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ABSTRACT

Past research has shown that teenagers with less educated parents and teenagers with lower academic aspirations are more likely than their peers to smoke. This study was conducted to provide additional descriptive data concerning the relationships of smoking to parents' education and students' educational aspirations and to provide preliminary evidence concerning causes of the inverse relationships between smoking and the education variables. Data were obtained for white high school seniors from the 1985 Monitoring the Future survey of high school seniors. The results revealed that students who had less educated parents or lower educational aspirations of their own were more likely to have tried a cigarette, more likely to have adopted cigarette smoking, and less likely to have quit smoking. These students also had more favorable attitudes toward smoking and reported greater acceptance of smoking by their friends. In addition, students with less educated parents or lower educational aspirations appeared to be more rejecting of adult authority and more predisposed to adopt adult behaviors, and these characteristics in turn were associated with smoking more. Multivariate analyses of these data, together with evidence from other studies, support the hypothesis that favorable attitudes toward smoking, social acceptance of smoking, and a tendency to adopt adult behaviors contribute to the higher rates of smoking among students with less educated parents or lower educational aspirations. (Author/NB)

Relationships of Teenage Smoking to Educational Aspirations and Parents' Education

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Abstract

This study analyzes data for white high school seniors from the 1985 Monitoring the Future national survey. Students who had less educated parents or lower educational aspirations were more likely to have tried a cigarette, more likely to have adopted cigarette smoking, and less likely to have quit smoking. Students with less educated parents or lower educational aspirations also had more favorable attitudes toward smoking and reported greater acceptance of smoking by their friends. In addition, students with less educated parents or lower educational aspirations appeared to be more rejecting of adult authority and more predisposed to adopt adult behaviors, and these characteristics in turn were associated with smoking more. Multivariate analyses of these data, together with evidence from previous prospective studies, support the hypothesis that favorable attitudes toward smoking, social acceptance of smoking, and a tendency to adopt adult behaviors contribute to the higher rates of smoking among students with less educated parents or lower educational aspirations.

In the contemporary United States, smoking is inversely related to socioeconomic status. For example, teenagers with less educated parents are more likely to be smokers (Bachman, Johnston & O'Malley, 1981; Oechsli & Seltzer, 1984). Prospective studies indicate that teenagers with less educated parents are more likely to adopt smoking and probably also less likely to quit smoking (Laoye, Creswell & Stone, 1972; Mittelmark, Murray, Luepker, Pechacek, Pirie & Pallonen, 1987). The inverse association between parents' education and teenage smoking has not been observed in every sample studied, but has been observed repeatedly in studies from the late 1950s through the 1980s (Bachman et al., 1981; Horn, Courts, Taylor & Solomon, 1959; Laoye et al., 1972; Mittlemark et al., 1987; National Institute of Education, 1979: Oechsli & Seltzer, 1984; U. S. Department of Health, Education and Welfare, 1976; Williams, 1973).

Teenagers who have lower academic aspirations and less academic success are also more likely to be smokers. High school dropouts are substantially more likely to be smokers than high school students (Pirie, Murray & Luepker, 1988). For high school students, smoking is substantially more common among those who do not plan to go to college, those who are not enrolled in a college preparatory track, or those who have poor grades (Bachman et al., 1981; Johnston, O'Malley & Bachman, 1987; Krohn, Massey, Skinner & Lauer 1983; U. S. Department of Health and Human Services, 1980). Among young adults, those who are not enrolled in college are substantially more likely to be smokers than college students (Johnston et al., 1987). Prospective studies indicate that students with lower educational aspirations and grades are more likely to experiment with smoking and to adopt smoking, and possibly also less likely to quit smoking (Laoye et al.,

1972; Skinner, Massey, Krohn & Lauer, 1985; Young & Rogers, 1986). The inverse association between educational aspirations or achievement and smoking has been observed consistently in data from the late 1950s through the 1980s (Bachman et al., 1981; Borland & Rudolph, 1975; US Dept HEW, 1976; Horn et al., 1959; Johnston et al., 1987; Krohn et al., 1983; Laoye et al., 1972; NIE, 1979; US Dept HHS, 1980).

Eckert (1983) has proposed a hypothesis to explain why teenagers with less educated parents and lower educational aspirations are more likely to smoke. Based on participant observation and interviews with high school students, Eckert contrasts the situation of college-bound students from middle class homes with the situation of non-college-bound students of lower socioeconomic status background. She argues that the college-bound students achieve more satisfaction and status in school and school-related activities. The college-bound students are also dependent on adults to help them achieve their educational goals. Consequently, the college-bound students are more predisposed to accept adult authority, including adult prohibitions against teenage smoking. In contrast, the non-college-bound students generally obtain less satisfaction and status in the school context and are less motivated to conform to adult restrictions on teenage behavior. Consequently, the non-college-bound student is more predisposed to begin to establish his or her adult identity by adopting adult prerogatives such as smoking. Eckert argues that the non-college-bound students have adopted smoking as a positive symbol of their emerging adult status and of solidarity with their particular social group.

Eckert's hypothesis suggests that low educational aspirations may be linked to smoking by the following characteristics. less satisfaction and

status in the school context, less conformity to adult standards for teenagers' behavior, greater desire to adopt behaviors considered characteristic of adults, and greater social approval of smoking. This hypothesis receives some support from previous prospective studies which have shown that smoking initiation and/or increased smoking is predicted by the following characteristics: less academic success, more rebelliousness and rejection of adult authority, more behavior characteristic of adults (e.g., employment and socializing with the opposite sex), and greater friends' approval of smoking (Chassin, Presson, Sherman, Corty & Olshavsky, 1984; Chassin, Presson, Sherman, Montellow & McGrew, 1986; Collins, Sussman, Rauch, Dent, Johnson, Hansen & Flay, 1987; Mittelmark et al., 1987; Murray, Swan, Johnson & Bewley 1983; Stewart & Livson, 1966; Young & Rogers, 1986). Previous studies have not, however, tested the extent to which these factors may contribute to the inverse association between smoking and parents' education or teenagers' educational aspirations.

Other factors may also contribute to the inverse association between smoking and the eduation variables. Teenagers with less educated parents or lower educational aspirations may have psychological characteristics that may increase the risk of becoming smokers, for example, lower self-esteem or greater fatalism. In addition, teenagers with less educated parents or lower educational aspirations may be less informed about the health risks of smoking or more willing to take health risks.

The present study has two major purposes: (1) to provide additional descriptive data concerning the relationships of smoking to parents' education and students' educational aspirations and (2) to provide preliminary evidence concerning the hypothesized causes of the inverse

relationships between smoking and the education variables. We have identified characteristics that are related to smoking and to parents' education or students' educational aspirations, and we have tested the extent to which these characteristics may account for the observed inverse associations between smoking and the education variables. Our analyses utilize cross-sectional data, so we are only able to establish statistical associations and cannot provide convincing evidence for specific causal relationships. Nevertheless, our findings, when taken together with evidence from previous prospective studies, provide suggestive evidence concerning the reasons why lower parental education and lower educational aspirations are associated with higher rates of smoking.

SAMPLE and METHODS

The data for the present study are from the 1985 Monitoring the Future survey of high school seniors in the coterminous United States. Sampling methods and sample characteristics have been described previously (Johnston, Bachman & O'Malley, 1986). Briefly, the sample was stratified by geographic area and by high school within geographic area. The response rate for students within sampled schools was about 84% (with most non-participation due to absence from school).

In this study we have analyzed data for the white students only. Preliminary analyses showed that the inverse association between the education variables and smoking was significantly stronger for the whites than for the blacks (data not shown). In fact, for the black females in this sample, there was even a tendency toward a positive association between parents' education and smoking. Because the relationships between smoking and the education variables differed by race, it would have been

necessary to analyze data for the white and black students separately. However, because of the limited sample size for blacks, and because other problems limit the reliability of black-white comparisons (Johnston et al., 1986), we have not analyzed data for the black students. We also have not analyzed data for students of "other races" due to limited sample size and the heterogeneity of this category.

Previous research indicates that there is a stronger inverse association between attending college and smoking for males than for females (Johnston et al., 1987). In addition, our own research indicates that some of the relationships analyzed in the present study differ by sex (Waldron, Lye & Brandon, 1989). Consequently, we have analyzed data for males and females separately, with the exception of three analyses which included both sexes and tested whether the relationships between smoking and the education variables differed by sex. There were 5781 white males and 6233 white females in the sample.

Five different questionnaire forms were administered, each to about one-fifth of the students. All five questionnaire forms contained certain items, including the smoking and education variables, as well as a number of life style variables. Other items, such as attitudes toward smoking, were included in only one questionnaire form. Analyses that included these items were necessarily restricted to the subsample of students who completed a specific questionnaire form (referred to herein as subsamples 1-5). The wording and response distribution of each item in the survey is given in Johnston et al. (1986). The item numbers given in that publication are included in our descriptions of the variables used in our analyses.

Smoking experience was assessed primarily by a "smoking scale" which was derived from responses to two questions concerning previous and current smoking experience (items B01 and B02). Higher values on the smoking scale indicate greater experience with smoking. Specifically, the smoking scale was set equal to 1 if the student had never smoked a cigarette, 2 if the student had smoked once or twice only, 3 if the student had smoked more than twice, but had not smoked any cigarettes in the past 30 days, 4 if the student had smoked in the past 30 days, but less than one cigarette a day, 5 if the student had smoked 1-5 cigarettes a day in the past 30 days, and 6 if the student had smoked about half a pack a day or more in the past 30 days. A corresponding series of dichotomous variables assessed progression in the various stages of smoking adoption. These dichotomous variables were: (1) ever vs. never smoked a cigarette; (2) among students who had ever smoked a cigarette, smoked more than twice vs. smoked once or twice only; (3) among students who had smoked more than twice, smoked in the past 30 days vs. not a current smoker; (4) among current smokers, daily vs. less than daily smokers; (5) among daily smokers, smoked at least half a pack a day vs. less than half a pack a day.

The advantage of the smoking scale was that the information concerning smoking experience was summarized in a single variable, in contrast to the five dichotomous variables required to convey the same information. The disadvantage of the smoking scale was that the assignment of quantitative values for each level of smoking experience was arbitrary, and this raises doubts concerning the validity of applying statistical techniques such as OLS (ordinary least squares) regression in analyses of the smoking scale. However, preliminary analyses indicated that the relationships observed for

the smoking scale in OLS regressions were similar to the relationships observed for the dichotomous smoking variables in logistic regressions. Because use of the smoking scale allowed a much more concise description of relationships than use of the five dichotomous variables, most of the analyses reported in this paper used the smoking scale.

Smoking cessation was assessed by a dichotomous variable, whether or not a person was a former smoker, for those who had ever smoked regularly (derived from item B001). Two additional dichotomous variables assessed attempts to quit smoking (whether or not a person had attempted to quit, for those who had ever smoked regularly) and success in quit attempts (whether or not a person was a former smoker, for those who had attempted to quit; both variables derived from items B001 and B004 for subsample 1). Expectations concerning future smoking were assessed by an item with four response categories, estimated likelihood of being a smoker five years in the future (item B006, subsample 1).

Parents' education was measured by the sum of scores for father's and mother's education (items C08 and C09). The parents' education variable ranged from 2, indicating that both parents completed grade school or less, to 12, indicating that both parents attended graduate or professional school after college. Although previous studies have reported differences in the relationships between teenage smoking and parents' education, depending on the specific genders of the teenager and parent (Oechsli & Seltzer, 1984; Williams, 1973), we found similar relationships between teenage smoking and parents' education for boys or girls compared to either fathers or mothers. Therefore we have analyzed relationships for parents' education, rather than father's and mother's education separately. High

school track was assessed as a dichotomous variable: academic or college prep vs. all others (item C15). College plans were assessed on the basis of each student's estimate of how likely he or she was to "graduate from college (four-year program)": 1 for definitely won't, 2 for probably won't, 3 for probably will, and 4 for definitely will (item C21D). Most of the relationships we assessed were similar for the high school track and college plans variables, and for convenience we refer to these variables together as educational aspirations.

Both parents' education and students' college plans were treated as continuous variables. Preliminary analyses indicated that the relationships between each of these variables and the smoking scale did not diverge significantly from a linear relationship. To prevent excessive complexity in the analyses, other relationships were also assumed to be linear.

To assess educational mobility we combined information concerning each student's college plans and parents' education. The educational mobility scale ranged from 2 for maximum upward mobility (both parents grade school educated and student definitely plans to graduate from college) to 48 for maximum downward mobility (both parents professional or graduate training and student definitely plans not to graduate from college).

We used the following procedure to identify variables that could provide insight into the processes underlying the inverse association between smoking and parents' education or students' educational aspirations. First, we selected from the many items available those that, on the basis of theoretical considerations and previous research, we expected to be related to both smoking and the education variables. Then,

these items were screened on the basis of Pearson's correlations for each of these variables with the smoking scale, parents' education, and college plans, and t-tests of the difference in each variable by high school track. An item was included in our analyses only if it had a significant relationship with smoking and with at least one of the education variables for at least one of the sexes. This screening process was necessary to reduce the number of variables considered to manageable proportions and to prevent excessive loss of cases in the multiple regressions due to missing values for variables which would not yield relationships of interest. Factor analyses were used as a basis for creating scales which had an average Cronbach α for males and females of .60 or greater. The scales and items included in the analyses are listed in Table 2 and described more fully in a Technical Appendix which is available from the first author upon request. The name of each scale or item is worded to indicate a characteristic that was associated with more smoking.

Because the data were obtained from a stratified sample of students clustered within selected high schools, the effective sample size for statistical tests is less than the actual sample size. Johnston et al. (1986) give general guidelines for correcting significance tests for this design effect. We have applied these guidelines to correlation coefficients and OLS regression coefficients derived from data for the various individual subsamples that completed a specific questionnaire form. We estimate that, when the probability uncorrected for the design effect is p=.01, the true probability, corrected for the design effect, is between .01 and approximately .07. Because the corrections for the design effect are at best approximate and in some cases impractical to compute, the

probabilities reported in this paper have not been corrected for the design effect. In order to make allowance for the decrease in significance which results when corrections are made for the design effect, we have used a significance level of $p \leq .01$ for the uncorrected probabilities, rather than the less stringent $p \leq .05$.

As discussed in the INTRODUCTION, a major purpose of this study is to evaluate the importance of a number of postulated intervening variables that may link lower parents' education or students' educational aspirations to greater smoking. To accomplish this, we have tested whether the introduction of controls for postulated intervening variables reduces the strength of the statistical association between the smoking scale and an education variable. Specifically, we have compared the unstandardized regression coefficients for the education variable in two equations:

(1) the simple OLS regression,

$$\text{smoking scale} = a_s + b_s \cdot \text{education variable} + \text{error}_s,$$

and (2) the multiple OLS regression,

$$\text{smoking scale} = a_m + b_m \cdot \text{education variable} + \sum b_i \cdot \text{control variable}_i + \text{error}_m.$$

The regression coefficients for the education variables in the simple regressions were negative, reflecting the inverse association between the education variables and smoking. In most cases, the magnitude of the regression coefficient for the education variable was smaller in the multiple regression which included the control variables. Unfortunately, it was not feasible to carry out a rigorous test of whether a given reduction in the magnitude of the regression coefficient was statistically significant. However, we have developed a criterion for what we call a

"substantially reduced" regression coefficient. Specifically, the regression coefficient is considered to be substantially reduced if the magnitude of the regression coefficient in the multiple regression is lower than the magnitude of the regression coefficient in the simple regression by at least $1.645 \cdot \sqrt{var_{b_s} + var_{b_m}}$ where var_{b_s} and var_{b_m} are the variances of the regression coefficients of the education variable in the simple and multiple regressions, respectively. For a single test of the difference between two normally and independently distributed variables, this criterion would indicate a statistically significant difference (1-tailed $p \leq .05$).[1] However, our criterion cannot be considered a test of statistical significance because it does not take into account either the covariance of the two regression coefficients (which would reduce the difference required to achieve statistical significance) or the effects of the stratified sample and the multiple tests performed (which would increase the difference required to achieve statistical significance). Nevertheless, the criterion is relatively stringent and is a more satisfactory guideline to effects of interest than the usual "eyeball" approach.

RESULTS

Relationships of Smoking Experience to Parents' Education and Educational Aspirations

Figure 1 shows the relationship of smoking experience to parents' education. Figures 2 and 3 show the relationships of smoking experience to educational aspirations, that is, college preparatory high school track vs. not and plans to graduate from a 4-year college. There was a significant inverse association between the smoking scale and each of the education variables both for males and for females (OLS regressions of the smoking

scale vs. each of the education variables; all p's≤.0001; data for the total sample).

To test whether the relationships between smoking and the education variables differed by sex, we carried out three OLS regressions which included both males and females. Each of these regressions assessed the relationship of the smoking scale to one of the education variables, sex, and the interaction between the education variable and sex. In each case, the smoking scale was significantly related to the education variable (all p's≤.001), but not significantly related to the interaction between the education variable and sex. This indicates that the relationships of smoking to the education variables were similar for males and females. Additional evidence presented in Waldron et al. (1989) supports the conclusion that there was no significant sex difference in the relationships between smoking and parents' education or educational aspirations.

Additional analyses evaluated the relationships between the education variables and the dichotomous variables that assessed progression in each stage of the smoking adoption process. These analyses showed that students with more educated parents or higher educational aspirations were less likely to have progressed at each step in the process of adopting regular cigarette smoking (Table 1). In addition, students with more educated parents or higher educational aspirations were more likely to have quit smoking (Table 1). Limited data suggest that students with higher educational aspirations were more successful in their quit attempts.[2]

In analyses that related the smoking scale to all three educational variables simultaneously, the regression coefficients for parents'

education were not significant, but the regression coefficients for high school track and college plans were highly significant (OLS regressions; all p's$\leq$.0001; total sample). Thus, smoking was not related to parents' education when controls were introduced for educational aspirations, but smoking was independently related to both high school track and college plans.

To evaluate the relationship between intergenerational social mobility and smoking, we analyzed the relationships of the smoking scale to each student's college plans, parents' education, and the upward or downward educational mobility of the student relative to his or her parents. In these analyses, the smoking scale was significantly related to college plans, but not to parents' education or educational mobility (OLS regressions; p$\leq$.0001 for the college plans variable for males and females; total sample).[3] Thus smoking was related to college plans, but not to class of origin or social mobility.

Additional data suggest that the inverse association between the education variables and smoking will persist or even strengthen as these high school seniors get older. Parent's education and students' educational aspirations were inversely associated with respondents' expectations that they would be a smoker in the future (OLS regressions, all p's$\leq$.0001, except not significant for parents' education for males; subsample 1). In analyses with controls for previous and current smoking experience, expectations concerning future smoking were not significantly related to parents' education or high school track, but expectations concerning future smoking were inversely associated with college plans (p$\leq$.01 for males and females). Additional analyses indicate that, among

nonsmokers, those who planned to attend college thought it less likely that they would adopt smoking (males only, p=.0001) and, among smokers, those who planned to attend college thought it more likely that they would quit smoking (males and females, p's=.003).

Variables that may Contribute to the Inverse Association between Smoking and the Education Variables

This section presents preliminary evidence concerning the importance of several postulated intervening variables that may contribute to the inverse association between smoking and parents' education or students' educational aspirations. As discussed in SAMPLE and METHODS, a variable was included in these analyses only if it was significantly related to smoking and at least one of the education variables. It is striking that, for all but one of these variables, the characteristic that was associated with smoking more was inversely related to parents' education and/or student's educational aspirations (Table 2). Students with less educated parents or lower educational aspirations reported more favorable attitudes toward smoking, more acceptance of smoking by their friends, more tendency to adopt behaviors that are characteristic of adults, less favorable attitudes toward school and less success in school, more fighting, and more disagreements with parents. Each of these characteristics was associated with smoking more, and thus each of these characteristics could be a variable that links lower parents' education and lower students' educational aspirations to greater smoking.

As disussed in the SAMPLE and METHODS section, we used regression analyses to assess the strength of the statistical association between smoking and a given education variable with and without controls for each

group of possible intervening variables. If the introduction of controls for a particular group of possible intervening variables resulted in substantial reductions in the regression coefficients of the education variables, then we assessed the effects of introducing controls for individual variables within that group.

Our analyses suggest that attitudes toward smoking may be an important link between lower parents' education or students' educational aspirations and greater smoking. When controls were introduced for attitudes toward smoking, the regression coefficients of the education variables were substantially reduced (compare the first two lines of Table 3). The coefficients for the educational aspiration variables were also substantially reduced when controls were introduced for individual variables that assessed rejection of smokers and smoking, whether or not the respondent minded being around people who are smoking, or respondent's positive or negative image of smokers (Table 3). Analyses of data for another subsample indicate that, when controls were introduced for the attitude, don't disapprove of smoking a pack or more a day, this also resulted in substantial reductions of the regression coefficients for the educational aspiration variables (data not shown).

Social acceptance of smoking may be another important link between lower parents' education or lower students' educational aspirations and greater smoking. When controls were introduced for friends' attitudes toward smoking, the strength of the statistical association between smoking and the education variables was substantially reduced (Table 4). Analyses of data for another subsample indicate that, when controls were introduced for an item indicating how many of the respondent's friends smoked

cigarettes, this also resulted in substantial reductions in the strength of the statistical association between smoking and the education variables (data not shown).

An additional link between lower parents' education or students' educational aspirations and smoking may be life style variables, including variables related to adopting adult status and success in school. When all twelve life style variables were included as controls in regressions of the smoking scale on each of the education variables, the regression coefficients of the education variables were substantially reduced (Table 5). When either the life style variables related to adopting adult status or the school-related variables were included as controls, the regression coefficients for the education variables were also substantially reduced. Among the life style variables related to adopting adult status, it appears that the most important variables were being employed more, more evenings out, and more dates. Among the school-related variables, low high school grades was by far the most important. Additional data for one subsample showed that, when controls were introduced for school-related attitudes such as not liking school or considering school work uninteresting or unimportant, this also resulted in substantial reductions in the strength of the statistical association between smoking and the educational aspiration variables (data not shown).

Anger and antisocial behavior may be a link between lower parents' education or students' educational aspirations and greater smoking, but the evidence is weak in this case. When variables that assess anger and antisocial behavior were included as controls in regressions of the smoking scale on each education variable, the regression coefficients for the

education variables appeared to be reduced, but none of these effects met our criterion for a substantially reduced regression coefficient (Table 5).* Similarly, when controls were introduced for the variables that measured disagreements with parents, or self-esteem and fatalism, or health habits, the regression coefficients of the education variables were somewhat reduced, but none of these effects was large enough to meet our criterion for a substantial reduction in regression coefficients (data not shown).

DISCUSSION

This study confirms and extends previous findings that teenage smoking is inversely related to parents' education and to teenagers' educational aspirations For the white high school seniors in this study, those with less educated parents or lower educational aspirations were more likely to have experimented with smoking and more likely to have progressed at each subsequent step in the process of adopting smoking. In addition, students with less educated parents or lower educational aspirations were less likely to have quit smoking. These relationships were similar for males and females.

Educational aspirations were significantly related to smoking even after controlling for parents' education. In contrast, parents' education was not significantly related to smoking after controlling for educational aspirations. Previous studies have reported similar findings (Bachman et al., 1981; Horn et al., 1959). These findings suggest that the influence of parents' education on smoking acts through personal characteristics and experiences that are associated with higher educational aspirations.

Specific characteristics and experiences that may be important are discussed in the following paragraphs.

As discussed in the INTRODUCTION, Eckert (1983) has proposed that non-college-bound high school students from lower socioeconomic status homes are more likely to smoke for a number of interrelated reasons. Specifically, Eckert argues that the non-college-bound students achieve less satisfaction and status in school and, as an alternative way of establishing their emerging adult identity, these students are motivated to adopt immediate adult prerogatives such as smoking. In addition, these students adopt smoking as a positive symbol of membership in their social group. Eckert also argues that the non-college-bound students are less accepting of adult authority, including adult prohibitions against teenage smoking.

Each of Eckert's arguments is supported by findings from the present study. Our cross-sectional data do not establish the nature of the underlying causal relationships, but the observed associations are compatible with her hypotheses, and evidence from previous prospective studies supports some of the postulated causal relationships.

Our findings show that, as hypothesized, students with less educated parents or lower educational aspirations had less academic success and less favorable attitudes toward school, and these characteristics in turn were associated with smoking more. Findings from previous prospective studies indicate that students with low grades or negative attitudes toward school are more likely to begin smoking or to increase their level of smoking (Chassin et al., 1984; Murray et al., 1983; Stewart & Livson, 1966; Young & Rogers, 1986). Our multivariate analyses demonstrate that the strength of

a statistical association between the smoking scale and the education variables was substantially reduced when controls for academic success or attitudes toward school were introduced. Taken together, these results suggest that lack of academic success and unfavorable attitudes toward school may contribute to the inverse association between parents' education or students' educational aspirations and smoking.

As hypothesized, students with less educated parents or lower educational aspirations were more likely to engage in behaviors characteristic of adults, including employment and romantic involvement with the opposite sex. These variables in turn were associated with smoking more. Previous prospective studies have shown that students who were employed or socialized more with the opposite sex were more likely to adopt smoking and possibly also less likely to quit smoking (Murray et al., 1983; Reynolds & Nichols, 1976). Our analyses have shown that, when controls were introduced for the variables that assessed the adoption of adult behaviors, the strength of the statistical association between the smoking scale and the education variables was substantially reduced. These results suggest that students with less educated parents or lower educational aspirations may be more predisposed to adopt behaviors characteristic of adults, and this may be one reason why these students are more likely to smoke.

Our data also support the hypothesis that students with less educated parents or lower educational aspirations have more favorable attitudes toward smoking and perceive their friends as having more favorable attitudes toward smoking. As expected, these attitudes were associated with smoking more. Previous prospective studies have shown that more

favorable attitudes toward smoking and friends' approval of smoking predict greater likelihood of smoking adoption and less likelihood of quitting (Chassin et al., 1984, 1986; Croft, Hunter, Webber, Watson & Berenson, 1985; Mittelmark et al., 1987; Murray et al., 1983). Our analyses show that, when controls for attitudes toward smoking or social acceptance of smoking were introduced, the strength of the statistical association between the smoking scale and the education variables was substantially reduced. These findings suggest that favorable attitudes toward smoking may be an important link between less educated parents or lower educational aspirations and smoking.

Finally, rejection of adult authority may be more common among students with less educated parents or lower educational aspirations, since these students reported more disagreements with parents and tended to report somewhat more antisocial behavior. These characteristics in turn were associated with smoking more. Previous prospective studies have shown that antisocial behavior, rebelliousness, and rejection of adult authority predict increased likelihood of smoking adoption and decreased likelihood of quitting (Chassin et al., 1984; Collins et al., 1987; Mittelmark et al., 1987; Reynolds & Nichols, 1976; Stewart & Livson, 1966). When controls for antisocial behavior and anger were introduced, the strength of the statistical association between the smoking scale and the education variables was reduced, but these effects did not meet our criterion for a substantial reduction in a regression coefficient. Thus, our findings provide weak support for the hypothesis that rejection of adult authority may contribute to the inverse association between parents' education or student's educational aspirations and smoking.

Additional hypotheses presented in the INTRODUCTION propose that teenagers with less educated parents or lower educational aspirations smoke more because they have less self-esteem and greater fatalism, less knowledge of the health risks of smoking, and/or greater willingness to take health risks. Our findings provide only very weak support for these hypotheses. However, it should be noted that our measures of knowledge of health risks and willingness to take health risks were limited, and it is possible that more substantial effects would be observed with better measures.

Our findings have implications for understanding socioeconomic status differentials in smoking among adults, as well as among teenagers. In the contemporary United States, smoking is less common among college-educated adults than among less educated adults (Pierce, Fiore, Novotny, Hatziandreu & Davis, 1989; Remington, Forman, Gentry, Marks, Hogelin & Trowbridge, 1985). Most adults who smoke adopted smoking during their teenage years. This suggests that one major reason why college-educated adults are less likely to smoke is that teenagers with higher educational aspirations have been less likely to adopt smoking. Thus, the types of causal relationships discussed in this paper have probably made a substantial contribution to the inverse relationship between education and smoking observed among adults.

The patterns of teenage smoking described in this study show important similarities to previously observed patterns of teenage use of alcohol and illicit drugs. For high school students, plans to graduate from college are inversely related to heavy alcohol consumption and use of marijuana or other illicit drugs (Bachman et al., 1981; Johnston et al., 1986, 1987).

Longitudinal evidence indicates that characteristics similar to those studied here, including lack of expectations for academic success, rejection of conventional values, and social acceptance of alcohol and drug use, contribute to greater alcohol consumption and use of illicit drugs by teenagers (Jessor & Jessor, 1977; Murray & Perry, 1985; Wingard, Huba & Bentler, 1980). These observations suggest that some of the same processes discussed in this paper that influence teenage smoking may also influence teenagers' use of alcohol and illicit drugs.

In conclusion, high school seniors with less educated parents or lower educational aspirations are more likely to adopt smoking and less likely to quit smoking. These students also have more favorable attitudes toward smoking. The non-college-bound students' more favorable attitudes toward smoking may be due to the usefulness of smoking as a positive symbol of group identity and incipient adult status for these students. In contrast, the college-bound high school students probably have more alternative sources of recognition and status within the school context. In addition, the college-bound students may be more dependent on adult support to actualize their future plans, and thus the college-bound high school students may be more willing to conform to adult authority, including proscriptions against teenage smoking. As Eckert (1983) has noted previously, if smoking serves a positive psychosocial function for the non-college-bound student, it will be important to take this into account in order to design effective smoking prevention programs for these students.

FOOTNOTES

[1] A 1-tailed test is appropriate for two reasons. First, we were interested in identifying variables which, when added as control variables, would reduce the magnitude of the regression coefficient of the education variable. Second, for all of the variables we studied, addition of the variable(s) to any of the regressions resulted in either a reduction or very little change in the magnitude of the regression coefficient of the education variable.

The criteria for substantially reduced regression coefficients given in Tables 3-6 were obtained by adding the criterion difference (defined in the METHODS section) to the negative regression coefficient from the corresponding simple regression. The criterion for a substantially reduced regression coefficient varied only slightly for the different multiple regressions listed in a given column in a table, since the variance of the regression coefficient of the education variable was quite similar for each of these related regression equations. Therefore, we report only one criterion for a substantially reduced regression coefficient in each column, based on the first multiple regression listed.

The regression coefficient for a given education variable varies somewhat for different samples of students, so all regressions that are compared with each other have been estimated for the same sample of students. To accomplish this, all regressions reported in a given column in Tables 3-6 were estimated for the students who had no missing data for any of the variables under consideration.

[2] Data concerning quit attempts and successes were only available for subsample 1 and, unfortunately, in this subsample the associations between

smoking cessation and the education variables were not significant, except for the association between smoking cessation and college plans for males (logistic regression, p=.005). For the males, college plans were not significantly related to having tried to quit, but college plans were significantly related to success in quit attempts (p=.005). Similar patterns of results were observed for college plans for females and high school track for males, although these associations did not meet our criterion for statistical significance.

[#] The results of these regression analyses were confirmed by inspection of tabulations showing the relationship of smoking to college plans and parents' education jointly.

[^] It should be noted that the difference in the regression coefficients required to meet our criterion for a substantial reduction was about twice as great for analyses that were restricted to one subsample as for analyses for the total sample. It appears that the magnitude of the effects observed for the anger and antisocial behavior variables might well be sufficient to meet our criterion for a substantial reduction, if effects of a similar magnitude were observed for a sample as large as the total sample.

*The data utilized in this paper were collected by Lloyd D. Johnston, Jerald G. Bachman and Patrick M. O'Malley of the Survey Research Center, Institute for Social Research, University of Michigan, and the data were made available by the Inter-university Consortium for Political and Social Research. The research reported in this paper has been supported by funds from the John D. and Catherine T. MacArthur Foundation Network on the Determinants and Consequences of Health-damaging and Health-promoting

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FIGURE LEGENDS

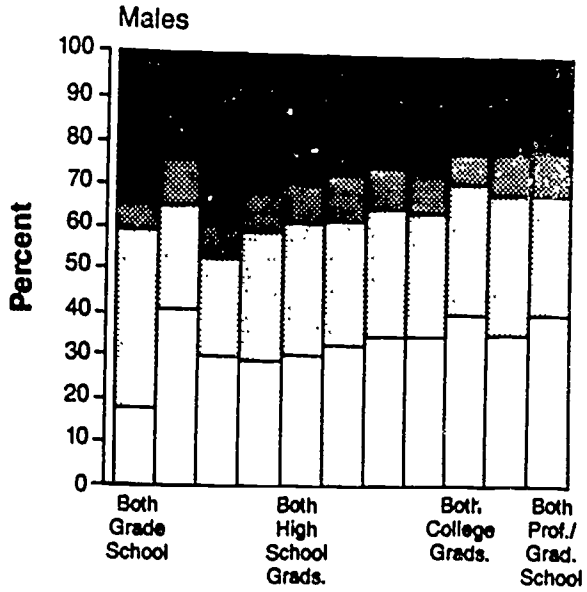
Figure 1. Relationship of Smoking Experience to Parents' Education.

Figure 2. Relationship of Smoking Experience to High School Track. The key for the symbols for smoking experience is given in Figure 1.

Figure 3. Relationship of Smoking Experience to College Plans. The key for the symbols for smoking experience is given in Figure 1.

Smoking Experience

- —currently smoke half a pack or more a day
- —currently smoke 1-5 cigarettes a day
- —currently smoke less than once a day
- —smoked more than once or twice, but currently do not smoke
- —smoked once or twice
- —never smoked



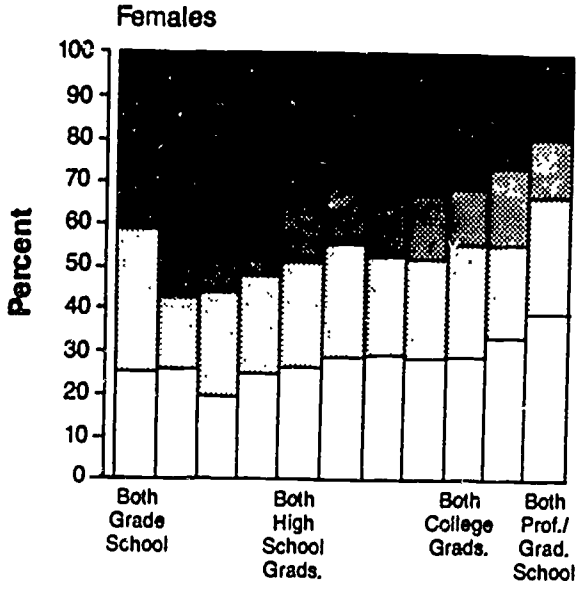


Figure 1

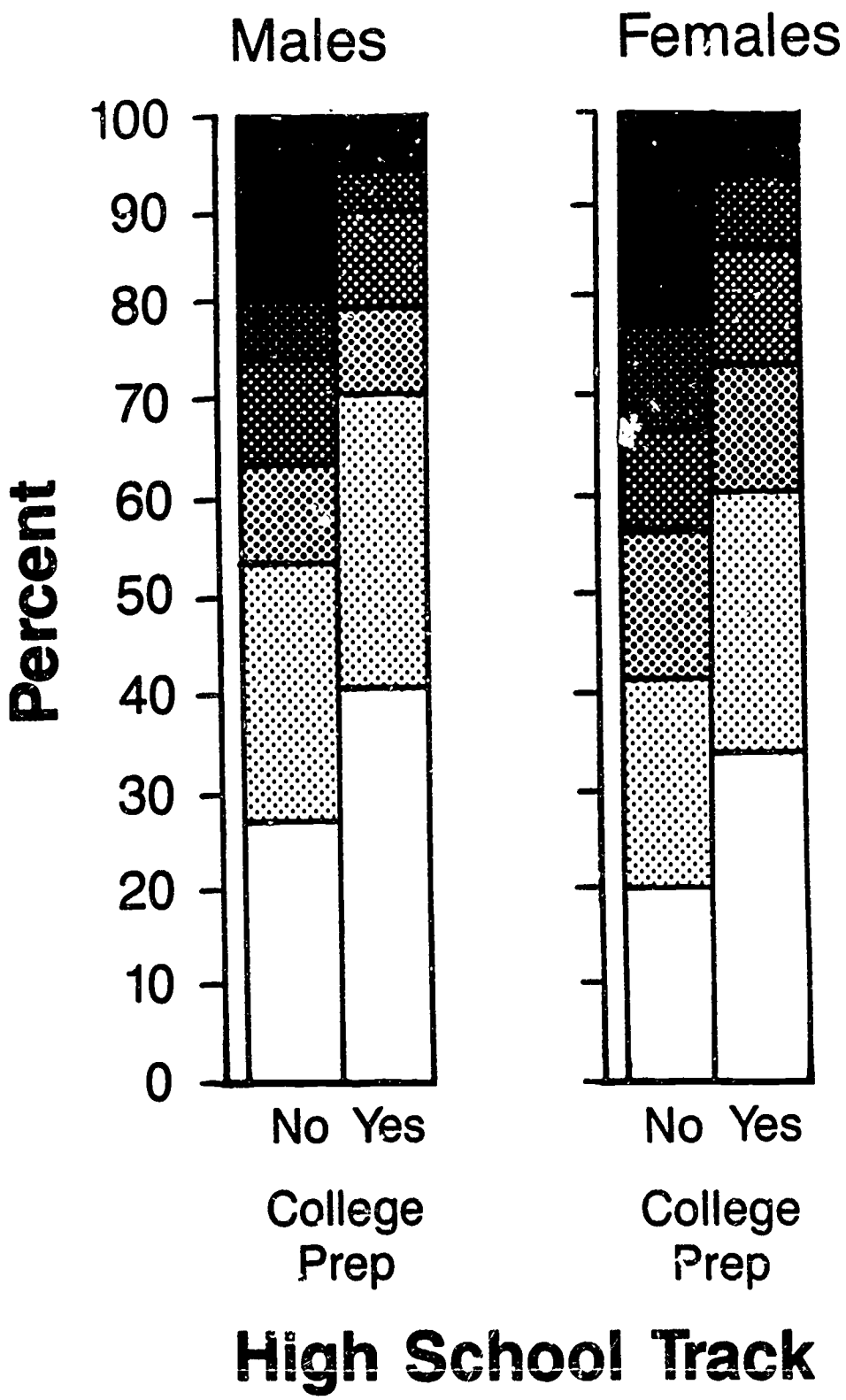
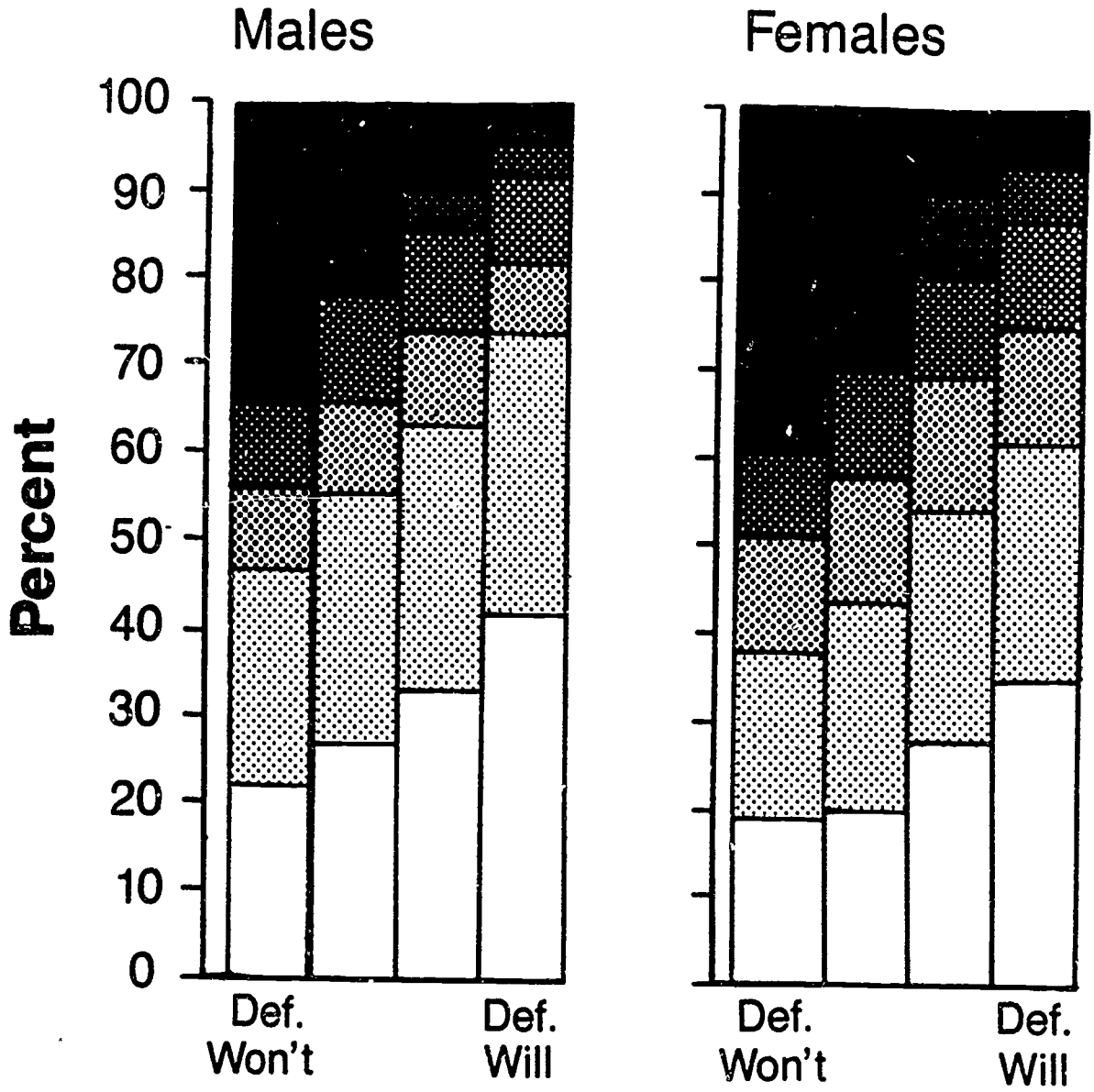

Males
Females
Percent
100
90
80
70
60
50
40
30
20
10
0
No Yes
College Prep
No Yes
College Prep
High School Track

Figure 2



Plans to Graduate from Four-year College

Figure 3

Table 1 - Relationships of Smoking Adoption and Cessation to the Education Variables

Smoking Adoption or Cessation Variable	Regression Coefficients (and p's) for the Education Variable in Various Regressions*						N	
	Parents' Education		College Prep Track		College Plans			
	Males	Females	Males	Females	Males	Females	Males	Females
Ever smoked a cigarette vs. never smoked (for all respondents)	-.066 (.0001)	.070 (.0001)	-.61 (.0001)	-.71 (.0001)	-.31 (.0001)	-.30 (.0001)	5061	5659
Smoked more than twice vs. once or twice only (for those who had ever smoked)	-.047 (.003)	-.036 (NS)	-.61 (.0001)	-.61 (.0001)	-.32 (.0001)	-.28 (.0001)	3364	4058
Smoked in past 30 days vs. didn't (for those who had smoked more than twice)	-.053 (NS)	-.061 (.002)	-.46 (.0001)	-.37 (.0001)	-.26 (.0001)	-.25 (.0001)	1872	2651
Smoked daily vs. less often (for those who smoked in past 30 days)	-.160 (.0001)	-.128 (.0001)	-.94 (.0001)	-.95 (.0001)	-.47 (.0001)	-.40 (.0001)	1388	1863
Smoked at least half a pack a day vs. less (for those who smoked daily)	-.080 (NS)	-.123 (.0001)	-.44 (.01)	-.72 (.0001)	-.30 (.0001)	-.28 (.0001)	863	1229
Former smoker vs. current smoker (for those who had ever smoked regularly)	+.109 (.001)	+.040 (NS)	+.51 (.0004)	+.52 (.0001)	+.36 (.0001)	+.25 (.0001)	1099	1637

*Separate logistic regression analyses were used to assess the relationship of each dichotomous smoking adoption or cessation variable to each education variable.

NS indicates $p > .01$.

Data for total sample.

Table 2. Bivariate Relationships of Attitudes, Life Style, and Other Variables to Smoking and Education Variables*

Variables*	Correlation with: Smoking Scale ♂s	Smoking Scale ♀s	Parents' Education ♂s	Parents' Education ♀s	College Plans ♂s	College Plans ♀s	T-test by College Prep Track ♂s	T-test by College Prep Track ♀s
Attitudes toward Smoking								
Don't reject smokers/smoking (5:3)	+.49	+.64	-.14	-.08	-.25	-.25	-6.8	-5.7
Positive image of smokers (5:6)	+.43	+.54	-.08	--	-.13	-.19	-4.8	-4.2
Smoker not trying to look mature and sophisticated (5:2)	+.40	+.49	-.11	-.11	-.22	-.20	-6.1	-5.1
Smoker does not look insecure (5:2'	+.39	+.46	-.10	-.10	-.21	-.17	-5.6	-5.4
Smoker does not look like conform (5:2)	--	+.15	-.18	-.15	-.21	-.19	-4.2	-5.8
Don't mind being around people who are smoking (5:1)	+.48	+.62	-.14	-.12	-.18	-.22	-5.4	-6.8
Smoking is not risky (5:1)	+.28	+.32	-.13	-.08	-.19	-.21	-6.3	-7.1
Harmful effects of smoking are exaggerated (5:1)	+.24	+.37	-.11	-.12	-.19	-.23	-6.5	-6.9
Smokers enjoy life more (5:1)	+.31	+.39	--	-.10	--	-.17	--	-4.2
Don't disapprove of smoking a pack or more a day (3:1)	+.52	+.53	-.10	-.08	-.19	-.22	-6.2	-5.0
Friends' Attitudes toward Smoking								
Close friends don't disapprove of smoking a pack or more a day (4:1)	+.43	+.48	-.18	-.21	-.28	-.20	-7.2	-8.2
Friends' Smoking								
Many of respondent's friends smoke cigarettes (2:1)	+.45	+.58	-.13	-.14	-.23	-.25	-6.1	-7.6
Life Style Variables								
Life Style Variables Related to Adopting Adult Status**								
Hours employed and earnings (T:2)	+.17	+.16	-.12	-.08	-.19	-.07	-13.9	-6.9
Frequency of evenings out for fun and recreation (T:1)	+.22	+.23	-.08	--	-.12	-.07	-7.9	-6.1
Frequency of dates (T:1)	+.13	+.18	--	-.06	-.04	-.12	-4.0	-7.9
School-Related Variables								
Frequency of cutting school and skipping class (T:2)	+.24	+.26	--	--	-.10	-.05	-9.1	-7.1
Frequency of missing school due to illness (T:1)	+.12	+.16	-.06	-.07	-.09	-.10	-7.1	-7.8
Low high school grades (T:1)	+.27	+.31	-.23	-.20	-.43	-.38	-35.4	-31.6
Other Life Style Variables								
Not religious (T:2)	+.16	+.24	-.07	-.09	-.18	-.14	-10.1	-10.2
More urban residence (T:1)	--	+.04	+.12	+.16	+.19	+.15	+9.9	+7.3
Mother worked at paid job (T:1)	+.04	+.07	--	--	-.05	-.05	-3.1	-5.9

(continued)

(Table 2, continued)

Variables	Correlations with Smoking Scale ♂s	Smoking Scale ♀s	Parents' Education ♂s	Parents' Education ♀s	College Plans ♂s	College Plans ♀s	T-test by College Prep Track ♂s	T-test by College Prep Track ♀s
School-related Attitudes								
Don't like school (1:2)	+.23	+.25	--	-.12	-.30	-.28	-6.0	-6.2
Schoolwork is not worthwhile (1:3)	+.21	+.21	-.11	--	-.29	-.17	-6.2	-2.9
Doing well in school is not important for getting good job (1:1)	+.15	+.15	--	--	-.19	-.12	-5.0	--
Not much competition for grades (1:1)	+.10	+.23	-.11	-.12	-.19	-.29	-6.8	-9.9
Friends encourage misbehavior in school (1:1)	+.14	+.12	--	--	-.13	-.08	-2.7	--
Fellow students do not dislike making teacher angry (1:1)	--	+.10	-.12	--	-.10	-.09	-3.6	-2.9
Fellow students do not dislike cheating (1:1)	+.16	+.10	-.10	-.12	-.17	-.13	-6.2	--
Anger and Antisocial Behavior								
Frequency and intensity of feeling angry (2:3)	+.17	+.26	-.09	-.07	-.12	-.13	-4.0	-3.8
Frequency and intensity of fighting (2:4)	+.17	+.24	-.17	-.10	-.18	-.11	-5.8	-4.1
Frequency of getting in trouble with police (2:1)	+.23	+.25	-.08	--	-.12	--	-3.6	--
Frequency of vandalizing school property (2:1)	+.12	+.10	-.08	--	--	--	-2.7	--
Frequency of shoplifting (2:1)	+.15	+.23	--	--	--	-.08	--	-3.9
Frequency of stealing something worth more than $50 (2:1)	+.19	+.12	--	--	-.14	--	-2.9	--
Frequency of stealing a car (2:1)	+.09	+.12	--	--	-.12	--	--	--
Frequency of stealing car parts (2:1)	+.09	+.08	--	--	-.09	--	--	--
Disagreements with Parents								
Disagreements re respondent's behavior (4:5)	+.14	+.14	--	-.14	-.18	-.13	-3.7	-3.6
Political disagreements (4:4)	+.15	+.13	-.11	-.13	-.18	-.12	-5.1	-4.2
Drug-related disagreements (4:2)	+.28	+.34	--	--	-.17	--	-4.4	-3.2
Disagree re whether okay to drink (4:1)	+.21	+.26	--	--	-.12	--	-3.9	--
Disagree re what values important (4:1)	+.21	+.15	-.10	--	-.15	-.10	-4.7	-3.6
Disagree re value of education (4:1)	+.22	+.14	-.14	-.11	-.29	-.23	-8.1	-5.6
Disagree re appropriate roles for women (4:1)	+.13	+.12	--	-.15	-.14	-.14	-5.1	-4.5

(continued)

(Table 2, continued)

Variables	Correlations with: Smoking Scale ♂	Smoking Scale ♀	Parents' Education ♂	Parents' Education ♀	College Plans ♂	College Plans ♀	T-test by College Prep Track ♂	T-test by College Prep Track ♀
Self-esteem and Fatalism								
Planning not helpful (5:2)	+.09	+.20	-.15	-.17	-.19	-.17	-6.1	-4.7
Negative self-image and social isolation (5:6)	+.16	+.13	-.19	-.18	--	-.14	-4.8	-4.8
Not positive self-image (5:4)	+.10	+.15	-.17	-.12	--	-.14	-3.9	-4.8
Good luck more important than hard work (5:1)	--	+.08	--	--	-.08	-.08	-2.7	--
Something/somebody stops me from getting ahead (5:1)	+.10	+.12	-.12	-.16	-.22	-.19	-6.9	-6.6
Not much chance of success in life (5:1)	+.09	+.13	-.13	-.20	-.23	-.18	-7.4	-6.2
Not usually some one can talk to (5:1)	--	+.08	--	-.08	--	--	--	--
Health Habits								
Don't have good health habits (2:4)	+.23	+.30	-.18	-.21	-.27	-.21	-7.2	-7.4
Infrequently sleep at least seven hours (2:1)	+.21	+.17	--	--	-.12	--	--	--

*For each correlation coefficient shown, $p \leq .01$. -- indicates $p > .01$, Negative t's indicate an inverse association between the listed variable and being enrolled in a college preparatory high school track.

+The numbers that follow the name of each variable indicate, first, the subsample for which the variable was available (or T for the total sample) and, second, the number of items included in the variable (which ranged from single items to six-item scales).

++Three dichotomous life style variables related to adopting adult status are not listed. These are not living with mother (T:1), not living with father (T:1), and being engaged, married, separated or divorced (T:1). T-tests and χ^2 tests showed that each of these variables was positively related to the smoking scale and inversely related to parents' education, college plans and college prep track (all $p's < .01$).

Table 3. Relationships of Smoking to the Education Variables, With and Without Controls for Attitudes Toward Smoking

Independent Variables included in each Regression*	Regression Coefficients (and p's) for the Education Variable in various Regressions					
	Parents' Education		College Prep Track		College Plans	
	Males	Females	Males	Females	Males	Females
Education variable only	-.084 (.0001)	-.091 (.0002)	-.80 (.0001)	-.79 (.0001)	-.33 (.0001)	-.37 (.0001)
Education variable plus:						
- 9 attitude toward smoking variables+	.000 (NS)	-.020 (NS)	-.27 (.005)	-.19 (NS)	-.09 (NS)	-.04 (NS)
- Don't reject smokers/smoking	-.026 (NS)	-.051 (.01)	-.47 (.0001)	-.42 (.0001)	-.17 (.0002)	-.13 (.001)
- Don't mind being around people who are smoking	-.032 (NS)	-.039 (NS)	-.53 (.0001)	-.36 (.0001)	-.22 (.0001)	-.17 (.0001)
- Positive image of smokers	-.053 (NS)	-.071 (.001)	-.55 (.0001)	-.55 (.0001)	-.24 (.0001)	-.22 (.0001)
- Smoker not trying to look mature and sophisticated	-.051 (NS)	-.051 (NS)	-.56 (.0001)	-.52 (.0001)	-.21 (.0001)	-.23 (.0001)
- Smoker does not look insecure	-.050 (NS)	-.056 (.01)	-.56 (.0001)	-.53 (.0001)	-.22 (.0001)	-.26 (.0001)
Criterion for a substantially reduced regression coefficient	-.029	-.042	-.56	-.57	-.23	-.27
N	830	974	830	974	830	974

* The smoking scale is the dependent variable in all cases.

+ The nine attitudes towards smoking include the five listed plus four that were not significantly related to smoking in the multiple regressions (smoking is not risky, harmful effects of smoking are exaggerated, smokers enjoy life more, smoker does not look like conformer).

Each of the underlined regression coefficients meets the criterion for a "substantially reduced" regression coefficient.

Data for subsample 5.

Table 4. Relationships of Smoking to the Education Variables, With and Without Controls for Friends' Attitudes Toward Smoking

Independent Variables included in each Regression	Regression Coefficients (and p's) for the Education Variable in various Regressions					
	Parents' Education		College Prep Track		College Plans	
	Males	Females	Males	Females	Males	Females
Education variable only	-.084 (.002)	-.060 (NS)	-.81 (.0001)	-.76 (.0001)	-.44 (.0001)	-.30 (.0001)
Education variable plus - Close friends don't disapprove of smoking a pack or more a day	-.022 (NS)	+.016 (NS)	-.48 (.0001)	-.38 (.0001)	-.28 (.0001)	-.16 (.0002)
Criterion for a substantially reduced regression coefficient	-.025	-.006	-.55	-.53	-.33	-.20
N	869	1008	869	1008	869	1008

Data for subsample 4.

Table 5. Relationships of Smoking to the Education Variables, With and Without Controls for Life Style Variables

Independent Variables included in each Regression	Regression Coefficients (and p's) for the Education Variable in various Regressions					
	Parents' Education		College Prep Track		College Plans	
	Males	Females	Males	Females	Males	Females
Education variable only	-.084 (.0001)	-.083 (.0001)	-.73 (.0001)	-.79 (.0001)	-.39 (.0001)	-.37 (.0001)
Education variable plus:						
- 12 life style variables*	-.016 (NS)	-.021 (NS)	-.27 (.0001)	-.30 (.0001)	-.21 (.0001)	-.19 (.0001)
- 6 life style variables related to adopting adult status	-.050 (.0001)	-.056 (.0001)	-.54 (.0001)	-.62 (.0001)	-.31 (.0001)	-.31 (.0001)
- Hours employed and earnings	-.069 (.0001)	-.074 (.0001)	-.64 (.0001)	-.75 (.0001)	-.35 (.0001)	-.36 (.0001)
- Frequency of evenings out for fun and recreation	-.071 (.0001)	-.079 (.0001)	-.66 (.0001)	-.73 (.0001)	-.35 (.0001)	-.35 (.0001)
- Frequency of dates	-.081 (.0001)	-.075 (.0001)	-.71 (.0001)	-.73 (.0001)	-.38 (.0001)	-.34 (.0001)
- 3 school-related variables	-.040 (.0005)	-.042 (.0001)	-.40 (.0001)	-.44 (.0001)	-.27 (.0001)	-.24 (.0001)
- Low high school grades	-.036 (.002)	-.040 (.0002)	-.43 (.0001)	-.47 (.0001)	-.27 (.0001)	-.24 (.0001)
- Frequency of cutting school and skipping classes	-.081 (.0001)	-.081 (.0001)	-.65 (.0001)	-.71 (.0001)	-.36 (.0001)	-.35 (.0001)
- Not religious	-.075 (.0001)	-.068 (.0001)	-.68 (.0001)	-.70 (.0001)	-.36 (.0001)	-.33 (.0001)
Criterion for a substantially reduced regression coefficient	-.058	-.058	-.61	-.68	-.34	-.32
N	4136	4731	4136	4731	4136	4731

*All twelve life style variables are listed in Table 2. Individual variables are listed in this table only if they were significantly related to smoking in at least one multiple regression and resulted in reductions of at least 10% in at least one coefficient of an education variable.

Data for total sample.

Table 6. Relationships of Smoking to the Education Variables, With and Without Controls for Anger and Antisocial Behavior Variables

Independent Variables included in each Regression	Regression Coefficients (and p's) for the Education Variable in various Regressions					
	Parents' Education		College Prep Track		College Plans	
	Males	Females	Males	Females	Males	Females
Education variable only	-.048 (NS)	-.071 (.002)	-.55 (.0001)	-.81 (.0001)	-.37 (.0001)	-.44 (.0001)
Education variable plus: - 8 anger and antisocial behavior variables*	-.023 (NS)	-.052 (NS)	-.39 (.0004)	-.66 (.0001)	-.30 (.0001)	-.38 (.0001)
Criterion for a substantially reduced regression coefficient	+.009	-.009	-.29	-.57	-.26	-.34
N	902	1071	902	1071	902	1071

* The individual anger and anti-social behavior variables are listed in Table 2.

Data for subsample 2