REVIEW ARTICLE

Reducing the prevalence of smoking in youth in Western countries: an international review

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Summary

This paper appraises the major options for the achievement of national targets for the reduction of teenage smoking in Western countries, which has changed little in recent years. The criteria for appraisal include efficacy, cost to the health sector, reach (that is, replicability), and impact (the combination of reach and efficacy). The major interventions appraised include school health education, media and school programmes for youth, media and community programmes for all age groups, prevention of sales to teenagers, restrictions on smoking in schools, advertising bans, fiscal policy, and media advocacy. Interventions aimed primarily at youth are likely to have a delaying effect only, and sophisticated school programmes, though potentially valuable, have proved difficult to implement effectively on a large scale. Priority should therefore be given to broad-based interventions aimed at the community as a whole, including mass campaigns for all age groups, fiscal policy, restrictions on smoking, and bans on advertising. Mass campaigns may be more effective than schools at reaching high risk groups. A continuous programme of media advocacy is essential to secure both the initial allocation and the retention of the resources required for an effective national programme.

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Keywords: smoking; children; prevention; review

Introduction

The purpose of this review is to identify the most effective interventions for the achievement of national targets (as in the USA¹ and the United Kingdom²) for the reduction of teenage smoking prevalence. It consists of a brief review of the process of smoking initiation, followed by an appraisal of the principal interventions available, based on data drawn chiefly from North America, Western Europe, and Australasia. The findings cannot be applied elsewhere with confidence.

While the conclusions are broadly similar to recent United Kingdom³ and US⁴ reviews, greater emphasis is given here to interventions which are capable of influencing large popu-

lations rapidly, in the light of the authors' experience as directors of national programmes. Less weight is given to those which are effective only within small communities or in well-resourced pilot trials – although these make up the bulk of the published studies on this subject.

Smoking initiation

In North America and Western Europe, most adult smokers report taking up regular smoking between the ages of 13 and 15⁵; and one in four teenagers have become regular smokers by the age of 15.⁶ In some countries – for example, the USA⁷ and England⁸ – up to 70% of children have experimented with smoking by the age of 16. For some teenagers, dependence on nicotine soon becomes important⁹; but even so, progression to regular smoking often involves several periods of cessation and reinitiation.^{9,10}

WHY DO CHILDREN TAKE UP SMOKING?

Several factors have been associated with the onset of tobacco use.⁴ Environmental factors include availability of cigarettes, the perception that tobacco use is the norm, peer and sibling attitudes, and lack of parental support during adolescence. However, the influence of parental smoking is not clear: of the published prospective studies, only about half show a clear predictive relation between teenage and parental smoking.⁴

Behavioural predictors⁴ include low academic achievement, rebelliousness, alienation from school, and lack of skills to resist offers of cigarettes. Personal risk factors include low self esteem and the belief that smoking confers future advantages in social life; but knowledge of the health risks does not by itself influence recruitment to smoking.¹¹

Although low socioeconomic status (SES) is strongly associated with adult smoking in many, though not all,¹² countries, it is less clearly associated with teenage smoking. For example, no relation was found between SES and smoking prevalence in a Health Education Authority (HEA) survey of 10000 English 9 to 15 year olds¹³; however, increased quitting by higher income smokers in England leads to an SES differential by the age of 30.¹⁴

While smoking prevalence among boys is significantly higher where traditional gender roles prevail (for example, in Japan¹⁵), preva-

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lence at age 16 is higher among girls in many Western countries.¹⁶ Explanations include physical reasons such as earlier maturation,^{16,17} greater susceptibility to nicotine addiction,¹⁰ and the differential impact of stress.¹⁸ Societal reasons include different experiences of adolescence,¹⁹ such as different rates of participation in sport.⁷ Other factors include the belief, much exploited by the tobacco industry,¹⁸ that smoking promotes weight loss.^{20,21}

CURRENT TRENDS

Smoking prevalence among 11 to 16 year olds in many Western countries has historically followed adult patterns. Boys' smoking in the 1960s was usually higher than girls', but then fell while girls' rose, until equality was reached between 1975 and 1985.²²⁻²⁵ Since then, teenage prevalence has changed relatively little in many countries^{4,8,26-28} despite concurrent declines in adult prevalence. However, prevalence among Canadian 15 to 19 year olds fell by two thirds from 1979 to 1991²⁹ and a 19% decline occurred among Australian 15 year olds between 1984 and 1990.³⁰ Black teenage prevalence in the USA has apparently declined, for reasons which include under-reporting³¹ but are not otherwise understood.

Intervention strategies

This review appraises two different types of intervention: *health promotion options*, for example, the use of health education to promote changes in individual lifestyles, and *health policy options*, for example restrictions on smoking in schools, use of fiscal policy, etc. These are appraised against the following criteria, as appropriate:

- **efficacy** – extent of any effect on teenage smoking prevalence
- **costs to the health sector**, that is, to national or local departments of health (in US\$) – the figures quoted may apply only to the country of origin
- **reach** – proportion of the target population likely to be reached by the intervention
- **impact** – the combination of efficacy and reach³² (for example, cessation clinics have high efficacy in terms of quitting rates but reach relatively few smokers, so their impact is low³³).

Analyses of this kind can be criticised for trying “to unravel gossamer with boxing gloves”³⁴ because they ignore the synergy between interventions. While this is an important issue, no health department can afford to invest in every possible intervention. This review is intended to help identify the most cost-effective selection available.

Health promotion options

SCHOOL HEALTH EDUCATION

Types of programme: tobacco-specific versus comprehensive

Evidence for the efficacy of school health education is available from controlled trials of

two kinds of programme: *tobacco-specific*, which focus mainly on smoking, and *comprehensive*, which deal with broader issues such as personal relationships and substance abuse generally. Some data are also available from cohort and cross-sectional studies on the relationship between smoking prevalence and school variables such as health education.

Efficacy: tobacco-specific programmes

The efficacy of tobacco-specific programmes has been the subject of considerable controversy. Early results were not encouraging³⁵ but the development of interventions based on social learning theory³⁶ from 1980 onwards led to a decade of optimism. This has faded only recently in the face of discouraging results under real life conditions.

Under the artificial conditions required for internal validity, tobacco-specific programmes typically delay the onset of smoking for up to five years,^{37,38} resulting in falls of 30–50% in smoking prevalence relative to controls by the age of 16.³⁹⁻⁴² Since there is little effect on teenagers who have already taken up smoking, best results are obtained from programmes delivered at about the age of 11–13.⁴²

The most effective programmes focus on social reinforcement, especially the development of skills to resist the pressure to use cigarettes.⁴² Methods used have included role play, practising refusal skills, making public commitments not to smoke, and the use of older peers (for example, 16 year olds) to teach 12 year olds.^{43,44} Programmes which focus more on social norms, self esteem, and reducing alienation, with a minimal focus on drugs (including cigarettes), are also effective, but to a lesser extent.⁴² Factually based programmes increase knowledge, but have little effect on behaviour.^{42,45} Finally, while most studies report no difference in results by gender, two programmes had no effects on girls^{44,46} while one had more impact on girls.⁴⁷

Most of these generally favourable results have been reported from pilot programmes implemented under artificial conditions, for example, using externally recruited instructors instead of classroom teachers.^{38,48} This has led to criticisms of their potential for large scale replication,^{49,50} as predicted by diffusion of innovation theory.⁵¹ Unfortunately these criticisms have been justified by randomised controlled trials in the USA,⁵² the United Kingdom,⁵³ and Australia,⁴⁷ which found that programmes of this type are relatively ineffective under real life conditions.

Efficacy: comprehensive health education programmes

Comprehensive programmes should be more effective than specific programmes in dealing with adolescent behaviours with a common social genesis – such as addictions.⁵⁴ Controlled trials of the comprehensive school health curriculum project (SHCP) of the US Centers for Disease Control and Prevention (CDC),⁵⁵ and similar programmes for ages

6–12,^{56,57} all found small reductions in experimental smoking at age 12.

Evaluation of CDC's comprehensive "teenage health teaching modules" (THTM) programme for ages 12–18, which is "organised by...health tasks of concern to adolescents, rather than by content area",⁵⁸ found a variety of self reported positive effects, including reductions in smoking prevalence and consumption among older teenagers (aged 15–18) at four month follow up.^{59–61} Many of the positive outcomes occurred among schools which implemented teenage health teaching modules under real life conditions – for example, without any specific training; however, provision of training enhanced the effects,⁶² as occurred also with the school health curriculum project.⁵⁵

Both the SHCP and THTM studies gave priority to external over internal validity, and are therefore difficult to interpret. However, it does seem probable that programmes such as these may have modest, probably short term, favourable effects on teenage smoking, as well as other health related behaviours.

Efficacy: other studies

The findings from cohort and cross sectional studies have been mixed. A 1974–81 cohort study in Derbyshire, United Kingdom, found smoking prevalence at age 18–19 to be 30% lower in schools where "traditional" health education was provided.⁶³ However, in California, no association was found between student recall of antismoking classes and susceptibility to smoking in the future, though there was an association with asking a friend not to smoke.⁶⁴

An Australian study of 26000 students in 347 secondary schools found that higher smoking prevalence was associated with the presence of a smoking education programme and a specialised health education teacher,⁶⁵ probably owing to recognition of the need for additional provision by high prevalence schools.

Finally, lessons given in primary schools may help to reduce parents' smoking,⁶⁶ while the active involvement of parents can magnify the effectiveness of school programmes for pre-adolescent children.^{67,68}

Costs

The costs of providing school health education are usually met by the education sector, but additional funding from health departments may help to provide the preimplementation training essential for the more sophisticated programmes.⁶⁹ However, intensive training does not necessarily achieve better behavioural outcomes than brief training.⁷⁰

Reach

Although school programmes can reach the great majority of children at minimal cost to health services,⁷¹ there is a trade off between efficacy and reach – the potentially most

effective programmes are those least likely to be widely adopted. For example, one year after training, only 25% of Los Angeles teachers were still using a sophisticated substance abuse prevention programme.⁷⁰

In addition, few schools can provide the minimum time required for effective use of tobacco specific programmes (estimated as 6–7 hours at age 12,⁷² with a possible requirement for "booster" sessions in later years⁴⁰). For example, schools in western Sydney, Australia, provide an average of two lessons annually per school year in the crucial 12 to 14 year old group⁷³ – compared to the minimum of five recommended by the National Cancer Institute (NCI) in the USA.⁴⁰ In the USA itself, competition from other "crisis" issues such as AIDS or illegal drugs limits the time available for tobacco-specific programmes.^{52,74} Comprehensive programmes are always likely to be more popular, especially as teachers generally rank smoking below other health topics in order of priority.⁷⁵

Conclusions

The best school health education programmes appear to be capable of delaying, but not preventing, recruitment to smoking. Delay is likely to result in gains to health because later starters may stop smoking earlier, and so are at reduced risk from smoking related disease.^{76,77}

Sophisticated tobacco specific programmes, though potentially the most effective, are unlikely to be widely adopted, and are probably less effective than pilot studies suggest. Comprehensive programmes are likely to achieve greater reach, although less is known about their efficacy. Health departments should therefore focus on support for comprehensive programmes within the broader concept of the health promoting school, with its emphasis on self esteem, health promoting policies, and family and community links.⁷⁸

SCHOOL BASED SMOKING PREVALENCE STUDIES

Programmes to reduce teenage smoking should always start with a prevalence study to assess need; but school smoking prevalence studies can also be a useful intervention in themselves. For example, a survey of 45000 teenagers in the Trent region of England, followed by immediate feedback to the schools involved, led to an increased antismoking activity in both schools and community.⁷⁹ Small scale surveys can be carried out by school nurses⁸⁰; provided anonymity is guaranteed, biochemical validation is not essential.⁸

The information obtained may be useful both for curriculum planning and as a source of data for use in lessons. For example, because teenagers generally overestimate the prevalence of smoking among their peers,⁸¹ survey results may help to correct misleading impressions.⁸² The inclusion of questions about minor respiratory illness may sometimes reveal a direct link between smoking and health,⁸³ thus providing further data for discussion.

CLUBS FOR NON-SMOKING TEENAGERS

Since 1985, the Health Education Authority and other organisations in the United Kingdom have experimented with non-smoking "Smoke Busters" clubs for children aged 10–14, originally in the hope of reaching alienated youth directly, rather than through schools – though some clubs are now based in schools. The clubs typically provide badges, newsletters, outings, competitions, and discounts in shops – all for a nominal membership fee. They can be costly to service, because they may attract up to 14000 members in a single city.^{84,85}

Evaluation conducted 22 months after the launch of a high profile club in Grampian region, Scotland, found a possible favourable effect on teenage smoking,⁸⁶ but this had disappeared at 48 month follow up.⁸⁷ This is not surprising because "non-smoking clubs for youth" are an essentially adult concept, which is unlikely to succeed with those most at risk.⁸⁸

On the other hand, the clubs can contribute valuable publicity through campaigns such as "Smoke-Free Zones for Kids", and they are attractive to politicians.⁸⁵ The funding of a high profile club at a key location may therefore contribute to the overall media communications strategy, but clubs are unlikely to have a significant direct effect on teenage smoking prevalence.

CESSATION PROGRAMMES FOR TEENAGERS

Efficacy

Although most adolescent smokers report that they have tried to stop,⁸ cessation programmes have not been generally successful: "adolescent smokers are not responsive to programs thus far developed".⁴ This is partly explained by the erratic development of teenage smoking, in which periods of abstinence and reinitiation typically alternate, according to United Kingdom^{9,10} and German studies.⁸⁹ Since 18 to 21 year old smokers are twice as likely to relapse as adults,⁹⁰ many leading clinicians will not accept teenagers for treatment (Fagerström KO, personal communication, 1993).

Costs

Costs are likely to be similar to adult programmes, although cost-effectiveness will be poorer for the reasons given above. Adult cessation programmes are not usually cost-effective (for example, \$235 per quitter for cessation classes compared to \$22 per quitter for a self help kit, at 1981 prices⁹¹) – though much cheaper than treatment for smoking related disease.

Reach

Even if the problems of efficacy can be overcome, the reach of teenage cessation programmes is limited.⁴ For example, a six session lunch hour programme attracted only 12% of eligible smokers in an Australian

study⁹²; only 1.3% of the eligible total were abstinent one week after the programme's quit date, and 80% of these are likely to have relapsed within six months.⁷⁷ While higher reach was achieved when programmes were held during lessons, quit rates were no greater.⁹²

Conclusions

Cessation programmes for teenagers are unlikely to have a significant impact on teenage smoking prevalence, owing to low efficacy and poor reach. Until further research⁹² proves otherwise, they should not be supported by health sector funds. Better options include cessation programmes for teachers – because smoking teachers make unenthusiastic health educators⁹³ – or the giving of brief, opportunistic advice to adolescents by family doctors.⁹⁴

COMBINED SCHOOL AND MASS MEDIA INTERVENTIONS AIMED MAINLY AT YOUTH

It has long been known that the mailing of mass campaign materials to schools can lead to an increase in the time allotted to smoking education.⁹⁵ Several attempts have also been made to influence young people through various combinations of school programmes and paid mass media advertising aimed mainly at youth.

Efficacy

The first of two NCI funded controlled trials found that a paid advertising campaign alone had little effect on smoking behaviour, though some favourable changes occurred in mediating variables.⁹⁶

The second, based at the University of Vermont, found that a combined mass media and school curriculum intervention achieved 35–40% reductions in smoking prevalence at age 15–17, compared to school curriculum only. The effects lasted for at least two years after the intervention was complete,⁹⁷ especially with high risk youth (Flynn BS, *et al*: paper presented at 121st Annual Meeting of the American Public Health Association, 1993).

Unfortunately, there is less encouraging evidence from larger scale campaigns such as the Minnesota State prevention programme, which included a mass campaign aimed mainly at youth,⁹⁸ funding for school programmes, and restrictions on smoking in public.⁵² A three year follow up found no significant effect compared to Wisconsin,⁵² although Minnesota children received many more anti-smoking messages from the media than did Wisconsin children.⁹⁹

Similarly, in England, major teenage programmes have been conducted since 1980, mainly through the Health Education Authority. These have included paid advertising, support for school health education, restrictions on smoking in schools, action against sales to those under 16, and the creation of

publicity in teenage media.¹⁰⁰ The programme was associated with a decline in the number who had tried smoking by age 11, from 44 % in 1982 to 32 % in 1992.⁸ However, no significant change in the prevalence of regular smoking among 11 to 16 year olds in England occurred from 1982 to 1992,⁸ although during this period adult prevalence fell from 35 % to 28 %.⁵

Costs

The cost of these initiatives was considerable. The mass media component of the Vermont project alone (including production and purchase of media) cost \$0.50 annually per head of total population (250 000), variously estimated as \$233⁴ or \$656–\$1351,¹⁰¹ per “delayed smoker”. The costs for the entire Minnesota and English programmes (schools as well as media) were, respectively, \$0.50 per head annually for a population of four million,⁵² and \$0.06 per head for 48 million.

Reach

The mass media based component of these interventions can reach at least 90 % of the target audience within a few months.⁹⁸ However, the reach of the Vermont project is likely to be limited by its high cost and its sophisticated school component, which required an average of nearly four class periods each year for five years.

Conclusions

These results are not easy to interpret. The Vermont project was highly effective in delaying recruitment, but is unlikely to be widely adopted. Furthermore, the disappointing results from the Minnesota state programme⁵² suggest that a Vermont-style intervention may be less effective under real life conditions.

COMMUNITY-WIDE PROGRAMMES AIMED AT ALL AGE GROUPS

Doubts concerning the effectiveness of school programmes in isolation have led to trials of their effectiveness as part of broader community interventions to prevent coronary heart disease in the USA and Finland. Interventions for youth have also formed part of major campaigns for all age groups in Australia and California.

Efficacy

Sophisticated school programmes, when implemented as part of broader interventions including mass campaigns for all age groups, activities in the workplace, etc, resulted in 10 % reductions in teenage smoking prevalence in both Minnesota and north Karelia. These lasted for at least six years in Minnesota,¹⁰² and for eight years in Karelia,⁴⁸ disappearing at 15 year follow up (Vartiainen E, *et al*: paper presented at 9th World conference on Tobacco and Health, Paris, 1994). It is not clear whether

the effect was due to a combination of the school and community programmes, or the community programmes alone. The broadly similar Stanford, California, “Five cities project” had no effect on teenage smoking.¹⁰³

On a much larger scale, statewide programmes in Australia involving paid media cessation campaigns, media advocacy, advice from health professionals, workplace restrictions, and curriculum and media interventions for youth coincided with a 19 % decline in smoking prevalence at age 15 between 1984 and 1990.³⁰ However, cause and effect cannot be attributed with certainty in the absence of controlled trials, and the broadly similar California State campaign since 1989 has so far had little effect on teenage smoking, despite substantial declines in Californian adult smoking since 1988.¹⁰⁴

Costs

The Sydney, Australia, Quit for Life campaign, which was primarily aimed at adults,¹⁰⁵ had a budget of US\$0.20 per head of total population in 1983. The California programme, funded from increased cigarette taxes, cost about \$0.50 per head of total population for the media campaign and \$1 per head for school programmes.¹⁰⁴

Reach

The reach of the coronary heart disease interventions is again likely to be limited by the sophisticated nature of the school components. However, the Australian campaigns probably achieved near universal reach, especially as the rate of decline in adult smoking accelerated significantly from 1983 onwards.¹⁰⁶ The media component of the Californian campaign reached over two thirds of the state's adolescents.¹⁰⁴

Conclusions

The results from some of the controlled trials in this category have proved particularly long lasting – not surprisingly in view of the concurrent community activity to discourage smoking among adult role models. Even so, the community coronary heart disease projects have limited application in real life, while the large scale campaigns in Australia and California were costly to implement – and ineffective with youth in California. Even in Australia, the decline in youth smoking cannot be attributed to the community programme with certainty, and may have ceased altogether in 1993.¹⁰⁷

Health policy and related options

RESTRICTIONS ON SMOKING ON SCHOOL PREMISES AND ELSEWHERE

Bans on smoking by students in school have long been associated with reductions in both the prevalence of smoking and the consumption of cigarettes in France¹⁰⁸ and California,¹⁰⁹ while the practice of permitting older students

to smoke in designated areas has been linked with higher prevalence in the USA.¹¹⁰

Associations between restrictions on teachers' smoking and reduced teenage prevalence were found in France¹⁰⁸ and the United Kingdom,⁶³ but not in a large recent Australian study.⁶⁵ In the USA, an association was found between state laws restricting smoking in private workplaces and lower teenage prevalence.¹¹¹ However, since the recent rapid increase in restrictive ordinances in the USA¹¹² has not been matched by a major decline in teenage prevalence, the direction of causality remains uncertain.

The costs to health departments of encouraging restrictions on smoking in schools are likely to be minimal, except where cessation classes for teachers are provided. However, there are many obstacles to full implementation unless school administrators are willing to make no-smoking mandatory. Extensive consultation may be required with unions and non-teaching staff,¹¹³ and full implementation can be blocked indefinitely by a small number of determined smokers.¹¹⁴ Not surprisingly, in 1992 only 1.1% of Californian adolescents reported that their schools were smoke-free, despite the extensive state campaign since 1989.⁶⁷

Conclusions

It is obviously desirable that the education sector (as with the health sector) set an example by establishing non-smoking as the norm on all occasions – even though there may be little effect on youth smoking prevalence. However, this may be difficult to achieve by consent, and requires firm support from school administrators for rapid implementation.

RESTRICTIONS ON SALES TO TEENAGERS

The sale of cigarettes to children aged under 16 or 18 is illegal in many countries, and both purchase and possession of cigarettes by teenagers is an offence in some parts of the USA. However, legislation of this kind is often so weakly enforced that its effects are statistically insignificant¹¹¹; for example, unsupervised vending machines may provide a major loophole.¹¹⁵ The enactment of regulations is therefore only a symbolic first step; compliance is the key issue.

Efficacy

Educational campaigns and vigorous action by enforcement agencies have reduced sales to children in specific locations in the United Kingdom¹¹⁶ and the USA.¹¹⁵ However, campaigns alone – even those involving the media – do not achieve significant, lasting reductions in sales, though they may stimulate debate and so influence public opinion in favour of more effective strategies.^{117,118}

In some small US communities, the use of underage children to make test purchases, combined with regular inspections and a law banning underage possession, has been

associated with falls of up to 50% in teenage smoking prevalence.^{119–121} The duration of effect beyond the age when sales are illegal is not known.¹¹⁵ However, national surveys paint a more depressing picture. In North America, teenagers were able to purchase cigarettes illegally in 77% of city locations surveyed.¹²² In the United Kingdom, despite active campaigns and increasingly restrictive legislation, overall ease of purchase by minors has changed little since 1986.⁸ There has also been a threefold increase since 1982 in England in the incidence of purchasing by teenagers from "other people", presumably older teenagers or adults purchasing legally on behalf of minors.⁸

Costs

The costs of enforcement do not usually fall upon health departments but the opportunity costs to other sectors may be considerable – for example, up to eight hours of police officer time is required to investigate and report on an offence in California.¹¹⁷ The cost of a quarterly compliance check in the USA is estimated at \$35 per establishment – a sum which could be recouped by charging license fees to retailers.¹²²

Reach

Because regular checks are essential for compliance,¹¹⁹ the reach of this intervention depends on the priority assigned to it by local enforcement agencies, which is likely to vary widely.

Conclusions

Vigorous activity may well help to delay recruitment to smoking among 11 to 13 year olds, but is less likely to be effective with older teenagers in the absence of strictly enforced regulations. Even then, delay is probably the most that can be achieved through this means.

The possibility that restrictions may do more harm than good by creating a "forbidden fruit" effect cannot be entirely excluded, especially as there are no legal restrictions on sales to teenagers in some countries (for example, Sweden). Nevertheless, given the possible delay to recruitment, sales to teenagers should continue to be restricted until there is firm evidence to the contrary.¹²³ However, the legislation should penalise the vendor rather than the buyer, and should not criminalise teenage smokers by prohibiting possession.¹²⁴

BANS ON ALL FORMS OF CIGARETTE ADVERTISING AND PROMOTION

Cigarette advertising has a substantial influence on teenage attitudes to smoking, helping to convey an impression of smoking as a normal and socially acceptable activity⁴; but evidence for direct effects on behaviour is more difficult to find.¹²⁵ Nevertheless, a cohort study of British teenagers found that "tobacco advertising promotes smoking among young

people... though the effect appears to be small in comparison with... the other influences on children".¹⁰

However, advertising campaigns which appear to be deliberately targeted at teenagers may be more harmful. For example, peaks in smoking initiation rates among girls aged under 18 between 1944 and 1988 in the USA coincided with the launch of major advertising campaigns targeted at women.¹²⁶

Similarly, although smoking prevalence among 16 to 18 year olds in California fell by one percentage point annually from 1984 to 1988, after the introduction of the "Joe Camel" advertising campaign in 1988,¹²⁷ it rose by 0.7 percentage points annually from 1988 to 1990.¹⁰⁴ In the north of England, the Health Education Authority found a possible association between increased prevalence among 11 to 15 year olds and the launch of a campaign ("Reg") which proved popular with teenagers – but not with the 35 to 55 year old adults at whom it was supposedly aimed.¹²⁸

A ban on advertising has universal reach, especially if linked with a requirement to sell cigarettes in plain packaging.¹²⁹ Costs to the health sector are minimal, apart from the media advocacy required to achieve it, and studies to monitor implementation. Because cigarette advertising promotes consumption among adults,¹²⁵ the duration of effect is likely to be lengthy.

Conclusions

There are many reasons for advocating a complete ban on all forms of tobacco promotion. However, its achievement should not mark the completion of national campaigns,²⁷ because it is only one of many components of an effective programme.

The continuing association of smoking with influential media personalities, for example in British youth fashion magazines,¹³⁰ British¹³¹ and American¹³² films (sometimes with tobacco industry funds¹³³), or in British soap operas, undoubtedly influences youth.¹⁷ National health departments should therefore consider allocating resources to monitor and publicise potentially damaging depictions of smoking in the media.

FISCAL POLICY

The price elasticity of cigarettes in many industrial countries is typically about -0.5% ¹³⁴ – that is, for every 1% increase in real price, per capita consumption falls by 0.5%. In the United Kingdom, the effect is inversely related to socioeconomic status, so price has little effect on wealthier smokers.¹³⁴

It is not clear whether young people are more sensitive to price than adults. In Canada, increased cigarette taxes between 1980 and 1988 were associated with a fall in smoking prevalence among 16 to 19 year olds from 45% to 22%.²⁹ In the United Kingdom and the USA, the most recent studies indicate that price has similar effects on consumption by

adults and youth^{134,135}; British teenage girls are particularly sensitive to price.¹³⁴

To be effective, price increases must not only exceed the rate of inflation, but must also outpace increases in real disposable income. In Finland, changes in youth smoking prevalence from 1977 to 1993 were mainly due to fluctuations in "affordability", that is, the ratio of price to pocket money.¹³⁶

The scope for raising taxes may be limited by smuggling,^{12,137} and high prices may have regressive effects on disadvantaged groups.¹⁴ Nevertheless, there is a strong case for investing health sector funds in presentations to finance ministries on the use of fiscal policy to promote health.^{138,139}

THE CREATION OF UNPAID PUBLICITY AND MEDIA ADVOCACY

Unpaid publicity is defined as any form of media coverage which does not involve payment for space or broadcast time, although it may require a substantial investment of resources. Examples include the deliberate creation of news coverage around the latest scientific findings, stories urging government action or attacking the tobacco industry, human interest stories about cancer victims, educational features, photo calls, or events such as No Smoking Day.¹⁴⁰

Major media "health scares" can have a direct effect on smokers,³³ resulting in short term declines in per capita consumption of up to 5%.¹⁴¹ Little is known about its direct influence on youth, but UK smokers of 16–19 years of age are particularly active participants in the annual No Smoking Day.¹⁴²

However, the most important reason for investing resources in the creation of publicity lies in its effects on public opinion, and ultimately, on decision makers. Studies in communications theory suggest that the repeated expression of a particular opinion in the media causes its supporters to voice their beliefs more openly, while opponents fall silent for fear of social isolation – so creating a "spiral of silence".¹⁴³

News stories can therefore have measurable effects on public opinion,^{144,145} and also on elected politicians and their senior advisers.¹⁴⁶ This important group, while denying any personal susceptibility to media influence, is often concerned about its presumed effect on others¹⁴⁷ (the "third person effect"¹⁴⁸).

Systematic use of the mass media to advance public policy initiatives is known as "media advocacy",^{149,150} as in the case of the US group "Mothers against drunk driving" (MADD), set up in 1980. Its success in forcing the issue onto the public agenda through media advocacy was associated with the passage of substantial legislation to control drunk driving in the 1980s – although there was no significant increase in drunk driving in the USA during this period.¹⁵¹

In Finland, smoking prevalence declined among all age groups in the 1970s, during a period of intense public discussion on the health hazards of tobacco. This was stimulated

Table 1 Review of major options for the reduction of teenage smoking prevalence

Intervention	Efficacy: effects on teenage smoking prevalence	Duration of effect	Illustrative costs to health departments	Reach	Comments
A Health education options					
1 School health education:					
1.1 Tobacco-specific programmes, based on social learning theory	Can reduce prevalence by 30–50% under ideal conditions. Relatively ineffective under real life conditions	Normally not more than 5 years	Varies according to nature of support provided	Low reach because schools are generally unable to provide adequate time	Impact limited by poor reach and low efficacy in real life
1.2 Comprehensive programme (preferably in the context of a health promoting school).	Probably less effective than tobacco-specific, but can achieve short term reductions in tobacco use under real life conditions	Not known	As above	Greater than tobacco-specific programmes	Likely to have greater impact than tobacco specific programmes, owing to greater reach
2 School based prevalence studies	Direct effects unknown	Not known	Minimal if schools can be trained to conduct own surveys	Capable of widespread use	Can help to stimulate activity in both school and community and provide data for school programmes
3 Clubs for teenagers ("Smoke Busters")	Possible delaying effect, but evidence is weak	Not more than 3 years	Costly – depends on level of service provided	Potentially high reach; limited by high costs	Unlikely to have much effect on teenage prevalence but a high profile club may generate useful publicity
4 Cessation programmes for teenagers	Relatively ineffective	Twice as likely as adults to relapse	Not cost-effective relative to other options	Low reach because recruitment is difficult	Unlikely to have significant impact
5 Mass media and school programmes aimed at youth	35–40% reduction (Vermont, USA); nil (Minnesota, USA; England)	At least 2 years after completion in Vermont	Vermont and Minnesota: \$0.50 per head of total population, annually. England: \$0.06	Media component: very high; schools component: limited if a sophisticated approach is used	Impact limited by high costs and limited reach of schools component
6 Community-wide programmes for all age groups	Linked with a 19% prevalence reduction at age 15 in Australia; 10% in Minnesota and N Karelia. Nil in Stanford Five Cities Project, and California State campaign	At least 6 years (Minnesota); 8 years only (N Karelia)	Sydney: (US)\$0.20 per head of total population in 1983	High in Australia, other examples used sophisticated schools components with a potentially low reach	Australian-style campaigns are the only real life example linked with a significant fall in teenage prevalence on a large scale. However, attribution of effect is uncertain
B Health policy options					
7 Restrictions on smoking on school premises	Uncertain: findings are variable and difficult to interpret	Not known	Relatively small	Difficult to implement without administration support	Should be supported for their exemplar effect but unlikely to have a major effect on prevalence
8 Restrictions on sales to teenagers	Up to 50% reduction in prevalence under exceptional circumstances	Not known, but probably short term	Minimal costs to health sector, except for supporting campaigns. Substantial opportunity costs to enforcement agencies	Difficult to achieve high reach without the support of a universal vendor funded scheme	Impact limited by low reach. Campaigns can generate useful publicity. Possible "forbidden fruit" effect?
9 Bans on advertising and sponsorship	Small but definite effect on recruitment in England; specific campaigns aimed at youth may have larger effects	Likely to be long term	Funding may be required for media advocacy needed to achieve a ban	Immediate universal reach	Highly desirable for many reasons
10 Fiscal policy	Price elasticity about –0.5 for adults. Teenage smoking is also price sensitive but elasticity is variable	Permanent as long as relationship between real price and income is maintained	No cost to health departments (smuggling may become a problem for other sectors) except for costs of supportive advocacy	Universal reach	Well worth implementing for effects on adults alone – though eventually limited by smuggling unless neighbouring jurisdictions co-operate
11 Media advocacy and creation of unpaid publicity	Direct effects on teenagers unknown. Publicity reduces adult smoking and influences public policy	Media coverage must be sustained to maintain favourable climate of public opinion; any resulting policy changes may have long term effects	Low compared to paid advertising, but not negligible	Universal reach	Essential to maintain the impetus of the entire campaign; in its absence, resources may be diverted elsewhere

by parliamentary debates relating to the passage of the 1977 Tobacco Act to ban advertising, among other measures.¹⁵² However, by 1980, female and adolescent smoking started to rise; later, illegal sales to 14 year olds and smoking in schools increased, and the Act was both weakened and ineffectively implemented.¹⁵³

A major cause of these surprising events was the disappearance of smoking and health as an issue from the media limelight – owing to complacency following the passage of the

Tobacco Act.^{27,153} Lack of media support was also cited as a contributory cause of the termination of the Minnesota state prevention programme.¹⁵⁴

Costs

The costs of media advocacy and the creation of unpaid publicity are considerably lower than paid mass campaigns, but are not negligible. An agenda setting event such as No-

Smoking Day costs about \$0.02 per head of total population annually in the United Kingdom.¹⁰¹ An effective long term strategic programme of media advocacy for a population of about 50 million ideally requires an annual investment of at least \$0.5 million – though occasional opportunistic bursts of publicity can be achieved for much less.

Conclusions

Although there are few published studies on this subject, indirect evidence suggests that media advocacy is fundamental to the survival of any long term national programme to reduce smoking prevalence. Its principal contribution lies in its potential to influence decision makers and thereby ensure the allocation of adequate resources and the adoption of effective policies.

Discussion

It will be obvious from this review that there are no “magic bullets” for the prevention of teenage smoking, and that large gaps in our understanding remain. However, some general conclusions can be drawn (table 1).

On the whole, the broader the approach, the greater the likelihood of success; teenage smoking prevalence is likely to fall fastest in countries where funds are available for broadly based community campaigns, supported by favourable fiscal policy, restrictions on smoking at work and in schools, and a ban on tobacco advertising.^{3,4} Even then, as the Californian State campaign has shown, success with youth is not guaranteed.

Isolated interventions aimed specifically at young people are less likely to have lasting results. Schools acting alone cannot be expected to change long held community norms,¹⁵⁵ such as tolerance of smoking, because society generally expects teachers to transmit prevailing values unchanged.¹⁵⁶ They are also unlikely to be effective with high risk youth¹⁵⁷ in view of the association between smoking and alienation from school.⁷¹

Paid advertising, as in the Vermont project, may give better results with this important group. However, the generalisability of the Vermont initiative is limited by its high cost. At \$US 0.50 per head of total population, and after allowing for economies of scale, a Vermont-style campaign for the whole of the USA would cost around \$100 million annually for a single year group of teenagers only. In proportion to population, this is equivalent to the total annual budget (US \$5–10 million) for both prevention and cessation in Australia.¹⁵⁸

Table 2 Recommendations for the cost-effective investment of health sector funds:

- Priority should be given to the creation of a climate of public opinion favourable to the achievement and maintenance of effective tobacco control policies
- Activities intended to reduce teenage smoking should only be conducted as part of a broader programme for all age groups, and not in isolation
- Preference should be given to interventions likely to influence the greatest number of individuals; reach is more important than efficacy in determining investment priorities

If funds of that magnitude are available, much greater benefit to public health could be achieved by investing in programmes for all age groups, rather than youth alone (table 2).³³

Historically, programmes aimed primarily at youth have been funded because of their popularity with the public,⁴ and in the belief that because most smokers take up smoking by age 18,¹⁵⁹ any success will be permanent.⁴ Because even the best programmes only delay recruitment, and up to 10% of smokers may be recruited as young adults,¹⁶⁰ this is unlikely to be the case.

Finally, as the example of Finland has shown, the effective use of media advocacy is essential for the creation of public opinion favourable to effective tobacco control policies. In its absence, hard won successes may eventually be lost as resources are diverted to competing priorities.

In most Western countries, the generally flat or even rising trends in teenage smoking prevalence are difficult to explain in view of the continuing decline among adults, and the commitment of substantial resources to prevention. It is possible that the falls in teenage prevalence from the 1960s to the 1980s were due to success in reaching those who were the most susceptible to education.¹⁵⁷

It is also possible that the more non-smoking has become the norm among adults, the more attractive it is to teenagers, especially girls, seeking a visible symbol of non-conformity.^{17,18}

Whatever the explanation, further declines in teenage smoking may be difficult to achieve with the range of interventions available at present. We can only hope that youth smoking prevalence will ultimately follow the downward adult trend in Western countries (assuming it continues), as it is difficult to imagine a world where only teenagers smoke.

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