

Effective Health Care

Bulletin on the effectiveness
of health service interventions
for decision makers

This bulletin reviews the
evidence for the
effectiveness of
interventions aimed at
preventing the uptake of
smoking in young people.



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Preventing the uptake of smoking in young people

- The number of children and young people starting to smoke is increasing. As 82% of smokers take up the habit during teenage years the increasing rates of young smokers will eventually feed through into adult smoking rates.
- The uptake of smoking is a complex process and is rarely a single distinct event. A factor strongly associated with decisions to start smoking is the influence of family members and peers.
- There is no simple way to prevent children and young people from taking up smoking. School-based programmes have achieved limited success, although social reinforcement/social norms type programmes seem to be more effective than traditional knowledge-based interventions.
- Mass media campaigns can influence smoking behaviour. Both the intensity and duration over which the messages are delivered appear to be important factors.
- Enforcement of the law relating to cigarette sales to underage youth can have an effect on retailer behaviour, but the impact on smoking behaviour is likely to be small.
- Community approaches involving different intervention components can influence smoking behaviour, particularly when multiple sites within a community are targeted.
- Most programmes have targeted 11–17 year olds. However, attitudes towards smoking and experimentation with cigarettes may already be established by this time. Programme implementation before regular patterns of smoking behaviour are formed should be considered. This may involve targeting children as young as 4–8 years of age.

A. Background

The number of children and young people starting to smoke is increasing. In 1988 the proportion of regular smokers aged 11 to 15 in England was reported to be 8% and by 1996 that figure had increased to 13%.¹ As 82% of smokers take up the habit during teenage years,² the increasing rates of young smokers will eventually feed through into adult smoking rates. The cost of smoking is high in terms of peoples' health, with smoking causing over 120,000 deaths in the UK at all ages in 1995. Forty-six thousand deaths were from cancer, 40,000 from circulatory disease and 34,000 from respiratory disease.³ Smoking also contributes to the gap in healthy life expectancy between people most in need and those most advantaged.¹ Treating illness and disease caused by smoking is estimated to cost the NHS up to £1.5 billion every year.⁴

Reductions in the number of young people taking up smoking are important if a downward trend in the level of adult smoking is to be re-established in the future. Concern over the rise in the number of young people starting to smoke has been recognised in policy initiatives from the UK Government. The recent White paper '*Smoking Kills*' identified young people as a priority and set targets to reduce smoking among children in England from 13% to 9% or less by 2010, with a fall to 11% by 2005.¹

The Government has pledged to spend approximately £100 million over the next three years on a concerted campaign to reduce smoking. This will include up to £60 million to develop NHS services to help smokers to quit and almost £50 million for a mass media education campaign.¹ UK policy is also in line with the European Commission (EC) Directive banning tobacco advertising. The EC Directive will become Law in the UK ending tobacco advertising as soon as is practicably possible, and well before the deadline of July 2002, and an end to all tobacco

sponsorship by July 2006 (the date by which the Directive must be fully implemented).^{1,5}

Factors associated with smoking

The challenge for any initiative aimed at reducing the uptake of smoking in young people is to address the factors that are associated with smoking (Table 1). A recent systematic review has documented a number of factors associated with the uptake of smoking, including environmental, socio-demographic, behavioural as well as individual characteristics.⁶

The uptake of smoking is a complex process and will rarely be a single, distinct event. However, one of the most consistent findings to emerge from the literature is the influence of peers and others, such as family members, in decisions to start smoking.⁶ Policy-related factors such as advertising and price are also likely to influence decisions. For example, evidence indicates that the introduction of tobacco advertisements which appeal to young people are associated with increases in the uptake of smoking.^{7,8} A recent study based on data collected from over 16,500 students in the USA suggests that increases in cigarette prices (from higher taxes on tobacco) could result in substantial reductions in cigarette consumption.⁹

This issue of *Effective Health Care* summarises the research evidence on approaches to preventing the uptake of smoking in young people and is aimed principally at people working in sectors responsible for young peoples' services. It is based mainly on recent systematic reviews available in *The Cochrane Library*.¹⁰ A summary of the review methods

is included in the appendix of this bulletin. Three main approaches to preventing the uptake of smoking are examined: (i) interventions delivered in schools, (ii) mass media campaigns and (iii) community programmes. The evidence on the effectiveness of strategies for preventing tobacco sales to minors is also summarised, which could contribute to the new Enforcement Protocol currently being developed by the Government, local authorities, trading standards and environmental health officers. The protocol is for use by local authorities and will help them exercise their statutory role in preventing under-age sales.¹ The evidence for the effectiveness of policy initiatives such as banning advertising and tobacco pricing is not examined in this bulletin.

B. School-based programmes

Schools have been regarded as an important setting for providing health information since the 1950s, and school-based programmes have been the most widely used approach in the UK for preventing the uptake of smoking. Early strategies often included scare or shock tactics, based on the assumption that young people started to smoke because they lacked knowledge about the adverse effects associated with smoking. More recent programmes have focused on the social factors thought to influence smoking, and have drawn heavily on psycho-social theories such as Social Learning Theory. Emphasis is placed on the acquisition of skills to resist the pressures to smoke.

Table 1 Factors associated with the uptake of smoking

Environmental	Socio-demographic	Behavioural/Individual
Parental smoking	Age	School performance
Parental attitudes	Ethnicity	Lifestyle
Sibling smoking	Parental socio-economic status	Self-esteem
Family environment/ parental attachment	Personal finance	Attitudes to smoking/smokers
Peer smoking		Stress
Peer attitudes & norms		Health concerns

This section of the bulletin is an overview of recent systematic reviews of school-based programmes designed to prevent the uptake of smoking in children and young people. Eight reviews met the criteria for inclusion and between them included over 170 primary studies. One of the reviews met only minimum criteria for inclusion and did not cover all the evidence identified, and is therefore not considered further.¹¹ Due to the different inclusion criteria used in each review, no single review included all available primary studies. The interventions evaluated ranged from tobacco-specific through to general health education programmes. Most of the studies were carried out in the USA and Canada, which is likely to limit the generalisability of the findings to UK settings.

Of the seven systematic reviews included, two presented their findings based on a qualitative synthesis of the literature. One included only randomised controlled trials (RCTs) that targeted children and young people up to the age of 18 years.¹² Over 60 relevant primary studies were included, but only 11 were considered to be of high quality. Results from the better quality studies showed that at 12 months follow-up there were 8–15% more non-smokers in the intervention groups compared with controls. The lower quality studies showed a similar trend. All 11 programmes provided information about smoking and its consequences, and all emphasised decision-making skills in conjunction with resistance/refusal skills training.

A second qualitative review categorised substance abuse prevention programmes according to programme type.¹³ Forty-five studies were identified, of which 27 targeted tobacco in addition to other substances. They were grouped into the following categories: (i) information/knowledge; (ii) affective (decision-making, self-esteem); (iii) social influences/skills development; and (iv) comprehensive (several components, including

information, decision-making and resistance skills training). The results from the 27 studies were presented as the number of positive, negative or neutral outcomes for each type of programme. The social influences programmes were the group with the highest proportion of positive results. Overall, 51% of outcomes were positive, 38% had no effect and 11% were negative. The comprehensive programmes had a similar proportion of positive outcomes (50%), but no negative outcomes. The programmes with positive outcomes tended to include training to recognise the pressures to smoke, norm setting, pledges or public commitment not to smoke and some form of education or information giving.

Five of the seven reviews presented their findings based on pooled effect sizes (see appendix for explanation of effect sizes). There are particular problems with the interpretation of effect sizes from the point of view of practical usefulness, and controversy still remains about the most appropriate method of interpretation.¹⁴ The effect sizes and the change in success rates attributable to the interventions – as reported in each of the five reviews – are presented.

A review published in 1997 presented its findings according to both study quality and programme delivery.¹⁵ Ninety drug prevention studies (120 programmes) with either a control or comparison group aimed at children aged from 11 to 18 years of age, were included, 43 of which specifically targeted tobacco use. Programmes were categorised according to whether they included active student participation or whether they used traditional didactic (non-participatory) presentations. The mean for programme intensity across studies was 10 hours. When studies of all quality were pooled, there were significant differences between the two types of programme, with participatory programmes achieving the best results (weighted effect sizes of -0.02 for non-participatory and 0.16 for participatory, $p < 0.05$). However,

in a separate analysis of better quality studies, the effectiveness of the two types of programme did not differ significantly (effect sizes were 0.13 for non-participatory and 0.18 for participatory, or a success rate of about 9%).

One review compared the effectiveness of four different types of school-based programme: (i) rational, or information giving; (ii) developmental, where the focus was on increasing self-esteem and developing decision-making skills; (iii) social norms, where examples of alternative behaviours were presented; and (iv) social reinforcement, which attempted to teach skills to recognise the social pressures to smoke and to develop skills to resist.¹⁶ A total of 84 studies (94 programmes) were included. Results from the better quality studies suggested that social reinforcement programmes were positive at post-test, first and second follow-up (effect sizes were 0.32, 0.31, 0.39) as were the social norms programmes (0.29, 0.19, 0.36). The effectiveness of the developmental programmes was mixed (0.36, 0.08, -0.42) and the rational programmes were generally not effective (-0.1, 0.13, -0.3). A definition of first and second follow-up was not provided in the review.

A recent meta-analysis evaluated the effectiveness of social reinforcement type programmes with 11 to 18 year olds.¹⁷ Ninety studies (with a total of 131 comparisons) were included, all of which had either a control or a comparison group. The results suggested that a reduction in smoking levels of around 5% at post-test and up to one year follow-up could be achieved when information on the short-term health consequences of smoking were combined with information on the social influences that encourage smoking and training on how to resist the pressures to smoke.

One meta-analysis focused entirely on Drug Abuse Resistance Education (DARE) programmes.¹⁸ DARE uses specially trained law enforcement officers to teach drug

prevention curricula in schools. Since its inception in 1983 it has become one of the most widely used programmes in the USA. Eight studies with either a control or a comparison group were included in the meta-analysis. DARE was shown to have a small, but significant effect on tobacco use when assessed post intervention (weighted effect size of 0.08, 95% CI: 0.02 to 0.14). However, in two studies which assessed effectiveness at one and two year follow-up this effect was not maintained. Although DARE has mainly been used in the USA, it was introduced into the UK in 1994 but there are currently few evaluations of its effectiveness available.¹⁹

Similarly, another meta-analysis only included data from one source: the California School-based Risk Reduction Program.²⁰ Eight studies with a control or comparison group were included, of which six had adopted a rational, mainly didactic approach, whilst two were developmental programmes which included life-skills training. Participants were aged nine to 14 years. Results at post-test showed that the developmental programmes were more successful in influencing smoking behaviour than the rational programmes (effect sizes of 0.16 versus 0.01 respectively).

The evidence to date for the effectiveness of school-based programmes in preventing the uptake of smoking in young people is limited. However, social reinforcement/social norms type programmes which include curricular components on the short-term health consequences of smoking, combined with information on the social influences that encourage smoking, together with training on how to resist the pressures to smoke seem to be more effective than traditional knowledge-based interventions.

In addition to considering the specific components that should be included in a programme, it is likely that other issues need to be addressed. For example, the training given to teachers that deliver the programmes, and how well each component is delivered and implemented are likely

to impact on effectiveness. The ages of the young people targeted may also be an issue. Most programmes were aimed at 11 to 17 year olds and it is likely that attitudes and beliefs about smoking and experimentation with cigarettes may already be established by this time. Programme implementation before regular patterns of smoking behaviour are formed should be considered. This may involve targeting children as young as four to eight years of age.²¹

In addition, methodological weaknesses with several of the systematic reviews, such as heterogeneity in effect sizes, suggesting differences between the studies combined, means that the results should be interpreted with caution.

Most of the evaluated school-based programmes have focused almost entirely on developing knowledge and skills. Less attention has been paid to the role that schools may play in influencing smoking behaviour. The importance of the school setting was acknowledged recently through the development of the European Network of Health Promoting Schools (ENHPS). The initiative was launched in 1991 with support from the WHO, the European Commission and the Council for Europe. The UK formally entered the network in 1993.²² The initiative recognises the importance of the school environment, and aims to achieve healthy lifestyles for all school members by developing and implementing policy and creating supportive environments. The initiative is still in its infancy and the implementation of all components in any one school is likely to take several years. However, there is some evidence that this is a promising approach.²³

More recently, the UK government announced The Healthy Schools Programme which aims to raise awareness about the opportunities that exist in schools for improving both the physical and mental health of children and young people.^{24,25} A number of pilot partnerships between education and health authorities have already been set up and it is

anticipated that the scheme will be implemented nationally in Autumn 1999, with funding from The Department of Health and the Department of Education and Employment.²⁶

C. Mass media campaigns

The mass media (TV, radio, newspapers, magazines) have become increasingly popular as a strategy for delivering preventive health messages and are seen as a particularly appropriate method for delivering anti-smoking messages to young people. For example, recent UK figures showed that 4–15 year olds watched an average of 18 hours 54 minutes of TV per week and 16–24 year olds, 20 hours and 19 minutes per week, during January to March of 1999.²⁷ Television is thought to influence young peoples' perceptions of the real world and acceptable social behaviour, and also to help define cultural norms.

In a recent systematic review, a total of 63 studies, which reported information about the use of mass media campaigns in the prevention of smoking, were identified, six of which met the criteria for inclusion.²⁸ All studies had a comparison group. Five studies were conducted in the USA^{30–34} and one in Norway.²⁹ The ages of participants targeted ranged from nine to 18 years across the studies. One study specifically targeted girls,²⁹ whilst another targeted young people at high risk of becoming smokers.³⁰ All six campaigns focused on preventing smoking among young people and two also included cessation components which were aimed specifically at parents.^{31,32} Table 2 provides a summary of the six studies.

Three studies evaluated the effectiveness of mass media campaigns as a single intervention in preventing the uptake of smoking in young people.^{29,33,34} One reported reductions in the number of smokers in the intervention group compared with the comparison group, after a

Table 2 Mass media interventions

Author (year) country, programme name	Design, participants, follow-up	Intervention	Results	Comments
Media campaigns versus no intervention				
Bauman (1991) ³⁴ USA	10 Standardised Metropolitan Areas matched for size & ethnicity & randomly allocated to Intervention (n=6) or Control (n=4) 12–14 year olds identified via cluster sampling procedures Follow-up: 11–17 months post broadcasts	Intervention: A: radio broadcast about expected consequences of smoking B: as A + sweepstake C: as B + TV broadcast of sweepstake Total 2102 students Control: no intervention Duration: Nov 85 to Feb 87	No effect of the intervention on smoking behaviour or intentions to smoke in the future	Both the individual and the area used as the unit of analysis Substantial variation in smoking within groups 22% lost to follow-up – more likely to be recent, regular smokers
Hafstad (1997) ²⁹ Norway	2 counties matched for size, education level, income, urban/rural settlement & smoking prevalence and allocated to Intervention or Control 14–15 year olds in secondary schools Follow-up: 1 year post final campaign	Intervention: provocative media campaign using newspaper, poster, TV & cinema spots – specifically targeting girls (n=4898) Control: no intervention (n=5439) Duration: 3 annual campaigns of 3 weeks duration	The odds ratio for being a smoker in the intervention compared to control was 0.74 (95% CI: 0.64 to 0.86) after controlling for baseline smoking & gender Expected to be a smoker in 3 years: 9% in intervention group compared with 13% in control (p<0.01)	Cinema & local TV stations were available to 63% of the intervention group 44% in the intervention group & 38% in the control group lost to follow-up No adjustment in the analysis for the unit of allocation
Worden (1983) ³³ USA	Intervention schools were selected if they were within range of a network affiliate station, control schools were in adjacent areas out of range of the signal 10–12 year olds in 93 schools Follow-up: 18 months post intervention	Intervention: media campaign using TV smoking prevention messages, showing refusal skills & non-smoking role models placed after school and during Saturday morning viewing hours (n=4005) Control: no intervention (n=2763)	No significant differences in smoking behaviour between groups, although a lower level of smoking was noted for the intervention group after the intervention than for the control group (7.4% to 15.6% v 7.1% to 17.5%)	Loss to follow-up: not stated No adjustment in the analysis for the unit of allocation
Media campaign combined with a school-based programme versus media campaign only				
Floy (1987) ³¹ USA	53 schools in 26 school districts – self-selected schools were allocated to either intervention or a mixture of intervention + control. Control schools selected from non-responding schools 12–13 year olds in 53 schools Follow-up: 2 years post intervention	Intervention: media campaign consisting of TV spots aimed at children & parents combined with a school curriculum smoking prevention programme. Free written materials were given to schools (n=12 schools) Control: media campaign only (n=18 schools) (Mixed schools =23) Duration: 2 weeks	There were no significant differences in smoking behaviour or intentions to smoke between groups	Intervention schools were self-selected – likely to be highly motivated 71% were lost to follow-up – who were more likely to be at higher risk of smoking or who were already smoking at baseline measurement
Media campaign combined with school-based programme versus school-based programme only				
Flynn (1995) ³⁰ USA	4 demographically matched communities selected as 2 pairs 9–17 year olds in 50 schools Follow-up: 2 years post intervention	Intervention A: grade specific information about smoking, teaching of refusal skills, & skills to resist advertising pressures & social support for non-smoking combined with TV & radio campaign Control: schools programme only Total 5458 students Duration: 4 years	Students in the intervention group were at lower risk for weekly smoking than students in the control group (OR 0.62, 95% CI: 0.49 to 0.78)	Both the individual & community used as the unit of analysis 62% lost to follow-up
Media campaign versus school programme versus media plus school programme versus health information control versus no intervention control				
Floy (1995) ³² USA The Television, School & Family Smoking Prevention & Cessation Project	47 schools randomly (blocked) assigned to conditions 12–14 year olds in 47 schools Follow-up: 2 years post intervention	Intervention A: social resistance classroom curriculum B: TV media intervention based on filmed classroom sessions C: A + B Control A: health information B: no intervention Total 6695 participants Duration: 6 weeks	No consistent programme effects on smoking behaviour or smoking intentions	Significant variability in the integrity of programme delivery in the classroom & TV programming was poorly executed Accounted for unit of allocation in analysis 53% lost to follow-up

three-year campaign which was designed to create negative reactions to smoking.²⁹ The media used included newspapers, posters, TV, and cinema spots. At one year follow-up the proportion of daily smokers was lower in the intervention county than in the control county (OR 0.74; 95% CI: 0.64 to 0.86, after adjustment for smoking at baseline and gender). This finding remained significant after adjustment for the difference in response rates to the questionnaire, between the intervention and control counties (OR 0.84, 95% CI: 0.76 to 0.95). The two other evaluations of media campaigns in this category did not report any differences in smoking behaviour between the intervention and control areas.^{33,34}

One study compared the effectiveness of a four-year media campaign combined with a school-based programme.³⁰ The focus of the intervention was on teaching refusal skills and skills to resist the pressure to smoke from advertising. New media messages were created on an annual basis to keep pace with the changing interests of the target audience.

At two-year follow-up, participants who received both the media and school-based programme were at significantly lower risk for weekly smoking than those in the comparison group, who received only the school-based component (OR 0.62, 95% CI: 0.49 to 0.78). A separate analysis assessed the impact of the intervention on different sub-groups, defined by their risk for smoking at baseline. Those classified as being at higher risk were young people who had tried smoking or had two or more family members or friends who smoked. Results indicated that the intervention had a greater effect on the higher risk groups than the lower risk group: differences in weekly smoking prevalence between the intervention and control groups were 7.3% for the higher-risk groups and 4.3% for the lower-risk group.³⁵

The cost of developing and broadcasting the campaign was approximately 759,000 US dollars.

The cost per student smoker averted was \$754 (95% CI: \$531 to \$1296) and the cost per life year gained discounted at 3% was \$696 (95% CI: \$445 to \$1269) based on figures for 1996.³⁶ Estimates of the cost per life year gained for this campaign compared favourably to other preventive strategies.

One study which evaluated the effectiveness of a media campaign combined with a school-based programme found no differences in smoking outcomes at two-year follow-up between the intervention group and a comparison group who received the media campaign only.³¹ An additional study compared the effectiveness of two different media interventions: a TV only and a TV plus a classroom programme with two control groups. The results showed that at two-year follow-up smoking behaviour did not differ significantly between the groups.³²

Despite methodological problems common to a number of the studies, such as high drop-out rates and differences between the groups in baseline smoking rates, some limited support is provided for the effectiveness of mass media campaigns. Evidence from the two campaigns that were effective in influencing smoking behaviour suggests that both intensity and duration are important. In one campaign there was an average of 550 TV and 350 radio spots purchased in each of the four years in which the campaign ran.³⁰ In the other, a total of 167 TV and cinema spots were shown in each of the three annual campaigns.²⁹

Developmental work with representative samples of the target audience is likely to be an important step, as it allows appropriate messages to be designed and delivered through the most suitable medium, at times when they have the most chance of reaching their intended audience. Similarly, consideration should be given to the most appropriate theoretical approach on which to develop the media campaign. This method gives a strong emphasis to consumer needs.

D. Retailer interventions

Controlling access to cigarettes is a well established strategy in preventing young people from becoming addicted to tobacco and in many countries tobacco sales to minors are prohibited. In the UK it is illegal to sell cigarettes to anyone under the age of 16. However, compliance with laws designed to limit access to tobacco is problematic. A recent survey found that 25% of secondary school children in England had tried to purchase cigarettes in a shop during the last year. Only 38% had been refused at least once.³⁷

A recent systematic review included 27 studies which have evaluated strategies aimed at deterring retailers from selling tobacco to minors.³⁸ Of the 13 studies with a control group, nine were based in the USA,³⁹⁻⁴⁷ three in Australia⁴⁸⁻⁵⁰ and one in the UK.⁵¹ Of the 11 trials which assessed the rate of illegal sales (via compliance checks), six were found to be successful. Three of the successful interventions involved active enforcement^{39,42,43} and three included a mixture of education,^{44,45} community organisation⁴⁴ and warning letters threatening prosecution.⁴⁹ However, assessing the rate of illegal sales does not demonstrate whether interventions aimed at deterring retailer sales affect young people's perceived ease of access to tobacco or their smoking behaviour.

Only one study which showed a reduction in the rate of illegal sales also showed a decline in perceived ease of access by young people.⁴⁴ Smoking prevalence, however, was not affected by the intervention. Four other controlled trials also assessed the impact of retailer interventions on smoking behaviour.^{43,47,50,51} Two of the evaluations reported small effects of the interventions on smoking prevalence.^{47,50} In one, the difference in prevalence was significant for daily smoking (4.9%, 95% CI: 0.7 to 9.0) but not for weekly or monthly

smoking.⁴⁷ In the other, an effect of the intervention was only apparent for the youngest age group (age 12 years).⁵⁰ Both studies, however, included other intervention components such as the introduction of new directives, which could have influenced smoking behaviour.

Law enforcement and community policies generally had an effect on retailer behaviour, but the impact on smoking prevalence was very small. Based on current evidence, reducing the ease with which under-age youth can purchase cigarettes as a means of reducing their use of cigarettes has only limited support.

E. Community interventions

Recognition that young peoples' decisions to smoke are made within a broad social context has led to the development and implementation of community-based programmes. Community interventions often include multiple co-ordinated activities all supporting non-smoking behaviour, such as age restrictions for tobacco purchase, smoke-free public places, media campaigns and special programmes in schools.

Thirteen different community interventions were included in a recent systematic review of the literature.⁶⁵ All studies had a control or comparison group, although methods of allocation varied. The interventions evaluated were diverse; each differed in terms of focus and intervention components. The ages of young people targeted ranged from eight to 24 years. Three studies were based in the UK,^{52,54,55} one in Finland⁶³ and the rest in the USA.^{53,57-62,64} Table 3 provides a summary of the 13 studies.

Eight studies compared community interventions with controls who received no intervention or standard care. Of these, two studies reported decreases in smoking prevalence in

those receiving the intervention.^{59,63} The difference in weekly smoking prevalence between the intervention and control groups was 9% in one study⁵⁹ and in the second, mean lifetime cigarette consumption (at 15-year follow-up) was 22% lower among those in the intervention community than in the control area.⁶³ Both of these programmes were initially designed as large scale, cardiovascular disease prevention programmes aimed at entire communities. They also included components such as school programmes that were targeted specifically at young people. One other study reported smoking rates of around 28% in 11 to 15 year olds who received an intervention comprising community health events, public policy issues and an intensive school programme.⁶⁰ In the control group smoking rates were 30% ($p < 0.001$). In the same study a third group received all intervention components, apart from the substitution of the intensive school programme for an age appropriate programme. Smoking rates in this group were significantly higher than in the control group (36%, $p < 0.01$).⁶⁰

Three studies assessed the effectiveness of community interventions compared with controls who received a school-based programme only.^{53,55,62} One found a significant reduction in self-reported monthly smoking prevalence in the community group compared with the control.⁵³ The difference was approximately 3%. This finding should, however, be treated with caution because when biochemical measurements (via samples of expelled carbon monoxide (CO)) were compared, smoking prevalence did not differ significantly between the groups.

In a comparison of the effectiveness of two identical community programmes, apart from the inclusion in one of a school-based component, no differences in smoking rates at six month follow-up were found.⁵⁶ Both groups did, however, have significant reductions in smoking prevalence of around 1.5%, from baseline to follow-up.

An evaluation of a community intervention including a school and parent programme, media campaigns, community organisation and health policy change found that smoking rates were 7% lower after the introduction of only the first two components than in a comparison group who received the media component only.⁵⁸

Despite several methodological problems common to a number of the studies, such as high drop-out rates and inappropriate use of analysis, there is some limited support for the effectiveness of community programmes to prevent the uptake of smoking in young people. Though there were few similarities across studies in terms of individual components, two studies that were successful in influencing smoking rates both targeted multiple sites within the community such as schools, work sites and churches. Various media channels were also used to reinforce messages. Community interventions are likely to be influenced by local factors and are therefore difficult to replicate in other settings. However, specific components involving schools, work-places, the media and other community groups can be modified so as to achieve acceptability with identified target groups.

F. Implications

The evidence summarised in this bulletin indicates that there is no simple way to prevent children and young people from taking up smoking. Focusing on any single element runs the risk of reaching the conclusion that little works. Policy-makers responsible for tobacco control face a challenge in determining the level of resources that should be allocated to preventing the uptake of smoking.

Due to the complex range of individual, social and environmental factors influencing decisions to smoke, multi-faceted approaches involving education, health services and other groups based in the community are important. A co-

Table 3 Community interventions

Author (year) country, programme name	Design, participants, follow-up	Intervention	Results	Comments
Community programmes versus no intervention				
Baxter (1997) ⁵² UK Action Heart	3 communities matched for coronary heart disease rate & socio-economic status and allocated to intervention or control 11 & 14 year olds in 4 schools Follow-up: post-intervention	Intervention: health education materials, peer led health days, healthy eating days, Smoke-busters Club, Action Heart Charter, non-smoking & healthy eating policies, worksite activities, publicity (n=2 schools, 601 pupils) Control: usual health promotion activities (n=1 school, 289 pupils) Duration: 3 years	Smoking prevalence increased in the intervention schools by 29% in girls & by 10% in boys. In the control schools smoking prevalence increased by 24% in girls & by 16% in boys	No adjustment in the analysis for unit of allocation NHS costs estimated to be £16, 350
Davidson (1992) ⁵⁴ UK Wensleydale Smokebusters	2 geographical areas allocated to intervention or control 8-15 year olds in primary & secondary schools Follow-up: 11 months post launch of the club	Intervention: informational material, outdoor events, No Smoking Day, competitions, celebrity endorsement of the club, Newsletter Control: no intervention Duration: 9 months	Smoking prevalence was 3% in the intervention group and 11% in the control group (not tested statistically)	More regular smokers in the control group than in the intervention group at baseline The project cost £6117 to implement & evaluate It is unclear what % of those surveyed at baseline were included at follow-up
Murray (1994) ⁵⁷ USA Minnesota-Wisconsin Adolescent Tobacco-use Research project	2 communities assigned to intervention or control 14 year olds in schools Follow-up: post-intervention	Intervention: state-wide policy to discourage smoking, financial incentives to schools to use anti-smoking curriculum, anti-smoking policies in schools, anti-smoking media campaign (TV, radio, newspaper, bill boards, posters), Health Department grants to communities for anti-smoking activities Control: no state-wide co-ordinated activity Duration: 4 years	A 2.4% (ns) net decline in smoking prevalence over the 4 year period in the intervention community compared to control community	Analysis took account of the unit of allocation Cross sectional surveys of randomly selected schools in each community Total funding was approx. \$2 million per year funded from tobacco taxes
Perry (1994) ⁵⁹ USA Class of 89 Study	2 communities matched for size & socio-economic factors 11 year olds in schools Follow-up: post intervention	Intervention: school programme, financial commitment not to smoke, population-wide community programme, including risk factor screening, community organisation, health education, media campaigns, continuing education for health professionals Control: no intervention Duration: 5 years	Weekly smoking prevalence was lower in the intervention group compared with the control group (14.6% v 24.1%, p<0.04) Results based on thiocyanate levels were similar	Analysis took account of the unit of allocation 55% lost to follow-up
Piper (1998) ⁶⁰ USA Healthy for Life Project	21 schools matched for baseline risk & randomly assigned to intervention or control 11-15 year olds in schools Follow-up: 1 year post intervention (age appropriate) & 3 years post-intervention (intensive)	Intervention: community health events, public policy issues, community organiser, + plus 2 different school programmes: age appropriate & intensive Control: no intervention Total = 2483 Duration: 3 years	Monthly smoking rates in the intensive condition significantly reduced the likelihood of smoking compared to control (coefficient -0.38, SE 0.15, p<0.05) and in the age appropriate condition the likelihood of smoking was increased compared to control (coefficient 0.41, SE 0.20, ns)	Aggregation of scores to the school level & hierarchical modelling performed It is unclear how far apart the intervention & control schools were from each other. Control schools might have been contaminated by community activities 32% lost to follow-up
St Pierre (1992) ⁶¹ USA Stay SMART	10 clubs selected & allocated to 1 of 2 interventions. A further 4 clubs selected to act as controls 12-16 year olds attending Boys & Girls Clubs Follow-up: 27 months after pre-test	Intervention A: Stay SMART programme (drug prevention resistance skills) (n=129) Intervention B: Stay SMART plus Booster (participants encouraged to be positive role models & influence peers) (n=121) Control: no intervention (n=127) Duration: A = 3 months, B = 27 months	The 3 groups did not differ on the smoking behaviour scale Post-hoc analysis found that both intervention groups reported less recent cigarette use than the control group (1.43 v 1.48 v 1.63, p<0.05)	No adjustment in the analysis for the unit of allocation Loss to follow-up: A = 60%, B = 55%, C = 57%

ns = non significant

Table 3 Community interventions (continued)

Author (year) country, programme name	Design, participants, follow-up	Intervention	Results	Comments
Vartiainen 1998 ⁶³ Finland North Karelia Youth Project	3 pairs of matched schools (1 urban, 1 rural) selected from 1 intervention & 1 control community 12–13 year olds in schools Follow-up: 15 years post-test	Intervention A: community-wide cardiovascular disease prevention activities, mass media, school programme led by project leader (n=314) Intervention B: as A but school programme led by class teachers (n=299) Control: no intervention (n=290) Duration: 2 years of school programme after 6 years of the community programme	Smoking prevalence was 28%, 30%, 30%, 32% for the intervention schools & 41% in the control schools; mean prevalence of smoking in both intervention groups was 30% compared with 41% in the controls (F=11.7, p=0.02)	Both individual & school used as unit of analysis Loss to follow-up: A=34%, B=30%, C=23%
Winkleby 1993 ⁶⁴ USA Part of the Stanford Five-City Project	4 non-randomly assigned cities in 1 state 12–24 year olds randomly chosen from households Follow-up: 3 years post intervention	Intervention: media campaigns, contests, courses, school programmes, smoking contests Control: no intervention Total = 2605 Duration: 6 years overall (school programme for 2 years)	No significant differences in smoking trends among the cities over time	No adjustment in the analysis for the unit of allocation Cross-sectional surveys
Community programmes versus school-based interventions				
Biglan (unpublished) ⁶⁵ USA Project SixTeen	1 of each pair (n=8) of matched communities randomly assigned to intervention or control 11 & 13 year olds in schools Follow-up: post intervention	Intervention: health education materials and videos aimed at teaching refusal skills, media advocacy, youth anti-tobacco activities, family communications, activities to reduce illegal sales Control: school-based activities only Duration: 3 years	Smoking prevalence increased (from baseline) by 3.6% in the intervention and by 7.3% in the control group (t=2.34, p<0.05) No significant differences between the groups when smoking prevalence was measured by expelled air CO levels	Group level data were used in the analysis Cross sectional surveys of all eligible students
Gordon (1997) ⁶⁶ UK Stopping them Starting	8 schools randomly selected & allocated to intervention or control 11–12 year olds in schools Follow-up: post-intervention	Intervention: smoking prevention booklet, take-home workbook, limited near schools test purchases, local agencies encouraged to raise smoking related issues with young people, anti-smoking displays, tobacco retailers visited & reminded of law about illegal sales to minors Control: school activities only Duration: 6 months	No significant differences in smoking prevalence between intervention & control	At baseline there were more non-smokers & fewer occasional smokers in the control group compared to the intervention group No details of the analysis given 787 pupils provided data at baseline and follow-up
Sussman (1998) ⁶⁷ USA Project Towards no Drug Abuse	21 schools chosen & randomly assigned (block design) to intervention or control 14–19 year olds in continuation high schools Follow-up: 1 year	Intervention A: drug abuse prevention curriculum, community newsletter Intervention B: drug abuse prevention curriculum, community newsletter, job training, drug-free parties, drug awareness week Control: no intervention Total = 2001 Duration: 3 weeks	No significant effect on cigarette use in the past 30 days	Analysis took account of the unit of allocation 33% lost to follow-up
Community programmes with & without a school-based component				
Kaufman (1994) ⁶⁸ USA	3 schools randomly assigned to intervention or control 11–12 year olds in schools Follow-up: 6 months post-intervention	Intervention: curriculum material, homework with parents, pupils prompted to read, watch & participate in media events, newspaper, radio advertisements, call-in talk show, bill board contest (n=131 students in 2 schools) Control: media only, no prompts to participate (n=76 students in 1 school) Duration: approx. 2 months	No significant differences in smoking rates between intervention & control Smoking rates decreased in both groups from baseline to follow-up (3.2 v 4.04, p<0.001 – higher score represents greater use)	Programme was financed by business leaders from the community No adjustment in the analysis for unit of allocation 32% lost to follow-up in the intervention group & 25% in the control group

Table 3 Community interventions (continued)

Author (year) country, programme name	Design, participants, follow-up	Intervention	Results	Comments
Community programmes versus mass media campaigns				
Pentz (1989) ⁹⁸ USA Midwestern Prevention Project	8 schools randomly assigned to intervention or control, 20 schools assigned to intervention & 14 to control (based on school commitments) 11–15 year olds in schools Follow-up: 1 year post intervention	Intervention: mass media, school programme & homework sessions with parents (parent & community organisation, promotion of local health policy change) Control: delayed control (media only) Total = 1607 Duration: 6 years overall	Smoking rates increased in both intervention & control over time, a reduced rate in intervention compared with control (15% v 22%, p<0.05)	Schools unit of analysis, all schools pooled Only the first 2 components have been evaluated to date 1% lost to follow-up

ordinated, long-term approach may produce greater success than a series of separate interventions, by operating in a more synergistic way. To be both effective and efficient, programmes will require active co-ordination between different agencies and sectors.

Prevention programmes should be aimed at the social factors that influence decisions to smoke and provide training to develop the skills necessary to resist the social pressures to smoke. Consideration should be given to targeting pupils before regular patterns of smoking behaviour are established, which may be as young as four to eight years of age. The importance of the school environment needs to be recognised and schools should aim to create supportive environments for their pupils, as emphasised in the Government's new Healthy Schools Programme.

Parents and other community members should be encouraged to participate in local initiatives so as to create consistent messages. Programmes to encourage smoking cessation as well as targeting smoking prevention could be developed. The effect on young peoples' smoking behaviour of attempts made by significant others, particularly parents, to stop smoking could then be explored.

Mass media campaigns, at both a local and national level, can be used to reinforce anti-smoking messages. Campaigns should be based on developmental work with representatives from the target audience so as to create appropriate messages that can be delivered via

the most suitable medium. Different age groups are likely to require different tactics. Similarly, greater attention should be given to needs assessment in planning the intervention and local data could be used to identify local problems and target interventions accordingly.

Legislation alone is not sufficient to prevent tobacco sales to minors. Law enforcement and community policies are likely to encourage compliance by retailers. The impact on smoking prevalence, however, is likely to be small.

A co-ordinated programme of rigorous research is needed to evaluate the effectiveness and cost-effectiveness of initiatives which are introduced into practice. In addition to measuring outcomes such as smoking behaviour, other outcomes such as acceptability and utilisation need to be monitored, as does the adequacy of programme implementation.

The factors which influence decisions to start smoking are complex and prospective studies are needed to understand the reasons why some young people take up smoking and others do not. Similarly, prospective studies exploring why some young people become dependent upon tobacco are also needed.

Appendix: Research Methods

Mass media and community interventions: 24 electronic databases were searched, key journals were hand searched, experts in the field were contacted and the reference lists of retrieved papers were scanned for other potentially relevant studies. The relevance and validity of each study were assessed and data extracted by

one reviewer and independently checked by another. When insufficient information was available, authors of the primary studies were contacted for clarification. A formal pooling was not carried out due to differences between studies in participants, settings, intervention components and the measurement of smoking outcomes. Data synthesis was therefore qualitative. Further details are available in *The Cochrane Library*.¹⁰

Retailer interventions: The Cochrane Tobacco Addiction Review Group Register of Controlled Evaluations was searched, as was Medline. The relevance and validity of each study were assessed and data extracted by one reviewer and checked independently by another. Studies were combined using a qualitative synthesis due to the heterogeneity in study designs. Further details are available in *The Cochrane Library*.¹⁰

School-based smoking interventions: 24 electronic databases were searched to identify systematic reviews of school-based interventions to prevent the uptake of smoking in children and/or young people. Reviews eligible for inclusion had to meet the following criteria: provide details of search and inclusion criteria, be aimed at children and/or young people, include school-based programmes targeting smoking (or smoking as part of an overall strategy), and report smoking-related outcomes (measured by self-report or biochemical validation). The relevance and validity of each review were assessed and data extracted by one reviewer and independently checked by another. Data were analysed qualitatively.

Effect sizes have been calculated in several of the school-based reviews. They are used for combining results of individual studies in which the same construct (e.g. smoking) is measured in different ways (e.g. ever smoked, daily smoking rate, weekly smoking rate, monthly smoking rate). The effect size (the difference of the mean effect of intervention and control over the pooled standard deviation) expresses the intervention effect in standard units and the results can be combined by calculating a pooled effect size.¹⁴ In some cases weighted effect sizes have been calculated – this method takes into account the sample size.

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Mass media interventions: Amanda Sowden and Lorna Arblaster, NHS CRD.

Retailer interventions: Tim Lancaster and Lindsay Stead, Institute of Health Sciences, Oxford.

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