
Smoking in Adolescence: Methods for Health Education and Smoking Cessation

A MIRNET Study

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The purpose of this study was to explore smoking behaviors and attitudes among adolescents. A self-administered questionnaire was used to sample adolescents presenting for health care to physicians belonging to MIRNET, a network of family physicians collaborating on research across Michigan. The questionnaire was anonymous and was completed before the visit. Physicians or office nurses were asked to complete a brief face sheet on their patient's demographic information and smoking status, which was linked to the questionnaire through a code number. Twenty-seven percent of female patients and 16% of male patients were smoking and 57% had tried smoking. Knowledge regarding health risks of smoking was high, and the major reasons given for starting to smoke were curiosity and peer behavior. Current smokers reported greater alcohol and marijuana use and cited problems with stress and anxiety, peer behavior, boredom, and the influence of smoking parents and relatives as factors in continuing to smoke. Patients' suggestions for successful smoking cessation focused on peers, explicit messages through pictures, and medication.

J FAM PRACT 1990; 31:369-374.

Tobacco smoking is thought to be responsible for more than 1 million premature deaths annually worldwide.¹ The Surgeon General has labeled smoking as the chief single avoidable cause of death in the United States and the most important public health risk.² Numerous studies have shown that adolescents are the group most at risk for beginning to smoke³ and that smoking in early adolescence is a strong predictor of smoking in adulthood.^{1,2,4-6} Smoking is also a predictor of other dangerous behaviors in late adolescence, such as other substance abuse, alcohol abuse, promiscuity, and reckless driving.^{2,7} Kandel and Yamaguchi³ found that the risk of initiating smoking increases steadily from age 12 to 16 years and then begins

to decline. The matter is largely settled by the age of 20 years. If a person is still a nonsmoker at this age, he or she is unlikely to begin.¹ Thus, the most important public health issue of this era and the single most avoidable cause of death hinges on adolescent smoking prevention and cessation.

Although numerous studies have related both socio-demographic and psychosocial factors to adolescent smoking, much remains to be learned about causal relationships. While the CASS study⁸ identified factors that are predictive of smoking onset and need to be targeted for interventions, practical methods must be sought in working with adolescents to achieve this goal. Current school-based smoking prevention programs for adolescents appear to have a significant impact on the prevention of smoking initiation,⁹⁻¹⁴ but as yet none has reported a decrease among regular smokers, and follow-up is not sufficiently long to determine whether regular smoking has actually been deterred.^{9,10} This lack of impact on smoking adolescents may be a result of the prevailing influence of smoking behavior among peers. Knowledge regarding health risks does not seem to deter adolescents

Submitted February 14, 1990.

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from smoking.^{2,15} In one study, 90% of adolescents were aware that smoking was a health hazard, but few believed that smoking was a threat to their own health.² Understanding why adolescents begin and continue to smoke is critical and may lead to effective preventive and cessation techniques that have thus far remained elusive.

The purpose of this study was to explore smoking behaviors and attitudes among adolescents, aged 12 to 20 years, within a community setting. More specifically, the study focused on a population of adolescents interacting with the health care system through visits with their primary care physicians, a visit often seen as an opportunity for health education and risk reduction. The study aims were to determine the incidence of smoking, to explore adolescents' knowledge about health risks of smoking, to identify factors associated with smoking and the reasons that adolescents begin smoking, and to solicit adolescents' ideas about the best methods for achieving smoking cessation.

METHODS

This study used a self-administered questionnaire to survey adolescents presenting for health care to physicians belonging to MIRNET, a network of family practice physicians in Michigan collaborating on research projects. The questionnaire included a face sheet (linked to the questionnaire by a common code number) requesting demographic information and smoking status, to be completed by the physician or nurse at that visit. The body of the questionnaire contained questions to be completed in private by the adolescent before or after the visit. The questionnaire requested information on the following items: (1) demographic information (including parents' occupations), (2) knowledge of specific health risks of smoking, (3) perceptions of adult (including parents), adolescent, and peer smoking behavior, (4) reasons for initiation and continuing to smoke, (5) associated drug and alcohol use, (6) patterns of smoking among current smokers, (7) reasons for quitting or considering smoking cessation, and (8) suggested methods for smoking cessation. The office nurse approached all adolescents requesting their participation in completing the questionnaire. The nurse then separated the face sheet from the questionnaire given to the potential participant and attached it to the adolescent's medical record before the visit with the physician. For those who refused participation, the nurse separated the face sheet and attached it to the patient's medical record, as above, and had the adolescent place the blank questionnaire in the envelope. This protocol was completed for all adolescents presenting to the physician offices from March through May 1989.

MIRNET is supported by the Michigan Academy of Family Physicians and represents 14 practice sites and 42 physicians. One half of the practice sites are located in urban areas and one half are rural practices distributed across Michigan, including both the Lower and Upper Peninsula. For this study, 10 practices with 23 physicians participated, including one of the two academic practices in the network.

For the purpose of this study, *urban* is defined as a practice location in counties within a standard metropolitan statistical area (SMSA), ie, a county or group of counties containing at least one central city with a population of 50,000 or more. *Rural* is defined as a practice location not within an SMSA area.

Data analysis was conducted initially using descriptive statistics followed by *t* tests for continuous variables and chi-square for categorical variables, analyzing responses by smoking status, sex, and residence. Multiple logistic regression was used to investigate the contribution of these variables to smoking behavior. The logit analyses were conducted using SAS proc logit.¹⁶ For the multivariate analyses, age and alcohol were dichotomized as: age younger than or age equal to or older than 15 years, and alcohol some or none. Odds ratios were calculated for terms identified in the final model.

RESULTS

Of 223 questionnaires and face sheets returned, only four adolescents returned blank questionnaires. There were 124 female respondents and 91 male, with current smoking reported by 33 (26.6%) and 14 (16%), respectively. Demographic data on the population are described in Table 1. Physicians and adolescents agreed on smoking status in 75% of cases. Physicians, however, were unaware of smoking status for one quarter of the adolescent smokers ($n = 12$). Two adolescents who denied current smoking were reported by physicians as smoking.

Smoking status was significantly associated with being female ($\chi^2 = 3.84, P = .05$), older in years ($t = 3.48, P < .01$), and not living with parents ($\chi^2 = 14.7, P < .01$), and with having a smoking boyfriend or girlfriend ($\chi^2 = 39.7, P < .01$), other smoking friends ($\chi^2 = 46.8, P < .01$), smoking parents ($\chi^2 = 9.4, P < .01$, and $\chi^2 = 4.8, P < .01$, for smoking mother or father, respectively), and siblings who smoke ($\chi^2 = 13.6, P < .01$, and $\chi^2 = 14.2, P < .01$, for smoking sister or brother, respectively). Smokers were also significantly more likely to report use of alcohol ($\chi^2 = 19.7, P < .01$) and marijuana ($\chi^2 = 34.3, P < .01$). The best model for cigarette use is shown in Table 2. Sex differences for smoking were no longer significant in the multivariate model.

TABLE 1. CHARACTERISTICS OF THE POPULATION (N = 223)

Characteristics	No. (%)
Age (years)	16.37 mean, range 12-20
Sex	
Female	124 (57.7)
Male	91 (42.3)
Race	
White	213 (97.7)
Black	3 (1.4)
Married	8 (4.5)
Living with partner	12 (5.5)
Urban	110 (49.5)
Rural	112 (50.5)
Parents' occupation	
Mother (n = 205)	
White collar worker*	116 (57.0)
Blue collar worker†	17 (8.3)
Unemployed/disabled	20 (8.8)
Student	2 (1.0)
Homemaker	50 (24.4)
Father (n = 202)	
White collar worker	75 (37.1)
Blue collar	114 (56.4)
Unemployed/disabled	7 (3.5)
Retired	3 (1.5)
Student	1 (0.5)

*White collar work includes professionals, service workers, business owners, managers, and technical, sales, and administrative support workers.

†Blue collar work includes craftspeople, operatives, fabricators, and laborers.

Drug use for the study population is shown in Table 3. As shown, over one half of the adolescents reported having tried smoking and sometimes drinking alcohol. Fifty-eight percent of the adolescents reported smoking at least one-half pack of cigarettes per day and 6% smoked

TABLE 3. DRUG USE IN THE STUDY POPULATION (%)

Drugs	Female Patients	Male Patients	Significance
	(n = 124)	(n = 91)	
	No. (%)	No. (%)	
Smoking (current)	33 (26.6)	14 (16)	$\chi^2 = 3.84, P = .05$
Age at onset, mean (y)	12.6	11.3	
Amount			
<1/2 ppd	14 (11.3)	6 (6.6)	
1/2-1 ppd	20 (16.3)	5 (5.5)	
>1 ppd	1 (0.8)	2 (2.2)	
Tried smoking	77 (64.7)	45 (50.6)	
Alcohol use (current)			$\chi^2 = 8.17, P < .05$
Often	7 (5.8)	6 (6.8)	
Sometimes	76 (62.8)	38 (43.2)	
Other drugs (current)			
Marijuana	15 (12.0)	6 (6.6)	
Cocaine	2 (1.6)	0	

ppd—packs per day.

more than one pack per day. There were no significant differences in smoking or drug use by practice location.

Knowledge about the health risks of smoking was high, with over 80% correct responses to each question (range 81.2% to 98.6%). No differences in knowledge were noted based on smoking status, practice location, or sex, with the exception that more girls believed that smoking did not increase health risks when using an oral contraceptive ($\chi^2 = 4.13, P < .05$). Perceptions about the prevalence of smoking among adults and teenagers in general were highly inaccurate, with 79% of adolescents reporting that over one half of adults smoke and 68% responding that over one half of teenagers smoke. These perceptions were not significantly different by smoking status.

The major reasons cited for starting to smoke were friends' smoking behavior, curiosity, stress, and boredom ("something to do") (Table 4). Smokers reported the

TABLE 2. MULTIPLE LOGISTIC REGRESSION MODEL ON SMOKING

Variables	Beta	χ^2	P	Odds Ratio	95% CI*
Age > 15 years	1.31	4.67	.03	3.71	12.3,1.13
Friends smoking†	-0.84	19.29	.00	12.58	38.8,4.06
Mother smoking	0.96	5.02	.02	2.60	6.0,1.12
Father smoking	1.02	5.63	.02	2.75	7.1,1.08
Marijuana use	2.05	12.20	.005	7.77	24.6,2.47

Model $\chi^2 = 79.09, r = .556$.

*Confidence interval.

†Friends smoking is an ordinal variable with 4 levels ranging from 1 = most to 4 = very few. The log odds ratio presented is the difference between the last and first category resulting in a positive odds ratio.

TABLE 4. REASONS CITED FOR SMOKING

Reasons for Smoking	Start Smoking (n = 66)	Continue Smoking (n = 51)*
	No. (%)	No. (%)
Friends smoke	30 (45.5)	13 (25.5)
Curious about smoking	27 (40.3)	6 (11.8)
Don't know	21 (31.8)	16 (31.4)
Under a lot of stress	17 (26.2)	17 (33.3)
Something to do	14 (21.2)	9 (17.6)
Parent or relative smokes	11 (16.7)	9 (17.6)
For my nerves	9 (13.6)	15 (29.4)
Feel more grown up	9 (13.6)	2 (3.9)
Told not to smoke	8 (12.1)	3 (5.9)
It's cool to smoke	5 (7.6)	2 (3.9)

*Includes 4 former smokers who responded to these questions.

major reasons for continuing to smoke were stress and anxiety, peer behavior, boredom, and the influence of smoking parents and relatives. Reasons reported for quitting, either among experimenters and former smokers or for current smokers who had thought about quitting, are listed in Table 5. Among smokers, thoughts of quitting were most often reported as being due to health concerns, expense of cigarettes, and requests from a parent or friend.

Responses about patterns of smoking revealed that one half of smokers smoked most often at parties and at home. Thirty-five percent reported smoking most with a friend. The time of day that adolescents were most likely to smoke was in the evening (52%), and 35% smoked most on weekends. The places where adolescents were least likely to smoke were school (59%), the bathroom (37%), and at work (35%). Sixty-nine percent of smokers had tried to quit at least once, and most smokers reported

TABLE 5. REASONS FOR QUITTING SMOKING

Reasons for Quitting*	Tried Smoking or Former Smokers (n = 95)	Current Smokers (n = 47)†
	No. (%)	No. (%)
Didn't enjoy smoking	56 (58.9)	1 (2.1)
Health concerns	14 (14.7)	29 (61.7)
Don't know	10 (10.5)	6 (12.8)
Pregnancy	8 (8.4)	1 (2.1)
Couldn't afford it	3 (3.2)	6 (12.8)
Parents or friend asked me to stop	3 (3.2)	5 (10.6)
Others‡	7 (7.4)	4 (8.5)

*Respondents could check more than one response.
 †Responding to question "What made you think about quitting?"
 ‡Includes illness and concerns about smoking effects on fetus/child.

TABLE 6. SUBJECTS' SUGGESTIONS FOR SMOKING CESSATION (%)

	Total (n = 206)	Smokers (n = 48)
	No. (%)	No. (%)
A friend to quit with	124 (59.9)	26 (54.2)
Health information		
Pictures of diseases caused by smoking	86 (41.7)	7 (14.6)
Friends	71 (34.3)	11 (22.9)
Television	57 (27.7)	7 (14.6)*
Physician or parent	41 (19.8)	5 (10.4)
Medication to make quitting easier	58 (28.0)	14 (29.2)
Stop smoking class or program	27 (13.1)	4 (8.3)

*Significant difference between smokers and nonsmokers ($\chi^2 = 5.35, P < .05$).

some factor that would cause them to stop. These factors included personal illness (30%), boyfriend or girlfriend quitting (26%), the death of someone they knew from smoking (21%), friends quitting (11%), and pregnancy (8%). Only two adolescents stated that nothing would make them stop smoking. Forty-six percent of current smokers reported wanting to quit smoking, but 74% felt that it would be hard or very hard to stop.

The major suggestion for promoting successful smoking cessation was having a friend with whom to quit (Table 6). Many reported that peer educators would be the preferred information source. Nonsmokers felt that pictures of diseases caused by smoking would have an impact on smoking cessation. Both smokers and nonsmokers believed medication to make quitting easier would be useful.

DISCUSSION

This study presents a description of the smoking behavior and beliefs of adolescents throughout the state of Michigan. The percentage of smokers in this sample is consistent with other reports.^{6,15,17} There has been some concern regarding the validity of self-reported smoking behavior from studies demonstrating higher reporting rates among adolescent smokers who were informed in advance of biological testing procedures.¹⁸ In this study, however, adolescents were informed of the confidential nature of their responses through the use of code numbers and envelopes that they sealed. This effort appeared to result in greater reporting of cigarette smoking through the questionnaire than from their physicians or the office

nurses. Only two adolescents (0.9%) who were reported as smokers through the face sheet denied smoking on the questionnaire, compared with the 12 self-identified teenage smokers (5.6% of the total sample and 25% of smokers) whose physicians or nurses believed them to be either nonsmokers or former smokers. It is not known how many face sheets were completed by physicians or nurses and whether these reports were based on notations in the medical record, questions asked at the time of the current visit, or clinical judgment. The underestimation of adolescent smoking in this sample may, therefore, be due to both inaccurate reporting and failure to inquire. Because of the high prevalence of adolescent smoking and the potential for physicians to have input into smoking cessation attempts, physicians are encouraged to inquire about smoking behaviors with adolescent patients and to do so in a confidential manner.

As in the study by Thambypillai,¹⁹ high awareness of the health risks of smoking did not seem to be a strong enough deterrent to cause current smokers to quit, despite reports that concern about health was a major reason to think about smoking cessation. Leventhal et al²⁰ noted that misperceptions about the risk to personal health and the smoking participation by both peers and adults tend to undermine the adolescents' appreciation of the health hazards of smoking. In this study as well, adolescents overestimated the prevalence of peer and adult smoking. This misperception was found to be an important part of a risk factor model tested by Newcomb et al⁷ for understanding drug use among adolescents. They found that the number of risk factors to which adolescents were exposed was linearly related to drug use and abuse. This finding supported the concept that while several different factors may eventually lead to substance abuse, exposure to multiple risk factors increases the likelihood of use. Prevention efforts must then focus on decreasing exposure to risk factors and modifying the factors already present. In this study, the most striking risk factor for smoking was exposure to smokers. One half of the adolescents reported smoking most at home, and 18% cited smoking parents or relatives as reasons to continue smoking. Efforts toward smoking prevention and cessation for adolescents must therefore target smoking parents as well.

It is encouraging that adolescents in this study reported both a desire to quit and previous cessation attempts. This finding is in contrast to Chapman and Homel,²¹ who found that 46% of students had no intention to stop smoking. In this study, 46% reported wanting to quit and only two stated that nothing would make them stop. The smoking adolescents also pointed to opportunities, such as a personal illness related to smoking, which might be used by physicians to encourage smoking cessation. Also it appears that both prevention programs and physicians' need to attend more to the adolescent's reasons for smoking.

Currently not being addressed is the high report of stress and anxiety as reasons to smoke. While one prevention program reported incorporating training in coping with anxiety,¹³ greater attention to this aspect of adolescent life might increase the success of prevention programs in smoking cessation. Glynn¹⁰ suggests that the current group of adolescent smokers, with more girls and drop-outs, may represent a harder-to-reach group who may require different or more targeted interventions. Such interventions may be uncovered through combining the lessons learned from both adult smoking cessation programs and adolescent prevention programs.

For adults, individualized advice on multiple occasions with a team approach, using two or more modalities of therapy, seems the most successful.²² These modalities include nicotine chewing gum, medication, and behavioral therapy including hypnosis and relaxation. Lessons learned from adolescent smoking prevention programs reporting modest success in preventing smoking onset include content on social and short-term consequences, social influences, and training in refusal skills.¹⁰ The optimal format appears to be two to five sessions yearly between grades 6 through 9 with peer and parental involvement.¹⁰ Added factors to target smokers suggested by this study might be peer-quit challenges, use of relaxation and stress reduction modalities, and considering the use of nicotine chewing gum or clonidine under physician supervision.

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