Competence skills help deter smoking among inner city adolescents

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Abstract

Objective—To test whether higher levels of general competence are linked to more frequent use of refusal assertiveness that is in turn related to less subsequent smoking among inner city adolescents.

Methods—Longitudinal study conducted during three year middle school or junior high school period. A sample of 1459 students attending 22 middle (ages 11–14 years) and junior high (ages 12–15 years) schools in New York City participated. Students completed surveys at baseline, one year follow up, and two year follow up. The students self reported smoking, decision making skills, personal efficacy, and refusal assertiveness. Teams of three to five data collectors administered the questionnaire following a standardised protocol. These data were collected in school during a regular 40 minute class period.

Results—Based on the tested structural equation model, decision making and personal efficacy (that is, general competence) predicted higher refusal assertiveness and this greater assertiveness predicted less smoking at the two year follow up. The tested model had a good fit and was parsimonious and consistent with theory.

Conclusions—Adolescent smoking prevention programmes often teach refusal skills in order to help youth resist peer pressure to smoke. The present findings suggest that teaching general competence skills as well may help to reduce smoking because youth with better personal efficacy and decision making skills are better able to implement smoking refusal strategies.

(*Tobacco Control* 2000;**9**:33–39)

Keywords: adolescent smoking; competence skills; refusal assertiveness; peer pressure

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Introduction

Each day in the United States more than 6000 adolescents try their first cigarette[1] and nearly one in five eighth graders (ages 13–14 years) have smoked in the past month.[2] Smoking at such young ages increases the likelihood of nicotine addiction.[3] Theoretical formulations about adolescent smoking behaviour posit that intrapersonal characteristics related to general competence, such as decision making and personal efficacy, have a central role in determining vulnerability to smoking.[4 5] Even though adolescents recognised the harm of smoking, they greatly overestimated its prevalence among peers and adults, negating the notion that smoking initiation is an informed decision.[6] High personal efficacy should help adolescents combat peer pressure to smoke and exert control over their own behaviour.[5] Some studies detected a direct relationship between smoking and poor decision making skills[7] or low efficacy,[8 9] but others conducted with predominantly ethnic minority inner city adolescents have not.[10 11] Even if decision making and personal efficacy are not directly associated with smoking, these general competence factors may be a foundation for factors with a closer relationship to smoking.

An example of a critical competence skill that is more closely related to smoking is the ability to refuse assertively. Since smoking role models and the media promote cigarette use, adolescents need to have the ability to refuse assertively. Reviews indicate that the smoking behaviour of family members and particularly friends greatly influences adolescents to smoke.[12 13] The role of the smoking status of family members and friends in adolescent smoking has also been demonstrated in Hispanic and African American inner city youth.[10 11 14 15] If adolescents had the ability to resist specific social pressures to smoke from family, friends and the media, then they would be less likely to smoke. In fact, refusal assertiveness has been negatively linked to cigarette smoking among African American inner city youth.[10]

Refusal skills training approaches to smoking prevention teach adolescents how to recognise, handle or avoid situations in which they have a high likelihood of experiencing peer pressure to smoke. Reviews of evaluations of this approach verify its effectiveness.[3 12 13] But another approach to smoking prevention focusing on competence enhancement incorporates refusal skills training within the context of a broader, more comprehensive one emphasising the teaching of a set of general personal and social skills. Unlike refusal skills training, this more generic skills training approach posits that it is necessary to provide adolescents with a wide range of life skills in order to reduce potential motivations to smoke and to decrease vulnerability to social pressures to smoke. Teaching adolescents decision making and other life skills is intended to increase personal efficacy.

Evaluations of competence enhancement prevention approaches showed their effectiveness in many studies conducted with predominantly white populations[16–21] and with predominantly

minority inner city populations.[22–26] Even though these comprehensive skills programmes proved effective in reducing adolescent smoking, additional research is needed to determine whether general competence is truly a necessary foundation for refusal assertiveness which then serves to decrease smoking. Since refusal skills only approaches have proven effective, some might argue there is no need to increase the length, breadth, and training requirements necessitated by the competence enhancement approaches. Because of the role of programme delivery and other factors that can decrease the effectiveness of a prevention intervention,[27] longitudinal aetiologic research can be particularly helpful in developing models to test these ideas.

One way to test the role of decision making and personal efficacy in adolescent smoking is to examine their indirect effect on smoking through refusal assertiveness. Adolescents who have not mastered decision making skills may select a quick solution (for example, do what my friends do—smoke) rather than working out all the possible consequences and seeing the conflict with their own personal values or beliefs.[28] As a result, refusal skills may be insufficient preparation for combatting social pressures to smoke. Similarly, if adolescents do not feel capable of performing behaviours because of low personal efficacy, then they may not attempt to use the refusal skills they have learned.

The purpose of this study is to test the principles underlying the competence enhancement approach to smoking prevention with inner city, minority adolescents. To date, it has only been theoretically stated that general competence will enhance refusal assertiveness. This study investigates whether greater levels of general competence (decision making skills and personal efficacy) are linked to subsequent refusal assertiveness and whether this greater refusal assertiveness is associated with less smoking. Such a model would provide support for teaching general competence skills along with refusal skills within the context of a smoking prevention programme.

Method
OVERVIEW
A total of 22 middle and junior high schools in New York City with 25% or more Hispanic students participated in this study. Middle schools included grades 6 to 8 (ages 11–14 years) and junior high schools covered grades 7 to 9 (ages 12–15 years). These students were from the control schools of a longitudinal smoking prevention trial conducted in 47 schools described in greater detail elsewhere.[23] The majority of the 22 schools served youth from families with average incomes at or below 150% of the federal poverty level. All sixth and seventh graders in English speaking, mainstream classes were eligible to participate by completing the study questionnaires. Of these, more than 90% of the students completed the initial baseline survey. Students also completed surveys at one year and two year follow ups.

The consent procedure used was approved by the institutional review board.

PARTICIPANTS
At baseline, 2400 students completed questionnaires. The retention rates over the course of the study (81% at one year and 63% at two year follow ups) compare favourably with retention rates for similar school based studies,[29 30] considering the recognised difficulty of conducting longitudinal research with inner city minority youth owing to high rates of mobility and absenteeism. The panel sample across the three time points (baseline, one year, two year) consisted of 1459 students (61% of baseline participants). The mean (SD) age at baseline for the panel sample was 12.4 (0.75) and the sample was 46% boys. In terms of ethnicity, this sample was 54% Hispanic, 20% African American, 7% Asian, 16% white, and 3% other. Approximately 70% of respondents lived in two parent households.

PROCEDURE
At each assessment, participating students completed questionnaires that measured self reported smoking behaviour and psychological factors hypothesised to be related to smoking. Students completed these surveys during a regular 40 minute class period. Several steps were taken to increase the accuracy of self reports. First, a team of three to five data collectors (of the same ethnic groups as participants) administered the surveys following a standardised protocol. Teachers were not involved in data collection activities. Students were assured that their answers would remain confidential, and student identification codes were used rather than names to emphasise the confidential nature of the surveys. Carbon monoxide breath samples were collected before students completed the questionnaire, which has been found to enhance the veracity of self reported smoking data.[31–33]

MEASURES
Students completed one of two randomly distributed questionnaire forms, and each form contained identical items with the order of measures on the last half of the questionnaire reversed. This procedure maximised the amount of data collected within the available time and minimised data loss from fatigue or boredom. Included on the questionnaires were items concerning race/ethnicity, sex, age, drinking behaviour of respondents, personal efficacy, decision making skills, and assertiveness, including several items assessing refusal assertiveness. All of the items/scales were derived from psychometrically valid and widely used instruments. Since the questionnaire had originally been developed for use with white, middle class students, the individual scales were pilot tested and revised based on the results of a previous study that examined their suitability for the target population.[24]

Cigarette smoking

One dichotomous (yes/no) item assessed smoking during the past month. A similar dichotomous measure assessed recent regular smoking during the past week. These measures are similar to those used in other major studies.[2][16] An 11 point smoking index assessed smoking frequency. Specifically, students responded to the question, "How often do you currently smoke?". Response options included: "I have never smoked" (1); "Not at all in the last 12 months" (2); "Once or twice in the last 12 months" (3); "A few times in the last 12 months" (4); "Usually once a month" (5); "A few times each month" (6); "Usually once a week" (7); "A few times each week" (8); "A few times most days" (9); "About half a pack each day" (10); to "A pack or more each day" (11). This measure has been included in many past studies.[15][23][34] Students rated behavioural intentions to be a smoker in two years on a five point scale: "I definitely will not" (1), "I probably will not" (2); "I might, I'm not sure" (3); "I probably will" (4); "I definitely will" (5). Behavioural intention measures have been used in earlier studies.[11][25]

Demographic variables

Students identified themselves as members of race/ethnic groups (Hispanic, African American, Asian, white, other). Participants indicated whether they were male or female and with whom they lived most of the time to determine if they lived in a two parent household or not. Respondents reported when they were born which allowed a calculation of their age.

Decision making

Five items derived from a subscale of the coping inventory[35] related to problem solving and direct action were used to measure decision making skills (α = 0.80). These items assessed sound decision making skills (for example, "When I have a problem I get information that is needed to deal with the problem"). Responses were rated on a five point scale which ranged from "never" (1) to "almost always" (5).

Personal efficacy

Five items from the personal efficacy subscale of the spheres of control scale[36] assessed personal efficacy (α = 0.75). This scale measured the extent to which respondents believed they could achieve personal goals through their own efforts (for example, "I can learn almost anything if I set my mind to it"). Responses were scored on a five point Likert scales which ranged from "strongly disagree" (1) to "strongly agree" (5).

Refusal assertiveness

Refusal assertiveness was measured using three items (α = 0.75) derived from the Gambrill and Richey assertion inventory.[37] A factor analytic study of the assertion inventory[38] previously revealed a stable factor structure that included refusal assertiveness. In the present study, a refusal assertiveness latent factor was created by using three of the indicator items identified in this previously validated factor. Response options for each item were on a five point Likert scale ranging from "never" (1) to "almost always" (5).

TREATMENT OF MISSING DATA

An analysis of missing data patterns indicated that complete data on all study variables were available for 64% of cases. Twenty four cases were missing 50% or more of the variables relevant to the present study and were eliminated from the sample. For the remaining cases with missing data, a full information maximum likelihood regression based procedure was used to impute data.[39] After adjusting for missing data, the final sample size was n = 1435 (98% of the panel sample of 1459).

STATISTICAL ANALYSIS

A two step approach was used to test the proposed hypothetical model. First, a confirmatory factor analysis (CFA) model was examined to assess how well the observed measures reflect the hypothesised latent constructs. Second, the hypothesised structural equations model (SEM) was tested to examine the relationships among constructs. Both the CFA and SEM analyses were conducted using the EQS programme.[40]

In order to evaluate the overall fit of the CFA and SEM models, several criteria were used: (1) a χ^2 p value, which if > 0.05 indicates that there are no significant discrepancies between the observed data and the hypothesised model; (2) a χ^2 :degree of freedom ratio < 5.0[41]; (3) a standardised root mean squared residual (SRMR) < 0.05; and several fit indices including (4) the normed fit index (NFI), (5) the non-normed fit index (NNFI), and (6) the comparative fit index (CFI). Each of these indices is derived by comparing the predicted covariation in the hypothesised model to that of the null model, with values > 0.90 indicating a good to excellent fit of the model to the data. The test of the structural equations model differs from the CFA model in that arrows representing path coefficients are tested to examine the relationships among the latent factors and to evaluate the overall fit of the hypothesised model.

Results

As expected, analysis of smoking prevalence rates indicated that smoking levels increased substantially from baseline (sixth and seventh graders) to the two year follow up (eighth and ninth graders). At baseline, 15.4% of participants reported that they had ever smoked, 10.6% smoked in the past year, 3.3% smoked in past month, and 1.4% smoked in the past week. At follow up, 30.4% of eighth and ninth graders reported that they had ever smoked, 22.0% reported smoking in the past year, 10.6% reported smoking in the past month, and 5.0% reported smoking in the past week.

ATTRITION ANALYSES

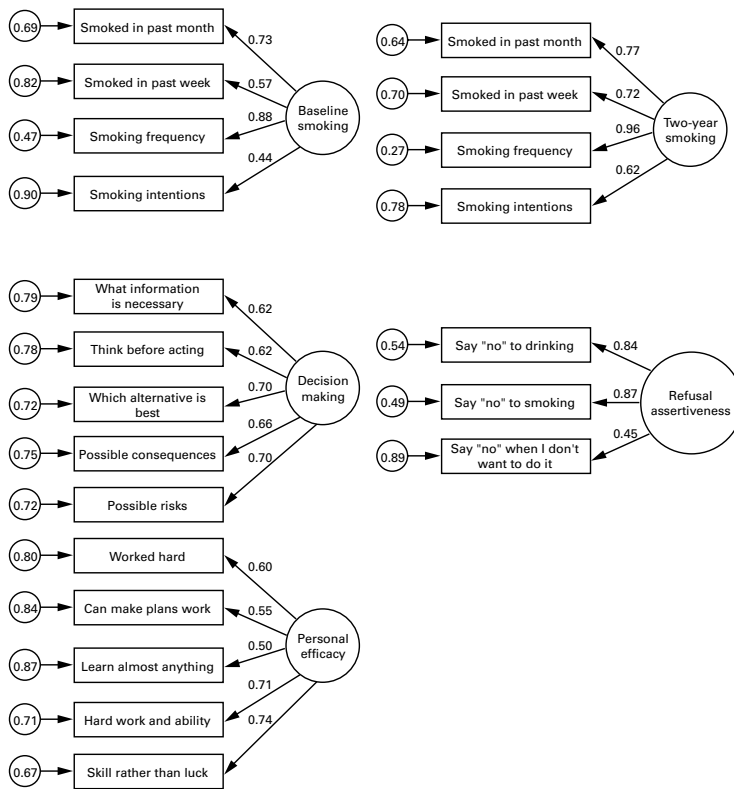Analyses were conducted to examine differences on the four smoking measures

Figure 1   Confirmatory factor analysis model. Large circles represent latent constructs, rectangles are measured variables[5], and small circles with numbers are residual variances.

between the panel sample and dropout students at the two year follow up. Dropouts were more likely than the panel sample to smoke in the past month (7.5% *v* 3.3%, χ^2 (1) = 21.30, p < 0.001), were more likely to smoke in the past week (3.6% *v* 1.4%, χ^2 (1) = 3.05, p < 0.001), smoked more frequently (mean = 1.72 *v* mean = 1.35, F(1,2374) = 49.33, p < 0.001), and intended to smoke more (mean = 1.60 *v* mean = 1.41, F(1,2293) = 27.95, p < 0.001). The loss of high end smokers would be expected to attenuate the estimation of the proposed relationships, making significant associations more difficult to identify. Thus, the impact of sample attrition on the findings of this study would be to make them more conservative. Dropouts had lower composite personal efficacy scores (mean = 19.51) than panel students (mean = 20.16; F(1,1933) = 15.11, p < 0.001) but no significant differences in decision making skills. It is common in longitudinal aetiologic studies of smoking behaviour for dropouts to be more likely to be smokers and be more deviant prone, as was found in the work of Chassin and colleagues, for example.[42 43] In the current study, we acknowledge that caution is warranted in gen-

eralising any findings, in particular to those who were heavier smokers and less efficacious.

CONFIRMATORY FACTOR ANALYSIS
Four latent factors were specified in the CFA or measurement model, each of which contained from three to five indicator items (fig 1). The baseline smoking factor had loadings ranging from 0.44 to 0.88, the decision making latent (baseline) factor had loadings ranging from 0.62 to 0.70, and the personal efficacy latent factor (baseline) had loadings ranging from 0.50 to 0.74. The refusal assertiveness latent factor measured one year later had loadings ranging from 0.45 to 0.87. The two year follow up smoking latent factor had loadings ranging from 0.62 to 0.96. Factor loadings for all latent constructs were highly significant (p < 0.001) and in the expected direction. Thus the CFA analysis indicated that the measurement model was properly specified and that each factor was statistically reliable based on the hypothesised model.

According to the criteria to evaluate the overall fit of the CFA, the model was a good to excellent fit (χ^2 (179, n = 1435) = 679, p < 0.001; χ^2/df = 3.8; SRMR = 0.04; NFI = 0.93, NNFI = 0.94, CFI = 0.95). Although the χ^2 p value was significant (which indicates that additional models could be fit to the data) this is not uncommon with large sample sizes.[44 45]

As shown in table 1, several of the latent factors from the CFA model were significantly intercorrelated. The strongest relationships were between refusal assertiveness and two year smoking (r = −0.32, p < 0.001), while baseline and two year smoking were highly correlated as expected (r = 0.37, p < 0.001). Furthermore, decision making and personal efficacy were moderately associated (r = 0.31, p < 0.001). Thus, the CFA analysis showed that the measurement model was excellent, with high factor loadings for all indicator variables and fit indices in the good to excellent range.

STRUCTURAL EQUATIONS MODELLING
As recommended by MacCallum and his colleagues,[46] the first step involved testing a saturated model that includes all possible paths from the exogenous latent factors to the construct of refusal assertiveness and to the two year smoking latent factor, as well as the path from the indirect factor to the outcome. The three exogenous latent factors in the model were baseline smoking, decision making, and personal efficacy, and the covariances among these factors were estimated in the saturated model. The SEM model also included the latent factor of refusal assertiveness, and the outcome latent factor of two year smoking.

Following a test of the saturated model, all non-significant paths were trimmed and the model was retested. The results of testing this final model are illustrated in fig 2. Each of the three baseline exogenous latent factors directly predicted refusal assertiveness: decision making (β = 0.15, p < 0.001) and personal

Table 1   Correlations among latent factors from confirmatory factor analysis

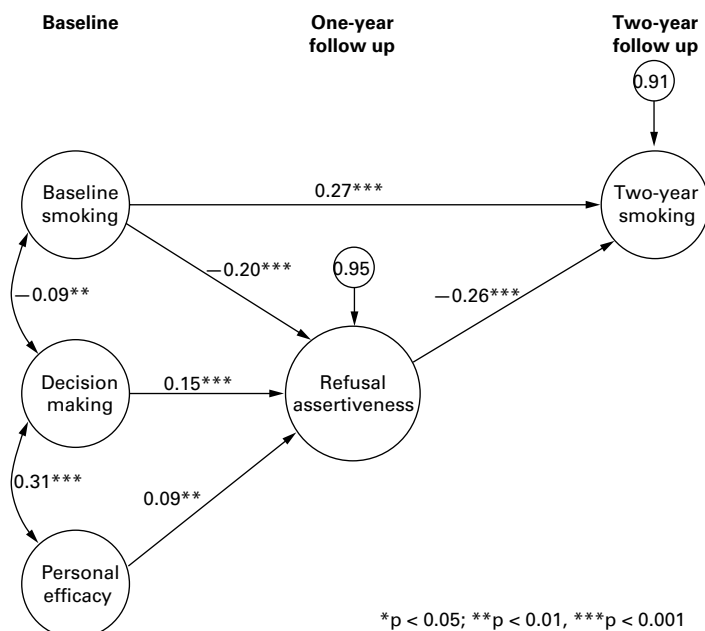| Latent factor	1	2	3	4	5
1. Baseline smoking	—				
2. Decision making	−0.09**	—			
3. Personal efficacy	−0.06	0.31***	—		
4. Refusal assertiveness	−0.23***	0.20***	0.15***	—	
5. Two year smoking	0.37***	−0.10**	−0.09**	−0.32***	—

**p < 0.01; ***p < 0.001.

Figure 2   Structural equation model. Large circles represent latent factors and small circles with numbers reflect residual variances.

efficacy (β = 0.09, p < 0.01) predicted higher refusal assertiveness, while baseline smoking predicted lower refusal assertiveness (β = −0.20, p < 0.001). Refusal assertiveness predicted less two year smoking (β = −0.26, p < 0.001). Baseline smoking also predicted two year smoking (β = 0.27, p < 0.001), as expected. In terms of goodness-of-fit indices, there was an excellent fit of the model to the data (χ^2 (178, n = 1435) = 537, p < 0.001; χ^2/df = 3.0; SRMR = 0.04; NFI = 0.95, NNFI = 0.96, CFI = 0.96). In summary, the findings shown in fig 2 indicate that each of the three exogenous latent factors significantly predicted refusal assertiveness, which in turn predicted two year smoking.

Discussion

The current study was designed to increase our understanding of the aetiology of cigarette smoking among inner city youth and provide additional information to guide efforts to refine prevention approaches. The findings from this longitudinal study highlight the importance of both generic and smoking specific aetiologic factors. These findings suggest that smoking prevention programmes should include components to enhance broader competence in addition to providing training in refusal skills. This is because youth with better personal efficacy and decision making skills are better able to implement smoking refusal strategies, which in turn reduce smoking behaviour. This is an important finding because research that only examined direct effects of sound decision making and high personal efficacy as deterrents to adolescent smoking have been mixed with some showing a relationship[7–9] and others showing no relationship.[10 11] Yet in the current tested model general competence, as represented by decision making and personal efficacy, served as a critical foundation for refusal skills. Although refusal skills training

requires a briefer investment of time, this study implies that the additional time and effort to teach general competence skills in addition to refusal skills may be very worthwhile.

According to these findings, adolescents whose decision making skills were deficient were less likely to use refusal skills and more likely to succumb to pro-smoking social influences. These adolescents might not have been able to weigh adequately the consequences of peer pressure to smoke or compromise by being assertive about not smoking without offending their friends. For example, they may have decided to just smoke one cigarette to fit in with their friends without evaluating the long term consequences (for example, their friends will expect them to smoke again next time). Such faulty decision making meant less frequent use of refusal skills and a greater tendency to smoke. In contrast, adolescents with adequate decision making skills may have been more likely able to weigh the consequences of succumbing to peer pressure and realise they could most appropriately respond by utilising assertive refusal skills. Thinking through the consequences and making use of other sound decision making practices would facilitate frequent use of refusal skills decreasing subsequent smoking. In terms of personal efficacy, adolescents who believed in their own ability to perform behaviours appeared to be more prepared to engage in refusal skills that minimised later smoking. Knowledge of refusal skills coupled with the belief in being able to actually use these skills seemed to be a fundamental combination in diminishing subsequent smoking.

Several limitations of the current study should be noted. Since only a limited number of variables were included, the tested model is not the only possible good fitting model of smoking behaviour among inner city minority adolescents. Even so, the model is parsimonious and consistent with prior prevention research conducted with inner city minority adolescents.[22–25] Because adolescents participating in this study were students, these results cannot be generalised to non-student populations. Yet, the middle school period has low dropout rates and absentees were pursued on two return data collections, lessening the detrimental impact relative to conducting such a study in high school and without pursuit of absentees. As the study was only conducted with inner city students, it is possible that different results might be obtained with suburban or rural populations. Finally, the loss of high end smokers from the panel sample may have attenuated the estimation of variable relationships and may mean the findings cannot be generalised to adolescents who are heavier smokers.

Although smoking prevention programmes that focused on refusal skills training have proven effective,[47–51] this prevention approach can be further improved through the addition of other personal and social skills training. Specifically, inclusion of broader competence skills to enhance personal efficacy and teach decision making and problem solving skills

appears warranted by these findings. The current study showed the importance of more general competence factors in enhancing refusal assertiveness and deterring adolescent smoking. Consequently, the tested model provided support for the competence enhancement approach to smoking prevention over the refusal skills training only approach.

Refusal training approaches teach adolescents information, norms, and refusal skills with a problem specific focus. But this type of approach assumes that adolescents are naturally motivated to resist pro-smoking influences. In contrast, the competence enhancement approach to smoking prevention recognises that training in a broader array of personal and social skills helps reduce the motivation to smoke and does not make the assumption that adolescents want to avoid social influences to smoke. Competence enhancement approaches include both aspects of a refusal skills programme (that is, training in handling social influences to smoke) and a more comprehensive personal and social skills training programme (setting and achieving goals, decision making and problem solving, coping strategies for stress and anxiety, communicating effectively, developing friendships, and general assertiveness). Learning this comprehensive array of skills is designed to boost personal efficacy. Moreover, these skills can be applied more generally to a variety of challenges that adolescents face including, but not limited to, smoking. The link between each general competence measure with refusal assertiveness in the present study suggests that decision making and personal efficacy motivated the use of refusal skills.

Reviews of the smoking prevention literature indicate that the competence enhancement approaches have proven long term effectiveness, as well as short term effectiveness, and generalisability to ethnic minority groups.[3 12 13] For example, a competence enhancement programme delivered during junior high school reduced pack-a-day smoking at the end of high school by 25% compared to a control group according to a large, long term study.[16] This body of research combined with the current study provides empirical support for a smoking prevention approach that can be implemented in a school setting and has a dual emphasis on resistance skills training and more general personal and social skills training. Moreover, the results of the current study underscores the utility of such an approach for inner city, minority adolescents. Future research is needed to determine the effectiveness of this prevention approach with other populations as well as to determine the relative importance of the various personal and social skills taught in this type of prevention approach.

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Smoking causes male sexual impotence. One of a series of postcards produced by ASH in the UK. The other side of the postcard states that 120,000 UK men in their 30s and 40s are currently impotent due to smoking and reports that a MORI poll conducted in April 1999 found that 88% of smokers failed to identify the link between impotence and smoking.