Social Influences on Adolescents' Smoking Progress: A Longitudinal Analysis.

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Abstract:
The purpose of this study was to examine social factors that predicted adolescent smoking transition from non-smoking or experimental smoking to more advanced stages of smoking behavior during a three-year span. A national cohort sample of adolescents (N=7,960) who participated in the 1989 and 1993 Teenage Attitudes and Practices Survey (TAPS I and TAPS II, respectively) was used for this study. The information obtained from this survey included measures of smoking behavior and a series of factors related to smoking models in the respondents' social environment. Results showed that the smoking behavior of best friends was the only consistent and significant factor in predicting adolescent smoking progress to more advanced stages of acquisition. Overall, the ability of social factors to predict adolescent smoking progress was weak. The findings of this study did not support the concept of the social learning theory in adolescent smoking behavior.

Article:
Despite the increasing efforts of smoking prevention interventions targeting adolescents, the prevalence of cigarette smoking among this population remains high.(1) Literature has indicated that any smoking by an adolescent, including experimental smoking, dramatically increases the risk of that adolescent becoming a regular adult smoker.(2)

In relationship to becoming a regular smoker, cigarette-smoking behavior follows a complex developmental process. Flay and colleagues(3) have identified a model to explain the smoking acquisition process, which is composed of five distinct behavioral stages. This stage model begins with the preparation stage (never smoked) and involves transitions to the initiation stage (trying the first cigarette), progressing to the experimentation stage (repeatedly trying cigarettes), moving to the habituation stage (becoming a regular smoker), and finally remaining in the maintenance stage (addictive smoking).(3)

Though this smoking acquisition process usually proceeds from one stage to the next, adolescents may remain in the same stage or move back to previous stages once they have initiated smoking. To incorporate the most effective strategies for smoking-prevention/intervention programs, it is important for researchers and smoking prevention practitioners (e.g., school health education teachers) to understand those factors that differentiate between those adolescents who are likely to proceed to regular smoking from those who are likely to maintain non-smoking behaviors. Furthermore, the stage model of smoking indicates that smoking interventions targeting the adolescent at the preparation and experimentation stage are more effective than interventions targeting more advanced stages (i.e., habituation and maintenance) when smoking has become a confirmed addictive behavior.(3)

A number of human behavioral theories have been adopted to delineate the determinants for smoking acquisition. One of the most promising models applied to the explanation of smoking behavior is social learning model.(4, 5) This theory emphasizes the reciprocal interaction between an individual's behavior and the social environment. Smoking behaviors of adults (i.e., parents) and peers (i.e., friends) influence adolescent smoking behavior by providing role models that demonstrate the social consequences and acceptance of cigarette smoking.(3) Conrad, Flay, and Hill summarized the findings of 27 prospective studies on the onset of smoking and a number of studies have examined the social influences on adolescent smoking behavior.(6) However,

limited information is available about the processes and factors involved in the transition from nonsmoking and experimental smoking towards becoming a regular smoker using the social influence model, especially with a national representative sample. The purpose of this study was to examine the social factors that may influence adolescent smoking acquisition over a 3-year period. A U.S. national cohort sample of adolescents who participated in the 1989 and 1993 Teenage Attitudes and Practices Surveys (TAPS I and TAPS II, respectively) was used for this study.(7)

METHODS

Sample

This study utilized a stratified multi-stage probability area sampling to generate a national representative sample of adolescents. A sample of 9,965 U.S. teenagers participated in 1989 TAPS I telephone interview. Of those, 9,135 were selected for re-interviewing in 1993 TAPS II, and 7,960 responded, representing an 87% response rate. The TAPS I and II surveys were conducted by the National Center for Health Statistics.(7) At the time of the TAPS II survey, the age of the sample ranged from 15 to 22 years. For the purpose of examining transition to regular smoking behavior, only subjects who were identified as nonsmokers and experimental smokers at the beginning of the study (TAPS I) were included in this study (N=6,519). The TAPS used computer-assisted telephone interviewing to collect data, and the TAPS II included all questions from the TAPS I. The information obtained from this survey included measures of smoking behavior and a series of factors related to smoking models in the respondents' social environments. Specifically, these questions asked respondents if their father smoked, mother smoked, older brother smoked, and older sister smoked. They were also asked "of their four best male friends, how many smoked," "of their four best female friends, how many smoked." In addition, the respondents were asked if their steady boy or girl friend smoked.(7)

TABLE 1
Odds Ratios (OR) and 95% C.I. of Nonsmoking Male Adolescents Progressing to Experimental or Regular Smoking According to Social Factors

	Experimenter			Regular Smoker		
Variable	OR	95%	C.I.	OR	95%	C.I.
Mother smokes						
Yes vs. No	0.96	0.76,	1.21	1.38	1.00,	1.90
Father smokes						
Yes vs. No	1.33	1.00,	1.67	1.34	0.96,	1.86
Older brother(s) smokes						
Yes vs. No	1.71	1.00,	2.87	2.01	1.00,	3.99
Older sister(s) smokes						
Yes vs. No	1.37	0.67,	2.79	1.82	0.73,	4.56
Of four best male friends, how many smoke?						
1-2 vs. 0	1.50	1.09,	2.07*	2.75	1.85,	4.07*
3-4 vs. 0	1.29	0.89,	1.88	2.04	1.25,	3.31*
Of four best female friends, how many smoke?						
1-2 vs. 0	1.68	1.20,	2.36*	1.33	0.78,	2.27
3-4 vs. 0	0.76	0.44,	1.31	1.59	0.85,	2.97
Steady girl friend who smokes						
Yes vs. No	1.20	0.67,	2.15	1.33	0.60,	2.96

*The odds ratio was significant, $p<.05$.

Data Analysis

The analysis was performed by using SAS statistical program? Odds ratios (OR) were used to measure the associations between adolescent smoking progress and smoking behaviors of parents, siblings, and best friends. Regular smokers were defined as those adolescents who were currently smoking, had smoked in the past 30 days, and had smoked at least 100 cigarettes in their lifetimes. Experimental smokers were defined as those adolescents who had smoked or tried a cigarette but had not smoked 100 cigarettes in their lifetimes and had not smoked in the past 30 days. Nonsmokers were defined as those adolescents who had never smoked a cigarette.

RESULTS

Smoking Progress for Nonsmokers at the TAPS I

Of the 4,444 nonsmokers at the beginning of the study (TAPS I), 28.2% (N= 1,252) became experimental smokers, and 10.9% (N=486) became regular smokers during a 3-year span. Tables 1 and 2 present the association (OR) of adolescent smoking transition and social factors for males and females, respectively. For males, one or two best male friends who smoked and one or two best female friends who smoked were significantly associated with smoking progress from nonsmoking to experimental smoking. The only social factor significantly placing a nonsmoking male adolescent at risk for becoming a regular smoker was having any best male friend who smoked.

For nonsmoking female adolescents, significant risk for progressing to experimental smoking was associated only with having any best male friend who smoked. However, several social factors were significantly associated with nonsmoking female adolescents progressing towards regular smoking. These included having a father who smoked, an older sister who smoked, and any best male friend who smoked.

Smoking Progress for Experimental Smokers at the TAPS I

Of the 2,075 experimental smokers at the beginning of the study (TAPS I), 29.6% (N=614) became regular smokers whereas the rest (70.4%) remained experimental smokers, during a 3-year span. Tables 3 and 4 present the association (OR) of a transition from experimental to regular smoking and social factors for males and females, respectively. For male adolescents, two social factors turned out to be significant ($p<.05$). Male adolescents who had three or four best male friends who smoked or who had any best female friend who smoked were significantly at risk for moving from experimental smoking to regular smoking. The strength of these ORs, however, was not substantial. None of the family-smoking and sibling-smoking variables were significantly related to this smoking progress ($p>.05$).

For female adolescents, three social factors were significantly associated with the transition from experimental smoker to regular smoker ($p<.05$). Having a father who smoked and three or four best male friends who smoked and having had a steady boyfriend who smoked were all significant factors in placing the female adolescent at risk for moving from experimental smoking to regular smoking. No sibling variables were significantly related to smoking progress ($p>.05$).

DISCUSSION

The purpose of this study was to examine social factors that predicted adolescent smoking transition to more advanced stages of smoking behavior during a 3 year span. Specifically, this study had two goals. The first goal was to apply the social influence factors, as represented by the smoking behavior of parents, siblings, and best friends, in predicting the likelihood that nonsmoking adolescents at TAPS I would progress to experimental or regular smoking behavior at the time of TAPS II, a 3-year span. Similarly, the second goal of this study was to apply social influence factors in predicting the likelihood that experimental smokers at TAPS I would become regular smokers at TAPS II.

TABLE 2
Odds Ratios (OR) and 95% C.I. of Nonsmoking Female Adolescents Progressing to Experimental or Regular Smoking According to Social Factors

	Experimenter			Regular Smoker		
Variable	OR	95%	C.I.	OR	95%	C.I.
Mother smokes						
Yes vs. No	1.18	0.94,	1.47	1.37	1.00,	1.88
Father smokes						
Yes vs. No	1.12	0.89,	1.41	2.01	1.49,	2.71*
Older brother(s) smokes						
Yes vs. No	1.38	0.84,	2.28	1.64	0.84,	3.21
Older sister(s) smokes						
Yes vs. No	1.87	0.96,	3.67	2.71	1.21,	6.06*
Of four best male friends, how many smoke?						
1-2 vs. 0	1.76	1.32,	2.35*	2.04	1.36,	3.05*
3-4 vs. 0	1.40	1.02,	1.91*	2.36	1.60,	3.48*
Of four best female friends, how many smoke?						
1-2 vs. 0	1.28	0.96,	1.70	2.36	1.60,	3.48*
3-4 vs. 0	1.45	0.97,	2.18	1.45	0.79,	2.68
Steady boy friend who smokes						
Yes vs. No	1.05	0.68,	1.63	1.46	0.82,	2.60

*The odds ratio was significant, $p<.05$.

Of all the findings, the only social factor that consistently predicted adolescent smoking progress seemed to be the smoking status of best friends. This finding confirmed previous literature that indicated that peer smoking behavior was the most important factor influencing transition to experimental or to regular smoking.(2, 9-11) Regarding the mechanism of peer influence, some have suggested that peer influence is largely the result of social selection as adolescent smokers seek out friends who are smokers.(11-13) Consequently, the impact of peer models cannot be regarded as a sole causal factor for adolescent smoking initiation and progress towards advanced stages of smoking acquisition. Social selection as a mechanism of the peer influence has been supported by researchers.(11) However, the findings from our longitudinal analysis using nonsmokers at the TAPS I suggested that the influence of peer smoking models on adolescent smoking progress appeared to be stronger than the social selection factor. Our analysis method minimized the self-selection of smoking friends by excluding regular smokers at the beginning of the study. Consequently, by including subjects with no prior smoking experience, the mechanism of social selection in explaining adolescents' smoking progress would be questionable.

TABLE 3
Odds Ratios (OR) and 95% C.I. of Experimental Male Smokers Becoming Regular Smokers According to Social Factors

Variable	OR	95% C.I.
Mother smokes		
Yes vs. No	1.36	1.00, 1.81
Father smokes		
Yes vs. No	1.30	0.98, 1.74
Older brother(s) smokes		
Yes vs. No	1.62	0.93, 2.82
Older sister(s) smokes		
Yes vs. No	1.35	0.68, 2.70
Of four best male friends, how many smoke?		
1-2 vs. 0	1.36	0.97, 1.90
3-4 vs. 0	2.05	1.45, 2.91*
Of four best female friends, how many smoke?		
1-2 vs. 0	1.49	1.04, 2.14*
3-4 vs. 0	1.58	1.03, 2.42*
Steady girl friend who smokes		
Yes vs. No	1.58	1.00, 2.52

*The odds ratio was significant, p<.05.

Overall, the strength of the prediction of adolescent smoking progress using social variables was not strong (see Tables 1-4). These findings appeared to be congruent with those of previous researchers(14) who found that the ability of adolescent's social psychological factors, which included social factors, to predict long-term smoking was weak. Perhaps the most surprising finding of this study was that parental smoking had little effect on adolescent smoking progress. This finding was supportive of neither the social influence model nor the current literature. A number of studies have found a significant relationship between the smoking behavior of parents and their children.(15-17) According to the social influence model, directly experiencing a behavior and its associated rewards and punishments influences beliefs about the consequences of the behavior and helps to formulate evaluative definitions of a behavior.(18) Parents may influence their adolescent children's smoking by providing evaluative definitions of smoking and by influencing the adolescents' expected consequences of smoking. Therefore, some researchers believe that parental smoking behavior should receive more emphasis. in smoking prevention program for adolescents.(15) Our findings, however, did not lend support to these beliefs. Though no clear explanations could be provided regarding these different results, a few speculatations may be made. Most of the existing previous research studies in adolescent smoking were cross-sectional in design in which smoking progress could not be determined. Also, cross-sectional studies usually do not provide information on whether parents became smokers before or after their children started to smoke. Consequently, the influence of parental smoking on their children's smoking behavior cannot be predicted. Perhaps a detailed history of parental smoking as well as their children's smoking behavior would be most useful in delineating the true influence of p parental smoking on their children as suggested by researchers.(15) Unfortunately, to our knowledge, no study has attempted this line of research.

TABLE 4
Odds Ratios (OR) of Experimental Female Smokers Becoming Regular Smokers According to Social Factors

Variable	OR	95% C.I.
Mother smokes		
Yes vs. No	1.10	0.81, 1.51
Father smokes		
Yes vs. No	1.50	1.12, 2.02*
Older brother(s) smokes		
Yes vs. No	0.69	0.35, 1.36
Older sister(s) smokes		
Yes vs. No	1.53	0.79, 2.98
Of four best male friends, how many smoke?		
1-2 vs. 0	1.21	0.81, 1.81
3-4 vs. 0	1.51	1.09, 2.11*
Of four best female friends, how many smoke?		
1-2 vs. 0	1.21	0.83, 1.74
3-4 vs. 0	1.18	0.76, 1.83
Steady boy friend who smokes		
Yes vs. No	1.69	1.17, 2.43*

*The odds ratio was significant, p<.05.

In conclusion, this study did not find strong social factors that were significantly associated with adolescents' smoking progress. Though the concept that adolescent behavior is influenced by the behavior of parents and peers has been well documented by social and behavioral theories(16-17), such influence may occur at an age prior to adolescence.(18, 19) At TAPS II, the subjects in the study had become young adults or older adolescents. Social factors may have less influence on smoking behavior at this period of development than in earlier years. The developmental trend of social influences on long-term adolescent smoking behavior warrants future research.

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