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Predicting young adulthood smoking among adolescent smokers and nonsmokers

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Abstract

Objective—We examined predictors of smoking in young adulthood among (1) adolescent nonsmokers and (2) adolescent smokers.

Methods—Data were analyzed from a longitudinal study of adolescents to young adulthood in 1988-1998.

Results—Predictors of smoking in young adulthood among adolescent nonsmokers included less education, being unmarried in adulthood, lower family social support, nonsmoking parents, and increased alcohol use over time. Predictors of smoking in young adulthood among adolescent smokers included lower family social support, more adolescent friends who used drugs, and slower decreases in depressive symptoms over time.

Conclusions—Distinct factors predict smoking initiation versus maintenance among young adults.

Keywords

smoking; adolescent health; young adult health; smoking initiation

INTRODUCTION

Cigarette smoking represents a major public health problem that continues to be the leading preventable cause of death, disease, and disability in the United States.¹ An estimated 21% of adults and 24% of teens in the U.S. continue to smoke.² Each day, about 1,000 people under 18 years of age³ and 1,800 people above 18 years of age⁴ begin smoking on a daily basis.

Adolescence and young adulthood are critical periods in an individual's development, with significant biological (e.g., puberty, physical growth), psychosocial (e.g., exploring intimate relationships with others), and contextual (e.g., moving from a high school to university environment) changes occurring during this time in the life-span. As part of this period of experimentation and change, many adolescents and young adults experiment with different substances, including alcohol, cigarettes, and illicit drugs. For some, the exploration of substance use may lead to an escalation, and possibly continuation, in use. For example, most individuals who smoke in adolescence and into young adulthood become regular cigarette users.⁵ Those who smoke daily, even only for 1 to 2 years, are likely to become

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dependent on nicotine.⁶ Moreover, once the progression of smoking advances, it is more difficult for smokers to stop smoking.⁷ In addition to the continuity pattern of smoking from adolescence to young adulthood, there is also a subpopulation of adolescents who do not initiate smoking until young adulthood. Unfortunately, little is known about the onset of smoking after age 20.⁸ It is possible that the factors related to continued smoking from adolescence into young adulthood may not be the same as those factors associated with smoking initiation in young adulthood.

The current study examines both the *initiation* of smoking in young adulthood and the *maintenance* of smoking from adolescence to young adulthood using ecological systems theory,⁹ which emphasizes the multiple levels of influence (e.g., societal, community, interpersonal, and intrapersonal factors) impacting health behaviors; and problem behavior theory,¹⁰ which emphasizes common underlying factors (e.g., environmental, personality, behavioral) that might influence different health risk behaviors. Among the contextual factors implicated in ecological systems theory, smoking among parents,¹¹⁻¹³ siblings,¹⁴⁻¹⁸ significant others,¹⁹ and friends^{15, 17, 20-26} are predictors of onset and continuation of smoking. Among the individual factors implicated in problem behavior theory, smoking has been associated with alcohol use, marijuana use, and other drug use,^{26, 28-30} as well as low academic achievement, behavioral problems in school, and other delinquent behaviors.²⁷ Moreover, research regarding the relationship between depressive symptoms and cigarette smoking indicate that depressive symptoms predict cigarette initiation,³¹ that smoking predicts depressive symptoms and disorders,³²⁻³⁴ or that there is a reciprocal relationship between depressive symptoms and cigarette use.^{26, 35, 36}

The current study aims to support and extend the research documenting these findings by using sociodemographic, psychosocial, behavioral, and environmental predictors identified in ecological systems theory and problem behavior theory to evaluate differences in (1) continued smoking in young adulthood among adolescent smokers; and (2) smoking initiation in young adulthood among adolescent nonsmokers.

METHODS

We examined predictors of smoking in young adulthood among adolescent nonsmokers and smokers. The current study used five waves of longitudinal data from a research project focused on adolescents and their parents entitled Lives Across Time: A Prospective Study of Adolescent and Adult Development (LAT). The initial 4 waves of assessment occurred during adolescence at 6-month intervals from 1988-1992. The fifth wave occurred in young adulthood from 1993-1998. A description of the participants and data collection methodology for each of these phases is provided in more detail below.

Participants

The sample consisted of 1,205 teens from three suburban high schools in Western New York. At the time of the initial assessment, the average age of the participants was 15.79 (SD=0.70) years and the participants were in the 10th or 11th grades of high school. During the fifth wave, participants were 23.8 (SD=1.35) years of age. The sample was mostly White (96.5%) from middle class families (annual household income=\$39,019.08 (SD=\$12,804.18), with the majority of students having married parents (88.7%).

Procedure

The Adolescent Phase (1988-1992)—The LAT study began by collecting paper-and-pencil survey data from sophomores and juniors in their high school classrooms. Schools provided a mailing list of the addresses of 10th- and 11th-graders. A packet of materials,

including a letter of introduction by the principal, a description of the study, and informed-consent forms, was mailed to adolescents and their parents. Those individuals willing to participate in the study were requested to sign the informed statement of consent (both the adolescent and one parent) and to return it to the investigator in a self-addressed, stamped envelope. Adolescents completed the self-report paper-and-pencil surveys in large groups (e.g., 40-50 students) in their high school settings under the supervision of a trained survey research team who administered the survey to adolescents. The survey took about 45-50 minutes to complete, and participants received \$10.00 for their participation. The collection times during the adolescent phase were spaced 6 months apart occurring in October and April of successive years. Sample retention across Waves 1-4 was high, exceeding 90%. The study was approved by the Institutional Review Board at the University of Buffalo and a Federal Certificate of Confidentiality was obtained.

The Time 5 Young Adult Phase (1993-1998)—Data collection at Wave 5 occurred on average 6.87 years (SD=1.10) after the Wave 4 data collection. At Wave 5, participants' written informed consent was required, and participants were reimbursed \$20 for their completion of survey. From the total of 829 young adults at Wave 5, 776 also had data, including specific smoking behavior data, at some point in the adolescent phase and also during the young adult phase. Therefore, for the purposes of this research, 776 participants were included in the analyses.

Measures

Candidate predictor variables consistent with ecological systems theory and problem behavior theory included *baseline sociodemographic variables* (age, gender, ethnicity [non-Hispanic White vs. other], parental marital status [married vs. other], parental income); *factors assessed in adolescence* included GPA (averaged at Waves 3 and 4), depressive symptoms, stressful life events, family social support, adolescent alcohol and marijuana use, friends' use of substances, and parental smoking; and *factors assessed in young adulthood* including years of education obtained, marital status (married vs. other), having children (yes vs. no), substance use, and depressive symptoms. For data analyses, we calculated an aggregate score for most measures by averaging two waves of measurement to get a more reliable and representative measure of variables across the older years of adolescence. If a variable was assessed at Waves 3 and 4, these two measurements were used; otherwise, Wave 2 and 4 data were used. If the measure was reported from only one of the given times, that score was used to maximize sample size. Our measures are described below.

Smoking Status—We asked: "How many cigarettes or packs of cigarettes did you usually smoke per day in the last 6 months?" with response categories of (1) none, (2) less than 1, (3) 1-5 cigarettes per day, (4) about ½ pack per day, (5) about 1 pack per day, (6) about 1 and ½ packs per day, and (7) about 2 packs or more per day. Reporting 'no smoking' (response options 1) was categorized as the non-smoking group. Screening positive for recent smoking was defined by reporting less than 1 cigarette per day (cpd) or more in the past 6 months. In adolescence (Waves 3 and 4), 444 (57.2%) were nonsmokers, 227 (29.3%) smoked less than 10 cigarettes per day, 47 (6.1%) smoked 10-19 cigarettes, and 58 (7.5%) smoked at least 20 cigarettes per day. In young adulthood (Wave 5), 485 (63.7%) were nonsmokers, 125 (15.7%) smoked less than 10 cigarettes per day, 62 (5.1%) smoked 10-19 cigarettes per day, and 124 (15.5%) smoked at least 20 cigarettes per day.

For the scope of this analysis we divided our sample into four groups: 'stable non-smokers' (those who never smoked), 'quitters' (those who smoked in adolescence but not in young adulthood), 'continued smokers' (those who smoked in adolescence and continued smoking in young adulthood), and 'late-onset smokers' (those who initiated first smoking in young

adulthood) (See Figure 1). These categories reflect smoking behaviors from abstaining, initiation, continuation, and cessation of cigarette smoking. The groups were defined based on how many cigarettes participants smoked per day in the past 6 months at each wave of the research in adolescence (4 times) and young adulthood (1 time). Although smokers by our definition are not necessarily all regular smokers, many adolescents who report smoking become addicted³⁷ and thus reporting of smoking at least ‘1 per day in the past 6 months’ is a sufficient level to potentially transition into regular smoking by young adulthood and to pose risk for the development of nicotine dependence. Additionally, we assessed smoking behaviors in the past 6 months (rather than the past 4 weeks) under the assumption that this smoking time frame offers a better representation of regular smoking behaviors in contrast to just experimenting. Our aim was to identify predictors of smoking change or stability from adolescence into young adulthood.

The Center for Epidemiologic Studies Depression Scale (CES-D)—The Center for Epidemiologic Studies Depression Scale³⁸ was used to assess depressive symptoms at all five waves of data collection. The CES-D consists of 20 self-report items asking participants to indicate how many days during the past week they experienced the indicated emotions or behaviors. The CES-D has been used frequently in studies with middle adolescents.³⁹ The internal consistency estimate for the CES-D with this sample was .90. Data from Wave 3 and Wave 4 were averaged to yield an adolescent CES-D score, and the CES-D was administered at Wave 5 to yield a change score (i.e., Wave 5 minus adolescent CES-D scores).

Delinquency—Delinquent activity was measured with 16 items used in prior delinquency research.⁴⁰ A 6-point Likert scale (1 = never to 6 = 10 or more times) was used for each item in reference to the past 6 months. Items varied in terms of severity of offense and included skipped school, hit teacher or parent, and was suspended from school. Wave 2 and 4 scores were averaged. The internal consistency estimate for the measure was .84.

Stressful Life Events—A list of 31 undesirable life events was constructed by adapting the Adolescent Life Change Event Scale (ALCES) of Yeaworth, York, Hussey, Ingle, and Goodwin.⁴¹ Events were sampled from multiple social stress domains: family (e.g., “hassling with parents”), school (e.g., “failing one or more subjects”), interpersonal (e.g., “breaking up with a close personal friend”), and intrapersonal (e.g., “getting badly hurt or sick”). Adolescents were asked to report whether each event occurred within the past 6 months, with higher scores indicating a greater number of stressful events and greater intensity of stress. The internal consistency estimate for the composite score, formed by summing all affirmative responses, was .65. Wave 3 and Wave 4 data were averaged.

Family Social Support—The Perceived Social Support—Family measure was administered to assess the amount of perceived emotional support provided by family.⁴² The measure consists of 20 items with four response options (generally false, more false than true, more true than false, and generally true). Examples of survey items included “My family gives me the moral support I need,” “Members of my family are good at helping me solve problems,” and “My family is sensitive to my personal needs.” The response format of this perceived social support measure was modified to include a “don’t know” response option with the four-response option format as proposed by Procidano and Heller⁴² in order to increase the utility of the measure.⁴³ The internal consistency estimate for this measure at Wave 1 with this sample was .94.

Quality of Friendships—This was measured by a Close Friend 15-item scale of interactive friendship events assessing characteristics of adolescent friendships such as

reciprocity, conflict, and self-disclosure.⁴⁴ Windle based this measure of friendship characteristics on the research of Youniss and Smollar.⁴⁵ The events measured the frequency of occurrence and relative seriousness of problematic events in relationships with a close friend (e.g., my close friend told me a secret, my close friend criticized me, I talked to my close friend about a personal problem in my life). Respondents were requested to answer the occurrence of each event with reference to their closest same-sex (adolescent) friend and to indicate how often each event had occurred (1 = never happened, 2 = happened once, 3 = happened twice, 4 = happened more than twice). The score was an average of Wave 2 and Wave 3 data.

Alcohol Use—Alcohol use was measured with a standard quantity frequency index (QFI) that assessed beer, wine, and hard liquor consumption in the past 6 months.⁴⁶ Respondents were asked how often they usually had each beverage in the last 6 months (1 = never to 7 = every day) and, when they had the beverage, on average how much they usually drank (10-point scale from 1 = none to 10 = more than 8 cans, bottles, or glasses, depending on the beverage). A QFI of 0.5 is equal to 1 drink. The QFI measures from Wave 3 and Wave 4 were averaged to provide a measure of the average number of ounces of ethanol consumed in the past 6 months in adolescence, and this assessment was also administered at Wave 5 to yield a change score (i.e., Wave 5 minus adolescent level of alcohol consumption).

Adolescent Marijuana Use—Marijuana use was measured with the participant self-reporting the frequency of marijuana use during the past 6 months by using a 7-point scale that ranged from 1 (never used) to 7 (used every day). The validity of self-reports of substance use has been supported in numerous research studies.^{47, 48} Data were averaged from Wave 3 and Wave 4 to determine adolescent usage.

Extent of Alcohol Problems—To assess alcohol-related problems that occurred during the past 6 months, participants responded to 13 items to determine individual effects of drinking. The scale used a 5-point response option to quantify the number of times a problem occurred as a result of alcohol (0, 1-2, 3-5, 6-10, and 10 + times). Items included problems with friends, family, teachers, or legal authorities caused by drinking behavior, in addition to missing school, “passing out,” and having regrets the day after drinking. Cronbach’s alpha for this measure with this sample was .84. Averages of Wave 3 and Wave 4 were used.

Percent of Friends who Drink or Use Drugs—To calculate the percentage of friends who use alcohol or use drugs, adolescents were requested to indicate 1) the number of adolescents whom they considered friends and 2) the number of these friends who a) consumed alcohol and b) used drugs. Percentage scores were calculated by dividing the number of friends using these substances by the total number of friends. Percentage scores were calculated as averages of Wave 3 and Wave 4.

Data Analyses

Bivariate analyses were conducted comparing (1) quitters to continued smokers and; (2) stable non-smokers to late-onset smokers. We used t-tests for continuous variables and Chi-Squared tests for categorical variables. We then conducted multivariate binary logistic regression analysis to predict (1) late-onset smoking vs. continued abstinence among adolescent nonsmokers and (2) continued smoking vs. cessation among adolescent smokers. We used forced entry of predictors sequenced as sociodemographic variables (gender, parental marital status, family income, years of education, marital status, and children); adolescent psychosocial variables (GPA, depressive symptoms, delinquency, stressful life events, family social support, quality of friendships, parental smoking, alcohol use,

marijuana use, extent of alcohol problems, percent of friends who drink, and percent of friends using drugs); and change in depressive symptoms and change in alcohol use from adolescence to young adulthood. All data were analyzed using PASW statistical software version 17.0. Significance levels were set at $\alpha \leq .05$.

RESULTS

Descriptive Statistics

Table 1 contains participant descriptive statistics. Of the 776 participants included in these analyses, 29.1% (N=226) were continued smokers (smoked in adolescence and in young adulthood), 47.7% (N=370) were stable nonsmokers (did not smoke as an adolescent or as an adult), 13.7% (N=106) were quitters (smoked as an adolescent but not as an adult), and 9.5% (N=74) were late-onset smokers (did not smoke in adolescence but did smoke in young adulthood). Overall, this reflects a smoking prevalence of 42.8% in adolescence and 38.7% in young adulthood in this sample.

Predictors of Continued Smoking

Table 2 shows the results of the bivariate analyses for sociodemographic and psychosocial variables as predictors of change in smoking status among adolescents who smoked. Among adolescents who smoked, significant correlates of smoking in young adulthood included obtaining fewer years of education by young adulthood ($p < .001$), being unmarried in young adulthood ($p = .04$), lower GPA in adolescence ($p = .02$), having used marijuana in adolescence ($p < .001$), having a greater proportion of adolescent friends who used drugs ($p < .001$), slower decreases in depression from adolescence to young adulthood ($p = .02$), and increases in alcohol use from adolescence to young adulthood ($p = .04$).

Table 3 shows the results of the multivariate models predicting continued smokers. Predictors of continued smoking included lower family social support during adolescence (OR=0.97, CI 0.95, 1.00, $p = .05$), slower decreases in depression among those who smoked in adolescence and in young adulthood (OR=1.05, CI 1.00, 1.10, $p = .04$), and having a greater proportion of adolescent friends who used drugs (OR=1.02, CI 1.00, 1.04, $p = .05$).

Predictors of Late-Onset Smoking

Table 2 shows the results of the bivariate analyses for sociodemographic and psychosocial variables as predictors of change in smoking status among adolescents who did not smoke. Among adolescents who did not smoke, significant correlates of smoking in adulthood included obtaining fewer years of education by young adulthood ($p = .004$), being unmarried in young adulthood ($p = .03$), and increases in alcohol use from adolescence to young adulthood ($p < .001$).

Table 4 shows the results of the multivariate models predicting late-onset smokers. Predictors of smoking initiation in young adulthood included fewer years of education (OR=0.77, CI 0.60, 0.99, $p = .04$), being unmarried in young adulthood (OR=0.11, CI 0.20, 0.62, $p = .01$), lower family social support during adolescence (OR=0.97, CI 0.94, 1.00, $p = .03$), parents being nonsmokers (OR=0.42, CI 0.17, 1.03, $p = .06$), and increases in alcohol use from adolescence to young adulthood (OR=1.06, CI 1.03, 1.08, $p < .001$).

DISCUSSION

The current findings make a critical contribution to the literature in that it utilized longitudinal data from a relatively large sample of adolescents followed into young adulthood in order to investigate distinct predictors of (1) continued smoking from

adolescence to young adulthood and (2) late-onset smoking in young adulthood. Important nuances were found that differentially predicted continued smoking versus smoking initiation in young adulthood. Specifically, less decreases in depressive symptoms from adolescence to young adulthood predicted continued smoking in young adulthood among adolescent smokers, whereas greater increases in alcohol consumption from adolescence to young adulthood predicted smoking initiation in young adulthood among adolescent nonsmokers. These findings are critical in addressing smoking among adolescents and preventing smoking onset in young adulthood.

With regard to continued smoking into early adulthood among adolescent smokers, results indicated that less decrease in depression, lower family social support during adolescence, and having a greater proportion of adolescent friends who used drugs significantly predicted smoking continuation. In our study sample, depression scores were greater during adolescence than in young adulthood on average across all four groups. Among adolescent smokers that continued to smoke into young adulthood, they experienced less relief of depressive symptoms. This is interesting given that the extent of depressive symptoms among adolescent nonsmokers was lower. This is consistent with prior research indicating the complex relationship of depression and smoking, specifically the reciprocal relationships between depressive symptoms and cigarette use.^{29, 30} Furthermore, high perceived family social support has been shown to be inversely related to psychosocial dysfunction and distress,³⁶ which may also impact smoking behaviors as well as level of depressive symptoms. Thus, the interplay of these factors is critical in smoking progression and maintenance. Finally, current findings were consistent with prior research indicating that having a greater proportion of adolescent friends who use drugs is a risk factor for continued smoking.^{15, 17, 20, 21, 49}

Predictors of late-onset smoking in young adulthood included lower family social support, greater increases in alcohol use, being unmarried, not having children, and fewer years of education. Our findings supported prior research indicating a positive association between smoking and alcohol use.^{22, 50-54} A possible reason explaining why change in alcohol use was not predictive among continued smokers is that alcohol use behaviors were persistently high from adolescence to young adulthood and there was thus no or little change in the levels of alcohol use during that time period. Higher rates of cigarette smoking among unmarried young adults, relative to married young adults, is supported in the literature;⁵⁵ this might also account for the finding regarding parenthood being protective of late-onset smoking. We also found that predictors of late-onset smoking included fewer years of education, which has repeatedly been shown to be associated with greater risk and higher rates of smoking throughout the life course.⁵⁶⁻⁵⁹

The smoking prevalence found among this sample was higher than national averages in adolescence (42.8% versus roughly 25% per the Monitoring the Future data in 1990)⁶⁰ and slightly higher than national averages among young adults (38.7% versus roughly 31% per Monitoring the Future data in 1995).⁶¹ The reasons for the escalated smoking prevalence among our sample may reflect our method of assessment – the Monitoring the Future survey assesses 30-day point-prevalence of smoking, whereas we asked for amount of smoking in the past six months. We also included those smoking less than 1 cpd over the past six months as smokers; however, this constituted only 6% of our adolescent smokers and none of our young adult smokers. It is also interesting to note that the smoking prevalence of the parents of this sample had higher rates than other national estimates in the early 1990's (31.3% versus 25.7% per the National Health Interview Survey-Health Promotion and Disease Prevention [NHIS-HPDP]).⁶² Given the known association between parental smoking to smoking initiation among youth, the higher rates among our sample of adolescents and young adults is reasonable. However, the reasons for the large differences in

smoking prevalence in the parents and thus their children in comparison to national averages at this time are unclear.

Implications and Recommendations

Given the continued high smoking prevalence rates^{1, 2, 5} and the findings of this present study, smoking behaviors among adolescents and young adults warrant continued attention. Research should further examine distinct factors predicting these different trajectories of smoking and the interplay among these factors and other potential underlying mechanisms. Also future research should apply this approach to more recent longitudinal data sets and to data sets including greater ethnic and socioeconomic diversity. In practice, our results suggest the importance for future public health campaigns and smoking cessation interventions to understand those at risk for continued smoking or late-onset smoking. Smoking reduction strategies need to address the multi-factor context of smoking behaviors. Alcohol, depression, and family social support were strong predictors of smoking in this study and support the usefulness of a multilevel approach in prevention and cessation strategies. In particular, attention should be given to the role of depression in continued smoking during this time frame and beyond, as cessation intervention strategies may need to have an explicit focus on depressive symptoms for a subgroup of smokers. Moreover, addressing cigarette smoking and alcohol use concurrently among adolescents is critical in preventing smoking initiation and escalation of alcohol use. Also it is important to recognize and emphasize the protective nature of education in reducing health risk behaviors. Understanding those at risk for continued smoking or late-onset smoking will be useful in reducing smoking initiation and escalation among adolescents and young adults.

Strengths and Limitations

This study has limitations that should be acknowledged. Results were based on a predominantly middle-class, Caucasian sample in the 1990's, and therefore this limits the generalizability of findings to other populations of adolescents and young adults or the current population. Another limitation involves our assessment of smoking behavior over the course of the last six months, which is not a conventional assessment of smoking behavior. However, this time frame was chosen to coincide with the assessments every six months during Waves 1 through 4. In addition, in our definition of the four smoking status groups, we did not take into account variation in level or intensity of smoking (e.g., light versus heavy smoking). We also chose to include even low level smokers – those smoking < 1 cpd – in our group of smokers. This decision was based on the likelihood of progression of cigarette consumption and level of addiction among even light or nondaily smokers.^{63, 64} Despite these limitations, this study offered a unique opportunity to compare predictors of smoking from adolescence to young adulthood by investigating smoking behaviors during the peak risk periods for smoking onset. Additionally, the longitudinal design of the research advances our knowledge about transitions from adolescence into young adulthood and smoking behavior outcomes and raises several issues to be addressed in interventions and future research. In regard to all findings, it is important to note that the final wave of assessment for this study was at age 23. It will be valuable to see what predictors remain or become significant as the participants continue to develop in young adulthood and beyond.

Conclusions

This study was unique in that it specifically examines predictors of smoking initiation in young adulthood and predictors of smoking continuation from adolescence to young adulthood. Few longitudinal studies have followed adolescents into young adulthood assessing tobacco use during the transition. Low levels of perceived family social support emerged as a critical factor relevant in smoking among both continued smokers and late-onset smokers. The results also indicated that distinct factors predict smoking initiation

versus continuation among young adults. The most notable differences in predictors of late-onset smokers and continued smokers were that increased alcohol use predicted late-onset smoking whereas continued smoking was predicted by lower decreases in depressive symptoms. Given the results of this present study, interventions targeting specific factors (e.g., depressive symptoms vs. alcohol use) might address smoking differently among these groups.

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		Smoking in Young Adulthood	
		No	Yes
Smoking in Adolescence	No	Stable Non-smokers <i>Never smoked</i> 47.7% (N=370)	Late-onset Smokers <i>Initiated smoking in YA</i> 9.5% (N=74)
	Yes	Quitters <i>Smoked in A but not in YA</i> 13.7% (N=106)	Continued Smokers <i>Smoked in A and YA</i> 29.1% (N=226)

Figure 1.
Smoking groups

Table 1**Participant characteristics**

Variable	N (%) or M (SD)
<i>Adolescent variables</i>	
Age (SD)	15.79 (0.70)
Female (%)	442 (57.0%)
Non-Hispanic White (%)	749 (96.5%)
Parental marital status – Married (%)	440 (88.7%)
Family income (SD)	39,019.08 (12,804.18)
<i>Adulthood variables</i>	
Years of education (SD)	15.27 (1.91)
Marital status - Unmarried	654 (80.8%)
No children in home	693 (89.7%)
<i>Adolescent psychosocial variables</i>	
GPA (SD)	2.97 (0.67)
CESD (SD)	15.13 (9.40)
Delinquency (SD)	5.85 (4.26)
Stressful life events (SD)	12.61 (7.56)
Family social support (SD)	56.70 (13.58)
Quality of friendships (SD)	48.05 (6.56)
<i>Adolescent alcohol/drug use</i>	
Parental smoking status – Smoker (%)	182 (31.3%)
Adolescent alcohol use (SD)	12.34 (25.24)
Adolescent marijuana use (%)	202 (26.0%)
Extent of alcohol problems (SD)	2.29 (2.54)
% friends who drink (SD)	67.93 (33.03)
% friends who use drugs (SD)	15.72 (26.09)
<i>Change, adolescence to adulthood</i>	
Change in CESD (SD)	-3.92 (9.67)
Change in alcohol use (SD)	3.63 (31.09)
<i>Smoking Status Change</i>	
Continued smokers (%)	226 (29.1%)
Stable non-smokers (%)	370 (47.7%)
Quitters (%)	106 (13.7%)
Late-onset smokers (%)	74 (9.5%)

Table 2

Bivariate analysis of sociodemographic variables and psychosocial variables as predictors of change in smoking status

Variable	Among Adolescent Smokers			Among Adolescent Nonsmokers		
	Quitters N (%) or M (SD) N = 106	Continued Smokers N (%) or M (SD) N = 226	p	Stable nonsmokers N (%) or M (SD) N = 370	Late-onset smokers N (%) or M (SD) N = 74	p
<i>Adolescent variables</i>						
Age	15.71 (0.63)	15.83 (0.70)	0.12	15.78 (0.70)	15.73 (0.69)	0.63
Gender			0.14			1.00
Male	30 (28.3%)	83 (36.7%)		184 (49.7%)	37 (50%)	
Female	76 (71.7%)	143 (63.3%)		186 (50.3%)	37 (50%)	
Ethnicity			0.63			0.20
Non-Hispanic White	101 (95.3%)	219 (96.9%)		360 (97.3%)	69 (93.2%)	
Other	5 (4.7%)	7 (3.1%)		10 (2.7%)	5 (6.8%)	
Parental marital status			0.66			0.68
Unmarried	9 (12.5%)	17 (10.5%)		43 (15.2%)	7 (12.1%)	
Married	63 (87.5%)	145 (89.5%)		240 (84.8%)	51 (87.9%)	
Family income	39635.31 (12418.06)	39080.59 (13416.26)	0.73	39540.23 (12197.38)	39090.85 (14199.07)	0.78
<i>Adulthood variables</i>						
Years of education	15.42 (1.78)	14.59 (1.97)	<0.001	15.76 (1.73)	15.10 (1.95)	0.004
Marital status			0.04			0.03
Unmarried	74 (72.5%)	183 (83.2%)		293 (80.9%)	67 (91.8%)	
Married	28 (27.5%)	37 (16.8%)		69 (19.1%)	6 (8.2%)	
Children			0.53			0.40
No	82 (80.4%)	183 (83.2%)		324 (89.5%)	68 (93.2%)	
Yes	20 (19.6%)	37 (16.8%)		38 (10.5%)	5 (6.8%)	
<i>Adolescent psychosocial variables</i>						
GPA	2.96 (0.60)	2.78 (0.66)	0.02	3.18 (0.64)	3.08 (0.60)	0.25
CESD	16.69 (8.67)	16.69 (10.29)	0.99	13.75 (8.88)	12.70 (7.41)	0.34
Delinquency	6.58 (4.41)	7.25 (4.34)	0.19	4.52 (3.70)	4.62 (3.26)	0.83
Stressful life events	15.38 (7.25)	14.77 (8.29)	0.52	10.91 (6.42)	10.78 (6.40)	0.87
Family social support	57.03 (14.90)	54.37 (13.25)	0.10	59.48 (13.05)	57.02 (12.86)	0.14
Quality of friendships	47.54 (6.70)	47.66 (6.27)	0.88	48.37 (6.49)	47.78 (6.52)	0.49

Variable	Among Adolescent Smokers			Among Adolescent Nonsmokers		
	Quitters N (%) or M (SD) N = 106	Continued Smokers N (%) or M (SD) N = 226	p	Stable nonsmokers N (%) or M (SD) N = 370	Late-onset smokers N (%) or M (SD) N = 74	p
<i>Adolescent alcohol/drug use</i>						
Parental smoking status			0.10			0.35
Non-smoker	54 (75.0%)	104 (63.8%)		198 (68.5%)	44 (75.9%)	
Smoker	18 (25.0%)	59 (36.2%)		91 (31.5%)	14 (24.1%)	
Adolescent alcohol use	17.75 (34.08)	21.00 (32.37)	0.40	4.62 (11.42)	5.20 (8.76)	0.68
Adolescent marijuana use			<0.001			0.69
No	73 (68.9%)	107 (47.3%)		327 (88.4%)	67 (90.5%)	
Yes	33 (31.1%)	119 (52.7%)		43 (11.6%)	7 (9.5%)	
Extent of alcohol problems	3.23 (2.57)	3.42 (2.58)	0.52	1.32 (1.92)	1.41 (1.85)	0.71
% friends who drink	79.45 (23.49)	82.78 (24.97)	0.26	55.39 (34.70)	55.68 (3.82)	0.95
% friends who use drugs	15.39 (22.62)	29.62 (32.13)	<0.001	7.04 (17.74)	5.10 (11.55)	0.37
<i>Change, adolescence to adulthood</i>						
Change in CESD	-6.70 (9.16)	-3.87 (10.73)	0.02	-3.51 (9.06)	-2.05 (9.29)	0.21
Change in alcohol use	-8.25 (35.36)	1.44 (41.07)	0.04	4.81 (15.99)	21.47 (38.43)	<0.001

Table 3

Predictors of continued smoking in young adulthood among adolescent smokers

Variable	OR	CI	P
<i>Adolescent variables</i>			
Gender			
Male		Ref	
Female	0.89	0.35, 2.24	0.80
Parental marital status			
Married		Ref	
Unmarried	0.77	0.25, 2.43	0.66
Family income	1.00	1.00, 1.00	0.67
<i>Adulthood variables</i>			
Years of education	0.85	0.69, 1.06	0.16
Marital status			
Unmarried		Ref	
Married	0.68	0.28, 1.65	0.40
Children			
No		Ref	
Yes	0.87	0.33, 2.34	0.80
<i>Adolescent psychosocial variables</i>			
GPA	1.00	0.51, 1.96	1.00
CESD	1.04	0.99, 1.10	0.16
Delinquency	0.97	0.86, 1.09	0.59
Stressful life events	0.99	0.93, 1.04	0.58
Family social support	0.97	0.95, 1.00	0.05
Quality of friendships	1.02	0.97, 1.07	0.50
Alcohol/drug use			
Parental smoking			
Non-smoker		Ref	
Smoker	1.73	0.81, 3.68	0.16
Adol. alcohol use	1.02	0.99, 1.05	0.27
Adol. marijuana use			
No		Ref	
Yes	1.54	0.68, 3.52	0.30
Extent of alcohol problems	0.99	0.82, 1.20	0.90
% friends who drink	1.00	0.98, 1.01	0.87
% friends using drugs	1.02	1.00, 1.04	0.05
<i>Change variables</i>			
Change in CESD	1.05	1.00, 1.10	0.04
Change in alcohol use	1.01	0.99, 1.04	0.29

Nagelkerke $R^2 = .308$ $p < .001$

Note: Significant p-values associated with CI's including 1.00 are a result of rounding to the nearest hundredth.

Table 4

Predictors of late-onset smoking in young adulthood among adolescent nonsmokers

Variable	OR	CI	P
<i>Adolescent variables</i>			
Gender			
Male		Ref	
Female	1.95	0.84, 4.52	0.12
Parental marital status			
Married		Ref	
Unmarried	0.94	0.26, 3.43	0.93
Family income	1.00	1.00, 1.00	0.23
<i>Adulthood variables</i>			
Years of education	0.77	0.60, 0.99	0.04
Marital status			
Unmarried		Ref	
Married	0.41	0.20, 0.62	0.01
Children			
No		Ref	
Yes	3.18	0.71, 14.28	0.13
<i>Adolescent psychosocial variables</i>			
GPA	0.85	0.41, 1.75	0.66
CESD	0.97	0.92, 1.03	0.37
Delinquency	0.98	0.84, 1.15	.84
Stressful life events	1.00	0.92, 1.10	.92
Family social support	0.97	0.94, 1.00	.03
Quality of friendships	1.01	0.96, 1.10	.64
Alcohol/drug use			
Parental smoking			
Non-smoker		Ref	
Smoker	0.42	0.17, 1.03	0.06
Adol. alcohol use	1.03	0.90, 1.07	0.47
Adol. marijuana use			
No		Ref	
Yes	1.13	0.20, 6.33	0.89
Extent of alcohol problems	0.83	0.57, 1.21	0.34
% friends who drink	1.01	0.99, 1.02	0.36
% friends using drugs	0.98	0.94, 1.02	0.32
<i>Change variables</i>			
Change in CESD	1.00	0.96, 1.05	0.99
Change in alcohol use	1.06	1.03, 1.08	<0.001

Nagelkerke $R^2 = .299$ $p < .001$

Note: Significant p-values associated with CI's including 1.00 are a result of rounding to the nearest hundredth.