Smoking Initiation Associated With Specific Periods in the Life Course From Birth to Young Adulthood: Data From the National Longitudinal Survey of Youth 1997

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Abstract

Objectives—Guided by the life-course perspective, we examined whether there were subgroups with different likelihood curves of smoking onset associated with specific developmental periods.

Methods—Using 12 waves of panel data from 4088 participants in the National Longitudinal Survey of Youth 1997, we detected subgroups with distinctive risk patterns by employing developmental trajectory modeling analysis.

Results—From birth to age 29 years, 72% of female and 74% of US males initiated smoking. We detected 4 exclusive groups with distinctive risk patterns for both genders: the Pre-Teen Risk Group initiated smoking by age 12 years, the Teenage Risk Group initiated smoking by age 18 years, the Young Adult Risk Group initiated smoking by age 25 years, and the Low Risk Group experienced little or no risk over time. Groups differed on several etiological and outcome variables.

Conclusions—The process of smoking initiation from birth to young adulthood is nonhomogeneous, with distinct subgroups whose risk of smoking onset is linked to specific stages in the life course.

Studies suggest that there have been recent increases in adolescent smoking in the United States.[1,2] More effective prevention requires further understanding of tobacco use etiology. Numerous researchers have documented the timing and risk of early onset of tobacco use.[3–8] Although children as young as 4 to 5 years have reported smoking,[3,4] the hazard of smoking onset (defined as the probability for a never-smoker to initiate smoking during a 1-year period) is relatively low (0%–3%) before age 10 years.[3–6] The risk then increases rapidly to peak at around age 14 to 16 years, with initiation rates ranging from 5% to 15%, depending on study population and time of measurement, before it declines.[3–6] The risk of smoking initiation in later adolescence and early adulthood remains at less than 10%.[9–13]

Despite this general age pattern of the risk of smoking onset, it remains unclear whether there are actual subgroups with unique risk curves associated with different developmental periods. Most studies of smoking risk trajectories are based, either implicitly or explicitly, on the assumption that 1 probability curve quantifies the risk of smoking onset for all individuals across ages and developmental periods, which may not be the case. An additional limitation of the current literature is that much of the previous research has relied on cross-sectional or brief longitudinal samples of adolescents rather following adolescents through young adulthood.

According to the life-course perspective,[14–16] the interplay of intrapersonal factors and environmental factors determines who is at risk for smoking initiation at what time periods (i.e., ages). Such influential factors may include age- and development-related differences in individual vulnerability to tobacco use[17] and external influences such as peer pressure, parental monitoring, and social support.[11,18–20] Therefore, the process of smoking onset may not be homogeneous but diverse, involving subgroups of individuals with unique time patterns corresponding to different developmental periods in the life span.

In general, very young children and adolescents are less likely than older adolescents to be self-motivated to smoke.[21] Rather, children are likely to be influenced by external factors, such as parents and peers.[22–24] For example, some young adolescents may be left home alone around friends who smoke; they may mimic others and simply pick up a cigarette. Those who pass through preadolescence without smoking may face new risks in high school. Most youths have more freedom from their parents in high school than they did previously. The increased unsupervised time allows adolescents more opportunities to start smoking when they feel the need, such as being with other smokers or feeling stressed or depressed. [25,26] Research among young adults (primarily college students) indicates that lack of self-efficacy, being more rebellious, and previous use of other substances are among the most influential factors for smoking onset in this period.[10,11,18]

Further support for the existence of subgroups for smoking initiation is the research finding of subgroups with different trajectories in frequency and amount of tobacco use.[27–38] Labels vary, but typical subgroups reported by these studies include nonsmokers, occasional smokers, early and late stable smokers, escalators, and quitters. Although not linked to specific developmental periods, each subgroup has its own risk curve across the age span from adolescence to young adulthood. Additionally, researchers have found significant differences in a variety of factors among trajectory subgroups, including gender, race/ethnicity, mental health, and parental monitoring.[27–38] A landmark longitudinal study found that early stable smokers had more smoking friends than experimenters, abstainers, late stable smokers, and quitters; abstainers were more likely than early and late stable smokers to have enrolled in college; and late stable smokers were least likely to be married.[31]

We are not aware of other research examining subgroups with time patterns of smoking onset risk that are directly linked to specific periods in the life span, which has direct implications for smoking prevention. Guided by the life-course perspective, we used 12 rounds of panel data from a nationally representative sample. Our goals were to detect subgroups with distinctive time patterns regarding likelihood of smoking initiation and then

to determine whether the detected subgroups varied systematically by established risk factors in adolescence and outcome measures in young adulthood.

METHODS

Data were from the National Longitudinal Survey of Youth 1997 (NLSY97), an ongoing project sponsored by the US Department of Labor. NLSY97 participants were randomly selected to represent all US adolescents aged 12 to 16 years by the end of 1996. Participants completed follow-up surveys annually after the baseline survey in 1997. Trained staff collected data at participants' homes. The data for sensitive questions, including those for cigarette smoking, were collected by audio computer-assisted self-interviewing, whereas other data were collected by computer-assisted personal interviewing.

We analyzed data from baseline to the 2008 survey (12 rounds). At baseline, 6748 adolescents completed the survey. Of these participants, we included 4088 (60.58%) who provided data on age and smoking initiation. There were no significant differences between the included participants and those excluded regarding key variables at baseline, which included race/ethnicity (66.1% of included participants and 64.2% of those excluded were non-Hispanic White) and mean age of smoking onset (12.1 years for included vs 12.2 years for excluded); however, significantly more females than males were included (2095 vs 1993; $P < .01$). To minimize potential selection bias attributable to this gender difference, we analyzed the data by gender.

Smoking Initiation

Cigarette smoking initiation was self-reported. At baseline, participants who responded positively to the question "Have you ever smoked cigarettes in your life?" were further asked, "How old were you when you smoked an entire cigarette the first time?" We used the reported age of smoking the first whole cigarette to model the time trajectory of smoking initiation. Those who responded negatively to the first question at baseline were asked at subsequent follow-up surveys, "Have you ever smoked an entire cigarette since the last survey on [date of the last survey]?" We thus used respondent's age at the time of the follow-up survey in our modeling analysis for those who responded positively in a follow-up.

Additional Variables

Baseline—We assessed race/ethnicity as White and others (Black; American Indian, Eskimo, or Aleut; Asian or Pacific Islander; and something else). We assessed peer smoking as the perceived proportion of children in the same grade who smoked or had smoked cigarettes (1 = almost none, 2 = about 25%, 3 = about half, 4 = 75%, and 5 = all). Because of a highly skewed distribution, for analysis, we recoded this variable as 0 (almost none) and 1 (some). We assessed parental monitoring on the basis of youths' report at age 12 to 14 years using an established instrument.[39,40] Four items asked about the extent to which the youth's parents knew (1) the youth's close friends, (2) the friends' parents, (3) whom the youth was with when not at home, and (4) the youth's teachers and what the youth was doing in school (0 = knows nothing; 4 = knows everything). We assessed monitoring for

mothers and fathers separately; we summed scale scores (α_{father} = 0.81; α_{mother} = 0.71), with higher scores reflecting closer monitoring. We assessed depressed affect at age 12 to 14 years with 1 item from the Child Behavior Checklist scale.[41] Participants indicated how often they felt unhappy, sad, or depressed (0 = not true; 1= sometimes true; 2 = often true). We used these variables as predictors of subgroups with distinctive smoking onset risk patterns at the baseline assessment.

Age 24 years—We assessed the following variables (scored yes or no): education (ever enrolled in a 4-year college), employment (ever employed), current smoking (smoked in the past 30 days), and marital status (currently married). These variables were used as outcome variables. We selected age 24 years because it was the last age for which we had data for all participants in the sample and because of the low likelihood of smoking initiation after this age.

Accelerated Longitudinal Design

The 12 rounds of the NLSY97 survey data from 1997 to 2008 made it possible to directly assess the risk of smoking initiation from ages 12 to 29 years using an accelerated longitudinal design (Table 1).[42] To assess smoking initiation before age 12 years, we used the reported age of first smoking at baseline to reconstruct the birth cohort following the method widely used in tobacco research.[3,5,9] For example, if an adolescent who was aged 14 years at baseline in 1997 reported smoking initiation at age 7 years, we used age 7 years in modeling analysis. Table 1 shows the number of participants by age and survey waves, as well as the number and percentage of participants who initiated smoking.

Trajectory Modeling Analysis

Developmental trajectory analysis, also known as growth mixture modeling, is a methodology devised to detect and quantify unique subgroups of a study population on the basis of a heterogeneous population assumption.[43] We challenged the traditional one-age-pattern-for-all hypothesis by assuming the existence of multiple subgroups with unique age patterns for smoking initiation. We used growth mixture modeling[43] (implemented with SAS PROC TRAJ procedure[44] [SAS Institute, Cary, NC]) to detect these subgroups and to quantify the trajectory pattern of smoking initiation across ages and developmental periods. We used the Bayesian Information Criterion (BIC) to determine the optimal number of subgroups by evaluating whether adding 1 more group was associated with reductions in BIC of at least 5 units.

We used a 2-step procedure established from our previous experience with this method[45,46] to conduct the modeling analysis. In step 1, we started with a model with a larger number of subgroups (5–7), all being set as cubic polynomial. In step 2, we revised the model by reducing the number of groups or altering the degree of the polynomial (zero to cubic) for individual subgroups, using the BIC criterion and significance tests of the estimated model coefficients.

Comparing Influential Variables by Risk Group

After establishing the subgroups with different developmental trajectories, we classified participants in the total sample into specific groups on the basis of the posterior probability. We then compared factors among the 4 smoking initiation risk subgroups using the χ^2 test or analysis of variance. We completed group comparisons using the relative risk statistic with 95% confidence interval (following a significant χ^2) or Dunnett's t post hoc test (following a significant F). Because of the age restriction (12–14 years) for assessing parental monitoring and depressed affect in the NLSY97, only participants in this age range at baseline were included when these variables were used in an analysis.

RESULTS

Among the 4088 participants, 2095 (51.25%) were female and 1993 (48.75%) were male; 72% of the total sample was White. Table 1 shows that, overall, the sample included youths aged 12 through 29 years. Average age was 14.72 years (SD = 1.44) at baseline in 1997 and 26.27 (SD = 1.42) at the last wave in 2008. Overall, smoking onset was most likely at ages 13 (10.4%) and 14 (10.2%) years.

Developmental Trajectories of Smoking Initiation

A 4-group trajectory model fit the data well for both genders (BIC = −6927.75 for females and BIC = −7027.94 for males). Figure 1 depicts the trajectories of smoking initiation by gender, and Table 2 includes the final model parameters.

Data in Figure 1a illustrate 4 subgroups of females with distinctive developmental trajectories of smoking onset likelihood. We labeled the first one the Pre-Teenage Risk Group (PTRG; 9.69% of the sample). This group was characterized by a low risk (< 5.0%) of smoking onset before age 6 years. The risk increased rapidly thereafter, approaching 100% at age 12 years. A similar but slightly steeper risk curve characterized the second group, the Teenage Risk Group (TRG; 44.18%), with the smoking onset age curve delayed 5 to 6 years. The risk was rather low before age 12 years and increased rapidly thereafter, approaching 100% at age 18 years. The risk curve for the third group, the Young Adult Risk Group (YARG; 18.32%), started to grow after age 17 years, rapidly increased thereafter, and started approaching 100% at age 24 years. Finally, the risk curve for the last group, the Low Risk Group (LRG; 27.81%), was basically flat throughout the study age range of birth to 29 years. Ten women (1.7%) in the LRG began smoking between ages 23 and 26 years.

Data in Figure 1b demonstrate a 4-group developmental trajectory pattern for males. The pattern was similar to that for females, except for a few differences. The risk curves for the TRG ($t = 2.67$; $P < .01$), YARG ($t = 4.59$; $P < .001$), and LRG ($t = 2.47$, $P < .05$) of males increased slightly quicker along the horizontal age line than those of females. Of the males, 12.96% were in the PTRG, 36.39% in the TRG, 24.95% in the YARG, and 25.70% in the LRG. Twenty men (3.9%) included in the LRG began smoking after age 23 years. Trajectory analysis indicated that significantly more males than females were included in the PTRG ($t = 3.01$; $P < .01$) and YARG ($t = 4.34$; $P < .01$).

As shown in Table 2, for both genders, the PTRG, TRG, and YARG were adequately described by a binomial model, whereas the LRG was adequately described with an intercept-only model. With the exception of the quadratic term for males in the TRG, all model coefficients were statistically significant. The PTRG, TRG, and YARG all contained a positive linear growth component (α_1); the quadratic component α_2 was positive and greatest for the PTRG but declined in the TRG and YARG.

Factors Associated With Individual Risk Groups

Table 3 summarizes the results from the analyses comparing the 4 risk groups. Overall, differences tended to be strongest between the PTRG with LRG and weaker between the YARG with LRG. Among females, all 9 variables showed significant differences between the PTRG and LRG. Females in the PTRG were significantly more likely than LRG females to be White, to have peers who smoked, to be married, and to currently smoke, and less likely to have attended a 4-year college and to be employed. PTRG females also reported significantly lower paternal and maternal monitoring and higher depressed affect than LRG females. The same pattern was found between TRG and LRG females, except that marital status was no longer significantly different. There were fewer differences between YARG females and LRG females. YARG females were significantly more likely than LRG females to be White, less likely to have attended college, and more likely to currently smoke.

Generally, males exhibited group differences similar to those of females. However, there was no association between employment status and smoking initiation risk group for males. In addition, compared with LRG males, YARG males were significantly more likely to have had smoking peers in adolescence and significantly less likely to be currently married. There were no differences in racial makeup between YARG and LRG males, or in marital status between PTRG and LRG males.

DISCUSSION

Understanding smoking initiation is critical to strengthening current tobacco prevention efforts. Traditionally, the risk of smoking initiation is viewed as a homogeneous process, generally increasing over time as youths enter and pass through adolescence.[10–13] In this study, we explored the process of smoking initiation through a new analytical strategy based on a heterogeneous hypothesis. We tested the hypothesis using the accelerated design and longitudinal data collected from a large, nationally representative sample. We first confirmed the existence of 4 distinct and mutually exclusive subgroups of US youths. Each risk subgroup had its own time curve for smoking initiation. Furthermore, these subgroups were clearly linked with different developmental periods, from preschool age to young adulthood. Finally, comparison analyses revealed potential impacts of risk factors in early adolescence that may have contributed to smoking onset for individual subgroups, and outcome measures that may have been affected by these risk subgroups.

Early initiation of tobacco use has been linked to an increased likelihood of longduration smoking, higher risk of nicotine dependence, and a greater lifelong risk of developing smoking-related cancers.[47,48] Great effort has therefore been devoted to understanding the timing of and risk factors associated with the early onset of tobacco use.[3–9] We identified 4

subgroups with distinctive risk trajectories for smoking onset, supporting the heterogeneous hypothesis. The first 3 groups were characterized by initiating smoking before age 12 years (PTRG), between ages 13 and 18 years (TRG), and after age 17 years (YARG), and the LRG was characterized by a zero risk (before age 22 years) to low risk (3%, after age 22 years) to initiate smoking over a period of the first 29 years in life.

The homogeneous hypothesis suggests that adolescence is the risk zone for smoking initiation. However, the current study demonstrates that there are 3 periods with heightened risk of smoking onset, with each being unique to a specific subgroup. The 3 high-risk groups (i.e., PTRG, TRG, and YARG) can be considered as 3 "tests": 1 for preadolescents, 1 for adolescents, and 1 for young adults. From preadolescence to young adulthood, a person will be less likely to initiate smoking only if he or she "passes" all the 3 tests. Our study findings indicate that approximately 11% of US youths failed the first test by starting smoking before age 12 years; approximately 40% (the TRG) failed the second test, even though they passed the first one by not starting smoking before 12 years; and approximately 22% failed the third test (YARG) and initiated smoking during young adulthood, although they passed the 2 previous tests. Overall, only about 27% US youths passed the 3 tests (LRG) by age 29 years.

There were marked differences across subgroups in variables associated with smoking initiation. Relative to girls, boys were more likely to be in the PTRG and YARG. There were larger proportions of White youths in both the PTRG and TRG, and in the female YARG, than in LRG groups. Consistent with previous research suggesting that earlier smoking initiation is associated more strongly with external factors,[22–24] we found more peer smokers among those who started smoking earlier. Peer smoking was most common for PTRG youths, followed by TRG youths and then YARG youths. Parental monitoring was lower and depression was higher among PTRG and TRG youths than among YARG and LRG youths.

In addition, risk group membership significantly predicted a number of variables measured at age 24 years. Relative to individuals in the LRG, participants in other subgroups who had initiated smoking were less likely to have been admitted into a 4-year college and more likely to be currently smoking. The risk to smoke later in life was also substantially higher for youths in the 3 risk groups (PTRG, TRG, and YARG), both males and females, compared with the LRG youths. Interestingly, the relationships linking smoking initiation risk group with college acceptance and marital status were weaker for males than for females.

Identification of the distinctive subgroups with unique time patterns of risk trajectories for smoking onset has important implications for strengthening tobacco control. First, the risk subgroups are clearly associated with schooling (preadolescence associated with grade school level, adolescence with middle and high school level, and young adulthood starting after high school). This finding adds new evidence supporting the strategy of school-based smoking prevention programs.[2] Furthermore, continued smoking prevention must be maintained across all school grades from primary school to college, with emphasis on the high school period, when approximately 40% of US youths smoked their first cigarette.

Our findings also provide evidence supporting appropriate selection of targeted risk factors for intervention at different periods. Early prevention programs should target emotional issues (e.g., depressed affect), peer influence, and parental monitoring to assist US adolescents with passing the first 2 tests by not initiating smoking. Lastly, tobacco use prevention during young adulthood may need to strengthen regulatory and policy measures related to education and employment places to assist US youths with passing the third test by not initiating smoking during this period.[49]

This study is among the first to systematically investigate the risk of smoking initiation with a life-course perspective, and the findings are unique and promising; however, there are several limitations. The study relied on self-reported age of smoking initiation; measurement error could not be assessed at the individual level. Furthermore, initiation of smoking before age 12 years was retrospectively reported within a much longer period (from birth to baseline assessment) compared with initiation of smoking at age 12 years or older (reported at follow-up, with duration varying from 6 months to 23 months). The differential recall periods may result in biased age data because of forward telescoping. [50] Lastly, the analysis of factors associated with smoking onset risk subgroups was limited by the variables available from the NLSY97.

Despite these limitations, this study's findings advance our understanding of the process of smoking initiation. The likelihood of smoking initiation is not homogeneous across the life span; rather, individuals in different risk groups face increased risks of smoking at different developmental periods, and such risks are associated with different influential factors. These findings provide new evidence supporting both etiological and prevention intervention studies targeting risk subgroups at different developmental periods. To win the war against tobacco, future research should adapt the heterogeneity strategy to continue exploring factors affecting the risk of smoking initiation by subgroups, to improve the existing tobacco prevention programs, and to devise new and more effective programs.

Acknowledgments

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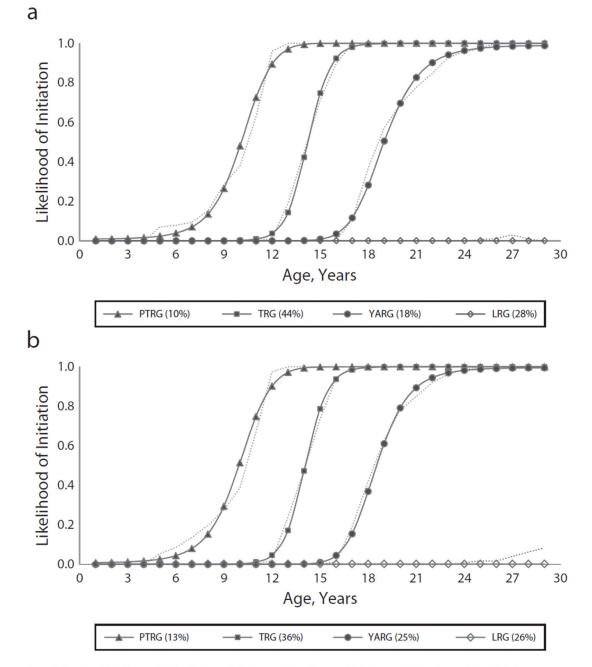
Figure 1.
Trajectories of the likelihood of smoking initiation from birth through young adulthood among (a) US females and (b) US males: National Longitudinal Survey of Youth 1997.

TABLE 1

Accelerated Longitudinal Design, Sample Size, and Number of Persons Who Initiated Cigarette Smoking in the United States: National Longitudinal Survey of Youth 1997

Age, Years	Survey Wave (Year), No.												Total, No.	Initiators, No. (%)
	1 (1997)	2 (1998)	3 (1999)	4 (2000)	5 (2001)	6 (2002)	7 (2003)	8 (2004)	9 (2005)	10 (2006)	11 (2007)	12 (2008)		
4	4088												4088	28 (0.7)
5	4088												4088	10 (0.2)
6	4088												4088	16 (0.4)
7	4088												4088	28 (0.7)
8	4088												4088	47 (1.1)
9	4088												4088	48 (1.2)
10	4088												4088	124 (3.0)
11	4088												4088	170 (4.2)
12	561												561	342 (8.4)
13	865	41											906	427 (10.4)
14	884	821	47										1752	415 (10.2)
15	827	894	857	19									2597	325 (8.0)
16	680	845	879	820	21								3245	257 (6.3)
17	265	795	873	898	833								3664	219 (5.4)
18	6	638	750	838	885	859	43						4019	173 (4.2)
19		54	646	778	830	879	835	22					4044	120 (2.9)
20			36	669	802	854	901	843	35				4140	83 (2.0)
21				66	655	786	843	884	848	62			4144	61 (1.5)
22					62	668	781	845	892	849	99		4196	49 (1.2)
23						42	662	788	841	885	853	85	4156	33 (0.8)
24							23	673	799	854	891	848	4088	22 (0.5)
25								33	642	798	850	887	3210	14 (0.3)
26									31	624	777	849	2281	11 (0.3)
27										16	608	791	1415	2 (0.0)
28											10	616	626	0
29												12	12	0

Source. National Longitudinal Survey of Youth 1997 (12 rounds from 1997 to 2008). Data of year 1997 for participants aged birth to 11 years were from reconstructed cohort; data for birth to 3 years (no initiators) are not shown.

TABLE 2

Parameter Estimates of Developmental Trajectories Models of the Likelihood of Smoking Initiation Among US Young Persons: National Longitudinal Survey of Youth 1997

Group	%[a] (95% CI)	Intercept (β_0)	Linear (β_1)	Quadratic (β_3)
Females (n = 2095)				
PTRG	9.69 (8.27, 11.12)	4.98***	11.72***	3.57***
TRG	44.18 (41.83, 46.52)	−0.44***	10.20***	−1.43*
YARG	18.32 (16.45, 20.20)	−6.71***	11.27***	−2.85***
LRG	27.81 (25.88, 29.73)	−6.91***		
Males (n = 1993)				
PTRG	12.96 (11.32, 14.61)	4.97***	11.30***	3.28***
TRG	36.39 (34.03, 38.74)	−0.24**	10.20***	−1.31
YARG	24.95 (22.82, 27.08)	−6.86***	12.13***	−3.03***
LRG	25.70 (23.77, 27.63)	−5.92***		

Note. LRG = Low Risk Group; PTRG = Preteen Risk Group; TRG = Teenage Risk Group; YARG = Young Adult Risk Group. Model fit: Bayesian Information Criterion (BIC) = −6927.75 for females and BIC = −7027.94 for males. Trajectory modeling test indicated significantly more males than females in the PTRG ($t = 3.01$; $P < .01$) and YARG ($t = 4.34$; $P < .001$).

[a] The percentage of each gender represented in each risk group.

* $P < .05$;

** $P < .01$;

*** $P < .001$.

TABLE 3

Factors Associated With Detected Risk Groups of Smoking Initiation Among Young US Females and Males: National Longitudinal Survey of Youth 1997

Variable	Smoking Initiation Risk Group				No.	Omnibus Statistic
	PTRG	TRG	YARG	LRG		
Females, baseline variables						
Race/ethnicity						
White, %	74.51	77.41	67.02	59.31	2088	$\chi^2 = 58.31$***
RR (95% CI)	2.01 (1.41, 2.86)	2.35 (1.87, 2.95)	1.39 (1.06, 1.83)	1.00 (Ref)		
Peer smoking						
Some, %	88.18	83.03	69.97	66.02	2066	$\chi^2 = 77.51$***
RR (95% CI)	3.84 (2.42, 6.08)	2.52 (1.97, 3.21)	1.20 (0.91, 1.59)	1.00 (Ref)		
Parental monitoring						
Father, mean (SD)	6.09 (4.20)[a]	7.56 (3.77)[a]	9.28 (3.69)	9.35 (3.73)	1012	$F = 28.38$***
Mother, mean (SD)	9.35 (3.23)[a]	10.18 (3.16)[a]	11.33 (2.88)	11.43 (3.01)	1290	$F = 24.57$***
Depressed affect, mean (SD)	0.90 (0.70)[a]	0.69 (0.67)[a]	0.47 (0.60)	0.46 (0.59)	1328	$F = 24.04$***
Females, variables at age 24 y						
Education						
No college, %	73.66	55.50	43.27	35.16	2095	$\chi^2 = 109.36$***
RR (95% CI)	5.16 (3.62, 7.35)	2.30 (1.86, 2.85)	1.41 (1.08, 1.83)	1.00 (Ref)		
Employment						
Ever employed, %	82.67	83.08	87.27	88.56	2078	$\chi^2 = 10.70$*
RR (95% CI)	0.62 (0.39, 0.96)	0.63 (0.47, 0.86)	0.89 (0.60, 1.32)	1.00 (Ref)		
Currently smoking						
Yes, %	67.58	54.87	38.59	0.36	1864	$\chi^2 = 106.37$***
RR (95% CI)	570.15 (137.68, 2361.14)	332.49 (82.54, 1339.38)	171.83 (42.15, 700.52)	1.00 (Ref)		
Marital status						
Currently married, %	22.17	17.15	13.46	15.78	2092	$\chi^2 = 7.66$*
RR (95% CI)	1.52 (1.02, 2.27)	1.10 (0.83, 1.46)	0.83 (0.57, 1.20)	1.00 (Ref)		
Males, baseline variables						

Variable	Smoking Initiation Risk Group				No.	Omnibus Statistic
	PTRG	TRG	YARG	LRG		
Race/ethnicity						
White, %	81.58	77.41	68.06	72.48	1976	$\chi^2 = 21.79^{***}$
RR (95% CI)	1.68 (1.17, 2.43)	1.30 (1.00, 1.69)	0.81 (0.62, 1.06)	1.00 (Ref)		
Peer smoking						
Some, %	80.75	75.18	61.65	55.58	1970	$\chi^2 = 78.16^{***}$
RR (95% CI)	3.35 (2.36, 4.77)	2.42 (1.89, 3.09)	1.28 (1.00, 1.65)	1.00 (Ref)		
Parental monitoring						
Father, mean (SD)	6.76 (3.97)[a]	8.29 (3.70)[a]	9.38 (3.50)	9.17 (3.81)	1022	$F = 17.98^{***}$
Mother, mean (SD)	8.71 (3.61)[a]	9.80 (3.22)[a]	10.87 (2.77)	10.73 (3.16)	1246	$F = 23.09^{***}$
Depressed affect, mean (SD)	0.55 (0.66)	0.53 (0.60)[a]	0.40 (0.56)	0.42 (0.56)	1292	$F = 4.98^{**}$
Males, variables at age 24 y						
Education						
No college, %	77.82	63.38	50.20	39.14	1993	$\chi^2 = 125.87^{***}$
RR (95% CI)	5.46 (3.89, 7.66)	2.69 (2.13, 3.40)	1.57 (1.22, 2.01)	1.00 (Ref)		
Employment						
Ever employed, %	85.88	87.04	87.58	87.82	1972	$\chi^2 = 0.66$
RR (95% CI)	0.84 (0.54, 1.31)	0.93 (0.66, 1.31)	0.98 (0.67, 1.42)	1.00 (Ref)		
Currently smoking						
Yes, %	68.51	62.58	52.34	0.61	1763	$\chi^2 = 108.49^{***}$
RR (95% CI)	351.74 (109.56, 1129.24)	270.37 (86.02, 849.82)	177.52 (56.26, 560.17)	1.00 (Ref)		
Marital status						
Currently married, %	9.40	9.89	5.53	9.39	1991	$\chi^2 = 7.97^{*}$
RR (95% CI)	1.00 (0.60, 1.66)	1.06 (0.72, 1.56)	0.57 (0.35, 0.92)	1.00 (Ref)		

Note. CI = confidence interval; LRG = Low Risk Group; PTRG = Preteen Risk Group; RR = risk ratio; TRG = Teenage Risk Group; YARG = Young Adult Risk Group. 95% CIs not containing 1.00 are significantly different from the LRG. Female sample was as follows: for PTRG, n = 205 (9.79%); for TRG, n = 928 (44.30%); for YARG, n = 379 (18.09%); for LRG, n = 583 (27.83%). Male sample was as follows: for PTRG, n = 266 (13.35%); for TRG, n = 710 (35.62%); for YARG, n = 506 (25.39%); for LRG, n = 511 (25.64%).

[a] Significantly different from the LRG mean when Dunnett's *t* test was used.

* *P* < .05;

**
P < .01;

***
P < .001.