NICE National Institute for Health and Care Excellence

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

Evidence Update April 2013

A summary of selected new evidence relevant to NICE public health guidance 23 'School-based interventions to prevent the uptake of smoking among children and young people' (2010)

Evidence Update 38

Evidence Updates provide a summary of selected new evidence published since the literature search was last conducted for the accredited guidance they relate to. They reduce the need for individuals, managers and commissioners to search for new evidence. Evidence Updates highlight key points from the new evidence and provide a commentary describing its strengths and weaknesses. They also indicate whether the new evidence may have a potential impact on current guidance. For contextual information, this Evidence Update should be read in conjunction with the relevant public health guidance, available from the NICE Evidence Services topic page for smoking cessation.

Evidence Updates do not replace current accredited guidance and do not provide formal practice recommendations.

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National Institute for Health and Care Excellence

Level 1A
City Tower
Piccadilly Plaza
Manchester M1 4BT
www.nice.org.uk

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Introduction

This Evidence Update identifies new evidence that is relevant to, and may have a potential impact on, the following reference guidance:

[1] **School-based interventions to prevent the uptake of smoking among children and young people. NICE public health guidance 23 (2010).**

A search was conducted for new evidence from 1 November 2008 to 31 October 2012. A total of 7493 pieces of evidence were initially identified. Following removal of duplicates and a series of automated and manual sifts, 19 items were selected for the Evidence Update (see Appendix A for details of the evidence search and selection process). An Evidence Update Advisory Group, comprising topic experts, reviewed the prioritised evidence and provided a commentary.

This Evidence Update was developed in parallel with the guidance review process for NICE public health guidance 23. The Evidence Update and the decision about whether to update the guidance were derived from the same evidence base. Further information about the guidance review is available from the NICE website.

Feedback

If you have any comments you would like to make on this Evidence Update, please email contactus@evidence.nhs.uk

[1] NICE-accredited guidance is denoted by the Accreditation Mark

Key points

The following table summarises what the Evidence Update Advisory Group (EUAG) decided were the key points for this Evidence Update. It also indicates the EUAG's opinion on whether the new evidence may have a potential impact on the current guidance listed in the introduction. For further details of the evidence behind these key points, please see the full commentaries.

The section headings used in the table below are taken from the guidance.

Evidence Updates do not replace current accredited guidance and do not provide formal practice recommendations.

	Potential impact on guidance	
Key point	**Yes**	**No**
Organisation-wide or 'whole-school' approaches		
• Effective school tobacco policies appear to be those that: are enforced; are strongly prohibitive (including prohibiting smoking at all times in all areas); and have explicit purpose and goals.		✓
Adult-led interventions		
• A lesson-based smoking prevention programme prior to secondary school may have long-term preventive effects on smoking that continue into secondary school.		✓
• Forming repeated 'implementation intentions' (a type of planned behaviour) about how to refuse cigarettes may reduce smoking in the long term.		✓
• 'Unplugged' (a general substance abuse prevention programme) may help to reduce smoking in the long term. Further research is needed to adapt and pilot this intervention in a UK setting.		✓
• 'Project Toward No Drug Abuse' (a general substance abuse prevention programme) may prevent smoking among older teenagers from schools with a high drug-use risk. Further research is needed to adapt and pilot this intervention in a UK setting.		✓
• Evidence suggests that the 'Smokefree Class Competition' (an incentive-driven smoking prevention intervention) may not prevent smoking initiation among non-smoking children and adolescents in the long term, and similar schemes could also possibly widen health inequalities in the short term.	✓*	
• Limited evidence suggests that a web-assisted smoking prevention programme may help to prevent smoking among some groups of students.		✓

* Evidence Updates are intended to increase awareness of new evidence and do not change the recommended practice as set out in current guidance. Decisions on how the new evidence may impact guidance will not be possible until the guidance is reviewed by NICE following its published processes and methods. For further details of this evidence in the context of current guidance, please see the full commentary.

Key point	Potential impact on guidance	
	Yes	No
Peer-led interventions • The ASSIST (A Stop Smoking in School Trial) programme appears to be a cost-effective intervention (mean cost per student=£32), and may be more effective among girls of lower socioeconomic status.		✓
Coordinated approach • Implementing school-based sessions on resisting substance use as part of a wider community and university partnership appears to reduce smoking in the longer term.		✓
• There is some evidence of the effectiveness of community interventions featuring a school component in reducing smoking, but it is not strong and contains methodological flaws.		✓
• There is some, albeit limited, evidence of the effectiveness of smoking prevention as part of wider targeting of other risk behaviours.		✓
• Socioeconomic status did not appear to have any consistent effect on outcomes with the European Smoking Prevention Framework Approach (a coordinated smoking prevention programme).		✓

1 Commentary on new evidence

These commentaries analyse the key references identified specifically for the Evidence Update. The commentaries focus on the 'key references' (those identified through the search process and prioritised by the EUAG for inclusion in the Evidence Update), which are identified in bold text. Supporting references provide context or additional information to the commentary. Section headings are taken from the guidance.

The commentaries make reference to the relevant existing recommendations from the current guidance. Although correct when the guidance was originally published, some of the language and terminology used in these recommendations may not reflect recent changes to the organisations and structures engaged in public health initiatives.

1.1 Organisation-wide or 'whole-school' approaches

School tobacco policies

NICE PH23 recommends that head teachers, school governors, teachers, support staff and others who work with primary and secondary schools and further education colleges (including Healthy Schools and Healthy Further Education leads, personal, social, health and economic [PSHE] education coordinators, school nurses and counsellors), should:

- Develop a whole-school or organisation-wide smokefree policy.
- Ensure the policy forms part of the wider healthy school or further education strategy.
- Apply the policy to everyone using the premises for any purpose, at any time.
- Widely publicise the policy and ensure it is easily accessible.
- Ensure the policy supports smoking cessation in addition to prevention.

Five cross-sectional studies recently examined school tobacco policies.

A study by **Adams et al. (2009)** examined the effect of school tobacco policies on tobacco use among 16,561 grade 7 to 12 students in 40 middle and high schools in Illinois, USA. Data on student smoking behaviour were gathered via survey (54% response) as part of the Youth Tobacco Access Project, a large 5-year intervention funded by the National Cancer Institute. Tobacco policy enforcement was assessed by school officials via questionnaire, and policy comprehensiveness was rated by researchers.

Enforcement of the school tobacco policy was significantly associated with reduced levels of both observation of smoking on school grounds (odds ratio [OR]=0.49, 95% confidence interval [CI] 0.32 to 0.75, $p<0.01$), and current smoking among students (OR=0.83, 95% CI 0.70 to 0.99, $p<0.05$). Policy comprehensiveness did not however appear to significantly affect either observed or current smoking (data not given).

A study by **Lovato et al. (2010a)** assessed the influence of school tobacco policies on smoking prevalence among 27,892 grade 5 to 9 students in 272 schools (55% response to recruitment) in 10 Canadian provinces. Data on student smoking behaviour were gathered via questionnaire (58% response) as part of the 2004–2005 Youth Smoking Survey, a biennial survey sponsored by Health Canada. School tobacco policy intent was assessed and coded by researchers, and policy enforcement was rated based on interviews with school officials. Policy variables were analysed in a model controlling for age and sex using a binary definition of smoking status (1=smoker, 0=non-smoker). Schools with no policy (8%) were excluded from analyses.

At the school level, a lower level of smoking prevalence was predicted by tobacco policies with an explicit purpose and goals (relative risk [RR]=0.57, 95% CI 0.34 to 0.99, p<0.04) and by those that prohibited smoking on school grounds at all times (RR=0.43, 95% CI 0.20 to 0.97, p<0.04). At the individual level, policies with an explicit purpose and goals still predicted reduced smoking prevalence (RR=0.38, 95% CI 0.15 to 0.95, p<0.04), but the effect of prohibiting smoking on school grounds at all times was no longer significant (p=0.15). At both the individual and school level, policies mandating a smoking cessation programme predicted higher smoking prevalence, although it was unclear if mandated cessation programmes caused more smoking, or resulted from it.

A study by **Lipperman-Kreda et al. (2009)** tested the relationship between students' personal beliefs about smoking, their perception of school tobacco policy enforcement, community disapproval of smoking, and smoking behaviours. The study involved 17,256 students (mainly grade 8 to 11) from a random sample (though schools could also volunteer) of 255 middle and high schools throughout Oregon, USA. Data were taken from the 2006 Oregon Health Teens Survey (81.2% response), which addressed a wide range of issues including smoking behaviours and beliefs, perceived school tobacco policy enforcement, and perceptions about disapproval of adolescent smoking in the local community.

Perception of community disapproval of smoking was a significant predictor of perception of school tobacco policy enforcement (p<0.001). Additionally, both perceived school tobacco policy enforcement and perceived community disapproval were significantly positively associated with beliefs about smoking, such as perceived harm (p<0.001) and personal disapproval (p<0.001). Both of these beliefs were shown to be negatively associated with smoking over the past 30 days (p<0.001) therefore indicating a potential sequential link between both perceived enforcement of school policy and community disapproval of smoking, and reduced levels of smoking among students.

A study by **Lovato et al. (2010b)** investigated the influence of school tobacco policies, and other school and community factors, on adolescent smoking. A total of 22,681 grade 10 and 11 students were recruited from 77 secondary schools (69% response to recruitment) in 5 Canadian provinces. Schools (excluding private, religious and chartered) were randomly selected from municipalities with a population of at least 10,000 (excluding Vancouver, Montreal and Toronto because of their size and cultural differences to other municipalities). Student smoking behaviours were assessed via a survey (77% response), with smoking status measured using a binary definition (1=smoker, 0=non-smoker). School tobacco policy intent was rated by researchers, policy enforcement was rated based on interviews with school officials, and tobacco prevention and cessation programmes were assessed by a survey of school officials. Additionally, field observations were made within 1 kilometre of the school, such as assessment of students smoking in the school vicinity.

Students were less likely to smoke if they were from schools with programmes focusing on tobacco prevention (OR=0.87, 95% CI 0.81 to 0.94) and with stronger policies prohibiting tobacco use and paraphernalia (OR=0.92, 95% CI 0.88 to 0.97), and more likely to smoke where greater numbers of students were seen smoking on the school periphery (OR=1.25, 95% CI 1.07 to 1.47). There also appeared to be a correlation between likelihood of smoking and greater enforcement of smoking policies (OR=1.20, 95% 1.07 to 1.35), however this may not necessarily indicate that enforcement leads to more smoking, but may be that more enforcement is needed or observed in schools with higher levels of smoking.

A study by **Sabiston et al. (2009)** explored the relationships between individual factors, school tobacco policy, and adolescent smoking behaviour. A total of 24,213 grade 10 and 11 students were recruited from 81 secondary schools in 5 Canadian provinces. Response rates were 72% for schools and 82% for students. Schools (excluding private, religious and chartered) were randomly selected from municipalities with a population of at least 10,000

(excluding Vancouver, Montreal and Toronto because of their size and cultural differences to other municipalities). Students' smoking behaviours were assessed via a survey. School tobacco policy intent was assessed and coded by researchers, policy implementation was rated based on interviews with school officials, and policy enforcement was assessed by researchers observing student smoking.

Smoking prevalence was lower in schools with a stronger policy intent for prohibition (OR=0.83, 95% CI 0.72 to 0.95) and for cessation services (OR=0.74, 95% CI 0.60 to 0.92), and also where policies were more strongly enforced (OR=0.90, 95% CI 0.81 to 1.00; all $p<0.05$). Students smoking on school property were associated with greater levels of smoking (OR=1.20, 95% CI 1.09 to 1.32, $p<0.05$).

Several limitations were common to most of the 5 cross-sectional studies, including that: much of the data about smoking behaviours and policy enforcement were self-reported which may have introduced bias; details of school policies were not provided therefore it was difficult to know exactly what constituted a good policy; data were cross-sectional and therefore no definitive causal links could be made; socioeconomic data were not provided; wider anti-smoking legislation outside of the school environment may have affected results but was not discussed; the US and Canadian settings may reduce applicability to the UK; and several studies had low response rates.

Taken together, the studies highlighted several themes common to school tobacco policies that appeared to reduce smoking prevalence. Effective policies seemed to be those that: are enforced (which may be more important than comprehensiveness); are strongly prohibitive (including prohibiting smoking at all times in all areas); and have explicit purpose and goals. Additionally, there appeared to be a potential effect of students' perception of both smoking disapproval by the wider community, and tobacco policy enforcement, which in turn may reduce smoking prevalence and promote normative support for policy approaches as part of an ecological approach. The evidence is in broad agreement with recommendations in NICE PH23 about the need for smokefree policies that apply to all and that are widely publicised.

A report of the Surgeon General by the US Department of Health and Human Services (2012) was also in broad agreement with both the new evidence and current recommendations of NICE PH23, recognising that 'school policies on tobacco use have been recommended as an important component of comprehensive, multicomponent efforts to prevent use. Overall, research has shown that, to be effective, tobacco-related policy needs to be enforced and should foster a proactive approach by schools to prevention.'

Key references

Adams ML, Jason LA, Pokorny S et al. (2009) The relationship between school policies and youth tobacco use. Journal of School Health 79: 17–23 [NIH Public access author manuscript – full text]

Lipperman-Kreda S, Grube JW (2009) Students' perception of community disapproval, perceived enforcement of school antismoking policies, personal beliefs, and their cigarette smoking behaviors: results from a structural equation modeling analysis. Nicotine & Tobacco Research 11: 531–9

Lovato CY, Pullman AW, Halpin P et al. (2010a) The influence of school policies on smoking prevalence among students in grades 5–9, Canada, 2004–2005. Preventing Chronic Disease 7: A129

Lovato CY, Zeisser C, Campbell HS et al. (2010b) Adolescent smoking: Effect of school and community characteristics. American Journal of Preventive Medicine 39: 507–14

Sabiston CM, Lovato CY, Ahmed R et al. (2009) School smoking policy characteristics and individual perceptions of the school tobacco context: are they linked to students' smoking status? Journal of Youth & Adolescence 38: 1374–87

Supporting reference

US Department of Health and Human Services (2012) Preventing tobacco use among youth and young adults: A report of the Surgeon General

1.2 Adult-led interventions

NICE PH23 recommends that head teachers, school governors, teachers, support staff and others who work with primary and secondary schools and further education colleges (including Healthy Schools and Healthy Further Education leads, PSHE education coordinators, school nurses and counsellors), should integrate information about the health effects of tobacco use, as well as the legal, economic and social aspects of smoking, into the curriculum. They should also deliver interventions that aim to prevent the uptake of smoking.

The guidance makes several specific recommendations about the nature of the interventions that should be provided; the relevant aspects of these recommendations are discussed in the commentaries that follow.

Pre-secondary school interventions

NICE PH23 recommends that smoking prevention interventions should be entertaining, factual and interactive, be tailored to age and ability, and include strategies for resisting the pressure to smoke.

A cluster randomised controlled trial (RCT) by **Crone et al. (2011)** examined the effects of a smoking prevention programme called 'But I don't smoke' among 1815 grade 5 and 6 pupils (the majority aged 10 or 11 years) from 151 classes in 121 Dutch elementary schools. Schools were randomly assigned to control (usual smoking prevention education) or to the intervention. The intervention comprised six 1-hour lessons (3 lessons provided in grade 5, and 3 lessons in grade 6) focusing on, for example, the consequences of smoking, expressing intentions not to smoke, attitudes toward smoking, and reacting to social pressure. The lessons involved activities such as role-playing and discussion of videos. Data about attitudes to smoking, social influences, and smoking behaviour were gathered by questionnaire before and after the lessons in grades 5 and 6, and an additional questionnaire was sent to students when they entered the first grade of secondary school. Effect sizes of the intervention on behavioural determinants were determined as a linear regression coefficient ('beta'), and analyses were adjusted for significant baseline differences between the groups such as paternal smoking (which was greater among controls) and smoking by the teacher (greater among intervention students).

Although some significant effects of the intervention were noted after the first set of lessons in grade 5 (such as fewer perceptions of the benefits of smoking, and lower perceived approval and prevalence of smoking among social networks), these effects were no longer significant after the lessons in grade 6. There were also no significant differences observed between the groups in either grade 5 or 6 for smoking prevalence. However, in secondary school (1 year after the intervention), versus the control group, the intervention group were significantly less likely to smoke (OR=0.59, 95% CI 0.35 to 0.99), and have a significantly greater intention not to smoke (beta=0.13, 95% CI 0.01 to 0.24). A sub-analysis of the secondary school data showed that these effects were only significant in girls, with female students in the intervention group significantly less inclined to start smoking (beta=0.21, 95% CI 0.04 to 0.37) and to smoke (OR=0.44, 95% CI 0.24 to 0.81) than those in the control group.

Limitations of the evidence included that: the transition to secondary school and differences between secondary schools may have affected results; there were some baseline differences between the groups (although these were adjusted for); secondary school data were available for only 57% of students (although the dropout rate was almost identical for each group); and data were self-reported.

The evidence suggests that a lesson-based smoking prevention programme prior to secondary school may have longer term preventive effects on smoking that continue into

secondary school, which is consistent with recommendations in NICE PH23 to deliver interactive interventions to help resist smoking tailored to the appropriate age.

Key reference

Crone MR, Spruijt R, Dijkstra NS et al. (2011) Does a smoking prevention program in elementary schools prepare children for secondary school? Preventive Medicine 52: 53–9

Smoking refusal strategies

NICE PH23 recommends that smoking prevention interventions should aim to develop decision-making skills through active learning techniques, and include strategies for enhancing self-esteem and resisting the pressure to smoke from the media, family members, peers and the tobacco industry.

An RCT by **Conner and Higgins (2010)** investigated the long-term efficacy of 'implementation intentions' (a type of planned behaviour, in this case refusing cigarettes) in preventing uptake of smoking at 4-year follow-up among 397 adolescents (from an original cohort of 1338) aged 15 to 16 years. Participants were originally recruited aged 11 to 12 years from 65 classes in 20 schools from a single Local Education Authority in northern England. Classes were randomised to 1 of 4 groups: the implementation intentions intervention (planning how, where and when to resist smoking in various situations using simple responses to refuse cigarettes); a self-efficacy intervention (planning what to say to refuse to smoke); control group 1 (an implementation intention plan for completing homework); or control group 2 (a self-efficacy plan for completing homework). Participants from all groups were provided with the relevant intervention materials to complete, given anti-smoking materials, and were also asked to commit to not smoking. The intervention materials were then completed again, and the anti-smoking materials re-read, at 4, 8, 12, 16, 20 and 24 months after baseline. Data were gathered on smoking behaviours from all participants via questionnaire, and a random subset (n=305) were also breath-tested for carbon monoxide. A binary definition of smoking was used to interpret questionnaire responses, with smokers defined as those reporting a smoking frequency of at least 'sometimes'. Data were analysed with a multilevel model controlling for baseline smoking, gender, attitudes to smoking, and friends and family smoking.

At 4 years, those in the implementation intention group were significantly less likely to smoke according to analyses of both the questionnaire (OR=0.65, 95% CI 0.45 to 0.95) and the breath test (OR=0.15, 95% CI 0.03 to 0.79). Limitations of the evidence included that the time required to deliver the interventions was not clear, some of the data were self-reported (although similar results were seen with the objective breath-test measure), and there was a high drop-out rate of 70% at 4 years (although an intention-to-treat analysis was used to attempt to overcome bias).

The evidence suggests that forming repeated implementation intentions about how to refuse cigarettes may reduce smoking in the long term, which is consistent with recommendations in NICE PH23 to offer interventions that help to resist the pressure to smoke.

A larger trial of implementation intentions is currently underway in the UK.

Key reference

Conner M, Higgins AR (2010) Long-term effects of implementation intentions on prevention of smoking uptake among adolescents: a cluster randomized controlled trial. Health Psychology 29: 529–38

General substance abuse prevention programmes

NICE PH23 does not include specific recommendations about the delivery of smoking prevention interventions as part of a wider substance abuse prevention programme. Two different general substance abuse prevention programmes, that included a smoking prevention component, were examined by 4 recent studies.

'Unplugged'

'Unplugged' is a school-based substance abuse prevention programme for students aged 12 to 14 years that aims to tackle both experimental and regular use of alcohol, tobacco and illicit drugs. Following a 2.5-day training course, teachers deliver 12 weekly 1-hour lessons involving interactive activities and role-play, covering areas such as student's existing knowledge, the effects of tobacco, alcohol, and illicit drugs, the perceived versus actual prevalence of drug use, refusal skills, assertiveness, decision-making and coping strategies, and ending with personal goal setting. The Unplugged programme was recently investigated in 3 studies.

A cluster RCT by **Faggiano et al. (2010)** examined the effectiveness of Unplugged among 7079 pupils aged 12 to 14 years from 170 schools across 7 European countries (Austria, Belgium, Germany, Greece, Italy, Spain and Sweden). As well as examining the effect of the Unplugged intervention alone, 2 additional intervention arms were also included comprising Unplugged plus the addition of activities involving either peers or parents. Schools were grouped into 3 socioeconomic strata at the area level and then randomised to control (usual curriculum) or to 1 of the 3 intervention arms. Data on behavioural and psychometric outcomes related to tobacco, alcohol and drug use were collected from students via a questionnaire. The primary outcomes of the study were behavioural endpoints for tobacco, alcohol and illicit drugs use (although only tobacco outcomes are discussed here).

At 18-month follow-up (15 months after the end of the programme), although a lower increase in daily smoking was seen among the students exposed to Unplugged compared to those in the control group (5.5% versus 6.4%, p value not stated), an adjusted multilevel model did not show a statistically significant effect of the intervention for the outcomes of any smoking (prevalence odds ratio [POR]=0.94, 95% CI 0.80 to 1.11), frequent smoking (6 or more cigarettes per month; POR=0.89, 95% CI 0.72 to 1.09) or daily smoking (20 or more cigarettes per month; POR=0.92, 95% CI 0.73 to 1.16).

Limitations of the evidence included that: data were self-reported; the level of substance abuse at baseline differed between intervention and control arms (data not given) although these were accounted for in analyses; significantly more participants were retained during follow up in the intervention versus the control group (data not given) but sensitivity analyses did not appear to indicate any major impact on results; the continental European settings may limit transferability of results to the UK; a large amount of teacher training and classroom time was needed, which may not be viable in UK schools; levels of curriculum delivery varied (only 55% of enrolled classes implemented all 12 lessons, and 23% of classes received less than 6 lessons); and the intervention focused on a number of substance abuse issues as well as tobacco, complicating assessment of the intervention from a smoking prevention perspective.

A second cluster RCT by **Gabrhelik et al. (2012a)** assessed Unplugged among 1874 grade 6 students (typically aged 11 to 13 years) from 74 schools in 3 regions of the Czech Republic. Schools were obtained from the 3 regions by stratified random sampling and then randomised to control or to Unplugged (a revised version of the programme was used in this study, including shorter lessons of 45 minutes instead of 1 hour). Data on behavioural and psychometric outcomes related to tobacco, alcohol and drug use were collected from students via a questionnaire which also featured a drug knowledge test at the end. The primary outcomes of the study were behavioural endpoints for tobacco, alcohol and illicit drugs use (although only tobacco outcomes are discussed here). Data were available at the latest follow up for 94% of students, and the intervention was delivered at 100% fidelity with every class receiving all 12 Unplugged lessons.

A multi-level, Bonferroni-corrected analysis indicated that at 2-year follow-up versus control, the Unplugged programme had significantly reduced the level of any smoking (OR=0.75, 99.2% CI 0.59 to 0.95), daily smoking (6 or more cigarettes per day; OR=0.60, 99.2% CI 0.38

to 0.96), and heavy smoking (20 or more cigarettes per day; OR=0.49, 99.2% CI 0.24 to 0.97). Similarly significant effects were also observed for all 3 smoking categories at 15-month follow-up, but effects varied at earlier time points (for example, no effect was seen for any categories at 1 month, and at 12 months there was an effect on any smoking but not daily or heavy smoking).

Limitations of the evidence included that: data were self-reported; 5 schools randomly assigned to control dropped out before the baseline survey and could not be replaced (whereas no intervention schools dropped out); the mechanism for delivering Unplugged in the trial (1 teacher working with 1 class) did not reflect the wider situation in schools in the Czech Republic (1 prevention worker assigned to all classes within a school), and also may not be generalisable to the UK; and differences between the Czech Republic and the UK, such as smoking rates, may limit relevance to the UK.

Finally, a sub-analysis of the RCT by Gabrhelik et al. (2012a) was performed by **Gabrhelik et al. (2012b)** to examine the effect of Unplugged on trajectories in smoking behaviours in male and female students, using growth mixture modelling to estimate the impact of gender. Within the model, students were assigned to either of 2 trajectories to describe the progression of their smoking behaviour: slow escalators (91% of students), and moderate/rapid escalators (9% of students).

In both trajectory groups, more rapid increases in smoking were seen in females versus males (OR=1.17, p=0.01), but there was no significant difference in gender between the trajectory types (OR=1.02, p=0.98). However, among slow escalators, the Unplugged intervention had a significant effect on smoking behaviour versus those in the control group (OR=0.20, p<0.01), whereas for moderate/rapid escalators the effect of Unplugged was not significant (OR=0.43, p=0.08).

Taken together, the results from the 3 studies suggest variable efficacy of the Unplugged programme, but that in some settings it may help to reduce smoking in the long term. However, heterogeneity between the trials, and issues with external validity to the UK, prevent firm conclusions about Unplugged, and there is currently unlikely to be an impact on NICE PH23. Further work is needed to adapt and pilot Unplugged in a UK setting.

The evidence also suggests the possibility that Unplugged may be more effective among particular sub-groups of smokers, which begins to address the question of targeted versus universal smoking prevention interventions as set out in the NICE research recommendation. Because Unplugged tackles smoking alongside other substance abuses, the evidence may also help inform another NICE research recommendation about whether smoking prevention works best alone or in conjunction with a broader substance abuse prevention programme.

Key references

Faggiano F, Vigna-Taglianti F, Burkhart G et al. (2010) The effectiveness of a school-based substance abuse prevention program: 18-month follow-up of the EU-Dap cluster randomized controlled trial. Drug & Alcohol Dependence 108: 56–64

Gabrhelik R, Duncan A, Miovsky M et al. (2012a) "Unplugged": a school-based randomized control trial to prevent and reduce adolescent substance use in the Czech Republic. Drug & Alcohol Dependence 124: 79–87

Gabrhelik R, Duncan A, Lee MH et al. (2012b) Sex specific trajectories in cigarette smoking behaviors among students participating in the Unplugged school-based randomized control trial for substance use prevention. Addictive Behaviors 37: 1145–50

'Project Toward No Drug Abuse'

A cluster RCT by **Sussman et al. (2012)** tested the efficacy of adding motivational interviewing-based booster sessions to 'Project Toward No Drug Abuse' (TND; an interactive classroom-based substance abuse prevention programme) among 1186 participants (mean

age=16.8 years) from 24 high schools in 4 counties of southern California, USA. Schools were eligible if: they were within 75 miles of the project headquarters; they taught grades 9 to 12; they offered at least 2 classes and had a minimum of 60 students; and at least 5% of students were non-Hispanic White. A total of 61 candidate schools were identified, which were then assessed for 'drug-use risk' based on a list of criteria including, for example, low test scores. Schools were ranked according to drug-use risk, and then starting at the top of the list and working down, schools were recruited in batches of 3 (to ensure risk of drug use was similar across all groups) and then randomised to 1 of the 3 study arms: TND only, TND plus motivational interviewing booster (TND+MI), or control (usual drug-use prevention).

TND comprised 12 classroom lessons of 45 minutes delivered over 4 weeks by trained health educators, focusing on: motivation factors (such as beliefs about drug use); skills (social, self-control, and coping skills); and decision-making (how to make decisions that lead to health-promoting behaviours). The MI booster involved, ideally, 3 sessions of 20 minutes between participants and trained MI personnel, comprising a session 1 to 3 days after the classroom component (in person), and 2 further sessions at 3- to 4-month intervals (by telephone). Data were collected from participants via questionnaire about their use of several legal and illegal substances, and also about risky sexual behaviour (although only tobacco outcomes are discussed here). Different models were used to analyse data: a 'substance use status' model (outcomes assessed as binary indicators of whether a substance was used in the last 30 days); and a 'times of substance use' model (outcomes assessed in terms of the number of times a substance was used in the past 30 days).

For cigarette use after 1 year, no significant effect of TND (with or without MI) was seen with the 'substance use status' model (OR=0.80, 95% CI 0.61 to 1.04, p=0.079), but a significant effect was seen with the 'times of substance use' model (OR=0.87, 95% CI 0.77 to 0.99, p=0.035). A comparison of TND with and without MI did not indicate a significant effect of MI with either the substance use (p=0.481) or times of use (p=0.065) model.

Limitations of the evidence included that: participants attended an average of only 67% of TND lessons (although fidelity was high, with 86.1% of lessons including all content as prescribed); only 24% of participants in the TND+MI group received all 3 MI sessions; only 70.8% of participants completed surveys at 1 year (although attrition bias was examined and controlled for in data analyses); and the setting, student profile and intensive nature of the intervention may limit applicability to the UK.

The results of the intervention are mixed but evidence with some outcomes suggests that there may be an effect of TND on preventing smoking among older teenagers from schools with a high drug-use risk, but an MI component did not appear to provide an additional effect. This is consistent with recommendations in NICE PH23 that interventions should be tailored to age, and should help develop skills in decision making and resisting pressure to smoke. Uncertainties about the transferability of the data mean further work is needed to adapt and pilot TND in a UK setting.

The targeting of TND to schools at high risk of drug abuse in this study may also provide useful information about targeted versus universal smoking prevention interventions as set out in the NICE research recommendation. Because TND tackles smoking alongside other substance abuses, the evidence may also help inform another NICE research recommendation about whether smoking prevention works best alone or in conjunction with a broader substance abuse prevention programme.

Key reference

Sussman S, Sun P, Rohrbach LA et al. (2012) One-year outcomes of a drug abuse prevention program for older teens and emerging adults: evaluating a motivational interviewing booster component. Health Psychology 31: 476–85

Incentive-driven competitions

Although NICE PH23 recommends that smoking prevention interventions should be entertaining and interactive, it makes no recommendations concerning the use of incentive-driven competitions. These types of competition were recently examined by 3 studies.

The 'Smokefree Class Competition' (SFC) is a European school-based intervention for children aged 11 to 14 years, where the whole class commit to not smoking for 6 months. To enter, at least 90% of pupils in the class must vote in favour of participation, and a contract is signed to state their intention to remain smokefree. Smoking status is self-monitored, and a monthly report is made to competition organisers that at least 90% of the class remain smokefree; if not they leave the competition. If at least 90% of the class are still not smoking after 6 months, they are entered into a lottery to win prizes. SFC was recently investigated in 2 studies.

A cluster RCT by **Isensee et al. (2012)** examined SFC in 208 classes from 84 schools (n=3490 students, mean age=12.6 years) in the German state of Saxony-Anhalt. All secondary schools were eligible for the study, unless school closure was expected within 2 years, or the school was already involved in a tobacco control programme or had previously taken part in SFC. Schools were randomised (stratified by type of school) to either SFC (where classes could then agree to take part or decline) or control (usual curriculum). Data were collected via self-completed questionnaires at baseline and at 7, 12 and 19 months. At baseline, versus those agreeing to take part in SFC or controls, those who declined SFC had higher rates of lifetime smoking (p=0.018) and current smoking (p=0.009), and were from classes with a 'poorer climate' as judged by the teacher (p=0.001).

No effect of SFC on frequency of smoking initiation was seen among baseline lifetime never smokers during the study follow-up (data not presented), and no overall effect of SFC on current smoking frequency (measured on a scale of 1 to 5, where 1=no smoking and 5=daily smoking) was seen at any follow-up. However, a sub-analysis among baseline occasional smokers (those who smoked less than weekly prior to the intervention), suggested that smoking frequency was significantly reduced after SFC (versus a comparative group combining controls and those who declined SFC), at both 7 months (1.78 versus 2.14 respectively, p=0.001) and 12 months (1.53 versus 2.14 respectively, p<0.001); the result at 19 months was not significant. Additionally, risk of progression to established smoking among baseline lifetime experimental smokers was higher for those not participating in SFC (adjusted hazard ratio=1.45, 95% CI 1.00 to 2.10, p=0.047).

Limitations of the study included that the trial was set in a single, rural state of Germany which may have socioeconomic and cultural differences with other populations, potentially reducing the external validity of results. Also, data were gathered by self-reporting, with the risk that smoking habits may have been concealed in order to remain eligible for prizes (although inconsistent response patterns that may have indicated under-reporting were no different between groups). Additionally, there was substantial attrition across the groups (data from all follow-ups were available for only 62% of the sample), with more loss to follow-up among those offered SFC than controls, which may have affected results (although a statistical analysis of attrition did not reveal strong biases).

SFC was also assessed in a Cochrane review by **Johnston et al. (2012)**. RCTs and non-RCTs of children aged 5 to 18 years in any setting with a minimum follow up of 6 months were included. Although studies of all types of smoking prevention incentives were eligible for the review, 6 of the 7 trials identified were of SFC (including the RCT by Isensee et al. 2012 discussed above). The primary outcome was smoking status at longest follow-up among those reported as non-smokers at baseline. Of the 7 included studies, only 5 trials (3 RCTs, 2 non-randomised trials; all of SFC) could be meta-analysed (n=6362 baseline non-smokers).

Only 1 study reported a significant effect of SFC on smoking prevention at its longest follow-up (12 months), however when the review authors reanalysed the data (to take into account that it was a cluster trial), the effect was no longer significant. From pooled analysis of the RCTs identified, no significant effect of SFC was seen on long-term smoking prevention (RR=1.00, 95% CI 0.84 to 1.19; 3 RCTs, n=3056). A similar result was seen with the non-randomised trials (RR=0.81, 95% CI 0.61 to 1.08; 2 trials, n=3306). For the 1 trial not studying SFC, data could not be extracted for the primary outcome.

Limitations of the evidence included that: outcome data could not be extracted from all trials; only prevention (and not progression) of smoking was examined; most of the included studies suffered attrition bias at the longest follow-up; and although all included studies were cluster trials, only 3 performed appropriate analyses to adjust for this. The authors also noted that incentives may increase the risk of false claims by participants, as well as create the potential for bullying and isolation of smoking students. The review found little robust evidence of this, but noted that limited research on negative consequences of SFC had been done.

A study by **Mercken et al. (2012)** assessed differences in outcomes between lower and higher socioeconomic groups via secondary analyses of several trials of smoking prevention interventions. As part of this study, a secondary analysis of an RCT by Crone et al. 2003 was performed to examine the effect of socioeconomic status on outcomes with an incentive-driven smoking prevention competition (similar to SFC) in the Netherlands. The original RCT randomised 26 lower secondary education schools (n=2562 students, average age=13 years) to control (usual drug prevention) or the intervention. The intervention comprised some initial lessons about smoking, covering knowledge, attitude and social influence. The class then agreed not to start smoking (or to stop smoking) for the next 5 months. Classes in which less than 10% of students were smoking after 5 months entered a competition to win prizes. Socioeconomic status was measured by 2 parental indicators: education level, and work situation. Smoking behaviour was measured by questionnaire.

At 5 months, the intervention was seen to have a significant effect among those whose parents had a mid to high education level (OR=0.35, 95% CI 0.13 to 0.95) and those from a family with a parent working full-time (OR=0.57, 95% CI 0.33 to 0.97). The intervention did not however appear to be effective among those whose parents had a low education level, or were not in full-time work, which may suggest the potential for widening health inequalities. By 12 months, all significant effects of the intervention had disappeared.

Limitations of the evidence included that: self-reporting of smoking behaviours may have been influenced by the possibility of prizes; the setting may limit validity to the UK; socioeconomic analyses may depend on the indicators used and different indicators may give different results; socioeconomic indicators were self-reported; and the difference in effect between lower and higher socioeconomic groups may potentially have been caused by the intervention being implemented differently between these groups.

Currently, NICE PH23 does not make specific mention of SFC or other incentive-driven interventions. There now appears to be evidence that SFC may not prevent smoking initiation among non-smoking children and adolescents in the long term, and similar schemes could also possibly widen health inequalities in the short term. Because of the potential appeal to schools as an entertaining and interactive intervention in line with current guidance, it may be useful to draw attention to issues with these types of intervention. This evidence may therefore have a potential impact on NICE PH23, although the details of any impact are outside the scope the Evidence Update. Decisions on how the new evidence may impact guidance will not be possible until the guidance is reviewed by NICE following its published processes and methods.

Key references

Isensee B, Morgenstern M, Stoolmiller M et al. (2012) Effects of Smokefree Class Competition 1 year after the end of intervention: a cluster randomised controlled trial. Journal of Epidemiology & Community Health 66: 334–341

Johnston V, Liberato S, Thomas D (2012) Incentives for preventing smoking in children and adolescents. Cochrane Database of Systematic Reviews issue 10: CD008645

Mercken L, Moore L, Crone MR et al. (2012) The effectiveness of school-based smoking prevention interventions among low- and high-SES European teenagers. Health Education Research 27: 459–69

Supporting reference

Crone MR, Reijneveld SA, Willemsen MC et al. (2003) Prevention of smoking in adolescents with lower education: a school based intervention study. Journal of Epidemiology and Community Health 57: 675–80

Web-assisted interventions

NICE PH23 recommends that smoking prevention interventions should be entertaining, factual and interactive, aim to develop decision-making skills through active learning techniques, and include strategies for enhancing self-esteem and resisting the pressure to smoke.

An RCT by **Norman et al. (2008)** evaluated a classroom-based, web-assisted smoking prevention and cessation programme among 1402 grade 9 to 11 students from 81 classes in 14 secondary schools in Toronto, Canada. Schools were selected by stratified sampling to balance size, neighbourhood and other unique characteristics (such as single-sex) to reflect the community and population. Schools could refer other schools to the study. Participants were individually randomised to the intervention or to control. The intervention comprised a single 1-hour classroom session, including a 20-minute interactive task on 'the Smoking Zine' website (combining interactive quizzes and self-assessments to help resist pressures to smoke and promote self-efficacy), a short period filling in their scores from the website in a journal, and finally a 10-minute small-group motivational interview with a counsellor or public health nurse. Monthly tailored emails were then sent for 6 months after the classroom session to support ongoing change. Participants in the control group performed a similar, non-smoking related, web-based activity. The main outcomes of resistance to smoking, intentions to smoke, and cigarette use, were assessed via questionnaire. The rate of follow-up at 6 months was 87%.

The intervention maintained the level of resistance to smoking among those with the highest baseline resistance, whereas among the control group, the proportion of those reporting high levels of resistance to smoking had decreased by 3-month follow up ($p<0.05$). For intention to smoke, there was a spike at 3-month follow-up in the proportion of those with high intentions to smoke among the control group, but a continued decline among those in the intervention group ($p<0.05$). However, no significant differences in intention to smoke were seen among those classed as non-smokers at baseline. For cigarette use, those who received the intervention were less likely to take up heavy smoking than those receiving control ($p<0.05$).

Limitations of the evidence included that: follow-up was short-term; randomisation was at the individual and not class level, meaning students who received the web intervention may have shared lessons learned with friends from the control group; the intervention programme was treated as a whole and individual components were not analysed; and fewer smokers (77%) than non-smokers (92%) were followed up at 6 months.

Although limited, the evidence suggests that a web-based programme may help to prevent smoking among some groups of students, and may be a tool for consideration alongside other forms of adult-led interventions. Programmes of this nature are consistent with current

recommendations to provide entertaining and interactive interventions that help to resist smoking, therefore the evidence is unlikely to have an impact on NICE PH23.

Key reference

Norman CD, Maley O, Li X et al. (2008) Using the internet to assist smoking prevention and cessation in schools: a randomized, controlled trial. Health Psychology 27: 799–810

Components of effective adult-led school programmes

The recent report of the Surgeon General by the US Department of Health and Human Services (2012) noted that 'school-based programmes, with evidence of effectiveness, containing specific components, can produce at least short-term effects and reduce the prevalence of tobacco use among school-aged youth'. It stated that the most effective programmes were those that are interactive, address social influences, include components on intentions not to use tobacco, use peer leaders, add community components, include life skills practice, and contain at least 15 sessions including some up to at least grade 9.

This is in broad agreement with the new evidence and the recommendations of NICE PH23.

1.3 Peer-led interventions

The ASSIST (A Stop Smoking in School Trial) programme

NICE PH23 recommends that head teachers, school governors, teachers, support staff in secondary schools and others who work with them (including Healthy Schools leads, PSHE education coordinators, school nurses and counsellors) should consider offering evidence-based, peer-led interventions aimed at preventing the uptake of smoking such as the ASSIST programme.

Cost effectiveness of ASSIST

Hollingworth et al. (2012) performed a cost effectiveness analysis of the ASSIST programme based on a cluster RCT by Campbell et al. (2008). ASSIST involves training students to act as supporters to encourage their peers not to smoke. The original RCT took place between 2001 and 2002, and involved 10,730 students aged 12 to 13 years, from 59 secondary schools in England and Wales randomised to receive the ASSIST programme or usual smoking education. For the cost analysis, the hours spent working on the programme during the trial were totalled for all individuals involved (including health promotion specialists, ASSIST trainers and teachers) and multiplied by 2008 unit costs. Other costs such as travel expenses and training materials were inflated to 2008 values.

A total of 17,909 hours were worked on the ASSIST programme across the 30 intervention schools, of which 3485 hours were contributed by paid staff (the 14,424 hours contributed by student peer supporters were not factored into the cost analysis). The total cost of delivering ASSIST, including additional expenses, was £169,865. The mean cost per school was £5662, equivalent to £32 per student (95% CI £29.70 to £33.80). The results from the RCT indicated that after 2 years, 85.6% of the intervention group and 83.5% of controls were not smoking (a 2.1% reduction in smoking prevalence with ASSIST). Dividing the mean cost per student (weighted by year group size) by the difference in the proportion of students smoking between the 2 trial arms gave an incremental cost-effectiveness ratio of £1500 (95% CI £669 to £9947), representing the cost per additional student not smoking at 2-year follow-up. It was also noted that using employed ASSIST trainers rather than private contractors reduced the average cost per student by £6. The authors concluded that the intervention was cost-effective, although this was based on assumptions about a reduction in adolescent smoking leading to reduced smoking prevalence in adulthood. No specific analyses of potential healthcare savings or quality-adjusted life years were performed.

Limitations of the evidence included that peer supporters' time was not part of the cost analysis (although monetary costs would have been difficult to assign). Additionally, 'usual smoking education' varied across the schools not participating in ASSIST which may have introduced confounding effects. Finally the study measured outcomes at 2 years, therefore whether the effects of the intervention would continue into adulthood, and whether the intervention would be cost-effective in the longer term, are unclear.

Although the study did not formally calculate cost effectiveness, the authors suggested that ASSIST is likely to be cost-effective, consistent with its recommendation for use in NICE PH23. Knowing the mean cost per student of £32 may also be useful for schools.

Additional information about the study by Hollingworth et al. (2010) is also available from an independent critical appraisal report produced for the Centre for Reviews and Dissemination's NHS Economic Evaluation Database.

Socioeconomic analysis of ASSIST

As part of the study by **Mercken et al. (2012)**, a secondary analysis of the RCT by Campbell et al. (2008) was performed to examine the effect of socioeconomic status on outcomes with the ASSIST programme. Three indicators of socioeconomic status were used: family affluence, free school meal entitlement, and school location in the South Wales valleys (a deprived area). A multi-level model assessed the effect of ASSIST for the 3 categories.

For family affluence score, a significant effect of ASSIST was seen among those with low scores (OR=0.71, 95% CI 0.54 to 0.93) and high scores (OR=0.68, 95% CI 0.52 to 0.90), but not among those with mid scores. There was also a significant effect of ASSIST among those who attended schools in the valleys (OR=0.53, 95% CI 0.32 to 0.89). No significant effects were seen with free school meals. Sub-analyses by gender revealed significant effects of ASSIST among girls with low family affluence scores (OR=0.59, 95% CI 0.42 to 0.83) and girls attending valley schools (OR=0.40, 95% CI 0.21 to 0.76), but no significant effects were seen in any of the sub-analyses of boys.

Limitations of the evidence included that: it was not clear which follow-up data from the original RCT were used; socioeconomic analyses may depend on the indicators used and different indicators may give different results; some socioeconomic indicators were self-reported; lower participant numbers for the sub-analyses may reduce the validity of findings; and there is a possibility that ASSIST could have been implemented differently between lower and higher socioeconomic groups.

The evidence suggests that ASSIST may be more effective among specific socioeconomic groups, particularly girls of lower socioeconomic status. This is unlikely to have an impact on NICE PH23 but it provides useful information about mediators of the effect of the programme and its potential in reducing health inequalities. The evidence may also help to address questions about the impact that factors such as socioeconomic group may have on the effectiveness of interventions to prevent the uptake of smoking as per the NICE research recommendation.

Key reference

Hollingworth W, Cohen D, Hawkins J et al. (2012) Reducing smoking in adolescents: cost-effectiveness results from the cluster randomized ASSIST (A Stop Smoking In Schools Trial). Nicotine & Tobacco Research 14: 161–8

Supporting references

Campbell R, Starkey F, Holliday J et al. (2008) An informal school-based peer-led intervention for smoking prevention in adolescence (ASSIST): a cluster randomised trial. Lancet 371: 1595–602

Centre for Reviews and Dissemination (2012) Reducing smoking in adolescents: cost-effectiveness results from the cluster randomized ASSIST (A Stop Smoking In Schools Trial). NHS Economic Evaluation Database

1.4 Training and development

No new key evidence was found for this section.

1.5 Coordinated approach

NICE PH23 recommends that government departments, school inspectorates, school governing bodies and school commissioners, children's trusts, local authorities (in particular, children and young people's services, trading standards and environmental health officers), Connexions or Integrated Youth Support Services, primary care trusts, regional and national health commissioners, and local tobacco control alliances, should ensure that smoking prevention interventions in schools and other educational establishments are part of a local tobacco control strategy. They should also ensure that schools and other educational establishments deliver evidence-based smoking prevention interventions that are integrated into the curriculum, PSHE education and work associated with Healthy Further Education and Healthy Schools status.

Community, school and university partnerships

Spoth et al. (2011) examined the long-term findings from an RCT of a community–university partnership model designed to prevent substance misuse and related problems. The trial involved 11,960 grade 6 students (90% of those eligible) from 28 community school districts of Iowa and Pennsylvania, USA. Communities were eligible to participate if they had a school district enrolment between 1300 and 5200 students, and if at least 15% of students were eligible for free or subsidised school lunches. Pairs of communities were matched on school district size and location and then randomised to the PROSPER (promoting school–university partnerships to enhance resilience) intervention, or to control (usual programming). The PROSPER model comprised 3 components: local community teams linked with public schools; a team of university researchers; and a prevention coordinator team to liaise between the community and university teams. This model then guided the selection and delivery of several evidence-based interventions.

The local teams first selected 1 of 3 available family-focused interventions; all 14 teams chose the 7-session 'Strengthening Families Programme'. In the second year of the study, teams selected 1 of 3 school-based interventions (each consisting of 11–15 classroom sessions delivered in most cases by a regular teacher). Six teams chose 'All Stars' (based on social learning and problem behaviour theory), 4 chose 'Life Skills Training' (also guided by social learning and problem behaviour theory), and 4 chose 'Project ALERT' (based on the social influence model of prevention). Some intervention communities then also held booster sessions. Programme content fidelity ranged from 89% to 91% across all programmes. Data were collected from students for 4.5 years of follow-up via questionnaires about the use of several legal and illegal drugs (although only tobacco outcomes are discussed here), and about 'new users' (those initiating substance use having reported no lifetime use at baseline). Data from all time points were available for 88% of eligible students.

From an intention-to-treat, multilevel analysis of covariance, the PROSPER intervention had a significant effect on both past-month tobacco use (relative reduction=16.1%, p=0.067) and new tobacco users (relative reduction=13.1%, p=0.028). Growth trajectory analyses also showed significantly slower growth in the intervention group for both new tobacco users (p=0.008) and past-month tobacco use (p=0.023). At an earlier 18-month follow-up, no significant effects on tobacco use were seen.

Study limitations included: issues of generalisability (the study was conducted in 2 states of the USA in small communities with populations of 7000 to 44,500, and participants were primarily white); and that all substance use outcomes were self-reported.

The evidence suggests that implementing school-based sessions on resisting substance use as part of a wider community and university partnership appears to reduce smoking in the longer term (although the study setting may limit applicability to the UK). This is consistent with recommendations in NICE PH23 to deliver evidence-based substance use prevention interventions in the school curriculum as part of a local tobacco control strategy.

The Strengthening Families Programme referred to above is currently being trialled in the UK.

Key reference

Spoth R, Redmond C, Clair S et al. (2011) Preventing substance misuse through community-university partnerships: randomized controlled trial outcomes 4 1/2 years past baseline. American Journal of Preventive Medicine 40: 440–7 [NIH Public Access author manuscript – full text]

Community interventions

A Cochrane review by **Carson et al. (2011)** assessed the effectiveness of community-based interventions on smoking behaviour in young people. RCTs and non-RCTs in young people under the age of 25 years, examining multicomponent interventions (such as school or workplace programmes, media promotion, and public policy) targeted at communities (in whole or in part) with the aim of influencing smoking behaviour (including preventing uptake), were included. The definition of a smoker varied among the trials, but where possible the strictest definition ('any history of smoking') was used. A total of 25 studies (15 RCTs, 10 non-RCTs; n=104,000) were identified, with the majority from the USA. School components featured in 21 of the trials, but the type, duration and intensity varied across the studies, and no specific analyses of these components were provided by the review.

Among the 25 included studies, for the primary outcome of smoking behaviour (assessed objectively or by self-report), 1 study reported a reduction in short-term smoking prevalence (12 months or less), 9 detected significant long-term effects, 2 reported significantly lower smoking rates in the control population, and the remaining 13 studies showed no significant difference between groups. Meta-analyses were performed of those studies with appropriate data, but did not show any significant effect of the intervention on primary smoking behaviours except in a single study of smokeless tobacco (p=0.01). However, the authors stated that these results should be interpreted with caution because only 2 of the 10 studies categorised as showing a clinically and statistically significant benefit could be included in the meta-analyses.

Limitations of the evidence include that: the external validity of results to communities outside those in which the study interventions were performed may be limited; and in their quality assessment, the authors noted a high or unclear risk of bias in 8 of 11 methodological quality items for at least half the included studies.

The authors concluded that there was some evidence of the effectiveness of community interventions in reducing smoking (the majority of which featured a school component), but that it was not strong and contained methodological flaws, therefore this evidence is unlikely to have an impact on NICE PH23.

Key reference

Carson KV, Brinn MP, Labiszewski NA et al. (2011) Community interventions for preventing smoking in young people. Cochrane Database of Systematic Reviews issue 7: CD001291

Prevention of multiple risk behaviours

A systematic review by **Jackson et al. (2011)** examined the effect of interventions to prevent multiple risk behaviours, namely substance abuse (legal and illegal, including tobacco) and risky sexual behaviour, in young people. Experimental or quasi-experimental studies in children and young people aged 5 to 25 years with a minimum 6-month follow-up were included. Clinical intervention studies, and studies of prevention among existing drug abusers

and other high-risk populations, were excluded. A total of 18 studies were identified, but only 13 studies (10 RCTs, 3 non-RCTs; n=20,674) were discussed in the analysis (5 weak studies were excluded). Of the studies analysed, 9 involved a school setting (4 were curriculum-based, 4 were whole-school or multi-setting, and 1 was curriculum-based with a parent and peer component), and of the remainder 3 were non-school based (individual or family programmes), and 1 was community based. Only 1 study's quality was deemed strong, with the rest rated as moderate quality. Heterogeneity between studies precluded meta-analysis.

Of the 9 studies reporting outcomes for smoking, 4 studies (of which 2 comprised a school component) showed a significant effect of the intervention on 1 or more smoking measures. The authors overall conclusion was that there was limited evidence of the effect of programmes to reduce multiple risk behaviours, and the most promising programmes targeted multiple domains (individual, school, family or community).

Limitations of the evidence included that: the majority of studies were based in the USA (and some examined sub-populations based on, for example, socioeconomic factors) which may limit applicability to the UK; most studies had high attrition, particularly among those most at risk; smoking was not always a primary outcome; and grey literature was not searched.

Although the data may suggest some positive effects of targeting multiple risk behaviours across multiple domains, the breadth of the study interventions, the absence of pooled analysis, and the predominantly US setting of most studies limit the conclusions that can be drawn. This evidence is therefore unlikely to have an impact on NICE PH23.

Additional information about the study by Jackson et al. (2011) is also available from an independent critical appraisal report produced for the Centre for Reviews and Dissemination's Database of Abstracts of Reviews of Effects.

Key reference

Jackson C, Geddes R, Haw S et al. (2012) Interventions to prevent substance use and risky sexual behaviour in young people: a systematic review. Addiction 107: 733–47

Supporting reference

Centre for Reviews and Dissemination (2012) Interventions to prevent substance use and risky sexual behaviour in young people: a systematic review. Database of Abstracts of Reviews of Effects

Socioeconomic influences on coordinated interventions

NICE PH23 does not make specific recommendations about delivering coordinated smoking prevention interventions in the context of socioeconomic status.

As part of the study by **Mercken et al. (2012)**, a secondary analysis of a trial by de Vries et al. (2006) was performed to examine the effect of socioeconomic status on outcomes with the European Smoking Prevention Framework Approach (ESFA) programme. The original trial was a randomised community-based intervention (comprising a school, parent, and community component) across 6 European countries. After 30 months, the strongest effects were seen in Portugal therefore the Portuguese data were chosen for re-analysis. In the initial study, 2 regions of Portugal were randomised to intervention (14 schools) or control (11 schools) with a total of 3102 participants (average age=13.5 years). The school-based element of the ESFA programme comprised lessons on effects of tobacco, reasons for smoking and not smoking, social influence processes, refusal skills and decision making, and also a smokefree competition. In addition, parents were given information about discussing smoking with their children, and at the community level, the Portuguese health minister and the mayor of the community introduced ESFA on the national no-smoking day. Socioeconomic status was measured by 3 indicators: father working full-time, mother working full-time, and amount of pocket money.

At 30 months, the ESFA programme was seen to have a significant effect among those with a father working full-time (OR=0.56, 95% CI 0.43 to 0.73), those with or without a mother working full-time (OR=0.67, 95% CI 0.49 to 0.91; and OR=0.51, 95% CI 0.32 to 0.81 respectively), and those with no or low pocket money (OR=0.62, 95% CI 0.46 to 0.84). The intervention did not however appear to be effective among those without a father working full-time, or those with mid to high pocket money.

Limitations of the evidence included that: the Portuguese setting may limit validity to the UK; the analysis used results for 'ever smoking' which may be less robust than 'current smoking' outcomes; socioeconomic analyses may depend on the indicators used and different indicators may give different results; pocket money may not be a reliable socioeconomic indicator (for example, children from higher socioeconomic groups may be bought things rather than being given more money to spend); and socioeconomic indicators were self-reported.

The mixed findings did not appear to demonstrate a consistent effect of socioeconomic status on outcomes with the ESFA programme, and the evidence is therefore unlikely to have an impact on NICE PH23.

Supporting reference

de Vries H, Dijk F, Wetzels J et al. (2006) The European Smoking prevention Framework Approach (ESFA): effects after 24 and 30 months. Health Education Research 21: 116–32

Components of an effective coordinated approach

The recent report of the Surgeon General by the US Department of Health and Human Services (2012) noted that 'school-based programmes produce larger and more sustained effects when they are implemented in combination with other initiatives such as mass media campaigns, family programmes, and state and community programmes.'

This is in broad agreement with the new evidence and the recommendations of NICE PH23.

2 New evidence uncertainties

During the development of the Evidence Update, the following evidence uncertainties were identified for the UK Database of Uncertainties about the Effects of Treatments (UK DUETs).

Adult-led interventions

- Incentives for preventing smoking in children and adolescents

Coordinated approach

- Community interventions for preventing smoking in young people
- Mid-childhood (ages 6–10 years) programmes to prevent substance use and risky sexual behaviour in young people

Further evidence uncertainties for preventing uptake of smoking among children and young people can be found in the NICE research recommendations database.

UK DUETs was established to publish uncertainties about the effects of treatments that cannot currently be answered by referring to reliable up-to-date systematic reviews of existing research evidence.

Appendix A: Methodology

Scope

The scope of this Evidence Update is taken from the scope of the reference guidance:

- School-based interventions to prevent the uptake of smoking among children and young people. NICE public health guidance 23 (2010).

Searches

The literature was searched to identify studies and reviews relevant to the scope. Searches were conducted of the following databases and websites, covering the dates 1 November 2008 (the end of the search period of NICE public health guidance 23) to 31 October 2012:

Databases

- ASSIA (Applied Social Sciences Index and Abstracts)
- CDSR (Cochrane Database of Systematic Reviews)
- CENTRAL (Cochrane Central Register of Controlled Trials)
- CINAHL (Cumulative Index to Nursing and Allied Health Literature)
- DARE (Database of Abstracts of Reviews of Effects)
- EMBASE (Excerpta Medica database)
- ERIC (Education Resources Information Centre)
- HMIC (Health Management Information Consortium) database
- HTA (Health Technology Assessment) database
- MEDLINE (Medical Literature Analysis and Retrieval System Online)
- NHS EED (Economic Evaluation Database)
- PreMEDLINE
- PsycINFO
- Sociological abstracts

Websites (* indicates websites additional to those searched for NICE PH23)

- Aggressive Research Intelligence Facility
- Action on Smoking and Health (ASH)
- ASH Scotland
- ASH Wales
- Bandolier
- Centre for Tobacco Control Research
- Clinical Evidence
- Cochrane Public Health Group
- Cochrane Tobacco Addiction Group*
- Department for Education* (Department for Children, Schools and Families no longer exists)

- Health Scotland
- NHS Evidence
- NICE website – for previous Health Development Agency publications and NICE public health guidance
- Public Health England*
- Public health observatories (East Midlands, Eastern Region, London, North East, North West, Scotland, South East, South West, West Midlands, Yorkshire and Humber, Wales)
- Public Health Research Consortium*
- Quit
- The Campbell Collaboration
- The Evidence for Policy and Practice Information and Co-ordinating Centre
- The Trials Register of Promoting Health Interventions
- TRIP database
- UK Public Health Association
- Welsh Government (Health and Social Care)*

Table 1 provides details of the MEDLINE search strategy used, which was adapted to search the other databases listed above.

All the search terms from the original search strategy for NICE PH23 were used. However, after an initial scoping search, other relevant terms were added to the original search strategy:

- Population terms added: juvenile*, minor*, female*, male* exp students, student*, pupil*
- Educational establishment terms added: class*, college*
- Intervention terms added: health improvement, program*, module*, interven*, strategy, strategies, policy, policies, model* , technique*, framework*

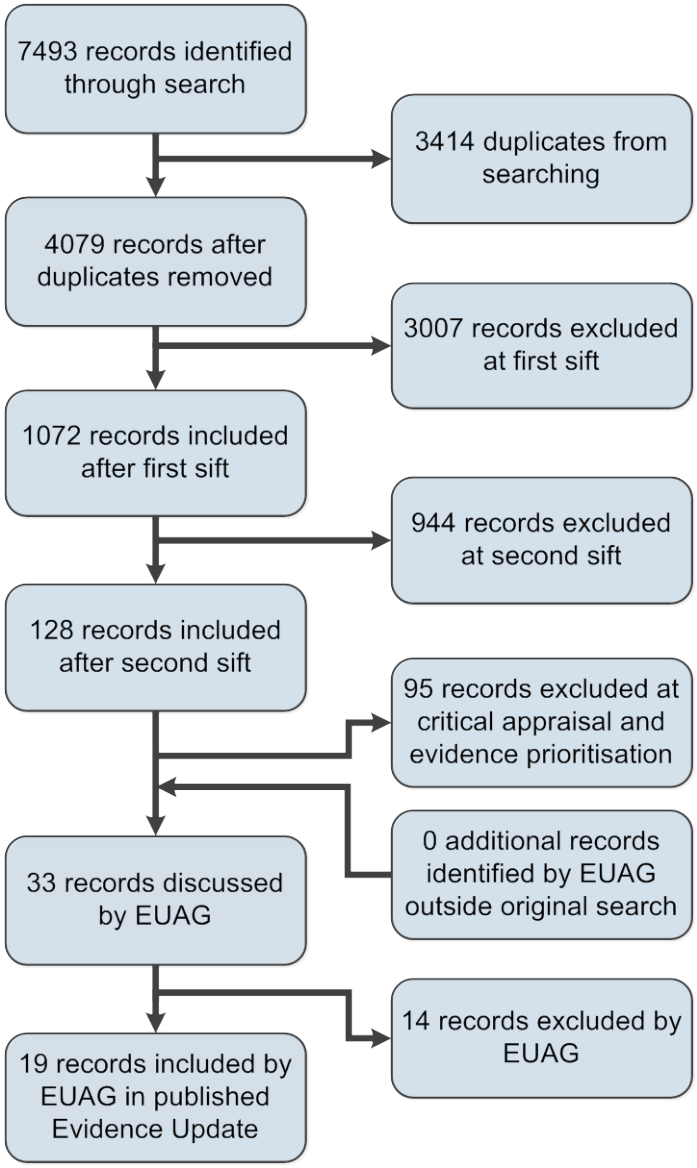
Figure 1 provides details of the evidence selection process. The long list of evidence excluded after review by the Chair of the EUAG, and the full search strategies, are available on request from contactus@evidence.nhs.uk

There is more information about how NICE Evidence Updates are developed on the NICE Evidence Services website.

Table 1 MEDLINE search strategy (adapted for individual databases)

1	exp Adolescent/
2	exp Child/
3	(adolescent* or child* or youth* or teenage* or juvenile* or minor*).ti,ab.
4	young people.ti,ab.
5	young person*.ti,ab.
6	young adult*.ti,ab.
7	(girl* or female*).ti,ab.
8	(boy* or male*).ti,ab.
9	exp Students/
10	(student* or pupil*).ti,ab.
11	or/1-10
12	exp Schools/
13	(school* or class*).ti,ab.
14	(academy or academies).ti,ab.
15	city technology.ti,ab.
16	sixth form*.ti,ab.
17	education cent*.ti,ab.
18	secure unit*.ti,ab.
19	training unit*.ti,ab.
20	secure training.ti,ab.
21	referral unit*.ti,ab.
22	(offender* adj institute*).ti,ab.
23	further education.ti,ab.
24	college*.ti,ab
25	or/12-24
26	11 and 25
27	health promotion.ti,ab. or exp Health Promotion/
28	health improvement.ti,ab.
29	health education.ti,ab. or exp Health Education/
30	primary prevention.ti,ab. or exp Primary Prevention/
31	(campaign* or teach* or advis* or counsel* or promot* or encourag*).ti,ab.
32	(program* or lectur* or train* or workshop* or seminar* or lesson* or learn* or curricul* or course* or educat* or module*).ti,ab.
33	(interven* or strategy or strategies or policy or policies or model* or technique* or framework*).ti,ab.
34	or/27-33
35	26 and 34
36	smok*.ti,ab. or exp Smoking/
37	(tobacco* or cigarette* or nicotine*).ti,ab.
38	((prevent* or abstain* or abstin* or stop* or discourag* or anti* or no or non) adj2 smok*).ti,ab
39	or/36-38
40	35 and 39

Figure 1 Flow chart of the evidence selection process



EUAG – Evidence Update Advisory Group

Appendix B: The Evidence Update Advisory Group and Evidence Update project team

Evidence Update Advisory Group

The Evidence Update Advisory Group is a group of topic experts who review the prioritised evidence obtained from the literature search and provide the commentary for the Evidence Update.

Professor Amanda Amos – Chair

Professor of Health Promotion, Centre for Population Health Sciences, University of Edinburgh

Ms Judith MacMorran

Senior Health Improvement Specialist, Newcastle Hospitals Community Health

Professor Ann McNeill

Professor of Addictions, National Addiction Centre, Institute of Psychiatry, King's College London

Dr Simon Murphy

Reader, Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer), Cardiff University

Dr Lisa Szatkowski

Lecturer in Medical Statistics, University of Nottingham and UK Centre for Tobacco Control Studies

Evidence Update project team

Marion Spring

Associate Director, Evidence Information Services

Catherine Swann

Associate Director, Centre for Public Health Excellence

Chris Weiner

Consultant Clinical and Public Health Adviser

Cath White

Programme Manager, Evidence Updates

Jayne Jefferies

Information Specialist, Evidence Information Services

Andrew Hoy, Patti White

Analysts, Centre for Public Health Excellence

Fran Wilkie

Critical Appraiser, Evidence Updates

Patrick Langford

Editor, Evidence Updates