

Prospective Social-Psychological Factors of Adolescent Smoking Progression

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Abstract:

Purpose: To evaluate the ability of social-psychological risk factors to predict adolescent smoking behavior.

Methods: Nonsmoking adolescents ($n = 4032$) who participated in the 1989 and 1993 Teenage Attitudes and Practices Surveys (TAPS I) were selected for analyses. Four multivariate logistic models were used to examine (a) adolescents' smoking initiation, (b) adults' smoking initiation, (c) adolescents' progression to regular smoking, and (d) adults' progression to regular smoking. A series of social-psychological variables were measured.

Results: All four models were significant. However, no social-psychological factors were consistently significant in all four models, except white ethnicity. Data showed that social-psychological factors are less able to predict the transition from nonsmoking to experimental smoking than that from nonsmoking to regular smoking.

Conclusions: Future prospective studies should measure both social-psychological and smoking acquisition factors at closer intervals to more accurately examine potential relationships.

KEY WORDS: Adolescent, Smoking, Social-psychological factors, Risk factors

Article:

The literature regarding smoking behavior of adolescents suggests that social-psychological factors can predict adolescent smoking initiation (1–6). These studies enhance understanding of adolescents' smoking behavior from some social-psychological perspectives. Such factors are viewed as occurring on a continuum from proximal to distal risk factors. Proximal risk factors include personal and behavioral factors that directly affect a person's decision to smoke, whereas distal risk factors include sociodemographic and environmental factors that indirectly affect a person's acceptance of tobacco use (1). Most current smoking prevention and intervention programs focus on these social-psychological factors (1).

Despite the theoretical understanding of adolescent smoking behavior, numerous smoking prevention and intervention programs, as well as constant public antismoking campaigns, adolescent smoking rates remain high. For example, the 1991 National Household Surveys on Drug Abuse (NHSDA) reported that 42% of 12–18-year-olds had tried smoking (7). The 1989 Teenage Attitudes and Practices Survey (TAPS) found that 47% of adolescents had tried smoking (8). The 1991 Youth Risk Behavior Survey (YRBS) reported that 70% of school youth stated they had smoked (9), and the 1992 Monitoring the Future Project (MTFP) reported that 62% of high school seniors had attempted smoking (10). The YRBS and MTFP also reported that 28% of high school students were current smokers (i.e., they had smoked within the past 30 days).

Although numerous studies have reported that prevention programs adopting the social influence model have successfully reduced the rates of smoking initiation (11–15), a number of prospective studies have found that the prediction of social-psychological factors on smoking behavior is moderate or weak (16–18). For example, a 6-year follow-up study of school smoking prevention trials indicated that their effectiveness was not maintained. Other prospective studies revealed that the ability of social-psychological factors predicting

adolescent smoking progress was marginal at best (16–18). These findings may suggest that the social-psychological prediction of adolescents' smoking behavior should be repeatedly assessed in prospective studies. Cross-sectional studies are unable to determine with certainty the order of occurrence of social-psychological factors and smoking. If a predictive relationship is found, then a search for a mechanism can begin to explain the causal link. With this in mind, the overall objective of this study was to further evaluate the ability of social-psychological risk factors to predict adolescent smoking status over a 3-year span.

The current study also examined social-psychological risk factors at different smoking stages (1). Flay (19) described a model to explain the smoking acquisition process which is composed of five distinct behavioral stages. This model states that all young people begin with the preparation stage (never smoked). They then try a few cigarettes (the initiation stage) and may repeat, but irregularly, trying smoking (experimentation stage). Over a longer period of attempting smoking, smoking becomes regular (habituation stage). Finally, they develop a physiological need for nicotine (addictive stage). In this study, social-psychological factors that may predict smoking progression from nonsmoking to the experimental stage, as well as from nonsmoking to the regular smoking stage, were considered.

Adolescents have different social-psychological risk factors than young adults, and thus are at greater risk of trying and continuing smoking. Age is a risk factor consistently linked with smoking onset in early adolescence (20,21). Adolescents 11–15 years of age are in the peak age group for trying and experimenting with cigarettes (21). Wang et al. also found that from age 14 years on, adolescents' initiation of smoking sharply increases (20). Previous research has indicated that adolescents who initiated smoking at older ages are not as clearly identifiable as those who initiated smoking at earlier ages (16). In addition, few studies have been conducted to examine those who initiated smoking after age 18 years, in comparison with those who initiated smoking as adolescents. This study tracked those who initiated smoking at ages 16–18 versus those who initiated smoking at ages 19–21. Important differences have been found between adolescent and young adult smokers with regard to risk factors associated with their smoking behaviors (22).

Rates of smoking initiation vary among ethnic groups as well as by age group. The 1985 National Health Interview Survey reported that for persons aged 25–64 years, the odds of ever smoking were similar for African-Americans and whites, when controlling for socioeconomic status and demographic factors. The odds of heavy smoking for African-Americans, however, were considerably lower than for whites. Our own previous analyses of national data found similar patterns for adolescents (16). Ethnicity has been regarded as an important moderating factor influencing adolescent smoking. Sussman et al. examined social-psychological factors of smoking onset among southern Californian seventh- and eighth-grade white, African-American, Hispanic, and Asian students and found unique combinations of social-psychological factors may be relevant to ethnic differences in smoking initiation (23). For example, adult and peer influences were strongest predictors for whites; risk-taking preferences were the strongest predictors for smoking among African-Americans, while adult and peer approval of smoking were important factors influencing all adolescents' smoking. Limited information is available regarding ethnic differences in social influences on adolescents' smoking behavior, especially in prospective studies (24). Perhaps this limitation is owing to the fact that many studies did not have a sufficiently large sample size to examine ethnic differences. The present prospective study examined ethnic differences among whites, African-Americans, and Hispanics, and included ethnicity as a factor predicting smoking status along with social-psychological factors.

Methods

Sample

The TAPS used probability sampling to generate a national representative sample of adolescents. A sample of 9965 U.S. teenagers participated in the 1989 TAPS I telephone interview. Of those, 9135 were selected for reinterviewing for the 1993 TAPS II, and 7960 responded, yielding an 87% response rate. TAPS I and II surveys were conducted by the National Center for Health Statistics (8). At the time of the TAPS I survey, the age of the participants ranged from 12 to 18 years, and by the time of TAPS II survey, the ages of the cohort sample members ranged from 15 to 22 years. For the purpose of examining smoking initiation and progression,

only subjects who were identified as nonsmokers at the beginning of the study (TAPS I) were included in this study ($n = 4032$). The TAPS used computer-assisted telephone interviewing to collect data, and the TAPS II included all questions from the TAPS I.

Regular smokers were defined as adolescents who were currently smoking, had smoked at least 10 days in the past 30 days, and had smoked at least 100 cigarettes in their lifetimes. Experimental smokers were defined as 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 adolescents who had never smoked a cigarette. Subjects were categorized by race including African-American, white, and Hispanic. The income variable was computed as “above” and “below” poverty level.

Measures

Scales were adopted based on the previous literature (1,16) that included important variables predicting adolescent smoking.

Smoking beliefs. This construct included seven items asking respondents if they believed there was any harm in having an occasional cigarette; if they believed smoking helps people to relax, to keep down their weight, and to reduce boredom and stress; and if they believed smoking helps people feel more comfortable at parties and in other social situations. The response categories were “yes” or “no.”

Smoking attitude. Attitudes toward smoking included five items. Participants responded to the following statement: “I dislike being around people who smoked,” “Seeing someone smoking turns me off,” “I would rather date people who do not smoke,” “I personally do not mind being around people who smoke,” and “I could stop smoking anytime I wanted to.” The response categories were “agree,” “disagree,” and “no opinion.”

Depressive symptoms. Six items were included asking respondents during the past year how often they: (a) felt unhappy, sad, or depressed; (b) felt hopeless about the future; (c) experienced trouble going to sleep or staying asleep; (d) felt too tired to do things; (e) felt nervous or tense; and (f) worried too much about things. The subjects responded to these symptoms with: 1 = “never”; 2 = “rarely”; 3 = “sometimes”; or 4 = often.

Risk-taking behavior. Four items were included: (a) “In the past year, how many times were you involved in a physical fight?” (b) “During the past 4 weeks, how many times have you been in a vehicle driven by someone who had been drinking or using drugs?” (c) “How often do you wear a seat belt when you drive or ride in a car?” and (d) “How many nights a week do you usually go out for fun or recreation?” The measurement used an interval score.

School behavior. This included three items: (a) “How much do you like school?” (with a 4-point scale: 1 = “a lot”; 2 = “some”; 3 = “very little”; 4 = “not at all”); (b) “How did you do in school?” (with a 4-point scale: 1 = “much better than average”; 2 = “better than average”; 3 = “average”; 4 = “below average”); and (c) “How many days did you skip or cut school in the past 2 weeks?”

Social environment. This included six variables: (a) number of parents smoking; (b) number of friends smoking (out of best 4 male and best 4 female friends); (c) perceived parents’ approval of smoking with a dichotomous response (“yes” or “no”); (d) perceived friends’ approval of smoking with a 3-point response (1 = “approve”; 2 = “disapprove”; 3 = “not care”); (e) perceived norms (i.e., “How much do you think kids of same age care about staying off cigarettes?” (1 = “care a lot”; 2 = “care somewhat”; 3 = “care a little”; 4 = “do not care”); and (f) perceived number of teachers in school who smoke (1 = “none”; 2 = “a few”; 3 = “some”; 4 = “most/all”).

Data Analysis

For the purpose of data analysis, coding for all variables was examined and necessary reversing was implemented so that all variables yielded higher scores associated with negative behaviors. The principal component analysis (PCA) was performed on variables in each of the following three constructs: (a) smoking

beliefs, (b) smoking attitudes, and (c) depressive symptoms. The PCA provides a linear combination of the original variables that represent the construct. The factor loadings and eigenvalues were used to evaluate the linear combination of the variables in each scale. A factor loading for any variable below .40 was dropped: the recommended cutoff factor loading in most factor analysis textbooks (25). One variable from the smoking attitude and one variable from smoking beliefs were discarded based on this criterion. The eigenvalue indicates the total variance explained by the factor. The explained variances of belief factor, attitude factor, and depression factor were 78%, 73%, and 80%, respectively. A factor score was then computed for each scale. A factor score can be interpreted as a standard score from a linear combination of a series of original variables.

Table 1 Smoking Status by Age, Gender, and Ethnicity

	Nonsmoker (%)	Experimenter (%)	Regular (%)
Age^a			
Adolescent	64.35	24.82	10.83
Adult	67.81	23.09	9.10
Race^a			
White	63.20	24.89	11.90
A-A	74.39	20.61	5.0
Hispanic	63.10	27.04	9.86
Gender^a			
Male	63.72	26.16	10.13
Female	67.25	22.40	10.35
Interactions			
Adolescent			
White	61.82	25.33	12.83
A-A ^b	73.38	21.82	4.80
Hispanic	63.32	27.41	9.27
Adults			
White	65.84	24.05	10.11
A-A	76.13	18.52	5.35
Hispanic	62.50	26.04	11.46
Male			
White	62.51	26.38	11.11
A-A	69.84	23.61	6.56
Hispanic	57.47	31.61	10.92
Female			
White	63.87	23.47	12.66
A-A	78.31	18.03	3.66
Hispanic	68.51	22.65	8.84

^a Significant at $p < .05$.

^b African-American.

The purpose of the data analysis was to find out the most significant and nonredundant variables. This purpose was accomplished in two steps. First, each predictor variable and smoking status were tested to screen out the significant variables using SAS categorical data modeling (CATMOD) (26). Only significant predictors ($p < .05$) were retained and presented in the second-step analysis. Second, the sample was divided into two groups: Adolescents in TAPS I (aged 12–15 years) who remained adolescents in TAPS II (15–18 years) were referred to as the adolescent group; and adolescents in the TAPS I (aged 16–18 years) who became young adults (aged 19–21 years) in the TAPS II were referred to as the adult group. Four separate multivariate logistic models were developed: (a) adolescents who became experimenters in TAPS II, (b) adolescents who became regular smokers in TAPS II, (c) young adults who became experimenters in TAPS II, and (d) young adults who became regular smokers in TAPS II. The goodness-of-fit statistics (χ^2) with all of the independent variables, percentage of

overall correct classification, Wald statistic for each variable, odds ratios (OR), and 95% confidence intervals were computed to evaluate the logistic models as well as for each predictor variable.

Results

Smoking Initiation and Progression, by Age and Ethnicity

Table 1 presents the prevalence rates of smoking initiation and progression by age, gender, and ethnicity. Adolescents had both slightly higher rates of smoking initiation and regular smoking rates than their adult counterparts. Male adolescents had a higher smoking initiation rate (26.16%) than their female counterparts (22.40%); however, the regular smoking rate was higher for females than males (10.35% vs. 10.13%). Regarding ethnicity, whites had the highest rate for regular smoking (11.90%), but Hispanics had the highest rate for smoking initiation (27.04%). African-Americans had the lowest rates for both smoking initiation (20.61%) and regular smoking (5.0%).

A review of prevalence rates by age and ethnicity indicated that adolescent smoking initiation rates were higher for each of the ethnicity groups than for their adult counterparts. For regular smoking, however, adult African-Americans and Hispanics had higher rates than adolescents of the same ethnicity.

Examination of the prevalence rates by gender and ethnicity revealed the smoking initiation rates to be higher for males in each of the ethnic groups than for females. For regular smoking, however, white females had higher rates than white males. The African-American regular smoking rate for males was almost twice as high as that for African-American females.

Adolescents Who Became Experimenters

Table 2 presents the adjusted ORs for all predictor variables of smoking initiation for adolescents who were nonsmokers at ages 12–15 years, and again as they progressed to ages 15–18 years. During this 3-year span, these adolescents had initiated smoking, but had not developed regular smoking behavior. The overall model was significant: $X^2(15) = 58.93$; $p < .001$. Self-rated school performance (OR = 1.14), perceived number of teachers smoking (OR = 1.14), and perceived friends' approval (OR = 1.54) were significant predictors of smoking progression from nonsmokers to experimenters.

Table 2. Odds Ratios (OR) and 95% Confidence Intervals of Social-Psychological Predictors for Adolescent Smoking Initiation

Variable	Adjusted OR	95% Confidence Interval	
Attitude	1.08	0.98	1.18
Beliefs	1.01	0.92	1.12
Depression	0.98	0.89	1.08
Like school	1.11	0.95	1.30
School performance	1.14	1.01	1.29 ^a
Days missing school	0.98	0.87	1.09
No. parents smoking	1.04	0.90	1.19
No. friends smoking	1.07	0.93	1.23
No. teachers smoking	1.14	1.02	1.28 ^a
Friend approval	1.54	1.18	2.00 ^a
No. physical fights	1.10	0.98	1.24
No. nights out	1.03	0.95	1.11
Race			
White	1.00		
African-American	0.68	0.52	0.88 ^a
Hispanic	1.00	0.73	1.35
Gender			
Male	1.00		
Female	0.87	0.71	1.06

^a Significant at $p < .05$.

Table 3. Odds Ratios (OR) and 95% Confidence Intervals of Social-Psychological Predictors for Adult Smoking Initiation

Variable	Adjusted OR	95% Confidence Interval	
Attitude	0.96	0.84	1.09
Beliefs	1.19	1.05	1.36 ^a
Depression	1.15	1.00	1.33 ^a
Like school	1.23	0.98	1.55
School performance	1.32	1.09	1.59 ^a
Days missing school	1.12	0.96	1.30
No. parents smoking	0.91	0.75	1.11
No. friends smoking	1.08	0.94	1.24
No. teachers smoking	1.01	0.86	1.20
Friend approval	1.00	0.71	1.40
No. physical fights	0.95	0.77	1.16
No. nights out	1.04	0.93	1.17
Race			
White	1.00		
African-American	0.68	0.46	0.98 ^a
Hispanic	1.07	0.63	1.76
Gender			
Male	1.00		
Female	0.84	0.63	1.12

^a Significant at $p < .05$.

The magnitude of these ORs was not high, and the strongest predictor was perceived friends' approval, suggesting that adolescents who perceived friends' approval were 1.5 more times as likely to initiate and experiment with smoking. African-American adolescents were less likely than whites to initiate smoking at this stage (OR = 0.68). The correct classification parameter indicated the model was 71.7% correct.

Young Adults Who Became Experimenters

Table 3 presents the adjusted ORs for all predictor variables of smoking development for adolescents who were nonsmokers at ages 15–18 years, and again as they progressed to ages 19–21 years. During this 3-year span, these young adults had initiated smoking. The overall model was significant: $X^2(15) = 47.56; p < .001$. Review of the individual variables showed that positive attitude toward smoking (OR = 1.19), self-rated school performance (OR = 1.14), and being white were the significant risk factors. The magnitude of these ORs was not high, and the strongest predictor was being white, followed by self-rated school performance. The correct classification parameter indicated the model was 74.0% correct.

Adolescents Who Became Regular Smokers

Table 4 presents the adjusted ORs for all predictor variables of smoking development for adolescents who were nonsmokers at ages 12–15 years, and again as they progressed to ages 15–18 years. During this 3-year span, these adolescents had become regular smokers. The overall model was significant: $X^2(15) = 153.08; p < .001$. Depression scores (OR = 1.22), not liking school (OR = 1.27), self-rated school performance (OR = 1.14), missing school (OR = 1.23), number of parents smoking (OR = 1.34), number of friends smoking (OR = 1.44), perceived number of teachers smoking (OR = 1.22), and being white (OR = 3.13, reciprocal) were significant predictors of smoking progression from nonsmokers to regular smokers. The magnitude of these ORs was not high, and the strongest predictors were being white and parents and friends smoking. The correct classification parameter indicated the model was 85.7% correct.

Table 4. Odds Ratios (OR) and 95% Confidence Intervals of Social-Psychological Predictors for Adolescents Becoming Regular Smokers

Variable	Adjusted OR	95% Confidence Interval	
Attitude	1.05	0.92	1.20
Beliefs	1.14	1.00	1.31 ^a
Depression	1.22	1.07	1.39 ^a
Like school	1.27	1.02	1.58 ^a
School performance	1.27	1.06	1.52 ^a
Days missing school	1.23	1.07	1.42 ^a
No. parents smoking	1.34	1.12	1.61 ^a
No. friends smoking	1.44	1.22	1.70 ^a
No. teachers smoking	1.22	1.04	1.44 ^a
Friend approval	0.88	0.59	1.30
No. physical fights	1.13	0.96	1.32
No. nights out	1.03	0.92	1.14
Race			
White	1.00		
African-American	0.32	0.19	0.51 ^a
Hispanic	0.72	0.44	1.14
Gender			
Male	1.00		
Female	1.09	0.81	1.45

^a Significant at $p < .05$.

Table 5. Odds Ratios (OR) and 95% Confidence Intervals of Social-Psychological Predictors for Adults Becoming Regular Smokers

Variable	Adjusted OR	95% Confidence Interval	
Attitude	1.03	0.86	1.23
Beliefs	1.29	1.07	1.55 ^a
Depression	1.29	1.06	1.59 ^a
Like school	1.43	1.03	1.98 ^a
School performance	1.08	0.82	1.41
Days missing school	1.12	0.90	1.39
No. parents smoking	1.11	0.84	1.45
No. friends smoking	1.09	0.89	1.32
No. teachers smoking	0.89	0.69	1.14
Friend approval	0.89	0.53	1.44
No. physical fights	1.19	0.91	1.53
No. nights out	1.01	0.85	1.19
Race			
White	1.00		
African-American	0.49	0.25	0.89 ^a
Hispanic	1.13	0.53	2.25
Gender			
Male	1.00		
Female	0.76	0.50	1.16

* Significant at $p < .05$.

Young Adults Who Became Regular Smokers

Table 5 presents adjusted ORs for all predictor variables of smoking development for adolescents who were nonsmokers at ages 15–18 years and who progressed to ages 19–21 years. During this 3-year span, these adolescents had become regular smokers. The overall model was again significant: $X^2(15) = 43.44; p < .001$. Positive beliefs about smoking (OR = 1.29), depression scores (OR = 1.29), and not liking school (OR = 1.43) were significant predictors of young adults' smoking progression from nonsmokers to regular smokers. These findings indicate that older adolescents are less likely to be influenced by parents than younger adolescents. The correct classification parameter indicated the model was 86% correct.

Discussion

The goal of this study was to examine social-psychological factors in predicting smoking acquisition among adolescents over a 3-year period. By doing so, several analytical strategies were adopted that considered the smoking developmental model and factors predicting smoking transition from nonsmoking status to experimental smoking status, and from nonsmoking status to regular smoking status. Strategies also incorporated ethnic comparisons.

All four multivariate logistic models were significant, suggesting that social-psychological factors were able to predict adolescent and adult smoking development from nonsmoking to either experimental or regular smoking. However, review of the individual social-psychological risk factors appears to suggest that these models need improving. Some of our findings were consistent with the previous smoking literature, and some were not.

Two distal factors (SES and gender) failed to predict adolescent smoking development. Family income did not predict smoking initiation or transition to regular smoking during the screening process by univariate analysis. This contradicts the literature that claims low SES predicted smoking initiation in multiple longitudinal studies (27). No conclusion can be made regarding this inconsistency. Perhaps the measurement and calculation of SES, the design of the study, as well as the analysis of data can be further examined so that the reason for the difference can be resolved.

Gender differences in smoking initiation have been reported. From 1974 to 1985, smoking initiation rates for young men dropped from 45% to 33%, but rates for young women remained at 34% (28). This study did not confirm this notion. Our findings are consistent with Clayton's review, which found considerable similarities between adolescent females and males who smoke (28).

Previous studies found that among Californian youths progressing from seventh to eighth grade, smoking initiation rates were higher for Hispanics and African-Americans than for whites (23). However, the present study found that the rates are much higher among whites for initiating and experimenting with smoking at these two age categories than for African-Americans and Hispanics. However, regular smoking rates were higher for African-Americans than for whites and Hispanics. This finding suggests that if smoking rates reported in previous studies combined whites and Hispanics, true smoking rates for whites may be higher since the lower Hispanic smoking rate would lower the mean prevalence rate. As African-American smoking rates for later adults and young adults increase, African-Americans may start smoking at later ages; this is consistent with higher adult smoking rates among African-Americans (29).

Findings suggest that social-psychological factors are less able to predict the transition from nonsmoking to experimental smoking than the progression from nonsmoking to regular smoking. These findings partially support Gordon's findings, which indicated that the scale of social-psychological variables factors of experimental smokers was often in between nonsmokers and regular smokers. Among adolescents, regular smokers had more smokers in their social circles than experimental smokers (30). When young people try smoking, it is often in a social or environmental situation, such as at a party where friends offer them cigarettes, or in a stressful situation where smoking is attempted as a quick and easy coping strategy for stress reduction (31). This may explain why the most significant risk factor for this group was that they perceived their friends would approve of their smoking. Adolescents at this stage are still learning the social meaning of smoking (32), and social-psychological factors such as smoking attitudes and beliefs are not very well formed as in regular smokers. This indicates that modification of adolescent smoking at the experimental stage may be easier to accomplish than reducing the incidence of an established behavior (33). This implies that adolescents in experimental stages of smoking should be the target of secondary prevention efforts.

For young adults, the most significant risk factor was their perceived school performance, measured by responses to the question, "How do/did you do in school?" Those who perceived their school performance as "average" or "below average" were most likely to smoke. This finding reinforces the findings in most prospective studies that indicated a positive relationship between low academic achievement and smoking onset (21). Students who care more about their school performance may be less likely to attempt negative behaviors. This study indicated that the prediction of the development from nonsmoking to regular smoking is stronger than the prediction of experimental smoking. Seven significant risk factors predicted adolescent development to regular smoking. Adolescents who were depressed, did not like school, missed more school, perceived poor school performance, had parents who smoked, had more friends who smoked, and perceived more teachers who smoked were more likely to become regular smokers. However, fewer significant variables predicted young adults' progression to regular smoking. These included believing that smoking has positive effects, feeling depressed, and not liking school. The difference between these two logistic models may be explained by the notion that adolescents in general are more affected by social-psychological factors than are adults (1,16).

Whereas all predictive models were significant, few risk factors except white race were significant in all four logistic models. This fact may be attributed to several potential limitations inherent within this study. First, prospective studies allow the examination of a predictive relationship between social-psychological factors and smoking; however, adolescents may change their social-psychological risk factors during the prospective study period. Examining smoking behavior over a 3-year time span cannot rule out the possibility that these social-psychological factors may have changed before their smoking behavior. This may explain why, on the whole, these social-psychological models were not very strong, as judged by the number of risk factors as well as the magnitude of ORs, in predicting smoking status. It would, of course, be difficult to survey these social-psychological factors just before their smoking initiation or becoming regular smokers. Also, the smoking

behavior measure used in this study is based on self-report and does not employ a biochemical measure. Thus, adolescent cigarette use may be underestimated. Future prospective studies should measure social-psychological factors and smoking initiation and development at shorter intervals such as 6 months; then, some of limitations in current prospective studies may be resolved and the ability of social-psychological factors to predict smoking onset may be legitimately tested.

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