

# Smoking Cessation in Young Adults: Age at Initiation of Cigarette Smoking and Other Suspected Influences

## ABSTRACT

**Objectives.** Previous research has suggested that early smoking initiation predicts longer duration of smoking, heavier daily consumption, and increased chances of nicotine dependence. This report set out to estimate the relationship between smoking cessation and age of initiation, as well as nicotine dependence, sex, race, and education.

**Methods.** A sample of 1007 young adults was randomly selected from a large health maintenance organization in southeast Michigan. Hazard ratios of quitting associated with age at smoking initiation were estimated among 414 persons who smoked daily for 1 month or more.

**Results.** With potential confounders controlled for, the likelihood of cessation was significantly higher in smokers who initiated smoking after age 13. The hazard ratio for quitting associated with smoking initiation at ages 14 to 16 was 1.6 and with initiation at or after age 17 was 2.0, compared with initiation at or before 13 years of age. Factors that decreased the likelihood of cessation were nicotine dependence and low education.

**Conclusions.** Public policy to discourage early smoking, if it succeeds in delaying the initiation of smoking, might contribute to the reduction of smoking-related mortality and morbidity by increasing the potential for quitting. (*Am J Public Health*. 1996;86:214-220)

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### Introduction

The dramatic decline in the prevalence of cigarette smoking in the United States since the 1960s has been achieved primarily by smokers' successful attempts to quit.<sup>1-3</sup> Although smoking initiation by young people has declined somewhat, the contribution of the decline to the overall decreased prevalence of smoking has been of secondary importance. As smoking cessation programs continue to be a key component of public health efforts to prevent the adverse effects of smoking on health, the identification of factors that predict smoking cessation has implications for public policy.

While the initiation of cigarette smoking in adolescence appears to fit within a model of progression from legal to illegal substances,<sup>4-6</sup> the persistence of smoking in the third decade of life is in striking contrast with the sharp decline in the use of alcohol and illicit drugs in the early 20s.<sup>7</sup> A maturation process has been proposed to describe the course of alcohol and illicit drug use from adolescence to young adulthood, whereby cessation is linked to transitions in adult social roles—specifically, marriage, parenthood, and employment—that are presumed to be incompatible with drug involvement.<sup>8</sup> The persistence of cigarette smoking into adulthood might suggest that cigarette smoking, in contrast with heavy drinking and illicit drug use, has been compatible with the fulfillment of adult social roles.

Smoking cessation varies by sex, race, education, and number of cigarettes smoked daily. Higher rates of quitting have been reported for males versus females, Whites versus Blacks, persons with higher versus lower education, and light versus heavy smokers.<sup>8-11</sup> Older smokers—that is, those over 40 years of age—are more likely to quit than younger

smokers, a change attributed to the growing awareness of smoking-related illnesses with advancing age.<sup>11</sup> In fact, there is evidence to suggest that age modifies the relationship between heavy smoking and quitting. Specifically, Coombs et al. report that among older adults, the chance of quitting is higher in heavy smokers, than in light smokers,<sup>11</sup> an opposite trend to that in younger adults. By way of explanation, they suggest that among older adults, light smokers are not necessarily less dependent than heavy smokers, since there are among them formerly heavy smokers who, unable to quit, have cut down “as the best alternative to quitting completely.”<sup>11(p244)</sup> This interpretation is based on the assumption that level of smoking is an imperfect indicator of nicotine dependence, which is the critical factor in cessation. Nicotine dependence per se, as distinct from heavy smoking, has not been previously examined.

Other potential factors in smoking cessation might include a history of childhood conduct problems and a lifetime history of major depression. A history of conduct problems has been related to early smoking initiation and, independent of age of initiation, to the development of nicotine dependence.<sup>12,13</sup>

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Major depression has been associated with nicotine dependence and a lower prevalence of being an ex-smoker.<sup>14-16</sup> The relationship of these variables to the potential for smoking cessation has also not been previously examined.

As is the case with illicit drug use, early initiation of cigarette smoking has been associated with a greater potential for problems, including heavy daily consumption, longer duration of smoking, and nicotine dependence.<sup>5,12,13,17-19</sup> This evidence would suggest that the inverse association between age at initiation and cessation, observed in relation to some illicit drugs,<sup>8</sup> might apply also to cigarettes. However, this hypothesis has not been previously examined.

The purpose of this report is to examine the extent to which smoking cessation varies by age at smoking initiation. We address the following questions: (1) Are smokers with late initiation more likely to quit than smokers with early initiation? (2) Are nicotine-dependent smokers less likely to quit than nondependent smokers? (3) Does nicotine dependence account for the differential likelihood of quitting between smokers with late and early onset, if such an association is observed? Evidence that the potential for quitting is greater for smokers who began at an older age compared with those who began at an early age would support public policies that delay the onset of smoking. Thus, the relationship between age of smoking initiation and that of cessation and the role of nicotine dependence were investigated in a longitudinal epidemiological study of young adults and estimated in a multivariate survival analytic model that controlled for sex, race, and education.

## Methods

A simple random sample of 1200 individuals was selected from all 21- to 30-year-old members of a 400 000 member health maintenance organization (HMO) in southeast Michigan. The HMO serves the tricity area of Wayne, Oakland, and Macomb, which contains 91% of the 4.3 million people in the Detroit standard metropolitan statistical area. Of those selected, 1007 respondents (84% of the sample) were interviewed at their homes in 1989. Compared with nonparticipants, participants were slightly more likely to be female and older—that is, between ages 26 and 30. The median age of the respondents was 26 years, 61.7% were female, 80.7% were White,

and 45% were married. A small minority (3.7%) had less than a high school education, 21% had completed high school, 46% had some college, and 29.3% were college graduates. Twenty-two percent of the respondents lived in the city of Detroit at the time of the interview while the remaining respondents resided in other parts of the metropolitan area. Follow-up interviews were conducted in 1992, 3.5 years after baseline, with 979 (97%) of the original interviewees.

The National Institute of Mental Health Diagnostic Interview Schedule,<sup>20</sup> revised to cover diagnoses in the *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edition, revised (*DSM-III-R*),<sup>21</sup> was used to gather information on subjects' history of psychiatric disorders, including nicotine dependence. Data on the precision and accuracy of the previous version of the Diagnostic Interview Schedule have been reported elsewhere.<sup>22-24</sup> The Diagnostic Interview Schedule inquires about age of onset of daily smoking and age of last cigarette. An item on age at smoking initiation, as defined below, was added for this study. History of subjects' lifetime nicotine dependence was ascertained at baseline, and interval history, covering the 3.5-year period since baseline, was ascertained in the follow-up interview.

## Definition of Key Variables

*Smoking cessation* was defined as having last smoked at least 1 year before the time of the latest interview. Because most relapses occur within the first year after quitting, the definition captures successful quitting.<sup>25</sup> *Age of smoking initiation* was defined as the age at which a respondent first smoked a cigarette. Based on previous research on this issue and nicotine dependence, age at smoking initiation was classified into three categories: up to and including 13 years, 14 to 16 years, and 17 years and older.<sup>12</sup> Regarding nicotine dependence, the *DSM-III-R* adopted a unitary diagnostic definition across all psychoactive substances, reflecting the current consensus in the field of addiction on the key features of substance use disorder. At the core of the definition is the construct of dependence, defined by cognitive, behavioral, and physiological symptoms that characterize compulsive use of all substances. The following are the criterion symptoms of psychoactive substance dependence in the *DSM-III R*: (1) greater use than intended, (2) unsuccessful efforts to quit, (3) a great deal of time spent getting the substance, (4)

intoxication or withdrawal symptoms when expected to fulfill a major role obligation, (5) important activities given up, (6) continued use despite knowledge of adverse consequences, (7) tolerance, (8) withdrawal symptoms, and (9) use to avoid withdrawal. *Nicotine dependence* is defined in the *DSM-III-R* by the presence of three or more of these criterion symptoms.<sup>21</sup> *Age of onset of nicotine dependence* is defined in the Diagnostic Interview Schedule as the age at which the first dependence symptom occurred.

## Statistical Analysis

The analysis of smoking cessation was performed on the combined baseline and follow-up data of the subset of young adults who had smoked daily for a month or more at any time in their life ( $n = 414$ ). (Cessation in persons who had never progressed to daily smoking is a separate topic not covered in this inquiry.) The combined data covered lifetime experience up to age 33. The cumulative incidence of smoking cessation in the three age-of-initiation groups was estimated by standard life-table methods, a nonparametric estimator for grouped censored data.<sup>26,27</sup> The censored subjects were smokers who had continued to smoke for up to 1 year before the last interview.

Cox proportional hazards models for censored survival data were used to estimate the hazard ratios of quitting associated with age at smoking initiation.<sup>28-30</sup> The models included sex, race, and education as fixed covariates. Because the period during which cessation could have occurred started when daily smoking began, time was defined as number of years since onset of daily smoking. The use of years rather than days as the time unit increases the number of ties in event occurrences. For that reason, the discrete version of the proportional hazard model, which correctly models tied data, was used. Two adjusted hazard ratios were calculated in the model: the hazard ratio of quitting among smokers who began smoking at ages 14 to 16 compared with those who began before their 14th birthday, and the hazard ratio of quitting among smokers who began smoking at age 17 or older compared with those who began before age 14. These hazard ratios provide direct estimates of the extent to which each of the late smoking onsets is associated with an advantage over early smoking onset in terms of the potential for cessation. The role of nicotine dependence in the associa-

**TABLE 1—Selected Characteristics of Young Adult Smokers, by Age at Smoking Initiation**

	Age at Smoking Initiation		
	≤ 13 Years (n = 139)	14–16 Years (n = 179)	≥ 17 Years (n = 96)
Female, %	64	67	59
White, %	86	93	72
Less than college, %	75	81	79
Nicotine dependence, %	75	69	54
Daily smoking onset, age range, y	11–28	14–30	17–29

Note. Difference in percentage of Whites across groups is statistically significant ( $\chi^2 = 22.3$ , 2 *df*,  $P < .0001$ ).

**TABLE 2—Estimated Probabilities of Smoking Cessation at Selected Years of Daily Smoking, by Age at Smoking Initiation**

Years Daily Smoking	Age at Smoking Initiation		
	≤ 13 Years (n = 139)	14–16 Years (n = 179)	≥ 17 Years (n = 96)
	% (95% CI)	% (95% CI)	% (95% CI)
3	4.4 (1.0, 7.8) (130)	9.6 (5.3, 13.9) (158)	13.6 (6.7, 20.5) (80)
5	6.6 (2.4, 10.7) (126)	16.5 (11.0, 22.0) (144)	22.7 (14.1, 31.2) (62)
7	11.0 (5.8, 16.4) (115)	24.1 (17.7, 30.4) (127)	30.4 (20.7, 40.1) (49)
9	17.3 (10.9, 23.8) (102)	27.8 (21.1, 34.5) (105)	34.9 (24.6, 45.2) (33)
11	23.0 (15.8, 30.3) (88)	35.0 (27.6, 42.4) (82)	43.1 (31.4, 54.9) (20)
13	29.6 (21.5, 37.7) (66)	39.6 (31.7, 47.4) (55)	43.1 (31.4, 54.9) (10)

Note. Numbers on which the estimates are based appear in parentheses below the estimates; estimated probabilities represent cumulative incidence figures from standard life-table methods.

tion between age at initiation and cessation was estimated in an expanded model, which also included time of onset of nicotine dependence as a time-dependent covariate. In separate analyses, interactions between the key independent variables were tested, and no significant interactions were detected.

In an additional analysis, the association of smoking cessation with a history of conduct problems and major depression was explored. The two variables were added to the Cox proportional hazards model, the first as a fixed covariate and the second as a time-dependent covariate. The expanded model estimated and tested the partial associations of each of these variables with smoking cessation, as well as the partial association of age at

smoking initiation with smoking cessation, with the added variables held constant.

## Results

### Age at Smoking Initiation

Of the 414 persons who have ever smoked daily for 1 month or more, 33.6% smoked their first cigarette at age 13 or before, 43.2% first smoked at 14 to 16 years of age, and 23.2% began at age 17 or later. Table 1 compares the three smoking initiation groups on sex, race, education, nicotine dependence, and age at which daily smoking began. Race varied significantly across the three groups, with higher proportions of Whites in the earlier smoking initiation groups than in the later

group. No significant differences were detected on the other four variables.

### Smoking Cessation and Age at First Cigarette

Of those same 414 persons, 145 had quit and did not smoke for at least 1 year before the last interview. The cumulative incidence of cessation and the confidence intervals [CIs] for selected years, up to 13 years since daily smoking began, appear in Table 2. (There were not sufficient data for precise estimation beyond 13 years.) At all time points, the cumulative percentage of those quitting increased with increasing age at first cigarette. The gradient relationship between quitting and age of smoking initiation was evident as early as 3 years after daily smoking began. Specifically, the cumulative percentage of quitting in smokers with early age of smoking initiation ( $\leq 13$  years) was 4.4%, compared with 9.6% and 13.6% in smokers with intermediate (14 to 16 years) and late ( $\geq 17$  years) initiation, respectively. The smoking cessation advantage associated with delayed smoking initiation was maintained throughout the entire 13-year period depicted in Table 2. Figure 1 presents the survival curves of smoking cessation in these three groups of smokers. The unadjusted hazard ratios for cessation up to age 33 in smokers who smoked their first cigarette at 14 to 16 years and at age 17 or later, compared with those who first smoked at age 13 or earlier, were 1.5 (95% CI = 1.0, 2.2) and 1.9 (95% CI = 1.2, 3.0), respectively.

The adjusted hazard ratios for smoking cessation associated with age of smoking initiation were estimated in a discrete Cox proportional hazards model, with sex, race, and education as covariates. These ratios, or estimated relative risks, are presented in Table 3 for two age-of-smoking initiation groups, 14 to 16 years and 17 years and older, compared with the earliest group, age 13 and younger, as a reference. Adjusted for sex, race, and education, the hazard ratio for quitting associated with initiation at 14 to 16 years of age was 1.6 (95% CI = 1.1, 2.3) and that associated with initiation at age 17 or later was 2.0 (95% CI = 1.3, 3.2). The results also show that race and sex were not significantly related to smoking cessation, but that smokers with less than a college education were 60% less likely to quit compared with college-educated smokers (hazard ratio = 0.4; 95% CI = 0.3, 0.6).

*The Role of Nicotine Dependence*

The relationship of nicotine dependence with smoking cessation and the potential role of nicotine dependence in the association between age of initiation and cessation were examined next. The discrete proportional hazards model was expanded by adding onset of nicotine dependence as a time-dependent covariate. The results appear in Table 4. Smokers with nicotine dependence were 40% less likely to quit than smokers who were not dependent, with sex, race, education, and age of initiation controlled for (hazard ratio = 0.6; 95% CI = 0.4, 0.8). Nevertheless, the association between age of smoking initiation and quitting remained statistically significant, with little change in the hazard ratios from the previous estimates as they appear in Table 3. No significant interactions were detected between nicotine dependence and age of smoking initiation ( $P > .25$ ).

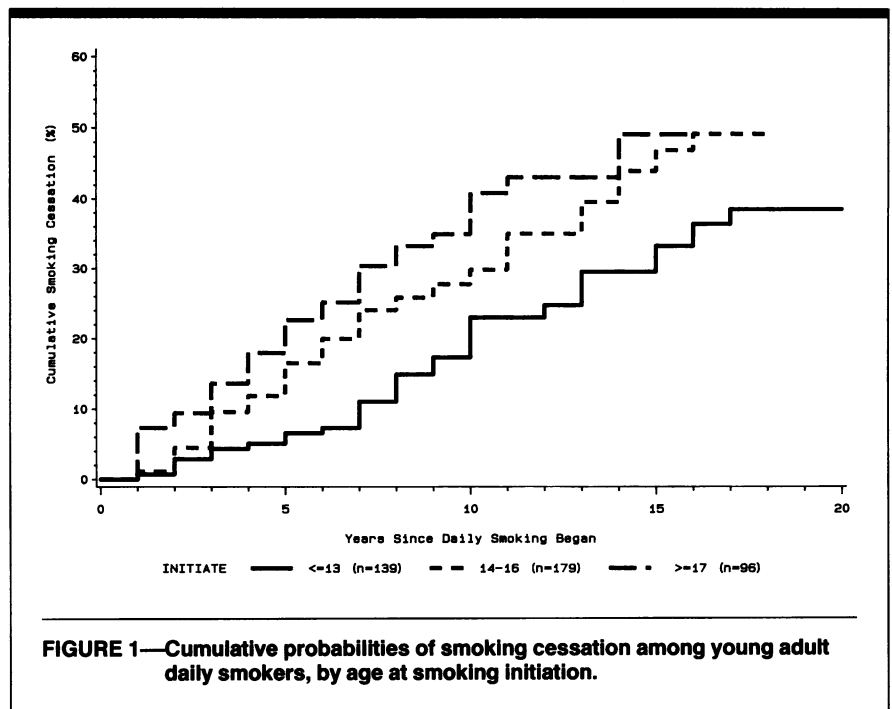
*Exploring the Effects of Conduct Problems and Major Depression*

In additional models, the potential association of smoking cessation with a history of conduct problems and major depression was explored.

A history of childhood conduct problems, defined as at least one out of six conduct problems before age 15, and onset of major depression were added into the discrete Cox proportional hazard models, the first as a fixed covariate and the second as a time-dependent covariate. Neither a history of conduct problems nor prior major depression were significantly related to smoking cessation. A history of conduct problems was associated with a slight increase in the hazard ratio of subsequent quitting (1.3,  $P = .121$ ), and prior major depression was associated with a slight decrease in the hazard ratio of subsequent quitting (0.8,  $P = .384$ ). Furthermore, neither of these variables modified the association between age of smoking initiation and cessation.

**Discussion**

The results indicate the following: (1) The likelihood of smoking cessation was greater in smokers who had begun cigarette smoking after age 13 than in those who had begun earlier. Compared with smokers in the earliest initiation group, smokers who began at 14 to 16 years were 1.6 times more likely to quit, and those who began at age 17 or later were twice as likely to quit. (2) Nicotine-



**FIGURE 1—Cumulative probabilities of smoking cessation among young adult daily smokers, by age at smoking initiation.**

**TABLE 3—Discrete Cox Proportional Hazard Model (n = 414): Hazard Ratio for Smoking Cessation, by Age at Initiation, with Sex, Race, and Education Controlled for**

	Hazards Ratio	95% Confidence Interval	P
Initiation, y			
≤ 13	1.0	Reference	
14–16	1.6	1.1, 2.3	.015
≥ 17	2.0	1.3, 3.2	.002
Sex			
Male	1.0	Reference	
Female	0.9	0.7, 1.3	.618
Race			
Black	1.0	Reference	
White	0.8	0.5, 1.3	.339
Education			
College	1.0	Reference	
Less than college	0.4	0.3, 0.6	.0001

Note. Likelihood ratio test:  $\chi^2 = 36.87, 5 df, P = .0001$ .

dependent smokers were 40% less likely to quit successfully than nondependent smokers. (3) The relationship between delayed uptake of smoking and quitting was independent of the inhibiting effect of nicotine dependence. There were two other results of interest: the strongest predictor of smoking cessation was level of education, with smokers who completed college being 2.5 times as likely to quit as those with no college education; and sex and race differences in smoking cessation were trivial and nonsignificant.

The generalizability of the findings is limited in several ways. The sample comprises young adults, so the findings might not apply to older smokers. It should, however, be emphasized that the age limitation provides a methodological advantage. Because of the young age of the sample, the findings are less likely to be biased by selective mortality or by recall errors regarding historical information on smoking behaviors than they would be if older adults were included. Furthermore, the restriction of the sample

**TABLE 4—Discrete Cox Proportional Hazard Model (n = 414): Hazard Ratios for Smoking Cessation by Age at Initiation, with Nicotine Dependence, Sex, Race, and Education Controlled for**

	Hazards Ratio	95% Confidence Interval	P
Initiation, y			
≤ 13	1.0	Reference	
14–16	1.6	1.1, 2.4	.013
≥ 17	2.0	1.3, 3.2	.003
Sex			
Male	1.0	Reference	
Female	0.9	0.6, 1.3	.543
Race			
Black	1.0	Reference	
White	0.9	0.5, 1.4	.572
Education			
College	1.0	Reference	
Less than college	0.4	0.3, 0.5	.0001
Nicotine dependence			
No	1.0	Reference	
Yes	0.6	0.4, 0.8	.001

Note. Likelihood ratio test:  $\chi^2 = 47.62$ , 6 df,  $P = .0001$ .

to a relatively narrow age range in young adulthood avoids complexities due to cohort effects and the effects of advanced age on cessation behavior. Thus, the young age of the sample allows a clearer interpretation of the observed relationship between age of smoking initiation and cessation than if a wider age range was included.

Drawn from a list of members of a large HMO, subscribers and dependents, the sample represents the population of this age in the area, excluding only the extremes of the socioeconomic range. Available reports on HMO populations indicate that the members generally represent the population of the geographic area except that they are slightly more educated and healthier.<sup>31,32</sup> On indicators of general health and health behaviors (e.g., ratings of self-assessed health, prevalence of cigarette smoking, and alcohol and cocaine use), our sample resembles the late 1980s US population of comparable age, as described in national reports.<sup>33–35</sup>

It is almost by definition that nicotine-dependent smokers have more difficulty quitting and are therefore less likely to quit successfully than nondependent smokers. Previous studies on community samples and smoking cessation programs have used the number of cigarettes smoked per day as an indicator of dependence; many (but not all) found that this number predicted successful quitting.<sup>9,10,36–38</sup> An-

other commonly used measure of nicotine dependence is the Fagerström Tolerance Questionnaire,<sup>39</sup> which appears to correlate with biochemical measures of dependence (nicotine, cotinine) and, probably, behavioral outcomes such as withdrawal symptoms and ability to quit.<sup>40</sup> The limitations of daily cigarette consumption and of the Fagerström Tolerance Questionnaire for measuring dependence have been discussed previously.<sup>40</sup>

This is the first study to examine smoking cessation in a community sample, using the current definition of nicotine dependence as formulated in the major psychiatric classification systems, the *DSM-III-R* and the *International Classification of Diseases*, 9th revision (ICD-9).<sup>21,41</sup> While level of cigarette consumption and the Fagerström questionnaire reflect notions of addiction as a physiological phenomenon, at the core of the *DSM-III-R* and the ICD-9 definition is a cognitive, behavioral, and physiological cluster that characterizes compulsive use of all substances. The definition reflects the current consensus in the field of addiction on the cardinal characteristics of substance use disorder.<sup>42</sup> Our findings support the predictive validity of this definition: controlling for variables previously observed to predict cessation, we found that nicotine-dependent smokers were less likely to quit than nondependent smokers. Other findings from this study suggest that smoking cessation might vary also by level of

nicotine dependence, with moderately dependent smokers being less likely to quit than mildly dependent ones.<sup>13</sup> Our previous reports on the association of nicotine dependence with psychiatric disorders, including other substance use disorders, major depression, and anxiety disorders, support the construct validity of the definition.<sup>14,15</sup> Such associations could be expected on the basis of previous findings on the comorbidity between other substance use (i.e., alcohol and illicit drug) disorders and specific mental disorders.<sup>43</sup>

The greater potential for quitting associated with later smoking initiation was independent of nicotine dependence. Although dependent smokers were less likely to quit than nondependent smokers, dependent smokers who had delayed the initiation of smoking were more likely to quit than those who had begun to smoke at an earlier age. While previous research has reported that age at smoking initiation predicts duration or level of smoking, this is the first study to report on the association between age at smoking initiation and cessation. The association was not accounted for by sociodemographic correlates of early initiation or nicotine dependence. Moreover, although a history of conduct problems was associated with early smoking initiation, such a history did not account for the association between early initiation and cessation. Nonetheless, this observational study does not permit a causal interpretation of the association. Early smoking initiation might be a marker of factors that influence the potential for smoking cessation.

Our finding that the potential for quitting was markedly higher in smokers with a college education than in smokers with no college education is in accord with previous evidence that smoking cessation varies by indicators of social class.<sup>11,44,45</sup> A well-established finding is the inverse relationship between the prevalence of smoking and the level of education, with college-educated individuals showing the lowest prevalence.<sup>2,46</sup> While it would be tempting to attribute the smoking gap between the college- and the non-college-educated populations to the enlightening effect of education, the explanation is likely to lie elsewhere. National data from the Monitoring the Future study, gathered over a period of nearly 20 years, indicate that the smoking gap has its origins in high school, and that the rate of smoking is far lower in college-bound than in non-college-bound high school seniors.<sup>46</sup> That the smoking pattern estab-

lished in high school continues into adulthood is supported by evidence on enduring cohort differences in smoking rates.<sup>47</sup> Our finding that smokers who are college graduates are more likely to quit than smokers with less than a college education is an additional aspect of the social class-smoking association. It might be that, because of the lower rate of smoking among college-bound adolescents (predominantly children of middle-class, college-educated parents), college-educated smokers find themselves in social environments in which fewer of their peers smoke, a condition that would enhance the likelihood of cessation. Thus, the smoking gap that originates in high school is likely to widen over time as college graduates, with already lower rates of smoking, quit at higher rates than non-college graduates of the same age. Increasing class-related gaps in the prevalence of smoking, attendant on class-related differences in the cessation of smoking, have been reported for the United States, Canada, Great Britain, Norway, and Sweden.<sup>48</sup>

As smoking has become increasingly concentrated within the non-college-educated population, the finding that delayed initiation signals an increased potential for quitting among all smokers (including those with less than a college education) has important public health implications. Programs that delay smoking initiation might have considerable value even if they do not succeed in fully preventing the uptake of smoking. Delaying smoking initiation among adolescents could eventually reduce the rate of smoking through increasing the potential for successful cessation. □

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## Call for Nominations for the 1996 Fred L. Soper Award for Publications in the Field of Inter-American Health

The Pan American Health and Education Foundation (PAHEF) is now accepting nominations for the 1996 award in honor of Fred L. Soper, former director of the Pan American Health Organization (PAHO, the World Health Organization Regional Office for the Americas) from 1947 to 1958. The award is presented annually to the author or authors of an original scientific contribution comprising new information on, or new insights into, the broad field of public health, with special relevance to Latin America or the Caribbean or both. This may consist of a report, an analysis of new data, experimental or observational, or a new approach to analyzing available data. Preference is given to studies involving more than one discipline and to papers related to infectious disease, a lifelong concern of Dr Soper.

Only papers already published in scientific journals listed in the Index Medicus or in PAHO's official journals are eligible for consideration. Furthermore, the award is limited to contributions by authors whose principal affiliation is with

teaching, research, or service institutions located in the countries of Latin America and the Caribbean (including PAHO centers).

The award fund is administered by PAHEF, which receives voluntary contributions designated for the purpose and holds them in a separate fund. The award consists of a suitable certificate and a monetary prize of US\$1000. The winner(s) of the award each year is nominated by an award committee, composed of representatives designated by PAHO and by PAHEF; final selection is made by the board of trustees of PAHEF.

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