CIGARETTE SMOKING FROM ADOLESCENCE TO YOUNG ADULTHOOD: WOMEN'S DEVELOPMENTAL TRAJECTORIES AND ASSOCIATES OUTCOMES

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Objectives: This study aimed to compare 1,442 women with distinct developmental trajectories of smoking from ages 13–23 on important young adult outcomes at age 29 (e.g., education, income, mental and physical health, arrest history, drug and alcohol abuse), as well as early transitions to sexual intercourse, parenthood, and marriage.

Methods: Women were classified as Abstainers or into 1 of 5 trajectory classes for which they had the highest probability of membership: Stable Highs, Early Increasers, Late Increasers, Triers, and Decreasers. Regression analysis was used to model outcomes as a function of trajectory class membership.

Results: Abstainers and Triers generally had more favorable outcomes than Stable Highs and Early Increasers. Decreasers were more likely to graduate from college than Stable Highs and Early Increasers and had a lower arrest rate than Stable Highs. Women who increased their smoking from initial low levels (Late Increasers) generally had poorer young adult outcomes compared to Triers and Abstainers, but lower risk for early sex and early parenthood compared to Stable Highs and Early Increasers.

Conclusions: Women with certain patterns of smoking from age 13–23 are at heightened risk for early transitions to sexual activity and parenthood, as well as health, behavioral, and socioeconomic problems during young adulthood.

Although adolescent smoking has declined somewhat in recent years, the prevalence of smoking among girls remains alarmingly high (Johnston, O'Malley, & Bachman, 2003; Substance Abuse and Mental Health Services Administration [SAMHSA], 2003). The short- and long-term health consequences of smoking are well documented (U.S. Department of Health and Human Services [USDHHS], 2001), with young smokers reporting poorer health and greater health services utilization compared to nonsmokers (Johnson & Richter, 2002; Newcomb & Bentler, 1987), as well as loss of stamina and withdrawal symptoms (Stanton, Lowe, & Gillespie, 1996). However, smoking is also associated with a wide range of psychosocial and behavioral problems during adolescence, including poor academic performance, drug and alcohol use, and delinquent activity (Ellickson, Tucker, & Klein, 2001; Escobedo, Reddy, & DuRant, 1997). Further, young girls who smoke are more likely than girls who do not smoke to experience early parenthood—as much as 5 times more likely by one estimate (Ellickson et al., 2001). Together, these findings suggest that young female smokers may not only report greater physical health problems by young adulthood, but face significant challenges in terms of low educational achievement and socioeconomic status, poor psychosocial adjustment, continuing behavioral problems, and an inability to successfully transition into and fulfill adult roles and responsibilities.

However, not all adolescent girls who smoke may be at similar risk for adverse outcomes. Some girls consistently smoke throughout their teenage years,

others delay smoking until late adolescence, and still others decrease their smoking or quit altogether. Several recent studies have documented the considerable heterogeneity in patterns of youth smoking (Andrews & Duncan, 1998; Colder et al., 2001; Soldz & Cui, 2002), with at least 2 of these studies providing a glimpse at how these distinct developmental smoking trajectories may be differentially associated with young adult outcomes (Chassin, Presson, Sherman, & Pitts, 2000; Orlando, Tucker, Ellickson, & Klein, 2004). For example, results from 1 or both of these studies indicate that youth who begin smoking during middle school and become relatively heavy smokers by young adulthood are less likely to go to college than abstainers and most other classes of smokers, report lower life satisfaction and greater negative affect than abstainers, and are more likely to engage in problem behaviors such as drug selling, violence, and drug and alcohol abuse than abstainers and light smokers. Youth who are able to decrease their smoking or quit appear to be at an advantage over those who continue to smoke at relatively high levels in terms of higher rates of college attendance, lower negative affect, and avoiding problematic drug use. Postponing smoking until later adolescence has also been associated with certain positive outcomes relative to early initiation, such as a higher rate of college attendance.

The present study extends previous research on smoking trajectories by focusing specifically on girls and women to (1) compare those with different smoking trajectories on demographic characteristics, as well as transitions that may have a particularly strong impact on the course of women's lives if experienced at a young age—initiation of sexual intercourse, parenthood, and marriage; and (2) examine the long-term outcomes associated with different patterns of smoking by comparing women with different developmental trajectories of smoking on key outcomes at age 29 such as educational attainment, income, job problems, arrest and abortion histories, physical and mental health, and alcohol and drug problems.

Methods

Participants

The original sample consists of 6,527 participants in the RAND Adolescent/Young Adult Panel Study, conducted to evaluate the Project ALERT drug prevention program for middle school children (Ellickson & Bell, 1990). Participants were recruited at grade 7 (1985) from 30 California and Oregon schools chosen to reflect a wide range of school and community environments across urban, suburban, and rural school districts. Nine schools had a minority population of 50% or more and 18 schools drew students from neighborhoods with household incomes below their state median. At baseline, 59% of participants came from an intact nuclear family and 53% had a father whose education stopped with high school. The cohort was assessed repeatedly over a 16-year period, when participants were approximately aged 13, 14, 15, 16, 18, 23, and 29. Unless otherwise noted, the present analyses are restricted to the 1,442 females who could be classified into one of the smoking trajectory classes based on information from the first 6 assessments and completed the survey on young adult outcomes at age 29.

Measures

Smoking trajectory classification. Smoking trajectory classification was based on results from a prior study (Orlando et al., 2004) that employed latent growth mixture modeling, implemented in Mplus (Muthén & Muthén, 1998–2001), to identify homogeneous trajectories of smoking for the entire sample. Our previous study used information provided by participants at each of the first 6 waves of data collection (ages 13–23) on their quantity and frequency of smoking to derive a smoking variable at each wave that ranged from 0–7 (0 = nonsmoker in past year; 1 = <3 times in past year and <3 times in past month; 2 = 3–10 times in past year and <3 times in past month; 3 = ≥11 times in past year and <3 times in past month, or 3–5 times in past month; 4 = ≥6 days in past month and <3 cigarettes per day; 5 = ≥6 days in past month and 3–7 cigarettes per day; 6 = ≥6 days in past month and about one-half pack per day; 7 = ≥6 days in past month and a pack or more per day). An a priori class of Abstainers included participants who reported not smoking over 6 waves of data. Data from the remaining participants were used to estimate latent growth trajectories for smoking. The basic latent growth model included 3 parameters (intercept, slope, and quadratic components) to characterize the trends in smoking over time. We tested models with differing numbers of latent classes (i.e., distinct groups with separate growth trajectories), and decided on the best number of classes based on 3 criteria: (1) difference in the model Bayesian information criterion (BIC) values; (2) average probability of class membership for each estimated class; and (3) shape of the estimated growth trajectories. The final model specified 5 distinct classes, which can be characterized as follows (we have added descriptive labels to the classes for ease of discussion and interpretation).

Stable Highs smoked at least weekly throughout the study period, and steadily increased quantity.

Early Increasers had a low smoking rate at age 13 that rose sharply to almost weekly smoking by age 14. They continued to increase their smoking, but less sharply, thereafter.

Decreasers smoked a few times per month at age 13, but steadily reduced their smoking to once or twice a year by age 23.

Late Increasers started low but increased steadily throughout the study period, with the sharpest increase between ages 18 and 23.

Triers never exceeded 1 or 2 cigarettes per year.

Demographic characteristics included ethnicity (White, African American, Asian, Hispanic, Other), whether the participant had an intact nuclear family at grade 7, and parents' education (1 = at least some college).

Early sexual activity, parenthood, and marriage were determined by participants' retrospective self-reports at the Wave 8 (age 23) and/or Wave 9 (age 29) assessments of the year or age when these events first occurred (sexual intercourse by age 14 or younger, parenthood by age 19 or younger, and marriage by age 19 or younger).

Age 29 outcomes included socioeconomic status, physical and mental health, behavioral problems, drug and alcohol abuse, and history of abortion. Three indicators of socioeconomic status were examined: whether participants had attained a college degree; employment income during the previous year (1 = <$10,000 to 9 = ≥$100,000); and whether participants had received welfare assistance during the previous year (Aid to Families with Dependent Children/Aid to Dependent Children, food stamps, or general assistance). We used a single item to assess current physical health, with higher scores indicating better perceived health (1 = poor to 5 = excellent). The 5-item Mental Health Index (Stewart, Hays & Ware, 1988; α = .81) was used as a measure of mental health (e.g., "How much of the time during the last 30 days have you been a nervous person, felt calm and peaceful, felt downhearted and blue"; 1 = all of the time to 6 = none of the time; higher scale score indicates better mental health). Dichotomous indicators of behavioral problems included whether participants had ever been arrested and whether they had experienced work-related problems during the past year (i.e., received a serious warning on the job or were fired). Separate dichotomous measures of alcohol abuse and drug abuse were created. In each case, 9 items assessed how many times in the past year (unless otherwise noted) the respondent experienced the following because of substance use: missed work; arrived late to work or left early (past 30 days); got into trouble at work; did something she later was sorry for; got into a physical fight; was arrested or held at a police station; had a traffic accident; was criticized by friends; and had difficulties with spouse or live-in partner. Separately for alcohol and drugs, women were classified as engaging in substance abuse if they had experienced 2 or more types of problems, or if they experienced a particular problem 3 or more times. Finally, women indicated whether they ever had an abortion.

Analytic approach

For this study, we first conducted a sensitivity analysis to ensure that patterns of smoking unique to women were not obscured by our previous full sample estimation (Orlando et al., 2004). Specifically, the same latent growth mixture modeling analysis that we used in our previous study to identify smoking trajectories in the full sample (described earlier) was conducted on the subsample of women only. Note that these analyses were not restricted to women with Wave 9 information. Across these 2 solutions (full sample and women only), we compared the number of trajectory classes that were identified, the shapes of these trajectory classes, and the classification status of the women.

To compare trajectory classes on the outcome variables, women were assigned to the smoking trajectory class for which they had the highest probability of membership (or classified as Abstainers, if appropriate). Logistic and least squares regression analyses were used to model each of the outcome variables as a function of trajectory class membership. Note that both Project ALERT intervention and control participants were included in all analyses to increase sample size. The intervention was implemented after Wave 1 and its effects on substance use had mostly eroded by Wave 3; nonetheless, these analyses controlled for Project ALERT group membership (intervention versus control group), as well as demographic characteristics. Using these models as a basis, we evaluated the association between class membership and each outcome by examining the significance of linear contrasts for each pairwise class comparison. Significance levels were adjusted for multiple comparisons (Hochberg, 1988).

These analyses also incorporated sample weights to reduce bias associated with attrition occurring by the age 29 assessment, as well as attrition that affected inclusion in the analyses identifying smoking trajectories (i.e., not having at least 3 waves of data). Attrition in the full baseline sample ranged from 10% at the age 14 assessment to 60% at the age 29 assessment. Participants who could not be located or dropped out of the study are known to differ from those who were retained on demographic characteristics, substance use, and grades. Previous work has shown that the use of sample weights is the best method of adjusting for attrition in this school-based sample (McGuigan, Ellickson, Hays, & Bell, 1997) and weights developed to deal with attrition by grade 12 have been found to remove most of the bias exhibited in the unweighted sample (Collins, Ellickson, & Bell, 1999). The weighting was conducted by using logistic regression to create predicted probabilities of both being included
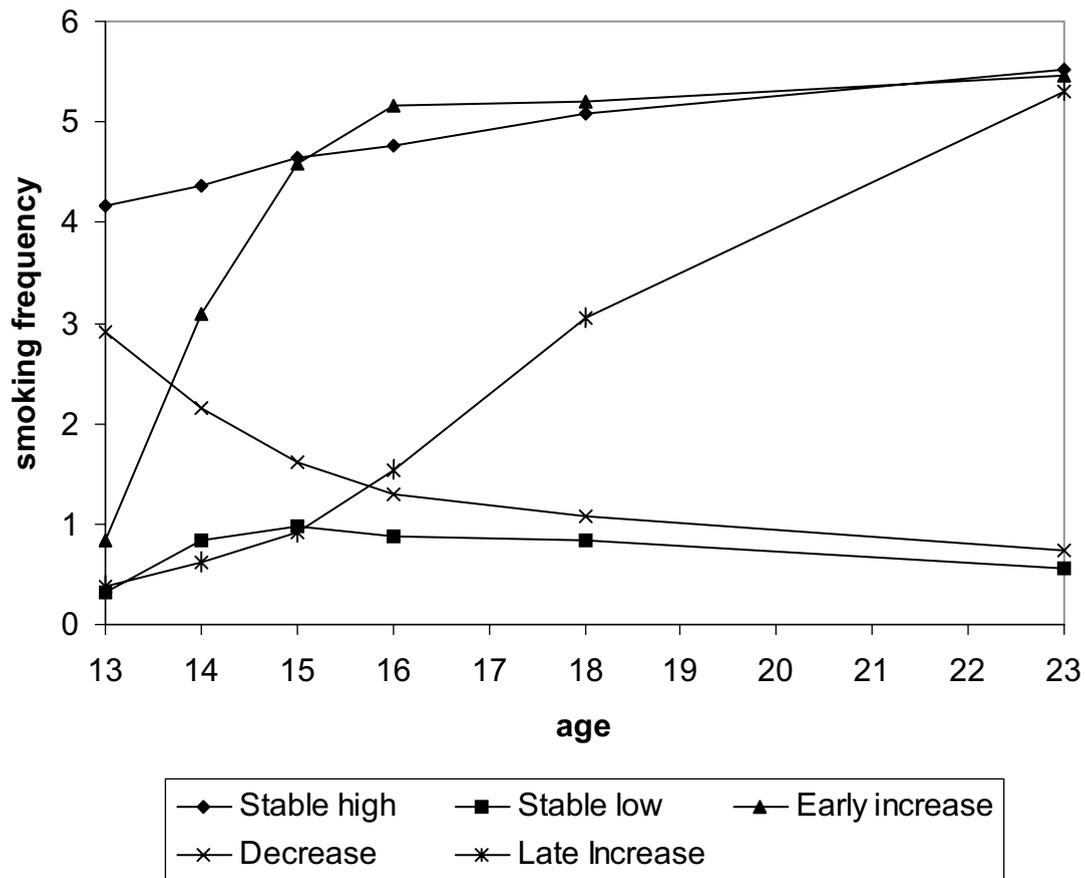
Figure 1. Observed weighted mean scores on frequency of smoking (0 = nonsmoker in past year; 1 = <3 times in past year and <3 times in past month; 2 = 3–10 times in past year and <3 times in past month; 3 = ≥11 times in past year and <3 times in past month, or 3–5 times in past month; 4 = ≥6 days in past month and <3 cigarettes per day; 5 = ≥6 days in past month and 3–7 cigarettes per day; 6 = ≥6 days in past month and about one-half pack per day; 7 = ≥6 days in past month and a pack or more per day) by smoking trajectory class.

in the relevant smoking trajectory (or trajectories) and responding to the 2001 survey using predictors that were derived from 7th grade information about each 7th grade participant (including race, gender, family structure, delinquency, substance use, and grades).

Results

Smoking trajectory classification

Several findings from the sensitivity analysis suggest that no patterns of smoking unique to women were obscured by the full sample estimation conducted by Orlando et al. (2004). As mentioned, 1 criteria for evaluating the relative suitability of different solutions is the difference in the model BIC values (better models are indicated by relatively lower BIC values). As was the case for the full sample, the BIC was smaller with a five-class structure than a four-class structure (BIC_4 = 39224.9; BIC_5 = 38856.5). Second, the shapes of the five smoking trajectories for women were nearly identical to those from the 5-class, full sample solution. Third, differences in classifications of women into trajectory classes was trivial between the

full-sample and women-only solutions: only 3.1% of the women would be classified differently if the female-only solution was used. Therefore, we used the original 5-class solution based on the full sample to assign women to trajectory classes for the present analyses: Stable Highs (6% of women, 8% of smokers, average probability of membership [APM] = .96); Early Increasers (11% of women, 15% of smokers, APM = .87); Decreasers (7% of women, 9% of smokers, APM = .80); Late Increasers (9% of women, 13% of smokers, APM = .84); and Triers (40% of women, 55% of smokers, APM = .92). Abstainers comprised 27% of the sample. Observed mean scores on frequency of smoking by trajectory class for women can be found in Figure 1.

Comparison of smoking trajectory classes

Demographic comparisons. Model-based mean and percentage estimates of demographic characteristics are presented in Table 1. The demographic composition of the analytic sample varied considerably with respect to growth curve trajectory classes. In terms of race/

Table 1. Proportion of women in each demographic group according to smoking class

	Stable high (n = 69)	Early increaser (n = 123)	Decreaser (n = 82)	Late increaser (n = 158)	Trier (n = 584)	Abstainer (n = 426)
Race/ethnicity						
White	70[ab]	78[a]	51[b]	77[a]	66[ab]	66[ab]
Black	7[abc]	2[c]	23[b]	9[ac]	13[ab]	11[ac]
Hispanic	13[a]	11[a]	18[a]	5[a]	11[a]	7[a]
Asian	0[a]	3[ab]	4[ab]	5[ab]	7[b]	16[b]
Other ethnicity	10[ab]	6[ab]	4[ab]	4[ab]	4[a]	0[b]
Nuclear family	29[a]	37[a]	48[ab]	60[bc]	60[b]	71[c]
Parents' education	31[ab]	33[a]	29[ab]	44[ab]	41[ab]	46[b]

Note: Row entries with identical superscripts are not significantly different from one another, on the basis of the Hochberg adjustment for multiple comparisons.

ethnicity, non-Hispanic white women were less likely to be Decreasers than either Early Increasers or Late Increasers, whereas African American women were more likely to be Decreasers than Early Increasers, Late Increasers, or Abstainers. African American women were also less likely to be Early Increasers than Triers. Asian women were more likely to be Triers or Abstainers than Stable Highs and women of "other" race/ethnicity were more likely to be Triers than Abstainers. Stable Highs and Early Increasers were less likely to come from an intact nuclear family than Abstainers, Triers, and Late Increasers, with the same being true for Decreasers and Triers compared to Abstainers. The latter were more likely than the Early Increasers to have parents who completed at least some college.

Early sex, parenthood, and marriage. As Table 2 shows, the 6 classes did not significantly differ on their rate of early marriage (which ranged from 10–19% across trajectory classes). Nor did Abstainers and Triers significantly differ in their rates of early sexual intercourse (6% versus 12%, respectively) or early parenthood (7% versus 10%, respectively). However, with only 1 exception, both Abstainers and Triers were significantly less likely to experience early sex and parenthood compared to Stable Highs (early sex: 41%; early parenthood: 29%), Early Increasers (early sex: 44%; early parenthood: 26%), and Decreasers (early sex: 22%; early parenthood: 22%). The exception involved Triers and Decreasers, who reported similar rates of early sex. Late Increasers were less likely to experience early sex (14%) and parenthood (9%) compared to Stable Highs and Early Increasers. Stable Highs, Early Increasers, and Decreasers had similar rates of early sex and early parenthood.

Socioeconomic status. Rates of college graduation were significantly higher among Abstainers (47%), Triers (43%), and Decreasers (35%) than among Stable Highs (14%) and Early Increasers (10%). Further, Abstainers and Triers had higher rates of college graduation than

Table 2. Demographic-adjusted mean estimates of age 29 outcomes for each smoking class

Outcome Variables	Stable high (n = 53–69)*	Early increaser (n = 103–122)	Decreaser (n = 66–82)	Late increaser (n = 139–158)	Trier (n = 515–584)	Abstainer (n = 371–425)
Early sex	41%[a]	44%[a]	22%[ab]	14%[bc]	12%[bc]	6%[c]
Early parenthood	29%[a]	26%[a]	22%[ac]	9%[bc]	10%[b]	7%[b]
Early marriage	15%[a]	15%[a]	19%[a]	10%[a]	11%[a]	10%[a]
College graduate	14%[a]	10%[a]	35%[bc]	23%[ac]	43%[b]	47%[b]
Income**	29.18[ab]	22.90[a]	33.46[ab]	26.22[a]	32.03[b]	32.31[b]
Welfare recipient	13%[ab]	18%[a]	5%[ab]	12%[ab]	6%[b]	4%[b]
Physical health	3.65[ab]	3.67[a]	3.94[abc]	3.95[abc]	4.00[bc]	4.13[c]
Mental health	3.53[ab]	3.39[a]	3.80[ab]	3.54[a]	3.76[ab]	3.89[b]
Arrest history	37%[a]	35%[ab]	13%[bcd]	24%[ab]	11%[c]	4%[d]
Job problems	15%[a]	10%[a]	7%[a]	7%[a]	7%[a]	6%[a]
Alcohol abuse	35%[a]	24%[ab]	16%[ab]	21%[ab]	14%[b]	5%[c]
Drug abuse	16%[a]	11%[a]	3%[ab]	7%[ab]	3%[b]	1%[b]
Had abortion	40%[a]	49%[a]	33%[abc]	36%[ac]	24%[bc]	17%[b]

Note. Row entries with identical superscripts are not significantly different from one another, on the basis of the Hochberg adjustment for multiple comparisons.
*Sample sizes vary due to missing data on outcome variables.
**Income is reported in thousands of dollars.

Late Increasers (23%). Abstainers and Triers also had significantly higher yearly income compared to Early Increasers and Late Increasers (approximately $32,000 versus $23,000–$26,000, respectively) and were less likely to be receiving welfare assistance compared to Early Increasers (4–6% versus 18%, respectively).

Physical and mental health. There were relatively few differences among the trajectory classes on physical and mental health. Abstainers ($M = 4.13$) reported better physical health than Stable Highs ($M = 3.65$) and Early Increasers ($M = 3.67$), whereas Triers ($M = 4.00$) reported better physical health than Early Increasers. For mental health, Abstainers ($M = 3.89$) reported better mental health than Early Increasers ($M = 3.39$) and Late Increasers ($M = 3.54$).

Behavioral problems. The arrest rate among smokers ranged from 11% for Triers to 37% for Stable Highs and was significantly lower among Abstainers (4%) compared with all other smoking trajectory classes except Decreasers (13%). Triers were less likely to have an arrest history compared to Stable Highs, Early Increasers (35%), and Late Increasers (24%). Finally, Decreasers were less likely to have an arrest history compared to Stable Highs. There were no significant differences among the trajectory classes on job-related problems (i.e., receiving a serious warning or being fired), with rates ranging from 6% among Abstainers to 15% among Stable Highs.

Alcohol and drug abuse. The rate of alcohol abuse was significantly lower among Abstainers (5%) than any of the smoking trajectory classes, which ranged from 14% for Triers to 35% for Stable Highs (note that Triers and Stable Highs were the only 2 smoking trajectory classes that significantly differed on alcohol abuse). Both Abstainers and Triers were less likely to report drug abuse compared to Stable Highs and Early Increasers (1–3% versus 11–16%, respectively).

Abortion. Abstainers (17%) and Triers (24%) were less likely to have had an abortion than Stable Highs (40%) and Early Increasers (49%); Abstainers were also less likely to have had an abortion than Late Increasers (36%).

Discussion

This study follows from our previous work identifying developmental trajectories of smoking from ages 13–23 in a cohort of over 6,500 West Coast youth (Orlando et al., 2004). The first step in our analyses was to ensure that patterns of smoking unique to women were not obscured in our previous analyses of the full sample. Our sensitivity analyses indicated that the 5 trajectory classes previously identified (in addition to an a priori class of Abstainers) accurately and fully describe the patterns of smoking in females. Confidence in the generalizability of the findings is bolstered by the fact that similar patterns have been found in other studies that employ large adolescent samples but differ in demographic composition and analytic strategy for identifying smoking patterns (Chassin et al., 2000; Soldz & Cui, 2002). Of particular note, although most women either abstained from smoking or smoked at very low levels between adolescence and young adulthood (69%), a substantial minority (25%) entered smoking pathways that led to relatively high levels of smoking by age 23. Only a few (6%) reduced their smoking over time. The fact that women with distinct smoking trajectories ultimately clustered into 2 groups by age 23, namely, those smoking at relatively high levels (35% of smokers) and those who rarely smoked (65% of smokers), likely reflects the addictive nature of cigarette smoking.

African American women were more highly represented in the trajectory class that tried cigarettes and then decreased use during adolescence than in the classes that increased use over time (Early Increasers, Late Increasers) or the class of Abstainers. This finding is consistent with previous work suggesting that young African American smokers are less likely to develop strong pro-smoking attitudes and intentions, and more likely to live in a social environment that becomes less conducive to smoking after the age of 13 or 14 years, compared to smokers in other racial/ethnic groups (Ellickson, Orlando, Tucker, & Klein, 2004). There were few differences between the trajectory classes on parental education. However, having an intact nuclear family at grade 7 emerged as a significant protective factor against smoking in general and the most extreme patterns of use in particular (Stable Highs, Early Increasers), thus extending previous work on the relevance of family structure to adolescent substance use (Griffin, Botvin, Scheier, Diaz, & Miller, 2000; Hoffman, 1995).

Past research indicates that young smokers are at higher risk for various psychosocial and behavioral problems during young adulthood (e.g., Chassin et al., 2000; Orlando et al., 2004), with these poorer outcomes likely caused by the risky psychosocial profile associated with youth smoking (Ellickson et al., 2001; Escobedo et al., 1997). The present study extends this line of research by focusing specifically on women to understand whether distinct developmental trajectories of smoking are differentially associated with women's economic, behavioral, and psychosocial outcomes in young adulthood, as well as early transitions to sex, parenthood, and marriage that may impact women's future life choices and achievement. Among the 5 smoking trajectory classes, the 2 groups of women who smoked early and at consistently high

levels throughout adolescence and emerging adulthood (Stable Highs, Early Increasers) were found to fare the worst. Further, the magnitude of differences between these 2 classes of women and Abstainers is quite striking and has not been previously documented. For example, compared to Abstainers, Stable Highs were 16 times more likely to have a history of drug abuse by age 29, 9 times more likely to have been arrested by age 29, nearly 7 times more likely to have initiated sexual intercourse by age 14 or younger, and 4 times more likely to have been a teenage mother. Women who maintained their smoking at consistently low levels during adolescence and emerging adulthood (Triers) had a more favorable profile than Stable Highs and Early Increasers in terms of lower rates of early sex, early parenthood, arrest, drug abuse, and abortion, and higher rates of college graduation. Nonetheless, even Triers were nearly 3 times more likely than Abstainers to have a history of arrest and alcohol abuse by age 29.

Our results suggest that decreasing smoking during adolescence is associated with certain positive outcomes, such as higher educational attainment and lesser likelihood of being arrested for criminal behavior. These relationships may reflect changes in aspirations and peer associations that appear to be linked with downward shifts in smoking (Chen, White, & Pandina, 2001; Orlando et al., 2004). Other advantages in young adulthood that may be associated with decreasing smoking during adolescence include higher socioeconomic status, better mental and physical health, and less likelihood of substance abuse, although many of the class comparisons involving Decreasers were not significant owing to low statistical power. Women who delayed smoking were at lower risk for early sex and parenthood than women who were more committed smokers throughout adolescence and emerging adulthood, a finding that is consistent with previous results indicating that Late Increasers initially have a weaker proclivity toward deviant behavior and are more engaged in school at age 13 compared to Stable Highs and Early Increasers (Orlando et al., 2004). However, this prior work also suggests that Late Increasers exhibit an increasingly risky psychosocial profile over time, which may help to explain why women who delayed smoking fared worse than Abstainers by young adulthood in terms of their educational attainment, income, mental health, and history of arrest, alcohol abuse, and abortion.

In interpreting these findings, it is important to keep in mind that our results do not imply that certain smoking patterns necessarily cause later problems in young adulthood. Indeed, it is highly unlikely that smoking has a direct effect on most of the outcomes that we examined (physical health being a notable exception). However, certain smoking patterns may influence young adult outcomes indirectly by increasing or decreasing the likelihood of being exposed to deviant peers, shaping self-perceptions, having an impact on how girls are viewed and treated by others, and so forth. If this is the case, continued efforts to prevent or reduce smoking throughout the years between adolescence and young adulthood may have substantial payoffs for women across multiple public health domains.

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Author Descriptions

Joan Tucker, a Social Psychologist and Behavioral Scientist at RAND, conducts research on risk factors for initiation and escalation of substance use; consequences of substance use during adolescence and young adulthood; and the impact of substance use, mental health problems, and victimization on HIV risk in vulnerable populations.

Phyllis Ellickson, a Senior Behavioral Scientist and Director of the RAND Center for Research on Child and Adolescent Health, led the team that developed and evaluated Project ALERT (a widely acclaimed drug prevention program) and has also published extensively on adolescent drug use, violence, and dropping out, as well as the challenges of conducting large-scale field trials and field experiments.

Maria Orlando, a Quantitative Psychologist specializing in health research at RAND, has extensive knowledge of test theory, including Item Response Theory, and advanced multivariate analysis methods such as Structural Equation Modeling and latent growth mixture modeling.

David J. Klein, a Quantitative Analyst in RAND's Statistical Research and Consulting Group, performs data management and statistical analysis, with current projects including studies on substance use, parent–child communications, quality and quantity of health care usage, and medical education.