 1990	1-year covariate adjusted smoking rate among pre-test smoker: intervention vs. control (111.6 cigarettes vs. 76.6 cigarettes)
Ausems 2004	**Post test 1** Prevalence of pre-test never smoker becoming smoker: 1) 27.4% (CI 15.4-39.4) 2) 16.8% (CI 4.9-28.7)

	3) 17.5% (CI 8.1-26.9) Control: 24.0% (CI 6.8-41.1) Prevalence of pre-test smokers continuing: 1) 34.6% (CI 18.8-48.3) 2) 33.8% (CI 25.2-42.3) 3) 26.8% (CI 7.1-36.6) Control: 29.9% (CI 14.4-45.4) **Post test 2** (6 months) Prevalence of pre-test never smoker becoming smoker: 1) 28.0% (CI 18.6-37.4) 2) 25.0% (CI 13.6-36.6) 3) 29.4% (CI 20.3-38.5) Control: 40.9% (CI 24.8-56.9) Prevalence of pre-test smokers continuing: 1) 29.4% (CI 16.9-42.0) 2) 37.0% (CI 21.3-52.6) 3) 45.0% (CI 37.0-53.1) Control: 42.2% (CI 35.2-49.2) **Post test 3** (12 months) Prevalence of pre-test never smoker becoming smoker: 2) 27.2% (CI 8.8-53.5) 3) 40.0% (CI 29.4-50.6) Control: 47.9% (CI 29.1-66.6) Prevalence of pre-test smokers continuing: 2) 37.0% (CI 22.3-51.7) 3) 40.4% (CI 34.0-46.9) Control: 46.9% (CI 33.7-60.1)
Biglan 2000	Net adjusted decrease in smoking prevalence at: 1 yr: 4.5% SE 1.7% (p=0.022) 2 yr:1.8% SE 1.3% (p=0.212) 3 yr: 2.4% SE 1.3% (p=0.077)

	4yr: 3.8% SE 1.6% (p=0.038)
Botvin 1990a	Proportion smoking weekly at follow up (significance verses control): 1) 0.22 (NS) 2) 0.16 (NS) 3) 0.05 (lower, p<0.005) 4) 0.21 (NS) 5) 0.16 (control
Botvin 1990b	Smoking index (p for intervention vs control). **At 1 year**: 1) 1.97 (ns) 2) 1.92 (ns) Control= 1.96 **At 3 years** (±SE): 1) 1.46±0.04 (p<0.001) 2) 1.50±0.04 (p<0.01) Control= 1.63±0.03
Botvin 2001	Intervention vs control outcomes (±SE) at 1 year follow up. Smoking frequency index: 1.73±0.04 vs 1.94±0.05 (p=0.012) Smoking quantity index: 1.19±0.02 vs 1.32±0.02 (p=0.0001)
Brown 2001	Percent less likely to try tobacco 2 years following the programme treatment (attended >11 activities vs. attended <11 activities) vs control (62.5% vs. 27.3%) vs 30%
Brown 2005	No significant differences were found in cigarette use growth rates between intervention and controls (variances = 0.576 and 0.048; SEs = 0.306 and 0.041; ps > .05; for model Parts 1 and 2, respectively).
Buller 2008a	Pre-test: Intervention vs. Control= 13.1% vs. 11.2% Post-test: Intervention vs. Control= 12.7%% vs. 14.3%

Buller 2008b	estimate=0.0247, p=0.122
Byrne 2005	interventions strategies were significantly better than control cohort in controlling overall smoking behaviour: 1. control vs health: X^2=13.21,df=1, p<.001 2. Control vs fitness: X^2=15.26,df=1, p<.001 3. Control vs. social skills: X^2=11.20,df=1, p<.001
Connell 2007	Nicotine abuse/dependence in treatment vs control: X^2=3.09, p=ns
Dent 2001	Change in prevalence of weekly cigarette use over 1 year (significance vs control): 1) 5.3% (ns) 2) 3.2% (p<0.05) 3) 2.6% (p<0.05) 4) 2.0% (p<0.05) Control = 5.6%
Elder 2002	There was no statistically significant between intervention and control in reduction 30-day cigarette use from post-test to final follow-up (OR=0.87; 95% CI 0.66 to 1.14).
Ellickson 1993	Weekly smoking: Teen-leader effect vs. control= 8.3% vs. 9.7% Adult- only effect vs. control= 9.1% vs. 9.7%
Flay 1995	LOS ANGELES: Information based control (mean , SD)(19.68,6.41), control group (20.04, 6.70), social resistance (18.35,6.96), TV (20.30, 6.44), TV+social resistance (19.39, 6.85). SAN DIEGO- control group (18.36, 6.04), social resistance(18.01, 6.15)
Gatta 1991	Sporadic education intervention has no impact in preventing cigarettes smoking in teenagers (RR=0.92; 95% CI 0.79 to 1.06)
Hansen & Graham 1991	Normative education classes had lower rates of ever smoking cigarettes (8.1% vs 10.3%, p=0.0311)

Jøsendal 1998	Prevalence of weekly smoking (adjusted odds ratios and 95% CIs for 1 vs control) 6 months: 1) 1.5%, 2) 1.1%, 3) 2.6%, Control= 3.1%
Kellam and Graham 1998	Boys in interventions group had a lower risk of starting to smoke than boys in control group (RR=0.62, 0.40 to 0.97, p=.04); no programme effect was observed among girls (RR=0.90, 0.57 to 1.42, p=.66)]
Lynam 1999	frequency of past-month cigarette use (DARE status beta=0.101, ns)
Murray 1992	Self-reported weekly smoking Prevalence: MSPP;13.8, SFG;13, MDEG;11.6, EC;10.6 Incidence: MSPP;10.5, SFG;10.1, MDEG;9.5, EC;7.9
Perry 2003	current smoker - boys : school vs. control (ns); school+family vs. control (0.18 vs. 0.31, p=.02); school+family vs. school (ns); girls school vs. control (ns); school+family vs. control (ns); school+family vs. school (ns)
Piper 2000	The Intensive condition significantly reduced the likelihood of smoking in 10th grade (3-year follow-up, beta (SE) = -0.38 (0.17); p<.05), but this effect did not reach statistically significance in 9th grade (3-year follow-up, beta (SE) = -0.30(0.17); p=ns).
Schofield 2003	There was no pre-post difference in the proportion of students who had smoked in the last week by experimental group (9.7% vs 10.0% increase in intervention and control groups, respectively)
Shean 1994	Peer-led intervention appeared to have preventive effect on taking up smoking by girls who were initially non-smokers (OR=0.50, 0.26 to 0.98); while teacher-led was not effective (OR=0.53, 0.27 to 1.01) There was no effect of either intervention on boys who were initially non-smokers [(teacher led OR=0.87, 0.39 to 1.96), peer-led OR=1.10, 0.53 to 2.28]
Simons-Morton 2005	There was additional decrease in the rate of smoking progression for the treatment group relative to the control group (added growth

	factor=-0.124, p <0.05)
Snow 1992	Students who had participated in the intervention had a lower mean use of tobacco after 2-year follow-up (F=2.87 (11073), p<0.09).
Spoth 2001	4-years follow-up New user proportions were significantly lower for ISFP (33 vs 50, p<.01) and PDFY (44 vs 50, p<.01) conditions adolescents than for control group adolescents for cigarette use 6-years follow-up There were statistically significant slower overall growths in lifetime cigarette use among ISFP- (growth rate = -2.95, p<.01) and PDFY- (growth rate = -2.94, p<.01) condition adolescents relative to controls.
Spoth 2002	There was no statistically significant difference in the percentage of users initiated between the post-test and follow-up 12 months later between interventions and control groups : school vs control (13.9% vs 16.7%, ns); school+family vs control (12.1% vs 16.7%, ns); school vs school+family (13.9% vs 12.1%, ns)
Storr 2002	Relative to control, a modest attenuation in the risk of smoking initiation was found for students assigned to either school-based (RR=0.57; 95% CI 0.34 to 0.96) or family based (RR=0.69; 95% CI 0.50 to 0.97) intervention classrooms.
Sun 2006	There were no statistically significant programme effect at short-, middle-, and long-term follow-up: 30-day cigarettes use 1. Year 1 follow-up: control (48.6) vs class (51.7) vs SAC (55.7) 2. Year 2 or 3 follow-up: control (53.2) vs class (55.1) vs SAC (53.5) 3. Year 4 or 5 follow-up: control (68.9) vs class (52.3) vs SAC (68.3)
Telch 1990	tape programme with peers (2.3%), tape programme without peers (9.5%), control 1 (11%), control 2 (11.1) p<0.001)
Werch 2005	Youth who received SPORT smoked less frequently than control youth (F(1, 509)=8.72, p=0.003); and were less advanced in their stage of initiation cigarette smoking (F(1,423)=12.39, p=0.000)
Winkleby 2004	Prevalence of regular smokers:

	Baseline to post- intervention: Intervention: Before 25.1% (7.3) After 21.3% (7.5) Control: Before 25.2% (5.5) After 26.7% (4.8) Net change -5.3% ($p<0.001$)