SMOKING AND TOBACCO CONTROL

MONOGRAPH 14

Changing Adolescent Smoking Prevalence

Where It Is and Why

U.S. DEPARTMENT OF HEALTH
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Public Health Service
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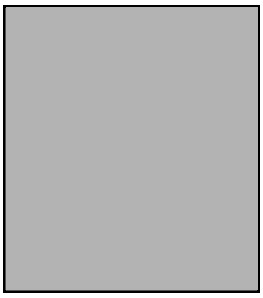
MONOGRAPH



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Smoking and Tobacco Control Monographs Issued to Date

Strategies to Control Tobacco Use in the United States: a blueprint for public health action in the 1990's. Smoking and Tobacco Control Monograph No. 1. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute. NIH Publication No. 92-3316, December 1991.

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Major Local Tobacco Control Ordinances in the Unites States. Smoking and Tobacco Control Monograph No. 3. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health. NIH Publication No. 93-3532, May 1993.

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Changes in Cigarette Related Disease Risks and Their Implication for Prevention and Control. Smoking and Tobacco Control Monograph No. 8. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health. NIH Publication No. 97-4213, February 1997.

Cigars. Health Effects and Trends. Smoking and Tobacco Control Monograph No. 9. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health. NIH Publication No. 98-4302, February 1998.

Health Effects of Exposure to Environmental Tobacco Smoke. The Report of the California Environmental Protection Agency. Smoking and Tobacco Control Monograph No. 10. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute. NIH Publication No. 99-4645, August 1999.

State and Local Legislative Action to Reduce Tobacco Use. Smoking and Tobacco Control Monograph No. 11. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Publication No. 00-4804, August 2000.

Population Based Smoking Cessation: Proceedings of a Conference on What Works to Influence Cessation in the General Population. Smoking and Tobacco Control Monograph No. 12. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Publication No. 00-4892, November 2000.

Preface

This monograph is the first major update of adolescent smoking behavior since the groundbreaking reports of the Surgeon General and the Institute of Medicine in 1994. The authors of this National Cancer Institute (NCI) Monograph report some progress toward reducing tobacco use among adolescents but also highlight areas in which more efforts need to be made.

Several chapters examine trends in adolescent smoking behavior, among all adolescents nationally, different racial/ethnic groups, and among adolescents residing in specific States. Other chapters examine these trends using different national surveys as data sources and different analytical methods. Finally, the remaining chapters present data on macro-level policies and factors that influence the initiation and maintenance of smoking behavior among adolescents.

National survey data are used in chapters 3, 4, 8, and 9 to examine trends in adolescent smoking. Chapter 8, "Changes in Adolescent Smoking Behaviors in Sequential Birth Cohorts," is the most extensive, reviewing data from 5-year birth cohorts from 1926-1930 to 1981-1985. The data show that initiation rates have declined over time at all ages for males while female cohorts showed little indication of a decline in initiation for ages under 16 years and an increasing initiation rate for ages 16 and older. Chapter 9, "Pattern of Adolescent Initiation Rates over Time: National and California Data," compares cross-sectional data from national surveys with data from the State of California shortly after the passage of Proposition 99. It was this law that provided tobacco control groups with funding to launch an aggressive anti-smoking campaign. Following the enactment of Proposition 99, adolescent smoking showed a significant decrease in California compared with the national experience during this time, primarily among adolescent males.

Chapters 6, 7, and 9 report results from statewide projects in three of the States at the forefront of tobacco control in this country. Chapter 6, "Changing Adolescent Smoking Prevalence: Impact of Advertising Intervention," describes progress in Massachusetts. Chapter 7, "Predictors of Tobacco Use among Adolescents in Florida, 1998-1999," examines data from Florida and includes a study of the predictors of tobacco use among adolescents in that state. As noted above, Chapter 9, "Pattern of Adolescent Initiation Rates over Time: National and California Data," analyzes adolescent smoking over the period 1990-1996, the period following the enactment of Proposition 99, which was marked by a large increase in tobacco control activity in California.

While several of the chapters present data on various racial/ethnic groups, Chapters 14, 15, 16, and 17 focus exclusively on describing and explaining smoking behavior of African American, Hispanic/Latino, Asian American and Pacific Islander, and American Indian and Alaskan Native adolescents. Chapter 14, "African American Teen Cigarette Smoking: A Review," delineates the protective factors that may contribute to substantially lower prevalence rates among African American adolescents and risks factors that may contribute to increases in smoking that began in the early 1990's. Little is known on how protective and risk factors explain the "late onset" of smoking and transition to higher smoking rates among African American adults. Data are limited and do not often distinguish smoking rates among subgroups of people of African heritage.

Chapter 15, "Understanding Tobacco-Use Research among Hispanic/Latino Adolescents: A Sociocultural Perspective," suggests that explaining prevalence rates among Hispanic/Latino adolescents requires an understanding of the complex interfacing of changing demographics, heterogeneity among subgroups, sociodemographics, culture, language capabilities and preferences, role of acculturation, immigrant status, gender, social networks, and tobacco advertising and promotion. Prevalence rates are increasing although they are still lower than for Whites and American Native Indians.

Chapter 16, "Asian American and Pacific Islander Adolescent Cigarette Smoking: A Review," reviews factors associated with smoking, but strongly suggests that national data often mask the differences in tobacco use among American Asian and Pacific Islander ethnic subgroups. Small sample sizes in surveillance studies and lack of understanding on factors associated with tobacco use among subgroups often limit the generalizability of the results. Aggregate data from the California Youth Tobacco Survey document Asian youth susceptibility to smoking and dramatic increases in smoking rates from 1993-1996. Additional studies are needed to closely monitor prevalence rates and dissect factors influencing initiation among American Asian and Pacific Islander ethnic subgroups.

Chapter 17, "American Indian and Alaskan Native Teen Cigarette Smoking: A Review," examines the historical and cultural context of tobacco use among American Indian and Alaskan Native adolescents. American Indians and Alaskan Native adolescents have consistently reported the highest percentage of cigarette smokers in the nation and these rates continue into adulthood. These rates vary by geographical region and among Native Indian groups. Reducing the harmful effects of tobacco in tandem with preserving Native culture calls for unique approaches to tobacco control among Native Indian adolescents.

While there are either limited aggregate data or subgroup data within African American, Hispanic/Latino, Asian American and Pacific Islander, and American Indian and Alaskan Native adolescents, these chapters offer explanations for factors that influence smoking initiation. It has long been recognized that a single tobacco control initiative is not equally successful

in all geographical areas or groups of different ethnic, educational, or economic backgrounds. These chapters each contribute to an understanding of the complexity and subtleties of tobacco control in this country.

This Monograph examines some of the macro-level influences of smoking behavior among adolescents. Two chapters address the effect of the media. Media influences are important and relevant for many reasons, including the enormous budget the tobacco industry devotes to advertising cigarettes, and that a large portion of this advertising is directed at young people. Chapter 10, "Changing Adolescent Smoking Prevalence: Impact of Advertising Intervention," examines this impact and addresses the use of advertising to deliver tobacco prevention messages. Chapter 13, "The Role of Tobacco Advertising and Promotion in Smoking Initiation," reports on the possible causal relationship between tobacco marketing and youth smoking initiation. Additional chapters analyze the impact of other macro-level factors. Chapter 12, "The Impact of Price on Youth Tobacco Use," examines how the price of cigarettes may influence youth smoking. Data suggests that youth are more responsive to cigarette price increases than are young adults and adults. Youth with greater disposable income smoke more than those with fewer resources and price sensitivities may differ for population subgroups. Little is still known about the impact of large price increases on cigarette demand and the black market in tobacco products and the long-term impact of price changes on addictive behaviors over time.

The results presented in Chapter 11, "Has Youth Access to Tobacco Changed over the Past Decade?" are not encouraging. Youth access to cigarettes has not changed in the recent past and youth often obtain cigarettes from a variety of noncommercial and commercial resources. Although many states and communities have laws prohibiting the sale of cigarettes to minors, these laws are not always fully enforced. Curtailing illegal sales may reduce rates, but high compliance rates are necessary in order to see any effect since compliance rates may underestimate the commercial availability of cigarettes to minors.

In summary, while this Monograph documents some successes in the reduction of youth smoking initiation in some States and localities, there remains a need for an ongoing and exhaustive search for solutions, followed by committed and successful application to enable the country to reach its goals in the area of adolescent smoking.

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This monograph is the result of a conference and set of analyses commissioned and funded jointly by the National Cancer Institute and the Tobacco Control Section of the California Department of Health Services. The conference was held on May 24 and 25, 1999, in San Diego, California. Draft sections of this volume were subjected to peer review and revision, and the resultant draft of the entire volume was also subjected to peer review and revision.

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Contents

Overview of Recent Changes in Adolescent Smoking Behavior

David M. Burns, Lloyd D. Johnston

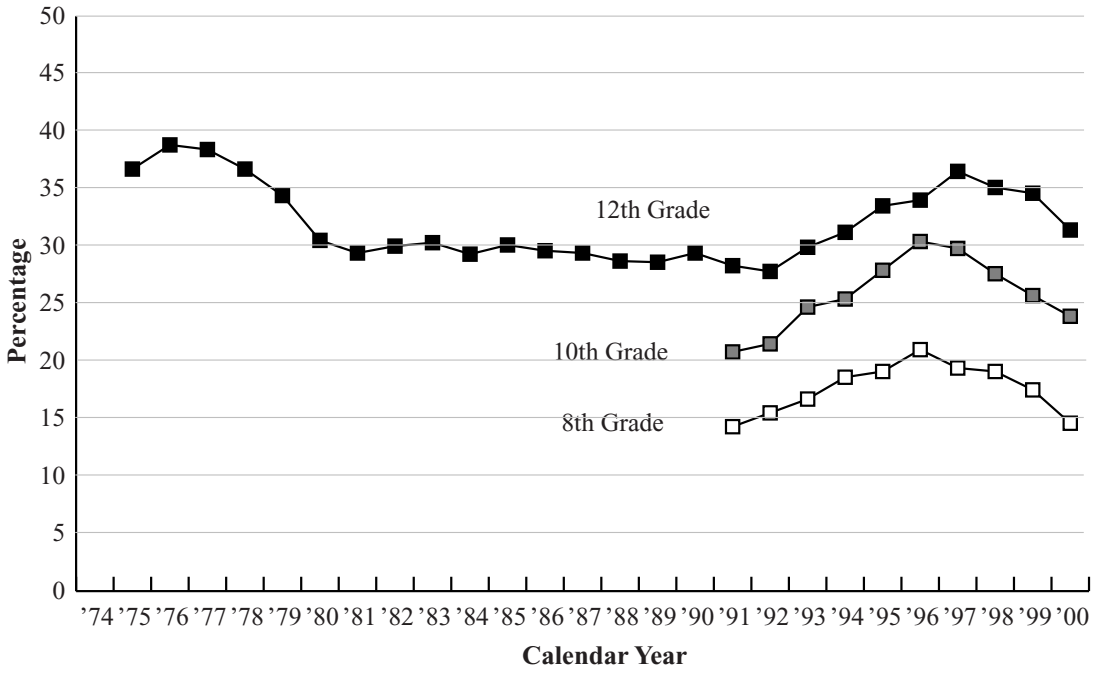
This chapter provides a synopsis and integration of a range of findings put forward by the authors of this monograph. The reader is referred to the relevant chapters for the complete exposition of the findings, their place in the larger literature, and the supporting references.

INTRODUCTION One principal aim of tobacco control programs is the prevention of smoking initiation. Adolescent smoking prevalence peaked during the 1940s for males and during the early1970s for females. Since the 1940s, there has been a substantial decline in smoking prevalence among adolescent males. However, during the 1980s, the decline in prevalence stopped and began to level. The decline from the peak prevalence in the 1970s was less dramatic among female adolescents than male. During the 1990s, both genders experienced an increase in smoking prevalence and smoking rates among males and females are now similar. Recent changes in smoking behavior have been comprehensively documented in a report by the Centers for Disease Control and Prevention (CDC, 2000).

Data from the Monitoring the Future study (see Chapter 2) show a dramatic increase in adolescent smoking prevalence (Figure 1-1) during the 1990s, and similar trends have been observed with the Youth Risk Behavior Survey (YRBS) (see Chapter 3). The National Household Survey on Drug Abuse (NHSDA) showed an increase in the incidence of initiation over the same period (see Chapter 4). This volume examines the increases in smoking prevalence, defines the demographic composition and determinants of smoking, and identifies some of the approaches to dealing with this public health problem.

CHANGES IN ADOLESCENT SMOKING BEHAVIOR OVER TIME The Monitoring the Future study (Chapter 2) has been conducted consistently since 1975 and offers the most complete set of cross-sectional measures of adolescent smoking behavior since that time. Figure 1-1 presents trends in prevalence of any smoking within the last 30 days from 1975 to 2000 for 12th-grade students and from 1991 to 2000 for 8th- and 10th-grade students. The data in Figure 1-1 suggest a peak in 12th-grade smoking prevalence in the mid-1970s, followed by a short period of decline, then by a 10-year period from 1980 to 1990, during which prevalence remained level. Beginning in the 1990s, all three grades showed a nearly simultaneous period of increasing current and daily smoking. The smoking prevalence peaked for 8th- and 10th-grade students in 1996 and for 12th-grade students in 1997. However, all grades have shown declines in prevalence over the last few years. These national trends are confirmed by data from the BRFS and NHSDA surveys (see Chapters 3 and 4).

Figure 1-1
Trends in 30-Day Prevalence of Cigarette Smoking for 8th-, 10th-, and 12th-Graders, 1975-2000

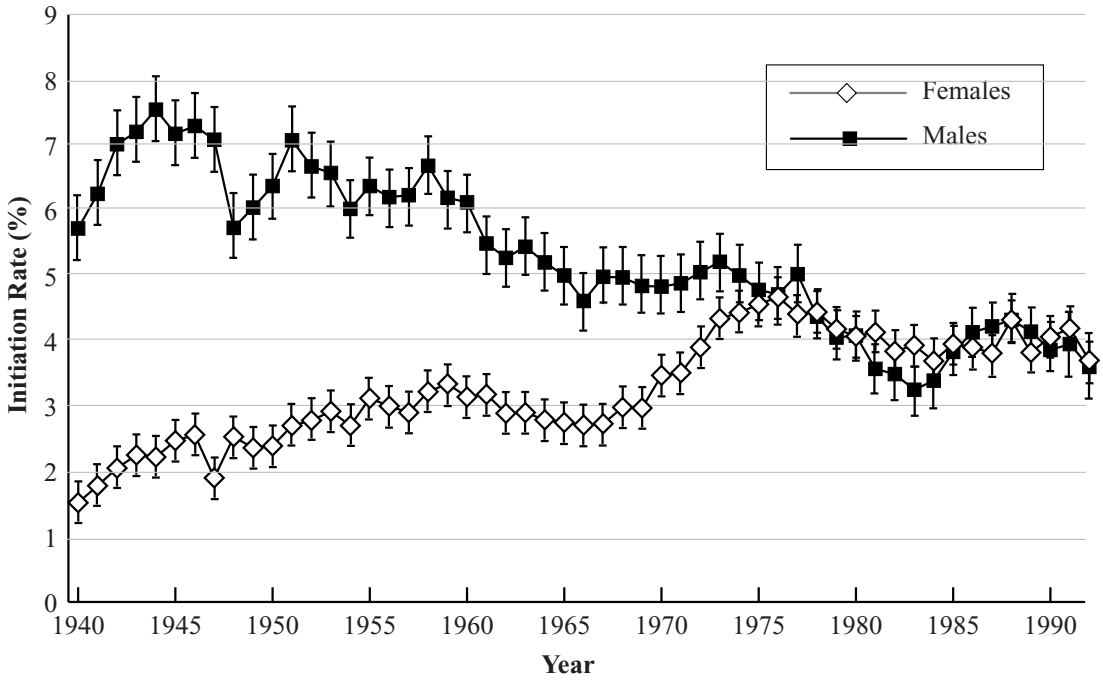


NOTE: Data from the most recent Monitoring the Future Study was used in this figure. Other sections of this monograph present older data available at the time the chapters were written.
SOURCE: Monitoring the Future Study, University of Michigan.

It is possible to estimate smoking initiation rates for the years prior to the availability of the cross-sectional survey data (*i.e.*, pre-1975) by using recall of the age of smoking initiation from surveys of adults (see Chapters 8 and 9). When gender-specific trends in adolescent smoking initiation over the last half-century are examined using this approach (See Chapter 9), rates of smoking initiation among adolescent males have decreased significantly since 1940 (Figure 1-2). Adolescent females, who had rates of initiation that were substantially lower than those for adolescent males prior to 1970, increased their rates of initiation between 1940 and 1960, and then their rates declined slightly during the early 1960s. Female adolescents aged 12-17 sharply increased their rates of initiation following Philip Morris' introduction and marketing of Virginia Slims brand of cigarettes in the late 1960s. Male and female adolescent initiation rates have been similar since the mid-1970s.

Most of the change in initiation seen over the last several decades can be attributed to the changes in rates among older 15- to 17-year-old adolescents, with rates among 12- to 14-year-old adolescents changing much less. This rise in adolescent smoking initiation during the late 1960s and early 1970s is confirmed by examining the age at which first regular smoking occurred as reported by 12th-grade students in the Monitoring the Future study (See Chapter 2).

Figure 1-2
Incidence of Smoking among 12- to 17-Year-Old Adolescents, 1940-1992

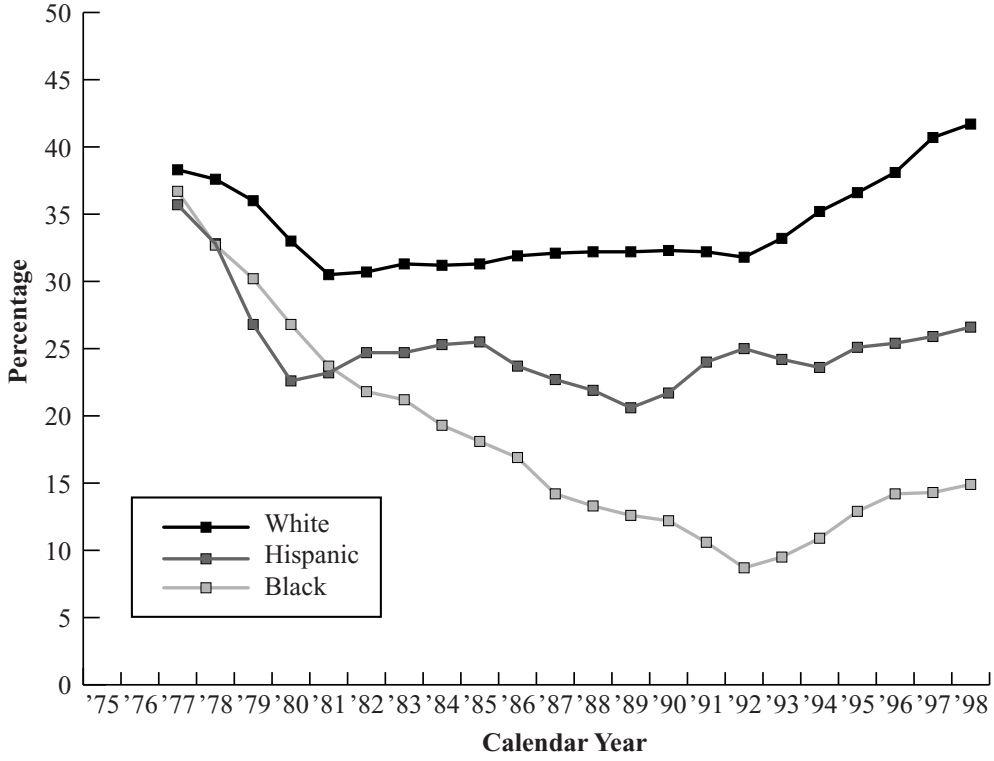


National estimates of current smoking within the last 30 days for adolescents have increased between 1991 and 1997 as measured by both the Monitoring the Future study (Figure 1-1; see Chapter 2) and the Youth Risk Behavior Survey (YRBS), and these trends occurred across all age groups of adolescents and in both genders. Recent data suggest that these trends of increasing prevalence are reversing (see Figure 1-1), but they remain a critical public health concern.

Demographic Composition of the Recent Increase in Adolescent Smoking Prevalence

Recent increases in adolescent smoking prevalence rates have occurred across all racial and ethnic groups, but the magnitude of the changes has not been uniform. Cross-sectional survey data from the Monitoring the Future study (see Chapter 2) show small differences in smoking prevalence rates among White, Hispanic, and African American 12th-grade adolescents in 1976, near the start of the study (Figure 1-3). However, during the period of general decline in use (1977–1981), smoking prevalence among Africa American and Hispanic 12th-grade students declined more than among Whites. Thereafter, through 1992, cigarette smoking prevalence rates among Hispanic adolescents remained stable, but at lower levels than among Whites. Smoking prevalence rates among African American students continued to decline steadily from 1981 to 1992, opening a very large differential with White smoking rates and a sizeable

Figure 1-3
Trends in 30-Day Prevalence of Cigarette Smoking by Race/Ethnicity for 12th-Graders, 1975-1998



Source: The Monitoring the Future Study, University of Michigan.

differential with Hispanic rates. After 1992, all three groups showed some increase in smoking, though the increase was smallest among Hispanics. There also was a change in smoking prevalence associated with population density; the increase in teen smoking prevalence during the 1990s was greatest in the non-urban areas.

These differences in smoking behavior are confirmed by analyses of the YRBS data (see Chapter 3) and of the NHSDA data (see Chapter 4). Reconstructed initiation rates from the adult Current Population Survey (CPS) (see Chapter 9) also suggest that there is a difference between age-specific initiation rates at every age of non-Hispanic White adolescents and those of Hispanic and African-American adolescents.

In contrast to the national data, which show that there has been a clear increase in smoking prevalence rates among African American adolescents, data from two states with strong tobacco control programs—California and Massachusetts (see Chapters 5 and 6, respectively)—show smaller increases in smoking prevalence rates. These states also do not show an increase in smoking prevalence rates among African American adolescents. In these states, the increase in smoking prevalence was most evident among non-Hispanic White and Asian adolescents.

Other demographic characteristics that are associated with differences in adolescent smoking trends are presented and discussed in Chapter 2, based on findings from the Monitoring the Future study. However, the greatest divergence in trends is that associated with race/ethnicity.

Changes in the Social Predictors of Adolescent Smoking

Educational aspirations and school performance have long been established as strong correlates of cigarette smoking (Bachman *et al.*, 1978; Johnston, 1973), and they define populations of adolescents who have clear differences in smoking prevalence (see Chapter 2). Self-described school performance is strongly correlated with smoking prevalence in the NHSDA (See Chapter 4), and the Monitoring the Future study demonstrates a clear difference in smoking prevalence between two groups of 12th-grade students with different educational aspirations (see Chapter 2). However, the increase in smoking prevalence that occurred in the mid-1990s was observed in both of these groups of 12th-grade students.

Data from California collected in 1990, 1993, and 1996 demonstrate an increase in smoking prevalence among adolescents (see Chapter 5) over this interval, and smoking prevalence was strongly associated with self-described below-average school performance. However, the prevalence of smoking among students with poor school performance did not change between 1990 and 1996. In contrast, there was an increase in smoking prevalence for adolescents who described their school performance as average or above average. This suggests that the increase in smoking prevalence in California occurred among those same students with whom smoking prevention efforts generally have been most successful. Parental smoking and sibling smoking were also strongly associated with adolescent smoking. Furthermore, the increases in smoking prevalence across the survey years occurred among adolescents with and without the influence of parental or sibling smoking.

Examining changes in adolescents' perception of the number of their friends who are smokers offers some insight into the reasons for the increase in adolescent prevalence (see Chapter 5). Adolescents who reported three or more friends who smoked had a smoking prevalence approximately ten times that of adolescents who reported that none of their friends smoked. However, there did not appear to be any increase between 1990 and 1996 in smoking prevalence within each category of number of friends who smoked. For example, the prevalence of smoking went from 4.4 percent in 1990 to 3.8 percent in 1996 among 16- to 17-year-old adolescents who had no male friends who smoked and from 41.0 percent in 1990 to 36.4 percent in 1996 among those who had three or more male friends who smoked. This would suggest that the power of perceived adolescent peer smoking to predict, and possibly influence, adolescent smoking prevalence had not increased between 1990 and 1996. What has changed is the fraction of adolescents who report that multiple friends smoke. For example, the percentage of 14- to 15-year-old adolescents who reported that none of their male friends smoked declined from 61.7 percent in 1990 to 38.1 per-

cent in 1996, while the percentage who reported that three or more of their male friends smoked increased from 13.1 percent in 1990 to 38.0 percent in 1996. This increase in reporting friends who smoked between 1990 and 1996 was evident for all age groups and for both male and female friends; and it demonstrates a dramatic rise in adolescents' perception of the number of their peers and friends who smoke. Part of this change in perception is likely to be based on an accurate assessment of the increase in adolescent smoking prevalence that has occurred in California between 1993 and 1996, but the magnitude of the increases in perception of adolescent smoking (a tripling of friends and doubling of peers) is vastly out of proportion with the real change in prevalence (from 9.2 percent in 1990 to 12 percent in 1996). This suggests that a change may have occurred over this interval in the perception of adolescents about how common smoking is among their peers. Tobacco industry advertising and promotional efforts may have been successful in convincing adolescents that smoking is the norm for their peer group, and certainly public health efforts to de-normalize tobacco use among adolescents were not successful in altering the perceptions of these adolescents.

Effects of Tobacco Industry Promotional Efforts

Tobacco advertising and promotional activities are an important catalyst in the smoking initiation process. A review of the existing evidence on the relationship between exposure to advertising or having a tobacco promotional item and smoking behavior (see Chapter 13) suggests that there is a causal relationship between tobacco marketing and smoking initiation. Tobacco advertisements may be particularly attractive to adolescents who are looking for an identity similar to that offered by the images in the ads. These are the youths who are likely to retain tobacco promotional items, while those whose identity needs are met in other ways would likely lose, discard, or forget about them. Owning the items offers the opportunity to the vulnerable group to "try on the image of a smoker" (Feighery *et al.*, 1998). Doing so is likely part of a longer term process of accepting the image and, eventually, the smoking behavior that goes with it.

Effects of Counter-Advertising and Other Tobacco Control Programs

In Florida (see Chapter 7), mean scale scores on an index of receptivity to tobacco company promotions declined by 10 percent from 2.0 in 1998 to 1.8 in 1999 among middle school students in conjunction with a state-wide intensive media tobacco-control program. Among high school students, mean scores declined by 20 percent from 2.0 in 1998 to 1.6 in 1999. Declines in receptivity were evident (and of similar magnitude) across all racial/ethnic groups. Over the same interval, the prevalence of current cigarette use declined among middle school students from 18.5 percent in 1998 to 15.0 percent in 1999, and among high school students, from 27.4 percent in 1998 to 25.2 percent in 1999. Among middle school students, declines in current cigarette use were substantial and significant for both males and females. Among high school students, however, the decline was statistically significant only among females. Among both middle and high school stu-

dents, the declines were most pronounced among non-Hispanic White students. The only difference across the two survey years in the models predicting cigarette use was a small, but statistically significant, decrement in the magnitude of the odds ratio for number of friends who smoked cigarettes in 1999 compared to 1998.

After the passage of Proposition 99 in California in 1988, which increased the tax on a pack of cigarettes by 25 cents, initiation rates among older Californian boys decreased significantly. In 1991, these rates were significantly lower than initiation rates among boys of the same age in the rest of the nation (see Chapter 9). This suggests that early tobacco control efforts in California, which were predominantly media intensive, may have differentially impacted this age group during the early years of the campaign. There did not appear to be a significant change in smoking initiation among Californian girls of any age after the passage of Proposition 99. Smoking prevalence among adolescents increased between 1990 and 1996 in California, but the magnitude of the increase was proportionately less than that for the nation as a whole.

A similar effect was observed in Massachusetts (see Chapter 6), where smoking rates for youths remained flat between 1993 and 1996, in contrast to the increase nationally. It is postulated that a large cohort of junior high school smokers advancing into high school may have overwhelmed a prevention program in Massachusetts based on de-normalization of smoking in junior high school. What is promising is that whatever pressure this smoking cohort might have exerted on younger students appears to have been mitigated by the tobacco control work in Massachusetts. The data are consistent with effectiveness of the Massachusetts tobacco control program in changing social norms and are supportive of behavior change in younger grades, among males, among African Americans, and possibly among girls. All grades showed increases from 1993 to 1996 in the proportion reporting that *many* of their friends disapprove of smoking. This is consistent with success in changing social norms, even if mitigated somewhat by a reduction in those reporting that *all* friends disapprove of smoking.

There is evidence that antismoking advertising can help to deter adolescents from smoking cigarettes, but, to date, the evidence is indirect. Research suggests that certain types of advertising messages work better than others. According to Pechmann and Goldberg's (1998) findings, three of the seven message types tested were efficacious in terms of reducing adolescents' intent to smoke: One of the negative consequences messages (Endangers Family) and both of the normative information messages (Negative Smoker Role Models, Positive Nonsmoker Role Models). Based on these findings, at least, it appears that antismoking messages that are directed at adolescents should focus on smoking's negative consequences on family members and on smoking-related norms.

Research clearly indicates that tobacco control interventions conducted at the macro level can be very effective in reducing cigarette smoking among adolescents. In particular, these include increased tobacco taxation and stronger tobacco control policies.

CONCLUSIONS

1. Cigarette smoking prevalence among adolescents increased during much of the 1990s, but more recently began to decline. The increase in smoking prevalence occurred across all racial and ethnic groups, but appears to have been somewhat lower among female, Hispanic, and African American adolescents.

2. The increase in smoking prevalence was accompanied by an increase in the fraction of adolescents reporting that their friends smoked, and this may indicate a re-normalization of tobacco use among adolescents.

3. Evidence on the relationship between exposure to advertising or having a tobacco promotional item and smoking behavior suggests that there is a causal relationship between tobacco marketing and smoking initiation.

4. Tobacco control interventions conducted at the macro level can be very effective in reducing cigarette smoking among adolescents.

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Changing Demographic Patterns of Adolescent Smoking over the Past 23 Years: National Trends from the Monitoring the Future Study

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INTRODUCTION Over the past quarter century, some important changes have occurred in the levels and patterns of cigarette smoking by American young people. Given the known consequences of smoking for morbidity and mortality rates (NCI, 1997) and the enduring nature of smoking habits established during adolescence (Burns *et al.*, 1997; O'Malley *et al.*, 1988), changes in smoking behaviors carry extraordinary implications for the health and longevity of these cohorts of youngsters throughout their lives. In this chapter, the overall trends in adolescent smoking for the period of 1975 to 1998—as well as differential trends for a number of key demographic subgroups—are documented and discussed. Changes in transition rates over the same period are also considered.

METHODS The data presented here all derive from the Monitoring the Future (MTF) study, which has been conducted by the author and his colleagues at the University of Michigan since 1975. Funded by the National Institute on Drug Abuse, MTF tracks and studies young people's use of many substances, ranging from tobacco to heroin (Johnston *et al.*, 1998). Because the study uses a cohort-sequential design in which each graduating class of high school seniors is followed in a panel study for many years past graduation, it can address a wide range of research questions (Johnston *et al.*, 1996).

The present chapter draws upon the cross-sectional data gathered annually from sequential graduating classes of 12th graders since 1975. The chapter will also draw upon data gathered from sequential classes of 8th and 10th graders since 1991, when these two lower grade levels were added to the study's design.

Samples Each year, a large, nationally representative sample of students in public and private schools within the coterminous United States is separately drawn for each of the grade levels (8, 10, and 12). The sample sizes usually range from 16,000 to 18,000 students per grade, with students coming from 125 to 160 schools at each grade level. Nonparticipating schools are replaced in the sample, but students absent on the day of the administration are excluded since no make-up administrations are given. Usually, 9 to 17 percent of students are absent on the day of the administration.

A three-stage stratified random sampling procedure is used. The first stage is the selection of primary sampling units (PSUs), which are counties and/or communities selected by the University of Michigan's Survey Research Center Sampling Section to be included in the study. These counties and/or communities contain populations that are highly representative of the nation as a whole. The second stage is the random selection of schools from a listing of all schools in each PSU, taken with probability proportionate to their estimated size. Schools are invited to participate for a period of 2 years, so a half-sample, which is in itself drawn to be nationally representative, is entering the sample each year. The third stage is the random selection of classrooms within each school, which is done only in those schools for which subsampling is indicated (usually those containing more than 300 students in the grade).

Field Procedures On a mutually agreed-upon day in the spring, University of Michigan staff members go to each selected school to conduct the data collection. Self-administered questionnaires are distributed to the students, usually in their normal classrooms during a normal class period. Class periods last approximately 45 minutes. The confidential questionnaires, of which there are multiple forms, are randomly distributed to individuals. These questionnaires, most of which are 12 pages in length, are self-administered and are answered in optically scannable booklets.

The questionnaires are completed by the students and collected by the University of Michigan staff members, who immediately remove the booklets from the schools and ship them to a central location for optical scanning. The data are cleaned and edited, and cases with high levels of inconsistency and/or improbably high rates of reported drug use are deleted.

Measures Most of the measures reported in this chapter, all of which are contained in all of the questionnaire forms, are based on self-reported data from students. The regions wherein the study is conducted and their population sizes are both derived from census categorization (more detail on the measures may be found in Johnston *et al.*, 1997 & 1998).

Cigarette smoking is among the various measures of the study. Cigarette smoking is measured with two questions. The first, "Have you ever smoked cigarettes?" is used to determine lifetime smoking prevalence (*i.e.*, one or more cigarettes ever smoked). It is also used to determine the prevalence of having ever smoked regularly, which is defined as the proportion of respondents who answer "regularly in the past" or "regularly now." The other question asked is "How frequently have you smoked cigarettes in the past 30 days?" This question is used to determine the prevalence and frequency of current smoking ("past 30 days"), the prevalence of "current daily" smoking (one or more cigarettes per day during the past 30 days), and the prevalence of "current half-pack a day" smoking. In the present chapter, emphasis is given to the prevalence of any cigarette smoking in the past 30 days ("current smoking") and to the prevalence of daily cigarette smoking in the past 30 days ("current daily" smoking).

Among the demographic and other characteristics to be discussed here are gender, college plans, socioeconomic level of the parents (as measured by their average education level), region, population density, and racial/ethnic identity.

- Gender is self-reported.
- College plans are measured by the question "How likely is it that you will do each of the following things?" One of the choices given is "Graduate from college (four-year program)." Those who respond to this choice with "probably will" or "definitely will" are considered to be college-bound.
- Parental education is measured as the mean of two identical questions. One question asks for the highest level of education obtained by the mother and the other asks for that obtained by the father. Stepparents and foster parents can be substituted for natural parents, where appropriate, and one missing data case is allowed.
- Race/ethnicity is measured by the answer to a single question: "How do you describe yourself?" Because of limited sample sizes for most minority groups, the only data presented here are from those identifying themselves as "White (Caucasian)," as "Black or African-American," or as any one of four categories of Hispanics.

It should be noted that, over the life of the study, high priority has been given to keeping the method and measures constant, so that observed shifts in outcomes will not be caused by method artifacts.

In general, measures of substance use, including smoking, have shown high levels of reliability. Smoking measures, in particular, have shown a high level of stability across the years (O'Malley *et al.*, 1983). Good evidence of the validity of these measures also exists (see Johnston *et al.*, 1998).

RESULTS Table 2-1 presents the data on the smoking trends observed over the life of the study for 8th-, 10th-, and 12th-grade students. Note that data are only available from 1991 to 1998 for the 8th and 10th grades, but are available from 1975 to 1998 for 12th grade—a 23-year span. Because of the longer span covered, emphasis will be given here to the 12th-grade data, though the relevant tabular data are included here for the lower two grades as well.

Overall Trends The reader is reminded that "cohort effects" (lasting differences across age between different birth or class cohorts) have generally predominated over period effects (differences defined by the calendar year in which they occur) in explaining smoking (Burns *et al.*, 1997; O'Malley *et al.*, 1988). Therefore, what we observe to be happening among 12th graders during a given historical period may be an "echo" of changes first observable among those same cohorts at earlier ages and, therefore, in a prior historical period. For example, Figure 2-1 gives trends in lifetime prevalence of cigarette use for various grade levels using the retrospective grade-of-first-use data from each of the 12th-grade classes. It shows that the downturn in smoking observed among 12th graders in the years 1977-1981 was actually observable in earlier time periods, when those same students were in lower grades.

Table 2-1
Long-Term Trends in Prevalence of Cigarettes for Eighth, Tenth, and Twelfth Graders

	Year											
Grade Level	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Lifetime												
8th Grade	—	—	—	—	—	—	—	—	—	—	—	—
10th Grade	—	—	—	—	—	—	—	—	—	—	—	—
12th Grade	73.6	75.4	75.7	75.3	74	71	71	70.1	70.6	69.7	68.8	67.6
Thirty-Day												
8th Grade	—	—	—	—	—	—	—	—	—	—	—	—
10th Grade	—	—	—	—	—	—	—	—	—	—	—	—
12th Grade	36.7	38.8	38.4	36.7	34.4	30.5	29.4	30	30.3	29.3	30.1	29.6
Daily												
8th Grade	—	—	—	—	—	—	—	—	—	—	—	—
10th Grade	—	—	—	—	—	—	—	—	—	—	—	—
12th Grade	26.9	28.8	28.8	27.5	25.4	21.3	20.3	21.1	21.2	18.7	19.5	18.7
1/2 Pack+ per Day												
8th Grade	—	—	—	—	—	—	—	—	—	—	—	—
10th Grade	—	—	—	—	—	—	—	—	—	—	—	—
12th Grade	17.9	19.2	19.4	18.8	16.5	14.3	13.5	14.2	13.8	12.3	12.5	11.4
Approx. N's												
8th Grade	—	—	—	—	—	—	—	—	—	—	—	—
10th Grade	—	—	—	—	—	—	—	—	—	—	—	—
12th Grade	9,400	15,400	17,100	17,800	15,500	15,900	17,500	17,700	16,300	15,900	16,000	15,200

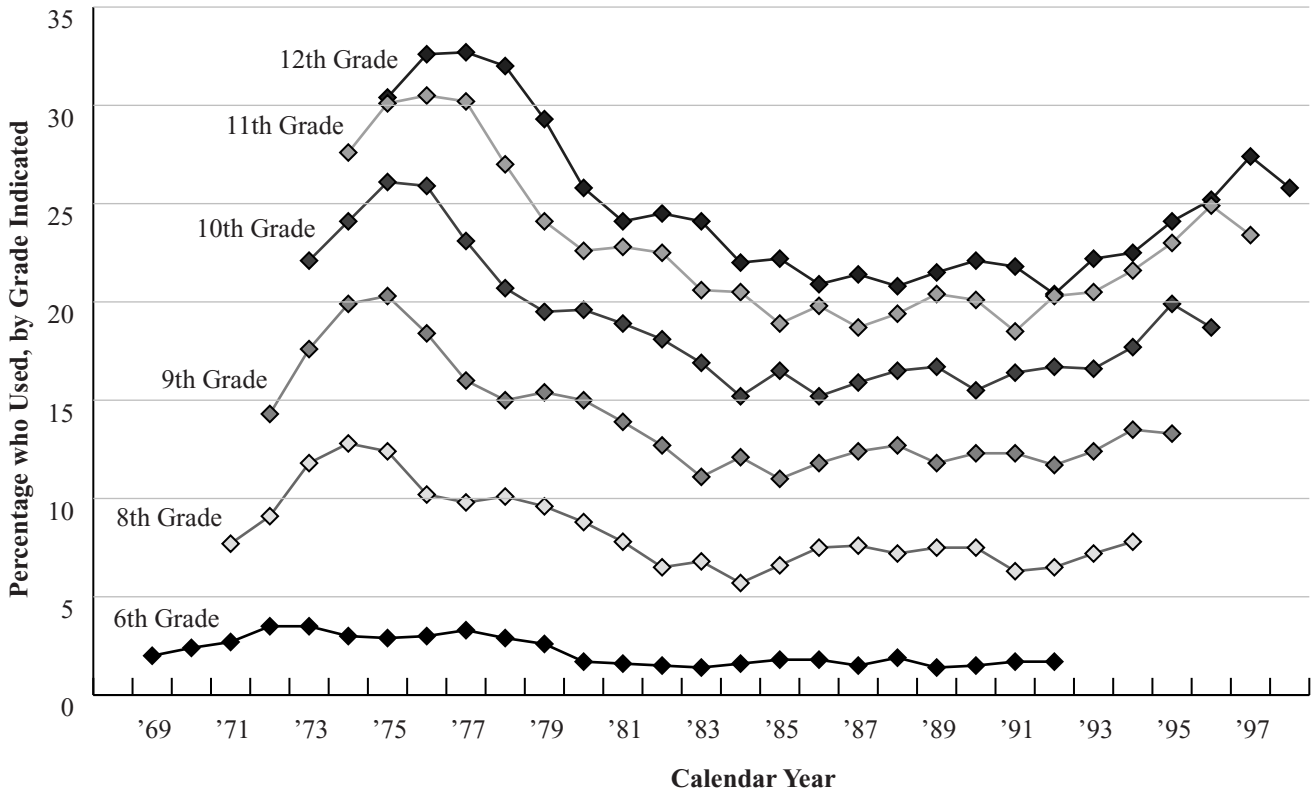
Table 2-1 (continued)

	Year												Change
Grade Level	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1997–1998**
Lifetime													
8th Grade	—	—	—	—	44	45.2	45.3	46.1	46.4	49.2	47.3	45.7	–1.6
10th Grade	—	—	—	—	55.1	53.5	56.3	56.9	57.6	61.2	60.2	57.7	–2.5*
12th Grade	67.2	66.4	65.7	64.4	63.1	61.8	61.9	62	64.2	63.5	65.4	65.3	–0.1
Thirty-Day													
8th Grade	—	—	—	—	14.3	15.5	16.7	18.6	19.1	21	19.4	19.1	–0.3
10th Grade	—	—	—	—	20.8	21.5	24.7	25.4	27.9	30.4	29.8	27.6	–2.2*
12th Grade	29.4	28.7	28.6	29.4	28.3	27.8	29.9	31.2	33.5	34	36.5	35.1	–1.4
Daily													
8th Grade	—	—	—	—	7.2	7	8.3	8.8	9.3	10.4	9	8.8	–0.2
10th Grade	—	—	—	—	12.6	12.3	14.2	14.6	16.3	18.3	18	15.8	–2.2**
12th Grade	18.7	18.1	18.9	19.1	18.5	17.2	19	19.4	21.6	22.2	24.6	22.4	–2.2*
1/2 Pack+ per Day													
8th Grade	—	—	—	—	3.1	2.9	3.5	3.6	3.4	4.3	3.5	3.6	0.1
10th Grade	—	—	—	—	6.5	6	7	7.6	8.3	9.4	8.6	7.9	–0.7
12th Grade	11.4	10.6	11.2	11.3	10.7	10	10.9	11.2	12.4	13	14.3	12.6	–1.7*
Approx. N's													
8th Grade	—	—	—	—	17,500	18,600	18,300	17,300	17,500	17,800	18,600	18,100	
10th Grade	—	—	—	—	14,800	14,800	15,300	15,800	17,000	15,600	15,500	15,000	
12th Grade	16,300	16,300	16,700	15,200	15,000	15,800	16,300	15,400	15,400	14,300	15,400	15,200	

*Note: Level of significance of difference between the 2 years indicated: * = 0.05, ** = 0.01, *** = 0.001.*
Source: The Monitoring the Future Study, University of Michigan.

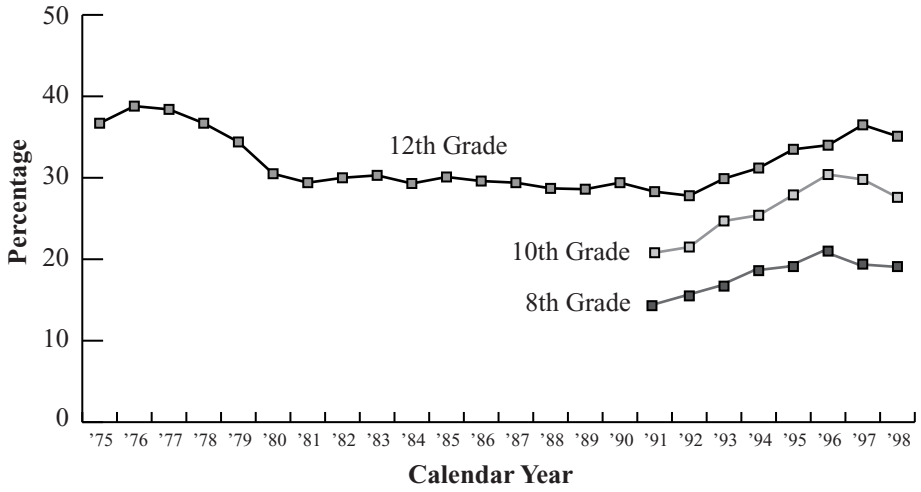
Figure 2-1

Percentage of Cigarette Smoking on a Daily Basis: Trends in Lifetime Prevalence for Earlier Grade Levels (Based on Retrospective Reports from 12th Graders)



SOURCE: The Monitoring the Future Study, University of Michigan.

Figure 2-2
Trends in 30-Day Prevalence of Cigarette Smoking for 8th, 10th, and 12th Graders



SOURCE: The Monitoring the Future Study, University of Michigan.

The data in Figure 2-1 show that an increase in youth smoking initiation was occurring in the 1970s (and possibly earlier); the increase was followed by a period of decline, and then a long period in which initiation rates, as well as current smoking rates, remained level (Figure 2-2). Beginning in the 1990s, however, all three grades showed a nearly simultaneous period of increasing current and daily smoking rates (though the 12th graders were 1 year later than the lower grades in turning up and, subsequently, in turning down). This nearly simultaneous movement suggests that a "period effect" occurred in the 1990s in addition to the more usual cohort and age effects. Furthermore, virtually all demographic subgroups exhibited this upturn (Tables 2-2 and 2-3). It has been suggested that these facts in combination imply that contemporaneous culture-wide forces were at work. Among the most plausible possibilities are 1) changes in the quantity and the quality (more youth-oriented) of cigarette advertising and promotion, 2) growing exposure of youths to smoking by popular role models in movies and television (both on and off screen), and 3) a decline in the price of cigarettes.

After a substantial and proportional increase in smoking rates among all three grades during the early and mid-1990s, evidence of a turnaround began to appear in 1997 (for the 8th and 10th graders) and in 1998 (for the 12th graders) and rates began to decline. It is suspected that the extensive adverse publicity associated with the emerging tobacco settlement and the Congressional and Administration debate over that settlement played an important role in bringing about this modest turnaround. If so, the nascent decline may not be one that continues, since the public debate has now subsided considerably.

Table 2-2
Cigarettes: Trends in 30-Day Prevalence of Use by Subgroups for Eighth and Tenth Graders

	Percentage of 8th Graders Who Used in the Last 30 Days								
Class of:	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**Change**
Approx . N:	*17,500*	*18,600*	*18,300*	*17,300*	*17,500*	*17,800*	*18,600*	*18,100*	**1997–1998**
Total	14.3	15.5	16.7	18.6	19.1	21.0	19.4	19.1	–0.3
Sex									
Male	15.5	14.9	17.2	19.3	18.8	20.6	19.1	18.0	–1.1
Female	13.1	15.9	16.3	17.9	19.0	21.1	19.5	19.8	0.3
College Plans									
0 or <4 Years	29.2	31.9	34.1	36.6	36.5	39.2	40.0	40.1	0.1
4-Year Degree	11.8	13.1	14.3	16.1	16.8	18.2	16.9	16.5	–0.4
Region									
Northeast	13.7	14.4	15.0	17.8	18.6	22.1	18.0	15.6	–2.4
North Central	15.5	16.5	16.3	18.5	20.9	23.2	20.0	22.3	2.3
South	15.7	17.0	18.2	19.5	19.4	21.1	21.0	21.1	0.1
West	10.0	12.2	16.4	18.0	16.5	17.1	17.1	15.1	–2.0
Population Density									
Large MSA	12.8	15.0	14.1	15.5	16.5	19.4	15.8	16.4	0.6
Other MSA	14.9	15.3	17.8	20.7	19.4	21.4	19.7	17.7	–2.0
Non-MSA	14.8	16.4	17.9	17.8	21.5	22.1	22.8	24.8	2.0
Parental Education[a]									
1.0–2.0 (Low)	26.2	24.1	23.3	26.1	25.3	26.5	26.9	26.7	–0.2
2.5–3.0	16.4	16.9	19.8	20.6	22.7	24.4	22.4	23.9	1.5
3.5–4.0	13.9	14.9	17.4	20.1	20.8	21.4	20.9	21.4	0.5
4.5–5.0	10.1	13.3	12.5	14.9	14.9	18.4	16.2	14.2	–2.0
5.5–6.0 (High)	11.3	11.5	13.3	15.1	14.5	17.3	15.3	13.8	–1.5
Race (2-yr avg.)[b]									
White	—	16.2	17.8	18.9	20.7	22.7	22.8	21.5	–1.3
Black	—	5.3	6.6	8.7	8.9	9.6	10.9	10.6	–0.3
Hispanic	—	16.7	18.3	21.3	21.6	19.6	19.1	20.1	1.0

Table 2-2 (continued)

	Percentage of 10th Graders Who Used in the Last 30 Days								
***Class of*:**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**Change**
***Approx. N*:**	*14,800*	*14,800*	*15,300*	*15,800*	*17,000*	*15,600*	*15,500*	*15,000*	**1997–1998**
Total	20.8	21.5	24.7	25.4	27.9	30.4	29.8	27.6	–2.2*
Sex									
Male	20.8	20.6	24.6	26.6	27.7	30.1	28.2	26.2	–2.0
Female	20.7	22.2	24.5	23.9	27.9	30.8	31.1	29.1	–2.0
College Plans									
0 or <4 Years	36.5	35.0	41.9	42.2	46.3	46.2	47.2	45.2	–2.0
4-Year Degree	17.3	18.6	21.0	21.7	24.7	27.8	26.8	24.5	–2.3 *
Region									
Northeast	22.4	21.9	27.1	24.5	27.8	31.7	29.3	30.1	0.8
North Central	22.9	24.3	26.0	28.8	30.1	32.5	31.7	29.5	–2.2
South	21.2	19.8	24.0	25.7	30.8	33.4	32.2	29.8	–2.4
West	16.7	20.2	21.2	20.1	19.6	20.8	23.2	19.6	–3.6
Population Density									
Large MSA	19.7	21.6	22.5	22.3	23.3	26.2	26.6	22.5	–4.1 *
Other MSA	20.3	20.3	23.8	26.3	28.9	31.1	28.9	26.6	–2.3
Non-MSA	22.7	23.7	28.2	26.7	31.3	33.9	34.9	35.7	0.8
Parental Education[a]									
1.0–2.0 (Low)	23.5	28.4	29.5	26.4	30.9	28.7	28.2	28.0	–0.2
2.5–3.0	24.1	23.3	28.0	29.1	33.2	33.8	33.2	33.0	–0.2
3.5–4.0	20.4	20.6	24.8	26.0	27.8	31.6	30.9	27.3	–3.6 *
4.5–5.0	18.5	19.5	20.1	22.6	25.9	28.7	28.5	25.7	–2.8
5.5–6.0 (High)	18.5	18.9	21.4	20.7	21.8	27.8	24.6	22.5	–2.1
Race (2-yr avg.)[b]									
White	—	24.1	26.0	27.8	29.7	32.9	34.4	33.2	–1.2
Black	—	6.6	7.5	9.8	11.5	12.2	12.8	13.7	0.9
Hispanic	—	18.3	20.5	19.4	21.4	23.7	23.0	21.3	–1.7

** = 0.05 Level of significance of difference between the two most recent classes:*

— indicates data not available. See Table D-43 for the number of subgroup cases and Appendix B for definition of variables in Johnston, O'Malley, and Bachman (1998), National Survey Results on Drug Use from the Monitoring the Future Study, 1975–1998, Volume I: Secondary School Students. *Rockville, MD: National Institute on Drug Abuse.*

[a]*Parental education is an average score of mother's education and father's education.*

[b]*To derive percentages for each racial subgroup, data for the specified year and the previous year have been combined to increase subgroup sample sizes and thus provide more stable estimates.*

Source: The Monitoring the Future Study, University of Michigan.

Table 2-3.
Cigarettes: Trends in 30-Day Prevalence of Use by Subgroups for Twelfth Graders

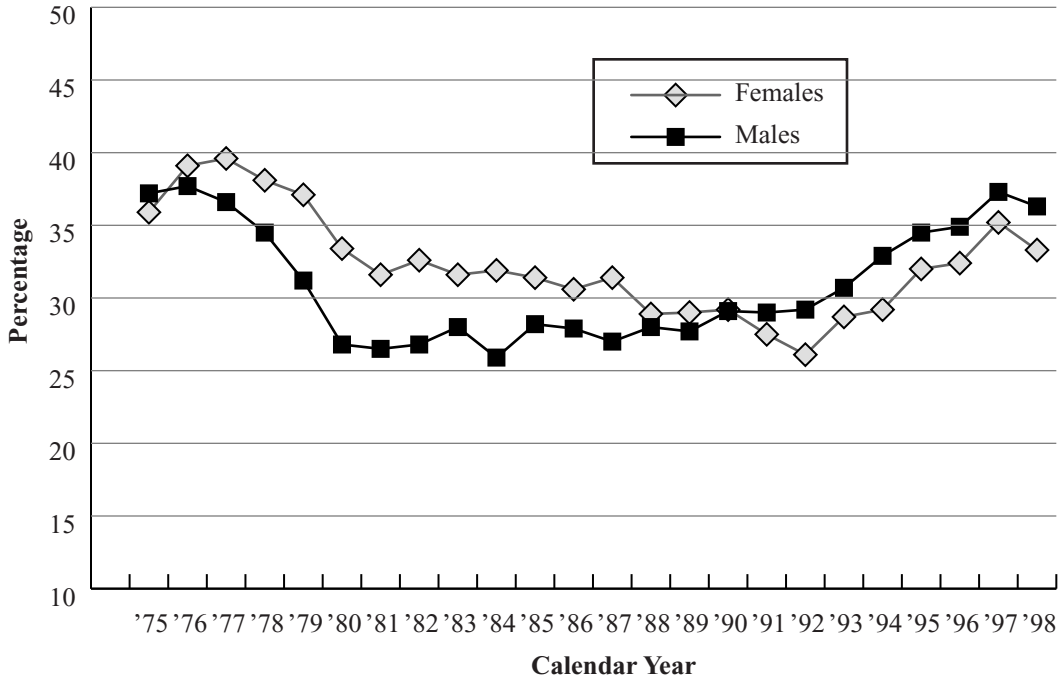
	Percentage Who Used in the Last 30 Days											
Class of:	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Approx. N:	*9,400*	*15,400*	*17,100*	*17,800*	*15,500*	*15,900*	*17,500*	*17,700*	*16,300*	*15,900*	*16,000*	*15,200*
Total	36.7	38.8	38.4	36.7	34.4	30.5	29.4	30.0	30.3	29.3	30.1	29.6
Sex												
Male	37.2	37.7	36.6	34.5	31.2	26.8	26.5	26.8	28.0	25.9	28.2	27.9
Female	35.9	39.1	39.6	38.1	37.1	33.4	31.6	32.6	31.6	31.9	31.4	30.6
College Plans												
0 or <4 Years	—	46.3	46.2	44.6	43.0	39.6	38.1	38.7	38.0	37.9	40.5	38.5
4-Year Degree	—	29.8	29.4	27.4	26.0	22.3	22.3	22.1	23.3	22.7	22.8	24.0
Region												
Northeast	40.1	41.8	43.0	40.6	37.0	34.1	31.5	32.1	34.6	33.5	34.2	35.2
North Central	39.5	41.3	40.5	39.0	36.6	31.5	32.4	33.5	33.2	31.4	34.1	32.5
South	36.2	39.1	37.6	35.7	35.4	31.8	28.9	29.4	28.7	28.6	25.6	26.1
West	26.3	28.3	27.7	27.3	24.8	21.2	21.8	20.4	21.8	22.9	26.3	23.3
Population Density												
Large MSA	39.7	40.4	40.9	37.5	33.4	31.2	30.6	32.1	30.8	31.3	31.9	30.8
Other MSA	35.1	35.9	36.1	34.3	33.5	29.7	27.4	27.8	29.1	28.2	28.5	28.0
Non-MSA	36.7	40.9	39.2	39.4	36.4	30.9	30.9	31.2	31.5	29.3	30.8	31.0
Parental Education[a]												
1.0–2.0 (Low)	37.2	43.2	39.6	38.1	38.1	32.7	32.5	32.6	32.7	33.6	32.3	28.6
2.5–3.0	37.0	41.2	40.8	39.3	35.9	34.2	31.7	32.0	32.2	31.8	32.3	32.3
3.5–4.0	31.9	35.3	37.3	34.0	33.3	28.0	28.2	29.0	28.0	28.1	29.7	29.7
4.5–5.0	32.3	35.0	33.0	32.6	30.1	25.7	26.0	25.5	27.8	25.2	27.7	26.4
5.5–6.0 (High)	26.8	30.8	32.8	31.9	29.6	24.0	22.5	25.1	25.5	23.7	22.6	26.7
Race (2-yr avg.)[b]												
White	—	—	38.3	37.6	36.0	33.0	30.5	30.7	31.3	31.2	31.3	31.9
Black	—	—	36.7	32.7	30.2	26.8	23.7	21.8	21.2	19.3	18.1	16.9
Hispanic	—	—	35.7	32.8	26.8	22.6	23.2	24.7	24.7	25.3	25.5	23.7

Table 2-3 (continued)

	Percentage Who Used in the Last 30 Days												
***Class of*:**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**Change**
***Approx. N*:**	*16,300*	*16,300*	*16,700*	*15,200*	*15,000*	*15,800*	*16,300*	*15,400*	*15,400*	*14,300*	*15,400*	*15,200*	**1997–1998**
Total	29.4	28.7	28.6	29.4	28.3	27.8	29.9	31.2	33.5	34.0	36.5	35.1	–1.4
Sex													
Male	27.0	28.0	27.7	29.1	29.0	29.2	30.7	32.9	34.5	34.9	37.3	36.3	–1.0
Female	31.4	28.9	29.0	29.2	27.5	26.1	28.7	29.2	32.0	32.4	35.2	33.3	–1.9
College Plans													
0 or <4 Years	39.7	37.5	38.0	37.5	38.1	38.6	37.3	40.9	43.5	45.0	45.7	46.7	1.0
4-Year Degree	24.3	24.4	24.1	25.4	24.2	23.8	27.3	28.0	29.9	30.8	33.1	31.3	–1.8
Region													
Northeast	34.1	31.2	29.4	31.9	30.5	29.6	34.2	33.2	34.4	38.5	40.6	35.9	–4.7
North Central	31.7	31.1	34.9	34.0	34.6	31.7	33.2	36.2	37.8	37.7	39.3	40.0	0.7
South	26.0	28.0	26.4	26.1	25.4	26.4	29.0	30.7	33.5	33.2	35.0	34.3	–0.7
West	26.6	23.9	22.7	25.1	23.2	22.8	22.9	24.0	26.5	24.4	30.5	29.1	–1.4
Population Density													
Large MSA	29.3	26.9	25.9	27.9	26.2	25.6	29.5	29.0	33.9	32.1	34.9	32.9	–2.0
Other MSA	28.2	28.3	28.2	29.6	29.3	26.9	29.8	31.1	31.7	32.6	35.7	34.2	–1.5
Non-MSA	31.8	31.4	32.2	30.4	28.6	31.5	30.3	33.8	36.2	38.2	40.0	39.7	–0.3
Parental Education													
1.0-2.0 (Low)	28.8	28.1	25.4	26.3	31.3	27.1	26.5	26.2	31.2	31.5	31.2	32.3	1.1
2.5-3.0	31.4	29.9	30.8	30.8	28.7	30.3	30.4	32.8	35.0	35.5	36.5	36.0	–0.5
3.5-4.0	28.8	27.8	29.4	29.3	28.4	27.8	29.9	31.4	33.2	33.2	35.6	36.7	1.1
4.5-5.0	27.6	28.6	27.0	29.1	26.9	25.8	30.1	32.0	32.6	34.5	37.5	34.2	–3.3 *
5.5-6.0 (High)	29.3	27.8	26.3	28.6	27.1	25.5	30.5	30.4	34.0	32.9	38.5	33.1	–5.4 *
Race (2-yr avg.)													
White	32.1	32.2	32.2	32.3	32.2	31.8	33.2	35.2	36.6	38.1	40.7	41.7	1.0
Black	14.2	13.3	12.6	12.2	10.6	8.7	9.5	10.9	12.9	14.2	14.3	14.9	0.6
Hispanic	22.7	21.9	20.6	21.7	24.0	25.0	24.2	23.6	25.1	25.4	25.9	26.6	0.7

*Level of significance of difference between the two most recent classes: * = 0.05, ** = 0.01, *** = 0.001. "*
"—" indicates data not available.
See Johnston et al., 1998, Table D-44 for the number of sub group cases and Johnston et al., 1998, Appendix B for definition of variables.
Source: The Monitoring the Future Study, the University of Michigan.
[a]*Parental education is an average score of mother's education and father's education.*
[b]*To derive percentages for each racial subgroup, data for the specified year and the previous year have been combined to increase subgroup sample sizes and thus provide more stable estimates.*

Figure 2-3
Trends in 30-Day Prevalence of Cigarette Smoking by Gender for 12th Graders

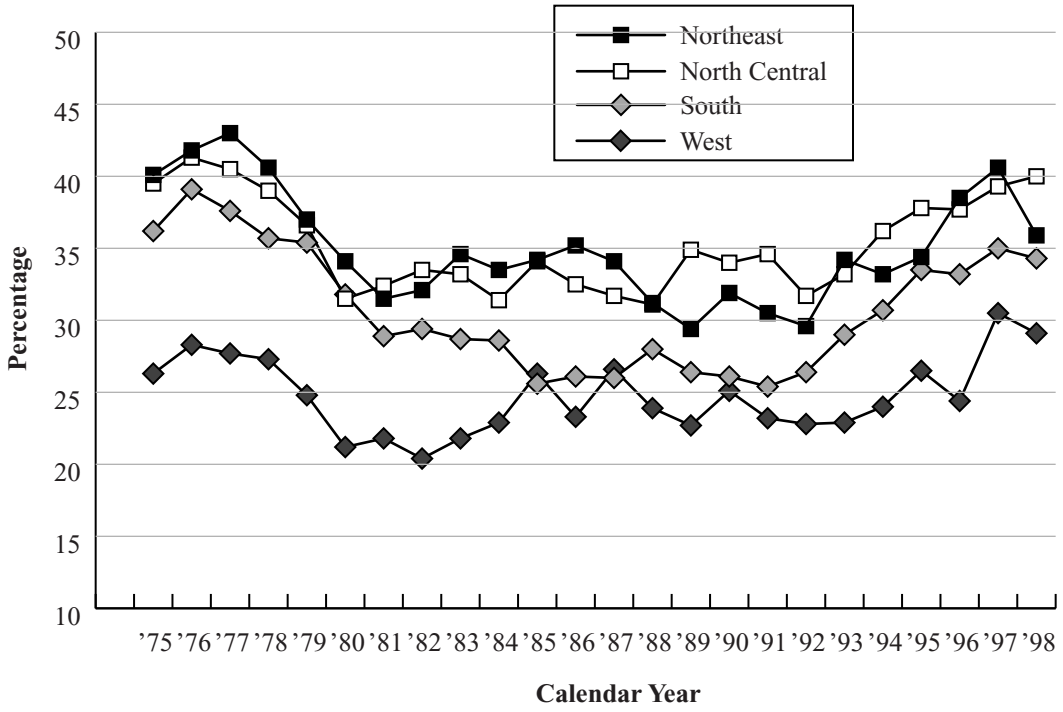


SOURCE: The Monitoring the Future Study, University of Michigan.

Gender Differences Before this study was launched in 1975, earlier studies had shown that males tended to have higher rates of smoking than females (U.S. DHHS, 1994). However, by 1976, females not only caught up to their male counterparts in 12th grade, but also attained a higher 30-day prevalence of smoking for some years thereafter (Figure 2-3). By 1990, however, males closed the gap and have been slightly more likely to smoke than females in the years since. Because a slightly higher proportion of male current smokers smoke at the "half-pack-a-day" level, there was practically no gender difference in that measure in the years of 1979-1990, after which period the "half-pack-a-day" smoking level for males in the 12th grade exceeded that for females in the same grade.

Differences by Region There have been some consistent, long-term differences in student smoking rates across the four major census regions. As Figure 2-4 illustrates, the West consistently has had the lowest rate of smoking, at least as far back as 1975. The Northeast and North Central generally have had the highest (and roughly equivalent) rates. The South has tended to fall in the middle. However, the South showed the greatest decline in smoking rates in the first part of this 23-year study, and then the greatest increase from 1985 to 1997, thus bringing its smoking rates close to the levels observed in the Northeast and North Central.

Figure 2-4
Trends in 30-Day Prevalence of Cigarette Smoking by Region for 12th Graders



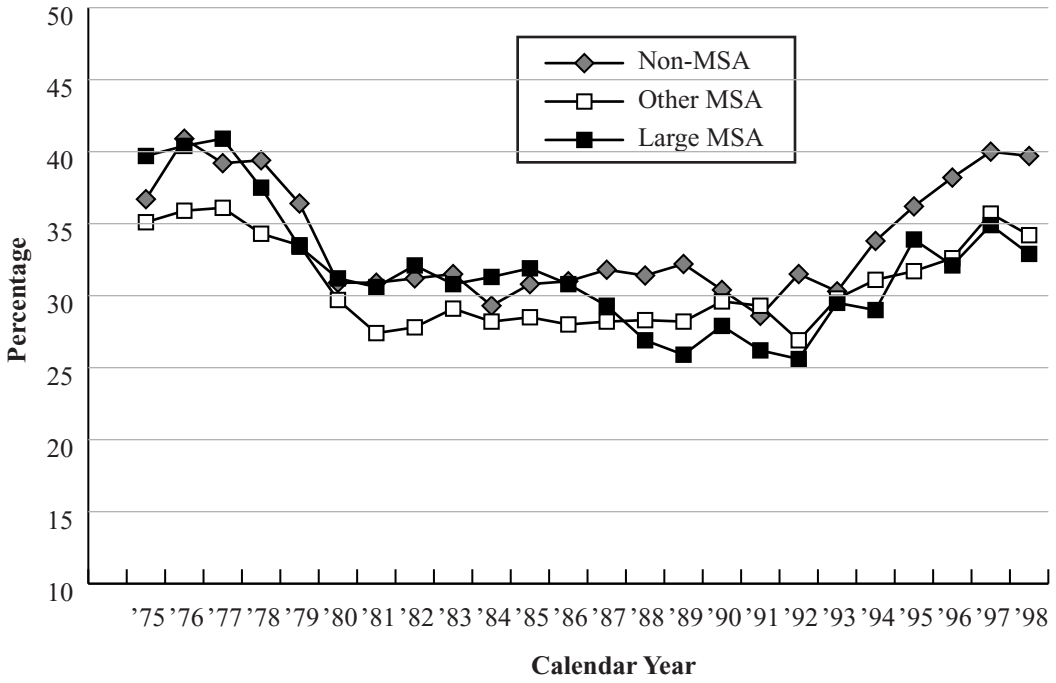
SOURCE: The Monitoring the Future Study, University of Michigan.

It should be noted that, over this 23-year interval, the proportion of the sample coming from each of the four regions has changed somewhat. In proportion to the total sample size, the South has shown the most growth, followed by the West, while the Northeast and North Central have both declined by roughly three percentage points each. Insofar as regional differences reflect cultural differences, this geographical redistribution of the population could be having subtle effects on the smoking rates.

Differences by Population Density

Three broad levels of population density have been distinguished for these analyses: self-representing metropolitan statistical areas, or "large MSAs" (currently, the 16 largest cities); "other MSAs" as defined by the Census; and non-metropolitan areas ("non-MSAs"). As Figure 2-5 shows, there were no very great differences in 30-day smoking prevalence among these three strata from 1975 to 1993, although the areas categorized as "other MSAs" tended to have slightly lower than average rates for much of that time period. After 1993, the increase in smoking rates was sharpest in the non-metropolitan ("non-MSA") stratum; by the late 1990s, this stratum had the highest smoking rate. A similar divergent change can be seen at grades 8 and 10 as well (see Table 2-2).

Figure 2-5
Trends in 30-Day Prevalence of Cigarette Smoking by Population Density for 12th Graders



NOTE: Census categories: Large MSA = 18 largest Standard Metropolitan Areas, Other MSA = all other Metropolitan Statistical Areas, Non-MSA = areas not designated as Metropolitan Statistical Areas
SOURCE: The Monitoring the Future Study, University of Michigan.

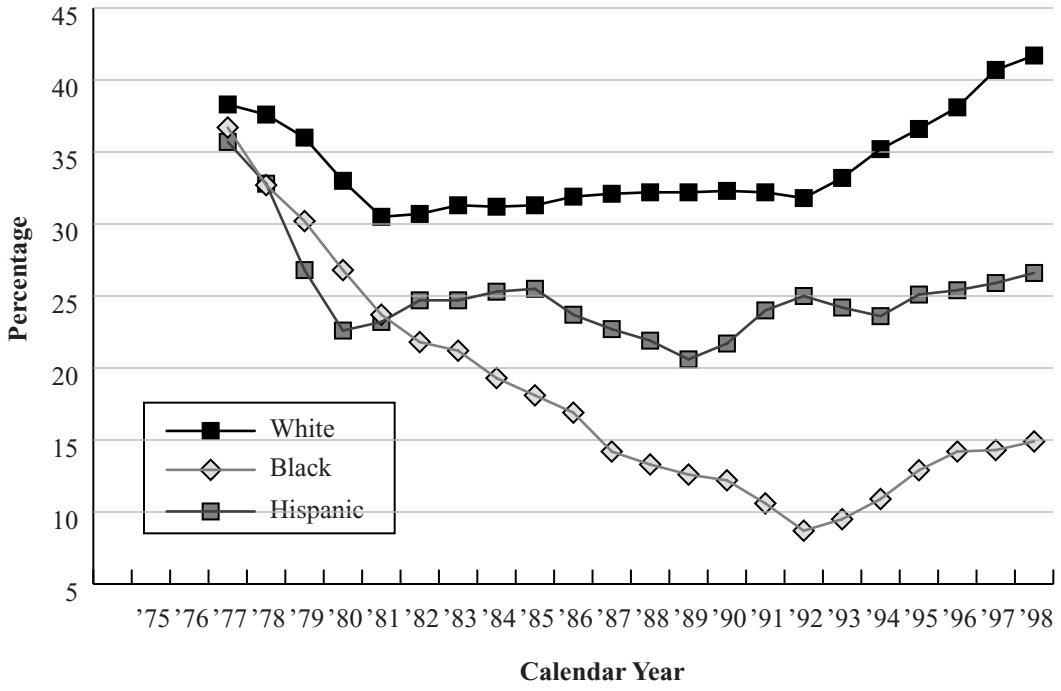
Over the 23-year life of the study, the proportion of the national sample coming from non-metropolitan areas has declined considerably, by about 7 to 10 percentage points. This reflects the continuation of longer term trends in migration to urban areas.

Differences by Race/Ethnicity

In recent years, perhaps the most dramatic differences in trends in youth smoking associated with demographic subgroups have occurred in relation to the dimension of race/ethnicity. Figure 2-6 and Table 2-3 show that there was little difference in smoking rates in 1976 among Whites, Hispanics, and African Americans. However, during the period of general decline in tobacco use (1977–1981), smoking rates among Blacks and Hispanics declined more than among Whites. Thereafter, the smoking rates of Hispanics moved more or less in parallel with those of Whites; that is, their use stayed stable, although at somewhat lower levels, through 1992. However, smoking rates among African American students continued to decline steadily from 1981 to 1992[1], opening a very large differential

1. Note that a 2-year moving average has been presented here for the three racial/ethnic groups in order to smooth out some of the random fluctuations that result from the limited annual sample sizes for the two minority groups.

Figure 2-6
Trends in 30-Day Prevalence of Cigarette Smoking by Race/Ethnicity for 12th Graders



SOURCE: The Monitoring the Future Study, University of Michigan.

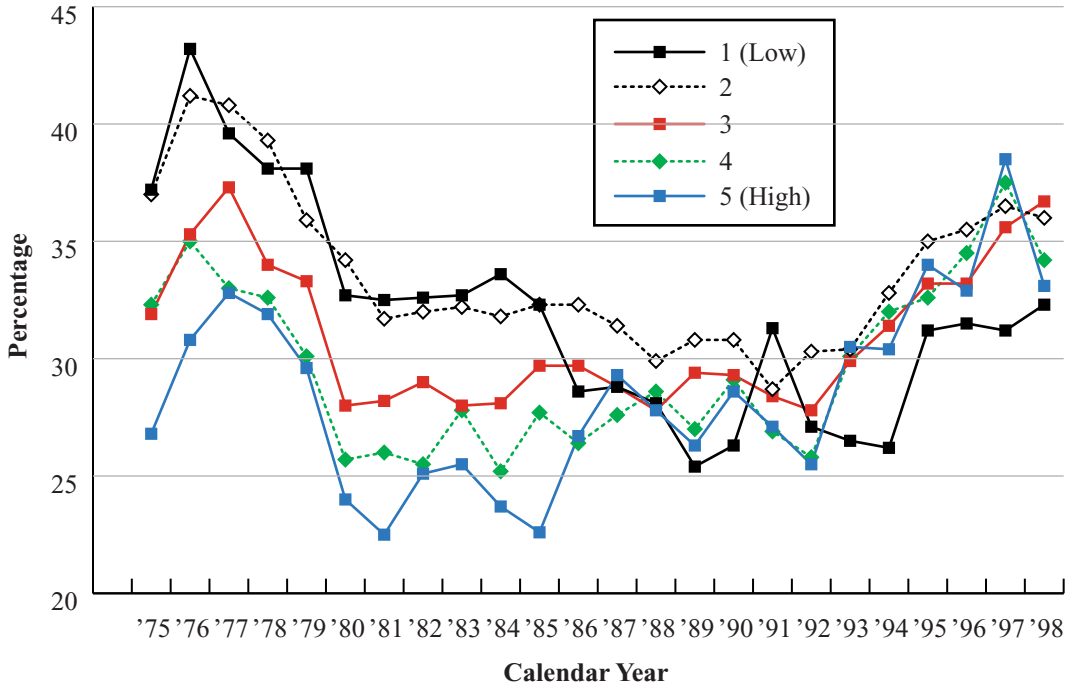
with the smoking rates of Whites and a sizeable differential with Hispanic smoking rates. After 1992, all three racial/ethnic groups showed some increase in smoking rates, though the increase was least among Hispanics.

As a proportion of the national sample of 12th-grade students, the Hispanic population has grown considerably over the 23-year interval (by roughly 8 percentage points), the Black population has grown modestly (by about 2 percentage points), and the White population has declined substantially (by about 10 percentage points). Had these changes in ethnic composition not been taking place, one might have expected somewhat more of an increase in the overall smoking rates than was actually observed (since the two minority groups generally have lower smoking rates than Whites). It is possible, therefore, that this change in the ethnic composition of the population masked some of the effects of other cultural forces that were leading to increased smoking rates among youths.

Differences Associated with Parents' Educational Level

Over the life of the study, an important change in the association between parental education and the cigarette smoking rates of their children has gradually emerged with the 12th graders. As Figure 2-7 illustrates, there was a fair-sized negative association between parental education and children's smok-

Figure 2-7
Trends in 30-Day Prevalence of Cigarette Smoking by Parents' Average Education for 12th Graders



NOTE: Parental education is an average score of mother's education and father's education reported on the following scale: 1. Completed grade school or less, 2. Some high school, 3. Completed high school, 4. Some college, 5. Completed college, 6. Graduate or professional school after college. Missing data were allowed on one of the two variables.
SOURCE: The Monitoring the Future Study, University of Michigan.

ing rates at the beginning of the study. In the last half of the 1970s, this association maintained, as all five parental education strata distinguished in the figure showed a decline in rates of smoking among the children from the mid-1970s through 1981. However, for roughly the decade that followed, this association gradually disappeared. During this time, smoking rates among children in the higher parental education strata gradually rose and rates among children in the lower parental education strata declined some (note that these changes pretty much canceled each other out in the overall smoking statistics). Since around 1990, there has been little difference in children's smoking rates among the various parental education strata, with the exception that the lowest stratum (which is fairly small) did not show as large an increase in smoking rates in the 1990s as did the other strata.

Of course, some of this change in the association between parental education and smoking rates may be explained in terms of the differential racial/ethnic trends just discussed (since race/ethnicity is correlated with social class). Another explanation for this change may be the changing proportions represented by the three racial/ethnic groups in the total sample of

the study. It should be noted that, in the lower grades, there still is a negative association between parental education and current smoking (Table 2-2). The fact that this association is not currently observable among 12th graders could reflect social class differences in the age at which smoking is initiated, but not in the smoking rate eventually attained. It could also indicate that differential rates of dropping out of school among the different social strata lead to a leveling of differences by 12th grade.

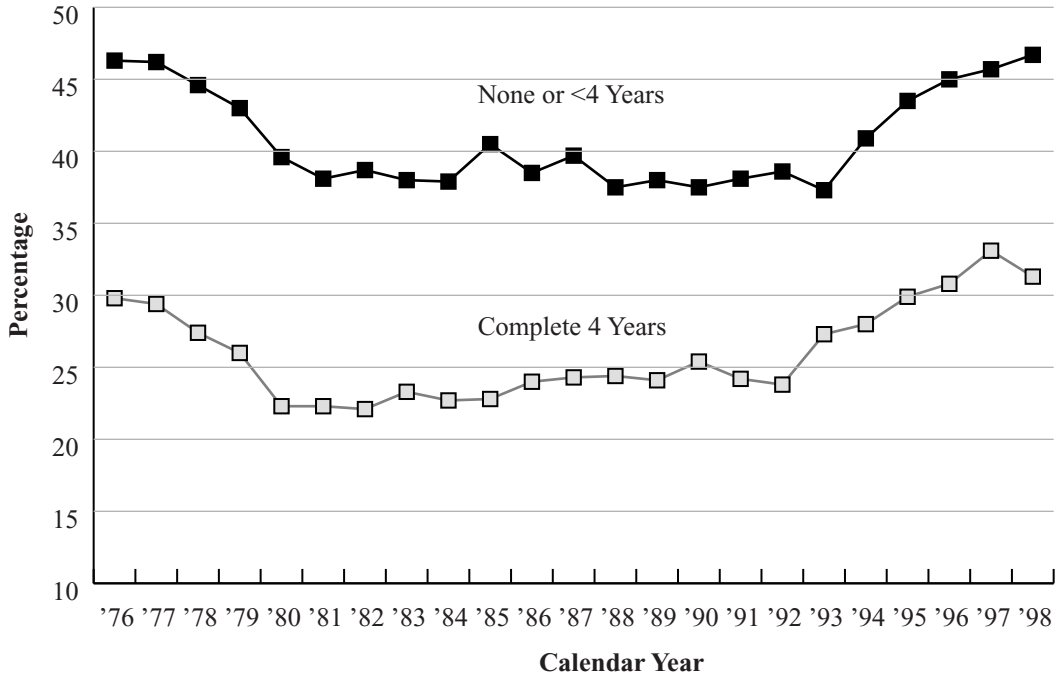
Overall, the average educational level of students' parents was rising steadily over the 23-year, historical interval covered by the study. Between 1975 and 1998, the size of the group representing the lowest educational stratum fell from about 20 percent of the national sample to about 8 percent, whereas the proportion in the top two strata increased from roughly 20 percent to roughly 38 percent of the sample (each level is defined by an absolute level of educational attainment). Given the nature of the changes in adult smoking that were occurring during that period—overall adult smoking rates were declining—and the fact that an increasing proportion of students were being raised by more educated adults, one would have expected that substantially more students were being exposed to constructive parental influences with regard to smoking. If this conjecture is true, then the impact of other cultural influences that have caused youth smoking rates to rise in the 1980s and 1990s may have been partially masked or offset by these more positive parental influences.

Differences Associated with College Plans

Educational aspirations and eventual educational attainment have long been strong negative correlates of cigarette smoking (Bachman *et al.*, 1978; Johnston, 1973). Thus, it comes as no surprise that, across the full 23-year interval of this study, data have shown that those who plan to attend college have been much less likely to smoke than those who do not (Figure 2-8). There have been two important changes in this relationship, however. One change was that the proportional difference between the two groups (college-bound vs. non-college-bound) narrowed considerably as the ratio of current smoking among the college-bound students rose from 57 percent of the non-college-bound rate in 1982 to 73 percent of that rate in 1993. The other change was that the proportion of 12th graders planning to attend college rose considerably—a trend that might have been predictable from the fact that the average educational level of their parents also had been rising.

The proportion of the sample claiming to be college-bound increased from about 51 percent of the sample in 1976 to about 79 percent by 1998—an increase of more than 50 percent. Given the long-standing differences in smoking rates for these two groups, one might have expected the shift to reduce the overall level of youth smoking. Clearly, this did not happen, which again could mean that other cultural influences working in the opposite direction more than offset any effects of educational aspiration. It could be, however, that the differences in educational aspirations were really proxies for other things that differentiated the two groups, things that perhaps did not shift over time (*e.g.*, academic ability). Therefore, the

Figure 2-8
Trends in 30-Day Prevalence of Cigarette Smoking by College Plans for 12th Graders



SOURCE: The Monitoring the Future Study, University of Michigan.

migration into the college-bound camp simply narrowed the differences between these two groups regarding those other factors and, thus, narrowed the differences in their smoking rates as well.

Changes in Transition Rates across Time

Changes in current smoking levels are brought about both by changes in initiation rates and changes in rates of transition to various stages of involvement with smoking. Table 2-4 provides trend data on a number of such transition rates along with other ratios of interest. The data show that there have been some systematic trends over the period 1975-1998 and, as might be expected, they correlate in general with changes in the level of current smoking.

For example, in the period of declining rates of current smoking among 12th graders (1977 through 1981), a number of transition rates were also declining. The rate of transition from "lifetime" use to current ("30-day") use declined from 0.51 to 0.41; rates from "lifetime" use to "current daily" use declined from 0.38 to 0.29; and rates from "lifetime" use to "current half-pack-a-day" use declined from 0.26 to 0.19. Similarly, transition from "lifetime" use to ever smoking "regularly" fell from 0.43 to 0.34 and the

subsequent transition from ever smoking "regularly" to current smoking fell from 0.84 to 0.79. Note the much smaller proportional shift in the transition rate for those who already have established a regular smoking pattern.

During the long period of stability in current smoking rates among 12th graders (1981 through 1992), most of the transition rates remained fairly steady. Note, however, that the ratio of "current half-pack-a-day" smoking to any current smoking, which is not a transition rate, continued to decline after 1981, from 0.46 in 1981 to 0.37 in 1988, before stabilizing.

Finally, in the period of increasing current smoking rates among 12th graders (1992 through 1997), most of the transition rates increased. Again, the ratio of "half-pack-a-day" smoking to current smoking moved differently, this time holding steady at around 0.36 to 0.39, which was about where it was in 1986.

Table 2-4 also shows that, during the life of the study, there was a downward shift in the proportion of current daily smokers who were smoking at a level of half-pack a day or more. That proportion fell from 0.68 in 1978 to 0.58 by 1991, where it has remained. This downward shift of smoking levels, in theory, could have important long-term health consequences for the smokers if more of the daily smokers could maintain a lighter habit. However, it is quite possible that this shift reflects more the effects of increasing environmental constraints on smoking in the high schools during this historical period rather than any lasting shift in the self-restraint of smokers. If so, the ratio would be expected to shift back up to prior levels of smoking after these graduating classes leave high school and its constraints.

The fact that the transition rate from regular use to current smoking is so high, and has changed so little over the years, is consistent with the notion that a pattern of regular smoking is hard to change once it is established. This transition seems to have been least affected by whatever social forces brought about the changes in initiation and continuation of cigarette smoking at the earlier stages of involvement.

Table 2-5 shows the rate of transition from "ever smoking" to "current smoking" for all of the various demographic subgroups discussed above. These differential trends in the transition rates (which are the complement of the quitting rate) help to explain some of the diverging subgroup trends discussed above. In particular, note how substantially the transition rate fell (or the rate of discontinuing smoking rose) among African American adolescents during the period 1976-1998.

Table 2-4
Trends in Various Smoking Events and in Transition Rates across Them: Twelfth Graders, 1975–1998

	Percentage Who Used											
***Class of*:**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
***Approx. N*:**	*9400*	*15400*	*17100*	*17800*	*15500*	*15900*	*17500*	*17700*	*16300*	*15900*	*16000*	*15200*
Lifetime	73.6	75.4	75.7	75.3	74.0	71.0	71.0	70.1	70.6	69.7	68.8	67.6
Thirty-Day	36.7	38.8	38.4	36.7	34.4	30.5	29.4	30.0	30.3	29.3	30.1	29.6
Current Daily	26.9	28.8	28.8	27.5	25.4	21.3	20.3	21.1	21.2	18.7	19.5	18.7
Current ½ Pack or More per Day	17.9	19.2	19.4	18.8	16.5	14.3	13.5	14.2	13.8	12.3	12.5	11.4
Ever Smoked Regularly	32.7	32.6	31.9	29.5	25.8	24.1	24.6	24.2	21.9	22.1	20.8	
Ratios:												
30-Day/Lifetime	0.50	0.51	0.51	0.49	0.46	0.43	0.41	0.43	0.43	0.42	0.44	0.44
Current Daily/Lifetime	0.37	0.38	0.38	0.37	0.34	0.30	0.29	0.30	0.30	0.27	0.28	0.28
Current ½ pk+/Lifetime	0.24	0.25	0.26	0.25	0.22	0.20	0.19	0.20	0.20	0.18	0.18	0.17
Current Daily/30-Day	0.73	0.74	0.75	0.75	0.74	0.70	0.69	0.70	0.70	0.64	0.65	0.63
Current ½ pk+/30-Day	0.49	0.49	0.51	0.51	0.48	0.47	0.46	0.47	0.46	0.42	0.42	0.39
Current ½ pk+/Current Daily	0.67	0.67	0.67	0.68	0.65	0.67	0.67	0.67	0.65	0.66	0.64	0.61
Smoked Regularly/Lifetime	—	0.43	0.43	0.42	0.40	0.36	0.34	0.35	0.34	0.31	0.32	0.31
30-Day/Smoked Regularly	—	1.19	1.18	1.15	1.17	1.18	1.22	1.22	1.25	1.34	1.36	1.42
Current Daily/Smoked Regularly	—	0.88	0.88	0.86	0.86	0.83	0.84	0.86	0.88	0.85	0.88	0.90
Current ½ pk+/Smoked Regularly	—	0.59	0.59	0.59	0.56	0.55	0.56	0.58	0.57	0.56	0.57	0.55

Table 2-4 (continued)

	Percentage Who Used											
Class of:	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Approx. N:	*16300*	*16300*	*16700*	*15200*	*15000*	*15800*	*16300*	*15400*	*15400*	*14300*	*15400*	*15200*
Lifetime	67.2	66.4	65.7	64.4	63.1	61.8	61.9	62.0	64.2	63.5	65.4	65.3
Thirty-Day	29.4	28.7	28.6	29.4	28.3	27.8	29.9	31.2	33.5	34.0	36.5	35.1
Current Daily	18.7	18.1	18.9	19.1	18.5	17.2	19.0	19.4	21.6	22.2	24.6	22.4
Current ½ Pack or More per Day	11.4	10.6	11.2	11.3	10.7	10.0	10.9	11.2	12.4	13.0	14.3	12.6
Ever Smoked Regularly	21.3	20.6	21.6	22.0	21.6	20.4	22.2	22.6	24.0	25.1	27.4	25.8
Ratios:												
30-Day/Lifetime	0.44	0.43	0.44	0.46	0.45	0.45	0.48	0.50	0.52	0.54	0.56	0.54
Current Daily/Lifetime	0.28	0.27	0.29	0.30	0.29	0.28	0.31	0.31	0.34	0.35	0.38	0.34
Current ½ pk+/Lifetime	0.17	0.16	0.17	0.18	0.17	0.16	0.18	0.18	0.19	0.20	0.22	0.19
Current Daily/30-Day	0.64	0.63	0.66	0.65	0.65	0.62	0.64	0.62	0.64	0.65	0.67	0.64
Current ½ pk+/30-Day	0.39	0.37	0.39	0.38	0.38	0.36	0.36	0.36	0.37	0.38	0.39	0.36
Current ½ pk+/Current Daily	0.61	0.59	0.59	0.59	0.58	0.58	0.57	0.58	0.57	0.59	0.58	0.56
Smoked Regularly/Lifetime	0.32	0.31	0.33	0.34	0.34	0.33	0.36	0.36	0.37	0.39	0.42	0.40
30-Day/Smoked Regularly	1.38	1.39	1.32	1.33	1.31	1.36	1.35	1.38	1.40	1.36	1.33	1.36
Current Daily/Smoked Regularly	0.88	0.88	0.87	0.87	0.86	0.84	0.86	0.86	0.90	0.89	0.90	0.87
Current ½ pk+/Smoked Regularly	0.54	0.51	0.52	0.51	0.49	0.49	0.49	0.50	0.52	0.52	0.52	0.49

Notes: Level of significance of difference between the two most recent classes: s =0.05, ss =0.01, sss =0.001.
Source: The Monitoring the Future Study, University of Michigan.

Table 2-5

Trends in the Transition from Lifetime Cigarette Use to Use in the Past 30 Days: Twelfth Graders, 1976–1998

	Transition Rate											
Class of:	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**
Total	0.49	0.51	0.51	0.49	0.48	0.43	0.42	0.43	0.44	0.42	0.44	0.44
Sex												
Male	0.50	0.48	0.47	0.43	0.38	0.39	0.40	0.41	0.39	0.42	0.42	0.41
Female	0.52	0.53	0.50	0.50	0.47	0.43	0.45	0.44	0.45	0.45	0.44	0.46
College Plans												
0 or <4 Years	0.57	0.57	0.56	0.54	0.51	0.49	0.51	0.50	0.50	0.53	0.51	0.53
Complete 4 Years	0.43	0.42	0.40	0.38	0.34	0.33	0.34	0.35	0.35	0.36	0.38	0.39
Region												
Northeast	0.53	0.56	0.53	0.49	0.48	0.44	0.45	0.47	0.47	0.48	0.50	0.49
North Central	0.54	0.52	0.51	0.48	0.43	0.44	0.45	0.45	0.43	0.48	0.47	0.47
South	0.52	0.50	0.47	0.48	0.44	0.41	0.43	0.42	0.42	0.39	0.40	0.40
West	0.41	0.39	0.40	0.37	0.33	0.33	0.32	0.34	0.35	0.39	0.36	0.39
Population Density												
Large MSA	0.54	0.53	0.50	0.46	0.43	0.43	0.46	0.43	0.45	0.45	0.45	0.44
Other MSA	0.49	0.49	0.46	0.46	0.43	0.40	0.41	0.42	0.41	0.42	0.42	0.42
Non-MSA	0.53	0.51	0.51	0.48	0.43	0.42	0.43	0.44	0.41	0.45	0.45	0.46
Parental Education												
1.0–2.0 (Low)	0.56	0.51	0.49	0.50	0.45	0.45	0.46	0.46	0.46	0.46	0.42	0.43
2.5–3.0	0.53	0.53	0.52	0.47	0.47	0.43	0.45	0.44	0.45	0.46	0.47	0.45
3.5–4.0	0.49	0.49	0.46	0.45	0.40	0.40	0.41	0.40	0.40	0.43	0.43	0.43
4.5–5.0	0.48	0.46	0.44	0.42	0.38	0.37	0.37	0.40	0.38	0.41	0.40	0.42
5.5–6.0 (High)	0.42	0.46	0.44	0.44	0.37	0.34	0.37	0.39	0.37	0.36	0.42	0.46
Race (2-year avg.)												
White	—	0.51	0.50	0.48	0.46	0.42	0.43	0.44	0.44	0.45	0.46	0.46
Black	—	0.49	0.46	0.43	0.38	0.36	0.34	0.32	0.32	0.30	0.30	0.26
Hispanic	—	0.46	0.45	0.39	0.34	0.34	0.37	0.36	0.38	0.38	0.37	0.36

Table 2-5 (continued)

	Transition Rate										
Class of:	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Total	0.44	0.44	0.46	0.48	0.46	0.47	0.49	0.49	0.55	0.51	0.56
Sex											
Male	0.43	0.43	0.45	0.46	0.46	0.48	0.52	0.53	0.54	0.57	0.54
Female	0.43	0.44	0.45	0.44	0.43	0.48	0.48	0.50	0.52	0.55	0.53
College Plans											
0 or <4 Years	0.51	0.52	0.52	0.54	0.53	0.52	0.57	0.60	0.62	0.62	0.62
Complete 4 Years	0.39	0.39	0.42	0.40	0.41	0.46	0.47	0.49	0.51	0.53	0.50
Region											
Northeast	0.47	0.45	0.48	0.47	0.46	0.51	0.51	0.53	0.58	0.60	0.56
North Central	0.45	0.50	0.50	0.51	0.49	0.53	0.56	0.55	0.59	0.58	0.59
South	0.43	0.41	0.42	0.42	0.43	0.47	0.50	0.52	0.52	0.55	0.52
West	0.37	0.35	0.41	0.39	0.40	0.41	0.42	0.47	0.43	0.49	0.48
Population Density											
Large MSA	0.42	0.41	0.44	0.43	0.43	0.49	0.49	0.53	0.52	0.55	0.52
Other MSA	0.42	0.43	0.46	0.46	0.44	0.48	0.50	0.51	0.53	0.56	0.53
Non-MSA	0.46	0.46	0.46	0.45	0.48	0.48	0.53	0.53	0.57	0.57	0.56
Parental Education											
1.0–2.0 (Low)	0.42	0.39	0.40	0.48	0.43	0.43	0.43	0.47	0.50	0.48	0.51
2.5–3.0	0.44	0.46	0.47	0.45	0.47	0.48	0.51	0.53	0.55	0.55	0.54
3.5–4.0	0.42	0.44	0.45	0.45	0.45	0.48	0.51	0.51	0.51	0.55	0.55
4.5–5.0	0.43	0.42	0.46	0.44	0.44	0.51	0.52	0.53	0.56	0.58	0.53
5.5–6.0 (High)	0.45	0.42	0.46	0.43	0.43	0.50	0.49	0.53	0.53	0.59	0.53
Race (2-year avg.)											
White	0.47	0.47	0.48	0.49	0.49	0.51	0.53	0.54	0.57	0.58	0.60
Black	0.24	0.25	0.25	0.23	0.20	0.21	0.26	0.27	0.31	0.31	0.31
Hispanic	0.33	0.32	0.35	0.37	0.39	0.39	0.39	0.39	0.40	0.40	0.43

Source: The Monitoring the Future Study, University of Michigan.

SUMMARY Over the 23-year interval covered by the Monitoring the Future study so far, there have been important changes in the patterns and trends of cigarette smoking by American adolescents. Overall, there was a decline in smoking rates early in the study interval and an equally substantial increase late in that same interval. These changes were attributable not only to changes in the rate at which young people were initiating cigarette smoking, but also to changes in the rates at which they were moving on to subsequent stages of use.

Although nearly all demographic subgroups showed an overall decline and subsequent overall increase in smoking rates, there have been some important changes in both the nature and extent of the subgroup differences in various demographic dimensions. In particular, racial/ethnic differences expanded substantially, while social class differences diminished considerably. At the lower (8th and 10th) grades, however, these differences did not disappear completely. Gender differences reversed twice during the study interval, whereas differences associated with college plans became less pronounced, though they are still large. There were also interesting changes associated with population density, in that the increase in teen smoking rates in the 1990s was greatest in the non-urban areas.

Substantial shifts in the demographic composition of the youth population occurred over this 23-year interval, with an increase in minority populations, particularly the Hispanic population. Substantial increases in the average educational level of parents and in the educational aspirations of the students themselves were also observed; some increase in the proportional concentration of the population in the Southern and Western regions of the country; and a continued concentration of the population in urban areas.

Given the general associations between youth smoking and most of these factors, one might have expected that these shifts in demographic composition of the national population would have led to decreases in the overall rate of youth smoking over the past 23 years. However, this has not been the case for most of the 1980s and 1990s, which suggests either (1) that cultural influences that have encouraged increased smoking rates have had their effects partially "masked" or were offset by those substantial demographic shifts, or (2) that the nature of the relationships between demographics and smoking rates is more complex than it appears to be on the surface.

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Trends and Subgroup Differences in Tobacco Use among High School Students in the United States, 1991–1997

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INTRODUCTION Tobacco use is the single leading cause of death in the United States (McGinnis and Foege, 1993). National trends in adolescent tobacco use and characteristics of adolescents who use tobacco are essential data for planning and evaluating tobacco prevention efforts (Everett *et al.*, 1998b).

This analysis used national Youth Risk Behavior Survey (YRBS) data to examine changes in cigarette smoking that occurred among high school students in the United States from 1991 to 1997. This analysis also examined the relationship between demographic characteristics and tobacco use behavior among these students.

METHODS The YRBS is a component of the Centers for Disease Control and Prevention's (CDC) Youth Risk Behavior Surveillance System and measures the prevalence of health risk behaviors among adolescents through representative national, state, and local surveys conducted biennially. The 1991, 1993, 1995, and 1997 national surveys used independent, three-stage cluster samples to obtain representative cross-sectional samples of students in grades 9 through 12 in each of the 50 states and the District of Columbia. In 1991, 1993, 1995, and 1997, the respective sample sizes were 12,272, 16,296, 10,904, and 16,262; the respective school response rates were 75, 78, 70, and 79 percent; the respective student response rates were 90, 90, 86, and 87 percent; and the respective overall response rates were 68, 70, 60, and 69 percent.

For each of the four cross-sectional surveys, students completed a self-administered questionnaire that included questions about cigarette smoking, smokeless tobacco use, and cigar smoking. The following tobacco use behaviors were examined:

1) lifetime cigarette smoking
   (ever smoked cigarettes, even one or two puffs);
2) ever daily smoking
   (ever smoked at least 1 cigarette every day for 30 days);
3) current cigarette smoking
   (smoked cigarettes on 1 or more of the 30 days preceding the survey);
4) frequent cigarette smoking
   (smoked on 20 or more of the 30 days preceding the survey);

5) smoking a whole cigarette before age 13;

6) current smokeless tobacco use
(used chewing tobacco or snuff on 1 or more of the 30 days preceding the survey);

7) smoking cigarettes on school property
(on 1 or more of the 30 days preceding the survey);

8) using smokeless tobacco on school property
(on 1 or more of the 30 days preceding the survey); and

9) current cigar use
(smoked cigars, cigarillos, or little cigars on 1 or more of the 30 days preceding the survey).

To compare trends of current cigarette smoking with those of other drug use, data about students' current use of alcohol, marijuana, and cocaine were also used. Students were identified as current users of alcohol, marijuana, or cocaine if they reported having used these substances on 1 or more of the 30 days preceding the survey.

Demographic characteristics used in this study included sex, race/ethnicity, grade in school, and school location. In addition, as a proxy measure for socioeconomic status, students were asked to identify the highest educational level of their mothers and fathers (not included in the 1991 survey). "Parent education" was defined as the highest level of education of either parent and was categorized into one of four levels: did not finish high school, graduated from high school, some education after high school, or graduated from college. Students who reported that they were not sure of either parent's educational level were excluded from analyses using this variable (n = 4,084 for 1993, 1995, and 1997 combined). School location (not included in the 1991 survey) was identified as urban, suburban, or rural based on the National Center for Health Statistics categories that use population and Metropolitan Statistical Area data and U.S. Bureau of the Census definitions (Quality Education Data, Inc., 1991). School locations were not identified for a total of 471 students in 1993, 1995, and 1997; thus, these students were excluded from analyses using school location. Data are presented only for non-Hispanic Black, non-Hispanic White, and Hispanic students because the numbers of students from other racial/ethnic groups were too small for meaningful analysis.

Data were weighted to provide national estimates, and SUDAAN software was used for all data analysis. Secular trends were analyzed using logistic regression—controlling for sex, grade in school, and race/ethnicity—and simultaneously assessing linear and higher order time effects. Significant linear and quadratic trends were presented. These secular trends were also examined for each of the following subgroups: sex, race/ethnicity, school location, and parent education. Linear trends suggest a significant increase or decrease in data over time. Quadratic trends suggest a significant but nonlinear trend in data over time. When the trend includes significant linear and quadratic components, the data demonstrate some nonlinear variation (*e.g.*, leveling off or change in direction) in addition to a linear effect.

Because data on school location and parent education were not available for 1991, trend analyses were only conducted between 1993 and 1997 when using these variables. Trend analyses were not conducted for current smokeless tobacco use, smokeless tobacco use on school property, or cigar use because data for 3 or more years were not available.

RESULTS

Trends and Subgroup Differences

Lifetime Cigarette Smoking

Overall, the proportion of all high school students who reported that they had ever tried cigarette smoking remained stable from 1991 to 1997; 70.2 percent reported this behavior in 1997 (Table 3-1). The pattern was consistent across sex, race/ethnicity, and school location. Lifetime smoking remained stable in each parent education subgroup except among students whose parents had some education after high school. Among these students, lifetime smoking showed a significant linear increase.

In 1997, lifetime smoking did not significantly differ by sex or school location, but was significantly more likely among Hispanic students than among White ($t = 2.5$, $p < 0.05$) and Black ($t = 2.3$, $p < 0.05$) students (Table 3-2). Lifetime smoking was also significantly more likely among students whose parents had not finished high school ($t = 5.3$, $p < 0.001$), had graduated from high school ($t = 4.3$, $p < 0.001$), or had some education after high school ($t = 3.9$, $p < 0.001$) than among students whose parents had graduated from college. Students whose parents had not finished high school ($t = 2.3$, $p < 0.05$) were significantly more likely to report lifetime smoking than were students whose parents had some education after high school.

Ever Daily Cigarette Smoking

Overall, ever daily smoking showed a significant linear increase from 1991 to 1997; 24.8 percent reported this behavior in 1997 (Table 3-3). Males, White students, Black students, and Black males showed significant linear increases from 1991 to 1997, and students in rural schools showed a significant linear increase from 1993 to 1997. Ever daily smoking was stable among females, Hispanic students, urban and suburban school locations, and all levels of parent education.

In 1997, ever daily smoking did not significantly differ by sex, but was significantly more likely among White students than among Black ($t = 12.3$, $p < 0.001$) and Hispanic ($t = 7.2$, $p < 0.001$) students. Ever daily smoking also was significantly more likely among Hispanic students than among Black students ($t = 4.0$, $p < 0.001$) (Table 3-2). Students in suburban ($t = 2.2$, $p < 0.05$) and rural ($t = 2.4$, $p < 0.05$) schools were significantly more likely than students in urban schools to report this behavior. Similarly, students whose parents had not finished high school ($t = 2.8$, $p < 0.01$) and students whose parents had graduated from high school ($t = 2.7$, $p < 0.01$) were significantly more likely to report ever daily smoking than were students whose parents had graduated from college.

Table 3-1
Percentage of High School Students who Reported Lifetime Cigarette Smoking, by Sex, Race/Ethnicity, School Location, and Parent Education—Youth Risk Behavior Survey, 1991–1997

	Survey Year			
	1991	**1993**	**1995**	**1997**
Total	70.1 (±2.2)*	69.5 (±1.4)	71.3 (±1.7)	70.2 (±1.9)
Sex				
Female	69.5 (±2.9)	68.7 (±1.8)	70.4 (±3.2)	69.3 (±2.6)
Male	70.7 (±2.0)	70.1 (±1.5)	72.1 (±2.0)	70.9 (±1.9)
Race/Ethnicity				
White	70.4 (±2.7)	70.2 (±1.5)	71.1 (±1.9)	70.4 (±2.3)
Female	69.4 (±3.9)	70.0 (±2.1)	71.1 (±3.2)	70.3 (±3.3)
Male	71.4 (±2.3)	70.4 (±1.7)	71.1 (±2.4)	70.4 (±2.4)
Black	67.2 (±3.3)	67.1 (±2.6)	66.0 (±3.7)	68.4 (±4.4)
Female	69.3 (±3.5)	66.7 (±3.7)	62.8 (±6.2)	66.8 (±5.2)
Male	64.8 (±5.3)	67.6 (±3.2)	70.6 (±4.8)	70.1 (±4.7)
Hispanic	75.3 (±1.6)	71.8 (±2.2)	76.3 (±4.8)	75.0 (±2.7)
Female	75.0 (±4.1)	68.2 (±3.6)	74.8 (±5.1)	72.7 (±3.9)
Male	75.7 (±4.7)	75.1 (±3.6)	77.8 (±7.2)	76.9 (±3.6)
School Location				
Urban	—	68.8 (±2.3)	70.6 (±2.9)	69.4 (±3.3)
Suburban	—	70.2 (±2.0)	71.6 (±2.9)	69.5 (±2.9)
Rural	—	67.0 (±2.8)	71.5 (±4.0)	74.6 (±6.1)
Parental Education†				
Did not finish high school	—	77.8 (±4.4)	73.4 (±8.0)	79.1 (±4.0)
Graduated high school	—	76.1 (±3.1)	76.2 (±2.6)	75.2 (±2.6)
Some education after HS	—	67.7 (±2.5)	73.2 (±2.9)	72.9 (±3.4) §
Graduated college	—	67.3 (±2.1)	68.0 (±2.8)	66.2 (±2.6)

** Numbers in parentheses are 95% confidence intervals.*
† Highest level of education of either parent.
§ Significant linear effect ($p < 0.05$).
Note: Trend analyses were conducted using a logistic regression model controlling for sex, grade in school, race/ethnicity, and higher order time effects.

Table 3-2

Percentage of High School Students who Reported Tobacco Use in 1997, by Sex, Race/Ethnicity, School Location, and Parent Education—Youth Risk Behavior Survey*

	Lifetime Smoking	Ever Daily Smoking	Current Smoking	Frequent Smoking	Smoked Before Age 13	Smoked on School Property	Current Smokeless Tobacco Use	Smokeless Tobacco Use on School Property	Current Cigar Use
Total	70.2 (±1.9)†	24.8 (±2.1)	36.4 (±2.3)	16.7 (±1.9)	24.8 (±2.3)	14.6 (±1.5)	9.3 (±2.2)	5.1 (±1.4)	22.0 (±2.1)
Sex									
Female	69.3 (±2.6)	25.4 (±3.1)	34.7 (±2.8)	15.7 (±2.1)	20.9 (±2.4)	13.0 (±2.2)	1.5 (±0.7)	0.4 (±0.2)	10.8 (±2.4)
Male	70.9 (±1.9)	24.3 (±2.2)	37.7 (±2.7)	17.6 (±2.7)	28.0 (±3.3)	15.9 (±1.7)	15.8 (±3.7)	9.0 (±2.5)	31.2 (±2.3)
Race/Ethnicity									
White	70.4 (±2.3)	29.2 (±1.7)	39.7 (±2.4)	19.9 (±2.2)	25.6 (±3.0)	15.8 (±1.8)	12.2 (±2.5)	6.5 (±1.7)	22.5 (±2.6)
Female	70.3 (±3.3)	31.0 (±3.3)	39.9 (±3.2)	20.1 (±3.2)	22.0 (±3.4)	14.9 (±3.2)	1.6 (±0.9)	0.4 (±0.3)	9.6 (±2.6)
Male	70.4 (±2.4)	27.7 (±2.4)	39.6 (±3.8)	19.8 (±3.3)	28.5 (±3.8)	16.5 (±2.4)	20.6 (±4.0)	11.3 (±2.9)	32.5 (±2.1)
Black	68.4 (±4.4)	9.9 (±2.1)	22.7 (±3.8)	7.1 (±1.8)	17.4 (±2.4)	8.8 (±2.0)	2.2 (±1.1)	1.4 (±0.9)	19.4 (±3.2)
Female	66.8 (±5.2)	7.4 (±2.6)	17.4 (±3.9)	4.3 (±1.8)	15.3 (±3.5)	5.5 (±2.0)	1.3 (±1.2)	0.4 (±0.7)	11.0 (±2.9)
Male	70.1 (±4.7)	12.6 (±2.9)	28.2 (±5.5)	10.1 (±3.1)	19.5 (±4.0)	12.4 (±3.1)	3.2 (±1.7)	2.5 (±1.6)	28.1 (±5.3)
Hispanic	75.0 (±2.7)	18.0 (±2.9)	34.0 (±2.7)	10.9 (±2.6)	24.9 (±3.2)	11.9 (±2.5)	5.1 (±2.3)	3.3 (±1.6)	20.3 (±4.4)
Female	72.7 (±3.9)	18.0 (±3.4)	32.3 (±3.7)	8.1 (±2.7)	20.3 (±4.2)	7.7 (±1.8)	1.2 (±1.0)	0.3 (±0.2)	13.0 (±2.8)
Male	76.9 (±3.6)	17.9 (±4.0)	35.5 (±3.6)	13.2 (±3.7)	28.6 (±5.6)	15.3 (±3.7)	8.3 (±3.3)	5.8 (±2.6)	26.3 (±7.0)
School Location									
Urban	69.4 (±3.3)	21.0 (±3.7)	32.8 (±2.4)	13.4 (±1.7)	20.9 (±2.0)	13.0 (±2.1)	7.5 (±3.3)	3.6 (±1.8)	22.7 (±5.2)
Suburban	69.5 (±2.9)	26.1 (±2.9)	37.2 (±2.8)	17.1 (±2.7)	25.7 (±2.9)	15.1 (±2.1)	8.6 (±2.5)	5.0 (±2.0)	21.6 (±1.8)
Rural	74.6 (±6.1)	29.6 (±5.6)	42.2 (±6.6)	23.8 (±5.9)	30.7 (±5.6)	16.8 (±4.9)	14.1 (±4.3)	8.0 (±3.0)	20.4 (±6.2)
Parental Education§									
Did not finish HS	79.1 (±4.0)	27.7 (±3.9)	39.3 (±4.6)	18.4 (±3.1)	35.4 (±3.7)	18.3 (±4.6)	8.1 (±3.0)	6.8 (±2.8)	18.7 (±4.4)
Graduated HS	75.2 (±2.6)	28.3 (±4.1)	40.2 (±3.8)	19.5 (±3.6)	30.3 (±2.6)	15.4 (±2.7)	8.7 (±3.0)	4.4 (±2.1)	21.4 (±3.4)
Some educ. after HS	72.9 (±3.4)	26.1 (±2.7)	37.7 (±3.0)	16.3 (±2.9)	25.3 (±3.5)	13.4 (±2.0)	8.9 (±2.3)	4.7 (±1.9)	20.5 (±3.4)
Graduated college	66.2 (±2.6)	22.9 (±2.7)	34.3 (±2.5)	15.5 (±2.3)	21.5 (±2.7)	14.4 (±1.9)	9.9 (±2.9)	5.1 (±1.7)	23.7 (±3.1)

** Lifetime smoking = ever smoked cigarettes, even one or two puffs; ever daily smoking = ever smoked at least one cigarette every day for 30 days; current cigarette smoking = smoked cigarettes on 1 or more of the 30 days preceding the survey; frequent cigarette smoking = smoked on 20 or more of the 30 days preceding the survey; smoked before age 13 years = age when first smoked a whole cigarette; current smokeless tobacco use = used chewing tobacco or snuff on 1 or more of the 30 days preceding the survey; smoked cigarettes on school property = on 1 or more of the 30 days preceding the survey; used smokeless tobacco on school property = on 1 or more of the 30 days preceding the survey; and current cigar use = smoked cigars, cigarillos, or little cigars on 1 or more of the 30 days preceding the survey.*

† Numbers in parentheses are 95% confidence intervals.

§ Highest level of education of either parent; HS = high school.

Table 3-3
Percentage of High School Students who Reported Ever Smoking Daily, by Sex, Race/Ethnicity, School Location, and Parent Education—Youth Risk Behavior Survey, 1991–1997

	Survey Year			
	1991	**1993**	**1995**	**1997**
Total	21.3 (±2.2)*	24.7 (±2.0)	23.6 (±2.9)	24.8 (±2.1) §
Sex				
Female	22.2 (±3.0)	24.5 (±2.5)	23.5 (±3.4)	25.4 (±3.1)
Male	20.4 (±1.9)	24.9 (±2.2)	23.7 (±3.2)	24.3 (±2.2) §
Race/Ethnicity				
White	25.0 (±2.8)	28.4 (±2.6)	27.6 (±3.7)	29.2 (±1.7) §
Female	27.2 (±4.0)	28.6 (±3.4)	28.9 (±3.9)	31.0 (±3.3)
Male	23.0 (±2.5)	28.2 (±2.9)	26.5 (±4.4)	27.7 (±2.4)
Black	7.1 (±1.7)	9.3 (±1.8)	9.1 (±2.4)	9.9 (±2.1) §
Female	5.6 (±1.8)	9.1 (±2.1)	5.6 (±3.2)	7.4 (±2.6)
Male	8.9 (±2.8)	9.4 (±3.2)	13.4 (±5.6)	12.6 (±2.9) §
Hispanic	16.1 (±2.5)	18.6 (±2.7)	17.0 (±3.8)	18.0 (±2.9)
Female	16.5 (±3.1)	18.3 (±4.0)	15.8 (±3.7)	18.0 (±3.4)
Male	15.7 (±3.2)	19.0 (±3.4)	18.3 (±5.8)	17.9 (±4.0)
School Location				
Urban	—	21.0 (±4.4)	19.2 (±2.8)	21.0 (±3.7)
Suburban	—	27.3 (±2.8)	24.5 (±4.7)	26.1 (±2.9)
Rural	—	19.1 (±2.9)	29.8 (±4.3)	29.6 (±5.6) §
Parental Education†				
Did not finish high school	—	30.5 (±4.3)	22.5 (±6.1)	27.7 (±3.9)
Graduated high school	—	27.7 (±4.1)	26.5 (±3.5)	28.3 (±4.1)
Some education after high school	—	24.0 (±2.2)	24.7 (±4.3)	26.1 (±2.7)
Graduated college	—	23.5 (±2.7)	22.1 (±3.6)	22.9 (±2.7)

** Numbers in parentheses are 95% confidence intervals.*
† Highest level of education of either parent.
§ Significant linear effect ($p < 0.5$).
Note: Trend analyses were conducted using a logistic regression model controlling for sex, grade in school, race/ethnicity, and higher order time effects.

Current Cigarette Smoking Current smoking showed a significant linear increase from 1991 to 1997; 36.4 percent of high school students reported this behavior in 1997 (Table 3-4). This significant linear increase was consistent across sex, race/ethnicity, school location, and parent education, except among students whose parents had not finished high school. Among these students, current cigarette smoking was stable from 1993 to 1997.

In 1997, current smoking did not significantly differ by sex, but was significantly more likely among White students than among Black ($t = 7.7$, $p < 0.001$) and Hispanic ($t = 3.5$, $p < 0.001$) students. Current smoking was also significantly more likely among Hispanic students than among Black students ($t = 4.9$, $p < 0.001$) (Table 3-2). Students in suburban ($t = 2.4$, $p < 0.05$) and rural ($t = 2.7$, $p < 0.05$) schools were significantly more likely to report this behavior than were students in urban schools. Similarly, students whose parents had not finished high school ($t = 2.3$, $p < 0.05$), had

Table 3-4
Percentage of High School Students who Reported Current Cigarette Smoking,* by Sex, Race/Ethnicity, School Location, and Parent Education—Youth Risk Behavior Survey, 1991–1997

	Survey Year			
	1991	1993	1995	1997
Total	27.5 (±2.7)†	30.5 (±1.9)	34.8 (±2.2)	36.4 (±2.3) §
Sex				
Female	27.3 (±3.4)	31.2 (±2.1)	34.3 (±3.2)	34.7 (±2.8) §
Male	27.6 (±3.1)	29.8 (±2.3)	35.4 (±2.4)	37.7 (±2.7) §
Race/Ethnicity				
White	30.9 (±3.3)	33.7 (±2.2)	38.3 (±2.7)	39.7 (±2.4) §
Female	31.7 (±4.6)	35.3 (±2.6)	39.8 (±3.5)	39.9 (±3.2) §
Male	30.2 (±3.8)	32.2 (±2.7)	37.0 (±3.3)	39.6 (±3.8) §
Black	12.6 (±2.5)	15.4 (±2.5)	19.2 (±3.2)	22.7 (±3.8) §
Female	11.3 (±2.3)	14.4 (±2.7)	12.2 (±3.1)	17.4 (±3.9) §
Male	14.1 (±4.5)	16.3 (±4.2)	27.8 (±5.5)	28.2 (±5.5) §
Hispanic	25.3 (±2.8)	28.7 (±2.9)	34.0 (±5.3)	34.0 (±2.7) §
Female	22.9 (±3.8)	27.3 (±3.9)	32.9 (±5.6)	32.2 (±3.7) §
Male	27.9 (±3.6)	30.2 (±3.4)	34.9 (±8.7)	35.5 (±3.6) §
School Location				
Urban	—	26.6 (±3.6)	31.1 (±3.3)	32.8 (±2.4) §
Suburban	—	32.6 (±2.7)	35.7 (±3.8)	37.2 (±2.8) §
Rural	—	27.9 (±3.3)	39.6 (±1.9)	42.2 (±6.6) §
Parental Education‡				
Did not finish high school	—	36.8 (±4.4)	33.1 (±4.5)	39.3 (±4.6)
Graduated high school	—	32.8 (±3.5)	37.6 (±3.9)	40.2 (±3.8) §
Some education after high school	—	28.9 (±2.5)	36.3 (±3.7)	37.7 (±3.0) §
Graduated college	—	29.7 (±2.5)	33.6 (±2.7)	34.3 (±2.5) §

** Smoked Cigarettes on 1 or more of the 30 days preceding the survey.*
† Numbers in parentheses are 95% confidence intervals.
‡ Highest level of education of either parent.
§ Significant linear effect ($p < 0.05$).
Note: Trend analyses were conducted using a logistic regression model controlling for sex, grade in school, race/ethnicity, and higher order time effects.

graduated from high school ($t = 2.9$, $p < 0.01$), or had some education after high school ($t = 2.1$, $p < 0.05$) were significantly more likely to report current smoking than students whose parents had graduated from college.

Frequent Cigarette Smoking Frequent smoking showed a significant linear increase from 1991 to 1997; 16.7 percent of students reported this behavior in 1997 (Table 3-5). This pattern was consistent among males, females, White, Black, and Hispanic students overall as well as White females, White males, Black males, and Hispanic males. Among students in rural schools, frequent cigarette smoking showed both significant linear and quadratic time effects; frequent smoking more than doubled between 1993 and 1995, then leveled off between 1995 and 1997. Frequent smoking remained stable among students in both urban and suburban schools. Among students whose parents had some education after high school and among students whose parents had graduated from college, frequent cigarette smoking significantly

Table 3-5
Percentage of High School Students who Reported Frequent Cigarette Smoking,* by Sex, Race/Ethnicity, School Location, and Parent Education—Youth Risk Behavior Survey, 1991–1997

	Survey Year			
	1991	**1993**	**1995**	**1997**
Total	12.7 (±2.2) †	13.8 (±1.7)	16.1 (±2.6)	16.7 (±1.9) §
Sex				
Female	12.4 (±2.9)	13.5 (±2.1)	15.9 (±3.0)	15.7 (±2.1) §
Male	13.0 (±1.9)	14.0 (±1.7)	16.3 (±2.9)	17.6 (±2.7) §
Race/Ethnicity				
White	15.4 (±2.8)	16.1 (±2.1)	19.5 (±3.6)	19.9 (±2.2) §
Female	15.8 (±3.9)	16.1 (±2.8)	20.8 (±4.1)	20.1 (±3.2) §
Male	15.0 (±2.1)	16.0 (±2.2)	18.4 (±3.8)	19.8 (±3.3) §
Black	3.1 (±1.1)	4.6 (±1.6)	4.5 (±1.8)	7.2 (±1.8) §
Female	1.9 (±1.0)	4.3 (±1.8)	1.3 (±0.8)	4.3 (±1.8)
Male	4.5 (±2.1)	4.9 (±2.5)	8.5 (±3.4)	10.1 (±3.1) §
Hispanic	6.8 (±1.5)	7.7 (±2.0)	10.0 (±3.3)	10.9 (±2.6) §
Female	5.7 (±2.3)	6.9 (±3.2)	9.3 (±3.8)	8.1 (±2.7)
Male	8.0 (±1.6)	8.5 (±2.3)	10.7 (±4.5)	13.2 (±3.7) §
School Location				
Urban	—	11.7 (±3.4)	13.0 (±2.4)	13.4 (±1.7) §
Suburban	—	15.3 (±2.4)	16.3 (±4.3)	17.1 (±2.7)
Rural	—	9.9 (±1.7)	22.2 (±3.5)	23.8 (±5.9) §,§§
Parental Education‡				
Did not finish high school	—	19.0 (±4.5)	15.4 (±3.7)	18.4 (±3.1)
Graduated high school	—	16.1 (±3.0)	18.8 (±3.5)	19.5 (±3.6)
Some education after high school	—	13.1 (±2.3)	18.2 (±4.0)	16.3 (±2.9) §
Graduated college	—	12.6 (±1.7)	14.0 (±3.0)	15.5 (±2.3) §

** Smoked Cigarettes on 20 or more of the 30 days preceding the survey.*
† Numbers in parentheses are 95% confidence intervals.
‡ Highest level of education of either parent.
§ Significant linear effect ($p < 0.05$).
§§ Significant quadratic effect ($p < 0.05$).
Note: Trend analyses were conducted using a logistic regression model controlling for sex, grade in school, race/ethnicity, and higher order time effects.

increased; however, frequent smoking remained stable among students whose parents had not finished high school or had graduated from high school.

In 1997, frequent smoking did not significantly differ by sex, but was significantly more likely among White students than among Black ($t = 7.9$, $p < 0.001$) and Hispanic ($t = 5.6$, $p < 0.001$) students. Frequent smoking also was significantly more likely among Hispanic students than among Black students ($t = 2.2$, $p < 0.05$). Frequent smoking among students in suburban ($t = 2.4$, $p < 0.05$) and rural schools ($t = 3.2$, $p < 0.05$) was significantly more likely than among students in urban schools. It was also significantly more likely among students in rural schools ($t = 2.0$, $p < 0.05$) than among students in suburban schools.

Smoked Cigarettes Before Age 13

Overall, the proportion of high school students who reported that they had smoked their first whole cigarette before age 13 years remained stable from 1991 to 1997; 24.8 percent of students reported this behavior in 1997 (Table 3-6). Similarly, there were no significant linear effects among males, females, White, Black, and Hispanic students overall, among students in suburban and rural schools, and across parent education. Students in urban schools showed a significant linear decrease in smoking before age 13. Hispanic males showed significant linear and quadratic effects with increases between 1991 and 1995 and then a decrease from 1995 to 1997. Among Hispanic students overall, there was a significant quadratic trend with smoking before age 13 years peaking in 1993. Among students whose parents had not finished high school, there was a significant quadratic trend with the lowest prevalence occurring in 1995.

In 1997, males were significantly more likely than females to smoke before age 13 ($t = 4.3$, $p < 0.001$) (Table 3-2). This behavior also was significantly more likely among White students than among Black students ($t = 4.6$, $p < 0.001$) and significantly more likely among Hispanic students than among Black students ($t = 3.6$, $p < 0.001$). Students in suburban ($t = 2.5$, $p < 0.05$) and rural ($t = 3.1$, $p < 0.01$) schools were significantly more likely than students in urban schools to smoke before age 13. Similarly, students whose parents had not finished high school ($t = 7.5$, $p < 0.001$), had graduated from high school ($t = 4.9$, $p < 0.001$), or had some education after high school ($t = 2.3$, $p < 0.05$) were significantly more likely to report smoking before age 13 than were students whose parents had graduated from college. Students whose parents had not finished high school were significantly more likely to report smoking before age 13 than students whose parents had graduated from high school ($t = 2.6$, $p < 0.05$) or whose parents had some education after high school ($t = 3.9$, $p < 0.001$).

Smoked Cigarettes on School Property

Smoking on school property remained stable from 1991 to 1997; 14.6 percent of students reported this behavior in 1997 (Table 3-7). This pattern was consistent among females, males, White female and male students, Black females, and among students whose parents had not graduated high school, had graduated high school, and students whose parents had graduated from college. Smoking on school property showed a significant linear increase among Black students overall, Black males, Hispanic males, and students in rural schools, and showed a significant linear decrease among Hispanic females. Among Hispanic females and students in rural schools, there were also significant quadratic trends with peaking in smoking on school property in 1995 and declines from 1995 to 1997. Among Hispanic females, after the decline from 1995 to 1997, the prevalence in 1997 was lower than in 1993, whereas, among students in rural schools, smoking on school property remained higher in 1997 than in 1993 even with these declines. Among students whose parents had some education after high school, there was only a quadratic trend with smoking on school property peaking in 1995.

In 1997, males were significantly more likely than females to report smoking on school property ($t = 2.5$, $p < 0.05$; Table 3-2). White students were significantly more likely than Black ($t = 4.9$, $p < 0.001$) and

Table 3-6

Percentage of High School Students who Reported Smoking Their First Whole Cigarette before Age 13 Years, by Sex, Race/Ethnicity, School Location, and Parent Education—Youth Risk Behavior Survey, 1991–1997

	Survey Year			
	1991	**1993**	**1995**	**1997**
Total	23.8 (±1.5)*	26.9 (±1.4)	24.9 (±2.7)	24.8 (±2.3)
Sex				
Female	22.1 (±1.9)	23.3 (±2.1)	21.8 (±3.7)	20.9 (±2.4)
Male	25.4 (±2.2)	30.1 (±1.7)	27.8 (±2.8)	28.0 (±3.3)
Race/Ethnicity				
White	25.1 (±2.1)	28.5 (±1.9)	25.9 (±2.9)	25.7 (±3.0)
Female	23.1 (±2.7)	24.6 (±2.7)	23.7 (±4.3)	22.1 (±3.4)
Male	26.9 (±3.1)	31.9 (±2.3)	27.9 (±3.4)	28.5 (±3.8)
Black	18.0 (±2.2)	18.9 (±1.8)	17.2 (±3.1)	17.4 ±(2.4)
Female	18.5 (±3.2)	17.4 (±2.5)	14.8 (±4.2)	15.3 (±3.5)
Male	17.4 (±2.7)	20.5 (±2.3)	20.1 (±3.1)	19.5 (±4.0)
Hispanic	22.0 (±2.6)	27.3 (±2.0)	26.6 (±3.2)	24.9 (±3.2) §§
Female	22.9 (±3.8)	23.5 (±3.6)	20.2 (±5.4)	20.3 (±4.2)
Male	20.9 (±3.0)	31.0 (±4.2)	33.0 (±5.5)	28.6 (±5.6) §,§§
School Location				
Urban	—	26.1 (±3.1)	22.8 (±2.3)	20.9 (±2.0) §
Suburban	—	27.5 (±2.0)	25.4 (±3.7)	25.7 (±2.9)
Rural	—	25.0 (±4.0)	27.5 (±4.6)	30.7 (±5.6)
Parental Education†				
Did not finish high school	—	36.3 (±5.3)	29.1 (±5.6)	35.4 (±3.7) §§
Graduated high school	—	30.1 (±3.3)	26.0 (±4.9)	30.3 (±2.6)
Some education after HS	—	25.4 (±1.7)	26.3 (±2.7)	25.3 (±3.5)
Graduated college	—	25.1 (±2.5)	22.6 (±2.8)	21.5 (±2.7)

** Numbers in parentheses are 95% confidence intervals.*

† Highest level of education of either parent.

§ Significant linear effect ($p < 0.05$).

§§ Significant quadratic effect ($p < 0.05$).

Note: Trend analyses were conducted using a logistic regression model controlling for sex, grade in school, race/ethnicity, and higher order time effects.

Table 3-7
Percentage of High School Students who Reported Smoking on School Property,* by Sex, Race/Ethnicity, School Location, and Parent Education—Youth Risk Behavior Survey, 1993–1997

	Survey Year			
	1991	**1993**	**1995**	**1997**
Total	—	13.2 (±1.8)†	16.0 (±2.1)	14.6 (±1.5)
Sex				
Female	—	12.9 (±1.8)	15.1 (±2.4)	13.0 (±2.2)
Male	—	13.5 (±2.1)	16.8 (±2.6)	15.9 (±1.7)
Race/Ethnicity				
White	—	14.6 (±2.4)	17.6 (±3.0)	15.8 (±1.8)
Female	—	14.5 (±2.3)	17.7 (±3.3)	14.9 (±3.2)
Male	—	14.7 (±2.8)	17.5 (±3.2)	16.5 (±2.4)
Black	—	5.9 (±1.6)	7.6 (±2.2)	8.8 (±2.0) §
Female	—	4.5 (±1.7)	4.5 (±2.4)	5.5 (±2.0)
Male	—	7.3 (±2.8)	11.6 (±2.3)	12.4 (±3.1) §
Hispanic	—	11.1 (±2.5)	14.9 (±3.3)	11.9 (±2.5)
Female	—	11.6 (±3.1)	13.6 (±3.9)	7.7 (±1.8) §,,§§
Male	—	10.6 (±2.7)	16.2 (±3.9)	15.3 (±3.7) §
School Location				
Urban	—	11.8 (±2.4)	14.3 (±1.7)	13.0 (±2.1)
Suburban	—	14.8 (±2.1)	16.4 (±3.9)	15.1 (±2.1)
Rural	—	6.8 (±3.2)	18.3 (±2.1)	16.8 (±4.9) §,§§
Parent Education‡				
Did not finish high school	—	16.3 (±4.1)	16.9 (±3.5)	18.3 (±4.6)
Graduated high school	—	14.3 (±3.4)	17.8 (±2.5)	15.4 (±2.7)
Some education after HS	—	12.7 (±2.0)	17.1 (±4.0)	13.4 (±2.0) §§
Graduated college	—	12.7 (±1.9)	14.3 (±2.6)	14.4 (±1.9)

** Smoked on school property on 1 or more of the 30 days preceding the survey (question not asked in 1991).*
† Numbers in parentheses are 95% confidence intervals.
‡ Highest level of education of either parent.
§ Significant linear effect ($p < 0.05$).
§§ Significant quadratic effect ($p < 0.05$).
Note: Trend analyses were conducted using a logistic regression model controlling for sex, grade in school, race/ethnicity, and higher order time effects.

Hispanic ($t = 2.4$, $p < 0.05$) students to report this behavior. Students whose parents had not finished high school were significantly more likely to have smoked on school property than were students whose parents had some education after high school ($t = 2.4$, $p < 0.05$).

Current Smokeless Tobacco Use and Smokeless Tobacco Use on School Property

In 1997, 9.3 percent of students reported current use of smokeless tobacco and 5.1 percent reported using smokeless tobacco on school property (Table 3-2).

Males were significantly more likely than females to report current smokeless tobacco use ($t = 7.9$, $p < 0.001$) and smokeless tobacco use on school property ($t = 6.9$, $p < 0.001$). White students were significantly more likely than Black ($t = 9.4$, $p < 0.001$) and Hispanic ($t = 5.8$, $p < 0.001$) students, and Hispanic students were significantly more likely than Black students ($t = 2.3$, $p < 0.05$), to report current smokeless tobacco use. Similarly, White students were significantly more likely than Black ($t = 6.5$, $p < 0.001$) and Hispanic ($t = 3.5$, $p < 0.001$) students, and Hispanic students were significantly more likely than Black students ($t = 2.0$, $p < 0.05$), to report smokeless tobacco use on school property. Students in rural schools were significantly more likely than students in suburban ($t = 2.0$, $p < 0.05$) and urban ($t = 2.8$, $p < 0.01$) schools to report current smokeless tobacco use. In addition, students in rural schools were significantly more likely than students in urban schools ($t = 2.4$, $p < 0.05$) to report smokeless tobacco use on school property. Parental educational level was not associated with current smokeless tobacco use; however, smokeless tobacco use on school property was significantly more likely among students whose parents had not finished high school than among students whose parents had graduated from high school ($t = 2.0$, $p < 0.05$).

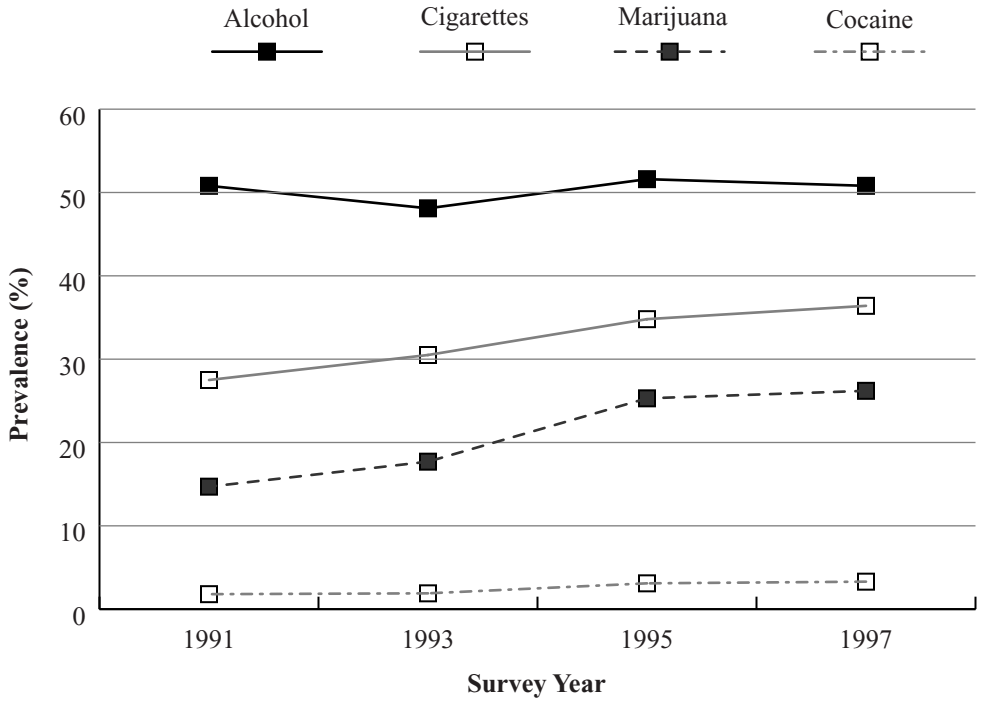
Current Cigar Use

In 1997, 22.0 percent of students reported current cigar use. Overall, males were significantly more likely than females ($t = 15.1$, $p < 0.001$) to report this behavior and these differences held across the racial/ethnic subgroups. Current cigar use did not vary significantly by race/ethnicity overall, by school location, or by parental education.

Trends in Current Smoking Compared with Other Drug Use

Overall, current alcohol use remained stable from 1991 to 1997 (50.8 ±2.8 percent in 1997); however, significant linear increases were seen for both current marijuana use (from 14.7 ±2.2 percent in 1991 to 26.2 ±2.2 percent in 1997, $p < 0.001$) and current cocaine use (from 1.8 ±0.5 percent in 1991 to 3.3 ±0.5 percent in 1997, $p < 0.001$). These increases were consistent with the significant linear increases in current cigarette smoking from 1991 to 1997 (Figure 3-1). This pattern was consistent among males and females, as well as among White and Hispanic students. Among Black students, however, cocaine use remained stable from 1991 to 1997.

Figure 3-1
Current Smoking and Other Drug Use* among High-School Students, 1991-1997



** Used alcohol, smoked cigarettes, used marijuana, or used cocaine on 1 or more of the 30 days preceding the survey.*

Source: Youth Risk Behavior Survey, 1991-1997.

DISCUSSION This study found that lifetime cigarette smoking remained stable among high school students from 1991 to 1997; 70 percent of students reported this behavior in 1997. However, both current and frequent cigarette smoking significantly increased from 1991 to 1997. With the current patterns of tobacco use among youths, an estimated 5 million persons aged 0 to 17 years in 1995 will die prematurely from a smoking-related illness (CDC, 1996).

Approximately 80 percent of tobacco use occurs for the first time among youths aged less than 18 years (U.S. DHHS, 1994). Schools are ideal settings to influence tobacco use patterns among young people because educators can reach almost all school-aged youths and can provide prevention education when children are at the highest risk of experimenting with tobacco. To be most effective, school-based programs must target young persons before they initiate tobacco use or drop out of school (CDC, 1994). For this prevention to occur, programs must begin to reach youths at an early age. This study found that, from 1991 to 1997, the proportion of students who reported smoking their first whole cigarette before age 13 was stable—one in four students reported this behavior in 1997.

To assist schools in providing the most effective tobacco-use prevention programs, the CDC (1994) developed Guidelines for School Health Programs to Prevent Tobacco Use and Addiction. These guidelines recommend that schools provide tobacco-use prevention education from kindergarten through 12th grade, with especially intensive instruction in junior high or middle school. However, this level of instruction is not occurring as recommended. Slightly more than one-half (55 percent) of middle and junior-high school teachers and fewer than half (47 percent) of senior high school teachers taught tobacco-use prevention as a major topic in their courses in 1994 (Crossett *et al.*, in press). Only 21 percent of teachers who included tobacco-use prevention as a major topic spent six or more class periods on the topic. Few teachers are dedicating the instructional time that research trials indicate is needed to effectively prevent tobacco use (NCI, 1990; Dusenbury *et al.*, 1997; Botvin *et al.*, 1995).

This study revealed that, overall, cigarette smoking on school property remained stable from 1993 to 1997, but increased significantly among Black students overall, Black males, Hispanic males, and students in rural schools. In 1997, 14.6 percent of students reported smoking cigarettes on school property and 5.1 percent (11.3 percent of White males) used smokeless tobacco on school property. The CDC guidelines recommend that school buildings, school property, school vehicles, and school-sponsored functions be tobacco-free. In addition, the Pro-Children Act of 1994 (1994) requires smoke-free environments in all schools supported by federal funds. Most schools have smoke-free building policies in place, but lack more comprehensive prohibitions (Crossett *et al.*, in press) that, if enforced, might reduce smoking on school property.

School-based tobacco-use prevention programs are most effective when supported by community-wide programs involving families, peers, and community organizations (CDC, 1994). Other critical components of a comprehensive tobacco control program include reducing youth access (*e.g.*, by implementing and adequately enforcing restrictions on minors' access) (U.S. DHHS, 1994), reducing the appeal of tobacco products (U.S. DHHS, 1994), conducting youth-oriented mass media campaigns (U.S. DHHS, 1994; FDA, 1996), and increasing excise taxes on tobacco products (U.S. DHHS, 1994; Hamilton *et al.*, 1997; Ohsfeldt *et al.*, 1997).

Rates of cigar smoking, although significantly higher among males than females, did not significantly vary across any other subgroups. However, as in other investigations (Najem *et al.*, 1997; Nelson *et al.*, 1995), differences emerged in other tobacco-use patterns among students of different racial/ethnic backgrounds. In this study, White students were significantly more likely than Hispanic students and Hispanic students were more likely than Black students to report ever daily smoking, current smoking, frequent smoking, current smokeless tobacco use, and smokeless tobacco use on school property. Further, White students and Hispanic students were significantly more likely than Black students to report smoking before age 13, and White students were significantly more likely than Black and Hispanic students to have smoked on school property.

Parental education and school location were also associated with tobacco use. As parents' education increased, students' current cigarette smoking decreased, although frequent smoking and current smokeless tobacco use were consistent across parental education subgroups. Students in urban schools were generally less likely to use tobacco than students in rural schools. These differences partly reflect differences in the racial/ethnic distributions found across school locations. For example, urban schools in 1997 were comprised of 45 percent of White students, 23 percent of Black students, and 15 percent of Hispanic students. However, in suburban schools, 67 percent of students were White, 9 percent were Black, and 8 percent were Hispanic. In rural schools, 84 percent of students were White, 4 percent were Black, and 5 percent were Hispanic. Urban schools have a higher proportion of Black and Hispanic students than other school locations and these students are generally less likely than White students to report cigarette use.

Increasing trends in current cigarette smoking were consistent with significant increases in current marijuana and cocaine use from 1991 to 1997. This was expected given the strong association between cigarette smoking and other drug use found in other investigations (Everett *et al.*, 1998a; Escobedo *et al.*, 1997; Parra-Medina *et al.*, 1995). Programs designed to prevent tobacco use should consider other substance use because rarely is one substance used in isolation (CDC, 1994; Everett *et al.*, 1998a).

The findings in this report are subject to at least two limitations. First, these data apply only to adolescents who attend high school. However, in 1996, only 5 percent of persons aged 14 to 17 were not enrolled in school (Snyder, 1997). Second, the extent of underreporting or overreporting cannot be determined, although the survey questions demonstrate good test-retest reliability (Brener *et al.*, 1995).

CONCLUSIONS Despite national efforts to reduce tobacco use among American youths, cigarette smoking increased among high school students nationwide from 1991 to 1997. In addition, smokeless tobacco use and cigar use were high in 1997. Continued efforts are needed to reduce all forms of tobacco use among youths.

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Trends in Adolescent Smoking in the United States: Data from the National Household Survey on Drug Abuse, 1994 through 1998

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INTRODUCTION It is well documented that most smokers begin cigarette use in their adolescent years (U.S. DHHS, 1999). The prevalence of both past-year and past-month smoking increases dramatically throughout adolescence and young adulthood, peaking when people are in their late teens or early twenties. Beyond that point, the prevalence of current smoking declines. The steepest gradient for lifetime smoking is observed in the teenage years. In 1998, about 17 percent of 12- to 13-year-olds had ever smoked compared to 37 percent of 14- to 15-year-olds and 55 percent of adolescents ages 16 and 17 (U.S. DHHS, 2000).

This chapter uses data from the National Household Survey on Drug Abuse (NHSDA) to examine trends in cigarette and other tobacco product use among adolescents aged 12 to 17 (U.S. DHHS, 1998). Trends for variables associated with cigarette use were also examined for the same time period.

The NHSDA was first conducted by the federal government in 1971. The survey was fielded periodically until 1990, at which time data collection became annual. Since October of 1992, the NHSDA has been conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA). The target population is United States civilian residents 12 years of age and older living in households, noninstitutional group quarters (*e.g.*, shelters, rooming houses, dormitories), and military bases. The survey collects data by administering questionnaires to a representative sample of this population at their place of residence. The NHSDA employs a multistage area probability sample, and data collection takes place continuously throughout the calendar year. From 1985 through 1998, Hispanics, Blacks, and adolescents were oversampled. The sample size of the NHSDA was expanded to 70,000 for the 1999 survey. The NHSDA uses self-administered answer sheets for the most sensitive portions of the survey.

SAMHSA continues to invest substantial resources for improving measurement of substance use and related issues. A series of methodological studies was conducted between 1988 and 1992. Based on the results from these studies, and consultation with drug researchers and other data users,

an improved instrument was fielded in 1994. One of the changes made in 1994 was putting cigarette use questions on self-administered answer sheets instead of having the interviewer administer them, as had been done prior to 1994. Therefore, the cigarette trends included in this paper will be limited to surveys conducted from 1994 through 1998. Estimates of adolescent cigarette use prior to 1994 are not comparable to the most recent years due to the change in data collection method (Brittingham *et al.*, 1998). The sample sizes for adolescents aged 12 to 17 years were 4,698 in 1994, 4,595 in 1995, 4,358 in 1996, 7,844 in 1997, and 6,788 in 1998. The adolescent interview response rate for each year was about 85 percent.

DATA ANALYSIS Statistical analyses were performed using SAS version 6.12 (SAS Institute, 1997) and SUDAAN version 7.5 (Shah *et al.*, 1997). Because of the sample design of the NHSDA, traditional methods of statistical analysis that assume simple random sampling are not applicable. It is necessary to use statistical methods that incorporate both survey weights and the complex sample design. SUDAAN was used to compute 95 percent confidence intervals and to test the difference between time periods at the critical level of $p < 0.05$.

Point estimates considered to be unreliable were omitted from all tables and are noted by asterisks (**). An estimate was considered unreliable if the relative standard error was greater than 17.5 percent of the log transformation of the estimated proportion.

Trend data are presented for cigarette use and smokeless tobacco use. Cigar use data are presented for the 1997 and 1998 survey years. Demographic characteristics used in this study included gender, age, and race/ethnicity. Data are presented for three major racial/ethnic groups: White non-Hispanic, Black non-Hispanic, and Hispanic. Tobacco use is also shown by population density, with large metropolitan areas being defined as Metropolitan Statistical Areas (MSAs) with populations of 1 million or more. Small metropolitan areas are MSAs with populations of less than 1 million, and nonmetropolitan areas are outside MSAs. Cigarette data are also presented for four U.S. geographic regions: Northeast, North Central, South, and West.

Table 4-1
Proportion of Adolescents Reporting Cigarette Smoking in the Month prior to Survey, by Age

	Smoked during Previous Month									
	1994		1995		1996		1997		1998	
Age (Years)	(N = 4,698)* %	CI	(N = 4,595)* %	CI	(N = 4,538)* %	CI	(N = 7,844)* %	CI	(N = 6,788)* %	CI
12–17	18.9	(17.5-20.4)	20.2	(18.8-21.8)	18.3	(16.9-19.7)	19.9	(18.6-21.3)	18.2	(16.9-19.7)
12–13	9.40	(7.6-11.5)	10.7	(8.8-12.9)	7.30	(5.7-9.3)	9.70	(8.1-11.6)	8.00	(6.5-9.9)
14–15	19.7	(17.3-22.4)	20.5	(18.0-23.2)	18.4	(16.2-20.8)	19.5	(17.5-21.9)	18.2	(15.9-20.7)
16–17	28.6	(25.8-31.7)	30.1	(27.3-33.2)	28.4	(25.9-31.3)	30.3	(27.8-33.1)	29.3	(26.6-32.3)

**Total N for ages 12–17.*
Note: CI = 95% confidence interval.
Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1998.

Other variables investigated included those shown in the literature to be important predictors for tobacco use, including self-reported average grades in school and perceived risk for cigarette smoking (Brandon *et al.*, 1996; Pierce *et al.*, 1996). The perceived risk question for cigarette use asks, "How much do you think people risk harming themselves physically and in other ways when they smoke one or more packs of cigarettes per day?" The four answer choices range from "no risk" to "great risk."

The NHSDA collects four different prevalence periods for substance use. The four time periods are lifetime use (at least once in one's life), past year use (using a substance at least once in the 12 months prior to interview), past month use (using a substance at least once in the 30 days prior to survey), and daily use. An adolescent is considered a "current smoker" if he or she reported smoking at least once within the 30 days prior to the interview.

RESULTS The steepest gradient for smoking prevalence is observed in the teenage years. In Table 4-1, trends for current smoking are shown by age. In the 1998 NHSDA, 8.0 percent of 12- to 13-year-olds reported smoking in the 30 days prior to the survey compared to 18.2 percent of 14- to 15-years-olds and 29.3 percent of 16- to 17-year-olds. For the time period of 1994 to 1998, the prevalence of teen smoking was fairly stable for the two younger age groups. Among 16- to 17-year-olds, there was no statistically significant increase between 1994 and 1998, but the prevalence estimates went from 28.6 percent of this age group reporting current smoking in 1994 to 29.3 percent in 1998.

Trends for current smoking among 12- to 17-year-olds by gender and race/ethnicity are shown in Table 4-2. Among White non-Hispanic males, the proportion reporting current cigarette use did not significantly change during the 4-year time period (22.5 percent in 1994 to 20.0 percent in 1998). For White non-Hispanic females, current smoking has been relatively stable at about 21 to 23 percent since 1995. Current smoking among non-Hispanic Black males increased from 11.2 percent reporting current smoking in 1994 to 16.9 percent in 1998, but this difference was not statistically

Table 4-2
Proportion of Adolescents 12 to 17 Years of Age Reporting Cigarette Smoking in the Past Month, by Gender and Race/Ethnicity

Race/ Ethnicity & Gender	Smoked during Previous Month									
	1994		1995		1996		1997		1998	
	%	CI	%	CI	%	CI	%	CI	%	CI
Non-Hispanic White										
Males	22.5	(20.0-25.4)	22.8	(20.2-25.7)	19.3	(16.9-22.0)	19.8	(17.5-22.4)	20.0	(17.6-22.8)
Females	21.5	(19.0-24.4)	23.1	(20.4-26.1)	22.5	(19.9-25.4)	23.8	(21.4-26.4)	21.0	(18.4-24.0)
Non-Hispanic Black										
Males	11.2	(8.4-15.0)	13.4	(10.4-17.2)	15.0	(12.0-18.8)	17.1	(13.9-21.0)	16.9	(13.6-21.1)
Females	11.9	(8.9-15.8)	10.3	(7.6-13.8)	8.70	(6.5-11.7)	12.8	(10.1-16.3)	10.6	(8.1-13.8)
Hispanic										
Males	15.2	(11.8-19.6)	18.0	(14.2-22.7)	17.0	(13.7-21.0)	18.8	(15.6-22.6)	15.4	(12.6-18.8)
Females	13.5	(10.1-18.2)	13.0	(9.8-17.3)	12.5	(9.8-15.9)	13.1	(10.4-16.3)	14.7	(11.9-18.3)

Note: CI = 95% confidence interval.
Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1998.

significant ($p < 0.07$). About 11 to 12 percent of non-Hispanic Black females have reported current smoking from 1994 to 1998. Current smoking has been reported by about 15 to 18 percent of Hispanic males since 1994. Among Hispanic females, current smoking has been relatively stable at about 13 to 15 percent since 1994.

Past year smokeless tobacco use trends are displayed in Table 4-3. Among White non-Hispanic males, the proportion reporting past-year smokeless tobacco use declined significantly ($p < 0.001$) from 15.0 percent in 1994 down to 8.8 percent in 1998. For White non-Hispanic females, rates for past year smokeless tobacco have remained at around 1 to 2 percent for 5 years. The use of smokeless tobacco remained at about 1 percent among non-Hispanic Black males during those 5 years and the level of use among non-Hispanic Black females has been so low that the estimates are statistically unreliable. Between 1994 and 1998, about 2 to 4 percent of Hispanic males were past-year smokeless tobacco users and less than 1 percent reported this behavior among Hispanic females.

Past-month (current) cigar use is shown in Table 4-4. Almost 9 percent of non-Hispanic White males and Hispanic males reported current cigar use in the 1998 survey compared to 4.7 percent of non-Hispanic Black males. Among White non-Hispanic females, 4.2 percent were current cigar smokers in 1998 compared to 2.3 percent of non-Hispanic Black females and 3.9 percent of Hispanic females.

Attitudes are known to be strong predictors of behavior. The data in Table 4-5 provide trends for the proportion of adolescents who reported that smoking a pack or more of cigarettes per day was of "great risk" to their health. None of the differences between 1994 and 1998 were statistically significant among adolescent males for any of the three racial/ethnic

Table 4-3
Proportion of Adolescents 12 to 17 Years of Age Reporting Smokeless Tobacco Use in the Past Year, by Gender and Race/Ethnicity

Race/ Ethnicity & Gender	Smoked during Previous Month									
	1994		1995		1996		1997		1998	
	%	CI	%	CI	%	CI	%	CI	%	CI
Non-Hispanic White										
Males	15.0	(12.9-17.4)	13.6	(11.6-16.1)	11.1	(9.2-13.4)	9.4[a]	(7.8-11.2)	8.8	(7.1-10.9)
Females	2.1	(1.4-3.2)	2.0	(1.3-3.2)	**	(**)	2.2	(1.5-3.2)	0.9	(0.4-2.0)
Non-Hispanic Black										
Males	1.5	(0.4-5.2)	**	(**)	**	(**)	1.2	(0.5-2.6)	1.3	(0.5-3.4)
Females	**	(**)	**	(**)	0.4	(0.1-1.7)	0.5	(0.1-1.7)	**	(**)
Hispanic										
Males	4.0	(2.4-6.5)	3.8	(1.9-7.6)	0.9	(0.4-2.2)	4.5	(2.9-7.1)	2.1	(1.2-3.8)
Females	**	(**)	0.7	(0.2-2.4)	0.2	(0.1-1.3)	0.7	(0.1-3.2)	0.9	(0.4-2.0)

Note: CI = 95% confidence interval.
[a] The difference between 1994 and 1997 is statistically different at p < 0.01.
*** Low precision, no estimate shown.*
Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1998.

Table 4-4
Proportion of Adolescents 12 to 17 Years of Age Reporting Cigar Use in the Past Month, by Gender and Race/Ethnicity

Race/ Ethnicity & Gender	Smoked during Previous Month			
	1997		1998	
	%	CI	%	CI
Non-Hispanic White				
Males	7.0	(5.6-8.8)	8.5	(6.8-10.5)
Females	3.9	(2.9-5.3)	4.2	(3.1-5.8)
Non-Hispanic Black				
Males	4.1	(2.8-6.2)	4.7	(3.0-7.4)
Females	3.5	(2.1-5.7)	2.3	(1.3-3.9)
Hispanic				
Males	6.8	(4.9-9.4)	6.6	(4.7-9.3)
Females	2.2	(1.2- 4.0)	3.9	(2.5-5.9)

Note: CI = 95% confidence interval.
Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1998.

Table 4-5
Proportion of Adolescents 12 to 17 Years of Age Reporting Perceived "Great Risk" from Smoking a Pack of Cigarettes a Day or More, by Gender and Race/Ethnicity

Race/ Ethnicity & Gender	Perceived "Great Risk" from Smoking									
	1994		1995		1996		1997		1998	
	%	CI	%	CI	%	CI	%	CI	%	CI
Non-Hispanic White										
Males	43.8	(40.7- 47.1)	N/A	N/A	47.8	(44.5-51.2)	47.5	(44.6-50.7)	49.2	(46.0-52.6)
Females	56.8	(53.6-60.2)	N/A	N/A	56.2	(53.0-59.6)	56.2	(53.3-59.2)	55.3	(51.9-58.8)
Non-Hispanic Black										
Males	51.1	(46.0-56.8)	N/A	N/A	57.3	(52.6-62.4)	56.2	(51.8-61.0)	54.1	(49.5-59.2)
Females	60.3	(55.6-65.3)	N/A	N/A	58.8	(54.1-63.8)	61.1	(56.9-65.6)	63.2	(59.0-67.8)
Hispanic										
Males	52.5	(47.5-58.0)	N/A	N/A	55.6	(50.9-60.7)	59.8	(55.7-64.2)	58.9	(54.8-63.3)
Females	61.2	(56.1-66.7)	N/A	N/A	63.9	(59.5-68.6)	57.9	(53.8-62.3)	64.5	(60.6-68.7)

Note: CI = 95% confidence interval.
Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1998.

categories. Only 43.8 percent of White non-Hispanic males viewed this behavior as risky to their health in 1994, and 49.2 percent felt this way in 1998. The change during this time period for Black non-Hispanic males was from 51.1 percent to 54.1 percent and, among Hispanic males, the proportion associating "great risk" with smoking a pack a day or more was 52.5 percent in 1994 and 58.9 percent in 1998. Attitudes toward smoking were stable among female adolescents, with only about 56 percent of White non-Hispanic females reporting "great risk" compared to 63 percent of Black non-Hispanic females and 65 percent of Hispanic females.

Tables 4-6 and 4-7 show trends for cigarette smoking by population density and region of the country, respectively. For both genders and all three population density measures, there were no statistically significant changes in cigarette smoking prevalence between 1994 and 1998. As seen in Table 4-7, there were also no statistically significant changes in cigarette smoking prevalence between 1994 and 1998. In 1998, however, there was a difference by population density with significantly ($p < 0.05$) fewer adolescents smoking in large metropolitan statistical areas compared to non-metropolitan statistical areas.

Logistic regression analysis was used to examine the relationship between smoking cigarettes and self-reported academic achievement. The relative likelihood or odds ratio (by gender) is shown in Table 4-8. Using male and female adolescents who reported getting mostly As in school as reference categories in separate models, the data show the risk of smoking rises notably with decreasing grades, ranging from an odds ratio of about 2 for students who get mostly Bs to 5.5 for male students who get mostly Ds and 11.5 for females who get mostly Ds.

Table 4-6
Proportion of Adolescents 12 to 17 Years of Age Reporting Cigarette Smoking in the Past Month, by Gender and Population Density

Gender & Population Density	Reported Smoking Cigarettes during Previous Month									
	1994		1995		1996		1997		1998	
	%	CI	%	CI	%	CI	%	CI	%	CI
Large MSA										
Males	16.8	(14.1-20.1)	17.6	(14.5-21.2)	19.1	(16.3-22.3)	17.2	(14.8-20.2)	17.1	(14.4-20.1)
Females	16.0	(13.5-19.1)	18.0	(15.0-21.6)	15.5	(12.8-18.6)	17.6	(15.1-20.4)	14.2	(11.7-17.4)[a]
Small MSA										
Males	23.0	(19.4-27.3)	20.5	(17.3-24.4)	14.5	(11.9-17.7)	19.9	(16.9-23.5)	17.8	(14.9-21.4)
Females	19.7	(16.3-23.9)	20.0	(16.8-23.7)	20.0	(16.8-23.6)	23.3	(20.0-27.1)	19.3	(16.1-23.1)
Non-MSA										
Males	19.4	(15.9-23.7)	25.7	(21.9-30.1)	20.8	(17.0-25.5)	21.1	(17.7-25.3)	23.0	(19.1-27.7)
Females	20.0	(16.3-24.6)	22.1	(18.1-27.1)	22.6	(18.5-27.6)	22.2	(18.6-26.5)	21.9	(17.9-26.9)

Note: CI = 95% confidence interval.
[a]The difference between females in large metropolitan statistical areas and females in non-metropolitan statistical areas is significantly different at p < 0.05.
Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1998.

Table 4-7
Proportion of Adolescents 12 to 17 Years of Age Reporting Cigarette Smoking in the Past Month, by Gender and Region

Gender & Region	Reported Smoking Cigarettes during Previous Month									
	1994		1995		1996		1997		1998	
	%	CI	%	CI	%	CI	%	CI	%	CI
Northeast										
Males	15.5	(11.7-20.6)	16.7	(12.4-22.5)	14.7	(10.9-19.7)	15.0)	(11.2-20.1)	17.4	(13.2-23.0)
Females	20.0	(15.3-26.1)	19.8	(15.4-25.4)	16.7	(12.4-22.4)	17.2	(13.0-22.8)	18.8	(14.2-24.8)
Northcentral										
Males	19.1	(15.5-23.5)	24.9	(20.5-30.1)	19.4	(15.8-23.9)	20.6	(16.9-25.2)	23.2	(19.0-28.3)
Females	21.5	(17.6-26.3)	22.2	(18.0-27.4)	20.1	(16.4-24.6)	24.1	(20.3-28.7)	20.0	(15.9-25.2)
South										
Males	23.0	(19.5-26.9)	21.4	(18.4-24.8)	20.1	(17.1-23.5)	20.2	(17.4-23.4)	17.8	(15.0-21.2)
Females	17.2	(14.3-20.6)	17.9	(14.8-21.5)	19.8	(16.7-23.4)	21.0	(18.2-24.2)	18.1	(15.0-21.9)
West										
Males	18.1	(14.2-23.1)	18.2	(14.4-22.9)	14.9	(11.6-19.1)	18.9	(15.5-22.9)	16.5	(13.7-19.8)
Females	15.0	(11.4-19.7)	19.3	(15.4-24.3)	16.9	(13.4-21.3)	19.4	(15.9-23.7)	14.0	(11.5-17.1)

Note: CI = 95% confidence interval.
Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1998.

Table 4-8
Odds of Being a Current Cigarette Smoker by Self-Reported Grades and Gender, 1997

Average Grades in School	Odds Ratio	
	Males	Females
Mostly As	1.00	1.00
Mostly Bs	2.38	1.85
Mostly Cs	4.10	3.24
Mostly Ds	5.54	11.5

Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1998.

Tables 4-9, 4-10, and 4-11 include incidence estimates calculated from the NHSDA. The methodology used for computation of these estimates is included in the footnotes at the bottom of each table. In Table 4-9, the age-specific rates of first use (per 1,000 person-years of exposure) are given by age group. For adolescents (12 to 17 years of age), the age-specific rate of first use has increased from 101.3 in 1965 to 139.1 in 1995. The age-specific rates of first daily use of cigarettes (per 1,000 years of exposure) are shown in Table 4-10 by age group. For adolescents, the rates of daily use have almost doubled from 44.0 in 1965 to 77.8 in 1996. Table 4-11 shows the incidence rates for first daily use of cigarettes by gender and age. For 12- to 17-year-old males, the rate of first daily use of cigarettes (per 1,000 years of exposure) increased from 56.2 in 1965 to 72.9 in 1996. For females, the increase has been more dramatic, with the rate going from 41.2 in 1965 to 82.6 in 1996. Standard errors for these incidence estimates are shown in Tables 4-12 through 4-14, which follow the text of this chapter.

DISCUSSION Although the prevalence of current cigarette smoking showed important differences by race/ethnicity and by age group, there were very few statistically significant changes between 1994 and 1998. White adolescents (both male and female) were more likely than Black or Hispanic teens to report current cigarette smoking in all five time periods. In general, adolescents living in non-metropolitan areas and small metropolitan areas reported higher rates of past month cigarette use than teens living in large metropolitan statistical areas. Teens in the South and North Central regions of the United States reported somewhat higher rates of current cigarette smoking in all five time periods, but, again, there were no significant changes over time.

Although males are generally less likely than females to see "great risk" to their health associated with heavy smoking (one or more packs per day), there were no changes between 1994 and 1998. As would be expected from the reported levels of smoking by race/ethnicity, White adolescents were less likely than their Black or Hispanic peers to associate "great risk" to their health from heavy smoking.

With the exception of White males, the prevalence of smokeless tobacco use is very low among adolescents. There was a significant decrease in past year smokeless tobacco use among White males ($p < 0.001$), with the

Table 4-9

Estimated Number (in 1000s) of Persons who First Used a Cigarette during Each Year, 1965–1995, Their Mean Age at First Use, and Annual Age-Specific Rates of First Use (per 1000 Person-Years of Exposure), Based on 1994–1997 NHSDAs

Year	Initiates (1000s)	Mean Age (Years)	Age-Specific Rate of First Use[1]		
			12–17	18–25	26–34
1965	2,974	16.0	101.3	112.9	19.8
1966	2,843	16.2	88.3	125.4	13.8
1967	3,229	15.6	112.9	114.6	9.5
1968	3,166	15.4	101.6	114.6	16.8
1969	3,362	15.5	111.0	122.3	8.3
1970	3,574	15.7	113.7	112.9	21.0
1971	3,472	15.2	119.3	102.1	9.4
1972	3,794	15.3	129.6	107.9	22.4
1973	3,395	15.5	114.8	87.2	16.8
1974	3,708	15.0	132.2	84.3	7.9
1975	3,650	15.2	125.0	95.7	7.3
1976	3,492	15.5	124.8	87.6	9.8
1977	3,428	15.7	126.9	87.8	14.6
1978	3,031	15.6	112.0	72.7	8.4
1979	2,997	15.7	111.0	83.8	9.7
1980	2,753	15.6	105.1	70.0	6.5
1981	2,735	15.6	107.0	66.7	7.0
1982	2,750	15.5	102.4	67.2	11.2
1983	2,739	15.1	106.0	64.5	4.5
1984	2,679	15.5	99.4	71.1	7.7
1985	2,816	15.5	111.3	69.4	7.8
1986	2,782	15.5	107.0	77.2	5.4
1987	2,566	16.1	98.6	66.1	12.6
1988	2,484	15.3	107.0	58.6	7.1
1989	2,503	16.3	99.5	60.9	8.5
1990	2,645	15.5	101.6	71.3	7.9
1991	2,567	16.0	100.5	66.4	11.1
1992	2,707	15.7	115.0	64.7	9.2
1993[2]	2,897	16.1	121.4	70.1	6.7
1994[3]	3,178	16.0	131.0	82.0	4.6
1995[4]	3,263	15.6	139.1	85.8	7.6

[1] The numerator of each rate equals the number of persons who first used the drug in the year (times 1000). The denominator of each rate equals the number of persons who were exposed to risk of first use during the year, weighted by their estimated exposure time measured in years. For example, for the age group 12–17 in 1990, the denominator is the sum of three components:

(1) those persons 12–17 years old in 1990 who first used the drug in 1989 or earlier, times a weight of zero. The weight is zero since they had zero exposure to the risk of first use in 1990.

*(2) those who first used the drug in 1990 times a weight of 0.5. The weight of 0.5 assumes that these people, on average, first used the drug at mid-year and consequently have a half year of exposure (*i.e.*, the first half of the year.)*

(3) those who never used, or those who first used the drug in 1991 or later, times a weight of 1.0. The weight of 1.0 assumes their exposure to the risk of first use during 1990 was for the whole year.

Each person is also weighted by his/her sample weight.

[2] Estimated using 1995, 1996, and 1997 data only.

[3] Estimated using 1996 and 1997 data only.

[4] Estimated using 1997 data only.

Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1997.

Table 4-10

Estimated Number (in 1000s) of Persons who Began Daily Cigarette Use during Each Year, 1965–1996, Their Mean Age at First Daily Use, and Annual Age-Specific Rates of First Daily Use (per 1000 Person-Years of Exposure), Based on 1994–1997 NHSDAs

Year	Initiates (1000s)	Mean Age (Years)	Age-Specific Rate of First Use[1]		
			12–17	18–25	26–34
1965	1,606	17.9	44.0	106.2	7.9
1966	1,716	17.9	42.6	117.0	6.0
1967	1,741	18.7	48.1	100.8	14.8
1968	2,268	18.5	49.7	155.2	6.4
1969	2,055	18.0	57.1	116.4	18.0
1970	1,910	17.3	52.5	101.9	6.5
1971	2,175	18.0	58.0	117.9	15.0
1972	2,004	17.9	57.7	95.4	25.4
1973	2,276	17.9	65.3	106.5	25.6
1974	2,403	18.9	66.2	109.2	23.7
1975	1,811	18.4	49.4	87.1	14.5
1976	1,976	18.1	54.8	93.1	17.6
1977	2,284	18.4	66.8	108.0	12.9
1978	1,984	18.3	59.6	88.1	14.4
1979	1,955	19.0	54.7	92.5	16.7
1980	1,704	18.7	51.6	81.7	10.5
1981	1,757	19.1	56.4	73.3	14.1
1982	1,586	18.7	49.2	73.3	11.9
1983	1,527	18.3	43.8	73.9	13.3
1984	1,547	18.4	52.3	65.4	11.1
1985	1,497	18.7	50.2	66.2	10.8
1986	1,561	18.0	56.7	69.5	10.0
1987	1,482	18.4	51.8	68.0	10.4
1988	1,384	18.5	51.2	60.8	11.4
1989	1,436	18.7	53.8	61.4	7.1
1990	1,503	18.3	57.8	63.6	13.9
1991	1,464	18.1	57.6	58.0	13.3
1992	1,651	18.2	61.9	69.1	11.9
1993	1,578	18.8	58.7	60.0	12.6
1994[2]	1,747	17.9	67.7	68.9	10.4
1995[3]	1,797	17.8	71.8	62.3	11.3
1996[4]	1,851	17.3	77.8	68.4	7.5

[1] The numerator of each rate equals the number of persons who first used the drug in the year (times 1000). The denominator of each rate equals the number of persons who were exposed to risk of first use during the year, weighted by their estimated exposure time measured in years. For example, for the age group 12–17 in 1990, the denominator is the sum of three components:

(1) those persons 12–17 years old in 1990 who first used the drug in 1989 or earlier, times a weight of zero. The weight is zero since they had zero exposure to the risk of first use in 1990.

(2) those who first used the drug in 1990 times a weight of 0.5. The weight of 0.5 assumes that these people, on average, first used the drug at mid-year and consequently have a half year of exposure (i.e., the first half of the year.)

(3) those who never used, or those who first used the drug in 1991 or later, times a weight of 1.0. The weight of 1.0 assumes their exposure to the risk of first use during 1990 was for the whole year.

Each person is also weighted by his/her sample weight.

[2] Estimated using 1995, 1996, and 1997 data only.

[3] Estimated using 1996 and 1997 data only.

[4] Estimated using 1997 data only.

Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1997.

Table 4-11

Annual Age-Specific Rates of First Daily Use (per 1000 Person-Years of Exposure) of Persons who Began Daily Cigarette Use during Each Year 1962-1996 among the Total U.S. Population by Gender, Based on 1994-1997 NHSDAs

	Age Specific Rate of First Use[1]								
	Total			Male			Female		
Year	12–17	18–25	26–34	12–17	18–25	26–34	12–17	18–25	26–34
1962	48.3	129.8	13.9	56.5	150.6	*	41.2	120.7	11.0
1963	51.0	104.6	24.3	61.1	142.8	*	41.6	86.7	32.7
1964	34.7	93.5	17.3	40.3	152.3	*	29.1	63.9	22.1
1965	44.0	106.2	7.9	54.3	143.8	*	34.1	84.5	3.2
1966	42.6	117.0	6.0	62.8	189.0	**	22.4	76.8	8.4
1967	48.1	100.8	14.8	55.3	139.3	11.6	41.2	79.4	16.2
1968	49.7	155.2	6.4	64.7	202.0	4.7	35.4	127.7	7.1
1969	57.1	116.4	18.0	67.2	166.0	24.2	47.3	84.8	15.5
1970	52.5	101.9	6.5	68.6	136.3	10.0	38.1	78.2	5.2
1971	58.0	117.9	15.0	58.6	175.4	12.5	57.4	79.3	15.9
1972	57.7	95.4	25.4	63.5	117.5	9.8	52.5	80.2	31.3
1973	65.3	106.5	25.6	76.5	154.2	24.1	55.5	74.3	26.3
1974	66.2	109.2	23.7	68.4	119.9	20.7	64.3	101.8	25.1
1975	49.4	87.1	14.5	47.2	114.8	25.5	51.3	66.8	9.5
1976	54.8	93.1	17.6	45.9	101.6	18.5	62.9	86.7	17.1
1977	66.8	108.0	12.9	75.7	106.4	7.8	58.7	109.3	15.4
1978	59.6	88.1	14.4	56.8	108.4	15.4	62.1	72.2	13.8
1979	54.7	92.5	16.7	56.3	89.2	14.4	53.2	95.1	18.0
1980	51.6	81.7	10.5	52.0	90.7	12.3	51.3	74.3	9.3
1981	56.4	73.3	14.1	52.5	78.1	18.2	59.9	69.1	11.6
1982	49.2	73.3	11.9	49.1	84.6	19.8	49.3	63.4	7.0
1983	43.8	73.9	13.3	42.1	91.9	10.8	45.2	58.5	14.9
1984	52.3	65.4	11.1	52.9	81.9	10.6	51.8	51.4	11.5
1985	50.2	66.2	10.8	60.3	81.3	4.6	41.7	53.4	15.3
1986	56.7	69.5	10.0	52.0	82.6	8.6	60.7	58.8	11.1
1987	51.8	68.0	10.4	55.7	74.3	14.4	48.5	62.8	7.5
1988	51.2	60.8	11.4	57.2	76.4	14.4	45.8	48.3	9.0
1989	53.8	61.4	7.1	58.6	79.4	6.9	49.4	47.4	7.2
1990	57.8	63.6	13.9	59.6	84.5	14.2	56.0	48.1	13.6
1991	57.6	58.0	13.3	60.5	68.7	19.5	54.8	50.2	8.4

Table 4-11 (continued)

	Age Specific Rate of First Use[1]								
	Total			Male			Female		
Year	12–17	18–25	26–34	12–17	18–25	26–34	12–17	18–25	26–34
1992	61.9	69.1	11.9	61.9	77.5	14.4	61.9	62.9	10.0
1993	58.7	60.0	12.6	56.1	71.4	17.4	61.3	51.5	9.0
1994[2]	67.7	68.9	10.4	71.9	93.5	11.2	63.6	50.0	9.7
1995[3]	71.8	62.3	11.3	78.4	81.1	8.9	65.1	48.0	13.0
1996[4]	77.8	68.4	7.5	72.9	84.8	9.9	82.6	55.9	5.8

** Low Precision, no estimate reported.*

*** Estimate rounds to zero.*

[1] The numerator of each rate equals the number of persons who first used the drug in the year (times 1000). The denominator of each rate equals the number of persons who were exposed to risk of first use during the year, weighted by their estimated exposure time measured in years. For example, for the age group 12–17 in 1990, the denominator is the sum of three components:

(1) those persons 12–17 years old in 1990 who first used the drug in 1989 or earlier, times a weight of zero. The weight is zero since they had zero exposure to the risk of first use in 1990.

(2) those who first used the drug in 1990 times a weight of 0.5. The weight of 0.5 assumes that these people, on average, first used the drug at mid-year and consequently have a half year of exposure (i.e., the first half of the year.)

(3) those who never used, or those who first used the drug in 1991 or later, times a weight of 1.0. The weight of 1.0 assumes their exposure to the risk of first use during 1990 was for the whole year.

Each person is also weighted by his/her sample weight.

[2] Estimated using 1995, 1996, and 1997 data only.

[3] Estimated using 1996 and 1997 data only.

[4] Estimated using 1997 data only.

Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1997.

past year rate dropping from 15 percent in 1994 to 8.8 percent in 1998. Table 4-4 includes the prevalence of cigar use by teens from the 1997 and 1998 surveys (cigar questions were added to the NHSDA in 1997). Cigars have been increasing in popularity for the last few years. White and Hispanic males are the most likely adolescents to report this behavior (8.5 and 6.6 percent, respectively).

Although the prevalence of past month cigarette smoking (current use) among adolescents has been relatively stable over time for all age, racial/ethnic, and gender groups in the NHSDA between 1994 and 1998, incidence estimates from this survey indicate there may be cause for concern. The trends for initiation of cigarette smoking (shown in Tables 4-10 through 4-12) indicate that an alarming number of adolescents become regular smokers each day. The incidence data included in this chapter indicate that more than 6,000 persons under the age of 18 try their first cigarette each day, and more than 3,000 persons under the age of 18 become daily smokers each day. Among persons 12 to 17 years of age, particularly the females, the incidence of first use of cigarettes and first daily use have been rising during the 1990s. Age-specific rates of regular smoking (first daily use) of cigarettes among 12- to 17-year-olds (per 1,000 years of exposure) have almost doubled in the last 30 years, from 44.0 in 1965 to 77.8 in 1996.

DATA LIMITATIONS An important potential source of bias is the underreporting of illicit behaviors such as cigarette use for persons less than 18 years of age (Bradburn *et al.*, 1987). While there are no objective criteria for validating the self-reports in this study, inferential evidence of their validity is available. Examples of such evidence include the large proportion of respondents admitting to the use of the tobacco products included, the near universal completion of survey items concerning tobacco use (NIDA, 1997), and the finding of predictable relationships between cigarette use and such items as self-reported grades. Underreporting bias has been reduced by allowing respondents to answer sensitive questions on self-administered answer sheets.

In a study published in 1998, Brittingham *et al.* analyzed data from the 1994 NHSDA. The main interview in the 1994 NHSDA included two versions of the smoking items. In one version, the interviewer administered the smoking questions and, in the other, the questions were self-administered. Even though cigarette use is legal for adults, self-administered questions produced higher estimates for the prevalence of cigarette smoking than interviewer-administered questions for respondents of all ages (Brittingham *et al.*, 1998).

THE FOLLOWING PAGES CONTAIN TABLES 4-12 THROUGH 4-14, WHICH SHOW STANDARD ERRORS FOR TABLES 4-9 THROUGH 4-11

Table 4-12

Standard Errors of Estimated Number (in 1000s) of Persons who First Used a Cigarette during Each Year 1965–1995, Their Mean Age at First Use, and Annual Age-Specific Rates of First Use (per 1000 Person-Years of Exposure), Based on 1994–1997 NHSDAs

Year	Initiates (1000s)	Mean Age (Years)	Age-Specific Rate of First Use[1]		
			12–17	18–25	26–34
1965	190	0.4	7.6	13.9	9.0
1966	188	0.3	7.3	14.5	6.0
1967	176	0.3	7.4	11.1	6.3
1968	166	0.3	8.4	11.2	9.0
1969	185	0.3	7.9	12.4	4.4
1970	218	0.4	9.1	11.3	10.9
1971	185	0.2	7.8	11.0	3.0
1972	188	0.2	7.5	10.1	8.4
1973	149	0.3	6.9	7.7	4.8
1974	184	0.2	8.1	9.9	2.5
1975	177	0.2	7.7	9.6	2.7
1976	197	0.3	7.4	9.9	3.2
1977	153	0.2	6.0	9.4	3.8
1978	124	0.3	4.8	6.6	2.5
1979	124	0.2	5.7	8.9	3.6
1980	106	0.3	4.9	6.6	2.9
1981	115	0.3	5.2	6.4	1.9
1982	108	0.2	4.7	6.6	3.5
1983	110	0.2	5.3	4.8	1.4
1984	115	0.2	4.6	5.7	2.2
1985	110	0.2	5.2	4.0	3.1
1986	99	0.2	5.7	5.7	1.3
1987	102	0.3	4.9	4.7	3.0
1988	91	0.2	5.1	4.6	2.1
1989	94	0.4	4.8	4.4	1.7
1990	94	0.2	4.1	5.2	1.6
1991	116	0.3	4.5	5.6	4.0
1992	102	0.2	4.2	4.5	2.9
1993[2]	107	0.3	5.0	4.9	1.5
1994[3]	155	0.4	6.6	7.3	1.4
1995[4]	178	0.2	9.1	10.1	2.6

[1] The numerator of each rate equals the number of persons who first used the drug in the year (times 1000). The denominator of each rate equals the number of persons who were exposed to risk of first use during the year, weighted by their estimated exposure time measured in years. For example, for the age group 12–17 in 1990, the denominator is the sum of three components:

(1) those persons 12–17 years old in 1990 who first used the drug in 1989 or earlier, times a weight of zero. The weight is zero since they had zero exposure to the risk of first use in 1990.

*(2) those who first used the drug in 1990 times a weight of 0.5. The weight of 0.5 assumes that these people, on average, first used the drug at mid-year and consequently have a half year of exposure (*i.e.*, the first half of the year.)*

(3) those who never used, or those who first used the drug in 1991 or later, times a weight of 1.0. The weight of 1.0 assumes their exposure to the risk of first use during 1990 was for the whole year.

Each person is also weighted by his/her sample weight.

[2] Estimated using 1995, 1996, and 1997 data only.

[3] Estimated using 1996 and 1997 data only.

[4] Estimated using 1997 data only.

Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1997.

Table 4-13

Standard Errors of Estimated Number (in 1000s) of Persons who Began Daily Cigarette Use during Each Year 1965–1996, Their Mean Age at First Daily Use, and Annual Age-Specific Rates of First Daily Use (per 1000 Person-Years of Exposure), Based on 1994–1997 NHSDAs

Year	Initiates (1000s)	Mean Age (Years)	Age-Specific Rate of First Use[1]		
			12–17	18–25	26–34
1965	141	0.5	7.2	11.6	4.5
1966	139	0.3	4.9	13.9	2.7
1967	145	0.5	5.9	12.9	7.1
1968	162	0.5	5.9	14.5	2.7
1969	150	0.3	6.2	12.4	8.7
1970	128	0.3	5.1	10.5	3.2
1971	160	0.4	5.6	12.1	7.2
1972	141	0.3	5.1	9.0	8.7
1973	160	0.3	6.7	9.9	8.1
1974	167	0.6	6.0	10.7	5.5
1975	122	0.5	4.0	9.2	4.3
1976	124	0.3	4.2	8.4	4.4
1977	151	0.4	5.1	11.5	3.2
1978	109	0.5	3.9	7.7	3.3
1979	108	0.4	3.1	7.0	3.8
1980	94	0.5	3.4	6.9	3.2
1981	117	0.6	3.9	7.4	3.7
1982	101	0.7	3.4	7.8	4.6
1983	85	0.3	3.2	6.1	3.9
1984	73	0.4	3.6	4.0	2.5
1985	92	0.5	3.8	5.1	3.8
1986	67	0.3	3.9	4.6	2.5
1987	78	0.3	4.7	5.0	2.5
1988	70	0.5	3.8	4.5	1.9
1989	78	0.6	3.5	4.5	1.4
1990	71	0.3	3.6	4.4	2.5
1991	82	0.3	3.8	4.3	3.6
1992	83	0.3	4.0	4.2	2.2
1993	79	0.7	3.2	4.3	2.7
1994[2]	78	0.5	3.7	5.9	2.2
1995[3]	113	0.3	4.5	6.5	2.3
1996[4]	139	0.4	7.0	7.8	3.4

[1] The numerator of each rate equals the number of persons who first used the drug in the year (times 1000). The denominator of each rate equals the number of persons who were exposed to risk of first use during the year, weighted by their estimated exposure time measured in years. For example, for the age group 12–17 in 1990, the denominator is the sum of three components:

(1) those persons 12–17 years old in 1990 who first used the drug in 1989 or earlier, times a weight of zero. The weight is zero since they had zero exposure to the risk of first use in 1990.

(2) those who first used the drug in 1990 times a weight of 0.5. The weight of 0.5 assumes that these people, on average, first used the drug at mid-year and consequently have a half year of exposure (i.e., the first half of the year.)

(3) those who never used, or those who first used the drug in 1991 or later, times a weight of 1.0. The weight of 1.0 assumes their exposure to the risk of first use during 1990 was for the whole year.

Each person is also weighted by his/her sample weight.

[2] Estimated using 1995, 1996, and 1997 data only.

[3] Estimated using 1996 and 1997 data only.

[4] Estimated using 1997 data only.

Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1997.

Table 4-14

Standard Errors of Annual Age-Specific Rates of First Daily Use (per 1000 Person-Years of Exposure) of Persons who Began Daily Cigarette Use during Each Year, 1962–1996, among the Total U.S. Population by Gender, Based on 1994–1997 NHSDAs

	Age Specific Rate of First Use[1]								
	Total			Male			Female		
Year	12–17	18–25	26–34	12–17	18–25	26–34	12–17	18–25	26–34
1962	6.0	20.3	6.6	9.3	39.4	*	7.8	23.7	5.8
1963	6.4	16.6	12.2	10.0	32.2	*	8.5	18.4	17.2
1964	5.1	13.4	9.5	7.9	29.8	*	6.0	12.1	13.3
1965	7.2	11.6	4.5	12.6	23.6	*	6.4	12.8	2.3
1966	4.9	13.9	2.7	8.6	27.7	**	4.8	14.3	3.8
1967	5.9	12.9	7.1	10.0	25.6	6.2	6.3	13.3	9.6
1968	5.9	14.5	2.7	9.7	29.1	3.4	6.9	16.0	3.5
1969	6.2	12.4	8.7	9.3	24.8	14.9	8.8	12.7	10.7
1970	5.1	10.5	3.2	10.9	20.4	7.9	5.6	10.6	3.2
1971	5.6	12.1	7.2	9.4	24.8	6.1	7.1	10.2	9.5
1972	5.1	9.0	8.7	8.1	16.7	7.3	6.6	9.0	11.9
1973	6.7	9.9	8.1	11.1	21.5	11.1	7.2	10.5	10.5
1974	6.0	10.7	5.5	8.7	18.3	9.3	7.7	12.7	6.9
1975	4.0	9.2	4.3	5.8	16.2	10.6	6.1	9.7	3.7
1976	4.2	8.4	4.4	6.0	13.0	8.5	6.3	10.4	5.3
1977	5.1	11.5	3.2	10.2	15.1	3.4	5.3	15.0	4.4
1978	3.9	7.7	3.3	6.8	14.2	5.1	4.4	9.3	4.3
1979	3.1	7.0	3.8	5.8	11.1	5.8	4.2	9.8	5.6
1980	3.4	6.9	3.2	5.6	12.7	6.8	3.9	7.9	3.2
1981	3.9	7.4	3.7	5.2	12.3	7.1	5.4	7.9	4.2
1982	3.4	7.8	4.6	4.9	12.3	10.9	4.8	7.0	3.0
1983	3.2	6.1	3.9	4.6	10.3	4.1	4.1	5.8	5.6
1984	3.6	4.0	2.5	6.1	7.2	4.4	4.4	4.5	3.6
1985	3.8	5.1	3.8	7.4	8.3	2.0	3.3	5.2	6.4
1986	3.9	4.6	2.5	5.4	7.6	3.5	5.2	5.1	3.2
1987	4.7	5.0	2.5	6.4	8.0	5.2	5.2	5.8	2.0
1988	3.8	4.5	1.9	5.7	8.1	5.2	4.3	4.5	2.5
1989	3.5	4.5	1.4	4.8	7.5	2.2	4.5	5.0	1.7
1990	3.6	4.4	2.5	5.6	7.5	3.4	4.5	4.9	3.7
1991	3.8	4.3	3.6	5.2	7.8	7.7	4.8	5.3	1.7

Table 4-14 (continued)

	Age Specific Rate of First Use[1]								
	Total			Male			Female		
Year	12–17	18–25	26–34	12–17	18–25	26–34	12–17	18–25	26–34
1992	4.0	4.2	2.2	5.4	7.1	3.6	4.8	5.6	3.1
1993	3.2	4.3	2.7	4.5	7.0	6.0	4.3	4.7	1.4
1994[2]	3.7	5.9	2.2	5.6	11.5	3.1	4.8	5.4	3.3
1995[3]	4.5	6.5	2.3	6.4	9.7	3.3	6.7	7.7	3.1
1996[4]	7.0	7.8	3.4	9.6	14.7	5.4	9.2	10.0	4.2

** Low Precision, no estimate reported.*

*** Estimate rounds to zero.*

[1] The numerator of each rate equals the number of persons who first used the drug in the year (times 1000). The denominator of each rate equals the number of persons who were exposed to risk of first use during the year, weighted by their estimated exposure time measured in years. For example, for the age group 12–17 in 1990, the denominator is the sum of three components:

(1) those persons 12–17 years old in 1990 who first used the drug in 1989 or earlier, times a weight of zero. The weight is zero since they had zero exposure to the risk of first use in 1990.

(2) those who first used the drug in 1990 times a weight of 0.5. The weight of 0.5 assumes that these people, on average, first used the drug at mid-year and consequently have a half year of exposure (i.e., the first half of the year.)

(3) those who never used, or those who first used the drug in 1991 or later, times a weight of 1.0. The weight of 1.0 assumes their exposure to the risk of first use during 1990 was for the whole year.

Each person is also weighted by his/her sample weight.

[2] Estimated using 1995, 1996, and 1997 data only.

[3] Estimated using 1996 and 1997 data only.

[4] Estimated using 1997 data only.

Source: SAMHSA, Office of Applied Studies, National Household Survey on Drug Abuse, 1994–1997.

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Cigarette Smoking among Adolescents in California, 1990–1996

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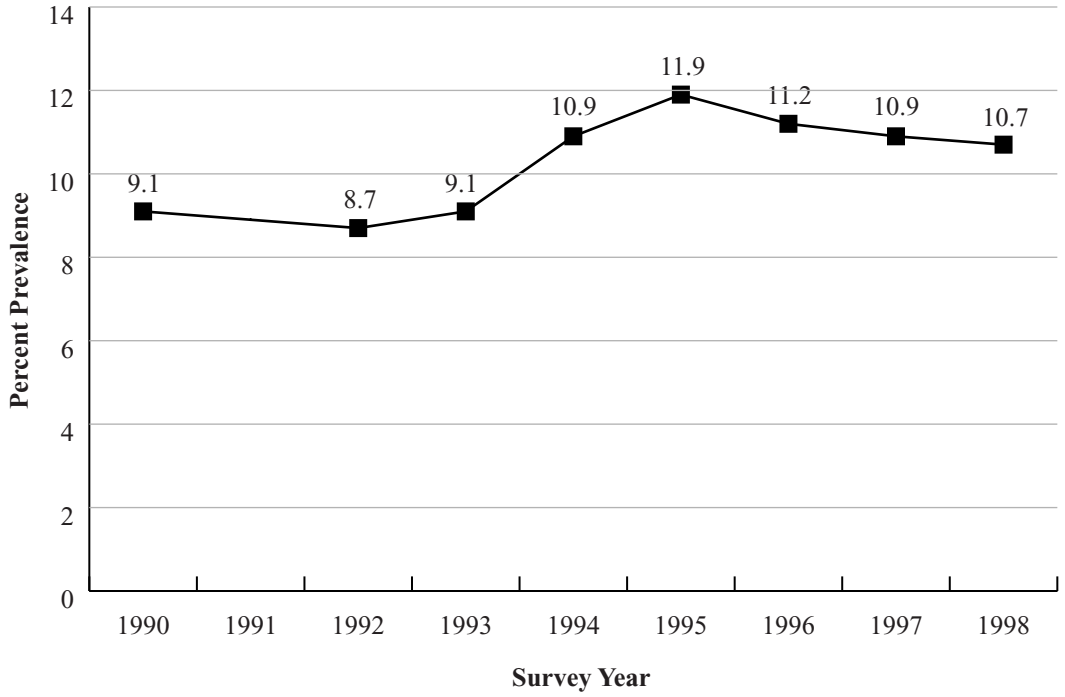
Christy M. Anderson, Thomas G. Shanks

INTRODUCTION Initiation of cigarette smoking occurs almost exclusively during adolescence (U.S. DHHS, 1994; Lynch and Bonnie, 1994; CDC, 1998a; Burns *et al.*, 1997). Currently, if one becomes an adult without becoming a cigarette smoker, it is unlikely that one will ever smoke cigarettes. California has conducted three large surveys of smoking behavior among adolescents in 1990, 1993, and 1996 (Burns and Pierce, 1992; Pierce *et al.*, 1994 & 1998). During this period, there has been an increase in adolescent smoking behavior nationally (CDC, 1998b) and in California (Pierce *et al.*, 1998). In this chapter, we examine the increase in smoking prevalence over time in California to define its demographic distribution. We also examine several predictors of adolescent cigarette smoking to determine whether the increase in prevalence has been accompanied by an increase in the power of the predictors to identify current smokers or by an increase in the prevalence of these predictors among the current population of adolescents. Tracking changes in adolescent smoking prevalence over time provides important information in aiding current primary prevention efforts and in predicting future adult disease consequences.

The California Tobacco Surveys are telephone surveys conducted periodically by the state of California and the methodology for these surveys is reported elsewhere (Pierce *et al.*, 1998). The absolute values for prevalence of smoking in these telephone surveys differ from those of the school-based surveys reported in other chapters of this monograph, but the trends over time are consistent across the differences in survey methodology.

DEFINITION OF SMOKING FOR ADOLESCENTS Initiation of cigarette smoking among adolescents is a process that includes experimentation with smoking, intermittent use, regular use, and addiction (U.S. DHHS, 1994; Lynch and Bonnie, 1994). Because the issue being examined is the start of smoking behavior among adolescents, the traditional adult definition of a smoker (Have you ever smoked 100 cigarettes in your lifetime?) would exclude many adolescents who are in the early stages of smoking initiation. As a result, the question used to define current smokers among the adolescents sampled in the California Tobacco Surveys was, "Think about the last 30 days. On how many of these days did you smoke?" A current smoker was one who reported any smoking in the last 30 days. The question "Have you ever smoked a cigarette?" was also asked, and those who said yes were defined as ever-smokers.

Figure 5-1
Smoking Prevalence among 12- to 17-Year-Old Adolescents in California: 1990-1998



1990, 1992-1993: California Tobacco Survey (CTS), UCSD.*
1994-1998: California Youth Tobacco Survey (CYTS), CDHS).*
** Telephone interviews.*

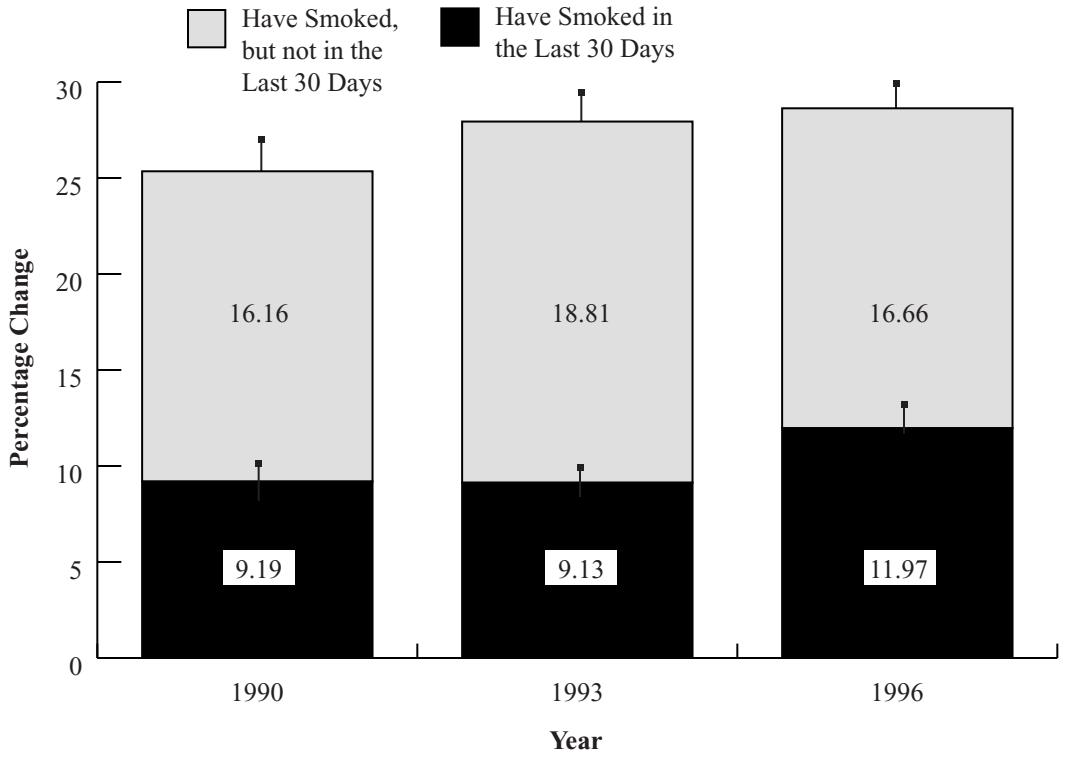
CHANGE IN ADOLESCENT SMOKING BEHAVIORS, 1990–1998

National data on adolescent smoking behavior indicate a substantial recent increase in smoking prevalence among adolescents, with most of the increase occurring after 1993 (CDC, 1998a). Similar changes have occurred in California. Figure 5-1 presents the prevalence of cigarette smoking among adolescents ages 12–17 for the period of 1990 to 1998 in California. These data are consistent with the national data showing a rise in prevalence over that period. This increase may have peaked and begun to decline after 1996.

The prevalence of current and ever smoking among 12- to 17-year-old adolescents is presented in Figure 5-2, with both ever smoking and current smoking estimates presented for 1990, 1993, and 1996 (Table 5-1).

Between 1990 and 1993, there was a significant increase in the proportion of adolescents who had ever smoked cigarettes, but the prevalence of smoking in the last 30 days was unchanged. In contrast, between 1993 and 1996, the prevalence of ever smoking increased only slightly, but there was

Figure 5-2
Change in Adolescent Cigarette Smoking: 1990-1996



1990, 1993, 1996 California Tobacco Survey (CTS), UCSD.
** Telephone interviews.*

a significant increase in the prevalence of current smoking. The magnitude of the increase in smoking prevalence in California is smaller than that reported for school-based surveys nationally (CDC, 1998a), but it clearly reflects a move in the opposite direction from that anticipated by the public health community. This report examines the demographic distribution of this change in adolescent smoking prevalence and describes the relationships between some of the known correlates of smoking initiation and this change in initiation over time.

Gender

Figure 5-3 presents the prevalence of smoking among male and female adolescents for the years 1990, 1993, and 1996. Males have a slightly higher prevalence of smoking than females, but both genders have increased by similar amounts over the 6-year interval. The increase over time was largely between the years 1993 and 1996 and was statistically significant for both males and females.

Age

Figure 5-4 presents the current-smoking prevalence among adolescents for different age groups. The figure reveals that the increase in prevalence has occurred predominantly among those aged 14–15 and 16–17, with the

Table 5-1

Cigarette Smoking Prevalence and Frequency of Use among Adolescents during the Last 30 Days: 1990, 1993, 1996

	Have Smoked in Last 30 Days						Have Smoked, but Not in Last 30 Days						Have Never Smoked					
***Total*:**	**1990**		**1993**		**1996**		**1990**		**1993**		**1996**		**1990**		**1993**		**1996**	
Statewide	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**
Total	9.19	0.93	9.13	1.04	11.97	1.07	16.16	1.38	18.81	1.65	16.66	1.18	74.61	1.30	71.90	1.45	71.36	1.38
Age (Years)																		
12–13	3.62	1.52	2.98	1.03	3.31	0.86	7.35	1.94	7.87	1.61	7.19	1.37	89.00	2.67	88.93	1.99	89.50	1.61
14–15	7.98	1.47	9.13	1.55	10.86	1.38	16.94	2.62	20.97	2.68	18.52	2.05	75.08	3.12	69.81	2.87	70.58	2.33
16–17	16.61	2.13	16.29	2.62	22.10	2.28	24.98	3.01	29.18	3.87	24.34	1.94	58.33	3.11	54.37	3.85	53.56	2.66
Race/Ethnicity																		
Non-Hispanic White	10.95	1.24	11.33	1.31	13.67	1.28	19.04	1.86	21.22	1.75	18.08	1.58	69.96	1.72	67.38	2.01	68.25	1.80
Hispanic	8.83	1.87	8.24	1.82	11.52	2.04	15.73	2.67	19.60	3.48	16.32	1.75	75.41	2.52	71.79	3.30	72.12	2.23
African-American	5.55	3.12	5.08	3.53	6.17	2.68	9.55	2.60	11.45	4.32	15.01	3.78	84.89	3.96	83.46	5.68	78.82	4.36
Asian/PI	4.70	2.55	5.09	3.44	8.96	2.76	9.16	3.51	10.25	2.85	12.60	2.76	86.14	4.19	84.66	4.25	78.44	3.32
Native American	8.65	5.10	8.73	5.38	18.25	10.48	18.28	8.59	18.17	8.86	19.44	8.09	73.07	9.97	73.10	8.67	62.31	10.44
Other	.	.	.	.	.	.	2.45	5.01	.	.	.	.	.	.	.	.	.	.
Educational Performance																		
Above average	5.86	1.08	5.94	1.20	8.88	1.15	14.10	2.04	16.94	2.26	14.69	1.42	80.04	1.93	77.00	2.36	76.42	1.61
Average	11.33	1.78	10.78	1.58	13.94	1.73	19.01	2.47	20.02	2.34	19.58	1.95	69.60	2.33	68.96	2.50	66.44	2.24
Below average	39.08	11.60	30.51	8.97	36.94	7.73	18.98	7.53	28.88	8.62	20.26	6.93	41.66	9.95	40.61	8.11	42.80	5.79
Unknown	4.28	6.78	.	.	28.90	10.78	2.98	6.09	.	.	18.60	9.35	92.74	9.42	.	.	.	.
Family Income (Dollars)																		
<10k	11.19	4.67	7.46	3.46	12.94	3.89	10.88	4.84	16.86	3.86	12.80	3.20	77.93	5.64	75.43	4.50	74.26	5.07
10k–20k	8.77	2.87	10.18	3.78	13.12	3.21	15.75	3.77	17.57	3.70	14.20	3.15	75.48	3.85	72.25	4.78	72.68	3.64
20k–30k	9.30	2.64	11.22	3.94	11.40	2.44	15.99	4.65	20.25	4.96	16.43	2.45	74.71	5.30	68.46	4.91	72.05	3.56
30k–50k	9.04	2.75	9.53	1.88	12.77	2.51	15.96	2.90	19.62	2.44	19.20	2.66	74.89	3.51	70.71	2.80	68.04	3.52
50k–75k	7.89	2.32	8.85	2.23	11.42	2.16	15.43	3.56	19.56	2.59	18.49	2.70	76.68	3.47	71.38	3.32	70.09	3.04
>75k	10.45	2.95	9.11	2.53	10.79	1.91	22.13	4.48	18.01	4.22	15.74	1.98	67.42	4.35	72.88	4.65	73.48	2.89
Unknown	8.26	3.01	6.69	2.86	12.03	3.01	16.96	5.11	18.53	5.24	15.94	3.61	74.69	5.61	74.23	5.45	72.02	4.43

Table 5-1 (continued)

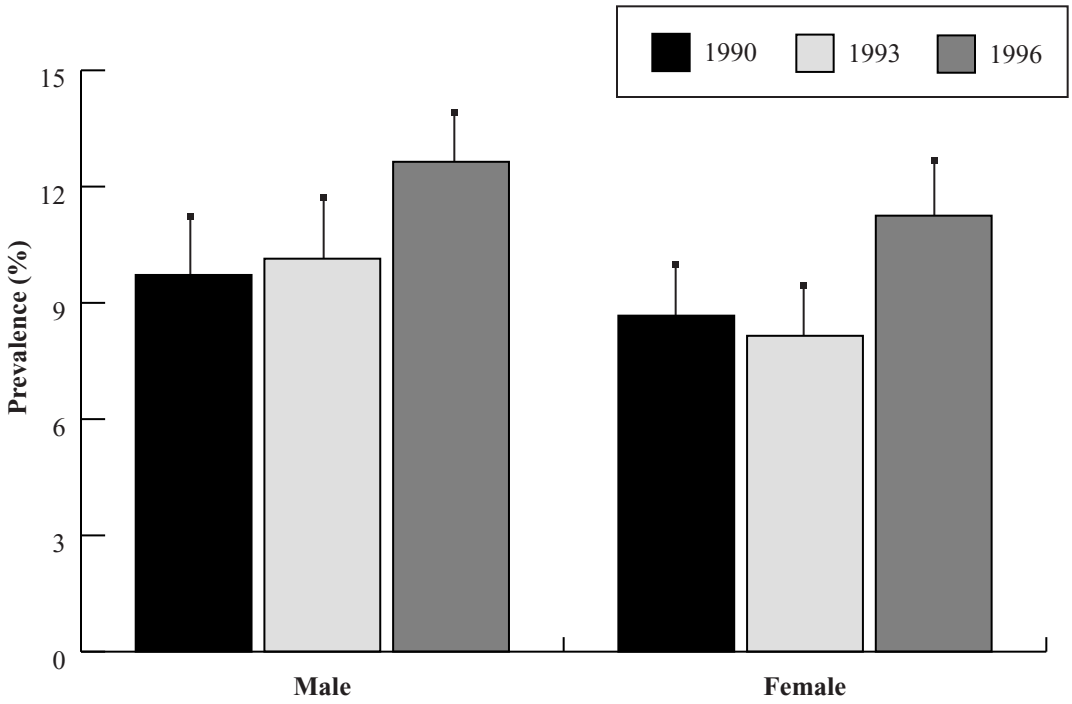
Males: *Statewide*	Have Smoked in Last 30 Days						Have Smoked, but Not in Last 30 Days						Have Never Smoked					
	1990		1993		1996		1990		1993		1996		1990		1993		1996	
	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)
Total	9.72	1.53	10.14	1.72	12.64	1.40	17.77	2.01	19.85	2.58	17.32	1.61	72.44	2.39	69.91	2.67	70.00	2.08
Age (Years)																		
12–13	4.30	2.85	3.28	1.37	4.20	1.33	8.21	3.40	8.40	2.30	8.23	2.04	87.44	4.40	88.21	2.58	87.56	2.67
14–15	7.04	1.87	9.34	2.30	9.34	2.29	19.30	4.14	20.11	2.97	19.26	2.69	73.66	4.12	70.55	3.83	71.32	3.39
16–17	18.69	3.49	18.88	4.37	24.75	3.06	26.57	3.35	32.71	5.67	24.36	3.27	54.57	4.82	48.18	5.14	50.89	3.83
Race/Ethnicity																		
Non-Hispanic White	10.23	1.58	12.00	1.98	13.37	1.75	19.54	3.03	20.11	2.70	18.74	2.02	70.11	3.30	67.73	3.43	67.89	2.45
Hispanic	10.92	3.05	9.74	2.74	13.31	2.76	19.37	4.55	23.04	5.67	16.88	2.74	69.65	4.31	67.11	5.43	69.72	3.63
African-American	6.51	5.80	6.65	4.82	5.86	3.20	10.51	4.76	14.31	6.92	16.09	4.91	82.98	9.25	79.03	8.26	78.05	5.20
Asian/PI	5.18	4.42	4.98	3.48	10.50	3.91	9.57	5.97	11.73	4.27	12.42	4.28	85.26	6.74	83.29	5.77	77.07	4.19
Native American	11.12	9.57	11.17	8.44	17.06	13.74	13.68	12.50	16.12	9.35	23.73	11.47	.	.	72.71	9.84	.	.
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Educational Performance																		
Above average	5.32	1.28	6.82	1.93	8.97	1.44	15.84	3.32	18.40	4.08	15.00	1.90	78.84	3.48	74.79	3.94	76.03	2.20
Average	11.29	2.36	11.46	2.47	14.92	2.21	20.86	3.40	19.91	2.96	20.47	2.70	67.72	3.54	68.36	2.96	64.53	3.18
Below average	48.25	14.17	29.02	12.35	33.91	8.41	14.59	8.85	30.01	11.35	20.86	8.94	36.74	10.90	40.97	10.68	45.24	8.34
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Family Income (Dollars)																		
<10k	14.64	8.37	7.95	4.64	14.57	5.10	17.71	10.26	18.18	7.25	14.68	4.54	67.65	11.53	73.87	8.00	70.76	5.65
10k–20k	8.67	3.90	10.52	4.93	16.96	4.90	17.30	6.89	21.11	4.98	12.52	4.50	74.03	7.99	68.37	6.40	70.52	5.68
20k–30k	9.27	3.31	14.33	5.14	11.14	3.27	17.25	6.23	21.11	6.65	15.62	4.14	73.47	6.79	64.56	7.26	73.00	5.32
30k–50k	9.43	4.67	9.50	2.57	13.97	3.78	16.62	4.13	19.59	3.30	19.51	3.32	73.73	4.90	70.73	3.91	66.52	4.96
50k–75k	7.85	2.52	11.02	3.67	12.20	2.67	15.82	4.59	18.38	3.65	19.17	3.78	76.34	4.81	70.19	5.13	68.62	4.47
>75k	11.03	4.67	10.35	3.84	9.10	2.40	26.35	6.69	16.93	4.83	17.73	2.84	62.62	6.61	72.72	5.39	73.16	3.80
Unknown	9.09	5.47	5.94	4.48	12.92	3.89	14.82	6.17	25.12	9.53	18.59	5.67	75.90	8.33	68.94	9.66	68.50	6.55

Table 5-1 (continued)

Females: *Statewide*	Have Smoked in Last 30 Days						Have Smoked, but Not in Last 30 Days						Have Never Smoked					
	1990		1993		1996		1990		1993		1996		1990		1993		1996	
	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)
Total	8.67	1.49	8.15	1.47	11.25	1.42	14.59	1.74	17.80	1.72	15.94	1.32	76.74	2.05	73.85	1.94	72.81	1.62
Age (Years)																		
12–13	2.98	1.66	2.70	1.36	2.37	1.05	6.52	1.93	7.37	1.90	6.10	1.42	90.50	2.80	89.61	2.73	91.53	1.47
14–15	8.93	2.41	8.92	2.48	12.51	2.19	14.57	2.66	21.82	3.78	17.72	2.54	76.50	3.84	69.08	4.48	69.78	3.33
16–17	14.62	2.99	13.74	3.12	19.20	2.64	23.45	4.58	25.71	4.06	24.31	2.56	61.93	4.92	60.46	4.49	56.50	3.09
Race/Ethnicity																		
Non-Hispanic White	11.67	2.15	10.67	2.03	14.02	2.10	18.53	2.61	22.30	2.64	17.33	2.00	69.81	3.08	67.04	2.94	68.66	2.64
Hispanic	6.80	2.27	6.75	2.25	9.71	2.41	12.21	3.24	16.19	3.15	15.75	2.29	80.99	3.76	76.45	4.03	74.54	2.73
African-American	4.78	4.27	3.63	3.89	6.47	4.23	8.77	5.24	8.80	4.43	13.98	4.92	86.46	6.33	87.58	5.87	79.55	6.03
Asian/PI	4.19	3.38	5.20	5.82	7.32	3.42	8.74	4.17	8.86	3.48	12.78	3.85	87.07	4.79	85.94	6.72	79.90	4.82
Native American	5.98	5.86	5.61	6.48	19.77	11.29	.	.	.	.	14.00	7.82	.	.	.	.	.	.
Other	.	.	.	.	.	.	2.76	5.67	.	.	.	.	.	.	.	.	.	.
Educational Performance																		
Above average	6.36	1.87	5.17	1.47	8.80	1.56	12.49	2.03	15.67	2.19	14.39	1.85	81.15	2.38	78.93	2.68	76.81	2.19
Average	11.37	2.53	10.06	2.17	12.78	2.31	17.13	3.35	20.14	3.42	18.52	3.05	71.50	3.20	69.60	3.88	68.70	3.31
Below average	21.48	11.43	32.81	12.28	42.10	15.46	27.41	11.51	27.14	11.78	19.23	10.46	.	.	40.05	12.85	38.66	11.77
Unknown	4.44	9.38	.	.	.	.	4.41	9.31	.	.	.	.	.	.	.	.	.	.
Family Income (Dollars)																		
<10k	8.56	5.29	7.04	5.48	11.30	4.97	5.69	3.10	15.74	6.22	10.90	4.25	85.76	5.60	76.76	7.10	77.80	6.68
10k–20k	8.85	4.61	9.80	5.17	9.17	3.56	14.33	5.07	13.69	5.23	15.93	3.82	76.82	5.93	76.50	6.80	74.90	4.41
20k–30k	9.34	4.29	7.84	3.87	11.65	3.73	14.44	5.81	19.32	5.42	17.19	4.09	76.21	6.99	72.70	5.08	71.16	5.57
30k–50k	8.66	2.92	9.56	3.20	11.53	2.44	15.30	4.51	19.65	3.60	18.87	4.02	76.04	5.89	70.69	4.82	69.60	4.64
50k–75k	7.93	3.20	6.68	2.36	10.51	3.12	15.06	4.96	20.75	4.48	17.70	3.65	77.01	5.27	72.58	4.32	71.78	4.00
>75k	9.89	4.70	7.91	3.45	12.87	2.81	18.07	4.89	19.06	5.60	13.27	2.86	72.04	6.65	73.03	6.20	73.86	3.90
Unknown	7.46	3.73	7.35	3.68	11.07	4.02	19.00	8.45	12.81	4.38	13.05	4.74	73.54	8.56	78.82	4.99	75.88	5.67

Note: The column Unknown has been eliminated from this table; CI = 95% confidence interval.
Source: 1990, 1993, 1996 California Tobacco Surveys, UCSD. Telephone interviews.

Figure 5-3
Prevalence of Smoking at Least One Cigarette in the Last 30 Days among Male and Female Adolescents: 1990, 1993, 1996



1990, 1993, 1996 California Tobacco Survey (CTS), UCSD.*
** Telephone interviews.*

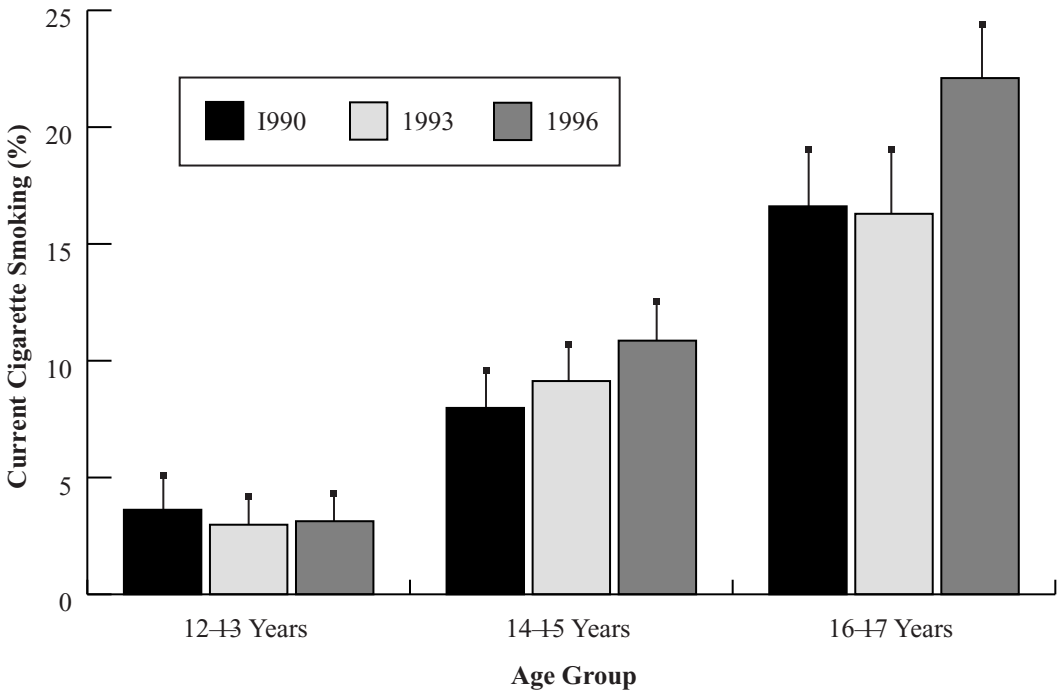
prevalence for the 12- to 13-year-old group remaining unchanged. This pattern of increasing prevalence for the two older age groups with no change for the youngest age group is present for both males and females.

Number of the Last 30 Days that Cigarettes Were Used

Use of cigarettes among adolescents is commonly episodic and progresses to a greater prevalence of daily smoking as the adolescent increases in age and adopts more adult—and addictive—patterns of smoking. This change in frequency of smoking with increasing age is presented in Figure 5-5 and Tables 5-2a and 5-2b, which show that an increasing percentage of adolescents report smoking in the last 30 days as they age. With each age group, smoking on 1–19 days out of the last 30 is the most common frequency of smoking reported, but the change in prevalence of daily smoking with advancing age is particularly dramatic.

It is useful to know how each category of number of days smoked has contributed to the observed increase in smoking prevalence among adolescents between 1990 and 1996. Figure 5-6 shows the increase (or decrease) in prevalence of each frequency of smoking between 1990 and 1996 for each age group. The increase in smoking prevalence between 1990 and 1996 is confined to the two older age groups, as noted earlier. The largest contribu-

Figure 5-4
Prevalence of Current Cigarette Smoking among Adolescent Californians of Different Ages: 1990, 1993, 1996

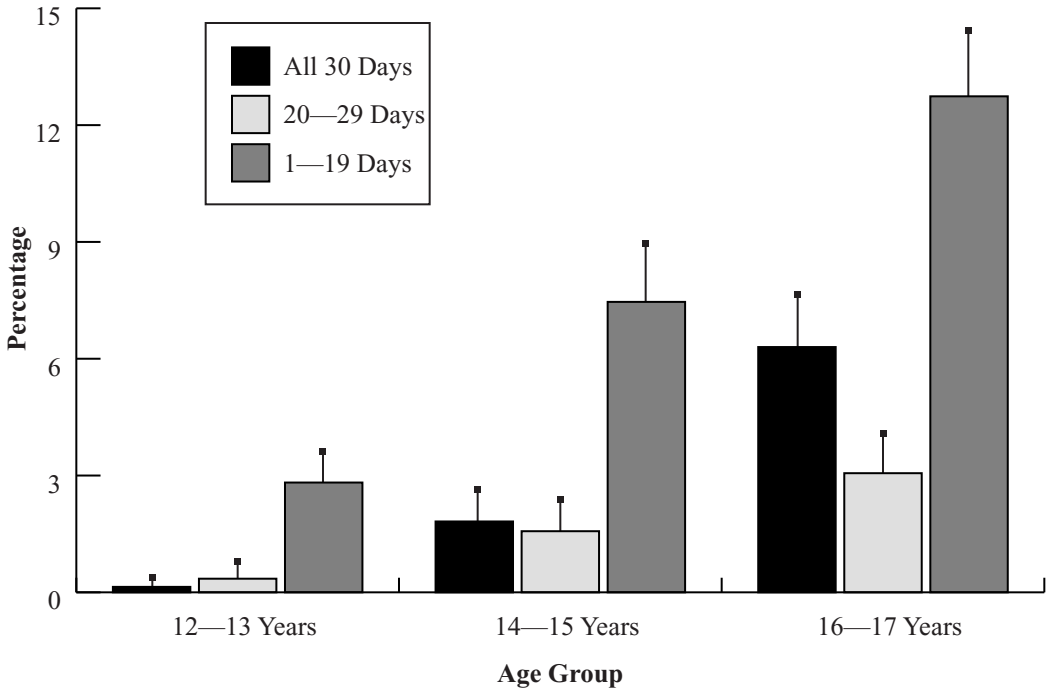


1990, 1993, 1996 California Tobacco Survey (CTS), UCSD.*
** Telephone interviews.*

tion to the increased prevalence is made by the change in the prevalence of adolescents smoking 1–19 days out of the last 30. This category is the largest category of smokers among all adolescents, but it also increases by more than 40 percent between 1990 and 1996, in contrast to the increase of less than 20 percent in daily smoking. These data suggest that a large fraction of the increase in smoking prevalence among California adolescents is composed of less-frequent smokers who may not yet be addicted and who may, therefore, still be able to easily stop smoking if they can be reached and appropriately motivated.

Race and Ethnicity White adolescents have a higher smoking prevalence than adolescents in other racial and ethnic populations, with the possible exception of Native Americans, for whom the small sample size in the survey leads to a wide confidence interval. The increase in smoking prevalence between 1990 and 1996 among all adolescents is replicated for each of the racial and ethnic groups, with the exception of African Americans (Figure 5-7). The pattern of increasing prevalence in all racial and ethnic groups, except African Americans, is present for both males and females.

Figure 5-5
Percentage of Adolescents who Have Smoked Different Numbers of Days Out of the Last 30 in 1996



1996 California Tobacco Survey (CTS), UCSD.*
** Telephone interviews.*

Income

No change in smoking prevalence over time is evident among adolescents whose families earn incomes over $75,000. Adolescents whose families earn less than $10,000 may have an increase in smoking prevalence between 1993 and 1996, but are unchanged from 1990. The bulk of the increase in smoking prevalence seems to occur among adolescents from families in the middle range of incomes of $10,000–$75,000.

In contrast to adults, who show marked declines in smoking prevalence with increasing family income, adolescent smoking does not appear to be strongly influenced by family income. Moreover, there is no clear trend over time by family income. Figure 5-8 presents adolescent smoking prevalence by levels of family income for 1990, 1993, and 1996.

PREDICTORS OF ADOLESCENT INITIATION

A number of factors, including family smoking behaviors and peer influence, are recognized as predictors of adolescent smoking initiation. In examining the increase in smoking prevalence among adolescents in California, it is useful to explore whether the impact of some of these predictors has changed over time. Three pat-

Table 5-2a
Cigarette Smoking Prevalence and Frequency of Use among Adolescents in the Last 30 Days: 1990

	Number of Days Smoked Cigarette(s) in Past 30 Days									
	All 30 Days		20–29 Days		1–19 Days		None in Past 30 Days		Never Smoked	
Total*: *Statewide	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)
Total	2.30	0.60	0.87	0.43	6.02	0.83	16.16	1.38	74.61	1.30
Age (Years)										
12–13	0.16	0.20	0.05	0.07	3.42	1.52	7.35	1.94	89.00	2.67
14–15	1.64	0.73	0.50	0.48	5.84	1.40	16.94	2.62	75.08	3.12
16–17	5.37	1.55	2.17	1.02	9.07	1.83	24.98	3.01	58.33	3.11
Race/Ethnicity										
Non-Hispanic White	3.82	1.18	1.21	0.49	5.92	1.05	19.04	1.86	69.96	1.72
Hispanic	0.99	0.53	0.36	0.38	7.48	1.91	15.73	2.67	75.41	2.52
African-American	.	.	1.08	2.21	4.48	2.73	9.55	2.60	84.89	3.96
Asian/PI	1.54	1.73	0.77	1.05	2.39	1.86	9.16	3.51	86.14	4.19
Native American	2.55	3.03	1.32	1.84	4.78	3.55	18.28	8.59	73.07	9.97
Other	.	.	.	.	.	.	2.45	5.01	.	.
Educational Performance										
Above average	1.26	0.56	0.59	0.31	4.01	0.94	14.10	2.04	80.04	1.93
Average	3.20	1.07	0.82	0.45	7.31	1.45	19.01	2.47	69.60	2.33
Below average	8.51	4.32	6.02	6.83	24.55	12.15	18.98	7.53	41.66	9.95
Unknown	3.00	6.14	.	.	1.28	2.59	2.98	6.09	92.74	9.42
Family Income (Dollars)										
<10k	1.91	1.38	0.89	1.84	8.39	4.14	10.88	4.84	77.93	5.64
10k–20k	2.07	1.72	0.34	0.34	6.36	2.59	15.75	3.77	75.48	3.85
20k–30k	2.52	1.28	0.94	0.87	5.85	2.07	15.99	4.65	74.71	5.30
30k–50k	2.14	1.15	1.00	0.64	5.90	2.18	15.96	2.90	74.89	3.51
50k–75k	2.34	1.44	0.88	0.74	4.68	1.37	15.43	3.56	76.68	3.47
>75k	2.94	2.09	1.26	1.04	6.24	1.89	22.13	4.48	67.42	4.35
Unknown	2.22	1.46	0.58	0.91	5.45	2.53	16.96	5.11	74.69	5.61

Table 5-2a (continued)

	Number of Days Smoked Cigarette(s) in Past 30 Days									
							None in Past			
Males*: *Statewide	**All 30 Days**		**20–29 Days**		**1–19 Days**		**30 Days**		**Never Smoked**	
	(%)	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**
Total	2.41	0.87	1.04	0.74	6.27	1.35	17.77	2.01	72.44	2.39
Age (Years)										
12–13	0.08	0.16	0.06	0.12	4.15	2.85	8.21	3.40	87.44	4.40
14–15	1.20	0.74	0.73	0.75	5.12	1.52	19.30	4.14	73.66	4.12
16–17	6.33	2.57	2.48	1.78	9.88	2.68	26.57	3.35	54.57	4.82
Race/Ethnicity										
Non-Hispanic White	3.79	1.53	1.22	0.78	5.23	1.27	19.54	3.03	70.11	3.30
Hispanic	1.22	0.83	0.56	0.75	9.14	2.96	19.37	4.55	69.65	4.31
African-American	.	.	2.40	4.90	4.11	3.87	10.51	4.76	82.98	9.25
Asian/PI	1.76	2.53	0.52	0.66	2.90	3.48	9.57	5.97	85.26	6.74
Native American	3.41	5.47	2.55	3.77	5.17	5.61	13.68	12.50	.	.
Other	.	.	.	.	.	.	.	.	.	.
Educational Performance										
Above average	0.88	0.56	0.57	0.53	3.88	1.28	15.84	3.32	78.84	3.48
Average	3.67	1.59	0.84	0.69	6.78	2.07	20.86	3.40	67.72	3.54
Below average	9.54	7.35	8.55	10.53	30.16	17.24	14.59	8.85	36.74	10.90
Unknown	.	.	.	.	.	.	.	.	.	.
Family Income (Dollars)										
<10k	3.13	2.60	2.06	4.26	9.45	6.21	17.71	10.26	67.65	11.53
10k–20k	1.41	1.35	0.15	0.30	7.11	3.86	17.30	6.89	74.03	7.99
20k–30k	2.41	1.56	1.49	1.59	5.37	2.50	17.25	6.23	73.47	6.79
30k–50k	3.14	2.07	0.94	1.10	5.35	4.13	16.62	4.13	73.73	4.90
50k–75k	1.13	1.00	0.93	1.08	5.78	2.09	15.82	4.59	76.34	4.81
>75k	3.36	2.94	1.51	1.97	6.16	3.00	26.35	6.69	62.62	6.61
Unknown	2.01	1.56	0.24	0.36	6.84	4.98	14.82	6.17	75.90	8.33

Table 5-2a (continued)

	Number of Days Smoked Cigarette(s) in Past 30 Days									
							None in Past			
Females*: *Statewide	**All 30 Days**		**20–29 Days**		**1–19 Days**		**30 Days**		**Never Smoked**	
	(%)	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**
Total	2.19	0.76	0.70	0.32	5.78	1.25	14.59	1.74	76.74	2.05
Age (Years)										
12–13	0.23	0.36	0.03	0.06	2.72	1.58	6.52	1.93	90.50	2.80
14–15	2.09	1.18	0.27	0.28	6.57	2.48	14.57	2.66	76.50	3.84
16–17	4.45	2.00	1.87	0.97	8.29	2.34	23.45	4.58	61.93	4.92
Race/Ethnicity										
Non-Hispanic White	3.85	1.47	1.20	0.61	6.62	1.81	18.53	2.61	69.81	3.08
Hispanic	0.77	0.72	0.17	0.23	5.87	2.23	12.21	3.24	80.99	3.76
African-American	.	.	.	.	4.78	4.27	8.77	5.24	86.46	6.33
Asian/PI	1.31	2.38	1.04	2.08	1.84	1.64	8.74	4.17	87.07	4.79
Native American	1.63	3.28	.	.	4.35	6.03	.	.	.	.
Other	.	.	.	.	.	.	2.76	5.67	.	.
Educational Performance										
Above average	1.61	1.01	0.61	0.42	4.14	1.18	12.49	2.03	81.15	2.38
Average	2.73	1.22	0.80	0.57	7.84	2.21	17.13	3.35	71.50	3.20
Below average	6.53	5.40	1.18	2.42	13.76	10.23	27.41	11.51	.	.
Unknown	4.44	9.38	.	.	.	.	4.41	9.31	.	.
Family Income (Dollars)										
<10k	0.98	1.09	.	.	7.58	5.04	5.69	3.10	85.76	5.60
10k–20k	2.67	2.46	0.51	0.63	5.66	4.40	14.33	5.07	76.82	5.93
20k–30k	2.65	2.27	0.27	0.37	6.43	4.17	14.44	5.81	76.21	6.99
30k–50k	1.16	0.86	1.05	0.77	6.45	2.91	15.30	4.51	76.04	5.89
50k–75k	3.50	2.26	0.82	1.10	3.61	2.19	15.06	4.96	77.01	5.27
>75k	2.54	3.13	1.03	1.11	6.32	2.99	18.07	4.89	72.04	6.65
Unknown	2.43	2.53	0.91	1.79	4.12	2.14	19.00	8.45	73.54	8.56

Note: The column "Unknown" has been eliminated from this table.
CI = 95% confidence interval.
Source: 1990, 1993, 1996 California Tobacco Surveys, UCSD. Telephone interviews.

Table 5-2b
Cigarette Smoking Prevalence and Frequency of Use among Adolescents in the Last 30 Days: 1996

	Number of Days Smoked Cigarette(s) in Past 30 Days									
	All 30 Days		20–29 Days		1–19 Days		None in Past 30 Days		Never Smoked	
Total*: *Statewide	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)
Total	2.70	0.48	1.65	0.43	7.62	0.76	16.66	1.18	71.36	1.38
Age (Years)										
12–13	0.14	0.16	0.35	0.43	2.82	0.73	7.19	1.37	89.50	1.61
14–15	1.82	0.67	1.57	0.63	7.47	1.16	18.52	2.05	70.58	2.33
16–17	6.30	1.19	3.06	0.97	12.74	1.71	24.34	1.94	53.56	2.66
Race/Ethnicity										
Non-Hispanic White	3.74	0.63	1.73	0.53	8.20	0.99	18.08	1.58	68.25	1.80
Hispanic	1.82	0.81	1.40	0.72	8.30	1.55	16.32	1.75	72.12	2.23
African-American	1.00	0.87	0.99	0.91	4.18	1.94	15.01	3.78	78.82	4.36
Asian/PI	1.79	1.14	2.09	1.32	5.08	1.93	12.60	2.76	78.44	3.32
Native American	6.01	5.16	3.82	4.34	8.43	4.90	19.44	8.09	62.31	10.44
Other	.	.	.	.	.	.	.	.	.	.
Educational Performance										
Above average	1.94	0.47	1.09	0.43	5.85	0.87	14.69	1.42	76.42	1.61
Average	2.94	0.68	1.51	0.66	9.49	1.56	19.58	1.95	66.44	2.24
Below average	9.26	4.53	10.04	4.83	17.65	5.58	20.26	6.93	42.80	5.79
Unknown	12.85	8.39	6.17	6.39	9.88	7.68	18.60	9.35	.	.
Family Income (Dollars)										
<10k	4.55	2.18	1.73	1.69	6.67	2.74	12.80	3.20	74.26	5.07
10k–20k	3.37	1.44	1.12	0.87	8.63	2.45	14.20	3.15	72.68	3.64
20k–30k	2.96	1.48	1.58	1.19	6.87	2.23	16.43	2.45	72.05	3.56
30k–50k	2.44	0.91	1.69	0.88	8.63	1.91	19.20	2.66	68.04	3.52
50k–75k	2.38	1.02	1.51	0.95	7.53	1.88	18.49	2.70	70.09	3.04
>75k	2.09	0.91	1.90	0.86	6.80	1.42	15.74	1.98	73.48	2.89
Unknown	2.22	1.26	2.03	1.40	7.79	2.53	15.94	3.61	72.02	4.43

Table 5-2b (continued)

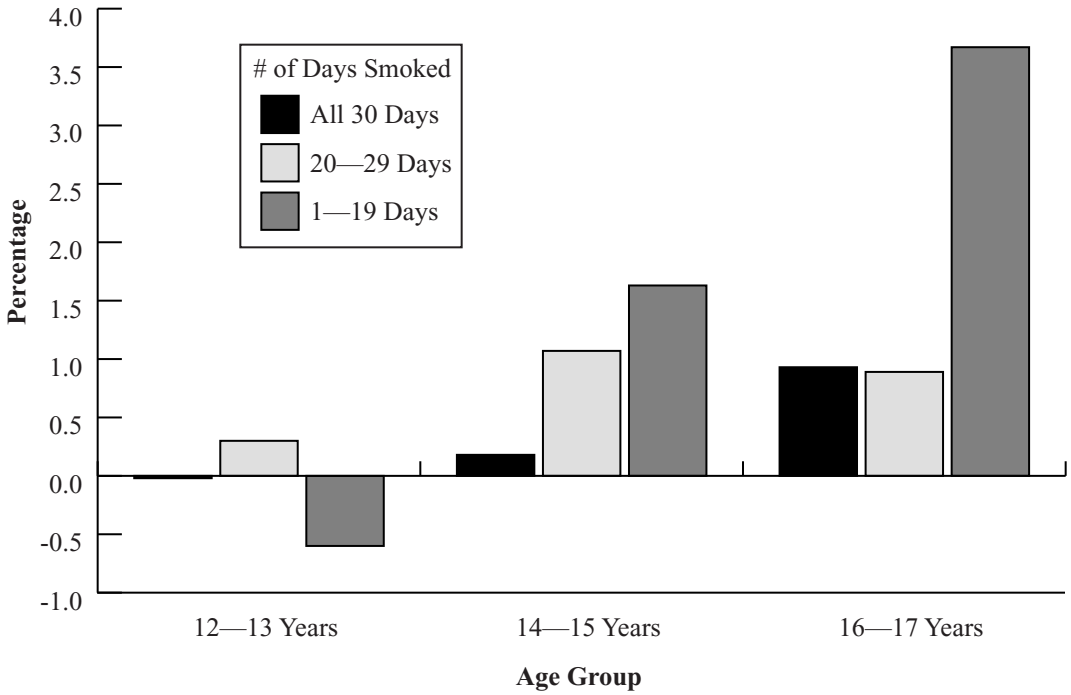
	Number of Days Smoked Cigarette(s) in Past 30 Days									
							None in Past			
Males*: *Statewide	**All 30 Days**		**20–29 Days**		**1–19 Days**		**30 Days**		**Never Smoked**	
	(%)	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**
Total	2.66	0.69	1.73	0.56	8.25	1.09	17.32	1.61	70.00	2.08
Age (Years)										
12–13	0.11	0.21	0.48	0.58	3.62	1.22	8.23	2.04	87.56	2.67
14–15	1.86	0.88	1.09	0.74	6.39	1.74	19.26	2.69	71.32	3.39
16–17	6.11	1.76	3.69	1.46	14.95	2.55	24.36	3.27	50.89	3.83
Race/Ethnicity										
Non-Hispanic White	3.10	0.83	1.98	0.80	8.29	1.42	18.74	2.02	67.89	2.45
Hispanic	2.29	1.15	1.19	0.81	9.83	2.14	16.88	2.74	69.72	3.63
African-American	0.44	0.63	0.31	0.62	5.11	3.03	16.09	4.91	78.05	5.20
Asian/PI	2.36	2.01	2.56	2.05	5.59	2.94	12.42	4.28	77.07	4.19
Native American	7.29	6.05	4.81	6.66	4.96	4.87	23.73	11.47	.	.
Other	.	.	.	.	.	.	.	.	.	.
Educational Performance										
Above average	1.89	0.72	1.13	0.58	5.95	1.13	15.00	1.90	76.03	2.20
Average	2.72	0.97	1.70	0.99	10.51	1.89	20.47	2.70	64.53	3.18
Below average	8.28	5.13	7.45	4.34	18.18	7.17	20.86	8.94	45.24	8.34
Unknown	.	.	9.30	12.04	11.13	12.52	.	.	.	.
Family Income (Dollars)										
<10k	5.25	3.22	1.52	2.08	7.80	3.88	14.68	4.54	70.76	5.65
10k–20k	4.41	2.46	1.56	1.46	10.98	3.48	12.52	4.50	70.52	5.68
20k–30k	2.92	1.90	1.53	1.53	6.69	2.98	15.62	4.14	73.00	5.32
30k–50k	2.35	1.48	1.61	0.94	10.01	2.86	19.51	3.32	66.52	4.96
50k–75k	1.94	1.45	2.31	1.65	7.95	2.32	19.17	3.78	68.62	4.47
>75k	1.65	1.07	1.76	1.10	5.69	2.06	17.73	2.84	73.16	3.80
Unknown	2.03	1.57	1.44	1.83	9.45	3.52	18.59	5.67	68.50	6.55

Table 5-2b (continued)

	Number of Days Smoked Cigarette(s) in Past 30 Days									
							None in Past			
Females*: *Statewide	**All 30 Days**		**20–29 Days**		**1–19 Days**		**30 Days**		**Never Smoked**	
	(%)	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**	**(%)**	**(CI)**
Total	2.75	0.61	1.55	0.54	6.95	1.09	15.94	1.32	72.81	1.62
Age (Years)										
12–13	0.18	0.26	0.21	0.34	1.99	0.92	6.10	1.42	91.53	1.47
14–15	1.79	0.83	2.09	1.00	8.63	1.92	17.72	2.54	69.78	3.33
16–17	6.52	1.59	2.38	1.07	10.30	1.99	24.31	2.56	56.50	3.09
Race/Ethnicity										
Non-Hispanic White	4.48	1.11	1.44	0.59	8.10	1.55	17.33	2.00	68.66	2.64
Hispanic	1.35	0.82	1.61	1.09	6.75	1.86	15.75	2.29	74.54	2.73
African-American	1.53	1.63	1.64	1.62	3.29	2.57	13.98	4.92	79.55	6.03
Asian/PI	1.19	1.19	1.59	1.63	4.54	2.54	12.78	3.85	79.90	4.82
Native American	4.38	6.00	2.56	3.76	12.83	9.59	14.00	7.82	.	.
Other	.	.	.	.	.	.	.	.	.	.
Educational Performance										
Above average	1.99	0.66	1.06	0.55	5.75	1.23	14.39	1.85	76.81	2.19
Average	3.21	0.99	1.28	0.84	8.28	2.22	18.52	3.05	68.70	3.31
Below average	10.92	7.16	14.44	9.50	16.75	8.41	19.23	10.46	38.66	11.77
Unknown	9.57	10.92	2.77	3.87	8.51	9.40	.	.	.	.
Family Income (Dollars)										
<10k	3.84	2.30	1.93	2.04	5.52	3.29	10.90	4.25	77.80	6.68
10k–20k	2.30	1.46	0.67	0.79	6.20	2.95	15.93	3.82	74.90	4.41
20k–30k	2.99	1.84	1.62	1.40	7.04	3.28	17.19	4.09	71.16	5.57
30k–50k	2.53	1.15	1.78	1.13	7.22	1.85	18.87	4.02	69.60	4.64
50k–75k	2.87	1.48	0.60	0.52	7.04	2.65	17.70	3.65	71.78	4.00
>75k	2.63	1.47	2.08	1.26	8.16	2.35	13.27	2.86	73.86	3.90
Unknown	2.42	1.70	2.67	2.20	5.98	3.19	13.05	4.74	75.88	5.67

Note: The column "Unknown" has been eliminated from this table.
CI = 95% confidence interval.
Source: 1990, 1993, 1996 California Tobacco Surveys, UCSD. Telephone interviews.

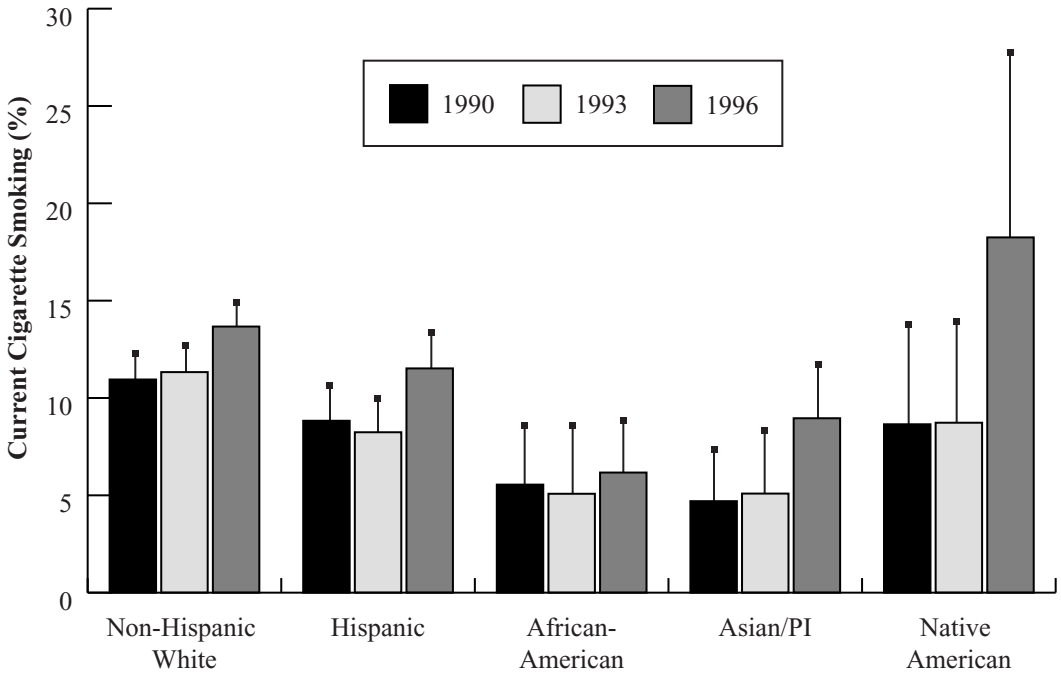
Figure 5-6
Change Between 1990 and 1996 in the Percentage of Adolescents who Smoked Different Numbers of Days Out of the Last 30



1990 and 1996 California Tobacco Survey (CTS), UCSD.*
** Telephone interviews.*

terns defining the increase in adolescent prevalence may emerge. First, the predictor of smoking initiation may have increased in frequency in the population (for example, the number of adolescents who report that their friends smoke may have increased), but the impact of the predictor on initiation may not have changed. This pattern would show no change between 1990 and 1996 in adolescent smoking prevalence at each level of the predictor, but more adolescents would be in the category that predicts higher initiation. A second pattern would result if the impact of the predictor on initiation has become more powerful over time. This pattern would show an increase in adolescent smoking prevalence between 1990 and 1996 in those levels of the predictor associated with high smoking initiation. A final pattern could occur in which the increase in smoking prevalence between 1990 and 1996 would be uniformly spread across the levels of the predictor, indicating that the predictor had not changed in the intensity of its effect on cessation. This last pattern would suggest that the predictor did not contribute to the observed increase in adolescent smoking between 1990 and 1996.

Figure 5-7
Current Cigarette Smoking Prevalence among Adolescent Californians of Different Race and Ethnic Groups: 1990, 1993, and 1996

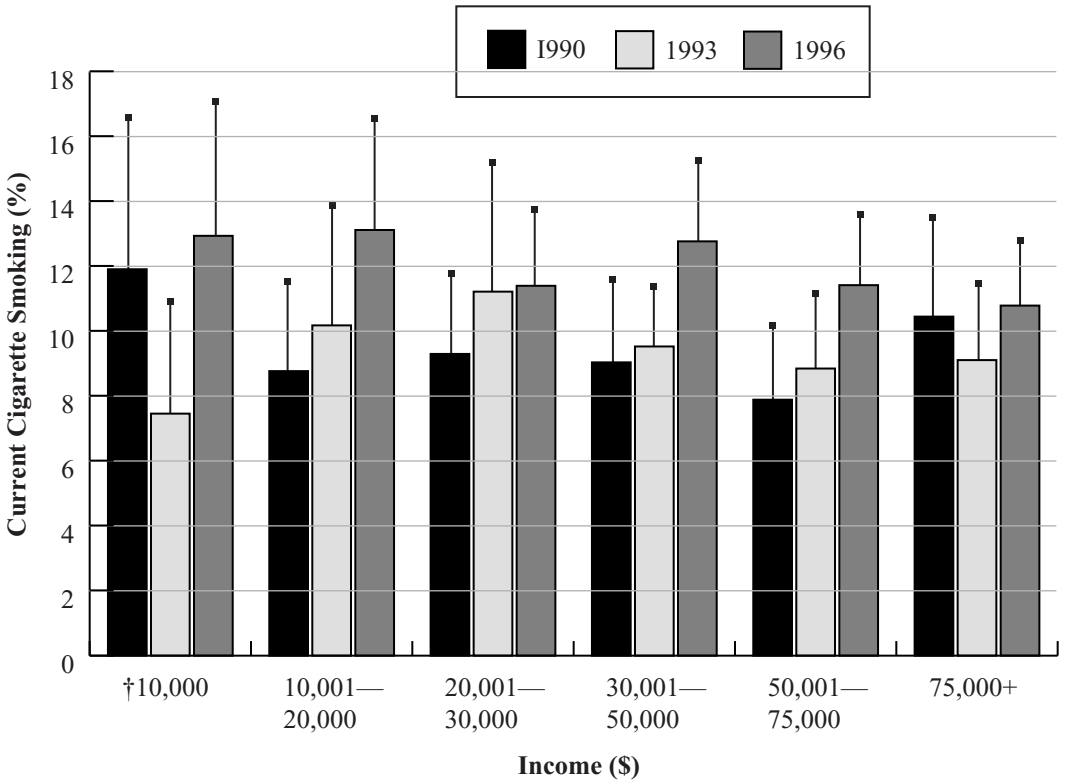


1990, 1993, and 1996 California Tobacco Survey (CTS), UCSD.*
** Telephone interviews.*

School Performance One of the most powerful predictors of adolescent smoking behavior is self-described school performance. Figure 5-9, as well as Tables 5-1, 5-2a, and 5-2b, present adolescent smoking prevalence in 1990, 1993, and 1996 for each of the school performance groups. For male and female adolescents combined, there are statistically significant increases in smoking prevalence for both the above-average and average school performance groups; the largest part of the increase appears to have occurred between 1993 and 1996. There was no increase in prevalence with adolescents who described their school performance as being below average, with 3 to 5 percent of adolescents describing their school performances as being in this category. This suggests that a substantial part of the recent increase in adolescent smoking prevalence occurred among those school performance groups in which prevention efforts have traditionally been most successful rather than among adolescents in the group that is at greatest risk (those with below-average performance).

When males and females are combined, there is an absence of change between 1990 and 1996 in the smoking prevalence of adolescents who report that they have below-average school performance. This masks an

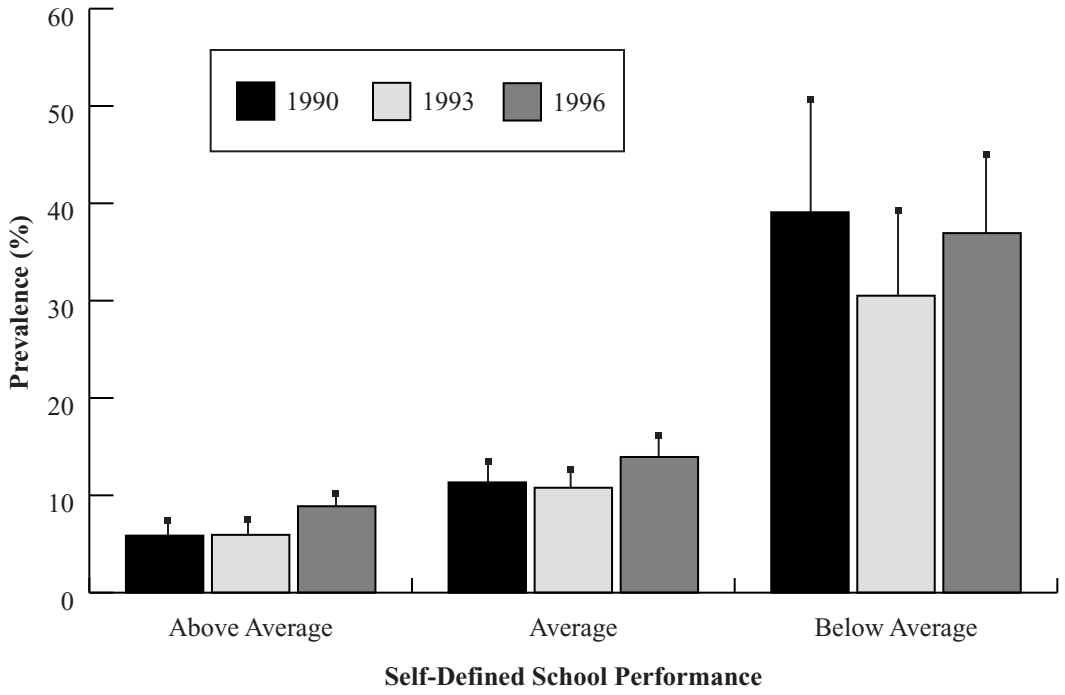
Figure 5-8
Prevalence of Current Cigarette Smoking among Adolescent Californians of Different Family Incomes: 1990, 1993, and 1996



1990, 1993, and 1996 California Tobacco Survey (CTS), UCSD.*
** Telephone interviews.*

important gender-related difference between 1990 and 1996 for this school performance category. When smoking prevalence trends are examined separately for male and female adolescents, both males and females show similar increases in smoking prevalence between 1990 and 1996 for the above-average and average school performance categories. However, males and females with below-average school performance change in opposite directions during the 1990–1996 period. Male adolescents with below-average school performance had a statistically significant decline in smoking prevalence between 1990 and 1993, and this decline was maintained in the 1993–1996 period. In contrast, adolescent females who reported below-average school performance almost doubled their smoking prevalence between 1990 and 1996, and the increase in prevalence seems to occur evenly across both the 1990–1993 and 1993–1996 time periods. These data suggest that there may be a strong gender-based change in the environmental influences and messages that are influencing smoking behavior in this high-risk target population of adolescents.

Figure 5-9
Cigarette Smoking Prevalence among Adolescents with Different Self-Defined School Performance: 1990, 1993, and 1996



1990, 1993, and 1996 California Tobacco Survey (CTS), UCSD.*
** Telephone interviews.*

Parental and Sibling Smoking

Smoking behavior of parents or siblings has a profound effect on the prevalence of smoking among adolescents. This effect is clearly demonstrated in Table 5-3 for each of the survey years. The questions asked about parental and sibling smoking status differed among the survey years. The answers were collapsed to "at least one parent smokes" and "at least one older sibling smokes" for this analysis.

There is a doubling of adolescent smoking prevalence among children of smoking parents, and having an older sibling who smokes triples the likelihood of adolescent smoking. However, across the three surveys, changes in the fraction of adolescents who are cigarette smokers within each category of parental or sibling smoking are less dramatic. Among adolescents aged 12–13, there is no significant change across the three survey years in the effect of parental or sibling smoking on adolescent smoking. That is, there is no significant change in the prevalence of smoking over time within each category of parental or sibling smoking. This age group also had no significant increase in smoking prevalence across the three surveys.

Table 5-3

Prevalence of Adolescents Who Have Smoked in the Last 30 Days: 1990, 1993, and 1996

	Years of Age																	
	12 - 13						14 - 15						16 - 17					
	1990		1993		1996		1990		1993		1996		1990		1993		1996	
	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)
Total	3.62	1.52	2.98	1.03	3.31	0.86	7.98	1.47	9.13	1.55	10.86	1.38	16.61	2.13	16.29	2.62	22.10	2.28
Male	4.30	2.85	3.28	1.37	4.20	1.33	7.04	1.87	9.34	2.30	9.34	2.29	18.69	3.49	18.88	4.37	24.75	3.06
Female	2.98	1.66	2.70	1.36	2.37	1.05	8.93	2.41	8.92	2.48	12.51	2.19	14.62	2.99	13.74	3.12	19.20	2.64
Parents Only																		
Parent(s) Smoke	5.42	2.40	5.00	2.25	5.28	1.53	11.27	3.38	12.19	3.27	16.25	2.36	22.50	4.68	23.18	4.26	27.39	3.71
Don't Smoke	2.68	2.02	1.98	1.22	2.34	0.99	6.02	1.95	7.28	1.83	8.04	1.62	13.06	2.66	12.53	2.92	19.23	2.16
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Older Siblings Only																		
Sibling(s) Smoke	7.86	5.50	11.17	5.71	12.20	4.02	21.22	8.47	26.52	7.61	25.15	4.46	29.06	8.28	31.86	7.43	37.88	5.34
Nonsmoking/ No Siblings	3.31	1.64	1.96	0.98	2.27	0.79	6.28	1.49	6.52	1.47	8.48	1.33	14.73	1.95	12.24	2.73	18.34	2.20
Unknown	.	.	.	.	3.17	6.38	.	.	.	.	5.12	10.43	.	.	.	.	.	.
Parents and Older Siblings																		
Neither Smoke	2.51	2.13	1.75	1.28	1.88	0.91	5.45	1.92	6.30	1.94	6.85	1.67	12.04	2.64	10.54	3.25	16.59	2.29
Parent(s) Only	4.86	2.51	2.67	1.81	3.20	1.65	7.83	2.95	7.02	2.60	11.80	2.20	19.74	4.71	16.49	4.39	22.94	4.19
Siblings Only	5.67	5.60	4.62	4.25	7.99	5.84	13.21	9.61	17.68	8.14	17.35	5.44	22.69	9.87	23.52	8.44	36.21	6.82
Both Smoke	9.47	8.99	16.87	9.37	15.81	6.05	26.56	13.49	32.72	11.78	32.95	8.02	34.77	12.85	41.55	10.42	39.64	7.37

Note: CI = 95% confidence interval.

Source: 1990, 1993, 1996 California Tobacco Surveys, UCSD. Telephone interviews.

For 15- to 16-year-old adolescents, there is a statistically significant increase in the prevalence of smoking among those adolescents who have a smoking parent (from 7.83 percent ± 2.95 percent to 11.80 percent ± 2.20 percent), but the increase in prevalence among those with a smoking sibling is not statistically significant (from 13.21 percent ± 9.61 percent to 17.35 percent ± 5.44 percent). The opposite pattern is evident for 16- to 17-year-old adolescents, for whom the increase in smoking prevalence with older sibling smoking is statistically significant (from 22.69 percent ± 9.87 percent to 36.21 percent ± 6.82 percent), but the increase with parental smoking is not (from 19.74 percent ± 4.71 percent to 22.94 percent ± 4.19 percent).

As might be expected from the increased prevalence of smoking among adolescents, there was also an increase in the fraction of adolescents who reported having an older sibling who smokes—from 10.5 percent in 1990 to 14.4 percent in 1996. There was no change, or a slight decline, in the frequency with which adolescents reported having a parent who smoked over this same time interval. It would appear that the changes in smoking prevalence that occurred between 1990 and 1996 from the effect of having a parent or sibling who smokes have been modest. These modest changes may be due to a combination of a small increase in the effect of parental or sibling smoking on the likelihood of adolescent smoking and a small increased prevalence of having a sibling who smokes.

Friends' Smoking The association between prevalence of adolescent smoking and self-reported number of friends who smoke is dramatic, is evident in each age group and present for both male and female friends, and is consistent across all three surveys (Table 5-4a). There is approximately a 10-fold increase in adolescent smoking prevalence among adolescents who report having three or more friends who smoke compared to adolescents who report having no friends who smoke.

However, there does not appear to be any increase across the survey years in the likelihood of smoking within each category of number of friends who smoke. For example, the prevalence of smoking goes from 4.4 percent in 1990 to 3.8 percent in 1996 among 16- to 17-year-old adolescents who have no male friends who smoke and from 41.0 percent in 1990 to 36.4 percent in 1996 among those who have three or more male friends who smoke. This would suggest that the power of perceived adolescent peer smoking in predicting—and possibly influencing—adolescent smoking prevalence has not increased between 1990 and 1996. What has changed is the fraction of adolescents who report having multiple friends who smoke (Table 5-4b). For example, the percentage of 14- to 15-year-old adolescents who report that none of their male friends smoked declined from 61.7 percent in 1990 to 38.1 percent in 1996, while the percentage who reported that three or more of their male friends smoked increased from 13.1 percent in 1990 to 38.0 percent in 1996. This shift in reporting friends who smoke was evident for all age groups and for both male and female friends.

A similar pattern emerges when peer influence is examined with a question that measures qualitatively how many of the adolescent's age group peers smoke (none, a few, some, or most). The prevalence of

Table 5-4a

Prevalence of Smoking among Adolescents of Different Ages by Reported Number of Friends who Smoke: 1990, 1993, and 1996

		Years of Age																	
		12 - 13						14 - 15						16 - 17					
		1990		1993		1996		1990		1993		1996		1990		1993		1996	
		(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)
Total		3.62	1.52	2.98	1.03	3.31	0.86	7.98	1.47	9.13	1.55	10.86	1.38	16.61	2.13	16.29	2.62	22.10	2.28
# Male Friends Who Smoke	0	2.36	1.90	0.81	0.53	1.00	0.59	3.35	1.38	3.91	1.63	1.37	0.74	4.41	1.42	2.61	1.20	3.79	1.84
	1	7.43	5.58	5.80	4.44	1.35	2.11	10.90	7.03	10.57	5.12	5.54	3.65	24.20	8.88	17.26	8.19	15.17	6.19
	2	9.62	6.12	13.26	9.95	3.66	3.62	17.47	8.80	10.55	4.56	11.38	3.61	26.67	9.50	23.15	7.51	20.93	6.38
	3+	24.81	16.01	15.68	8.15	16.37	4.49	26.13	7.59	25.48	6.74	21.80	3.33	41.05	6.51	35.52	5.76	36.42	4.17
# Female Friends Who Smoke	0	1.80	0.98	1.30	0.85	1.39	0.58	4.11	1.33	3.36	1.13	1.82	0.69	8.30	2.06	6.10	2.41	7.34	2.06
	1	4.43	3.42	5.65	4.78	2.44	2.07	15.13	5.85	13.11	4.74	9.58	3.60	19.78	7.41	19.55	5.63	16.87	5.73
	2	.	.	9.63	9.97	12.20	6.80	17.94	9.74	22.02	10.03	13.23	5.78	33.15	10.68	29.41	10.03	26.95	7.65
	3+	12.61	8.87	19.28	10.36	16.88	6.82	29.54	11.51	26.29	8.59	28.17	4.11	38.63	8.24	39.96	7.21	42.58	4.41
Male Subjects		4.30	2.85	3.28	1.37	4.20	1.33	7.04	1.87	9.34	2.30	9.34	2.29	18.69	3.49	18.88	4.37	24.75	3.06
# Male Friends Who Smoke	0	3.28	3.43	1.11	0.91	1.37	0.98	3.02	1.48	3.62	2.60	1.43	1.20	3.94	1.84	2.69	1.91	3.97	3.11
	1	2.93	4.41	4.00	4.86	1.71	3.42	6.04	4.85	8.93	7.08	6.69	4.27	26.58	11.10	19.23	12.00	12.93	7.70
	2	.	.	13.51	11.00	4.68	5.85	16.88	14.81	11.70	7.61	6.34	4.12	31.58	14.02	18.68	9.34	22.55	9.65
	3+	.	.	13.34	10.08	21.84	6.00	22.95	10.40	29.60	7.80	21.45	5.77	42.23	9.05	39.83	8.88	41.38	5.57
# Female Friends Who Smoke	0	2.44	1.66	1.54	1.30	2.12	1.06	4.49	1.81	4.17	1.91	2.30	1.14	11.00	3.09	9.51	4.35	9.80	3.05
	1	2.82	4.31	11.60	11.44	4.68	4.35	14.35	7.59	11.47	5.89	4.75	3.96	22.29	10.61	25.43	10.06	22.69	8.73
	2	.	.	.	.	.	.	.	.	.	.	15.04	9.68	.	.	31.04	16.63	34.43	12.05
	3+	.	.	13.89	14.10	22.68	11.84	18.81	18.26	34.60	13.65	28.33	7.37	41.31	12.35	39.29	11.24	49.23	6.67

Table 5-4a (continued)

		Years of Age																	
		12 - 13						14 - 15						16 - 17					
		1990		1993		1996		1990		1993		1996		1990		1993		1996	
		(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)	(%)	(CI)
Female Subjects		2.98	1.66	2.70	1.36	2.37	1.05	8.93	2.41	8.92	2.48	12.51	2.19	14.62	2.99	13.74	3.12	19.20	2.64
# Male	0	1.25	1.27	0.45	0.56	0.61	0.73	3.76	2.00	4.25	2.31	1.30	0.98	4.84	2.29	2.53	1.31	3.62	2.29
Friends	1	.	.	7.89	8.01	0.79	1.57	15.17	12.94	12.37	7.56	3.03	3.52	22.39	12.14	15.56	9.50	18.49	10.09
Who	2	9.47	7.84	12.92	20.41	2.41	3.55	17.88	9.03	9.53	6.89	17.84	7.73	22.49	14.74	26.72	12.40	18.68	7.88
Smoke	3+	.	.	19.57	14.85	11.20	6.18	30.63	13.18	22.05	9.59	22.07	4.01	39.28	10.96	29.26	8.38	31.09	4.60
# Female	0	1.23	1.15	1.11	1.22	0.57	0.63	3.72	2.23	2.45	1.46	1.14	0.86	5.53	2.71	2.80	1.81	3.59	2.33
Friends	1	5.22	4.65	1.46	2.11	0.58	1.14	15.52	7.81	14.53	7.19	12.99	6.14	18.18	8.95	15.41	8.58	12.54	6.02
Who	2	.	.	4.42	7.20	7.99	7.29	14.48	10.54	16.69	10.84	11.54	7.11	33.00	15.99	27.99	10.69	20.07	8.30
Smoke	3+	.	.	24.04	14.74	13.27	7.23	37.88	13.74	21.77	9.78	28.06	5.61	36.24	11.39	40.66	10.10	36.90	5.42

Note: CI = 95% confidence interval.
Source: 1990, 1993, 1996 California Tobacco Surveys, UCSD. Telephone interviews.

Table 5-4b

Percentage of Adolescents who Are in Each Category of Reported Number of Friends who Smoke: 1990, 1993, and 1996

	Years of Age								
	12 - 13			14 - 15			16 - 17		
	1990	1993	1996	1990	1993	1996	1990	1993	1996
Overall-Groups-etc.									
No Male Friends Smoke	75.1%	65.8%	67.8%	61.7%	54.6%	38.1%	52.8%	43.4%	30.1%
1 Male Friend Smokes	4.3%	5.7%	7.3%	9.7%	11.2%	9.6%	15.2%	16.8%	9.2%
2 Male Friends Smoke	3.5%	4.9%	6.4%	5.6%	8.6%	10.7%	11.0%	9.4%	12.6%
3+ Male Friends Smoke	4.2%	8.3%	13.5%	13.1%	17.7%	38.0%	17.1%	25.8%	45.3%
No Female Friends Smoke	78.0%	73.6%	74.7%	69.6%	62.1%	51.2%	59.2%	54.6%	43.8%
1 Female Friend Smokes	6.3%	6.5%	8.9%	9.9%	13.4%	9.9%	13.6%	14.1%	11.8%
2 Female Friends Smoke	3.7%	3.3%	4.2%	6.4%	7.1%	10.2%	8.3%	9.4%	9.8%
3+ Female Friends Smoke	2.5%	5.9%	8.8%	7.4%	12.8%	26.7%	14.5%	17.2%	33.3%

Note: CI = 95% confidence interval.

Source: 1990, 1993, 1996 California Tobacco Surveys, UCSD. Telephone interviews.

smoking increases in each age group with increasing proportion of peers who are reported to be smokers (Table 5-5). For example, the 1996 prevalence of smoking among 16- to 17-year-old adolescents is only 4.4 percent for those who reported that none of their peers smoke and 12.6 percent for those who reported that a few of their peers smoke, but the prevalence of smoking among those who reported most of their peers smoke is 42.8 percent. However, the prevalence of smoking within each category of reported peer smoking (none, a few, some, or most) did not change substantially between 1990 and 1996. What changed is the likelihood that an adolescent reported that most of his friends smoke. Figure 5-10 presents the percentage of adolescents in each age group who reported that most of their age group peers smoked in the 1990, 1993, and 1996 California Tobacco Survey (CTS). There was approximately a doubling between 1990 and 1996 in the fraction of adolescents who reported that most of their age group peers smoked, with almost 30 percent of 16- to 17-year-old adolescents reporting that most of their age group peers smoked (up from 16.7 percent in 1990).

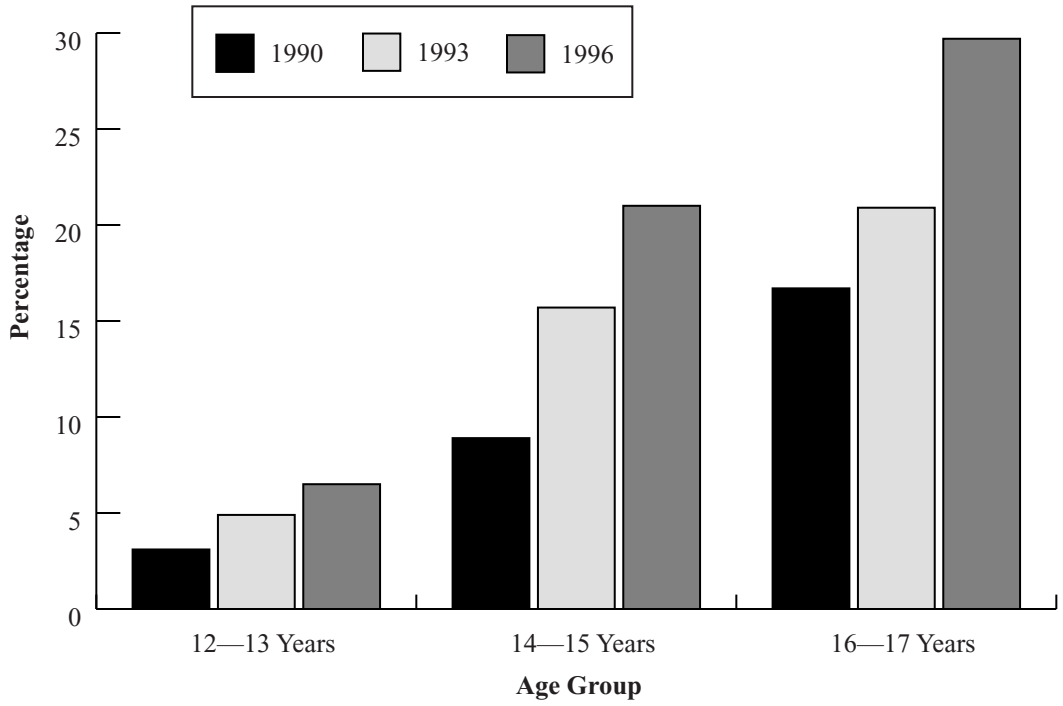
Both of these questions about smoking behavior among friends and peers demonstrate a dramatic rise in adolescents' perception of the number of their peers and friends who smoke. Part of this change in perception is likely to be based on an accurate assessment of the increase in adolescent smoking prevalence that has occurred in California between 1993 and 1996, but the magnitude of the increases in perception of adolescent smoking (a tripling of friends and doubling of peers) is vastly out of proportion with the real change in prevalence (from 9.2 percent in 1990 to 12 percent in 1996). This suggests that a change may have occurred over this interval in adolescents' perception about how common smoking is among their peers. Tobacco industry advertising and promotional efforts may have been successful in convincing adolescents that smoking is the norm for their peer group. Certainly, the public health efforts to de-normalize tobacco use among adolescents have not been successful in altering the perceptions of these adolescents.

Table 5-5
Smoking Prevalence among Adolescents of Different Ages by Self-Reported Number of Age-Group Peers who Smoke: 1990, 1993, 1996

			Has Smoked in Last 30 Days		Has Smoked, but Not in Last 30 Days		Never Smoked	
		Year	(%)	CI	(%)	CI	(%)	CI
Number of Peers Who Smoke: Ages 12–13	Total	1990	3.62	1.52	7.35	1.94	89.00	2.67
		1993	2.98	1.03	7.87	1.61	88.93	1.99
		1996	3.31	0.86	7.19	1.37	89.50	1.61
	None	1990	0.64	0.64	5.40	2.52	93.96	2.50
		1993	0.45	0.55	2.12	1.04	97.43	1.23
		1996	0.64	0.53	2.76	1.19	96.61	1.23
	A Few	1990	5.56	3.03	10.44	3.40	83.89	4.81
		1993	2.66	1.43	13.30	4.16	83.47	4.56
		1996	2.37	1.44	10.31	3.20	87.32	3.29
	Some	1990	7.55	5.20	10.32	5.53	82.13	7.58
		1993	8.60	4.78	12.98	4.84	78.42	6.42
		1996	7.19	3.19	16.78	4.83	76.04	5.45
	Most	1990	.	.	10.44	10.25	.	.
		1993	15.52	9.97	21.47	11.50	61.87	14.58
		1996	22.07	7.59	14.33	6.18	63.59	9.26
Number of Peers Who Smoke: Ages 14–15	Total	1990	7.98	1.47	16.94	2.62	75.08	3.12
		1993	9.13	1.55	20.97	2.68	69.81	2.87
		1996	10.86	1.38	18.52	2.05	70.58	2.33
	None	1990	2.45	2.10	8.92	4.10	88.64	4.44
		1993	0.25	0.36	6.23	3.23	93.53	3.27
		1996	2.28	1.59	6.52	2.78	91.20	3.15
	A Few	1990	5.26	2.26	17.21	3.57	77.54	4.07
		1993	4.37	2.36	23.22	3.69	72.23	4.12
		1996	4.98	2.26	20.51	3.95	74.52	4.58
	Some	1990	10.58	3.34	23.77	7.51	65.65	8.04
		1993	7.61	2.34	25.83	5.98	66.57	6.11
		1996	9.53	3.02	20.55	3.49	69.75	3.88
	Most	1990	32.03	9.57	25.11	8.70	42.86	10.74
		1993	33.86	6.14	23.89	6.11	42.13	6.67
		1996	29.78	4.42	23.90	4.10	46.32	5.23
Number of Peers Who Smoke: Ages 16–17	Total	1990	16.61	2.13	24.98	3.01	58.33	3.11
		1993	16.29	2.62	29.18	3.87	54.37	3.85
		1996	22.10	2.28	24.34	1.94	53.56	2.66
	None	1990	2.11	2.87	13.04	5.47	84.85	5.83
		1993	.	.	6.89	5.65	93.11	5.65
		1996	4.41	4.08	12.32	5.59	83.27	6.98
	A Few	1990	9.51	2.75	28.36	5.12	62.13	5.81
		1993	8.91	3.10	28.93	5.79	62.15	6.39
		1996	12.58	2.75	25.18	3.29	62.24	4.34
	Some	1990	21.34	5.36	27.70	6.80	50.63	7.01
		1993	15.12	4.76	33.48	6.33	51.34	6.01
		1996	17.20	4.36	26.19	4.21	56.61	4.23
	Most	1990	40.21	7.46	22.12	6.27	37.67	8.32
		1993	38.47	6.90	31.93	6.63	28.93	5.91
		1996	42.77	4.41	25.32	4.66	31.91	4.43

Note: CI = 95% confidence interval.
Source: 1990, 1993, 1996 California Tobacco Survey (CTS), UCSD. Telephone interviews.

Figure 5-10
Percentage of Adolescents of Different Ages who Report that Most of Their Friends Smoke Cigarettes: 1990, 1993, and 1996



1990, 1993, and 1996 California Tobacco Survey (CTS), UCSD.*
** Telephone interviews.*

Response of a Nonsmoking Adolescent to a Best Friend's Offer of a Cigarette

The response of a non-smoking adolescent to the question, "If one of your best friends were to offer you a cigarette, would you smoke it?" has been suggested as a measure of the strength of an adolescent's resolve not to smoke, and any response except "definitely no" is felt to suggest that the adolescent is at risk for subsequent initiation. The response to this question is also likely to reflect adolescent norms about smoking and the social acceptability of smoking among adolescent non-smokers. Table 5-6 presents the responses of adolescent non-smokers in the 1990, 1993, and 1996 CTS to this question. The frequency with which adolescent non-smokers report that they definitely would not smoke if offered a cigarette by their best friend remained constant between 1990 and 1993, but declined precipitously in 1996 (from 87.9 percent in 1993 to 78.6 percent in 1996). This decline is evident for each of the three age groups, including 16- to 17-year-old adolescents, whose resistance to friends' offers of cigarettes had been high (over 90 percent). This trend again suggests that the effort to de-normalize cigarette smoking has lost ground between 1993 and 1996, and this change may have contributed to the rise in adolescent smoking in California.

Intention to Quit Table 5-7 presents the responses of adolescents who have smoked in the last 30 days to the question, "Have you ever thought seriously about quitting?" Approximately 70 percent of adolescents who smoke have thought about quitting, but there have not been significant changes in this response across the three surveys. There were no significant differences across age groups or between male and female adolescents.

Access to Cigarettes Non-smoking adolescents were asked whether they thought it would be easy or hard to get cigarettes if they wanted to, and the results for the 1990, 1993, and 1996 surveys are presented in Table 5-8. The percentage of adolescents who thought that it would be easy to obtain cigarettes increased substantially with age, but there was no significant change in the perceived difficulty of obtaining cigarettes over the period 1990–1996 among non-smoking adolescents. The absence of a change in perceived difficulty of obtaining cigarettes between 1990 and 1996—a period during which a substantial improvement occurred in the refusal of adolescent attempts to purchase cigarettes—suggests two possible explanations. One possibility is that the restrictions on the availability of cigarettes to adolescents have not yet become extensive enough to actually reduce access of adolescents to cigarettes. The second possibility is that the perceived availability of cigarettes among non-smoking adolescents may be influenced by factors other than the actual availability of cigarettes.

COMPARISON OF CALIFORNIA WITH OTHER STATES USING CURRENT POPULATION SURVEY DATA The Current Population Survey (CPS) for 1992/1993 and 1995/1996 asked all individuals over the age of 15 years about their smoking behavior (those 15 years of age and older were not included in the January 1996 survey). These surveys can be used to compare the prevalence of smoking among 15- to 17-year-old adolescents in California to the rest of the nation. Table 5-9 presents the prevalence of smoking in California and the rest of the nation using the adult definition of smoking (has smoked at least 100 lifetime cigarettes and reports smoking all of the last 30 days or only some days). An additional category of those who have smoked at least 100 cigarettes, but who have not smoked in the last 30 days, is included to improve comparability with the adolescent definition tables. Adolescent current smoking prevalence was significantly lower in California than in the remaining states in both the 1992/1993 and 1995/1996 CPS. There are increases in adolescent smoking prevalence between 1992/1993 and 1995/1996 for both California adolescents and adolescents in the rest of the nation. The difference in the smoking prevalence of California and the rest of the nation is not statistically significant, since California's prevalence is proportionately similar to the prevalence of the rest of the nation. These data suggest that California remains below the rest of the nation in adolescent initiation, but that California has seen an increase in smoking initiation between 1992/1993 and 1995/1996 that is similar to that of the rest of the nation.

Table 5-6
Response of Adolescents who Have Never Smoked to the Question, "Would You Smoke if Your Best Friend Offered You a Cigarette?": 1990, 1993, 1996

	Definitely Yes		Probably Yes		Probably No		Definitely No		Unknown	
	(%)	CI	(%)	CI	(%)	CI	(%)	CI	(%)	CI
Total										
1990	0.18	0.16	0.86	0.36	12.05	1.81	86.87	1.86	0.04	0.05
1993	0.06	0.12	1.39	0.52	10.57	1.34	87.90	1.43	0.09	0.13
1996	0.20	0.16	2.16	0.50	18.74	1.06	78.65	1.18	0.25	0.15
Males										
1990	0.09	0.10	0.88	0.52	12.09	2.89	86.89	3.00	0.05	0.08
1993	.	.	1.62	0.96	11.76	1.92	86.44	1.98	0.19	0.27
1996	0.08	0.13	2.55	0.73	19.43	1.91	77.53	1.99	0.42	0.29
Females										
1990	0.26	0.30	0.85	0.56	12.00	2.62	86.86	2.64	0.04	0.07
1993	0.12	0.23	1.17	0.62	9.47	1.94	89.25	1.99	.	.
1996	0.32	0.29	1.76	0.64	18.02	1.49	79.82	1.71	0.08	0.11
Age in Years **12–13**										
1990	0.02	0.04	0.60	0.54	11.58	2.44	87.76	2.53	0.05	0.09
1993	0.14	0.27	1.31	1.00	11.32	1.74	87.17	1.93	0.06	0.10
1996	0.11	0.16	1.62	0.62	17.03	1.46	80.98	1.54	0.26	0.25
14–15										
1990	0.42	0.45	1.40	0.84	15.36	3.26	82.75	3.47	0.07	0.10
1993	.	.	1.54	0.85	11.80	2.42	86.46	2.33	0.19	0.38
1996	0.28	0.28	3.32	1.08	22.62	2.28	73.57	2.48	0.22	0.22
16–17										
1990	0.09	0.18	0.55	0.66	8.17	3.06	91.18	3.14	.	.
1993	.	.	1.30	1.15	7.39	2.37	91.31	2.90	.	.
1996	0.23	0.37	1.41	0.93	16.03	2.45	82.04	2.66	0.29	0.42

Note: CI = 95% confidence interval.
Source: 1990, 1993, 1996 California Tobacco Surveys, UCSD. Telephone interviews.

Table 5-7
Self-Reported Interest in Quitting among Adolescents who Have Smoked in the Last 30 Days: 1990, 1993, 1996

		Quitting Considered		Quitting Not Considered		Never Smoked Regularly		Unknown	
	Year	(%)	CI	(%)	CI	(%)	CI	(%)	CI
Overall	1990	68.56	5.62	13.13	4.06	18.00	4.41	0.31	0.39
	1993	72.66	4.83	13.53	3.25	13.50	3.99	0.31	0.61
	1996	70.47	3.10	12.99	2.76	16.32	2.72	0.21	0.29
Age in Years:									
12–13	1990	.	.	14.82	17.16	.	.	.	.
	1993	.	.	7.90	10.50	17.61	12.63	.	.
	1996	.	.	12.78	9.94	26.39	12.30	.	.
14–15	1990	64.14	10.04	12.30	6.27	22.69	8.51	0.87	1.30
	1993	71.85	9.38	11.02	5.36	17.12	8.03	.	.
	1996	67.09	5.84	16.36	6.08	16.55	5.12	.	.
16–17	1990	74.97	5.82	13.17	5.71	11.78	4.00	0.09	0.17
	1993	72.77	5.87	16.27	4.57	10.40	5.34	0.56	1.12
	1996	73.79	4.15	11.21	3.70	14.65	3.69	0.36	0.49

Note: CI = 95% confidence interval.
Source: 1990, 1993, 1996 California Tobacco Surveys, UCSD. Telephone interviews.

Table 5-8
Self-Reported Ease of Obtaining Cigarettes among Adolescents of Different Ages: 1990, 1993, 1996

Do You Think it would be Easy or Hard for You to Get Cigarettes if You Wanted Some?						
	Easy		Hard		Unknown	
Age Group	(%)	CI	(%)	CI	(%)	CI
12–13 Years						
1990	38.86	3.82	58.02	3.39	3.12	0.99
1993	37.08	3.25	58.93	3.15	3.99	1.27
1996	37.00	2.61	59.41	2.55	3.59	0.91
14–15 Years						
1990	65.28	3.80	32.87	3.76	1.85	0.90
1993	67.89	2.79	29.61	2.89	2.50	1.14
1996	67.11	2.69	30.53	2.70	2.36	0.84
16–17 Years						
1990	85.64	2.71	13.75	2.86	0.61	0.60
1993	84.96	3.29	12.55	2.77	2.49	1.93
1996	82.72	2.96	16.53	2.93	0.76	0.49

Note: CI = 95% confidence interval.
Source: 1990, 1993, 1996 California Tobacco Surveys, UCSD. Telephone interviews.

Table 5-9
Current Smoking Status among Respondents Ages 15 to 17 Years: 1992/1993 and 1995/1996 CPS: California Compared to the Rest of the Nation

Current Smoking Status	Years of Age	Smoked at Least 100 Lifetime Cigarettes: Number of Days Smoked in the Last 30 Days: All (%)	All CI	Some (%)	Some CI	None in the Last 30 Days (%)	None CI	Smoked <100 Cigarettes (%)	<100 CI
California									
1992/1993									
Total	15–17	4.43	1.60	1.40	0.91	1.85	1.04	92.32	2.07
Male	15–17	4.40	2.21	0.90	1.02	1.98	1.50	92.72	2.80
Female	15–17	4.47	2.31	1.94	1.54	1.71	1.45	91.88	3.05
Overall	15	2.65	2.17	0.71	1.13	0.59	1.03	96.06	2.63
Overall	16–17	5.31	2.12	1.74	1.24	2.47	1.47	90.49	2.78
1995/1996*									
Total	15–17	6.76	1.82	2.31	1.09	2.26	1.08	88.66	2.3
Male	15–17	8.9	2.88	1.75	1.32	1.87	1.37	87.48	3.35
Female	15–17	4.51	2.15	2.9	1.74	2.68	1.67	89.91	3.12
Overall	15	3.27	2.28	2.61	2.05	2.42	1.97	91.69	3.54
Overall	16–17	8.39	2.43	2.17	1.28	2.19	1.28	87.25	2.93
Nation Minus California									
1992/1993									
Total	15–17	7.07	0.60	2.33	0.35	1.89	0.32	88.70	0.74
Male	15–17	7.19	0.84	2.74	0.53	2.07	0.46	88.00	1.05
Female	15–17	6.95	0.85	1.91	0.46	1.70	0.43	89.44	1.02
Overall	15	4.03	0.79	1.60	0.50	1.49	0.48	92.88	1.03
Overall	16–17	8.62	0.80	2.70	0.46	2.09	0.41	86.58	0.97
1995/1996									
Total	15–17	8.23	0.62	3.46	0.41	1.99	0.31	86.33	0.77
Male	15–17	9.25	0.90	4.06	0.61	1.79	0.41	84.91	1.11
Female	15–17	7.12	0.83	2.80	0.53	2.20	0.47	87.88	1.06
Overall	15	4.63	0.81	2.78	0.63	1.28	0.43	91.30	1.08
Overall	16–17	10.08	0.83	3.81	0.53	2.35	0.42	83.76	1.02

Note: CI = 95% confidence interval.
**January, 1996 CPS did not include 15-year-olds.*

SUMMARY Cigarette smoking prevalence among adolescents in California is lower than that among the adolescents in the rest of the United States. However, it has increased between 1993 and 1996 and the extent of this increase in California is similar to that for the rest of the nation. The increase between 1993 and 1996 in California is largely among older adolescents and has occurred among each of the racial and ethnic groups, with the exception of African American adolescents. When examined by family income and level of school performance, the increase in adolescent smoking prevalence is predominantly among those groups with moderate to high family incomes and school performance—groups in which prior prevention efforts had been most successful. Analyses of the predictors of adolescent smoking initiation suggest that two of the principal changes were occurring between 1993 and 1996. One change was in adolescents' perception of the number of their friends and peers who smoke and the other was in the willingness of non-smoking adolescents to smoke if offered a cigarette by a close friend. These observations suggest that the effort to de-normalize smoking behavior among adolescents in California has not successfully altered their perceptions of the prevalence of smoking by adolescents or of the social acceptability of smoking among their peer group.

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Changing Social Norms to Decrease Adolescent Tobacco Use: Massachusetts, 1993–1996

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BACKGROUND AND OVERVIEW

The Massachusetts Tobacco Control Program (MTCP) was funded by a 25-cent cigarette tax increase in January of 1993. The program developed counter-tobacco media coverage in the summer of 1993 and began community programming early in 1994. By altering the social norms pertaining to tobacco use, the MTCP seeks to protect the residents of Massachusetts from environmental tobacco smoke, to assist smokers in successfully quitting their habit, and to reduce the rates of initiation and progression to habitual use of tobacco products among youths and younger adults. This chapter assesses the progress of the MTCP through 1997 by examining prevalence rates among adolescents in Massachusetts and changes in the direction and strength of factors associated with youth smoking. It will also compare smoking prevalence rates for Massachusetts to those of the nation as a whole.

Data are presented from four representative in-school surveys. Two were conducted within Massachusetts—the Massachusetts Prevalence Survey (MPS) of junior high and high school students (Briton *et al.*, 1997), and the Massachusetts Youth Risk Behavior Survey (MYRBS) of high school students (Massachusetts Department of Education, 1998). Selected items from two national surveys—the Monitoring the Future study (MTF), which follows 8th-, 10th-, and 12th-grade students (Johnston *et al.*, 1999), and the national Youth Risk Behavioral Survey (YRBS) of high school students (CDC, 1998)—are presented for comparison.

Information is presented on both lifetime and current[1] smoking, but only current smoking ("smoked at least once in the past 30 days") is defined in a consistent manner across all surveys and years. The MYRBS and YRBS define lifetime use as "ever smoked a cigarette, even one or two puffs," while the MTF defines it as "ever smoked cigarettes,"[2] and the MPS defines lifetime use as "ever smoked a whole cigarette" (U.S. DHHS, 1994).

This chapter examines changes among junior high as well as high school youths and, therefore, relies most heavily on the MPS. These data must be interpreted in the context of program intervention, as

1. Or *recent* in the YRBS and MYRBS.
2. Those who reported that they had tried cigarettes at least once or twice were classified as ever smokers.

Massachusetts youths in the 7th and 8th grades in 1996 would have had the benefit of 1 to 2 years' exposure to prevention programming prior to the average age (12.2 years) of smoking initiation (MPS, Briton *et al.*, 1997). In following with Worden *et al.* (1998), who detected a 50 percent reduction in smoking uptake among a cohort of middle school youths after 4 years of comprehensive tobacco control program exposure, we would expect to see preliminary evidence of the effectiveness of the MTCP in this younger group.

A series of analyses were conducted using MPS data to examine differences from 1993 to 1996 for males, females, individual grade, and for all grades combined (7 through 12) on current and lifetime smoking and specific correlates of smoking behavior—*i.e.*, peer influences (friends who smoke, friends who disapprove) and educational status (performance, plans after high school). Results were obtained by chi-square analyses using SPSS version 8.0 (SPSS, 1998).

TRENDS IN MASSACHUSETTS AND THE NATION PRIOR TO MTCP

The MTCP began at a time when tobacco use (cigarettes and smokeless tobacco) was increasing among youths both nationally and in Massachusetts (MTF—Johnston *et al.*, 1999; MPS—Briton *et al.*, 1997). Massachusetts evidenced this increase 2 to 4 years before it was apparent in the nation as a whole (1987–1990 as compared with 1991–1992, respectively)[3].

At MTCP baseline, the 1993 MPS (Briton *et al.*, 1997) assessed 5,321 public school students in grades 7 through 12 and found lifetime use of cigarettes among 9th through 12th graders (63.6 percent) to be virtually unchanged since 1990 (62.7 percent); however, lifetime use of smokeless tobacco significantly increased from 1990 (19.3 percent) to 1993 (24.6 percent). From 1990 to 1993, rates for current cigarette use across grades 9 through 12 increased from 29.2 percent to 33.6 percent; likewise, rates for current smokeless tobacco use increased from 6.4 percent to 9.3 percent‡. Alarmingly, the greatest increase in tobacco use from 1990 to 1993 occurred in the lower grades, with lifetime use of cigarettes for 7th and 8th graders increasing from 36.6 percent to 45.4 percent and current use almost doubling from 12.8 percent to 22.6 percent. For smokeless tobacco, lifetime use among 7th and 8th graders increased fourfold, from 4.1 percent to 16.4 percent, and current use increased threefold, from 1.7 percent to 5.7 percent.

3. Nationally, 12th graders reached their lowest levels on lifetime and current measures in 1992, as did 10th graders on lifetime use. Lifetime use among 8th graders and current use among 8th and 10th graders increased since the first recording in 1991. In Massachusetts, lowest levels of lifetime and current smoking among 7th, 9th, 10th, and 11th grade students were recorded in 1990, with 8th and 12th grade current rates lowest in 1987. There were similar increases in Massachusetts in smokeless rates, with lifetime use for all but the 11th grade at lowest levels in 1990, the first year asked of junior high school students. Lifetime use of smokeless tobacco in 11th grade and current use in grades 9 through 12 were lowest in 1987, the first year data were collected from high school students. Nationally, current rates for smokeless were lowest in 1993 for 8th grade and 12th grade, and 1996 for 10th grade.

‡ Data not shown.

Prior to 1993, junior high school youths had not been exposed to a comprehensive, coordinated anti-smoking media campaign or any school- or community-based prevention programs, but they both knew and liked Joe Camel (DiFranza *et al.*, 1991). It is probable that they could purchase their own cigarettes and could receive free samples from cigarette manufacturers at neighborhood events or through the mail. The brands they favored were heavily advertised in the magazines they read (King *et al.*, 1998) and many youths owned tobacco-branded merchandise (Biener *et al.*, 1994). Local provisions (ordinances and regulations) pertaining to youth access or reduction of environmental tobacco smoke had been passed in only a handful of cities and towns in Massachusetts, and there were few places where smoking was strictly prohibited. In 1994, close to half of all purchase attempts by underage youths resulted in illegal sales of tobacco products (Hamilton, 1998). Cigarettes were affordable, as the impact of the 1993 January tax increase was all but obliterated by the price reduction of premium brands by cigarette manufacturers in the months following the excise tax (Harris *et al.*, 1997). In 1993, not surprisingly, about one-third of youths surveyed reported that they would probably smoke in the next year—and they did.

TRENDS SINCE 1993 Increases in rates of smoking initiation and progression to regular use for those in lower grades (as documented by increased lifetime and current smoking rates for 1993) were reflected in the higher rates of current smoking by 9th and 10th grade youths in the 1995 MYRBS, and by 10th and 11th grade youths in the 1996 MPS (Table 6-1). Data from the 1996 MPS (Briton *et al.*, 1997) were collected from 6,844 public school students in grades 6[4] through 12 during November and December of 1996 and early January of 1997. Significant increases were found for current smoking among a combined sample of 10th, 11th, and 12th graders, from 33.3 percent in 1993 to 37.5 percent in 1996, $X^2(1) = 10.27$, $p < 0.002$. In contrast, there were significant decreases in current smoking for a combined sample of 7th, 8th, and 9th graders, from 26.4 percent in 1993 to 24.2 percent in 1996, $X^2(1) = 3.87$, $p = 0.04$. Students in a 7th, 8th, and 9th grade combined sample reported significantly lower lifetime cigarette use in 1996 (53.8 percent) than in 1993 (57.7 percent), $X^2(1) = 9.00$, $p < 0.003$. Likewise, lifetime rates decreased for boys [63 percent to 55.4 percent, $X^2(1) = 16.82$, $p < 0.001$] and for Hispanic youths [63 percent to 52 percent, $X^2(1) = 15.4$, $p < 0.001$] in this group. Current rates also declined among boys [28.1 percent to 21.6 percent, $X^2(1) = 16.0$, $p < 0.001$] and African American youths [27.1 percent to 16.1 percent, $X^2(1) = 23.48$, $p < 0.001$] in this combined sample.

Respondents in the overall sample (grades 7 through 12) who identified themselves as Asian/Pacific Islanders were significantly more likely to have ever smoked in 1996 than in 1993, while African American youths were

4. Sixth graders were first included in the MPS during the 1996 survey. Analyses comparing the results from the 1996 MPS to other MPS surveys focus on grades 7 through 12 only.

Table 6-1
Prevalence of Current[§] Tobacco Use among Massachusetts Youths by Grade, 1987–1999

Year:	1987	1990	1993	1993	1995	1996	1997	1999	1999
Survey:	MPS**	MPS**	MYRBS*	MPS**	MYRBS*	MPS**	MYRBS*	MYRBS*	MPS**
Grade									
6						18.1†††			N/A
7	11.6	7.5		18.5†		16.2†††			N/A
8	15.5	19.6		26.5††		26.0†††			N/A
9	32.0	24.9	28.9	34.5†††	32.3††	30.3†††	27.8	25.1	N/A
10	28.1	26.6	25.2	28.5	34.8†††	36.6†††	35.8†	29.2	N/A
11	34.9	31.6	31.0	33.1	37.7	38.9†††	35.5††	31.4	N/A
12	31.7	33.0	35.9	37.8	39.1	40.6†††	40.2†††	36.9†	N/A
13								N/A††	
14								N/A†††	
15									
16									

[§] *Current cigarette use defined as having smoked at least once in the past month.*
Surveys: MPS—Massachusetts Prelavence Survey conducted by Health & Addictions Research, Inc.; MYRBS—Massachusetts Youth Risk Behavior Survey conducted by the Department of Education.
** Data Collected in November, December, January (NDJ).*
*** Data Collected in April, May, June (AMJ).*
*Cohort progression (*e.g.*, using data from MPS):*
Seventh†, 8th††, 9th††† grades at MTCP baseline in NDJ of 1993; advance to 10th†, 11th††, 12th††† grades in NDJ of 1996.
N/A: Data not assessed.

significantly less likely to have smoked in the past 30 days in 1996 than in 1993 (Table 6-2). Tables 6-3 and 6-4 present changes in cigarette use from 1993 to 1996 for females and males, respectively. There were significant increases in current cigarette use for males in grade 12; however, there were declines in overall male and White male lifetime use, with 7th grade males significantly less likely to smoke (lifetime and current) in 1996 than in 1993 (Table 6-4). All grades experienced declines from 1993 to 1996 on lifetime and current use of smokeless tobacco and, with the exception of 10th grade (lifetime), 11th grade (current), and 12th grade youths, these declines were significant[‡].

The 1993 MYRBS (Massachusetts Department of Education, 1998) reported lifetime and current rates of cigarette use among public school students in grades 9 through 12 as 67.8 percent and 30.2 percent, respectively[‡]. Differences between current prevalence rates reported in the MYRBS and MPS for the same calendar year (*e.g.*, 1993) might be a function of sampling error or of the timing for data collection. Specifically, the MYRBS is administered in April, May, and early June, whereas the MPS is conducted in November, December, and early January.

[‡] Data not shown.

Table 6-2
Lifetime and Current Smoking Prevalence of Adolescents by Sex, Grade, Race/Ethnicity*, Educational Performance, Friends who Smoke, Friends who Disapprove of Smoking, and Plans after High School—Massachusetts, 1993, 1996

	Lifetime Use						
	1993				1996		
	%	(n)	95% CI		%	(n)	95% CI
Sex							
Female	62.0	(1,713)	± 1.8		63.1	(1,837)	± 1.8
Male	66.6	(1,679)	± 1.9	**	62.2	(1,799)	± 1.8
Grade Level							
7th	45.9	(439)	± 3.2		41.1	(412)	± 3.1
8th	60.1	(608)	± 3.0		58.5	(546)	± 3.2
9th	67.6	(617)	± 3.1		62.0	(635)	± 3.0
10th	67.8	(563)	± 3.2		70.6	(751)	± 2.7
11th	71.8	(548)	± 3.2		70.3	(633)	± 3.0
12th	75.1	(632)	± 2.9		74.9	(659)	± 2.9
Race/Ethnicity*							
White	64.4	(1,694)	± 1.8		62.4	(1,719)	± 1.8
Hispanic	64.2	(652)	± 3.0		61.6	(754)	± 2.7
African American	68.1	(856)	± 2.6		66.8	(887)	± 2.6
Asian/P.I.	44.3	(132)	± 5.7	**	58.2	(174)	± 5.6
Native American	70.6	(48)	±11.1		64.6	(53)	±10.6
Educational Performance†							
Above average	53.5	(1,527)	± 1.8		50.1	(1,574)	± 1.8
Average	75.2	(1,469)	± 1.9		75.9	(1,594)	± 1.8
Below average	82.1	(389)	± 3.5		84.1	(455)	± 3.1
Friends Who Smoke							
None	32.3	(352)	± 2.8	**	25.4	(301)	± 2.5
Few	60.2	(1,258)	± 2.1		57.9	(1,300)	± 2.0
Many	79.6	(1,055)	± 2.2		82.5	(1,127)	± 2.0
All	92.7	(719)	± 1.8		93.8	(877)	± 1.6
Friends Who Disapprove							
None	77.5	(478)	± 3.3		76.1	(472)	± 3.4
Few	76.7	(1,961)	± 1.6		78.9	(2,137)	± 1.5
Many	56.4	(610)	± 3.0		53.2	(709)	± 2.7
All	32.4	(329)	± 2.9	**	26.6	(285)	± 2.7
Plans after High School							
Go to work	79.1	(276)	± 4.3		80.2	(364)	± 3.7
Armed Forces	80.2	(162)	± 5.6		72.4	(268)	± 4.6
College	61.1	(2,634)	± 1.5		59.3	(2,618)	± 1.5
Other/Unsure	73.7	(323)	± 4.2		68.0	(376)	± 3.9
Totals	***64.0***	***(3,408)***	***± 1.3***		***62.5***	***(3,636)***	***± 1.3***

Table 6-2 (continued)

	Current Use						
	1993				1996		
	%	(n)	95% CI		%	(n)	95% CI
Sex							
Female	30.1	(830)	± 1.7		32.3	(936)	± 1.7
Male	28.9	(727)	± 1.8		29.1	(836)	± 1.7
Grade Level							
7th	18.5	(177)	± 2.5		16.2	(162)	± 2.3
8th	26.5	(267)	± 2.7		26.0	(240)	± 2.8
9th	34.5	(314)	± 3.1		30.4	(309)	± 2.8
10th	28.9	(240)	± 3.1		33.7	(356)	± 2.9
11th	33.0	(252)	± 3.3		38.9	(348)	± 3.2
12th	37.7	(317)	± 3.3		40.7	(357)	± 3.3
Race/Ethnicity*							
White	31.5	(828)	± 1.8		32.7	(897)	± 1.8
Hispanic	26.1	(264)	± 2.7		26.5	(323)	± 2.5
African American	22.2	(276)	± 2.3	**	17.7	(230)	± 2.1
Asian/P.I.	13.1	(39)	± 3.9		20.1	(60)	± 4.6
Native American	34.3	(23)	±11.6		48.1	(39)	±11.1
Educational Performance†							
Above average	20.3	(578)	± 1.5		20.0	(626)	± 1.4
Average	37.2	(726)	± 2.2		41.0	(857)	± 2.1
Below average	54.4	(254)	± 4.5		53.5	(284)	± 4.3
Friends Who Smoke							
None	2.3	(25)	± 0.9		1.4	(16)	± 0.7
Few	18.7	(391)	± 1.7		17.1	(382)	± 1.6
Many	44.6	(589)	± 2.7	**	50.5	(690)	± 2.7
All	71.3	(552)	± 3.2		73.2	(679)	± 2.9
Friends Who Disapprove							
None	52.2	(322)	± 4.0		51.4	(314)	± 4.0
Few	39.7	(1,012)	± 1.9	**	45.7	(1,233)	± 1.9
Many	15.4	(166)	± 2.2		14.3	(190)	± 1.9
All	5.2	(53)	± 1.4	**	2.2	(24)	± 0.9
Plans after High School							
Go to work	46.8	(162)	± 5.3	**	58.4	(261)	± 4.6
Armed Forces	47.5	(96)	± 7.0		40.2	(147)	± 5.0
College	25.8	(1,110)	± 1.3		26.1	(1,149)	± 1.3
Other/Unsure	43.9	(191)	± 4.7		38.3	(210)	± 4.1
Total	***29.5***	***(1,568)***	***± 1.2***		***30.5***	***(1,772)***	***± 1.2***

** Analyses involving race/ethnicity were weighted to control for area as a possible confounding variable, due to the fact that a large proportion of minority students in Massachusetts live in urban areas. Area weights (based on population and student response per area stratum) were applied to all other analyses, so that the sample would be representative of the state population and inferences could be drawn for students on a statewide level.*

*** Indicates significant difference from 1993 to 1996 for the variable of interest at $p < 0.05$.*

† Students reporting usual grades of As, As and Bs, or Bs were categorized as above average; Bs and Cs or Cs were categorized as average; Cs and Ds, Ds, or Ds and Fs were categorized as below average.

Table 6-3
Lifetime and Current Smoking Prevalence of Female Adolescents by Grade, Race/Ethnicity,* Educational Performance, Friends who Smoke, Friends who Disapprove of Smoking, and Plans after High School—Massachusetts, 1993, 1996

	Lifetime Use						
	1993				1996		
	%	(n)	95% CI		%	(n)	95% CI
Grade Level							
7th	39.3	(194)	± 4.3		38.4	(186)	± 4.4
8th	54.2	(280)	± 4.3		55.9	(243)	± 4.7
9th	65.4	(315)	± 4.3		61.4	(341)	± 4.1
10th	69.7	(295)	± 4.4		74.7	(375)	± 3.8
11th	71.6	(293)	± 4.4		71.4	(339)	± 4.1
12th	76.6	(334)	± 4.0		76.6	(353)	± 3.9
Race/Ethnicity*							
White	60.8	(833)	± 2.6		62.6	(869)	± 2.6
Hispanic	67.9	(368)	± 4.0		64.3	(405)	± 3.8
African American	74.3	(485)	± 3.4		70.5	(435)	± 3.7
Asian/P.I.	38.2	(63)	± 7.5		49.0	(77)	± 7.9
Native American	85.7	(18)	±15.7		81.8	(27)	±14.2
Educational Performance†							
Above average	50.8	(841)	± 2.4		50.8	(885)	± 2.4
Average	78.0	(712)	± 2.7		79.4	(742)	± 2.6
Below average	87.6	(149)	± 5.0		90.3	(205)	± 4.0
Friends Who Smoke							
None	30.1	(179)	± 3.7		23.5	(136)	± 3.5
Few	58.1	(609)	± 3.0		57.0	(617)	± 3.0
Many	76.4	(511)	± 3.2	**	83.0	(571)	± 2.8
All	92.4	(400)	± 2.5		93.9	(504)	± 2.1
Friends Who Disapprove							
None	76.4	(197)	± 5.2		81.7	(214)	± 4.8
Few	75.1	(1,036)	± 2.3	**	79.8	(1,103)	± 2.1
Many	57.5	(310)	± 4.2		54.8	(381)	± 3.7
All	27.4	(154)	± 3.7		23.3	(127)	± 3.6
Plans after High School							
Go to work	78.1	(100)	± 7.3		86.0	(172)	± 4.9
Armed Forces	79.1	(34)	±12.7		78.0	(92)	± 7.6
College	59.1	(1,403)	± 2.0		59.2	(1,404)	± 2.0
Other/Unsure	80.2	(170)	± 5.4		74.8	(163)	± 5.8
Total	***62.0***	***(1713)***	***± 1.8***		***63.1***	***(1837)***	***± 1.8***

Table 6-3 (continued)

	Current Use					
	1993			1996		
	%	(n)	95% CI	%	(n)	95% CI
Grade Level						
7th	14.2	(70)	± 3.1	19.0	(91)	± 3.5
8th	25.5	(132)	± 3.8	27.5	(120)	± 4.2
9th	34.8	(167)	± 4.3	33.0	(182)	± 4.0
10th	32.2	(136)	± 4.5	35.2	(176)	± 4.2
11th	35.9	(147)	± 4.7	42.0	(198)	± 4.5
12th	40.9	(178)	± 4.6	36.5	(168)	± 4.4
Race/Ethnicity*						
White	32.3	(442)	± 2.5	34.2	(474)	± 2.5
Hispanic	27.5	(148)	± 3.8	29.0	(181)	± 3.6
African American	22.3	(144)	± 3.2	18.4	(110)	± 3.1
Asian/P.I.	10.8	(18)	± 4.8	17.1	(27)	± 6.0
Native American	28.6	(6)	±21.3	54.5	(18)	±17.9
Educational Performance†						
Above average	20.8	(344)	± 2.0	20.8	(362)	± 1.9
Average	41.9	(382)	± 3.2	46.5	(434)	± 3.2
Below average	59.8	(101)	± 7.5	62.9	(139)	± 6.5
Friends Who Smoke						
None	1.3	(8)	± 1.0	1.4	(8)	± 1.0
Few	19.9	(208)	± 2.4	16.8	(181)	± 2.2
Many	43.9	(294)	± 3.8	51.1	(354)	± 3.8
All	72.5	(313)	± 4.2	73.4	(390)	± 3.8
Friends Who Disapprove						
None	54.3	(140)	± 6.1	58.8	(151)	± 6.1
Few	42.0	(579)	± 2.6 **	48.0	(662)	± 2.6
Many	15.5	(83)	± 3.1	14.2	(99)	± 2.6
All	3.4	(19)	± 1.5	2.8	(15)	± 1.4
Plans after High School						
Go to work	38.3	(49)	± 8.6 **	63.9	(124)	± 6.8
Armed Forces	39.5	(17)	±15.3	44.4	(52)	± 9.1
College	27.3	(647)	± 1.8	27.8	(657)	± 1.8
Other/Unsure	54.0	(114)	± 6.8	45.4	(99)	± 6.7
Total	***30.1***	***(830)***	***± 1.7***	***32.3***	***(936)***	***± 1.7***

** Analyses involving race/ethnicity were weighted to control for area as a possible confounding variable, due to the fact that a large proportion of minority students in Massachusetts live in urban areas. Area weights (based on population and student response per area stratum) were applied to all other analyses, so that the sample would be representative of the state population and inferences could be drawn for students on a statewide level.*

*** Indicates significant difference from 1993 to 1996 for the variable of interest at $p < 0.05$.*

† Students reporting usual grades of As, As and Bs, or Bs were categorized as above average; Bs and Cs or Cs were categorized as average; Cs and Ds, Ds, or Ds and Fs were categorized as below average.

Table 6-4
Lifetime and Current Smoking Prevalence of Male Adolescents by Grade, Race/Ethnicity, Educational Performance, Friends who Smoke, Friends who Disapprove of Smoking, and Plans after High School—Massachusetts, 1993, 1996

	Lifetime Use						
	1993				1996		
	%	(n)	95% CI		%	(n)	95% CI
Grade Level							
7th	52.9	(241)	± 4.3	**	43.5	(226)	± 4.3
8th	66.5	(327)	± 4.2		60.8	(303)	± 4.4
9th	69.6	(295)	± 4.4		62.7	(294)	± 4.4
10th	67.1	(267)	± 4.6		67.0	(376)	± 3.9
11th	71.9	(253)	± 4.7		69.1	(293)	± 4.4
12th	74.1	(295)	± 4.3		73.0	(306)	± 4.3
Race/Ethnicity*							
White	68.6	(857)	± 2.6	**	62.2	(850)	± 2.6
Hispanic	59.2	(273)	± 4.5		58.8	(349)	± 4.0
African American	61.6	(361)	± 4.0		63.6	(452)	± 3.6
Asian/P.I.	52.3	(69)	± 8.7		68.5	(98)	± 7.8
Native American	63.0	(29)	±14.4		53.1	(26)	±14.5
Educational Performance†							
Above average	57.9	(683)	± 2.8	**	49.2	(689)	± 2.6
Average	72.9	(754)	± 2.7		73.2	(852)	± 2.6
Below average	78.9	(232)	± 4.8		79.6	(250)	± 4.4
Friends Who Smoke							
None	35.5	(172)	± 4.3	**	27.3	(165)	± 3.6
Few	62.9	(647)	± 3.0		58.7	(683)	± 2.8
Many	82.9	(539)	± 2.9		82.0	(556)	± 2.9
All	93.1	(311)	± 2.7		93.7	(373)	± 2.4
Friends Who Disapprove							
None	79.3	(279)	± 4.3		72.1	(258)	± 4.7
Few	78.6	(912)	± 2.4		77.9	(1,034)	± 2.2
Many	55.7	(299)	± 4.2		51.4	(328)	± 3.9
All	39.3	(175)	± 4.6	**	30.2	(159)	± 4.0
Plans after High School							
Go to work	80.1	(173)	± 5.4		75.6	(192)	± 5.3
Armed Forces	80.6	(129)	± 6.2		70.0	(177)	± 5.7
College	63.8	(1,220)	± 2.2	**	59.5	(1,214)	± 2.1
Other/Unsure	67.7	(151)	± 6.2		63.6	(213)	± 5.2
Total	***66.6***	***(1,679)***	***± 1.9***	*****	***62.2***	***(1,799)***	***± 1.8***

Table 6-4 (continued)

	Current Use						
	1993				1996		
	%	(n)	95% CI		%	(n)	95% CI
Grade Level							
7th	22.7	(103)	± 3.9	**	13.7	(71)	± 3.0
8th	27.7	(135)	± 4.0		24.7	(121)	± 3.8
9th	34.0	(144)	± 4.5		27.2	(127)	± 4.1
10th	26.1	(104)	± 4.3		32.1	(179)	± 3.9
11th	29.3	(103)	± 4.8		35.4	(150)	± 4.6
12th	34.5	(137)	± 4.7	**	45.1	(188)	± 4.8
Race/Ethnicity*							
White	30.7	(383)	± 2.6		31.1	(423)	± 2.5
Hispanic	24.6	(113)	± 4.0		24.0	(142)	± 3.5
African American	21.6	(125)	± 3.4		17.1	(120)	± 2.8
Asian/P.I.	16.2	(21)	± 6.4		23.4	(33)	± 7.1
Native American	36.2	(17)	±14.4		43.8	(21)	±14.4
Educational Performance†							
Above average	19.5	(230)	± 2.3		19.0	(265)	± 2.1
Average	33.3	(344)	± 2.9		36.6	(423)	± 2.8
Below average	50.7	(146)	± 5.8		46.8	(145)	± 5.6
Friends Who Smoke							
None	3.3	(16)	± 1.6		1.3	(8)	± 0.9
Few	17.6	(181)	± 2.3		17.4	(201)	± 2.2
Many	44.9	(290)	± 3.9		49.9	(337)	± 3.8
All	70.1	(234)	± 4.9		72.9	(288)	± 4.4
Friends Who Disapprove							
None	51.4	(181)	± 5.3		45.9	(163)	± 5.2
Few	36.5	(422)	± 2.8	**	43.3	(571)	± 2.7
Many	15.3	(82)	± 3.1		14.3	(91)	± 2.7
All	7.7	(34)	± 2.5	**	1.7	(9)	± 1.1
Plans after High School							
Go to work	51.6	(110)	± 6.8		54.4	(137)	± 6.2
Armed Forces	49.4	(79)	± 7.9		38.2	(95)	± 6.1
College	24.0	(457)	± 1.9		24.2	(493)	± 1.9
Other/Unsure	33.9	(75)	± 6.3		33.5	(111)	± 5.1
Total	***28.9***	***(727)***	***± 1.8***		***29.1***	***(836)***	***± 1.7***

** Analyses involving race/ethnicity were weighted to control for area as a possible confounding variable, due to the fact that a large proportion of minority students in Massachusetts live in urban areas. Area weights (based on population and student response per area stratum) were applied to all other analyses, so that the sample would be representative of the state population and inferences could be drawn for students on a statewide level.*

*** Indicates significant difference from 1993 to 1996 for the variable of interest at $p < 0.05$.*

† Students reporting usual grades of As, As and Bs, or Bs were categorized as above average; Bs and Cs or Cs were categorized as average; Cs and Ds, Ds, or Ds and Fs were categorized as below average.

From 1993 to 1995, MYRBS (Massachusetts Department of Education, 1998) rates for lifetime cigarette use among high school students increased from 67.8 percent to 71.5 percent, while current use increased from 30.2 percent to 35.7 percent. Daily smoking rates increased from 11.9 percent to 14.6 percent. Current smokeless tobacco use in Massachusetts decreased by over 10 percent, from 9.4 percent to 8.4 percent. However, from 1995 to 1997, daily smoking among high school students remained flat at 14.5 percent, while current-month smoking decreased somewhat to 34.4 percent and current smokeless tobacco use continued to decline sharply to 6.0 percent. Lifetime smoking remained flat at 69.1 percent‡.

The national YRBS (CDC, 1998), administered biannually, has reported flat rates for lifetime smoking since 1991 (70.1 percent, 69.5 percent, 71.3 percent, 70.2 percent)(CDC, 1992), while current smoking rates continue to rise (27.5 percent, 30.5 percent, 34.8 percent, 36.4 percent). Nationally, current smokeless rates (10.5 percent, 11.5 percent, 11.4 percent, 9.3 percent) have declined at about half the rate experienced in Massachusetts from 1995 to 1997‡.

During the period between 1995 and 1997, declines in smoking were evidenced in high school students overall, but the greatest declines were among the 9th graders—the first high school class to have had the benefit of sustained MTCP activity prior to their initiation of tobacco use. The increases observed among 9th graders from 1993 to 1995 in lifetime (64.4 percent to 68.9 percent), past month (28.9 percent to 32.3 percent), and daily (8.1 percent to 11.8 percent) smoking were reversed in 1997, with lifetime and past-month cigarette use declining to pre-1993 levels (62.3 percent and 27.8 percent, respectively) and daily use easing slightly to 10.4 percent. Smokeless tobacco use continued to decline in 9th graders from 1993 to 1997 (10.3 percent to 5.7 percent)‡ (MYRBS, Massachusetts Department of Education, 1998).

To summarize, prior to MTCP inception in 1993, overall trends for Massachusetts paralleled that of the nation, although Massachusetts' cigarette rates were higher, and smokeless rates were lower, than the rest of the country[5]. Since 1993, however, there has been some divergence in these trends. Specifically, there have been significant declines in cigarette rates among junior high school students. Similarly, smokeless tobacco rates have declined among junior high and high school students in all grades—9th (current and lifetime), 10th (current), and 11th (lifetime) (MPS, Briton *et al.*, 1997). High school rates have remained level since 1995, yet declines in

5. The 1993 MYRBS (administered prior to MTCP) indicated that 12th-grade students' reported rate of current cigarette use was 20 percent higher than those reported for the country as a whole by MTF, a national survey of over 50,000 students (35.9 percent and 29.9 percent, respectively). MTF reported a national current smokeless tobacco rate of 10.4 percent for 10th graders and 11.1 percent for 12th graders. In Massachusetts, 10th and 12th graders reported current smokeless tobacco use of 8.1 percent and 8.8 percent, respectively.

‡ Data not shown.

smoking among 9th graders from 1995 to 1997, although nonsignificant, have returned the rates to pre-1993 levels (MYRBS—Massachusetts Department of Education, 1998). In contrast, the nation as a whole experienced increases in high school (CDC, 1995 & 1998; Kann, 1996) and 8th grade (Johnston *et al.*, 1999) use during this same period.

CHANGES IN CORRELATES OF SMOKING: 1993–1996

The MPS in 1993 and 1996 contained items that have been associated with smoking prevalence—friends who smoke, friends who disapprove of smoking, educational performance, and plans after high school. It is plausible that friends' disapproval and the proportion of friends who smoke would be impacted by a program that seeks to de-normalize tobacco use. We would not expect educational performance or post-high-school plans to be affected by program exposure, although they are correlated with tobacco use and could alter program effectiveness. Findings revealed significant differences from 1993 to 1996 in overall proportions of those responding on friends who disapprove and plans after high school; in females on friends who smoke, friends who disapprove, educational performance, and plans after high school; and in males on plans after high school (Table 6-5). Within-grade analyses reveal significant differences for 8th, 9th, 11th,and 12th grades on friends who smoke, for 8th and 9th grades (marginally suggestive of change for 7th grade, $p = 0.057$) on friends who disapprove, for 9th grade on educational performance, and for all but 10th grade on plans after high school (Table 6-6).

Changes Associated with Gender

In 1996, girls were less likely to say that none, a few, or many of their friends smoke and more likely to say that all of their friends smoke than in 1993. Increases were observed overall and for girls reporting that many of their friends disapprove, with slight declines for those reporting that none, few, or all friends disapprove. Also, there were increases in the proportion of girls reporting below-average grades. Finally, increases were observed for both boys and girls across the same time period on plans to go to work and join the armed forces after high school, as were decreases in plans to attend college. For boys, there were also increases in the percentage that were unsure of post-high-school plans, or had other plans (Table 6-5).

Changes Associated with Grade Level

Patterns were consistent for all grades that showed significant changes on plans after high school: those expecting to go to college decreased, those going into the armed forces increased, and (with the exception of the 7th and 12th graders) those going to work increased. These changes should be associated with increased smoking from 1993 to 1996. For educational performance, the proportion of 9th grade students reporting above-average grades increased, while those reporting average grades decreased. No changes were observed for those reporting below-average grades. It is unclear how these changes in educational performance may affect smoking behavior, although doing poorly in school has generally been associated with increased smoking behavior (Table 6-6).

Table 6-5
Friends who Smoke, Friends who Disapprove of Smoking, Educational Performance and Plans after High School, Overall and by Gender for 1993–1996

	Overall		Females		Males	
	%	(n)	%	(n)	%	(n)
Friends who Smoke			*			
1993						
None	21	1,091	22	595	19	485
Few	40	2,088	38	1,049	41	1,029
Many	25	1,327	24	670	26	650
All	15	776	16	434	13	334
Total	*100*	*5,282*	*100*	*2,748*	*100*	*2,498*
1996						
None	21	1,188	20	581	21	607
Few	39	2,246	37	1,083	41	1,163
Many	24	1,371	24	693	24	678
All	16	935	19	537	14	398
Total	*100*	*5,740*	*100*	*2,894*	*100*	*2,846*
Friends who Disapprove of Smoking	**		**			
1993						
None	12	617	9	259	14	352
Few	49	2,559	50	1,380	47	1,161
Many	21	1,081	20	539	22	537
All	19	1,014	21	563	18	445
Total	*100*	*5,271*	*100*	*2,741*	*100*	*2,495*
1996						
None	11	622	9	263	13	358
Few	47	2,714	48	1,386	47	1,328
Many	23	1,333	24	696	22	638
All	19	1,073	19	547	19	526
Total	*100*	*5,742*	*100*	*2,892*	*100*	*2,850*
Educational Performance†			*			
1993						
Below Average	9	474	6	170	12	293
Average	37	1,955	33	913	41	1,034
Above Average	54	2,853	61	1,656	47	1,179
Total	*100*	*5,282*	*100*	*2,739*	*100*	*2,506*
1996						
Below Average	9	544	8	229	11	315
Average	36	2,105	32	940	40	1,165
Above Average	54	3,148	60	1,746	49	1,401
Total	*100*	*5,797*	*100*	*2,915*	*100*	*2,881*

Table 6-5 (continued)

	Overall		Females		Males	
	%	(n)	%	(n)	%	(n)
Plans after High School	***		***		***	
1993						
Go to work	7	350	5	128	9	216
Armed forces	4	203	2	43	6	160
College	81	4,313	86	2,374	76	1,911
Other/unsure	8	438	8	211	9	224
Total	*100*	*5,304*	*100*	*2,756*	*100*	*2,511*
1996						
Go to work	8	454	7	199	9	255
Armed forces	6	371	4	118	9	252
College	76	4,424	82	2,379	71	2,045
Other/unsure	10	553	8	219	12	334
Total	*100*	*5,802*	*100*	*2,915*	*100*	*2,886*

** Indicates significance for 1993 to 1996 at p < 0.05.*
*** Indicates significance for 1993 to 1996 at p < 0.01.*
**** Indicated significance for 1993 to 1996 at p < 0.001.*
† Students reporting usual grades of As, As and Bs, or Bs were categorized as above average; Bs and Cs or Cs were categorized as average; Cs and Ds, Ds, or Ds and Fs were categorized as below average.

Table 6-6

Friends who Smoke, Friends who Disapprove of Smoking, Educational Performance and Plans after High School by Grade in School for 1993–1996

	Grade Level						
	7th	8th	9th	10th	11th	12th	Total
	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
Friends who Smoke		**	*		**	***	
1993							
None	43.3 (413)	19.9 (200)	14.1 (127)	15.7 (130)	14.2 (107)	13.6 (114)	20.7 (1,091)
Few	37.6 (358)	41.6 (419)	38.2 (344)	39.1 (323)	36.4 (275)	43.9 (369)	39.5 (2,088)
Many	11.6 (111)	26.7 (269)	28.2 (254)	25.0 (207)	32.2 (243)	28.9 (243)	25.1 (1,327)
All	7.5 (71)	11.8 (119)	19.4 (175)	20.2 (167)	17.2 (130)	13.6 (114)	14.7 (776)
Total	*100.0 (953)*	*100.0 (1,007)*	*100.0 (900)*	*100.0 (827)*	*100.0 (755)*	*100.0 (840)*	*100.0 (5,282)*
1996							
None	43.0 (419)	25.1 (231)	18.1 (185)	15.0 (158)	14.2 (127)	7.8 (68)	20.7 (1,188)
Few	36.3 (354)	42.3 (390)	40.6 (414)	40.9 (431)	33.1 (297)	41.2 (360)	39.1 (2,246)
Many	14.2 (138)	19.8 (183)	24.8 (253)	25.1 (264)	28.0 (251)	32.2 (281)	23.9 (1,370)
All	6.5 (63)	12.8 (118)	16.5 (168)	19.0 (200)	24.7 (222)	18.8 (164)	16.3 (935)
Total	*100.0 (974)*	*100.0 (922)*	*100.0 (1,020)*	*100.0 (1,053)*	*100.0 (897)*	*100.0 (873)*	*100.0 (5,739)*
Friends who Disapprove of Smoking		**	**				**
1993							
None	13.9 (132)	11.8 (118)	11.3 (102)	11.0 (91)	11.5 (87)	10.4 (87)	11.7 (617)
Few	27.1 (257)	47.4 (475)	55.9 (504)	54.1 (447)	53.4 (404)	56.5 (472)	48.5 (2,559)
Many	19.8 (188)	22.0 (221)	18.5 (167)	20.4 (169)	20.5 (155)	21.8 (182)	20.4 (1,082)
All	39.2 (372)	18.8 (189)	14.3 (129)	14.5 (120)	14.6 (110)	11.3 (94)	19.2 (1,014)
Total	*100.0 (949)*	*100.0 (1,003)*	*100.0 (902)*	*100.0 (827)*	*100.0 (756)*	*100.0 (835)*	*100.0 (5,272)*
1996							
None	10.0 (98)	12.1 (112)	11.2 (114)	11.5 (121)	10.2 (91)	9.7 (84)	10.8 (620)
Few	28.9 (283)	39.7 (367)	49.0 (498)	53.3 (563)	56.4 (505)	57.3 (498)	47.3 (2,714)
Many	21.6 (212)	25.6 (237)	24.0 (244)	22.4 (237)	22.1 (198)	23.7 (206)	23.2 (1,334)
All	39.5 (387)	22.5 (208)	15.8 (161)	12.8 (135)	11.4 (102)	9.3 (81)	18.7 (1,074)
Total	*100.0 (980)*	*100.0 (924)*	*100.0 (1,017)*	*100.0 (1,056)*	*100.0 (896)*	*100.0 (869)*	*100.0 (5,742)*

Table 6-6 (continued)

	Grade Level						Total
	7th	8th	9th	10th	11th	12th	
	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	
Educational Performance†	***						
1993							
Below Average	6.3 (59)	9.8 (99)	11.3 (103)	10.3 (85)	10.6 (80)	5.7 (48)	9.0 (474)
Average	25.9 (244)	27.3 (275)	46.0 (419)	38.2 (317)	42.9 (324)	44.8 (375)	37.0 (1,954)
Above Average	67.8 (638)	62.9 (634)	42.6 (388)	51.5 (427)	46.5 (351)	49.5 (414)	54.0 (2,852)
Total	*100.0 (941)*	*100.0 (1,008)*	*100.0 (910)*	*100.0 (829)*	*100.0 (755)*	*100.0 (837)*	*100.0 (5,280)*
1996							
Below Average	7.1 (71)	10.3 (96)	11.2 (115)	11.1 (118)	8.3 (74)	7.8 (69)	9.4 (543)
Average	26.6 (266)	30.2 (282)	33.2 (340)	42.1 (447)	41.3 (370)	45.6 (401)	36.3 (2,106)
Above Average	66.3 (664)	59.5 (556)	55.6 (570)	46.8 (498)	50.4 (451)	46.5 (409)	54.3 (3,148)
Total	*100.0 (1,001)*	*100.0 (934)*	*100.0 (1,025)*	*100.0 (1,063)*	*100.0 (895)*	*100.0 (879)*	*100.0 (5,797)*
Plans after High School	***	***	*	***	*	***	
1993							
Go to work	8.1 (77)	5.7 (58)	7.6 (69)	5.7 (47)	5.4 (41)	7.0 (59)	6.6 (351)
Armed forces	2.9 (28)	5.0 (51)	3.5 (32)	4.9 (41)	2.4 (18)	4.0 (34)	3.8 (204)
College	82.3 (784)	80.7 (817)	79.5 (725)	80.5 (668)	81.7 (618)	83.2 (701)	81.3 (4,313)
Other/unsure	6.7 (64)	8.6 (87)	9.4 (86)	8.9 (74)	10.4 (79)	5.8 (49)	8.3 (439)
Total	*100.0 (953)*	*100.0 (1,013)*	*100.0 (912)*	*100.0 (830)*	*100.0 (756)*	*100.0 (843)*	*100.0 (5,307)*
1996							
Go to work	6.5 (65)	7.8 (73)	10.7 (110)	6.3 (67)	9.4 (84)	6.4 (56)	7.8 (455)
Armed forces	8.2 (82)	9.2 (86)	5.0 (51)	6.5 (69)	4.6 (41)	4.8 (42)	6.4 (371)
College	75.6 (758)	73.9 (691)	73.8 (757)	76.1 (809)	79.1 (710)	79.6 (698)	76.2 (4,423)
Other/unsure	9.8 (98)	9.1 (85)	10.5 (108)	11.1 (118)	7.0 (63)	9.2 (81)	9.5 (553)
Total	*100.0 (1,003)*	*100.0 (935)*	*100.0 (1,026)*	*100.0 (1,063)*	*100.0 (898)*	*100.0 (877)*	*100.0 (5,802)*

* Indicates significance for 1993 to 1996 at $p < 0.05$

** Indicates significance for 1993 to 1996 at $p < 0.01$

*** Indicated significance for 1993 to 1996 at $p < 0.001$

† Students reporting usual grades of As, As and Bs, or Bs were categorized as above average; Bs and Cs or Cs were categorized as average; Cs and Ds, Ds, or Ds and Fs were categorized as below average.

While there was no change in overall proportion with friends who smoke, 8th and 9th graders were more likely to increase in the frequency of reporting that none of their friends smoked. Similarly, for lower grades, the proportion reporting that all of their friends disapproved increased over time. While nonsignificant, the direction was reversed for 11th and 12th grades. These changes should produce declines in smoking from 1993 to 1996 among lower grades (Table 6-6).

CHANGES IN LIFETIME AND CURRENT SMOKING ASSOCIATED WITH CORRELATES

Results of analyses conducted to detect changes in lifetime and current smoking (overall, females, males) by friends who smoke, friends who disapprove, educational performance, and post high school plans can be examined in Tables 6-2 through 6-4. Changes from 1993 to 1996 for both lifetime and current smoking are associated with differing levels of these variables.

Correlates Associated with Decreases in Smoking

Those who reported that none of their friends smoked were significantly less likely to have ever smoked in 1996 than in 1993, with similar patterns for males and females, but only the difference for males reached significance. Those who responded that all of their friends disapproved of smoking were significantly less likely to smoke (either current or lifetime) in 1996 than in 1993. Again, the direction of change was similar for females and males, but only the changes for males reached significance. Males whose grades were above average or who planned to go to college were significantly less likely to report lifetime smoking in 1996 than in 1993.

Correlates Associated with Increases in Smoking

Those who reported that many of their friends smoked were significantly more likely to have smoked in the past month in 1996 than in 1993. A similar result was obtained for those who planned to go to work after high school. Girls with many friends who smoked exhibited increases in lifetime smoking, while boys remained flat on this measure. Girls who planned to go to work increased significantly in current cigarette smoking from 1993 to 1996 (38.3 percent to 63.9 percent), while boys did not (51.6 percent to 54.4 percent). This is of concern in that the number of girls planning to go to work increased by 50 percent during this time. When a few friends disapproved of smoking, significant increases were observed from 1993 to 1996 on current smoking (overall, for females, and for males). While girls who reported that a few of their friends disapproved were also significantly more likely to report increases in lifetime smoking in 1996 than in 1993, corresponding lifetime use among boys remained flat.

To summarize, current smoking rates were virtually unchanged for 7th through 12th graders in Massachusetts from 1993 to 1996 (*i.e.*, 29.5 percent to 30.5 percent; Table 6-2) and were compatible with changes in the overall percentage answering that many or all of their friends smoke (i.e, 39.8 percent to 40.2 percent; Table 6-5).

Changes in current smoking within each of these grades, though not significant, are consistent with and directionally supportive of program impact. As mentioned earlier, the reductions in smoking for the combined sample of 7th, 8th, and 9th grade students were significant overall, for boys, and for Hispanic students on lifetime use, and for boys and African American students on current use.

While both boys and girls increased in the percentage of those planning to go to work, the overall increase in this category was driven almost entirely by girls, and this increase was associated with significant increases in current smoking overall and among those girls planning to go to work.

Those reporting that few of their friends disapproved of smoking were more likely to show increases in current and lifetime smoking. This was also true for girls. This effect was mitigated somewhat by the decline in those reporting that few of their friends disapproved.

IMPACT OF PERCEIVED INCREASING CIGARETTE PRICES

The price of cigarettes has been shown to impact smoking in both youths and adults (Chaloupka and Wechsler, 1997; Harris and Chan, 1999), with increases in premium brands more predictive of declines in youth smoking than price changes in generic or discount brands (Harris and Chan, 1999). In the 1993 and 1996 MPS, youths were asked if "price increases have affected your buying cigarettes."[6] Responses included the following: No, I don't smoke; No, I don't buy my own cigarettes; No, I buy the same number of packs as usual; No, the price of my brand did not increase; No, I switched to a cheaper brand; Yes, I buy fewer packs; Yes, I tried to quit smoking; Yes, I quit smoking. Results on this item were similar for both years. In 1996, 81.8 percent of youths either didn't smoke or didn't buy their own cigarettes and another 1.1 percent did not think their brand increased in price. Of the 17 percent remaining, close to one-third of those buying their own cigarettes and perceiving a price increase either tried to quit or actually quit. No behavior change was reported by 10.2 percent of respondents. Of the 6.8 percent who reported a change, quitting (3.2 percent) and attempting to quit (1.9 percent) were reported most often, while buying fewer packs (1.2 percent) was the next most frequent response. Very few reported switching to a cheaper brand (0.5 percent).

6. During this interval, actual cigarette prices did not increase in Massachusetts.

CONCLUSIONS The effect of a large cohort of junior high school smokers advancing into high school could overwhelm a prevention program that is based on de-normalization of smoking. What is promising is that the tremendous pressure that this smoking cohort might have exerted on younger students appears to have been mitigated by the tobacco control work in Massachusetts.

Data are consistent with MTCP effectiveness in changing social norms and are supportive of behavior change in younger grades, among males, among African Americans, and possibly among girls. While current smoking rates for youths have increased nationally, rates in Massachusetts have remained flat. From 1993 to 1996, all grades showed increases in the proportion of youths reporting that many of their friends disapprove of smoking. This is consistent with success in changing social norms, yet is mitigated somewhat by a reduction in those reporting that all friends disapprove (occurring mostly in upper grades, which also report the highest rates of current smoking). In contrast, current smoking decreased in lower grades and among males, where decreases in all friends disapproving did not occur. Furthermore, the 9th graders in the 1997 MYRBS high school survey showed some non-significant declines which, if continued into 11th grade, will be documented by the recently administered 1999 MYRBS. Girls appear to be at higher risk from environmental pressures (*i.e.*, below average grades, going to work after high school) and, more importantly, from the impact of these pressures on smoking rates (approximately 6 percent of the population of girls are responsible for 12 percent of the current smoking rate). Future programming may need to be more responsive to girls in this particular subset. While overall smoking rates for girls have not shown the same decline as for boys, it is notable that rates for girls have not increased. This fact suggests that the existing program may provide some protective effects for girls.

The effectiveness of the first few years of MTCP programming may not become detectable until the students who were in 4th and 5th grades in 1994 reach 9th and 10th grades in 1999. We can then determine any difference in their uptake process. The results of a successful program to de-normalize tobacco use may not be evident in the high school population until the present cohort of high school smokers—who began as most addicted smokers in junior high school—are out of high school and in their mid-20s. Older youths and young adults who smoke can continue to benefit from MTCP efforts as they become exposed to increased smoking restrictions in work and social settings. We are cautiously optimistic that the MPS conducted in November and December of 1999 and January of 2000 will continue to document significant progress in the area of youth smoking.

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Predictors of Tobacco Use among Adolescents in Florida, 1998–1999

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INTRODUCTION Tobacco use is the single leading preventable cause of death in the United States (McGinnis and Foege, 1993) and is estimated to cost the state of Florida over $2 billion annually in direct health care expenditures (CDC, 1996). In August of 1997, the state of Florida settled its lawsuit against the tobacco industry for claims regarding tobacco-related health care costs. As part of the $11.3 billion settlement, the state appropriated $23 million in fiscal year (FY) 1997/1998 and $70 million in FY 1998/1999. Settlement monies were used to fund the Florida Pilot Program on Tobacco Control, designed to prevent and reduce tobacco use among Florida youths. To determine prevalence rates of cigarette, cigar, and smokeless tobacco (chewing tobacco or snuff) use for Florida public middle- and high-school students, the Florida Department of Health conducted the Florida Youth Tobacco Survey (FYTS) in February, 1998 and again in February, 1999. The purpose of these surveys was to establish baseline parameters for, and to monitor the progress of, the Pilot Program, which initiated prevention activities in April 1998. The Florida Pilot Program on Tobacco Control targets youths under age 18 and has four program components, each of which implements a variety of activities designed to combat youth tobacco use and lower tobacco's attractiveness to youths. The program's centerpiece is a youth-oriented, counter-marketing media campaign developed to reduce the allure of smoking. Community partnerships in all 67 Florida counties, an education and training initiative, and an enforcement arm comprise the other program components. The Florida Youth Tobacco Survey is a key measure of the program's effectiveness.

This chapter describes tobacco use patterns among Florida adolescents and also discusses factors associated with tobacco use; it summarizes changes in tobacco use over the 1-year time period between 1998 and 1999 by sex, race/ethnicity, grade level, and geographic region (Bauer *et al.*, 1999).

METHODS The 1998 Florida Youth Tobacco Survey (FYTS) used a two-stage cluster sample design within each of seven geographic regions (selecting schools within regions and classrooms within schools). It sampled middle (grades 6-8) and high (grades 9-12) schools separately to obtain a representative sample of 11,865 public middle school and 10,675 public high school students in grades 6 through 12. The 1999 survey was conducted in 242 of the 255 schools that participated in the 1998 survey sample, among a representative sample of 11,724 middle and 9,254 high school students. The middle school response rates for 1998 and 1999 were 97 percent and 93 percent, respectively; the student response rates were 82 percent and 88 percent,

respectively; and the overall response rates were 80 percent and 82 percent, respectively. For the high school surveys, school response rates for 1998 and 1999 were 95 percent and 89 percent, respectively; the student response rates were 76 percent and 79 percent, respectively; and the overall response rates were 72 percent and 70 percent, respectively. Data were weighted to provide estimates generalizable to all public school students in grades 6-12 in the seven regions and the state. Survey data were analyzed, and point estimates and odds ratios were generated using the Statistical Analysis System (SAS). Variance estimates and 95 percent confidence limits were calculated using the Software for Statistical Analysis of Correlated Data (SUDAAN).

Students completed a self-administered questionnaire that included questions about prevalence of tobacco use (cigarette, cigar, and smokeless tobacco), exposure to environmental tobacco smoke, minors' access to tobacco products, enforcement of tobacco purchasing and possession laws, knowledge and attitudes about tobacco use, media and advertising, tobacco use prevention school curricula, and student demographic and other information. Eight reports on the 1998 survey results are available from the Florida Department of Health (see the Florida Department of Health web site at http://www.state.fl.us/tobacco and click on "research"). Current cigarette, cigar, and smokeless tobacco users were students who reported product use on 1 or more of the 30 days preceding the survey.

RESULTS

Changes in Receptivity to Tobacco Company Promotions

One of the goals of the Florida Tobacco Pilot Program is to change attitudes about and de-glamorize tobacco use. Adolescents' attitudes toward tobacco and their perceptions of the glamour associated with tobacco products are measured by two questions about whether a student has bought or received anything in the past 12 months with a tobacco company name or picture on it, and whether the student would use or wear such a product. The "receptivity" scale, calculated from these questions, quantifies students' receptivity to tobacco company promotions and has a range of 1 to 3, with 1 being less receptive and 3 being more receptive. Among middle school students, mean scale scores on the receptivity to tobacco company promotions index declined by 10 percent, from 2.0 in 1998 to 1.8 in 1999. Among high school students, mean scores declined by 20 percent, from 2.0 in 1998 to 1.6 in 1999. Declines in receptivity were evident (and of similar magnitude) across all racial/ethnic groups ($p < 0.05$ for all comparisons).

Changes in Prevalence of Current Tobacco Use

Prevalence of current cigarette use among middle school students declined from 18.5 percent in 1998 to 15.0 percent in 1999 ($p < 0.0001$) (Table 7-1). Among high school students, prevalence of current cigarette use declined from 27.4 percent in 1998 to 25.2 percent in 1999 ($p < 0.02$) (Table 7-2). Among middle school students, declines in current cigarette use were substantial and significant for both males and females; however, among high school students, the decline was statistically significant only among females. Among both middle and high school students, the declines were most pronounced among non-Hispanic White students. Current cigarette use declined from 22.0 percent in 1998 to 16.1 per-

Table 7-1
Percentage of Florida Public Middle School Students who Used Cigarettes, Cigars, or Smokeless Tobacco by Sex, Race/Ethnicity, and Grade: Florida Youth Tobacco Survey, 1998 and 1999

	Current Cigarette Use*				Current Cigar Use**				Current Smokeless Tobacco Use***			
	1998		1999		1998		1999		1998		1999	
Sample Size (*N*):	*(11,031)*		*(10,268)*		*(11,535)*		*(10,890)*		*(11,633)*		*(10,919)*	
Category	**%**	**CI**	**%**	**CI**	**p**	**%**	**CI**	**%**	**CI**	**p**	**%**	**CI**	**%**	**CI**	**p**
Sex															
Female	18.1	(±1.5)	14.9	(±1.8)	0.0040	10.3	(±1.0)	9.4	(±1.4)	0.2600	4.4	(±0.6)	2.8	(±0.6)	0.0001
Male	18.9	(±1.7)	15.0	(±1.4)	0.0001	17.6	(±1.3)	14.2	(±1.3)	0.0002	9.3	(±1.1)	6.8	(±0.9)	0.0010
Race / Ethnicity†															
White, non-Hisp.	22.0	(±1.8)	16.1	(±1.7)	0.0000	14.5	(±1.2)	11.1	(±1.4)	0.0001	7.6	(±1.1)	4.8	(±0.8)	0.0000
Black, non-Hisp.	9.5	(±1.4)	8.5	(±1.5)	0.3400	13.0	(±1.6)	12.3	(±1.9)	0.5500	5.3	(±1.1)	4.4	(±1.4)	0.2700
Hispanic	16.8	(±2.1)	16.1	(±2.6)	0.5100	13.6	(±1.7)	12.9	(±2.3)	0.5300	5.5	(±1.3)	3.6	(±1.1)	0.0200
Grade Level															
6th	10.5	(±1.4)	8.0	(±1.3)	0.0100	7.8	(±0.9)	6.7	(±1.2)	0.1600	6.0	(±1.0)	3.9	(±0.9)	0.0004
7th	19.3	(±2.1)	16.6	(±2.5)	0.0700	14.2	(±1.7)	11.4	(±1.8)	0.0200	7.0	(±1.2)	5.2	(±1.0)	0.0100
8th	25.0	(±2.3)	19.5	(±2.5)	0.0005	19.5	(±1.7)	16.8	(±2.2)	0.0600	7.1	(±1.1)	4.8	(±1.0)	0.0020
Total	18.5	(±1.4)	15.0	(±1.3)	0.0000	14.1	(±1.0)	11.9	(±1.1)	0.0020	6.9	(±0.7)	4.9	(±0.6)	0.0000

Note: CI = 95% confidence interval.

** Smoked cigarettes on ≥1 of the 30 days preceding the survey.*

*** Smoked cigars on ≥1 of the 30 days preceding the survey.*

**** Used smokeless tobacco on ≥1 of the 30 days preceding the survey.*

† Numbers of other racial/ethnic groups were too small for meaningful analysis.

Table 7-2
Percentage of Florida Public High School Students who Used Cigarettes, Cigars, or Smokeless Tobacco by Sex, Race/Ethnicity, and Grade: Florida Youth Tobacco Survey, 1998 and 1999

	Current Cigarette Use*				Current Cigar Use**				Current Smokeless Tobacco Use***			
	1998		1999		1998		1999		1998		1999	
Sample Size (*N*):	*(9,991)*		*(9,991)*		*(10,473)*		*(9,099)*		*(10,202)*		*(9,041)*	
Category	**%**	**CI**	**%**	**CI**	***p***	**%**	**CI**	**%**	**CI**	***p***	**%**	**CI**	**%**	**CI**	***p***
Sex															
Female	28.3	(±1.9)	25.9	(±2.0)	0.0400	14.1	(±1.2)	14.1	(±1.6)	0.9600	2.1	(±0.5)	2.4	(±0.7)	0.5900
Male	26.5	(±1.9)	24.6	(±2.4)	0.1600	27.0	(±1.8)	24.7	(±1.9)	0.0800	11.2	(±1.6)	10.3	(±1.6)	0.2600
Race / Ethnicity†															
White, non-Hisp.	34.8	(±1.8)	31.3	(±2.0)	0.0200	22.7	(±1.6)	21.4	(±2.2)	0.2400	8.7	(±1.5)	8.0	(±1.7)	0.3200
Black, non-Hisp.	9.8	(±1.5)	9.4	(±1.9)	0.6100	17.1	(±2.1)	14.8	(±1.9)	0.0900	3.5	(±1.1)	2.8	(±0.7)	0.2400
Hispanic	24.8	(±2.6)	24.2	(±2.8)	0.7000	17.9	(±2.0)	18.5	(±2.4)	0.8200	2.9	(±0.8)	4.4	(±1.2)	0.0700
Grade Level															
9th	25.9	(±2.6)	23.3	(±2.8)	0.1700	19.3	(±2.3)	18.8	(±2.7)	0.7800	6.5	(±1.4)	6.8	(±1.7)	0.7400
10th	25.5	(±2.8)	24.4	(±2.8)	0.5000	19.5	(±2.2)	19.1	(±2.2)	0.7600	7.0	(±1.7)	5.9	(±1.5)	0.3800
11th	29.8	(±2.5)	27.0	(±2.4)	0.0800	23.2	(±2.5)	19.2	(±2.2)	0.0100	7.3	(±1.4)	5.3	(±1.1)	0.0200
12th	29.8	(±2.9)	27.8	(±4.0)	0.3200	21.5	(±2.7)	21.2	(±2.8)	0.8600	6.4	(±1.3)	7.1	(±1.7)	0.4700
Total	27.4	(±1.6)	25.2	(±1.8)	0.0200	20.7	(±1.2)	19.5	(±1.5)	0.1400	6.7	(±1.0)	6.4	(±0.9)	0.2200

Note: CI = 95% confidence interval.

** Smoked cigarettes on ≥1 of the 30 days preceding the survey.*

*** Smoked cigars on ≥1 of the 30 days preceding the survey.*

**** Used smokeless tobacco on ≥1 of the 30 days preceding the survey.*

† Numbers of other racial/ethnic groups were too small for meaningful analysis.

cent in 1999 ($p < 0.0001$) among non-Hispanic White middle school students, and from 34.8 percent in 1998 to 31.1 percent in 1999 among non-Hispanic White high school students ($p < 0.02$). There was no statistically significant change in the prevalence of current cigarette use among non-Hispanic Black or Hispanic students at the middle or high school level. Prevalence of cigarette use in these groups was lower than among non-Hispanic Whites in both 1998 and 1999.

Current cigar use declined significantly only among middle school students. Among this group, current cigar use declined from 14.1 percent in 1998 to 11.9 percent in 1999 ($p < 0.0002$). This overall decline was almost entirely accounted for by the decline among males, from 17.6 percent in 1998 to 14.2 percent in 1999. Among racial/ethnic groups at the middle school level, the decline in current use of cigars was statistically significant only for non-Hispanic White students.

Current smokeless tobacco use declined among middle school students, among whom 6.9 percent were current users in 1998 and 4.9 percent were current users in 1999. The decline was evident in both male and female middle school students and among non-Hispanic White and Hispanic middle school students. Students at each grade level in middle school were significantly less likely to use smokeless tobacco products in 1999 than in 1998. Current use of smokeless tobacco products remained unchanged among high school students from 1998 to 1999.

Figures 7-1 and 7-2 show the change in current cigarette use from 1998 to 1999 for middle and high school students, respectively, by racial/ethnic group. Among both middle and high school students, statistically significant declines in current cigarette use were evident among non-Hispanic White students. No significant change in current cigarette use was observed among African American or Hispanic students. Among middle school students, statistically significant declines in cigar use were evident only among non-Hispanic White students, and declines for smokeless tobacco use were evident among both non-Hispanic White students and Hispanic students. Among high school students, no change in current cigar or smokeless tobacco use was observed over the 1-year time period.

Figures 7-3 through 7-5 show prevalence of current cigarette, cigar, and smokeless tobacco use, respectively, by grade, for 1998 and 1999. Although the 1998 and 1999 surveys were cross-sectional, the same schools (but not necessarily the same classrooms) were surveyed in each year. Thus, for example, the 7th grade students in 1999 were in the 6th grade in 1998. When viewed from this perspective, an estimate of initiation rates over the 1-year time period can be calculated. In 1998, 10.5 percent of 6th grade students had used cigarettes in the past 30 days. By 1999, 16.6 percent of 7th grade students had used cigarettes in the past 30 days. This interval from 6th to 7th grade is the only interval where an increase in cigarette use in the past 30 days was observed. Comparing grade "n" in 1999 to grade "n–1" in 1998 shows no similar increase (except marginally in the transition from 10th to 11th grade). Viewing current cigar and smokeless tobacco use in the same manner, increases across grade levels from 1998 to 1999 in

Figure 7-1
Percentage of Current Cigarette Users: Public Middle School Students who Smoked on 1 or More of the Previous 30 Days—Florida Youth Tobacco Survey

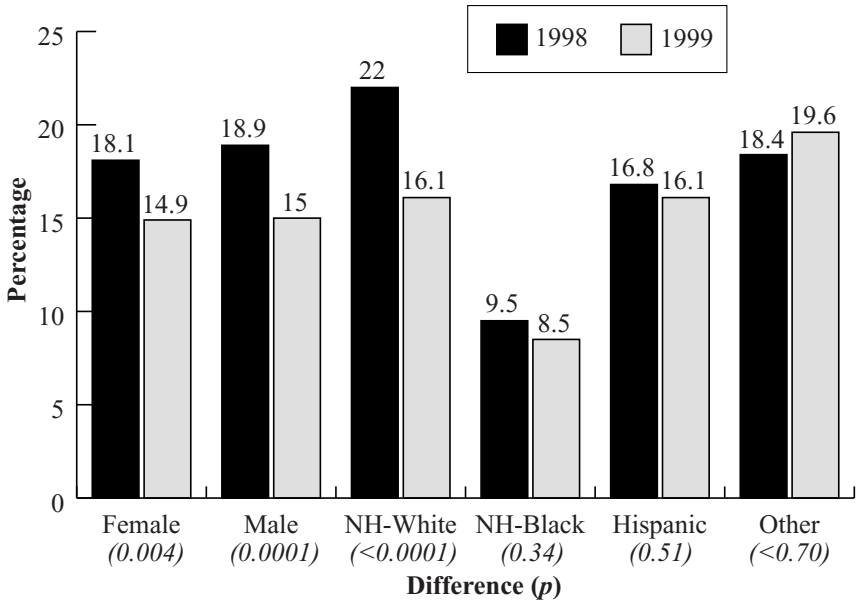
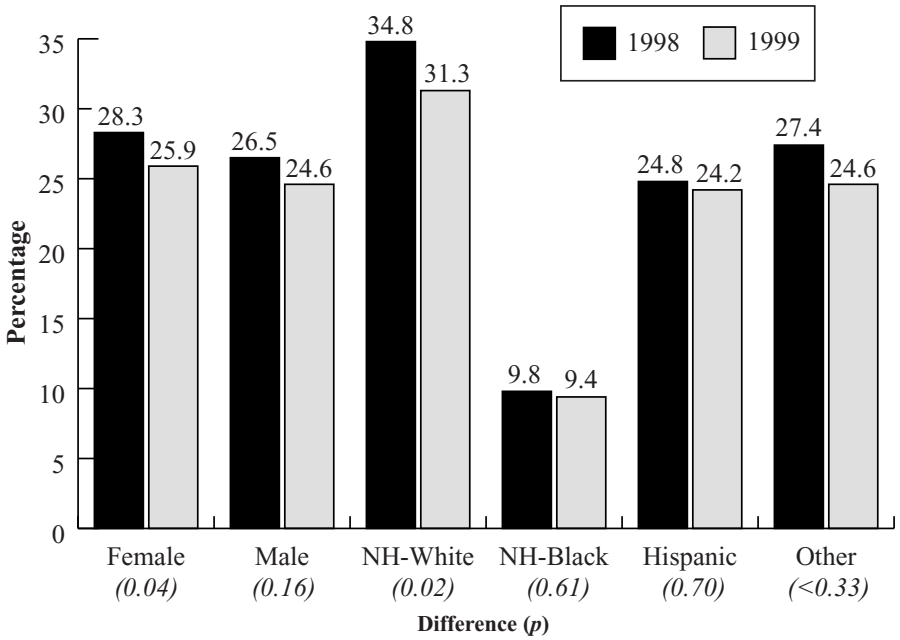


Figure 7-2
Percentage of Current Cigarette Users: Public High School Students who Smoked on 1 or More of the Previous 30 Days—Florida Youth Tobacco Survey



Source for both figures: Florida Department

Figure 7-3
Current Cigarette Use by Grade: Public School Students who Used Cigarettes on 1 or More of the Past 30 Days—Florida Youth Tobacco Survey

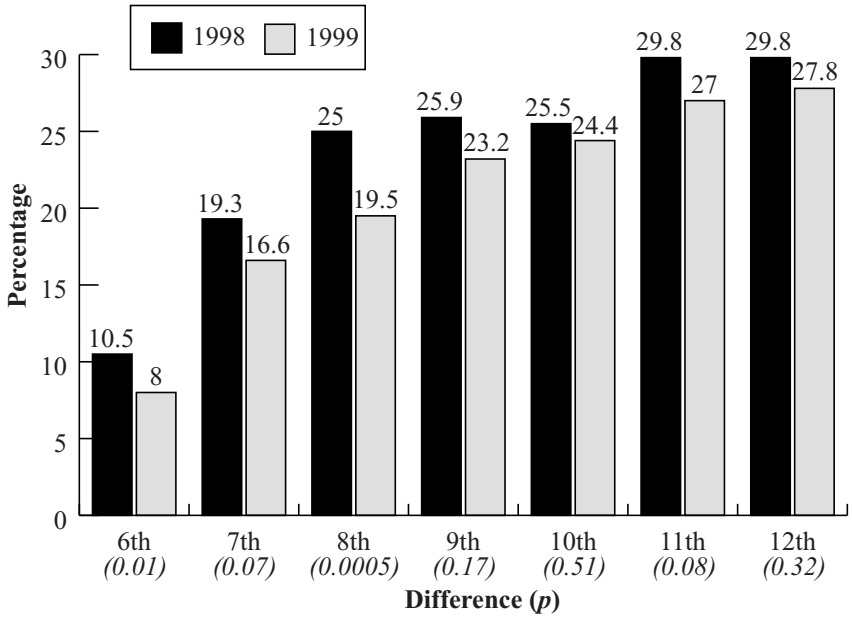
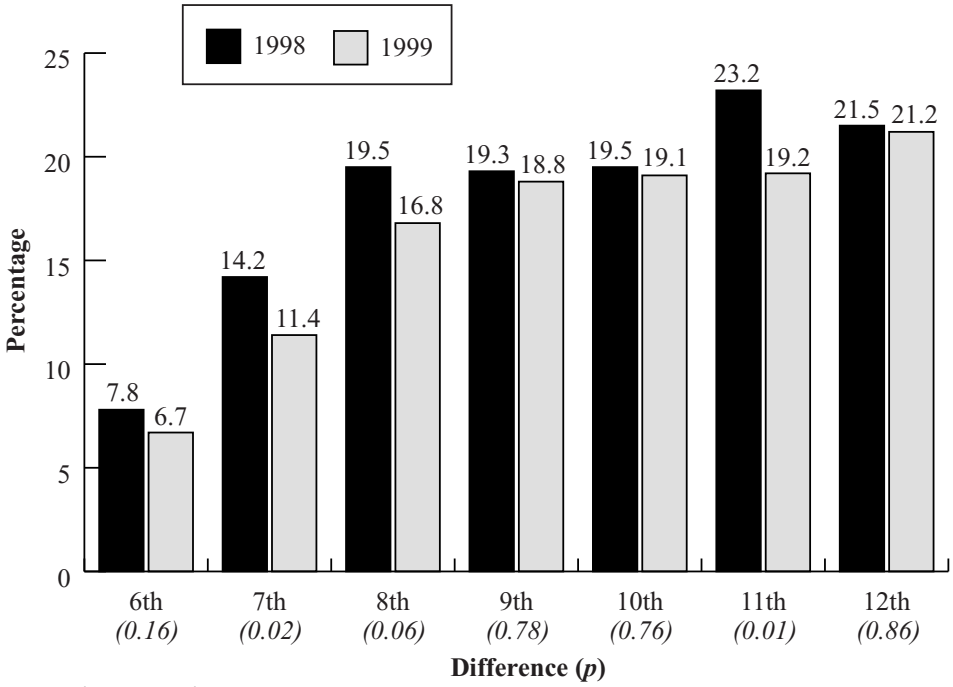
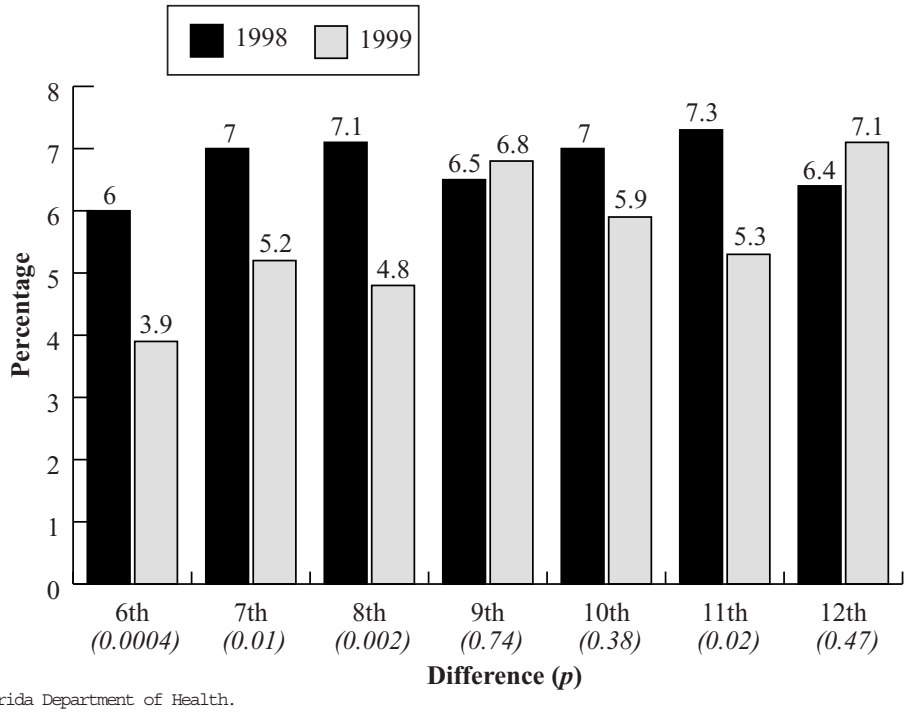


Figure 7-4
Current Cigar Use by Grade: Public School Students who Used Cigars on 1 or More of the Past 30 Days—Florida Youth Tobacco Survey



Source for both figures: Florida Department

Figure 7-5
Current Smokeless Tobacco Use by Grade: Public School Students who Used Smokeless Tobacco on 1 or More of the Past 30 Days—Florida Youth Tobacco Survey



Source: Florida Department of Health.

cigar use were only evident in the transition from grades 6 to 7 and from grades 7 to 8. For smokeless tobacco use, no increases were observed, suggesting limited initiation from over the 1-year interval.

Figures 7-6 and 7-7 show the change in tobacco use (all products combined) for middle and high school students, respectively, by region of the state. Among both middle and high school students, current use of any tobacco product (all three forms combined) was highest in the Tampa Bay and South Central regions of Florida in both 1998 and 1999. Among middle school students, the largest decrements in prevalence of current tobacco use were observed in the Tampa Bay region and the northern regions of the state (the Panhandle, Northeast, and North Central regions). Among high school students, statistically significant declines in current tobacco use were evident only in the state as a whole and in the Northeast region.

Figure 7-6
Current Tobacco Use by Region: Public Middle School Students who Used Any Tobacco on 1 or More of the Past 30 Days—Florida Youth Tobacco Survey

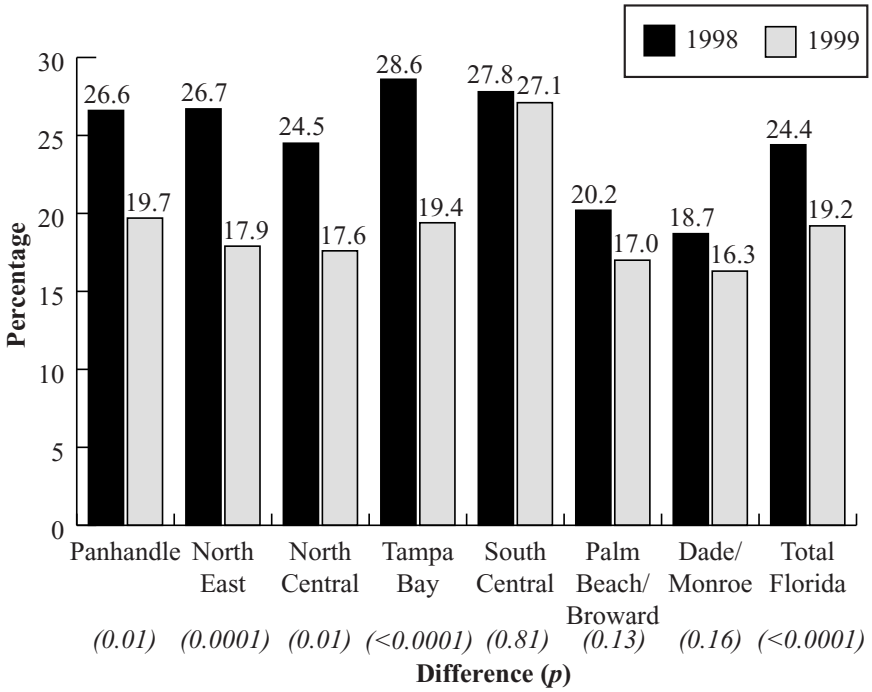
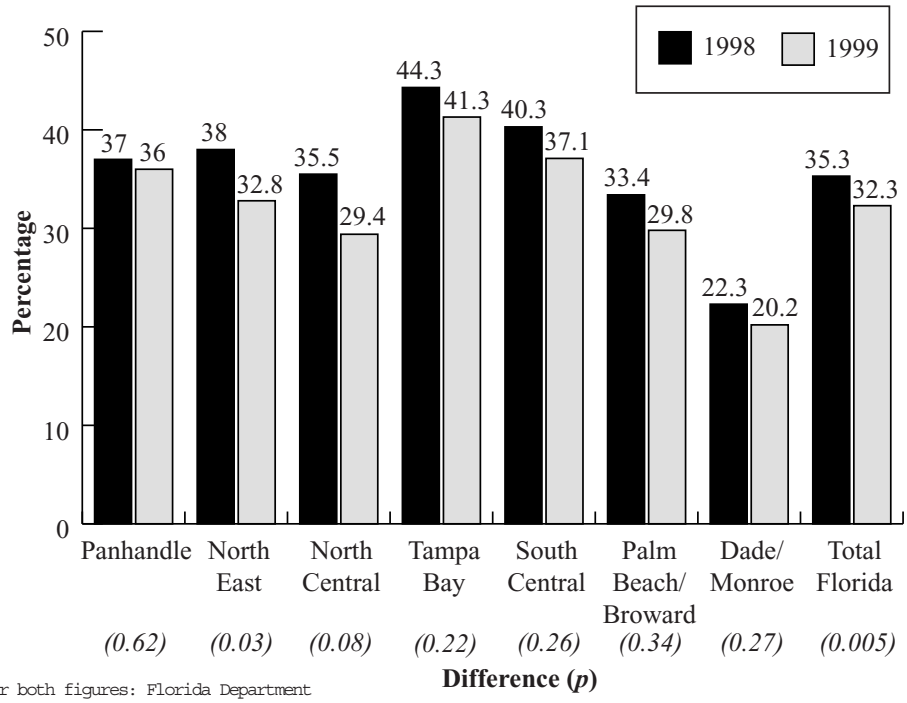


Figure 7-7
Current Tobacco Use by Region: Public High School Students who Used Any Tobacco on 1 or More of the Past 30 Days—Florida Youth Tobacco Survey



Source for both figures: Florida Department

Susceptibility to Cigarette Use

Survey respondents were grouped into one of six mutually exclusive categories representing the continuum of susceptibility to cigarette use from confirmed non-smokers to former users. The six categories are:

- Confirmed non-smokers—those who have never tried cigarettes and who indicate on three separate questions that they will "definitely not" smoke in the future;
- Considerers—those who have never tried cigarettes and who indicate that they will or are ambivalent about whether they will smoke in the future;
- Experimenters—those who have tried cigarettes, have never smoked regularly, and have not smoked in the past 30 days;
- Occasional users—those who have smoked cigarettes on 1 to 19 of the past 30 days;
- Frequent users—those who have smoked cigarettes on 20 or more of the past 30 days; and
- Former users—those who smoked daily at some point, but have not smoked in the past 30 days.

Built into the susceptibility variable is a measure of attitude and behavior. The first two categories reflect the students' past behavior and their predictions of future behavior based (presumably) on the attitudes they currently hold toward cigarette use. Overall, the percentage of students who are confirmed non-smokers increased from 38.5 percent in 1998 to 42.8 percent in 1999 among middle school students and from 24.1 percent in 1998 to 30.5 percent in 1999 among high school students (p-values for the difference: 0.0003 and 0.0001, respectively) (Figure 7-8). Among middle and high school students, the proportion of considerers remained constant over the 1-year period and, in middle school, the proportion of experimenters actually increased (from 21.8 percent to 23.6 percent, $p = 0.02$) (Figures 7-9 and 7-10). Statistically significant declines were seen in every other susceptibility category, including "former"[1] smoker. The lack of increase in the percentage of former smokers suggests that changes in susceptibility (particularly occasional and frequent users) are due to fewer initiations rather than more quitters.

1. The increase in experimenters and the decline in former smokers likely reflects the way these categories are defined. With fewer adolescents smoking, fewer are, or have been, regular (daily) smokers. Those who have smoked, but never smoked daily, and who have not smoked in the past 30 days are experimenters, not former smokers.

Figure 7-8
Percentage "Confirmed" Non-Smokers: Public School Students who Never Tried a Cigarette and Are Not Considering Trying a Cigarette—Florida Youth Tobacco Survey

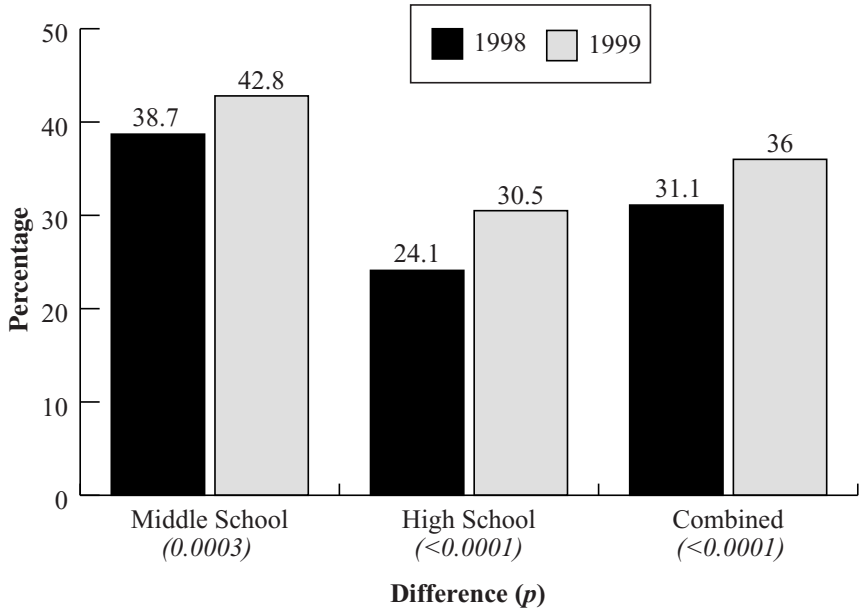
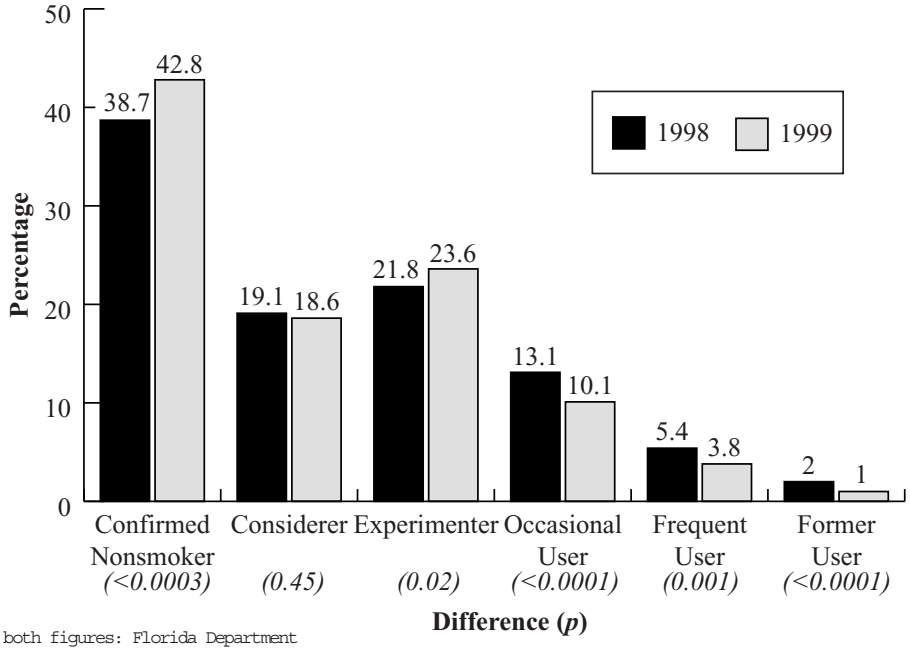
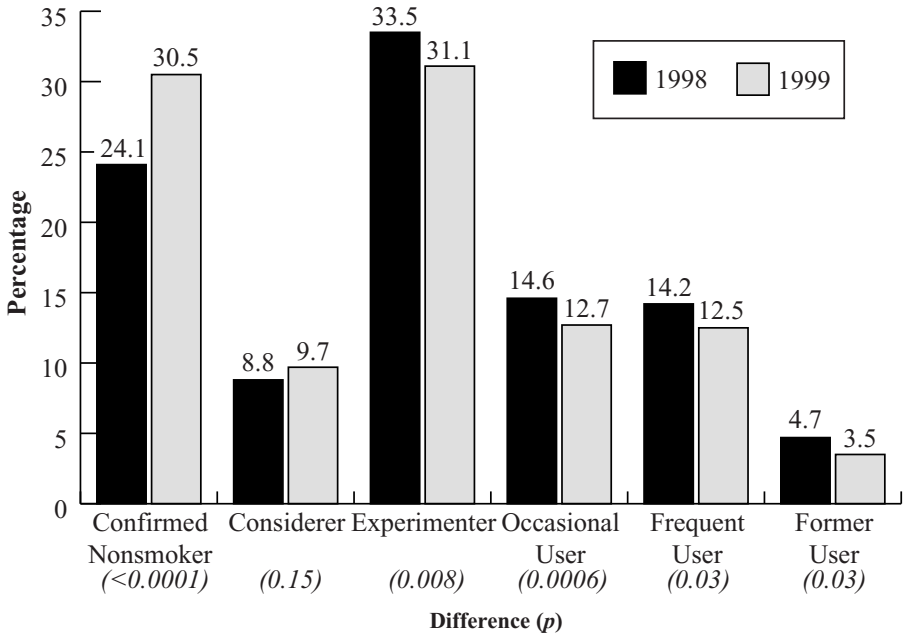


Figure 7-9
The "Susceptibility" Continuum: Public Middle School Students—Florida Youth Tobacco Survey



Source for both figures: Florida Department

Figure 7-10
The "Susceptibility" Continuum: Public High School Students—Florida Youth Tobacco Survey



Source: Florida Department of Health.

Although no substantial change in current use of cigarettes was observed among African American students (Tables 7-1 and 7-2), this group experienced the largest increase in the proportion of students who are "confirmed" non-smokers. Among middle and high school students combined, the proportion of students who are confirmed non-smokers increased from 28.7 percent to 33.1 percent among non-Hispanic White students ($p < 0.0001$), from 36.9 percent to 45.2 percent among African American students ($p < 0.0001$), and from 31.6 percent to 34.6 percent among Hispanic students ($p = 0.05$). In addition, the percentage of "considerers" declined among African American students, from 17.3 percent to 15.4 percent ($p = 0.06$), and the percentage of experimenters in the same group declined from 33.5 percent to 29.9 percent ($p= 0.008$) over the 1-year period. There were no changes in the percentage of students who were considerers or experimenters in any other racial/ethnic group (Table 7-3).

Table 7-3
Susceptibility to Cigarette Use, by Race/Ethnicity: Florida Youth Tobacco Survey, 1998 and 1999

	Non-Hispanic White		Non-Hispanic Black		Hispanic (Any Race)	
Categories	**1998**	**1999**	**1998**	**1999**	**1998**	**1999**
Never User	28.7	33.1*	36.9	45.2*	31.6	34.6*
Considerer	12.1	12.7	17.3	15.4	15.4	14.6
Experimenter	26.1	27.1	33.5	29.9*	28.2	29.0
Occasional User	15.7	13.0*	8.0	6.1*	15.3	13.7
Frequent User	13.4	11.0*	2.2	2.5	6.8	6.5
Former User	4.1	3.2*	2.2	1.0	2.7	1.7

Predictors of Tobacco Use and Consideration of Cigarette Use

Logistic regression modeling was used to identify predictors of current use of cigarettes, cigars, and smokeless tobacco products (separately) in each of the two survey years. Models were compared to identify differences in the factors associated with tobacco use and differences in the magnitude of the association across the two survey years. In addition, among those students who have never tried cigarettes (even one or two puffs), logistic regression was used to identify predictors of considering cigarette use in the future. Models for 1998 and 1999 were compared across the two time points for differences in the factors associated with considering smoking and in the magnitude of the association. The following variables were included in the models:

- Sex: girls as the referent;
- Race/ethnicity: Black, non-Hispanic as the referent;
- Age: in 1-year increments;
- Smokers at home: anyone who lives in the student's household smokes (yes/no);
- Number of friends who smoke cigarettes: continuous variable (0, 1, 2, 3, 4);
- Number of friends who use smokeless tobacco: continuous variable (0, 1, 2, 3, 4);
- Grade point average: continuous variable, A = 1, B = 2, C = 3, D = 4, F = 5, Missing = 6;
- Age inappropriate for grade: age-appropriate as the referent;
- Current use of cigarettes: non-use as the referent;
- Current use of cigars: non-use as the referent;
- Current use of smokeless tobacco: non-use as the referent.

Tables 7-4 and 7-5 show the odds ratios and 95 percent confidence limits for these variables for each of the three outcome variables (current use of cigarettes, cigars, and smokeless tobacco products), for 1998 and 1999, respectively, for middle and high school students combined. For the most part, the logistic regression models confirmed the findings from the descriptive analyses. Non-Hispanic White and Hispanic students were substantially more likely to use cigarettes relative to African American students; the odds of using cigarettes increased with increasing age and with the number of friends who use cigarettes or smokeless tobacco products; and the odds of using cigarettes were greater among those with a household member who smokes. Current use of cigars and smokeless tobacco were strongly associated with current cigarette use.

The only difference across the two survey years in the models predicting cigarette use was a small, but statistically significant, decrement in the magnitude of the odds ratio for number of friends who smoke cigarettes in 1999 compared to 1998.

The model predicting cigar use changed more substantially across the two survey years. The observed decline in cigar use by middle school boys resulted in a substantial decline in the odds ratio for males relative to females across the two survey years. Likewise, the observed significant reduction in cigar use among 11th grade students contributed to a decline in the magnitude of the odds ratio for age in the cigar use model. The magnitude of the odds ratio for current use of smokeless tobacco as a predictor for current cigar use increased substantially across the two survey years, suggesting a concentration of tobacco use among those who use multiple forms of tobacco.[2]

Not surprisingly, in the model predicting current use of smokeless tobacco products, the magnitude of the odds ratio for current cigar use also increased significantly. The magnitude of the odds ratios for number of friends who use smokeless tobacco and for current use of cigars significantly increased across the two survey years in the model predicting smokeless tobacco use.

A logistic regression model was also developed to identify predictors of considering cigarette use in the future among middle and high school students who have never tried cigarettes (Table 7-6). Overall, the percentage of middle and high school students who have never tried cigarettes, but who are considering smoking, remained unchanged across the two survey years at 13.7 percent of the total population. However, among those who have never tried cigarettes, the percentage who are considering trying cigarettes

2. Of the students who used any tobacco product in the previous 30 days (in 1998), 34.4 percent used cigarettes only, 28.1 percent used cigarettes and cigars, 15.8 percent used cigars only, 9.9 percent used all three types of tobacco, 5.3 percent used smokeless tobacco only, 3.4 percent used smokeless and cigars, and 3.1 percent used cigarettes and smokeless tobacco.

Table 7-4
Logistic Regression Model Predicting Odds of Tobacco Use, by Type of Product:
Florida Youth Tobacco Survey, 1998

Sample Size (*N*):	Cigarette Use (19,869)		Cigar Use (19,869)		Smokeless Tobacco Use (19,869)	
	OR	**CI**	**OR**	**CI**	**OR**	**CI**
Sex						
Female	1.00	—	1.00	—	1.00	—
Male	0.59	0.54–0.64	2.40	2.16–2.66	2.99	2.52–3.54
Race/Ethnicity						
White, non-Hispanic	3.44	2.93–4.03	0.62	0.51–0.74	1.70	1.32–2.17
Black, non-Hispanic	1.00	—	1.00	—	1.00	—
Hispanic	2.63	2.19–3.16	0.63	0.51–0.77	0.81	0.60–1.11
Asian/Pacific Islander	1.96	1.32–2.91	0.76	0.50–1.14	1.37	0.75–2.49
Amer. Indian/AK Native	3.69	2.11–6.45	0.57	0.34–0.97	3.03	1.49–6.16
Other	2.68	2.10–3.41	0.65	0.50–0.84	1.74	1.16–2.60
Age	1.20	1.16–1.25	1.21	1.15–1.26	0.94	0.87–1.01
Smokers at Home						
Yes	1.77	1.60–1.96	1.11	1.00–1.22	1.08	0.91–1.27
No	1.00	—	1.00	—	1.00	—
GPA	1.14	1.10–1.18	1.07	1.03–1.11	1.04	0.99–1.09
No. of Friends—Smoke	2.21	2.12–2.30	1.26	1.20–1.32	0.93	0.87–0.99
No. of Friends—Smokeless	0.94	0.88–1.02	1.08	1.01–1.15	2.21	2.06–2.36
Current Tobacco Use						
Cigarette						
Yes	NA	NA	10.59	9.27–12.10	3.21	2.61–3.94
No	NA	NA	1.00	—	1.00	—
Cigar						
Yes	10.72	9.38–12.25	NA	NA	3.67	3.06–4.41
No	1.00	—	NA	NA	1.00	—
Smokeless						
Yes	3.23	2.65–3.95	3.59	2.98–4.32	NA	NA
No	1.00	—	1.00	—	NA	NA
Inappropriate Age						
Yes	0.96	0.86–1.07	1.03	0.93–1.15	1.48	1.22–1.79
No	1.00	—	1.00	—	1.00	—
12th Grader	0.92	0.79–1.06	0.72	0.59–0.88	1.05	0.80–1.37

Note: CI= 95% confidence interval.

Table 7-5
Logistic Regression Model Predicting Odds of Tobacco Use, by Type of Product:
Florida Youth Tobacco Survey, 1999

Sample Size (*N*):	Cigarette Use *(18,193)*		Cigar Use *(18,193)*		Smokeless Tobacco Use *(18,193)*	
	OR	**CI**	**OR**	**CI**	**OR**	**CI**
Sex						
Female	1.00	—	1.00	—	1.00	—
Male	0.61	0.52–0.73	2.05	1.75–2.40	3.25	2.40–4.41
Race/Ethnicity						
White, non-Hispanic	3.19	2.60–3.91	0.55	0.45–0.67	1.32	0.94–1.85
Black, non-Hispanic	1.00	—	1.00	—	1.00	—
Hispanic	2.60	2.08–3.24	0.67	0.54–0.83	0.83	0.58–1.17
Asian/Pacific Islander	2.69	1.74–4.13	0.43	0.28–0.65	0.90	0.48–1.67
Amer. Indian/AK Native	3.16	2.03–4.92	0.77	0.52–1.13	2.18	1.07–4.44
Other	NA	NA	NA	NA	NA	NA
Age	1.19	1.14–1.23	1.12	1.08–1.15	0.96	0.91–1.02
Smokers at Home						
Yes	1.64	1.45–1.86	1.19	1.04–1.37	1.22	1.00–1.50
No	1.00	—	1.00	—	1.00	—
GPA	1.13	1.08–1.18	1.11	1.05–1.17	1.04	0.96–1.12
No. of Friends—Smoke	2.11	2.03–2.19	1.30	1.23–1.38	0.90	0.83–0.96
No. of Friends—Smokeless	0.87	0.80–0.93	1.13	1.03–1.23	2.81	2.60–3.05
Current Tobacco Use						
Cigarette						
Yes	NA	NA	11.15	9.58–12.97	2.77	2.07–3.71
No	NA	NA	1.00	—	1.00	—
Cigar						
Yes	11.19	9.60–13.04	NA	NA	4.85	3.88–6.04
No	1.00	—	NA	NA	1.00	—
Smokeless						
Yes	2.88	2.14–3.88	4.66	3.74–5.82	NA	NA
No	1.00	—	1.00	—	NA	NA
Inappropriate Age						
Yes	1.13	0.91–1.41	0.94	0.76–1.15	1.09	0.77–1.54
No	1.00	—	1.00	—	1.00	—
Unknown	2.32	0.58–9.28	2.70	1.02–7.15	7.70	3.36–17.66

Note: CI= 95% confidence interval.

Table 7-6
Logistic Regression Model Predicting Odds of "Considering" Cigarette Use:
Never-Smokers, Florida Youth Tobacco Survey, 1998 and 1999

Sample Size (*N*):	1998 Considerer (8,730)		1999 Considerer (9,058)	
	OR	**CI**	**OR**	**CI**
Sex				
Female	1.00	—	1.00	—
Male	0.87	0.79–0.96	0.83	0.72–0.96
Race/Ethnicity				
White, non-Hispanic	0.86	0.74–1.00	1.20	1.02–1.42
Black, non-Hispanic	1.00	—	1.00	—
Hispanic	0.97	0.82–1.15	1.26	1.07–1.49
Asian/Pacific Islander	1.24	0.97–1.59	1.55	1.12–2.14
American Indian/AK Native	0.68	0.33–1.39	1.29	0.84–1.97
Other	0.69	0.54–0.87	NA	NA
Age	0.92	0.88–0.95	0.90	0.85–0.96
Smokers at Home				
Yes	0.86	0.77–0.95	0.89	0.76–1.05
No	1.00	—	1.00	—
GPA	1.08	1.03–1.13	1.08	1.04–1.12
No. of Friends—Smoke	1.44	1.35–1.54	1.34	1.25–1.43
No. of Friends—Smokeless	1.02	0.92–1.12	1.08	0.95–1.22
Current Tobacco Use				
Cigarette				
Yes				
No	NA	NA	1.00	—
Cigar				
Yes	1.78	1.25–2.54	1.99	1.33–3.00
No	1.00	—	1.00	—
Smokeless				
Yes	2.65	1.84–3.81	2.38	1.34–4.21
No	1.00	—	1.00	—
Inappropriate Age				
Yes	1.23	1.12–1.35	1.35	1.03–1.77
No	1.00	—	1.00	—
12th Grader/Unknown	0.76	0.55–1.05	0.27	0.05–1.00
Receptivity	1.90	1.76–2.06	2.04	1.87–2.23

Note: CI= 95% confidence interval.

in the future declined from 30.7 percent in 1998 to 27.6 percent in 1999 ($p = 0.0005$). In the logistic regression model in 1998, the strongest predictors of considering trying cigarettes in the future were current use of another tobacco product (cigars or smokeless tobacco), the child's receptivity to tobacco company promotions[3], the number of friends who smoke, and being age-inappropriate for grade. Protective factors (against considering using cigarettes in the future) were living in a household with a smoker, being of non-Hispanic White race/ethnicity, and older age (possibly because students who fall into these three categories are significantly less likely to be never-smokers). In 1999, the model changed somewhat. Non-Hispanic White students were more likely than their African American counterparts to consider using cigarettes in the future (likely due to the decrease in considering among African American students) and the magnitude of the odds ratio for number of friends who smoke declined significantly.

SUMMARY In Florida, attitudes and behaviors related to tobacco use changed among public school-enrolled youths in the 1-year time interval between the 1998 and 1999 Youth Tobacco Surveys, an interval that included the 10 months immediately following the initiation of the Florida Pilot Program youth tobacco use prevention activities. Overall, current cigarette use declined 19 percent among middle school students and 8 percent among high school students. The percentage of students who are confirmed non-smokers increased in all racial/ethnic groups and at all grade levels. Predictors of tobacco use remained relatively unchanged over the 1-year time period; however, the magnitude of the predictors had changed. Peer influence, defined by the number of friends who use cigarettes, declined in importance as a predictor of cigarette use. The observed trend of increasing cigar use with increasing age was reduced.

Nationwide, the prevalence of cigarette smoking among adolescents increased during the 1990's (CDC, 1998; Johnston *et al.*, 1998b); however, smoking prevalence rates may have peaked in 1996 or 1997 and could be starting to decline (Johnston *et al.*, 1998a). Currently, national data for 1998 and 1999 are unavailable for comparison with the Florida data. However, the decline in cigarette use between 1998 and 1999 among Florida adolescents reported here is larger than any annual decline observed in this nation among youths since 1980 (Johnston *et al.*, 1998a & 1998b). Ongoing evaluation efforts are underway to determine whether the observed declines in youth tobacco use are related primarily to the program activities implemented by the Florida Pilot Program on Tobacco Control. If this is the case, similar programs or program components should be implemented nationwide to reverse the increase in youth smoking observed during the 1990's (CDC, 1998; Johnston *et al.*, 1998b).

3. Whether the student has bought or received anything with a tobacco company name or picture on it in the past 12 months and whether the student would use or wear something with a tobacco company name or picture on it.

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Changes in Adolescent Smoking Behaviors in Sequential Birth Cohorts

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INTRODUCTION Never starting to smoke is the best way to avoid the disease consequences of smoking, and preventing initiation of smoking among adolescents is a goal of almost all tobacco control campaigns. Success in reducing adolescent initiation is described in several other chapters in this monograph, using changes in adolescent prevalence derived from multiple cross-sectional surveys over time. One of these chapters discusses the longest series of survey data collection, the Monitoring the Future study (see Chapter 2).

The focus of this chapter is to examine past changes in past smoking initiation rates at various ages. Recent cross-sectional survey data on adults were used to reconstruct the adults' rates of initiation in the past. This technique is subject to recall and other biases, but allows examination of smoking initiation that occurred prior to the availability of cross-sectional data.

Initiation of cigarette smoking varies dramatically by year of age and has varied substantially across calendar year as well (see Chapter 2). The changes in adolescent initiation over time may have occurred uniformly across all ages, may be larger at some ages than at others, or may change in different directions at different ages. In order to examine initiation trends by both age and calendar year, age-specific initiation rates were estimated for successive birth cohorts of the U.S. population. A birth cohort is a group of individuals born during specific calendar years; in these analyses, a birth cohort consisted of 5-calendar-year groups. Five-year birth cohorts from 1926–30 through 1981–85 were examined, which allowed examination of changes in age-specific initiation rates over a span of approximately 60 years. By examining initiation rates at specific ages (*i.e.*, initiation at age 15) across sequential cohorts born during different calendar years, it is possible to examine changes over time in smoking initiation rates at each year of age. In addition, these age-specific initiation rates by birth cohort can be examined by gender, and for different race and ethnic groups, in order to define differences among these groups in smoking initiation.

METHODS The principal data source used for these analyses was the Tobacco Supplement to the Current Population Surveys of September, 1992; January and May, 1993; September, 1995; and January and May, 1996. Data from 417,116 self-respondents between 15 and 84 years of age were available for analysis. Ever-smokers were defined as those who had smoked at least 100 cigarettes in their lifetime. Among ever-smokers, age and year of initiation were obtained from the year of the survey, age at the time of the survey, and the answer to the question, "When did you first start smoking fairly

regularly?" Each person's ever-smoking status for each calendar year prior to the date of the survey was reconstructed based upon the respondent's recollection of starting smoking.

All respondents were grouped into sequential 5-year birth cohorts, beginning with those born between the calendar years 1926 and 1930 and extending to those born between 1981 and 1985. Age-specific initiation rates were constructed within each birth cohort by defining those who began the year of age as never-smokers as the population at risk for initiation (denominator for the initiation rate). Those who initiated during that year of age formed the numerator of the rate. Details of the CPS methodology are published elsewhere (see Chapter 9; Bureau of the Census, 1978).

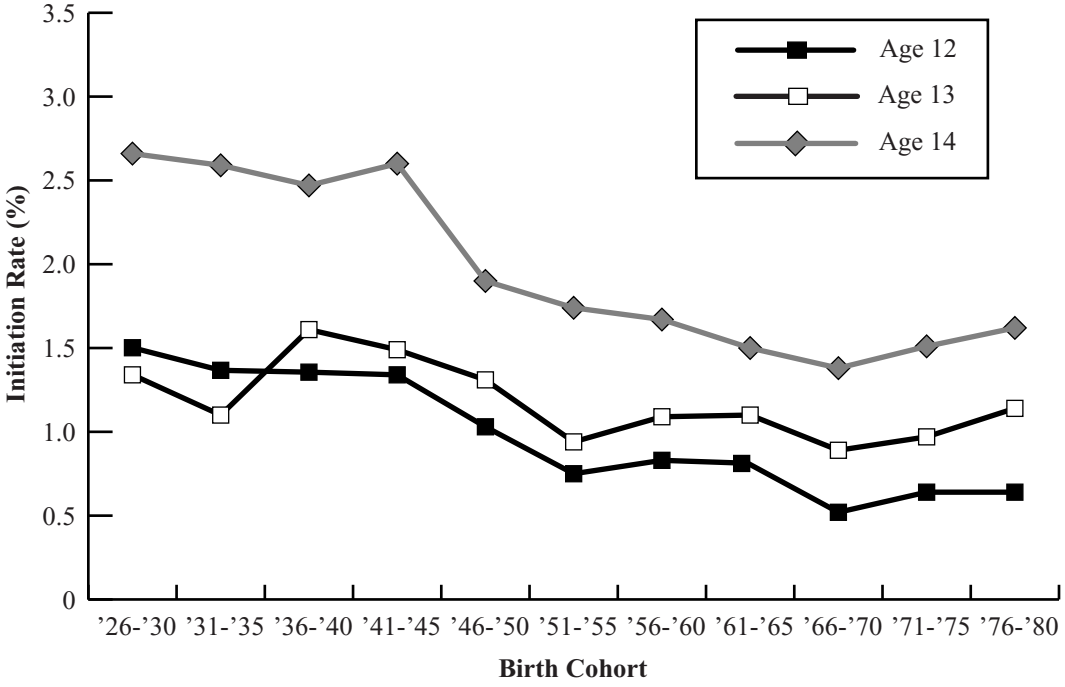
Determination of the smoking status of respondents in any given year was based on the survey administration date, the reported initiation age, and the age given in the survey. The age of initiation was subtracted from the age at the time of the survey, and the result was subtracted from the survey year to define the calendar year in which the respondent began to smoke. The respondent was considered a smoker from that year forward. The survey administration date was represented as a partial year, using both the year and month of the survey in this calculation (*e.g.*, September 1992 became 1992.75). Additionally, 6 months were added to all age responses to account for the distribution of birthdays occurring over the entire calendar year.

The distribution of ages reflected in the original sample was preserved while calculating the initiation rates for each calendar year. Since the distribution of 12- to 17-year-olds varied between calendar years, each initiation rate for each calendar year was standardized to the birth-year distribution of all respondents who would have been between the ages of 12 and 17 in that calendar year. Likewise, in order to make similar comparisons between ethnically diverse samples, the rates for each calendar year were standardized by ethnicity to the ethnic distribution of the United States represented by the 1995/1996 CPS.

HAVE AGE-SPECIFIC ADOLESCENT INITIATION RATES CHANGED OVER TIME?

Figure 8-1 presents initiation rates at single years of age for sequential 5-year birth cohorts of males born between 1926 and 1980. The age-specific initiation rate for each 5-year birth cohort was constructed by using the number of individuals born during the 5 calendar years of a birth cohort who began smoking during a specified age as the numerator. The denominator consisted of the number of individuals who began the same specified age as never-smokers. For example, the initiation rate at age 12 for the 1926–1930 birth cohort between the years 1926 and 1930 used the number of those who began smoking during their 12th year of age (which would have occurred between 1938 and 1942 for this birth cohort) as the numerator and the number of individuals who began their 12th year of age as never-smokers as the denominator. This measure averaged initiation rates at age 12 years for those born during the 5 calendar years that defined the birth cohort. The average age-specific initiation rate for each sequential cohort represented a calendar year period 5 years later than the initiation

Figure 8-1
Age-Specific Cigarette Smoking Initiation Rates with 95% Confidence Intervals by 5-Year Birth Cohorts, United States—Males



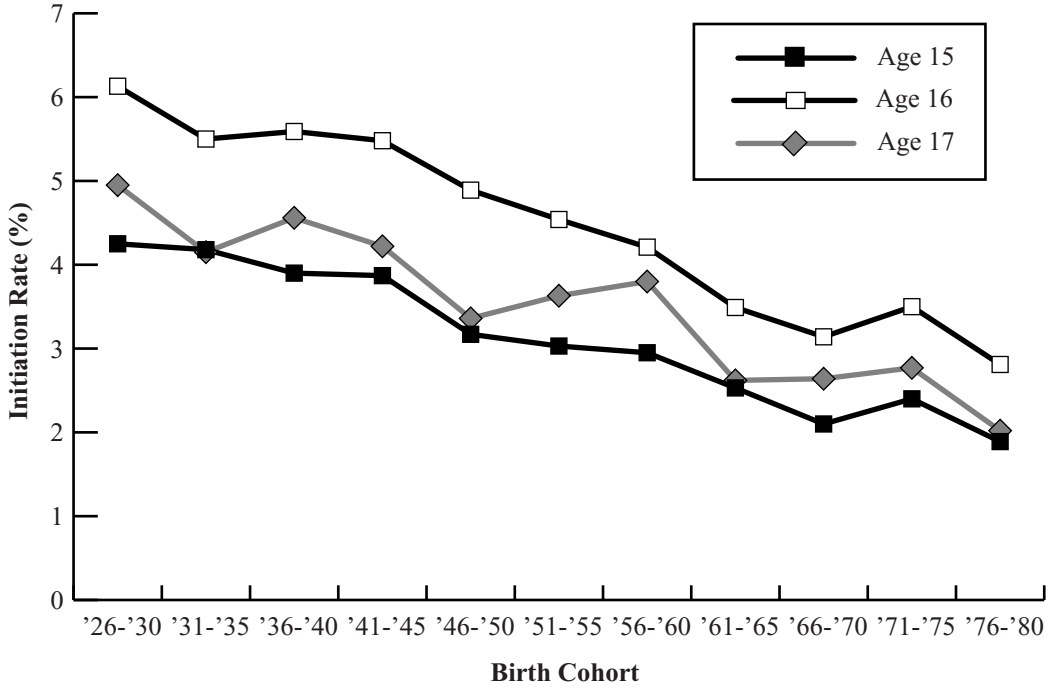
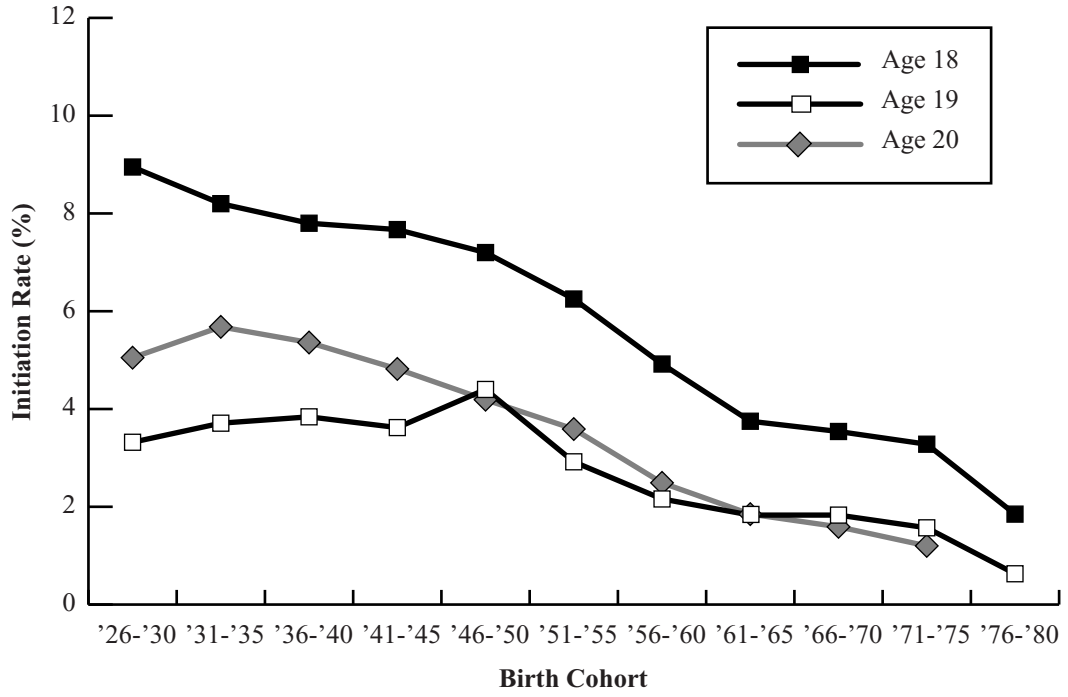
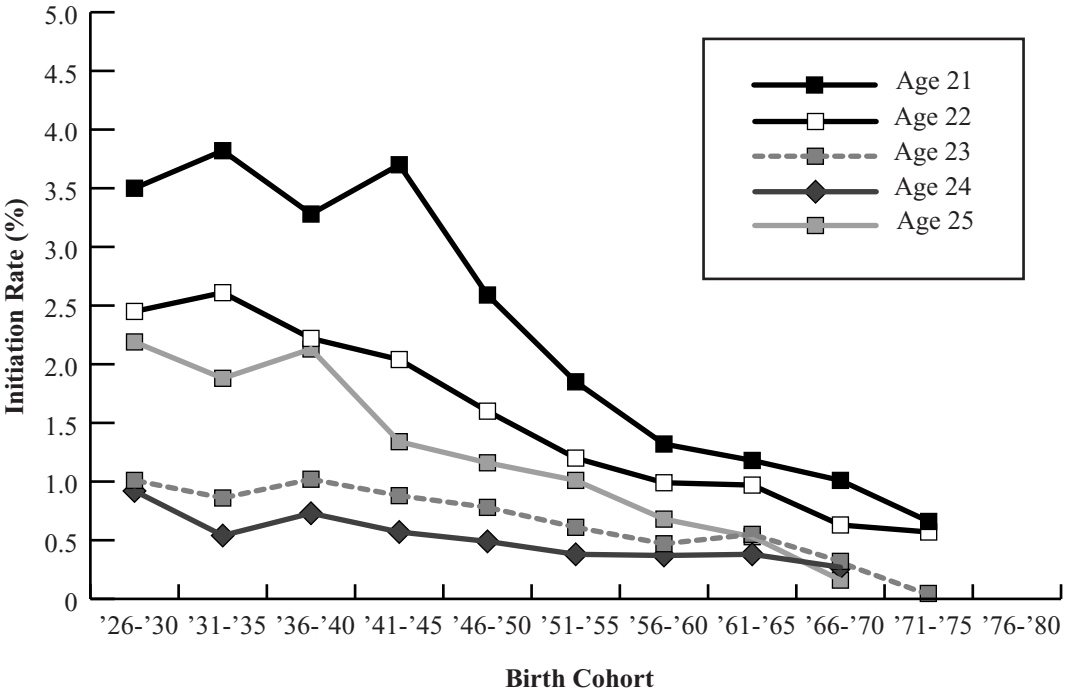


Figure 8-1 (continued)





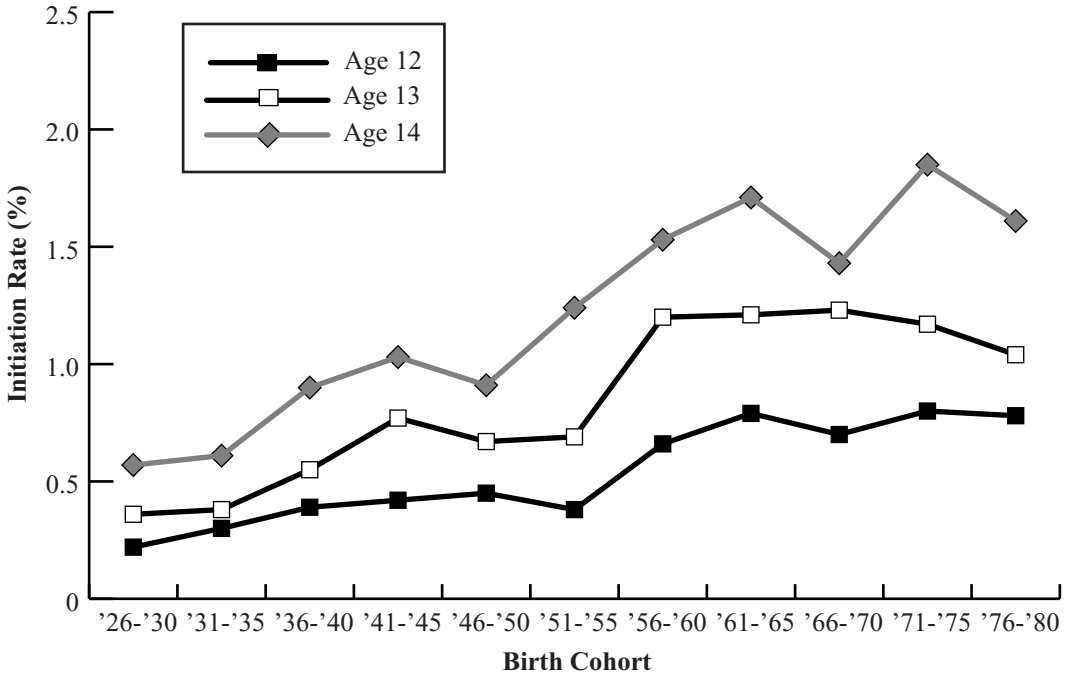
rate for the cohort that preceded it. Thus, by examining initiation rates for these sequential birth cohorts, a measure of the change (or lack of change) in rates of initiation at specific ages is obtained over a range of calendar years from about 1940 onward.

Figure 8-1 contains initiation rates for males at each single year of age from age 12 through age 25 for 5-year birth cohorts beginning with the 1926–1930 birth cohort and including the 1976–1980 birth cohort. The data are limited to the 1971–1975 birth cohort for those age 20 years and older, since individuals born during the years 1976–1980 would not have reached age 20 by the time of the most recent survey (1995/1996). In general, rates of smoking initiation have declined over time at every age, but the proportionate rate of decline is somewhat greater at older ages than it is at younger ages for males.

Initiation rates for females at each single year of age from age 12 through age 25 are presented in Figure 8-2. Rates of initiation among earlier birth cohorts of females are generally lower than for age- and cohort-matched males, but this difference disappears among more recent cohorts. The pattern of initiation over time appears to be quite different for females. Initiation rates at ages 12–14 appear to increase steadily from earlier birth cohorts to more recent ones, in contrast to the decline over time observed for male initiation rates at these ages. There is a suggestion that this trend of increasing female initiation at ages 12–14 is moderating or disappearing among the more recent cohorts. Initiation rates at ages 15 and 16 among females increase prior to the 1956–60 birth cohort, and then level off or decline slightly in more recent birth cohorts. Female initiation rates at ages 17–20 years show a pattern of increasing rates among earlier birth cohorts, but show a marked decline beginning with those born after 1955. The pattern of initiation rates over time at older ages among females born after 1945 are similar to the pattern over time among males, with a steep decline evident for most cohorts.

Tables 8-1 and 8-2 present the initiation rates estimated for each birth cohort by single year of age of initiation. The results of a linear regression of the rates over time are also presented for both the absolute value of the rate and for the proportional change in rates over time. Among males, there is a statistically significant decline in rates of initiation across sequential cohorts for all ages from age 8 through age 25, with the exception of age 11. The absolute and proportional differences are greatest at ages 18 and 19. Among females, however, there is not a statistically significant decline in initiation for most of the ages under age 16, with the exception of a statistically significant decline for the 11-year-old age group. There are statistically significant declines among females over the age of 16 years (except age 23). When median values for slopes of the proportional change across cohorts are compared for ages 12–17 and ages 18–25, there is a statistically significantly greater set of slopes among the older group compared to the younger group for both males ($P = 0.0005$) and females ($P = 0.0017$). This confirms the impression derived from the differences in absolute rates of initiation that older adolescents have had a greater decline in initiation over time compared to younger adolescents.

Figure 8-2
Age-Specific Cigarette Smoking Initiation Rates with 95% Confidence Intervals by 5-Year Birth Cohorts, United States—Females



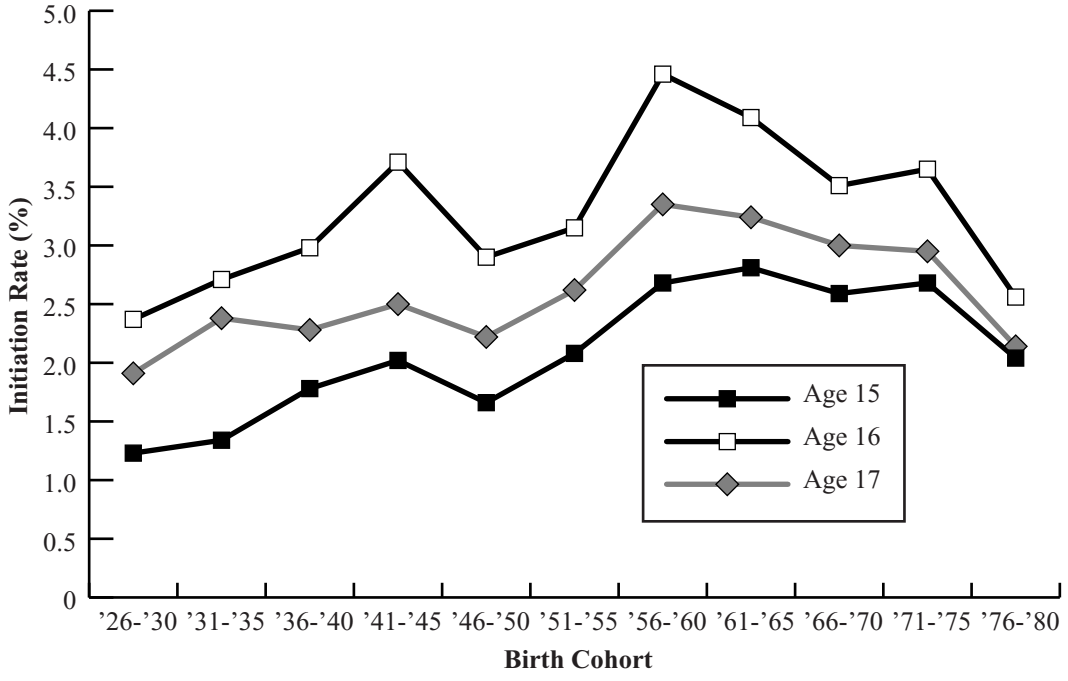
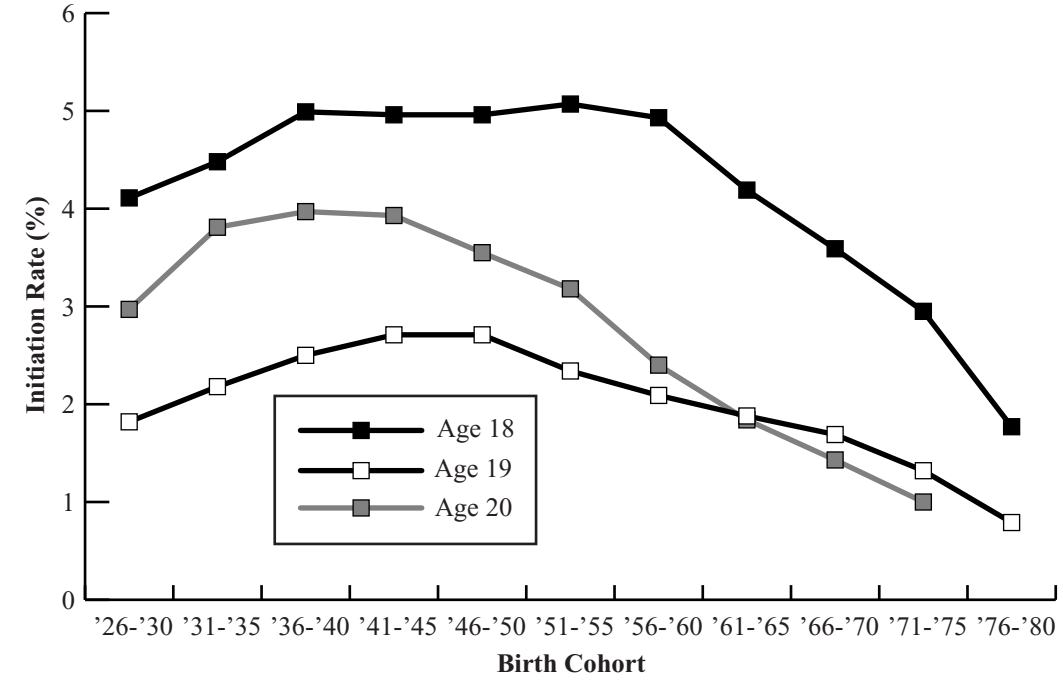


Figure 8-2 (continued)



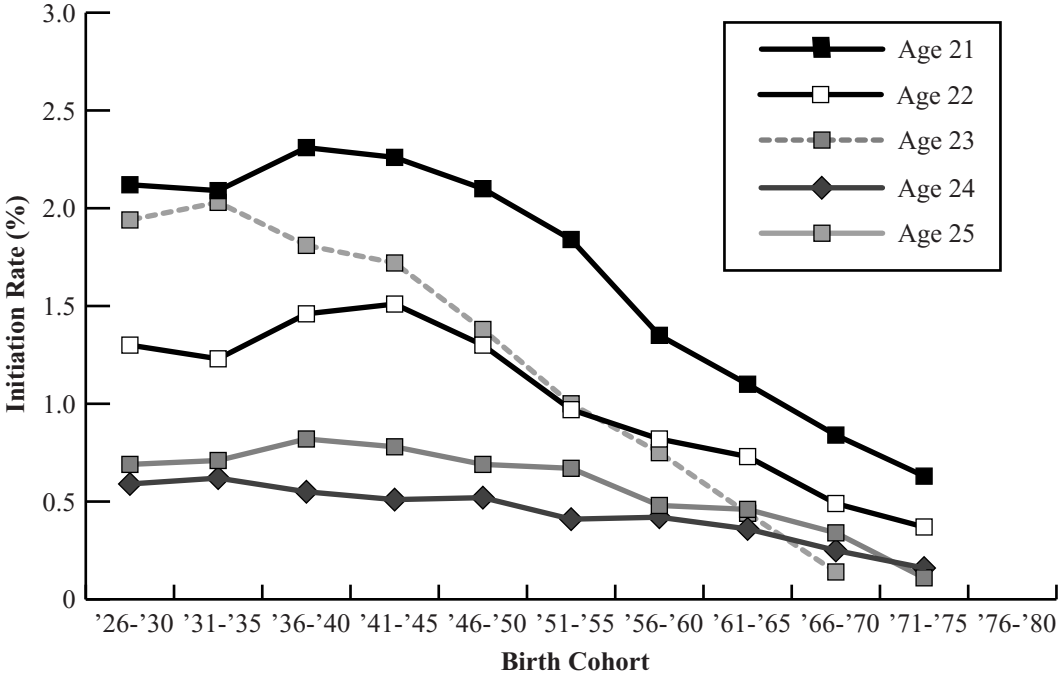


Table 8-1

Cigarette Smoking Initiation Rates with 95% Confidence Intervals, by 5-Year Birth Cohorts and Age, for CPS 1992/1993 and CPS 1995/1996: United States—Males

	Initiation Rate (%) by Age																	
Birth	**Age 8**		**Age 9**		**Age 10**		**Age 11**		**Age 12**		**Age 13**		**Age 14**		**Age 15**		**Age 16**	
Cohort	Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)	
‘26-‘30	0.67	0.16	0.25	0.10	0.51	0.14	0.28	0.10	1.50	0.24	1.34	0.23	2.66	0.33	4.25	0.42	6.13	0.53
‘31-‘35	0.59	0.15	0.29	0.11	0.53	0.14	0.41	0.13	1.37	0.23	1.10	0.21	2.59	0.33	4.18	0.43	5.50	0.51
‘36-‘40	0.66	0.15	0.27	0.10	0.49	0.13	0.27	0.10	1.36	0.22	1.61	0.25	2.47	0.31	3.90	0.40	5.59	0.49
‘41-‘45	0.48	0.12	0.22	0.08	0.39	0.11	0.28	0.09	1.34	0.20	1.49	0.21	2.60	0.28	3.87	0.35	5.48	0.43
‘46-‘50	0.36	0.09	0.19	0.06	0.31	0.08	0.23	0.07	1.03	0.15	1.31	0.17	1.90	0.21	3.14	0.27	4.89	0.35
‘51-‘55	0.25	0.07	0.16	0.06	0.23	0.07	0.17	0.06	0.75	0.12	0.94	0.14	1.74	0.19	3.03	0.25	4.54	0.31
‘56-‘60	0.20	0.06	0.12	0.05	0.21	0.06	0.21	0.06	0.83	0.12	1.09	0.14	1.67	0.18	2.95	0.24	4.21	0.29
‘61-‘65	0.21	0.06	0.11	0.05	0.24	0.07	0.25	0.07	0.80	0.13	1.10	0.15	1.50	0.18	2.53	0.23	3.49	0.28
‘66-‘70	0.19	0.07	0.08	0.04	0.18	0.07	0.15	0.06	0.52	0.11	0.89	0.15	1.38	0.19	2.10	0.23	3.41	0.29
‘71-‘75	0.28	0.10	0.09	0.05	0.22	0.09	0.25	0.09	0.64	0.15	0.97	0.18	1.51	0.23	2.40	0.29	3.50	0.36
‘76-‘80	0.15	0.08	0.06	0.05	0.16	0.09	0.22	0.10	0.64	0.17	1.14	0.23	1.62	0.27	1.89	0.30	2.81	0.45
Slope	-0.05*		-0.02*		-0.04*		-0.01		-0.10*		-0.05*		-0.15*		-0.25*		-0.34*	
Scaled Slope	-0.08*		-0.08*		-0.07*		-0.04		-0.07*		-0.03*		-0.05*		-0.05*		-0.05*	

	Initiation Rate (%) by Age																	
Birth	**Age 17**		**Age 18**		**Age 19**		**Age 20**		**Age 21**		**Age 22**		**Age 23**		**Age 24**		**Age 25**	
Cohort	Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)		Rate ± CI (%)	
‘26-‘30	4.95	0.52	8.95	0.72	3.32	0.50	5.05	0.64	3.50	0.57	2.45	0.50	1.01	0.33	0.92	0.32	2.19	0.50
‘31-‘35	4.15	0.47	8.20	0.68	3.71	0.52	5.68	0.66	3.82	0.59	2.61	0.51	0.86	0.31	0.54	0.24	1.88	0.46
‘36-‘40	4.56	0.48	7.81	0.64	3.84	0.51	5.36	0.62	3.28	0.52	2.22	0.45	1.02	0.31	0.73	0.27	2.13	0.46
‘41-‘45	4.22	0.41	7.67	0.57	3.62	0.44	4.82	0.52	3.70	0.49	2.04	0.38	0.88	0.26	0.57	0.21	1.34	0.32
‘46-‘50	3.36	0.31	7.20	0.46	4.04	0.38	4.19	0.41	2.59	0.34	1.60	0.28	0.78	0.20	0.49	0.16	1.16	0.24
‘51-‘55	3.63	0.30	6.25	0.40	2.92	0.30	3.59	0.34	1.85	0.26	1.20	0.21	0.61	0.15	0.38	0.12	1.01	0.20
‘56-‘60	3.80	0.29	4.92	0.35	2.12	0.24	2.49	0.27	1.32	0.20	0.99	0.18	0.47	0.12	0.37	0.11	0.68	0.15
‘61-‘65	2.62	0.25	3.75	0.31	1.83	0.23	1.85	0.23	1.18	0.19	0.96	0.17	0.55	0.13	0.38	0.11	0.53	0.13
‘66-‘70	2.64	0.27	3.54	0.33	1.83	0.25	1.59	0.23	1.01	0.19	0.63	0.15	0.32	0.12	0.27	0.11	0.16	0.09
‘71-‘75	2.77	0.33	3.28	0.40	1.57	0.31	1.20	0.30	0.66	0.26	0.57	0.31	0.00	0.00	0.00	0.00	0.00	0.00
‘76-‘80	2.02	0.56	1.85	0.72	0.63	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Slope	-0.25*		-0.72*		-0.31*		-0.57*		-0.40*		-0.25*		-0.09*		-0.06*		-0.25*	
Scaled Slope	-0.05*		-0.07*		-0.07*		-0.08		-0.09*		-0.09*		-0.08*		-0.08*		-0.10*	

**Indicate significance at 0.05 level.*

Table 8-2

Cigarette Smoking Initiation Rates with 95% Confidence Intervals, by 5-Year Birth Cohorts and Age, for CPS 1992/1993 and CPS 1995/1996: United States—Females

	Initiation Rate (%) by Age																	
Birth	**Age 8**		**Age 9**		**Age 10**		**Age 11**		**Age 12**		**Age 13**		**Age 14**		**Age 15**		**Age 16**	
Cohort	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)
‘26-‘30	0.08	0.05	0.02	0.02	0.03	0.03	0.07	0.04	0.22	0.08	0.36	0.10	0.57	0.13	1.23	0.19	2.37	0.26
‘31-‘35	0.11	0.06	0.08	0.05	0.11	0.06	0.10	0.05	0.30	0.09	0.38	0.11	0.61	0.14	1.34	0.20	2.71	0.29
‘36-‘40	0.14	0.06	0.06	0.04	0.07	0.04	0.07	0.04	0.39	0.10	0.55	0.12	0.90	0.16	1.78	0.22	2.98	0.29
‘41-‘45	0.07	0.04	0.06	0.04	0.09	0.04	0.11	0.05	0.42	0.10	0.77	0.13	1.03	0.15	2.02	0.21	3.71	0.29
‘46-‘50	0.07	0.03	0.04	0.03	0.07	0.04	0.13	0.05	0.45	0.09	0.67	0.11	0.91	0.13	1.66	0.17	2.90	0.23
‘51-‘55	0.08	0.03	0.04	0.03	0.09	0.04	0.10	0.04	0.38	0.08	0.69	0.10	1.02	0.13	2.08	0.18	3.15	0.23
‘56-‘60	0.11	0.04	0.05	0.03	0.10	0.04	0.15	0.05	0.64	0.09	1.20	0.13	1.53	0.15	2.68	0.20	4.46	0.26
‘61-‘65	0.09	0.04	0.09	0.04	0.12	0.04	0.19	0.05	0.79	0.11	1.21	0.13	1.71	0.16	2.81	0.21	4.09	0.26
‘66-‘70	0.12	0.05	0.12	0.05	0.10	0.04	0.23	0.06	0.70	0.11	1.23	0.15	1.43	0.16	2.59	0.22	3.51	0.27
‘71-‘75	0.11	0.05	0.11	0.05	0.12	0.06	0.23	0.08	0.80	0.14	1.17	0.17	1.85	0.22	2.68	0.27	3.65	0.32
‘76-‘80	0.12	0.07	0.06	0.05	0.13	0.07	0.27	0.10	0.78	0.18	1.04	0.21	1.61	0.26	2.04	0.30	2.56	0.40
Slope	0.01		0.01		0.01		0.03*		0.03		-0.03		0.03		-0.11		-0.39*	
Scaled Slope	-0.06		0.15		0.06		0.22*		0.05		-0.02		0.02		-0.04		-0.08	

	Initiation Rate (%) by Age																	
Birth	**Age 17**		**Age 18**		**Age 19**		**Age 20**		**Age 21**		**Age 22**		**Age 23**		**Age 24**		**Age 25**	
Cohort	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)	Rate	± CI (%)
‘26-‘30	1.91	0.24	4.11	0.36	1.82	0.25	2.97	0.33	2.12	0.29	1.30	0.23	0.69	0.17	0.59	0.16	1.94	0.29
‘31-‘35	2.38	0.28	4.48	0.39	2.18	0.29	3.81	0.38	2.09	0.30	1.23	0.23	0.71	0.18	0.62	0.17	2.03	0.31
‘36-‘40	2.28	0.27	4.99	0.40	2.50	0.30	3.97	0.38	2.31	0.31	1.46	0.25	0.82	0.19	0.55	0.16	1.81	0.29
‘41-‘45	2.50	0.25	4.96	0.36	2.71	0.28	3.93	0.35	2.26	0.28	1.51	0.23	0.78	0.17	0.51	0.14	1.72	0.26
‘46-‘50	2.22	0.21	4.96	0.31	2.71	0.24	3.55	0.29	2.10	0.23	1.30	0.19	0.69	0.14	0.52	0.12	1.38	0.20
‘51-‘55	2.62	0.21	5.07	0.30	2.34	0.22	3.18	0.26	1.84	0.21	0.97	0.15	0.67	0.13	0.41	0.10	1.00	0.16
‘56-‘60	3.35	0.24	4.93	0.30	2.09	0.21	2.40	0.22	1.35	0.17	0.82	0.14	0.48	0.11	0.42	0.10	0.75	0.13
‘61-‘65	3.24	0.24	4.19	0.28	1.88	0.20	1.84	0.20	1.10	0.16	0.73	0.13	0.46	0.11	0.36	0.09	0.44	0.10
‘66-‘70	3.00	0.25	3.59	0.29	1.69	0.21	1.43	0.19	0.84	0.15	0.49	0.12	0.34	0.10	0.25	0.09	0.14	0.08
‘71-‘75	2.95	0.30	2.95	0.33	1.32	0.24	1.00	0.23	0.63	0.21	0.37	0.21	0.11	0.14	0.16	0.23	0.00	0.00
‘76-‘80	2.14	0.52	1.77	0.62	0.79	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Slope	-0.20*		-0.37*		-0.25*		-0.47*		-0.23*		-0.16*		-0.09		-0.08*		-0.31*	
Scaled Slope	-0.05*		-0.12*		-0.11*		-0.16*		-0.16*		-0.16*		-0.15		-0.16*		-0.29*	

**Indicate significance at 0.05 level.*

Have Race/Ethnic-Specific Initiation Rates Changed in Recent Cohorts?

Initiation rates for the different race/ethnic groups are presented in Chapter 2 and show that initiation is markedly different over time for adolescents from different racial/ethnic backgrounds. In this section, age-specific initiation rates by race/ethnicity for the three most recent birth cohorts are examined. Age- and race-specific initiation rates are presented for these birth cohorts in Figure 8-3 (males) and Figure 8-4 (females). In general, age-specific initiation rates were lower for Hispanic and African American adolescents of both genders compared to those of non-Hispanic White adolescents. There were no clear differences between age-specific initiation rates for Hispanic and African American adolescents, but there was a suggestion that Hispanic females were somewhat more likely to initiate smoking at ages greater than 15 years than were African American females.

These lower age-specific initiation rates among African American adolescents are in apparent contrast with the higher adult smoking prevalences among African Americans compared to non-Hispanic White adults. An explanation of this anomaly is presented in Figures 8-5 and 8-6. These two figures present the prevalence of ever-smoking by attained age for non-Hispanic White and African American males (Figure 8-5) and females

Figure 8-3
Age-Specific Initiation Rates for Recent Birth Cohorts of White, African American, and Hispanic Males

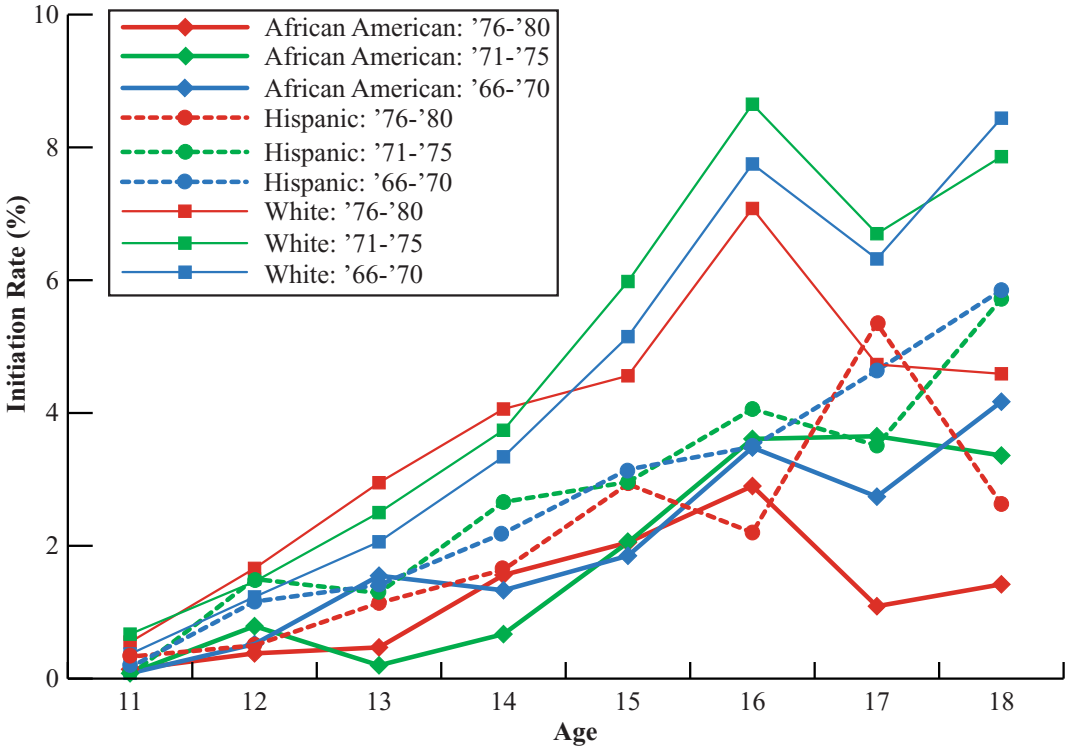
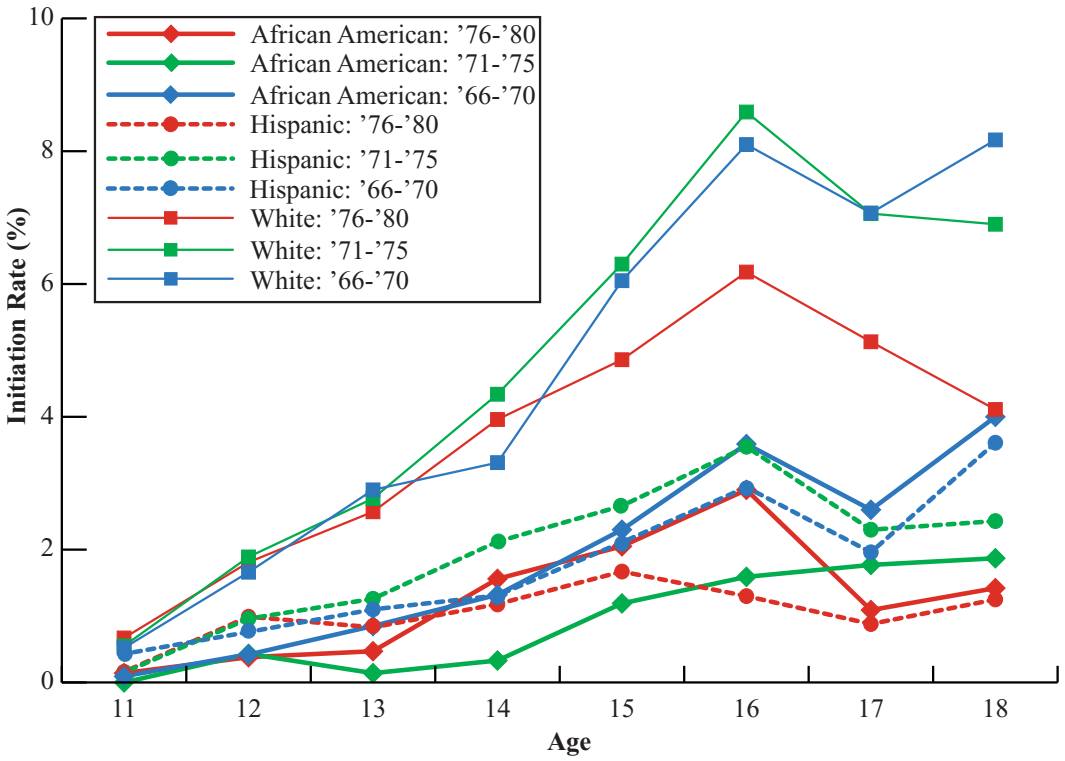


Figure 8-4
Age-Specific Initiation Rates for Recent Birth Cohorts of White, African American, and Hispanic Females

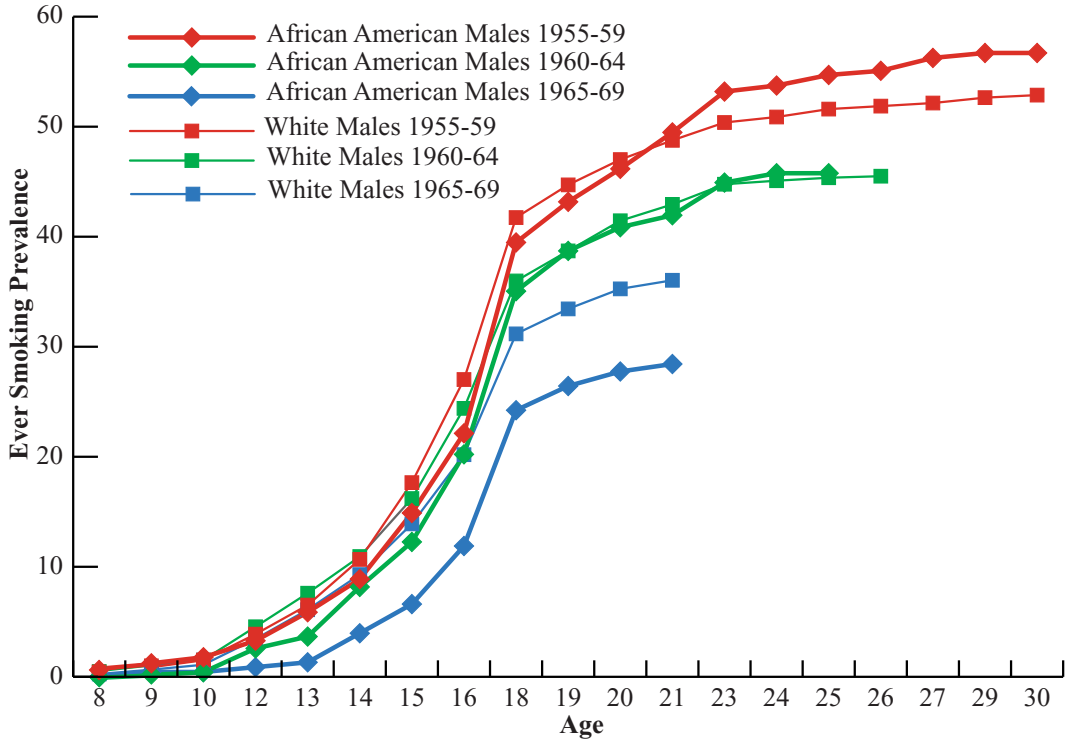


(Figure 8-6). African American ever-smoking prevalence lags behind that of non-Hispanic White males during adolescence, but increases much more rapidly during young adulthood. By age 25 years, the more rapid increase in ever-smoking prevalence among African American young adults results in the rates of ever-smoking prevalence that exceed those of non-Hispanic Whites.

A similar pattern is evident when African American female ever-smoking prevalence rates are compared to those of non-Hispanic White females. There is an even more pronounced lag in the rise of ever-smoking prevalence rates among African American females during adolescence, and the rates of rise in prevalence are also higher during young adulthood compared to non-Hispanic White females. However, among females, the more rapid rise in smoking prevalence during young adulthood does not result in smoking prevalences that exceed those of non-Hispanic White females.

What these analyses suggest is that the period of vulnerability to smoking initiation is longer for African American populations; it extends beyond adolescence and well into young adulthood. These data also suggest that the recent gains in lowering African-American smoking prevalence among

Figure 8-5
Delayed Onset Only among the Most Recent Cohort of Black Males

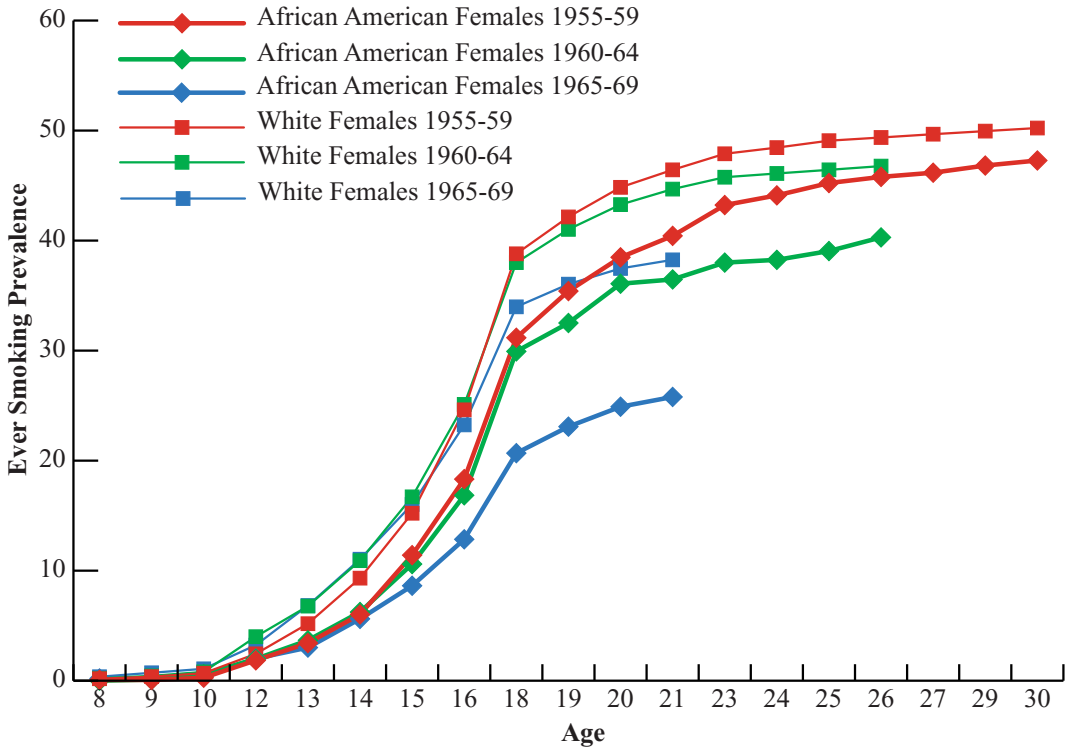


adolescents should be observed well into the early adult years before they can be counted as successful reductions in the fraction of African Americans who become cigarette smokers.

Are Age-Specific Initiation Rates Different by Level of Educational Attainment?

Age-specific initiation rates by birth cohort are presented for those with less than 12 years of education compared to those with at least 12 years of education. Among males with more than 12 years of education (Figure 8-7), initiation rates are higher for each birth cohort at each age compared to those who completed less than 12 years of education. The pattern among females is more complicated (Figure 8-8). For ages 16 and below, the pattern is similar to that for males, with those with 12 or more years of education showing a marked difference in rates of initiation for each birth cohort at each age compared to those who completed less than 12 years of education. However, initiation rates at ages 17 and 18 show no clear relationship to level of educational attainment. These analyses suggest that level of educational attainment may remain an important determinant of adolescent male initiation throughout adolescence, but that it is only an important determinant of adolescent initiation for females during early and mid-adolescence (age 16 and younger).

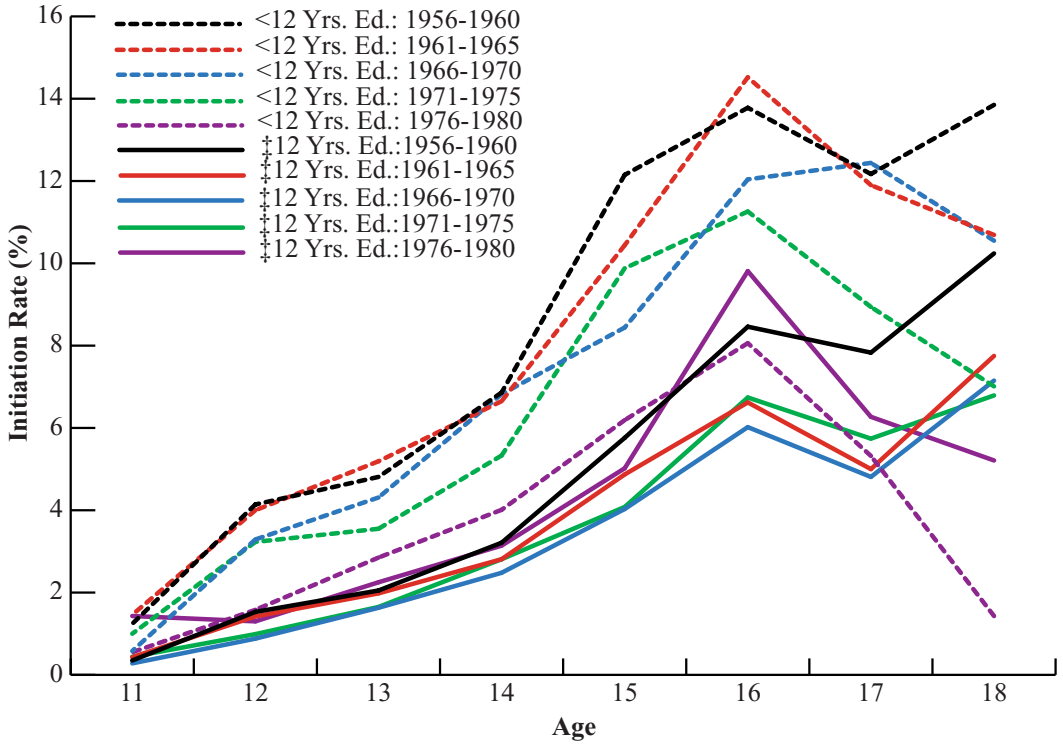
Figure 8-6
Delay Onset of Initiation among Black Females



DISCUSSION The data presented in this chapter are derived from surveys of adults using the adult definition of smoking and, therefore, are measures of initiation and prevalence among those who have actually become cigarette smokers as defined for most tobacco control programs. The questions raised by the use of a very sensitive adolescent definition of smoking (any smoking in the last month), and by the wide differences in prevalence estimates from school-based and telephone surveys, do not influence these measures. These estimates of initiation over time can, therefore, be used to compliment the cross-sectional survey data derived from individuals during adolescence. Issues of differential recall over time, differential mortality for smokers and never-smokers, and demographic changes in the population over time can bias these reconstructed estimates; therefore, the estimates that result may not match those that would be generated from a cross-sectional sample of the population taken in the year of the estimate.

In general, the estimates presented in this chapter mirror the cross-sectional data presented in other chapters in this volume, supporting the legitimacy of adolescent definitions of smoking as predictors of adult smoking behavior.

Figure 8-7
Age-Specific Initiation Rates for Males by Education Level and Birth Cohort

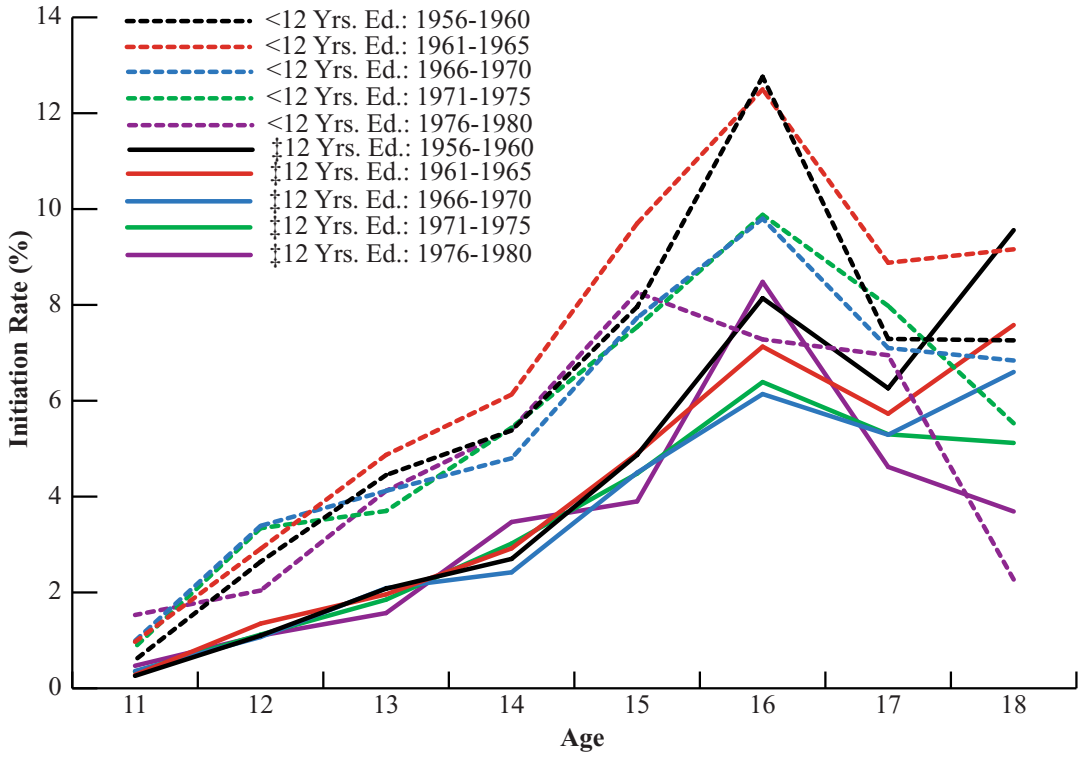


SUMMARY Age-specific rates of smoking initiation during adolescence derived from sequential birth cohorts of adults show that initiation rates have declined over time at all ages for males, with a steeper rate of decline across cohorts for initiation rates at ages over 16 years. Initiation rates among females rose across sequential cohorts with little evidence for a decline in initiation over time for ages and 16 years and under. At ages 16 and older, there is a trend of increasing rates of initiation for cohorts that were born prior to the early 1960s with a decline for subsequent cohorts.

Initiation rates during adolescence are lower for African American and Hispanic adolescents at all ages. However, initiation continues much later into young adulthood among African American adolescents with the result that they ultimately reach—and exceed, for African American males—the ever-smoking prevalence rates of non-Hispanic White populations.

Initiation rates among those with 12 or more years of education, compared to those with less educational attainment, are lower at all ages for males. The same trend is evident for females aged 16 years and younger. However, for initiation at ages 17 and 18 among females, there is little difference in rates of initiation evident for the two categories of educational attainment.

Figure 8-8
Age-Specific Initiation Rates for Females by Education Level and Birth Cohort



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Pattern of Adolescent Initiation Rates over Time: National and California Data

Christy M. Anderson, David M. Burns

INTRODUCTION This chapter presents data on trends in adolescent smoking initiation nationally and in California. Historical trends in adolescent initiation are presented for the nation and contrasted with those occurring in California. In 1988, Californian voters passed Proposition 99, which raised the tax on a pack of cigarettes by 25 cents and allotted 20 percent of the revenues to anti-tobacco education and prevention programs. Shortly after Proposition 99 was implemented, cigarette consumption and smoking prevalence in California declined (Bal *et al.*, 1990; Breslow and Johnson, 1993; Burns *et al.*, 1992; Burns, 1994; Elder *et al.*, 1996; Hu *et al.*, 1994; Pierce *et al.*, 1991). In this chapter, the impact of this proposition, and of the programs funded by it, on the initiation of cigarette smoking by Californian adolescents is examined.

Definitions used to define adolescent and adult smokers differ. Adolescent-based surveys define smokers as respondents who have smoked at least one cigarette in the last 30 days; the definitions are intended to be sensitive enough to capture respondents who are experimenting with cigarettes and are in the early stages of beginning smoking. Adult-based surveys define smokers as respondents who have smoked at least 100 cigarettes and currently smoke every day or some days. Adult-based surveys are intended to identify those respondents who are regular cigarette smokers—either occasionally or daily—and exclude those who are experimenting or in early initiation. Since not all those who first use cigarettes as adolescents become adult cigarette smokers, adolescent-based surveys may include as smokers those individuals who will be defined as never-smokers in adult surveys. To define initiation rates during adolescence among those who become adult smokers, cross-sectional surveys of adults are used to reconstruct past rates of initiation (Burns *et al.*, 1995; Cummings and Shah, 1995; Gilpin and Pierce, 1997; Pierce *et al.*, 1994). These cross-sectional surveys use the adult definition of ever-smoking and reconstruct adolescent initiation rates using questions that ask for the age at which respondents started smoking regularly, the current age of the respondent, and the survey year.

For this chapter, adolescent initiation rates for each calendar year were reconstructed retrospectively from subjects' responses on the Current Population Survey (CPS) of adults. All ever-smokers were asked the age at which they remembered beginning to smoke regularly. From their current age and the year of the survey, the year at which they initiated could be cal-

culated. Prevalence rates also could be reconstructed using the age at which respondents recalled beginning to smoke and the time they reported quitting. The pattern of U.S. initiation rates from 1940 to 1992 were examined and compared for males and females and for older and younger adolescents. The initiation rates of male and female adolescents in California were also compared with those of the rest of the nation. The rates were computed for males and females by three age groups: 12- to 17-year-olds, 12- to 14-year-olds, and 15- to 17-year-olds.

METHODS

Data

To generate retrospective initiation and prevalence rates, two sets of cross-sectional surveys were used from the Tobacco Use Surveys that periodically supplement the Census Bureau's Current Population Surveys (CPS). One set was administered in September, 1992; January, 1993; and May, 1993. The other was administered in September, 1995; January, 1996; and May, 1996. For the CPS, the Census Bureau collects labor force and demographic information monthly from about 50,000 households from the civilian, non-institutional population, surveying household members who are 15 years of age or older; the details of the survey methodology are described elsewhere (Bureau of the Census, 1978). All respondents are weighted to reflect the actual civilian, non-institutional population of the United States and of each individual state.

The 1992/1993 and 1995/1996 surveys interviewed a combined total of 623,613 people who were 15 to 84 years old at the time of the survey. Of these respondents, 68.5 percent were self-respondents, and only the answers from these respondents were used for this analysis. Another 1.5 percent were eliminated from the analysis due to unanswered questions, leaving 417,550 respondents available for analysis.

Cigarette sales and advertising data were used to make comparisons with initiation rates over time. Cigarette sales data were drawn from the Maxwell consumer report, which reports annual cigarette sales for each major cigarette brand since 1925 (Maxwell, Jr., 1994). Additionally, quantitative estimates were collected of the number of cigarette advertisements appearing in 11 popular magazines available from the beginning of the century to 1996. For each advertisement, the cigarette brand name, the title of the magazine, and the date of the magazine issue were compiled, among other facts. These data were summarized to present the average number of advertisements per magazine issue for each calendar year for the Virginia Slims brand of cigarettes.

Calculation of Initiation and Prevalence Rates

Each person's smoking status for each calendar year prior to the date of the survey was reconstructed based upon the respondent's recollection of starting and stopping smoking. All respondents were asked, "Has [respondent] smoked at least 100 cigarettes in his/her entire life?" Those respondents who answered "no" were considered never-smokers. Those respondents who answered "yes" were asked, "How old was [respondent] when he/she started smoking cigarettes fairly regularly?" This question was used to determine the age at initiation of smoking. Respondents who had smoked at least 100 cigarettes were also asked, "Does [respondent] now smoke cigarettes every

day, some days, or not at all?" Those respondents who answered "every day" or "some days" were considered current smokers; those who responded "not at all" were former smokers.

All calculations to determine the year in which respondents were smoking were based upon responses given in the survey regarding the survey administration date, the initiation age, and the age. The survey administration date was represented as a partial year, using both the year and month of the survey in this calculation (*e.g.*, September 1992 became 1992.75). Additionally, 6 months were added to all age responses to account for the distribution of birthdays occurring over the entire calendar year. These age and calendar-year calculations were then used, together with the questions on age of initiation, to reconstruct, for each calendar year, which adolescents were not smoking and which ones had begun smoking during that same year. For each calendar year, the number of adolescents who began that year as non-smokers represented the denominator of the initiation rate. The numerator of the rate was the number of adolescents who initiated during that calendar year.

The survey subjects were 15 to 84 years old at the time of the survey, the last of which was administered in 1996. Since the rates for each calendar year measured smoking initiation and prevalence of 12- to 17-year-olds, the last year all ages were present was 1993. The only survey available for the 1993 analysis was the May 1996 survey, providing a sample size of only about 200 for each gender (compared to 500 in 1992, and 950 in 1990). The small sample size for 1993 offered unstable estimates of the initiation and prevalence rates, so the last year from which the analysis was performed was 1992.

While calculating the initiation rates for each calendar year, the distribution of ages reflected in the original sample was preserved. Since the distribution of 12- to 17-year-olds varied between calendar years, each initiation rate for each calendar year was standardized to the birth-year distribution of all respondents who would have been between the ages of 12 and 17 in that calendar year. Likewise, to make similar comparisons between ethnically diverse samples, the rates for each calendar year were standardized by ethnicity to the ethnic distribution of the United States represented by the 1995/1996 CPS. When comparing the initiation rates across the different ethnic groups, the rates were smoothed using the loess procedure in S-Plus (MathSoft, Inc., 1999; Cleveland, 1979). Twenty percent of the rates were used to quadratically fit each rate, and each rate was weighted to the sample size used to calculate that rate.

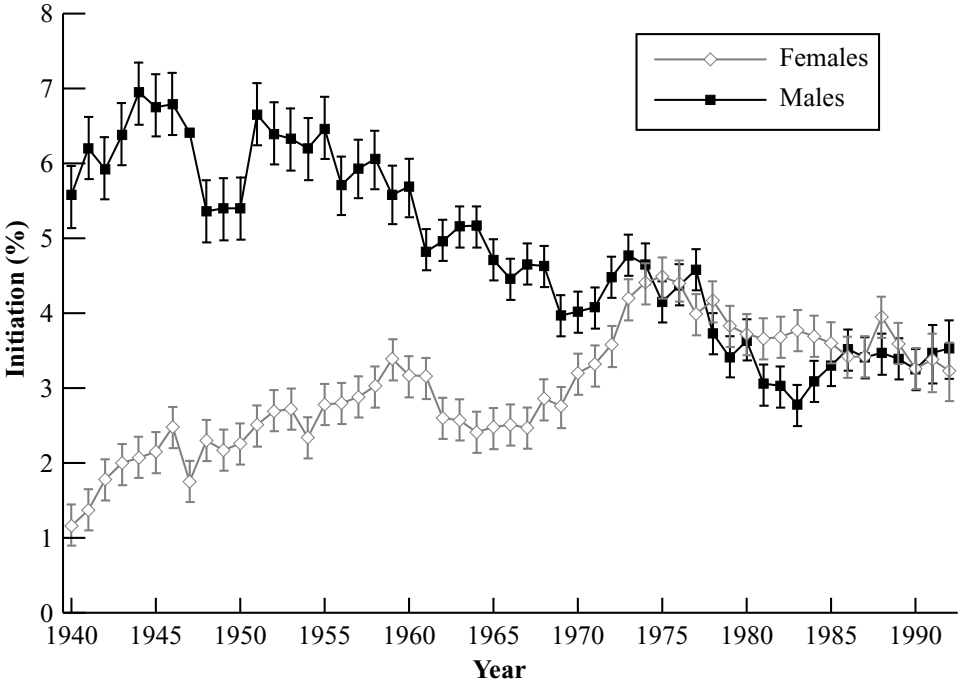
The CPS weights were used to calculate the initiation rates, and those rates and their corresponding sample sizes were used to calculate exact 95-percent binomial confidence intervals (Snedecor and Cochran, 1989).

RESULTS

National Male and Female Initiation Rates

Initiation rates of U.S. adolescents, aged 12 to 17, were compared between males and females. Male adolescents initiated smoking at a higher rate than did female adolescents prior to the mid-1970s (Figure 9-1). Specifically, from 1940 to 1973, boys initiated cigarette smoking at a significantly

Figure 9-1
Incidence of Smoking among 12- to 17-Year-Old Adolescents in the United States, 1940-1993



greater rate than did girls. From 1974 to 1980, boys and girls initiated at rates not significantly different from one another. Between 1981 and 1984, initiation rates for boys were significantly lower than for girls. Initiation rates have been similar for boys and girls since 1985. These observations are consistent with those reported elsewhere in this volume and in previous literature (Fiore *et al.*, 1989; see Chapter 2).

Smoking initiation rates among male adolescents have generally decreased since 1940 (Figure 9-1). This decline in the initiation rate reached its lowest level in 1983. Since that time, initiation rates among adolescent males have increased.

Unlike initiation rates among male adolescents, initiation rates among female adolescents have generally increased since 1940. Female adolescent initiation rates increased from 1940 to 1959, but declined during the early 1960s. Female adolescent initiation rates increased sharply from the late 1960s to the mid 1970s, then declined from the late 1970s to the early 1980s.

As previously reported (Burns, 1994; Pierce *et al.*, 1994; Pierce and Gilpin, 1995), the dramatic increase in girls' initiation rates in the late 1960s coincided with Philip Morris' introduction of Virginia Slims cigarettes (Figure 9-2). Sales of Virginia Slims rose from its inception in 1968 to a peak

in 1981. Contemporaneously, the number of Virginia Slims' cigarette advertisements in popular magazines increased from 1968 to 1987. In fact, the introduction of Virginia Slims was so successful that this brand has commanded up to 3 percent of the market share of cigarette sales (Kluger, 1997).

Initiation rates of 12- to 17-year-old males and females have also been computed for non-Hispanic White, Hispanic, and African American adolescents. Annual initiation rates and the 95-percent confidence intervals appear at the end of the chapter. Figures 9-3 and 9-4 display the loess-smoothing trend lines for male and female adolescents by ethnicity. Since the overall population of the United States is comprised mostly of Whites, initiation rates among White male and female adolescents are similar to initiation rates for males and females overall. In 1940, initiation rates among all three ethnic groups of adolescents were not significantly different for males or females. However, by 1992, White male and female adolescents initiated smoking at a significantly higher rate than the corresponding African American and Hispanic males and females aged 12 to 17 years.

From 1940 to 1992, White male adolescents generally initiated cigarette smoking at higher rates than did Hispanic or African American male adolescents. On the whole, initiation rates among male adolescents of all three ethnicities declined during this period. The overall patterns of initiation among Hispanic and African American male adolescents were similar until recent years. In the early 1980s, initiation rates among African American males declined steeply while White and Hispanic male adolescent initiation rates increased. By the late 1980s, these trends had changed with Hispanic male adolescent initiation rates decreasing and African American and White initiation rates increasing.

Initiation rates among White and Hispanic female adolescents generally increased from 1940 to 1992, although there was less of an increase among Hispanic female adolescents. In contrast, adolescent female initiation rates among African Americans have been decreasing since the mid 1970s and do not show evidence of the recent increase noted among African American male adolescents. The recent increase in African American male initiation rates has returned their rates of initiation to a level similar to those for African American females.

Comparison of Younger and Older Adolescent Initiation Nationally

U.S. initiation rates were computed for two separate age groups of adolescents: 12- to 14-year-olds and 15- to 17-year-olds. The initiation rates of both younger and older male adolescents declined from 1940 to 1992, but the decline was much greater among older boys than among younger boys (Figure 9-5). The calendar-year variability of initiation rates among male adolescents is largely explained by calendar-year variability among older boys, suggesting that temporal events have greater influence, both positively and negatively, on older male adolescents than on younger male adolescents.

Female adolescent initiation rates (Figure 9-6) revealed a rise in initiation rates since 1940 for both younger and older adolescents, with a significant increase in initiation among both groups starting around the mid-

Figure 9-2
Incidence of Smoking among 12- to 17-Year-Old Adolescent Females Compared to Virginia Slims' Sales and Advertisement

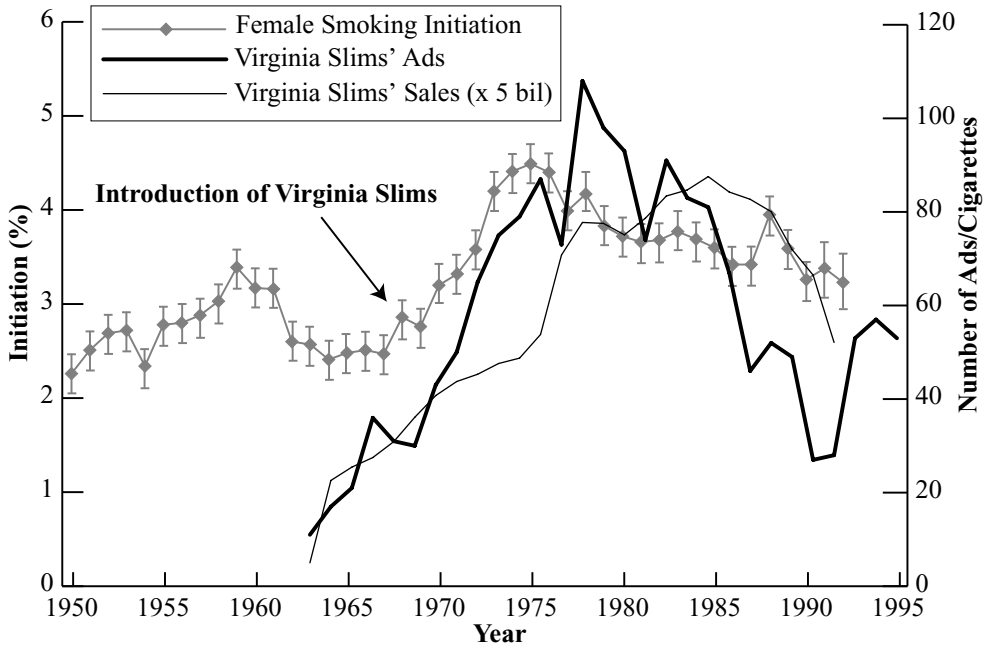


Figure 9-3
Cigarette Smoking Initiation among Adolescent Males 12 to 17 Years Old by Ethnicity [Weighted by Sample Size—Trendlines Fitted with Loess Algorithm (Quadratic)]

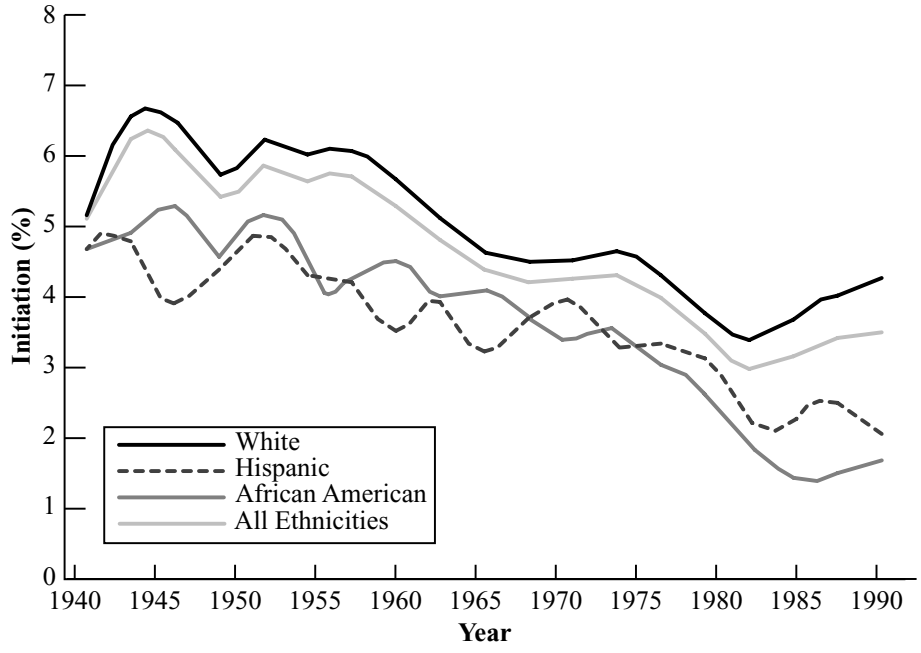


Figure 9-4
Cigarette Smoking Initiation among Adolescent Females 12 to 17 Years Old by Ethnicity [Weighted by Sample Size—Trendlines with Loess Algorithm (Quadratic)]

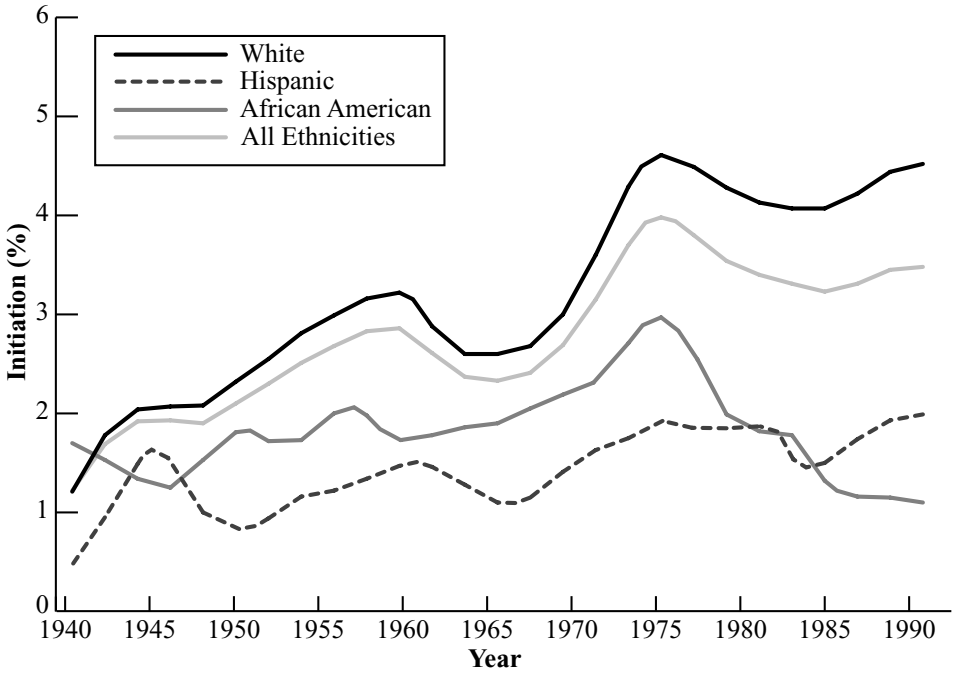
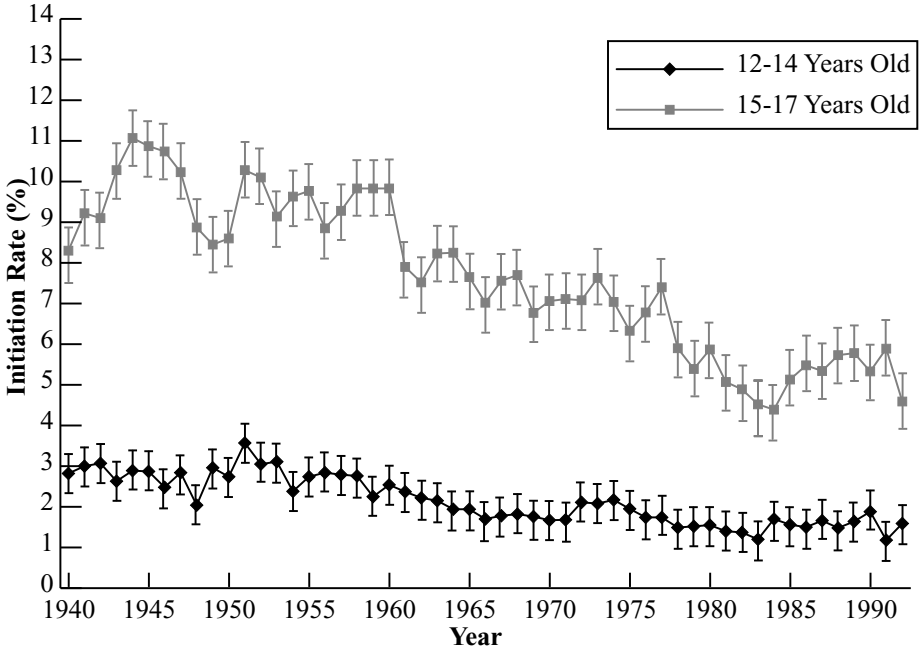


Figure 9-5
Comparison of the Smoking Initiation among Older and Younger Male Adolescents in the United States



1960s. The pattern of increases and decreases in initiation rates by calendar year was similar among older and younger female adolescents, but the fluctuations were more pronounced among the older girls. The pattern of initiation rates over time for female adolescents aged 12 to 17 can be attributed to the increases and decreases in initiation rates among both younger (12 to 14 years of age) and older (15 to 17 years of age) girls. Furthermore, the increase in initiation rates that coincided with the Virginia Slims' advertising campaign was present in both age groups of girls, but not in either age group of boys.

Comparison of California and the Rest of the Nation

Initiation rates from 1978 to 1992 were calculated for California and for the rest of the nation. These rates were evaluated for 12- to 14-year-old male and female adolescents and for 15- to 17-year-old male and female adolescents. They were also contrasted before and after 1988, the year in which Proposition 99 was passed.

Among younger male adolescents, there was no significant difference in smoking initiation rates between California and the rest of the nation, either before or after 1988 (Figure 9-7). However, for older male adolescents, some differences were apparent (Figure 9-8). Before 1988, there was no significant difference in initiation rates between male adolescents in California and in the rest of the nation; however, after 1988, the initiation rates of older Californian boys declined significantly and were significantly lower than rates in the rest of the nation in 1991. This difference was no longer statistically significant in 1992. Smoking prevalence rates among this older group of adolescents (not shown) followed a pattern similar to the initiation rates, but differences were not statistically significant.

Initiation rates among younger girls were not significantly different between those in California and the rest of the nation, and there did not appear to be a significant change in the initiation rates in California among younger female adolescents after 1988 (Figure 9-9).

Before standardization by ethnicity, initiation rates among older Californian girls were lower than among girls in the rest of the nation, and most of these rates were significantly different. After standardization for ethnicity, the difference in initiation rates between older girls in California and the rest of the United States disappeared (Figure 9-10). The lower rates in California, before standardization, appeared to be attributable to the lower rates of smoking initiation among the different ethnic groups that comprised California's population in contrast to the rest of the nation. With or without standardization, there did not appear to be a difference between initiation rates among older girls in California following the passage of Proposition 99 in 1988.

SUMMARY

The analysis had some limitations because rather than surveying the populations present in each year and calculating corresponding rates, respondents were surveyed in the 1990s and their rates were reconstructed retrospectively for each year from 1940 to 1992. Because the surveys were conducted in the recent past, the survey samples reflected the distribution of ethnic groups present today. Large proportions of the ethnic groups in today's population have immigrated to the United States since 1940, so any

Figure 9-6
Comparison of Smoking Initiation among Older and Younger Female Adolescents in the United States

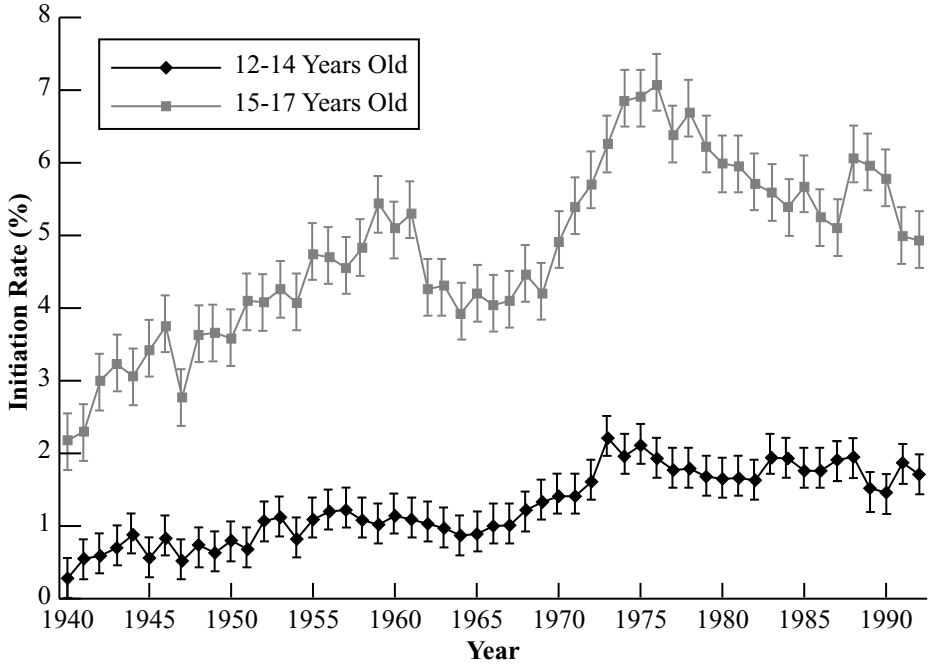


Figure 9-7
Comparison of Smoking Initiation Rates of California to the Rest of the Nation among 12- to 14-Year-Old Male Adolescents

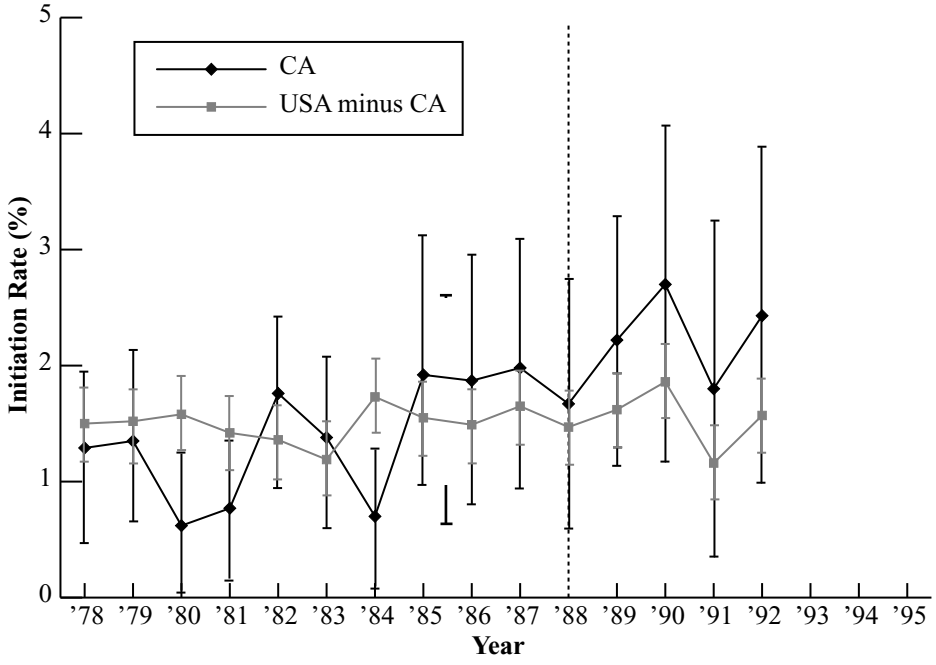


Figure 9-8
Comparison of Smoking Initiation Rates of California to the Rest of the Nation among 15- to 17-Year-Old Male Adolescents

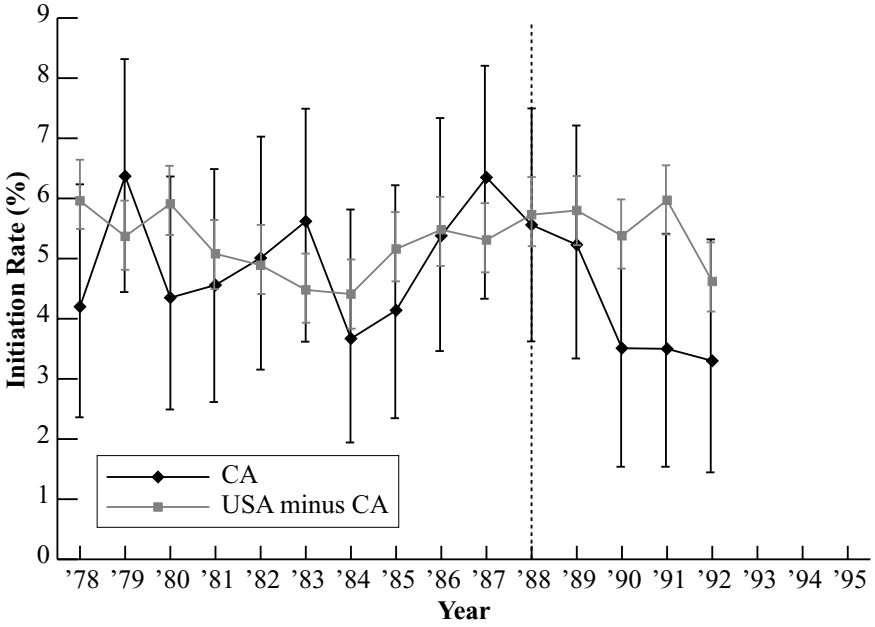


Figure 9-9
Comparison of Smoking Initiation Rates of California to the Rest of the Nation among 12- to 14-Year-Old Female Adolescents

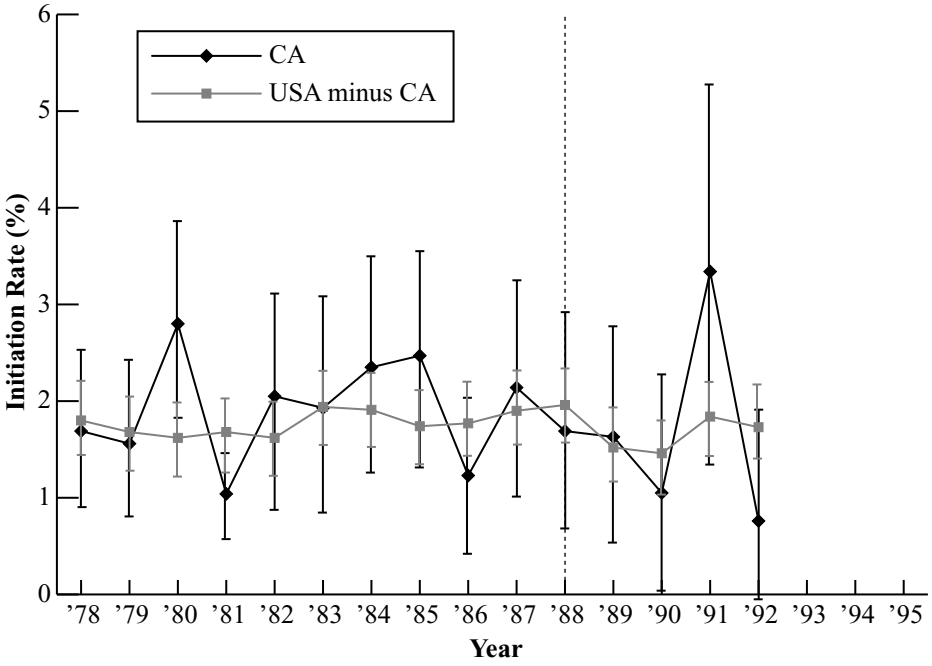
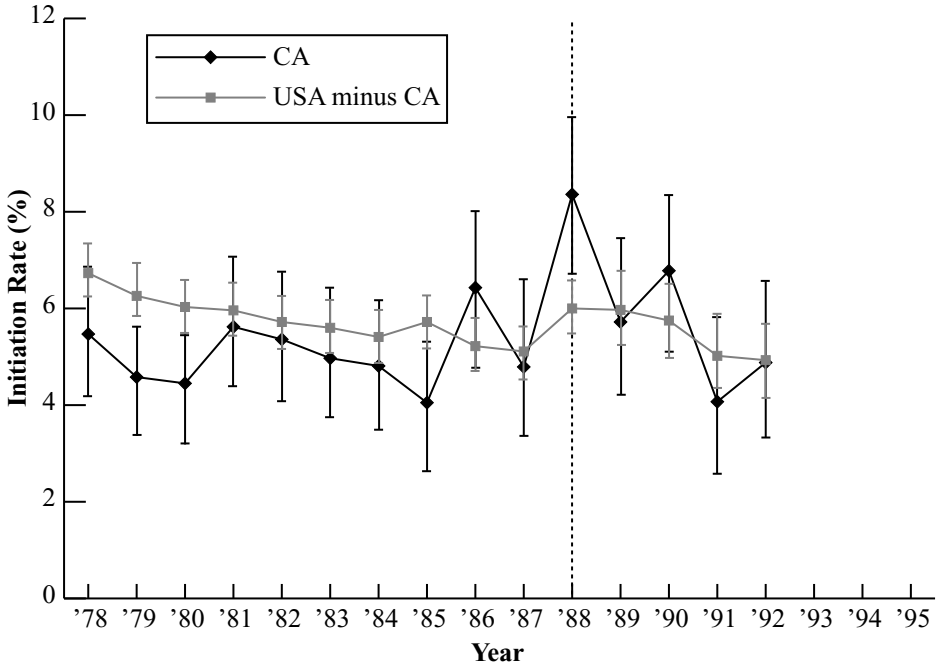


Figure 9-10
Comparison of Smoking Initiation Rates of California to the Rest of the Nation among 15- to 17-Year-Old Female Adolescents



fluctuations in initiation rates do not necessarily reflect events that happened in the United States. These initiation rates also reflected when the current population of the United States and California began smoking, not necessarily when the people present in the United States during each particular year began smoking.

Adolescent males have significantly decreased their smoking initiation since 1940 and most of the decreases and increases in initiation rates can be attributed to the changes among older 15- to 17-year-old adolescents. After the passage of Proposition 99 in California, older Californian boys' initiation rates decreased significantly. In 1991, these rates were significantly lower than the initiation rates among similarly aged boys in the rest of the nation. This suggests that tobacco control efforts in California may have differentially impacted this age group during the early years of the campaign.

Female adolescents increased their smoking initiation rates after 1940; in particular, initiation rates among female adolescents sharply increased at the time that Philip Morris introduced Virginia Slims. Both older and younger female adolescents experienced the increase in smoking initiation rates coincident with the introduction of the Virginia Slims brand. There did not appear to be a significant change in smoking initiation rates among either younger or older Californian girls after the passage of Proposition 99 in 1988.

FOLLOWING ARE FIGURES 9-1a THROUGH 9-1c, WHICH SHOW ANNUAL INITIATION RATES AND 95% CONFIDENCE INTERVALS

Figure 9-1a
Cigarette Smoking Initiation among 12- to 17-Year-Old White Adolescents

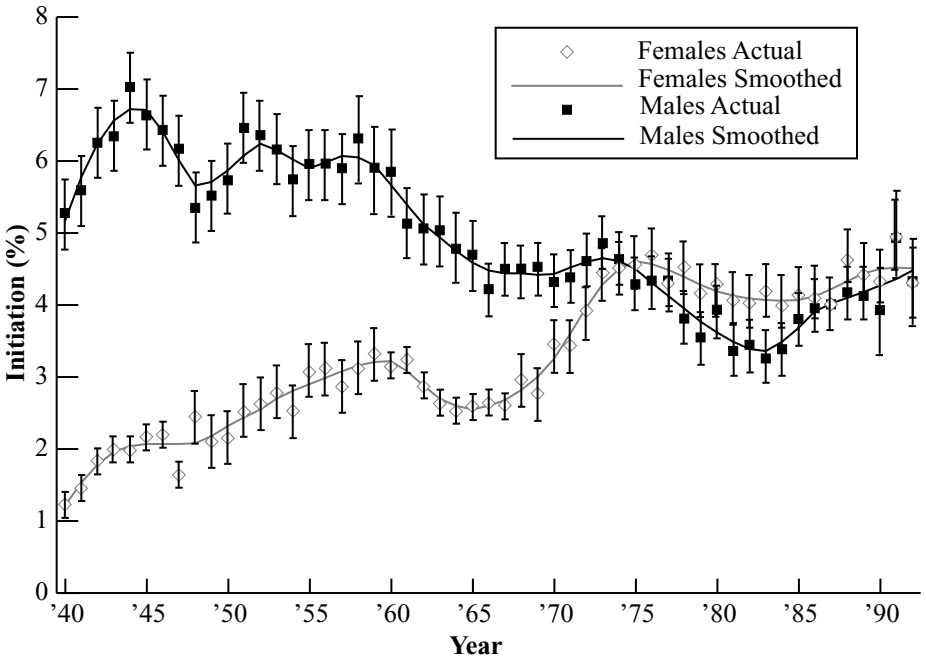


Figure 9-1b
Cigarette Smoking Initiation among 12- to 17-Year-Old Hispanic Adolescents

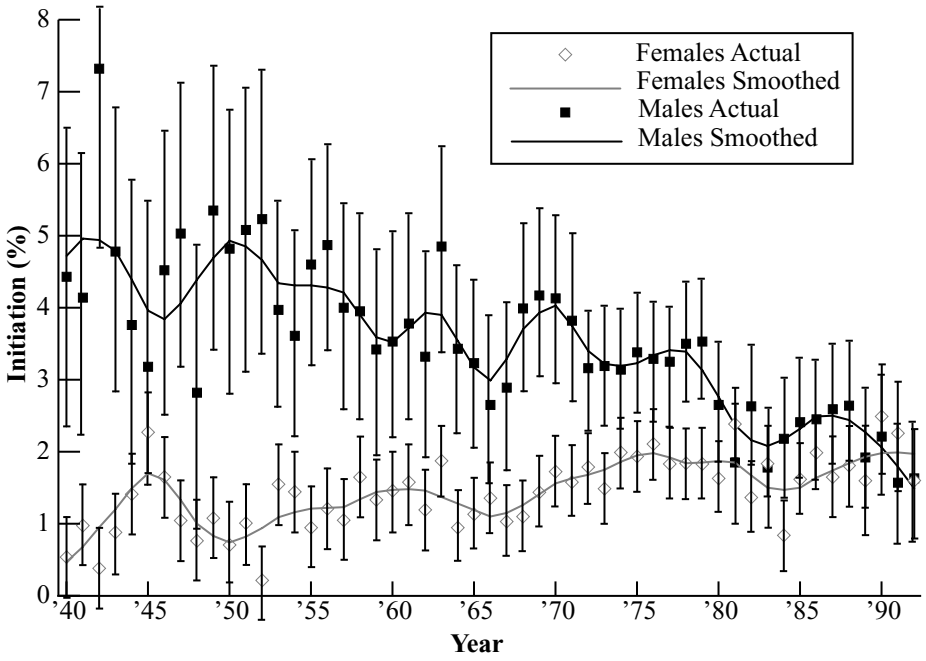
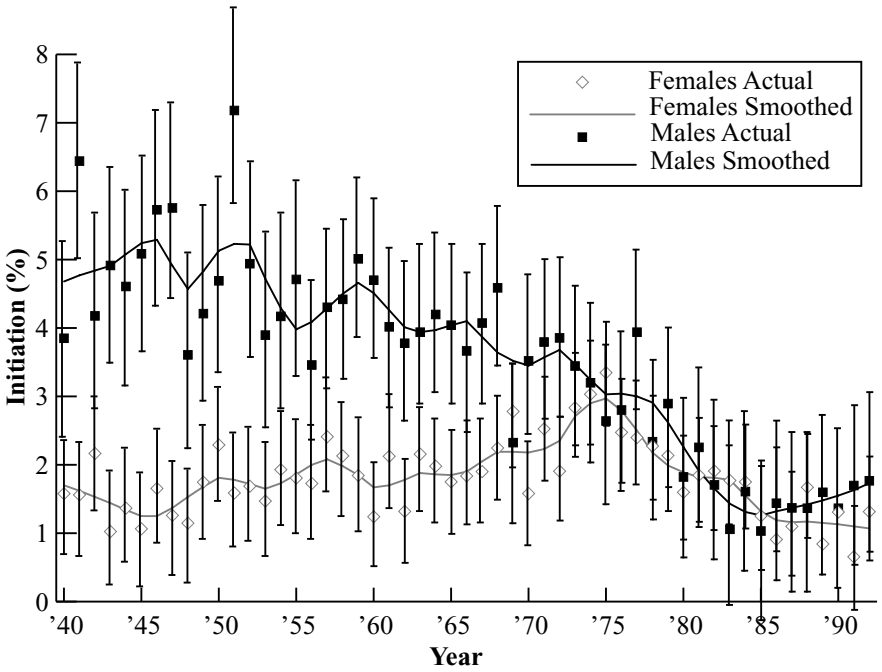


Figure 9-1c
Cigarette Smoking Initiation among 12- to 17-Year-Old African American Adolescents



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Changing Adolescent Smoking Prevalence: Impact of Advertising Interventions

Cornelia Pechmann

INTRODUCTION The U.S. federal and state governments are increasingly using paid mass-media advertising to communicate with the U.S. public. The U.S. Congress has allocated $1.2 billion—$200 million per year for 5 years—to fund an advertising campaign to keep youths from using illicit drugs (Fairclough, 1999). The U.S. Census Bureau has, for the first time, used advertising to increase mail-in response rates to the dicennial census; its advertising budget was roughly $100 million (U.S. Census Bureau, 1999). The American Legacy Foundation (http://www.americanlegacy.org), which is funded by the national U.S. tobacco settlement, is overseeing an antismoking advertising and promotional campaign amounting to $300 million in expenditures per year. U.S. states are currently trying to decide if they should run state-level antismoking campaigns (Brull, 1999). Several states, including Arizona, California, Florida, and Massachusetts, have already begun multi-year campaigns. California spends roughly $0.40 per capita ($12 million) per year while Massachusetts spends considerably more, or roughly $2.33 per capita ($14 million), per year on campaigns (Pechmann, 1997; Pechmann and Reibling, 2000a; Goldman and Glantz, 1998). Many other states are currently trying to decide if they should run state-level antismoking campaigns and are uncertain that antismoking advertising will pay off in terms of reduced smoking prevalence and lower health care costs (Brull, 1999).

The goal of this chapter is to assist decision-makers in making informed decisions about using advertising for tobacco use prevention. The first part will address the question, "Should antismoking advertising be used? That is, will it work?" To answer this question, the chapter will review research on the impact of such advertising on adolescent smoking prevalences and on leading indicator beliefs and attitudes. The second part of the chapter will describe research on the most promising message types in order to address the issue of how antismoking advertising campaigns should be designed.

SHOULD ANTISMOKING ADVERTISING BE USED FOR TOBACCO USE PREVENTION? The question of whether antismoking advertising should be used for tobacco use prevention depends on both its effectiveness and its cost-effectiveness, but neither issue has been resolved as yet. To date, there is little conclusive evidence of a direct link between advertising-only interventions and reduced adolescent smoking prevalences. However, one can point to a triangulation of indirect evidence for the effectiveness of antismoking advertising. That evidence is reviewed below.

Research on Antismoking Advertising Plus School-Based Programs

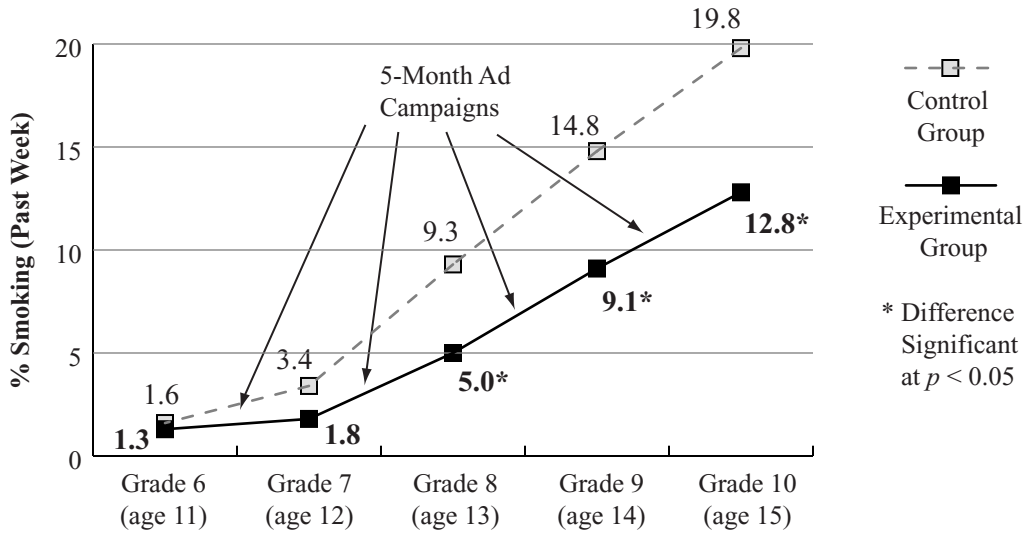
At least three studies have examined the efficacy of combining school-based tobacco use prevention programs with antismoking advertising, and the results look promising. In one study (Flynn *et al.*, 1992), students participated in a school-based program consisting of about four tobacco-specific classes per year for four years, spanning both middle school and high school. In addition, half of the students were exposed to a four-year antismoking advertising campaign. Each year, the advertising aired for five months and students saw roughly two antismoking spots per day; many students also assisted in the ad campaign design and evaluation (Worden *et al.*, 1988). By 10th grade, 12.8% of the students in the school-plus-advertising intervention group had smoked in the past week versus 19.8% in the school-only intervention group (Flynn *et al.*, 1992). This difference was significant and was sustained for at least 2 years after the program had ended (Flynn *et al.*, 1994).[1] In summary, the advertising and school program worked synergistically to lower adolescent smoking prevalences. However, there is no way of knowing how effective the advertising would have been on its own (Figure 10-1).

The intervention by Perry *et al.* (1992) targeted students in grades 6-8 with 6 to 10 tobacco-specific classes per year that were supplemented by antismoking advertising, health screenings, and community-based activities. By grade 8, the weekly smoking prevalences for the intervention group and the no-intervention control group began to diverge such that, by grade 10, the prevalence for the intervention group was half that of the control group (11 percent and 22 percent, respectively; Figure 10-2). Finally, Murray *et al.* (1992) studied middle school (junior high) students who were exposed to a less intensive school- and advertising-based intervention. The effects were weaker but nonetheless statistically significant. At the end of the study, the weekly smoking prevalence was 12 percent for the intervention group versus 16 percent for the no-intervention control group.

If states were to fund antismoking advertisements and school programs, however, they could not necessarily expect similar results. Both California and Massachusetts have used this dual-pronged approach, and neither state has produced sustained reductions in adolescent smoking prevalences (Goldman and Glantz, 1998; Pechmann, 1997; Pechmann and Reibling, 2000a; Popham *et al.*, 1994; Siegel and Biener, 1997). By splitting up limited funds between advertising and school programs, a state risks funding both programs inadequately (Pechmann and Reibling, 2000b). Indeed, California has been criticized for underfunding both its antismoking advertising campaign and its school-based initiatives (Pierce *et al.*, 1998; California Department of Education, 1995). Funding for California's antismoking school programming amounts to roughly $6 per student per year and experts say this amount should be at least doubled (California Department of Education, 1995).

1. Any effect that is described as significant is based on $p \leq 0.05$ unless otherwise specified.

Figure 10-1
Results of Flynn and Worden *et al.*'s (1992) Longitudinal Field Experiment

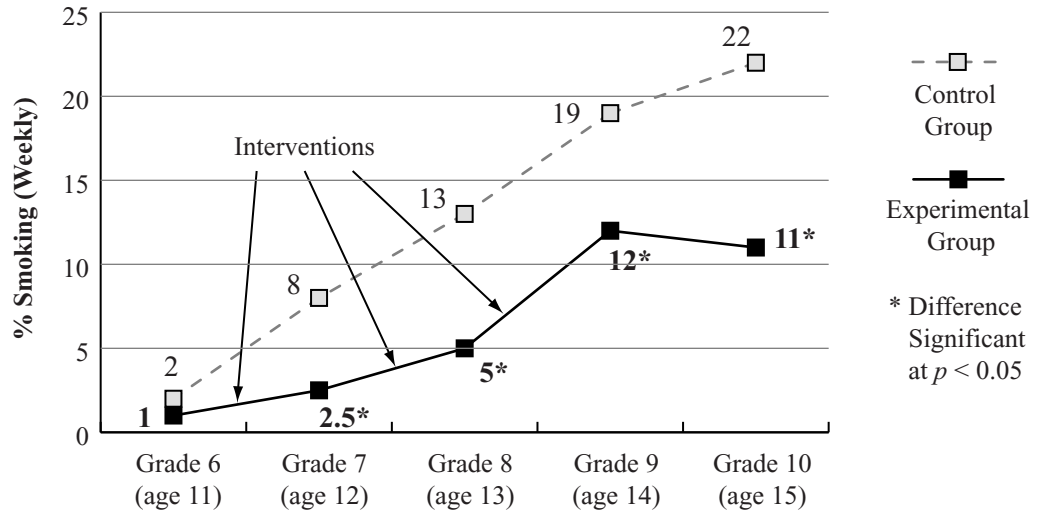


NOTES: 1. Each cohort group spanned 3 grades, so the grades listed are the medians (e.g., "Grade 6" represents the cohort group when in grades 5 - 7). Ages are approximate.
2. A similar pattern was observed for "Smoked yesterday" and "Smoked recently."
3. Flynn and Worden et al. (1994) found the effects were sustained 2 years hence (median grade = 12).

Further, it is often difficult to persuade schools to use the tobacco-specific programs that have been scientifically proven to work due to program length and intensity, teacher training requirements, and a general preference for locally produced, general drug programs (California Department of Education, 1995). Hence, while school-based programs combined with antismoking advertising could work, communities generally have been unable to implement this approach effectively. It would be easier to rely strictly on antismoking advertising, but more research is needed to determine whether advertising alone will work.

Research on Antismoking Advertising and Adolescents Two recent evaluations of state-based antismoking campaigns used longitudinal surveys of adolescents to ascertain whether there was a link between self-reported ad exposure and reductions in smoking initiation (Sly *et al.*, 2001) or progression to regular use (Siegel and Biener, 2000). The evaluations involved Massachusetts (Siegel and Biener, 2000) and Florida (Sly *et al.*, 2001). It was concluded that these states' antismoking television ads were effective in dissuading adolescents from taking up smoking (also see *MMWR*, 1999). Unfortunately, the contribution of this research is somewhat limited by the correlational nature of the data. The data clearly show that adolescents who reported seeing the antismoking ads later manifested a lower propensity to smoke, but

Figure 10-2
Results of Perry *et al.*'s (1992) Longitudinal Field Experiment



NOTES: 1. The intervention depicted was a 6 - 10 session/year school education program, but subjects in the experimental group were also exposed to a multi-year community health intervention involving mass media ads.
2. Ages are approximate.

these data could be interpreted in one of two ways. One possibility is that the antismoking ads reduced adolescent smoking. A rival explanation is that adolescents who had strong antismoking beliefs at the onset were more likely to pay attention to the antismoking ads and also were less likely to smoke in the future (Pechmann and Reibling, 2000b).

It is a well-established fact that consumers selectively attend to ads that support their prevailing product-related attitudes and behaviors, in part to avoid cognitive dissonance and preserve self-esteem (Alba and Hutchinson, 1987; Festinger, 1964; Frey, 1986). Hence, while there is generally a positive correlation between ad exposure and product beliefs and intentions, this seems to be due to reverse causality, to a large extent: beliefs and intentions drive exposure to advertising rather than exposure to advertising driving beliefs and intentions. Sly *et al*. (2001) and Siegel and Biener (2000) sought to control youths' prior smoking beliefs by including covariates in the analyses, such as age, sex, prior smoking status, and the smoking status of friends and parents; Siegel and Biener (2000) also controlled for the extent of television viewing. However, adolescents' preexisting smoking beliefs were not directly assessed and so it is difficult to draw any firm conclusions from the results.

Research on Antimarijuana Advertising and Adolescents

Some encouraging evidence that antimarijuana ads can reduce adolescents' propensity to use marijuana comes from a recent three-year, two-county study (Palmgreen *et al*., 2001). One county received two waves of antimarijuana television advertising while a second county received just the second wave, and each wave lasted four months. When the advertising was airing, it is estimated that 90+ percent of the adolescents saw three antimarijuana ads per week.

To measure the impact of the advertising, monthly surveys were conducted of 100 randomly selected youths from each county. The youths sampled were in grades 7-10 initially and the group sampled advanced to grades 10-13 (first year of college) at the end. Identical sampling and interview procedures were used throughout and the interviews were conducted at the youths' homes with the drug-related survey items being self-administered via laptop computer to ensure confidentiality. The results indicate that the ad campaign was highly effective. In each county, the prevalence of marijuana use among high-risk youths declined concurrently with the first wave of advertising. In the county that received a second wave of advertising, the initial declines in marijuana use were perpetuated. Overall, this study indicates that marijuana advertising alone can work, but it remains to be seen whether the results are applicable to antismoking advertising.

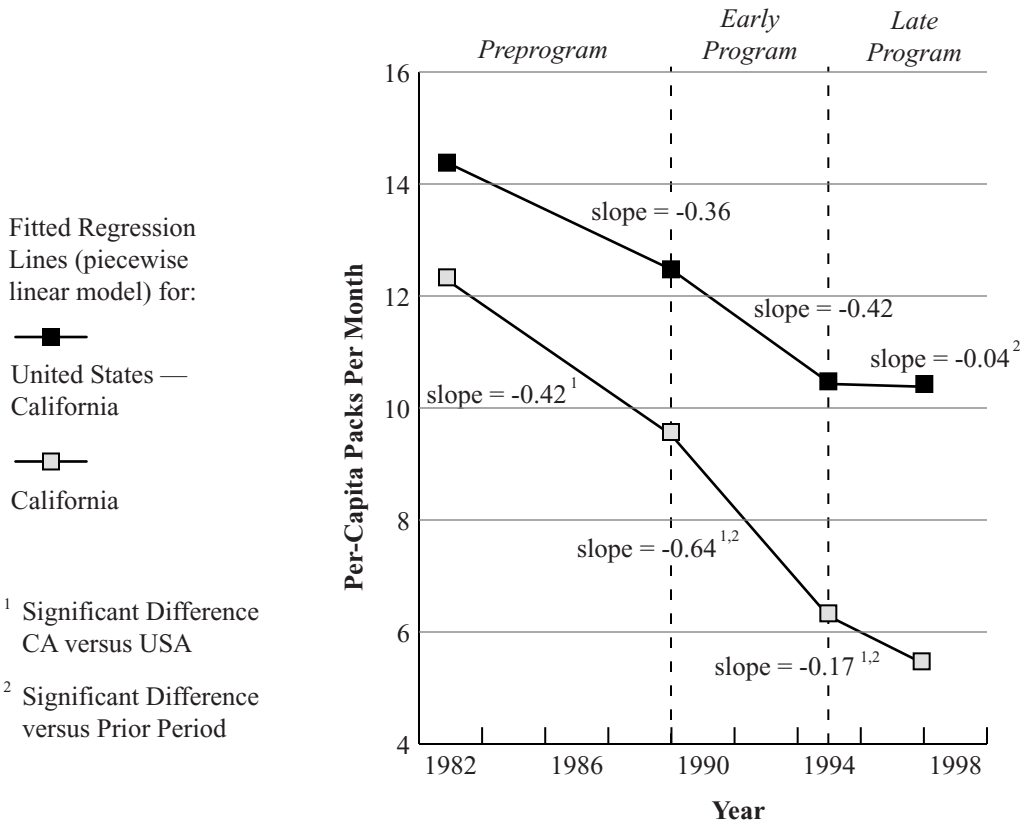
Research on Antismoking Advertising and Adult Smoking

Pierce *et al*. (1998) assessed the efficacy of the California tobacco control program that commenced in 1989 and included antismoking advertising (18 percent of total dollar expenditures), school-based programs (32 percent), and community-based antismoking efforts (40 percent). The advertising and community interventions targeted both adolescents and adults. In the preprogram years, per capita cigarette consumption was declining in both the United States and California, but more so in California. In the early program years (1989-1993), the rate of decline intensified significantly in California relative to both the previous trend in that state and the U.S. trend at that time. In the later program years (1994-1997), both California and the United States experienced a significant weakening in the rate of decline relative to the prior period (Figure 10-3). The researchers attribute the reduced efficacy of the California program to a 40-percent decrease in annual tobacco control expenditures from early to later program years. In conclusion, the Pierce *et al.* (1998) study suggests that well-funded tobacco control programs can be effective. It does not, however, partition out the effects of antismoking advertising relative to California's other tobacco control activities, such as tax-induced increases in cigarette prices. Nor does it address the specific issues of adolescent-focused advertising or adolescent smoking prevalences.

Research on Advertising's Impact on Adolescents' Beliefs and Behavioral Intentions

More direct evidence of the causal effect of antismoking advertising on youth has been provided by randomized experimental trials that are typically called "copytests." Typically, in such copytests, hundreds of adolescents who are representative of the U.S. population in terms of gender, ethnicity, and socioeconomic status are randomly assigned to view either antismoking advertising or control advertising (unrelated to smok-

Figure 10-3
Trends in per-Capita Cigarette Consumption in California and the Rest of the United States (Pierce *et al.*, 1998)



ing), after which they complete surveys. If the youths in the antismoking advertising (versus control) condition report significantly less favorable smoking-related beliefs or intentions, it is concluded that the advertising is efficacious. These measures have been shown to be leading indicators of adolescents' later smoking behaviors (Aitken and Eadie, 1990; Aitken *et al.*, 1991; Pierce *et al.*, 1995; Pierce *et al.*, 1996).

Pechmann and her colleagues have copytested a large number of youth-oriented advertisements that seek to de-normalize smoking by portraying teenage smokers as uncool, unwise, and misguided. The results are encouraging (Table 10-1). Pechmann and Ratneshwar (1994) found that the antismoking advertising lowered 6th graders' perceptions of a smoker's common sense, personal appeal, maturity, and glamour. Pechmann and Knight (2000) showed that just one antismoking ad was able to offset the impact of three cigarette ads that would otherwise have enhanced 9th graders' perceptions of a smoker's social stature, popularity, and vitality. Pechmann and Shih (1999) assessed 9th graders' reactions to a PG-rated feature film that depicted highly intelligent and attractive young movie stars smoking in one-third of the scenes. The findings suggest that the film enhanced

Table 10-1
Copytest Research Findings on Impact of Antismoking Ads on Adolescents' Beliefs about Teenagers who Smoke

Pechmann and Ratneshwar's (1994) Study of 6th Graders					
Teenage smokers' common sense, personal appeal, maturity, and glamour	control ads 3.6	>	antismoking ads 3.1		
Pechmann and Knight's (2000) Study of 9th Graders					
Teenage smokers' social stature, popularity, and vitality	cigarette ads 4.1	>	cigarette + anti-smoking ads 3.2	=	control ads 2.9
Pechmann and Shih's (1999) Movie Study with 9th Graders					
Teenage smokers' social stature	smoking scenes 3.9	>	antismoking ad before smoking scenes 3.3	=	control scenes 3.1

Note: Higher numbers indicate more favorable beliefs. The symbol " >" indicates statistically significant mean difference ($p \leq 0.05$).

youths' perceptions of a smoker's social stature, but that showing a 30-second antismoking ad immediately before the film prevented youths from being as influenced by the film's content. As a follow-up, "market test evaluation" studies should be conducted (Palmgreen *et al.*, 2001) to show a direct link between antismoking advertising and reductions in adolescent smoking prevalence.

HOW SHOULD ADVERTISING CAMPAIGNS BE DESIGNED?

When designing an advertising campaign, at least four important issues must be addressed: the message content (what to say), the executional style (how to say it), the target audience (whom to say it to and, hence, which media to choose), and the budget. In the interests of brevity, this section will focus on research regarding message content. For information on the other topics, readers can refer to the following articles and resources: *Best Practices for Comprehensive Tobacco Control Programs* (CDC, 1999); Everett and Palmgreen, 1995; Donohew *et al.*, 1991; Lorch *et al.*, 1994; Palmgreen *et al.*, 1991; Pechmann, 1997; Pechmann and Reibling, 2000a & 2000b; Worden *et al.*, 1988.

Focus Group Studies on Antismoking Advertising Messages

Several small-scale studies have utilized the focus group method to assess adolescents' reactions to different antismoking messages. Focus groups are structured and monitored group discussions that typically involve from 6 to 12 people. Most of these studies were conducted informally by advertising agencies to assist them in selecting specific ads for state-level campaigns and, as such, the results have not been published or widely disseminated. One exception is a study that was spearheaded by the Centers for Disease Control and Prevention (CDC), in which groups of adolescents were asked to comment on ten representative antismoking ads from various states (Teenage Research Unlimited, 1999). One hundred and twenty adolescents participated in the research and they reportedly preferred ads that dramatized the serious physical consequences of smoking. Many of the youths were critical of the Philip Morris "Think. Don't Smoke" ads, indicating that the ads did not give them any compelling reasons not to smoke.

Another published study, by Goldman and Glantz (1998), reviewed transcripts of focus groups that were conducted to develop antismoking advertisements for California, Massachusetts, and Michigan. The study concluded that the most compelling advertisements addressed second-hand smoke or tobacco industry manipulation. However, several researchers have disputed these conclusions (Worden *et al.*, 1998; Balch and Rudman, 1998). Since focus group researchers typically obtain qualitative data from small numbers of people and do not statistically analyze these data, definitive conclusions are difficult to reach.

Copytest Study on Antismoking Advertising Messages

A large-scale, two-part copytest study has been recently completed by Pechmann *et al*. (2000). The researchers identified the seven most common types of antismoking advertising messages used in recent years and evaluated the efficacy of each message type. The ads were obtained from several different U.S. states and health groups, Canada, and Australia, and represented a variety of executional styles. Close to 3,000 7th and 10th graders participated in the research. Roughly half of the youths were used to classify nearly 200 antismoking television ads into 7 distinct message types. The remaining youths participated in a copytest that assessed the impact of each message type (versus control messages) on their smoking-related knowledge, beliefs, and intentions. The copytest used eight randomly selected ads to represent each of the seven message types, or, in other words, assessed advertising "flights" or mini campaigns. Youths were randomly assigned to view just one ad type in order to obtain uncontaminated measures of persuasiveness. If an ad type significantly lowered adolescents' intention to smoke, it was considered to be efficacious; otherwise, it was not (Azar, 1999; Pierce *et al.*, 1995 & 1996).

"Disease and Death" ads emphasized the long-term physical effects of smoking, such as cancer, lung and heart disease, and death. "Cosmetics" ads claimed that smokers risk social rejection due to their bad breath and smelly clothes and hair. "Endangers Family" ads stressed that smokers can hurt their families with their second-hand smoke and untimely deaths. "Smokers' Negative Life Circumstances" ads associated smoking with negative loser imagery to imply an unattractive, undesirable, unhealthy lifestyle. "Refusal Skills Role Model" ads portrayed attractive, popular role models proudly and confidently resisting peer pressure to smoke. "Marketing Tactics" ads disclosed the tactics used to market cigarettes, such as image ads and the targeting of vulnerable groups. "Selling Disease and Death" ads stated that tobacco firms use manipulative and deceptive marketing tactics to sell a deadly product. All seven ad types apparently utilized principles from Protection Motivation Theory (Rogers, 1975 & 1983), which is a popular, well-substantiated theory of how people are persuaded to adopt risk-reduction behaviors, such as not smoking (Sturges and Rogers, 1996).

Pechmann *et al.* (2000) found that three of the seven message types were efficacious in terms of reducing adolescents' intention to smoke: "Endangers Family", "Smokers' Negative Life Circumstances", and "Refusal Skills Role Model". These ads were effective for precisely the same reason:

they enhanced adolescents' perceptions that smoking poses severe social risks, in that it could lead to social rejection and/or social sanctions, whereas nonsmoking could lead to social acceptance and respect. The "Disease and Death" and "Selling Disease and Death" messages made the physical risks of smoking seem more severe, but had no impact on intentions, presumably because youths perceived themselves to be invulnerable to the long-term physical risks. The "Selling Disease and Death" and "Marketing Tactics" messages increased youths' knowledge of marking tactics, but, again, there was no impact on intentions. Finally, the "Cosmetics" messages were the least effective of all; they produced no statistically significant effects.

CONCLUSION There is evidence that antismoking advertising can help to deter adolescents from smoking cigarettes. But, to date, all of the evidence is indirect. Also, research seems to suggest that certain types of advertising messages work better than others, but additional studies must be conducted before any definitive conclusions can be drawn. Since the funding that is available for tobacco use prevention is unprecedented, a portion of that money should be allocated to research on program development and evaluation, with a particular emphasis on advertising. Controlled experimental studies, including advertising copytests, should be an integral part of the research so that statistical analyses can be conducted and scientifically valid conclusions can be drawn. Proper research is essential for ensuring program success and for documenting that success.

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Has Youth Access to Tobacco Changed over the Past Decade?

Joseph R. DiFranza

In this chapter, the relationship between the availability of tobacco and the prevalence of adolescent tobacco use will be addressed. This chapter will discuss, in turn, how youths obtain tobacco, how the availability of tobacco is measured, the evidence concerning an impact of reduced availability on tobacco use rates, and national trends in the availability of tobacco.

SOURCES OF TOBACCO Youths obtain tobacco from a variety of sources. Noncommercial sources of tobacco include friends, siblings, parents, relatives, and even baby sitters (DiFranza *et al.*, 1994). Youths most commonly obtain their first cigarettes from friends or siblings, although it is not uncommon for youths to steal their first cigarettes from parents (DiFranza *et al.*, 1994). After the first cigarette, those who continue to smoke will typically rely upon same-aged friends as their first steady source (Stanwick *et al.*, 1987). Sharing cigarettes among friends is very common. In one study, 99 percent of young smokers reported having, at some time, obtained tobacco from friends (DiFranza *et al.*, 1994). The youths who are most likely to supply tobacco to their friends are those who are getting it from a commercial source (Wolfson *et al.*, 1997). In one survey, youths who obtained their most recent cigarettes from a commercial source were 73 percent more likely to provide tobacco to another adolescent (Wolfson *et al.*, 1997).

However, generosity does have its limits. With increasing levels of cigarette consumption, young smokers will be expected to pay for their own tobacco (DiFranza *et al.*, 1994). A developing dependence on nicotine with the accompanying need for a reliable source is another factor that encourages youths to begin to purchase their own tobacco (DiFranza *et al.*, 1994). Many youths begin to purchase tobacco soon after starting to smoke (DiFranza *et al.*, 1994; Forster *et al.*, 1997). Within ten weeks of the first cigarette, half of the young smokers in one survey had purchased their own tobacco (DiFranza *et al.*, 1994).

Youths may have several options for purchasing tobacco. They may do so directly from a commercial source, such as a store or vending machine, or they may give money to a peer or someone who is older to buy the tobacco for them (DiFranza *et al.*, 1994; Forster *et al.*, 1989). In one survey, 66 percent of young smokers reported having asked someone older to buy them tobacco at least once (DiFranza *et al.*, 1994). In communities where tobacco is easier to purchase, youths start to purchase their own tobacco sooner after starting to smoke (Forster *et al.*, 1997). Youths who are older and those who smoke more regularly are also more likely to purchase their own tobacco (Stanwick *et al.*, 1987; Forster *et al.*, 1997; Wolfson *et al.*, 1997;

Leopardi *et al.*, 1989). These youths then become sources for their friends. In addition, shoplifting is a common practice and is relied upon most heavily by younger smokers and boys (Forster *et al.*, 1997; Wildey *et al.*, 1995; CDC, 1996). Self-service displays in stores greatly facilitate shoplifting and are a common promotional strategy used by tobacco companies (Wildey *et al.*, 1995; Caldwell *et al.*, 1996).

The proportion of youths who buy their own tobacco probably varies from community to community, depending in part upon how difficult it is for underage youths to purchase tobacco. The 1995 Youth Risk Behavior Survey inquired of youths under age 18 as to their usual source of tobacco (CDC, 1996). For 40.9 percent of the youths, the usual source was a direct purchase from a commercial source, 32.9 percent borrowed from others, and 15.8 percent gave money to someone else to buy for them (CDC, 1996). Illegal sales are a primary source of cigarettes for underage smokers, either through direct purchase or through borrowing from friends who bought them. These facts underlie the supply side approach to tobacco use prevention. In theory, if the illegal sale of tobacco from retailers to youths could be stopped, the availability of tobacco to youths might be seriously diminished and fewer youths would use tobacco. Skeptics argue that other sources would be developed to replace commercial sources, thus negating the impact of the intervention. Also, restricting the sale of tobacco to minors might increase the temptation to smoke by painting tobacco as a forbidden fruit.

MEASURES OF TOBACCO AVAILABILITY

In 1987, the compliance test was introduced as a research tool for measuring the availability of tobacco to minors from commercial sources (DiFranza *et al.*, 1987). In the compliance test, an underage youth attempts to purchase tobacco from a commercial outlet in order to measure its compliance with tobacco sales laws. Since its introduction, the compliance test has been used extensively as an evaluation tool in studies concerning both tobacco and alcohol. It is also federally mandated as the official method by which state compliance with federal regulations is measured (DiFranza *et al.*, 1992; Jason *et al.*, 1991; Hinds, 1992; Forster *et al.*, 1998; Rigotti *et al.*, 1997; Center for Substance Abuse Prevention, 1996; Williams *et al.*, 1994; U.S. DHHS, 1997). Compliance tests are now performed in every U.S. state and territory, Canada, Britain, and Australia (U.S. DHHS, 1998; Radecki and Zdunich, 1993; Andrews *et al.*, 1994; Bagott *et al.*, 1997). However, despite its widespread adoption, the validity of the compliance test as a measure of retailer compliance or as a measure of the availability of tobacco has yet to be established.

The author has concerns that the methods used to conduct compliance tests are too artificial to accurately represent the interaction between the store clerk and the underage customer. Compliance test protocols employed for enforcement and evaluation purposes have always placed constraints on the behavior of the underage shopper (Riggoti *et al.*, 1997). Typical protocols prohibit the participation of youths who appear older than average; the use of measures, such as makeup or jewelry, to present a mature appearance; the misrepresentation of age; presentation of true or false proof of age; or the use of any story, plea, or conversation intended to persuade the

clerk. Some protocols prohibit the youth from completing the purchase (Cummings *et al.*, 1996). When the compliance test was first introduced, merchants had no reasonable concern about being penalized for making illegal sales (DiFranza *et al.*, 1987; Kirn, 1987). In areas where the law is enforced through the use of underage decoys, merchants may be more careful about who they will sell to. Compliance tests conducted with unfamiliar, inexperienced, non-smoking youths adhering to an artificial protocol may raise the suspicion of leery merchants. Compliance tests conducted under these circumstances may seriously overestimate actual merchant compliance. Unfortunately, the validity of the compliance test has never been assessed by comparing compliance rates obtained by underage smokers behaving naturally and those obtained by non-smokers following a protocol.

In addition to the behavior of the youth used for compliance testing, several other factors can introduce bias into the measurement of compliance. For example, many studies have demonstrated that girls are more often sold tobacco than are boys and that older youths are more successful than younger youths (CDC, 1996; DiFranza *et al.*, 1996; Forster and Wolfson, 1998). Tests conducted with young boys can be expected to yield much higher compliance rates compared to tests conducted with older girls (DiFranza *et al.*, 1996). Since merchant behavior is related to the characteristics of the buyer, it is not consistent over time. In other words, many merchants will refuse some youths, but sell to others. This has important implications for the interpretation of community compliance rates (the proportion of merchants who obey the law during a compliance test). Community compliance rates are typically determined by performing a survey in which all merchants are tested once (a census) or in which a random sample of merchants is tested (Williams *et al.*, 1994). In either case, individual merchants are tested only once. For example, in one survey, 33 percent of attempted purchases resulted in illegal sales (DiFranza *et al.*, 1996). From this, it might be deduced that 33 percent of merchants break the law. In fact, the actual proportion of law breakers was twice as high—this survey included six attempts to purchase tobacco from each merchant and, over the course of six attempts, 72 percent of merchants broke the law (DiFranza *et al.*, 1996). Community compliance rates based on single measurements of merchant compliance do not accurately reflect the proportion of merchants who are obeying the law.

Perhaps the greatest concern over the interpretation of compliance tests is that they cannot mimic how youths select the outlets from which to make their purchase attempts. Although there are no relevant published studies, common sense would suggest that youths do not attempt to obtain tobacco by conducting either a census or a random sample of merchants. It is more likely that youths ask their friends where they buy their cigarettes. Common sense would also suggest that youths would continue to patronize outlets where they have already been successful rather than try a new store every time they want to make a purchase. From the merchants' standpoint, it would be much safer to sell a pack of cigarettes to a particular youth if the first sale to that same youth did not result in legal action. Thus, youths

who live in the community—and are known to the merchants—may have a much higher success rate at purchasing tobacco than would be suggested by the community compliance rate.

In theory, it takes only one merchant in a community to supply a high school with cigarettes. Law enforcement and merchant education interventions are intended to shut off the supply of tobacco to youths by convincing all merchants to obey the law. For the many reasons outlined above, compliance tests may underestimate how frequently young smokers are refused a sale. Thus, compliance tests may seriously overestimate the impact of interventions on merchant behavior.

Another approach to assess the availability of tobacco is by surveying youths (DiFranza *et al.*, 1994; Stanwick *et al.*, 1987; Cummings *et al.*, 1992; Cismoski and Sheridan, 1994). Approaches that have been employed include asking youths how hard it is to purchase tobacco, whether they have ever purchased tobacco, how often they try to buy, and how often they are turned down (Forster *et al.*, 1998; Rigotti *et al.*, 1997; Johnston *et al.*, 1998). Two studies have obtained self-reports of tobacco availability and measured community compliance rates at the same time (Forster *et al.*, 1998; Rigotti *et al.*, 1997). In both studies, youths reported much greater ease at purchasing tobacco than would be suggested by the community compliance rate. In the first study, compliance rates averaged 82 percent across three communities, but the vast majority of young smokers in those communities reported never, or hardly ever, being refused a sale (Rigotti *et al.*, 1997). In the second study, with a measured community compliance rate of 97 percent, 77 percent of youths perceived a high availability of tobacco from commercial sources and 19.5 percent of male smokers still reported that their most recent cigarette came from a commercial source (Forster *et al.*, 1998). Whether community compliance rates or self-reports are the more accurate measure of availability is unknown since self-reported availability has not been validated. However, these self-reports raise further concern that community compliance rates seriously overestimate how hard it is for youths to buy tobacco from stores. If this were true, it would be reasonable to hypothesize that actual and measured community compliance rates would have to be very high in order to reduce the availability of tobacco to minors.

EVIDENCE THAT AVAILABILITY AFFECTS USE

Given the extent of the effort to reduce youth access to tobacco, there have been relatively few studies of the impact of such efforts on tobacco use rates (DiFranza *et al.*, 1992; Hinds, 1992; Forster *et al.*, 1998; Rigotti *et al.*, 1997; Jason *et al.*, 1991, 1999a & 1999b). In the first study to assess the effects of an enforcement intervention, Jason was able to demonstrate a 69-percent reduction in youth tobacco use rates in Woodridge, IL (Jason *et al.*, 1991). This effect has persisted for 8 years, despite a dramatic increase in the prevalence of smoking in the rest of the nation (Johnston *et al.*, 1998). Although the initial study consisted of before and after assessments, there were no control communities included. The investigators were able to expand this study into a controlled experiment with the inclusion of another intervention community and control com-

munities (Jason *et al.*, 1999b). The prevalence of tobacco use among youths was nearly 50 percent lower in communities that had instituted enforcement against the merchants (Jason *et al.*, 1999b). Community compliance rates between 90 percent and 100 percent were documented in Woodridge (Jason *et al.*, 1991).

This report was followed by another single-community study conducted in Leominster, Massachusetts, in which compliance rates over 90 percent were also associated with a significant drop in underage smoking rates (DiFranza *et al.*, 1992). This study also lacked a control condition. A third study reported a 22-percent drop in smoking prevalence in a community in the state of Washington after the enactment and enforcement of a ban on tobacco sales to minors (Hinds, 1992). Compliance rates were not measured in this study and a control group was not included. A well-controlled, multi-community trial in Minnesota reported a 28-percent reduction in tobacco use in communities with compliance rates of 97 percent compared to communities with compliance rates of 91 percent (Forster *et al.*, 1998). Reductions in smoking among younger, but not older, adolescents were reported in a four-community controlled trial in rural California, where compliance rates reached 100 percent (Altman *et al.*, 1999).

A sixth study, also a well-controlled, multi-community trial, failed to demonstrate any impact of an enforcement program on tobacco use (Rigotti *et al.*, 1997). This last study has been widely misinterpreted to show that vigorous enforcement has no impact. The investigators actually report that enforcement did not occur as planned. This study was designed to evaluate the impact of the 90-percent community compliance rates seen in the successful interventions (Rigotti *et al.*, 1997). Political considerations resulted in a scaling back of enforcement efforts in all intervention communities and, as a result, community compliance rates peaked at 82 percent. With 82 percent compliance rates, the vast majority of young smokers reported never, or hardly ever, being refused a sale (Rigotti *et al.*, 1997). The proportion of young smokers who purchased their own tobacco decreased very little in the intervention communities. The authors conclude that, rather than demonstrating the futility of enforcement efforts, the study indicates that 82-percent compliance rates are inadequate to impact on the ability of youths to purchase tobacco (Rigotti *et al.*, 1997).

Existing literature is consistent with the conclusion that curtailing illegal tobacco sales to minors can reduce tobacco use rates, but very high compliance rates are probably necessary in order to see any effect since compliance rates seriously underestimate the commercial availability of tobacco to minors. In each of the successful intervention studies in which compliance rates were measured, the rates were all above 90 percent. It is important to note that no enforcement intervention has resulted in increased tobacco use either by inadvertently portraying tobacco use as a forbidden fruit or through any other mechanism.

TRENDS IN THE AVAILABILITY OF TOBACCO TO MINORS

In 1987, it was demonstrated that illegal sales were made to an 11-year-old girl in 75 out of 100 attempts to purchase tobacco (DiFranza *et al.*, 1987). At that time, only 38 states had laws concerning the sale of tobacco to children, but enforcement was almost unheard of (DiFranza *et al.*, 1987; Kirn, 1987; U.S. DHHS, 1990). Several years later, not much had changed. In a survey of 93 U.S. communities in 1991–1992, 77 percent of merchants made illegal tobacco sales (Radecki and Zdunich, 1993).

To provide a picture of the magnitude of the problem, it was estimated that underage smokers consumed 924 million packs of cigarettes in 1998. These cigarettes were worth $1.86 billion at retail and generated $222 million of federal tax revenues and $293 million of state tax revenues (U.S. DHHS, 1990). Given the financial incentives of tobacco sales, it might not be too surprising that merchant education programs to discourage illegal sales have produced disappointing results (DiFranza and Brown, 1992; DiFranza and Librett, 1999; DiFranza *et al.*, 1996). Sustained success in reducing the availability of tobacco to minors has been achieved only through tough enforcement, typically through the frequent inspection of all retail outlets with underage decoys followed by penalties and re-inspection (Jason *et al.*, 1991; DiFranza *et al.*, 1992, 1998).

To encourage state level enforcement, Congress in 1992 enacted Public Health Service Act 398, which stipulates that states are entitled to block grants from the Substance Abuse and Mental Health Services Administration (SAMHSA). The grants are given contingent upon states enacting and enforcing a prohibition on the sale of tobacco to minors (State law regarding sale of tobacco products to individuals under age of 18. 106 STAT. 394, Public Law 102-321, July 10, 1992, Sec 1926. 42 USC 300x-26). States are required to conduct annual random surveys that measure statewide compliance to document the effectiveness of their enforcement efforts (U.S. DHHS, 1997). The limitations of this type of sampling have been discussed above. A recent review was conducted of the Federal Fiscal Year 1996 activities in 50 states, the District of Columbia, and 8 territories (DiFranza, 1999). Eighteen of these jurisdictions failed to provide a single example of a merchant being penalized for making an illegal sale during the previous fiscal year. Forty-seven states, eight territories, and the District of Columbia all reported compliance rates below the 82-percent rate that proved to be ineffective at significantly reducing the availability of tobacco or its use (Rigotti *et al.*, 1997; U.S. DHHS, 1998). Only three states reported compliance rates above 82 percent, and only one state—Florida—reported a compliance rate above 90 percent (U.S. DHHS, 1998). Thus, even though there are isolated communities where compliance rates are above 90 percent, only one state as of 1996 had enforced its law at the state level with sufficient vigor to achieve a level of compliance that could potentially impact on tobacco use rates.

Given the reported levels of compliance across all states and territories, it can be concluded that, with the possible exception of Florida, youth access to tobacco has not changed during the recent past. This conclusion is

supported by longitudinal tracking data from the Monitoring the Future study (Johnston *et al.*, 1998). In annual surveys, high school students have been asked to judge how easy it would be to obtain tobacco. Although the validity of this measure has not been established, 89.1 percent of 10th graders in 1992 felt that tobacco would be "fairly easy" or "very easy" to obtain and 89.6 percent felt this way in 1997.

It is interesting to note that, despite long-standing tobacco control programs in California and Massachusetts, these states had not achieved the 82-percent compliance rate (U.S. DHHS, 1998). While California, Massachusetts, and Florida all had anti-tobacco media campaigns, only Florida had implemented effective enforcement of tobacco sales laws and only Florida has reported an actual reduction in teen smoking rates (Connolly and Robbins, 1998; Pierce *et al.*, 1998; CDC, 1999). Surveys conducted by the Florida Department of Health in 1998 and 1999 demonstrated a decline in the proportion of underage smokers who obtained cigarettes from a store or friend or by giving someone money to purchase for them. This at least suggests that the decreased availability of tobacco to youths in Florida may have contributed to the observed decline in tobacco use (CDC, 1999). Another possible explanation is that this very recent downturn in adolescent tobacco use in Florida is part of a national trend.

CONCLUSION Except in the state of Florida and in scattered communities where laws are being vigorously enforced, there is no evidence that there has been any meaningful reduction in the availability of tobacco to youths and, hence, no impact on youth tobacco use would be expected.

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The Impact of Price on Youth Tobacco Use

Frank J. Chaloupka, Rosalie Liccardo Pacula

INTRODUCTION Over the past three decades, numerous econometric studies have researched the impact of price and tobacco control policies on tobacco use. These studies have examined the applicability of a fundamental principle of economics—the law of the downward sloping demand curve—to tobacco use. This principle states that as the price of a product rises, the quantity demanded of that product falls. To economists, price includes not only the monetary cost of purchasing a product, but also the time and other costs associated with buying that product, as well as the health consequences and other costs from using the product.

The demands for tobacco products, however, differ from those for most other products because of the addictive drug they contain—*i.e.*, nicotine. For years, the conventional wisdom was that addictive consumption was an irrational behavior that did not follow the basic laws of economics, including that of the downward sloping demand curve. However, a variety of econometric studies conducted over the past several decades clearly indicate that cigarette smoking and other tobacco use are not exceptions to the principles of economics. Several of the most recent studies apply economic models of addiction that explicitly recognize the intertemporal links in the consumption of addictive substances (Becker and Murphy, 1988). That is, economic models of addiction incorporate the acquired tolerance, reinforcement, and withdrawal effects that distinguish the consumption of addictive goods, including tobacco products, from the consumption of nonaddictive substances. The key implication of these models is that changes in addictive behavior in response to changes in price will not occur quickly, as they would for nonaddictive goods, but that the effects of permanent price changes will grow gradually over time.

PRICES AND ADULT TOBACCO USE Many studies have examined the effects of prices and tobacco control policies on overall cigarette demand and other tobacco use using diverse econometric and other statistical methods, employing data from the United States and many other countries. Several have used aggregate time-series data for a single geographical unit, while others have employed pooled cross-sectional time-series data; still others have used individual-level data taken from surveys. Most of these studies ignored the addictive aspects of tobacco use, although several recent studies have theoretically and empirically modeled addiction. Several clear conclusions emerge from this large, increasingly sophisticated, and rapidly expanding literature.

Permanent, inflation-adjusted increases in cigarette prices, which could be achieved by increasing cigarette taxes, will lead to significant reductions in cigarette smoking rates. Economists use the term "price elasticity of demand" to describe the impact of a change in price on consumption, defining it as the percentage change in consumption that results from a 1 percent increase in price. Price elasticity estimates from recent studies of cigarette demand fall in a relatively wide range, but most are in the narrow range from –0.3 to –0.5. These estimates imply that a 10 percent increase in price reduces cigarette demand among adults by approximately 3 to 5 percent. Similar findings are obtained for other tobacco products, although there are fewer studies for these products (Chaloupka and Warner, 2000).

The smoking reductions resulting from increased cigarette prices are not limited to reductions in the number of cigarettes smoked, but also include significant reductions in smoking prevalence. Several recent estimates based on individual level data from large, nationally representative surveys imply that a permanent, real 10-percent increase in price reduces smoking prevalence by 1 to 2 percent. For example, the Centers for Disease Control and Prevention (CDC, 1998) estimated that the price elasticity of smoking prevalence in the United States was –0.15, based on 13 of the National Health Interview Surveys (NHIS) conducted from 1976 through 1993. The changes in prevalence estimated using cross-sectional survey data are assumed to reflect reduced smoking initiation among youths and increased smoking cessation and reduced relapse among adults. Few studies have directly addressed these issues, however, given the lack of appropriate longitudinal data. However, by using retrospective data on smoking initiation from the NHIS, Douglas (1998) concluded that a 10-percent increase in price would reduce the duration of smoking by approximately 10 percent.

In the context of the economic models of addiction, cigarette smoking is clearly an addictive behavior in that current cigarette demand depends on past smoking. The most important policy implication of this is that the long-run impact of a permanent price increase or change in tobacco control policy will grow over time. Estimates imply that the long-run effect of a permanent price increase is approximately double the short-run impact (Chaloupka, 1991; Becker *et al.*, 1994). Thus, a 10-percent increase in cigarette price is expected to reduce cigarette smoking by approximately 8 percent in the long run.

PRICES AND YOUTH/YOUNG ADULT SMOKING

Economic theory suggests that the price sensitivity of cigarette demand will be inversely related to age for several reasons. First, the share of young smokers' disposable incomes spent on cigarettes is likely to be larger than that of adult smokers. Economic theory implies that the price sensitivity of demand will be greater the greater the share of income spent on a good, assuming that there is a positive impact of income on demand. Recent studies of youth smoking with good measures of youths' disposable income (Chaloupka and Grossman, 1996) provide clear evidence that youths with greater disposable income smoke more than those with fewer resources.

Second, peer influence is more important to youths than to adults. This has a positive multiplying effect for cigarette price increases—in addition to reducing a given youth's smoking directly, his or her smoking is reduced indirectly as peers reduce their smoking. In addition, because they have been smoking for a shorter time, youths are likely to be less addicted than adults and, consequently, youths' smoking decisions will be more immediately responsive to price.

Finally, youths are generally assumed to behave more myopically than adults. This implies that many of the future consequences of smoking will be more heavily discounted by youths than by adults, while the more immediate costs, particularly the monetary price, will be relatively more important.

The hypothesis that cigarette smoking by younger persons will be relatively more responsive to price than smoking among older persons is confirmed by several recent studies of cigarette demand based on cross-sectional surveys of youths and young adults. Recent estimates indicate that youths are up to three times more sensitive to price than adults, with a 10-percent price increase estimated to reduce youth smoking prevalence by 5 percent or more and also to reduce cigarette consumption among continuing young smokers (Chaloupka and Grossman, 1996; Evans and Huang, 1998; Lewit *et al.*, 1997). These empirical findings are consistent with the findings from recent qualitative research on youth smoking conducted by the CDC's network of prevention research centers (Balch, personal communication) as well as with the sharp increases in youth smoking prevalence observed after the prices of branded cigarettes were sharply reduced in April, 1993.

There appear to be important differences in price sensitivity among population subgroups. A recent study by Chaloupka and Pacula (1998a) concluded that young Blacks and young men are relatively more responsive to changes in price than are young Whites and young women, a finding consistent with the CDC's (1998) evidence on price responsiveness among adult population subgroups.

Similarly, several recent econometric studies based on cross-sectional data conclude that young adults are somewhat less responsive to price than youths, but more responsive than older adults. For example, the CDC found that persons ages 18 through 24 years were about 40 percent more responsive to price than those 25 through 39 years and almost six times more responsive than older adults (CDC, 1998). Similarly, Chaloupka and Wechsler (1997) found that college students were significantly more responsive to price than older persons.

Tauras and Chaloupka (1999a), using longitudinal data on young adult smoking from the Monitoring the Future surveys, provide additional evidence that young adults are more responsive to price than adults, but less responsive than youths, estimating an average overall price elasticity of –0.79. Also, as expected, in the context of an economic model of addictive behavior, they find that the long-run impact of a sustained price increase is

larger than the short-run effect (Chaloupka *et al.*, 1999b). Finally, they find strong evidence that increases in cigarette prices significantly raise the probability of smoking cessation among young adults, estimating that a sustained inflation-adjusted price increase of 10 percent increases the probability of cessation among young adult male and female smokers by 11 and 12 percent, respectively (Tauras and Chaloupka, 1999b).

Other tobacco control policies that raise the "costs" of smoking and other tobacco use lead to significant reductions in overall cigarette demand and smoking prevalence, particularly increased information on the health consequences of tobacco use, strong restrictions on cigarette smoking in public places and private workplaces, and counter-advertising campaigns (Chaloupka and Warner, 2000). Chaloupka and Grossman (1996), for example, concluded that strong restrictions on smoking reduced both the prevalence of youth smoking and cigarette consumption among young smokers. In contrast, they found little evidence that laws limiting youth access to tobacco reduced youth smoking, a finding they attributed to the relatively poor enforcement of these laws. Chaloupka and Pacula (1998b) examined the impact of enforcement directly, concluding that policies limiting youth access to tobacco that were comprehensive, aggressively enforced, and resulted in higher retailer compliance could produce relatively modest reductions in the prevalence of youth smoking.

DISCUSSION While much is known from economic research about the impact of price on cigarette demand, there is much more to learn. Advances in econometric methods, more and better data, and increased interdisciplinary research can help to address many of these issues.

The econometric evidence on the impact of price on cigarette smoking and other tobacco use is based on the relatively small changes in price that occur cross-sectionally and over time. Little is known, however, about the impact of relatively large price increases on cigarette demand, particularly among youths. The relatively new field of behavioral economics provides some evidence on this issue, suggesting that the price elasticity of demand rises as price rises (Bickel and Madden, 1998). This issue is currently being researched using more recent U.S. data that include several large state cigarette tax increases.

In addition, relatively little is known about the impact of large price increases on the growth of a black market in tobacco products and its subsequent impact on demand, particularly among youths. To the extent that organized and casual smuggling of tobacco products would result from large tax and price increases, the effects of the increases on tobacco use might be smaller than otherwise expected. The limited research in this area, however, suggests that the presence of a black market in tobacco products may be just as, or more, related to other factors—including the presence of informal distribution networks, nonexistent or weak policies concerning black market sales, and their lack of enforcement—as it is to prices (Joossens and Raw, 1995). Clearly, this issue needs to be explored more carefully.

More information is needed about the compensating behavior of smokers in response to price and policy changes that may offset some of the health benefits expected to result from the changes. The one study in this area suggests that some smokers respond to price increases by switching to longer and/or higher tar and nicotine cigarettes (Evans and Farrelly, 1998), with the largest effects found among the youngest smokers, thus offsetting some of the potential health benefits resulting from the reductions in smoking prevalence produced by a tax increase. Cummings and his colleagues (1997a) provided some related evidence based on data from the National Cancer Institute's Community Intervention Trial for Smoking Cessation that show that the use of generic cigarettes (typically higher in tar and nicotine) is higher in areas where average cigarette prices are higher, particularly among lower-income and heavier smokers.

Similarly, little is known about the potential for substitution between tobacco products and other licit and illicit addictive substances in response to higher cigarette prices and stronger tobacco control policies. In the recent debate over proposed national tobacco legislation, for example, some opponents of large tax increases argued that these would lead more youths to take up marijuana use even if they succeeded in reducing youth smoking. The very limited evidence on this issue, however, suggests that increases in cigarette prices will reduce not only cigarette smoking, but can also reduce alcohol and marijuana use among youths and young adults (Pacula, 1998; Chaloupka *et al.*, 1999a). Much more research is needed, however, to clarify these relationships.

Similarly, more research is needed to elucidate the impact of prices and tobacco control policies on the pathways and trajectories of smoking. This is particularly true with respect to the process from first use, through experimentation, and eventually to addiction, as well as with the processes around cessation and re-initiation. One recent study by a group of economists at Cornell University (DeCicca *et al.*, 1998) attempted to directly address the issue of the impact of price on smoking initiation using data from the National Education Longitudinal Survey of 1988 (U.S. Department of Education, 1988). The survey results concluded that higher cigarette taxes had little impact on the initiation of daily smoking between 8th and 12th grade. A similar analysis, using the same data but treating respondents with missing data differently, produced estimates of the price elasticity of smoking initiation comparable to the prevalence elasticities obtained from cross-sectional survey data described above (Dee and Evans, 1998). Comparable analyses examining this and other aspects of the uptake and cessation processes that employ better longitudinal data are needed to adequately address these issues.

Information about the effects of the pricing, availability, and marketing of nicotine replacement products on both the demand for these products and on cigarette smoking and other tobacco use is needed. Until very recently, the tobacco industry held a virtual monopoly on the distribution of products containing nicotine. Economic theory suggests that the increased availability of nicotine replacement products should both reduce

the demand for tobacco products as well as increase the price sensitivity of demand, potentially making tax increases an even more effective tobacco control policy. Some have argued, however, that the increased availability of these products and the marketing that accompanies them may affect youths' perceptions of the long-term consequences of tobacco use by creating the illusion that it is relatively easy to quit. If true, this reduction in the perceived "cost" of smoking may have contributed to the increases in youth smoking prevalence observed over the past decade as nicotine replacement products (NRP) became more widely available and heavily marketed. The very limited empirical information on the determinants of the use of nicotine replacement products suggests that economic influences, including income and price, may be particularly important (Cummings *et al.*, 1997b). More information is needed on the determinants of the demand for these alternative products and the impact of their availability on the demand for tobacco products, particularly among youths. This is relevant both to the long-term use and to the potential for abuse of these products. Long-term use could be considered part of a broader market for nicotine delivery products that includes cigarettes.

While much is known about the independent effects of price and tobacco control policies, more research is needed on the interaction between these interventions. There may be important, unrealized synergies between policies that could be used to enhance the effectiveness of tobacco control programs. For example, there is clear evidence that the earmarking of revenues from cigarette tax increases for anti-tobacco media campaigns and other efforts to reduce tobacco use have been very successful in California and Massachusetts (Hu *et al.*, 1995; CDC, 1996). In contrast, less is known about the interaction of a variety of other macro-level approaches to tobacco control.

CONCLUSIONS While there is still much to be learned, the existing research clearly indicates that macro-level interventions, including increased tobacco taxation and stronger tobacco control policies, can be very effective in reducing cigarette smoking and other tobacco use, particularly among youths and young adults. Moreover, because of its addictive nature, the long-run reductions in tobacco use resulting from sustained macro-level interventions will be even larger than those realized immediately.

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The Role of Tobacco Advertising and Promotion in Smoking Initiation

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INTRODUCTION Tobacco industry spokespersons claim that the intent of tobacco advertising and promotion is to increase a brand's market share among current smokers, and not to recruit new smokers. They claim most adamantly that their marketing activities are not directed toward the youth market (Bynum, 1998). The public health community has been equally adamant in insisting that

1) tobacco companies purposely market to youths because they know that few people initiate smoking in adulthood, and
2) the tobacco industry's advertising and marketing strategies are indeed quite effective and are responsible for increasing the rate at which young people start smoking (Lynch and Bonnie, 1994; Giglio, 1996).

This chapter reviews the research that has been brought to bear on the issue of tobacco advertising as it impacts smoking initiation among adolescents. It also presents findings from recent research on youths in Massachusetts.

TOBACCO MARKETING AND YOUTH SMOKING: EVIDENCE FOR A CAUSAL RELATIONSHIP Causation can never be proven beyond question. The strongest evidence for causality comes from controlled experiments in which individuals are randomly assigned either to a group that will receive exposure to the causal agent—in this case, cigarette advertising—or to one or more control groups that are not exposed to the causal agent, but are identical to the exposure group in every other way. This kind of study is obviously impossible to arrange in the case of cigarette advertising and also for most other potentially harmful exposures of interest to public health professionals. However, even the randomized controlled trial, the *sine qua non* of scientific causal evidence, can allow for alternative explanations, and whole books have been written to enumerate the variety of threats to validity that can compromise interpretation of such trials (Campbell and Stanley, 1966; Kerlinger, 1985). The best that one can do is attempt to build a body of evidence that supports a causal inference.

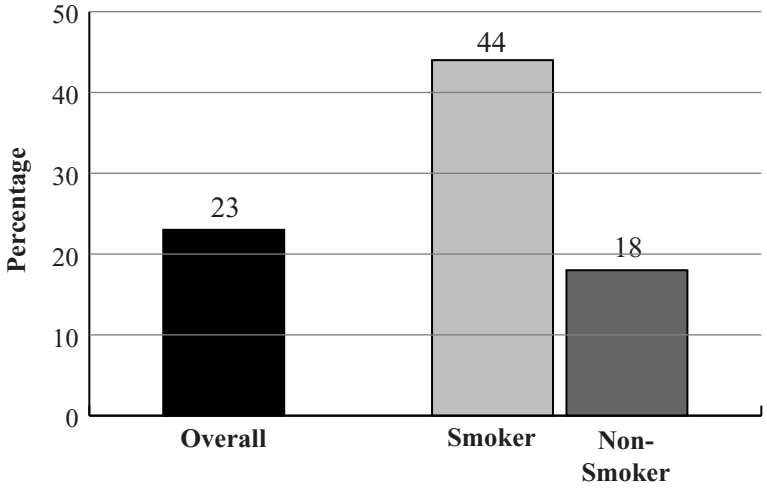
Three types of evidence must be brought to bear in support of a causal inference. At a minimum, evidence of causality must include correlation. In the case of advertising, correlational evidence would demonstrate, for example, that increases in advertising expenditures are associated with increases in smoking among youths or that, relative to youths with low levels of exposure to cigarette advertising, those with high levels of exposure are more likely to be smokers. The second type of evidence needed is that

which rules out plausible alternative explanations for the correlation. The most obvious alternative explanation for the correlational evidence described above is that smoking, or the interest in smoking, is what causes the advertising exposure or is what stimulates the advertising expenditures. The most common sort of evidence to rule out this interpretation is that which demonstrates the temporal ordering of exposure to tobacco advertising on the one hand and indicators of smoking on the other—evidence that can be provided by longitudinal studies. The third type of evidence needed to support a causal inference is evidence relevant to a mechanism by which the advertising leads to smoking initiation.

Correlational Evidence Historical analyses show that variations in advertising are associated with concomitant variations in smoking uptake among youths (Cummings *et al.*, 1995; Gilpin and Pierce, 1997). Other studies have documented a correlation between the intensity of brand-specific cigarette advertising and brand awareness, brand preference, or brand market shares among youths (Pierce *et al.*, 1991, 1994; Pierce and Gilpin, 1995; Chapman and Fitzgerald, 1982; McNeill *et al.*, 1985; Aitken *et al.*, 1987b; Goldstein *et al.*, 1987; Aitken and Eadie, 1990; DiFranza *et al.*, 1991; Hastings *et al.*, 1994; CDC, 1994; Pollay *et al.*, 1996). Some of this evidence has been criticized for choosing controversial measures (should the measures of advertising and of behavior be simultaneous or should the behavior measure be lagged?), for showing small effects, or for frequently showing no effects (Schudson, 1993; Sullum, 1998).

A large number of cross-sectional studies have reported associations between exposure to tobacco marketing on the one hand and attitudes toward smoking, susceptibility to smoking, smoking experimentation, or regular smoking among youths on the other (Charlton, 1986; Botvin *et al.*, 1991; Unger *et al.*, 1995; Evans *et al.*, 1995; Altman *et al.*, 1996; Gilpin *et al.*, 1997; Feighery *et al.*, 1998; O'Connell *et al.*, 1981; Aitken *et al.*, 1986a & 1986b, 1987a; Potts *et al.*, 1986; Klitzner *et al.*, 1991; Botvin *et al.*, 1993; Gallup International Institute, 1992; Roswell Park Cancer Institute, 1993; Slade, 1994; Coeytaux *et al.*, 1995; Schooler *et al.*, 1996; Sargent *et al.*, 1997; Richards *et al.*, 1995; Lam *et al.*, 1998). These relationships persist even when other factors shown to predict smoking initiation are controlled. The 1993 Massachusetts Tobacco Survey of youths provides evidence of this sort (Biener *et al.*, 1994). The data are from a telephone survey of a representative sample of 1,606 Massachusetts residents, aged 12 to 17 years. The survey measured involvement in cigarette promotional activities by asking respondents whether they owned a piece of clothing, a hat or bag, or some other item with a cigarette brand logo on it. The survey also asked whether they had a catalog from a tobacco company that showed what items could be obtained with coupons or proofs of purchase on cigarette packs.

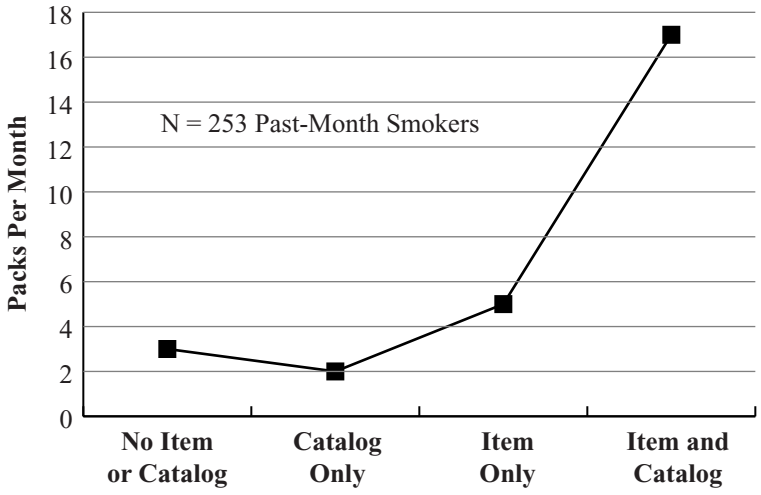
Figure 13-1
Ownership of Promotional Items among 12- to 17-Year-Old Youths—1993 Massachusetts Tobacco Survey



Twenty-three percent of the respondents indicated that they owned a promotional item. When ownership of promotional items was examined as a function of past-month smoking, multiple researchers have found a very strong relationship. Forty-four percent of adolescent smokers reported having a promotional item, compared to only 18 percent of non-smokers (Figure 13-1). It was also found that, among smokers, the greater their involvement with cigarette promotions, the more heavily they smoked (Figure 13-2). Those teen smokers who owned neither a catalog nor a promotional item reported smoking about 3 packs of cigarettes per month. Those who owned either an item or a catalog, but not both, reported smoking from 2 to 5 packs per month. Those who owned both an item and a catalog reported smoking an average of 17 packs of cigarettes per month, or approximately one-half pack per day.

The establishment of positive correlations between involvement with marketing activities and adolescent smoking behaviors provides support for the contention that tobacco marketing is, to some extent, responsible for smoking initiation. If such correlations were the only evidence, however, it would be reasonable to argue that the causal arrow might point in the opposite direction—that is, becoming a smoker may lead young people to pay more attention to tobacco advertisements and promotional schemes. Only by establishing the temporal sequencing of the interest in promotions and smoking can the argument about reverse causation be addressed. If it can be demonstrated that nonsmoking adolescents who show more interest in tobacco advertising and promotion subsequently initiate smoking at greater rates than those who show less interest, it cannot be argued that the

Figure 13-2
Smoking Intensity by Involvement with Tobacco Promotions—1993 Massachusetts Tobacco Survey



smoking came either before or simultaneously with the exposure to advertising. Providing this evidence requires longitudinal studies that make observations on the same individuals over time.

Longitudinal Studies Longitudinal studies are less common than cross-sectional ones because they are more difficult and costly to mount. Three known studies have been conducted outside of the United States. Two of these were Australian studies that demonstrated that nonsmoking youths who either approved of cigarette advertising (Alexander *et al.*, 1983) or reported that cigarette advertisements made smoking appear attractive to them (Armstrong *et al.*, 1990) were significantly more likely to start smoking over the next year or two than youths who had more negative responses to cigarette advertising at baseline. The third study found that 11- to 14-year-old Scottish youths with higher awareness of, and liking for, cigarette advertisements at baseline were more likely to develop positive intentions to smoke after a 1-year follow-up period (Aitken *et al.*, 1991).

Only one longitudinal study on the effects of advertising on youths has been published in the United States. Pierce *et al.* (1998) found that receptivity to cigarette promotional activities (measured as having a favorite cigarette advertisement, being willing to use a tobacco promotional item, and owning a tobacco promotional item) was associated with movement along a four-point smoking initiation continuum over a 3-year follow-up period among 12- to 17-year-old adolescents in California. About one-third of the movement was from being a confirmed nonsmoker to being ambivalent about whether one would smoke in the future. Although changes in this

indication of "susceptibility to smoking" have been shown to reliably predict future smoking (Jackson, 1998; Pierce *et al.*, 1995, 1996; Choi *et al.*, 1997), stronger evidence of advertising impact would link exposure at time one with actual smoking behavior at time two.

A recent longitudinal study of Massachusetts youths has made that connection (Biener and Siegel, 2000). In 1997, this study re-contacted the respondents to the Massachusetts Tobacco Survey who were between the ages of 12 and 15 in 1993. It was not possible to trace 30.7 percent of this group, but interviews were completed with 83 percent of those who could be found, for an overall follow-up response rate of 57.8 percent. For this research, a subset of the sample was used, specifically those 529 respondents who indicated at baseline that they had smoked no more than one cigarette in their lifetime.

The outcome measure was a dichotomous indicator of whether the respondent had become an established smoker, defined as having smoked 100 or more cigarettes by follow-up. This is the criterion commonly used to define "ever-smokers" among adults.

A three-level indicator of receptivity to marketing was constructed from the following two survey questions: 1) "Some tobacco companies make clothing, hats, bags, or other things with the brand on it. Do you have a piece of clothing or other thing that has a tobacco brand name or logo on it?" and 2) "Of all the cigarette advertisements you have seen, which brand's ads do you think attract your attention the most?"

The highest level of receptivity was assigned to those who reported owning a promotional item and who named a cigarette brand in response to the second question. Those who either owned an item or named a brand were scored as being moderately receptive to marketing. Those who neither owned an item nor named a brand were scored at the lowest level of receptivity. To rule out the possibility that some third factor could be responsible for causing both receptivity to tobacco marketing and subsequent progression to established smoking, the following baseline variables—shown to relate to both receptivity to marketing and becoming an established smoker—were included as covariates: whether the respondent reported having any close friends who smoked, whether the household included any adult smokers, and the respondent's score on a six-item scale of rebelliousness.

Finally, the level of the youth's involvement with smoking at baseline was also controlled. Although the cohort consisted of youths who had smoked at most one cigarette in their lifetime, they were differentiated into three smoking-status groups based on whether they had ever had a puff of a cigarette and on their responses to three items measuring "susceptibility to smoking." Respondents in the lowest risk group (confirmed nonsmokers) reported having never had even a puff of a cigarette and displayed a firm commitment not to smoke in the future. Respondents in the moderate risk group (ambivalent nonsmokers) had never puffed a cigarette, but gave less definitively negative responses to questions about the potential for smoking in the future. Respondents indicating that they had had a puff or a whole cigarette were classified in the highest risk group (early experimenters).

Results indicated that 21 percent of the respondents became established smokers during the 4-year follow-up period. Progression to established smoking was significantly more likely among Whites than among minority youths, youths who lived with at least one adult smoker, youths who reported that at least one of their close friends was a smoker, those who were early experimenters, and those scoring high in rebelliousness.

The smoking initiation rate among those high in receptivity to tobacco marketing (owned an item and named a cigarette brand as attracting their attention) was 46 percent, compared to 18 percent among those of moderate receptivity and 14 percent among those of low receptivity (chi square = 28.9, df = 2, $p < 0.0001$; Figure 13-3). The results of a multiple logistic regression that examined the impact of receptivity while controlling for all covariates revealed that adolescents who were highly receptive to marketing in 1993 were more than twice as likely to become established smokers by 1997 compared to those who were low in receptivity (OR = 2.70; 95% CI = 1.24-5.85). Being an early experimenter, having a close friend who smoked, and scoring above the mean on rebelliousness were also significant independent predictors of smoking initiation.

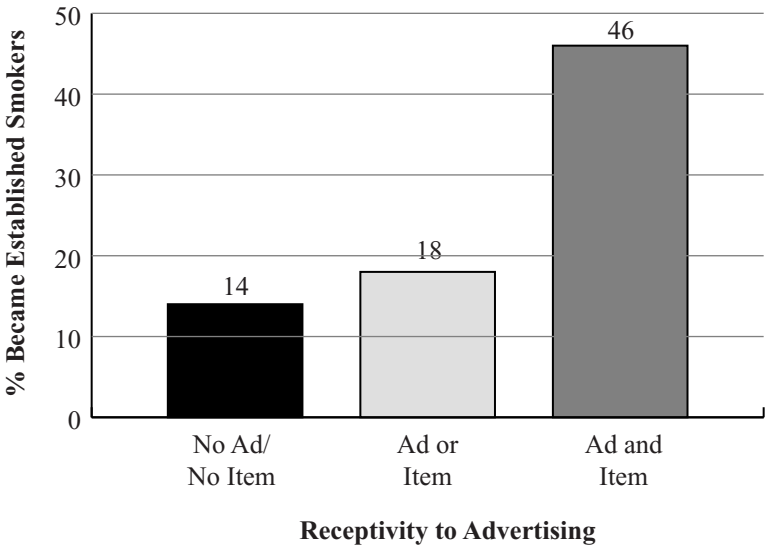
These findings demonstrate that paying attention to cigarette advertising and becoming involved in tobacco product promotions by obtaining an item of clothing, a sports bag, or some other piece of gear with a cigarette brand logo on it precedes, and reliably predicts, smoking initiation, even when controlling for other factors that have been shown to influence smoking uptake. Thus, even though the group of youths who were highly receptive to tobacco marketing at baseline were more likely to be rebellious, to have experimented with cigarettes, and to be exposed to parental or peer smoking at baseline, these factors taken by themselves do not fully explain the observed differences in progression to established smoking. This study demonstrates that the associations uncovered in prior studies are not solely due to increased participation in tobacco promotions among youths who have already moved along the smoking initiation continuum.

Evidence Regarding the Causal Mechanism

Cigarette advertising has been so pervasive on billboards, in storefronts, and in magazines and entertainment weeklies that most young people can name a brand whose ads capture their attention. Indeed, 75 percent of the above-mentioned sample of nonsmokers could do so. It is unlikely that simply distributing a T-shirt with a cigarette brand on it to a random sample of youths would induce a large proportion of those adolescents to become smokers. How is it, then, that noticing cigarette ads or owning a promotional item makes some adolescents more likely to become smokers?

A number of mechanisms have been hypothesized to account for the impact of tobacco advertising on youth smoking. It has been suggested that the pervasiveness of tobacco advertising gives the impression that most people are smokers (U.S. DHHS, 1994). Secondly, the advertisements undercut the fact that tobacco use is unhealthy, because the people pictured appear young, vibrant, and healthy. Thirdly, the messages conveyed by the advertising images are precisely those that would appeal to young people—

Figure 13-3
Progression to Established Smoking by Receptivity to Tobacco Advertising among Massachusetts Youths—Biener and Siegel, 2000



i.e., that smokers are independent, adventurous, popular, risk-taking, and attractive to the opposite sex (Altman *et al.*, 1987). In other words, cigarette advertising increases the perceived social value of smoking and, by doing so, increases the rate of smoking among adolescents. Additional analyses of the Massachusetts data tested that hypothesis by examining the relationships between knowledge of cigarette advertising, perceived social value of smoking, and position on the smoking initiation continuum.

The data for these analyses were primarily taken from the follow-up study of Massachusetts youths. A smoking initiation continuum was constructed from items on the baseline and follow-up surveys. This continuum combines items that assess susceptibility to future smoking, number of cigarettes smoked, and time since the last cigarette to yield an 11-point scale that ranges from 1 (has never had even a puff of a cigarette and is strongly committed to not smoking in the future) to 11 (has smoked more than 100 cigarettes in one's life and smoked on at least 20 days out of the previous 30) (U.S. DHHS, 1994).

Exposure to tobacco advertising was measured with a series of items on the follow-up survey that presented respondents with advertising slogans for various types of products with one word missing. For example: "Alive with BLANK," "Welcome to BLANK Country," and "I want to be like BLANK." The respondent was asked to fill in the blank. If the respondent provided a word for the blank, he or she was asked what product was being advertised. Six of the slogans were for cigarettes. Respondents were given one point for each blank correctly filled and one point for each cigarette brand correctly named. The total score could range from 0 to 12.

The social value of smoking was measured with six questions that had the respondents indicate whether smoking was an advantage, a disadvantage, or neutral for young people; the questions addressed a variety of dimensions. Respondents were asked, for example, "In general, do you think smoking has a good effect on how kids look, a bad effect on how kids look, or do you think it doesn't affect their looks one way or the other?" "Among people your age that you know, do you think those who smoke are more mature than those who don't, less mature, or is it about equal?" Similar questions assessed the relative advantages and disadvantages of smoking for popularity, intelligence, independence, and "how kids look at parties." Each item was scored 3 if smoking was seen as advantageous, 2 if it was seen as neutral, and 1 if it was seen as disadvantageous. The total score was the mean for all items and could range from 1.0 (smoking was seen as a disadvantage in all respects) to 3.0 (smoking was seen as an advantage in all respects).

Other variables in the analyses were the same as those described in the first study—age, gender, whether or not the respondent reported having a close friend who smoked at baseline, whether the respondent lived with at least one adult smoker, the household income level, the education level of the adult informant, and the youth's minority status.

Hierarchical multiple regression analysis was employed to estimate the effect of exposure to tobacco advertising on each respondent's position on the smoking initiation continuum at follow-up while controlling for position on the continuum at baseline and for the other control variables. Perceived social value of smoking was entered on the second step of the regression analysis. Change from Step 1 to Step 2 in the regression coefficient for exposure to tobacco advertising was computed. If the coefficient for tobacco advertising is reduced after adding perceived social value to the model, it would indicate that perceived social value is a mediating mechanism accounting for some proportion of the relationship between exposure to tobacco advertising and position on the smoking initiation continuum.

The results of the regression analysis are displayed in Table 13-1. Model 1 contains all predictors believed to be associated with adolescent smoking initiation, including the respondent's position on the uptake continuum at baseline. Step 1 includes all predictors except perceived social value of smoking. Results indicate that, when adjusting for all other predictors in the model, being at a higher level of initiation at follow-up is predicted by being at a higher level at baseline, having a close friend who smokes, having an adult smoker in the household, and knowledge of tobacco slogans. The only other predictor that approached significance was race/ethnicity, indicating that being a member of a minority group was associated with lower positions on the initiation continuum at follow-up. Respondents' scores on perceived social value of smoking were added in Step 2. As the results show (see Table 13-1), perceived social value of smoking was strongly related to position on the initiation continuum at follow-up, controlling for all other predictors. Furthermore, the coefficient for knowledge of tobacco slogans declined from 0.367 in Step 1 to 0.292 in Step 2, a reduction of 20 percent.

Table 13-1
Regression Coefficients for Predictors of Position on the Smoking Continuum at Follow-up for Cohort of Massachusetts Adolescents Surveyed in 1993 and 1997

	Model 1		Model 2	
Predictors	**Step 1**	**Step 2**	**Step 1**	**Step 2**
Age at baseline (12 to 17)	-0.223	-0.199	—	—
Gender (Male = 1; Female = 2)	0.382	0.436	—	—
Ethnicity (Non-Hisp. White = 1; Minority = 2)	-0.778	-0.572	-0.673***	-0.464
Baseline initiation continuum (1 to 11)	0.669***	0.583***	0.651***	0.574***
Close friend smokes (No = 0, Yes = 1)	1.030**	0.751*	1.084***	0.861
Adult smoker in household (No = 0; Yes = 1)	0.822*	0.673*	0.424	0.324
Household income (Under 50K =1; Over 50K = 2)	-0.225	-0.000	—	—
Education of adult informant (HS or less = 1; More than HS = 2)	0.029	0.082	—	—
Knowledge of tobacco slogans (0 to 12)	0.367***	0.292***	0.300***	0.214***
Perceived social value of smoking (1 to 3)	—	4.857***	—	4.776***
Adjusted R square (R^2)	0.357***	0.453***	0.328***	0.439***

** p < 0.05; ** p < 0.01; *** p < 0.001.*

Model 2 repeated the multiple regression analysis, this time including only those predictors from Step 1 that were significant to at least the 0.10 level of confidence. In Step 2, when perceived social value of smoking was added to the model, the coefficient for knowledge of tobacco slogans declined from 0.300 to 0.214, a reduction of 32 percent.

This analysis indicates that knowledge of tobacco slogans is a strong predictor of movement along the smoking initiation continuum among 15- to 20-year-old Massachusetts adolescents, even controlling for their stage of initiation 4 years earlier. It also shows that, although reports of having a close friend who smokes and having an adult family member who smokes are also associated with becoming more committed to smoking, these factors do not remove or neutralize the impact of exposure to tobacco advertising. Furthermore, this analysis provides evidence that one of the reasons that tobacco advertising promotes smoking initiation among adolescents is that it increases their perception that smoking cigarettes confers social advantages to people their age. The more knowledge adolescents have about advertising slogans, the more likely they are to report that young people who smoke are more attractive, more mature and independent, and more popular than nonsmokers. The analysis suggests that from 20 to 30 percent of the power of tobacco advertising to move adolescents along the smoking initiation continuum is due to its success in increasing the perceived social value of smoking.

SUMMARY The studies reviewed here comprise an impressive body of evidence that tobacco advertising and promotional activities are important catalysts in the smoking initiation process. Any particular study, taken alone, is subject to criticism and alternative explanations. When viewed as a group, however, the conclusion that there is a causal relationship between tobacco marketing and smoking initiation seems unassailable. This is not to say that the nature of the relationship is clear or simple. Tobacco advertising has been unavoidable in the environment of adolescents and most teenagers do not become smokers. It is proposed that tobacco advertisements are particularly attractive to adolescents who, for one reason or another, are looking for an identity that the images are carefully designed to offer. These are the youths who would retain promotional items, while those whose identity needs are met in other ways would likely lose, discard, or forget about them. Having the items offers the vulnerable group an opportunity to "try on the image of a smoker" (Feighery *et al.*, 1998). Doing so is likely part of a longer term process of accepting the image and, eventually, the smoking behavior that goes with it. More careful examination of the differential effect of advertising on more and less vulnerable youths would be very useful in helping us gain a better understanding of its effect.

What can be expected for the future? The multi-state agreement with the major tobacco companies includes some restrictions on billboard and transit advertisements and also on some forms of promotional items. However, tobacco advertising images are still widely displayed inside and outside of stores, in magazines, in the entertainment sections of newspapers, and at local sponsored events. Since it is the images that hold the power to influence adolescent behavior, a more comprehensive restriction on image advertising would be warranted.

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African American Teen Cigarette Smoking: A Review

Phillip S. Gardiner

INTRODUCTION Smoking rates in African American adolescents continue to be the lowest among all racial and ethnic groups in the United States. From 1978 to 1991, smoking rates declined for both males and females in this group (Bachman *et al.*, 1991). The Monitoring the Future (MTF) study showed that in 1978, 24.9 percent of African American high school seniors had smoked a cigarette daily, whereas only 4.1 percent reported this activity in 1991 (Johnston *et al.*, 1996). Similarly, the prevalence of smoking among African American adolescents has been substantially lower than the prevalence among White and Hispanic adolescents. This phenomenon is attested to by national, regional, and local surveys spanning the last 20 years (Bachman *et al.*, 1991; U.S. DHHS, 1994; CDC, 1996a; Johnston *et al.*, 1996; Sheridan *et al.*, 1993; Greenlund *et al.*, 1996).

These smoking rates for adolescents are conspicuously lower than the high smoking rates for adult African Americans. As African American teens reach adulthood, they have the highest smoking rates compared to any other racial/ethnic group, except for American Indians; this is especially true among African American men. Research has already identified "late-onset" smoking by African American teens as a characteristic that distinguishes this demographic group from other young smokers (Geronimus *et al.*, 1993; Robinson *et al.*, 1997; Royce *et al.*, 1993; Griesler and Kandel, 1998). Because African Americans are disproportionately plagued by heart disease, stroke, hypertension, diabetes, and AIDS—and because smoking is a prime suspect in many of these maladies—it will be very important to discover why smoking rates among adult African Americans have become so high, when the rates had been so low in adolescence.

During the 1990s, African American adolescent smoking rates jumped dramatically, as did all teenage smoking rates. In April of 1998, the Centers for Disease Control and Prevention (CDC) reported that African American youth smoking rates had increased sharply, from 12.6 percent to 22.7 percent—an 80 percent increase—from 1991 to 1997 (U.S. DHHS, 1998). The increases were most striking among young Black males, whose low cigarette-smoking rates were once deemed a public health success story. In 1991, 14.1 percent of male African American high school students smoked cigarettes, but by 1997, twice as many of these youths (28.2 percent) reported smoking cigarettes. In contrast, smoking rates among African American teenage girls also rose, but less dramatically (11.3 percent to 17.4 percent). Even with the distinct possibility of underreporting, African American adolescent smoking rates remain conspicuously lower and different than those for all other adolescents.

This chapter explores the protective factors that enable African American adolescents to be initially resistant to influences that initiate tobacco use. Identifying these factors is no small matter. Certain circumstances accounting for the rise in African American teenage smoking rates during the 1990s are also discussed. Potential problems of reliability and generalizability are reviewed, and finally, outstanding questions are identified. Overall, this review is meant to give meaning and context to the statistics on African American smoking presented throughout the monograph.

It should be noted that the African American population is not homogeneous. As a socially constructed "race," African Americans historically are a people who range from persons with only a trace of African heritage to dark-skinned Black people. This socially constructed racial term is further complicated by the presence of Haitians, Puerto Ricans, other peoples from the Caribbean, and African immigrants, who, as separate groups, have their own distinct cigarette-smoking patterns and rates (Taylor *et al.*, 1997). As Taylor and colleagues point out, ever-smoking rates among urban, foreign-born Blacks are considerably lower than those among American-born Blacks; among foreign-born Blacks, ever-smoking rates are lower among women relative to men (Taylor *et al.*, 1997).

PROTECTIVE FACTORS Many researchers have taken notice of the significant difference between the smoking behavior of African American youths and youths of other racial/ethnic groups, but few researchers have actually sought to tease out the predictors of this differential behavior (Gritz *et al.*, 1998). Even after controlling for school performance, drop-out rates, parental income, and drug use, Wallace and Bachman (1991) still reported that the observed ethnic differences in smoking rates remained among adolescent smokers. Though small, there is an emerging body of literature that seeks to identify the factors that have protected young African Americans from smoking initiation. Research has identified six protective factors: 1) the cost of cigarettes, 2) sports participation, 3) body-type preferences, 4) relative influence of peers and parental smoking status, 5) marijuana use, and 6) ethical and religious concerns. It seems that there is an intersection of socioeconomic, cultural, and racial factors that, when taken together, initially curtail African American adolescent smoking.

One factor limiting African American youth smoking may be the cost of cigarettes. Some researchers have shown that an increase in cigarette prices will lead to lower consumption of cigarettes, especially among teens (Chaloupka and Pacula, 1999; Hu *et al.*, 1995). Those same researchers have concluded that young Blacks are relatively more responsive to changes in price than are young Whites and young women. Similarly, Robinson and colleagues (1997) also found that "regular" smoking was heavily influenced by cost. The *Morbidity and Mortality Weekly Report* (MMWR) of the CDC concurs that not only would a 50-percent price increase cause a 12.5 percent decline in smoking, but that Hispanic smokers and non-Hispanic Black smokers were more likely than White smokers to reduce or quit smoking in response to a price increase (CDC, 1998). An important cautionary note is sounded by Stephens and colleagues (1997) from Canada, who have

demonstrated that, although cigarette prices are effective in controlling smoking rates, price changes will have less impact than desired unless coupled with anti-smoking ordinances.

Another protective factor, especially for African American males, may be participation in high school sports programs. In a survey of high school athletes, Davis and associates (1997) pointed out that race was a significant determinant of tobacco use, with Whites being more likely to use tobacco products. Davis and associates also concluded that high-intensity athletes were significantly less likely to be heavy smokers than athletes participating in low-intensity sports (Davis *et al.*, 1997). Since many African American males see participation in football, basketball, and track and field (high-intensity sports) as a means toward future employment and avenues for escaping depressed inner cities, the Davis findings have a ring of authenticity. Other researchers reported that Black boys scored higher on dietary restraint than White boys. These authors speculated that, given African American males' involvement in sports, such teens possibly smoked less and dieted more in comparison to their White middle school counterparts (Klesges *et al.*, 1997).

Cultural differences may also play a protective role in limiting African American adolescent girls' use of tobacco products generally, and cigarettes in particular. Recent surveys have shown that one of the reasons young White girls start smoking is to control their weight (Klesges *et al.*, 1997). On the other hand, African American girls don't necessarily subscribe to the European model of beauty. Klesges and colleagues (1997) have shown that White adolescent girls are much more concerned with weight, and the potential for cigarette smoking to control it, than are young African American girls. Similarly, Camp and associates found that while 39 percent of White female and 12 percent of White male adolescents reported using smoking to control their appetite and weight, not a single Black male or female adolescent reported using cigarettes for this purpose (Camp *et al.*, 1993). Other researchers have shown that pregnancies among African American teenagers have played a role in lowering the smoking rates among this sector of the population. Land and Stockbauer (1993) analyzed the data files extracted from Missouri birth certificates, which revealed statistics on 41,544 Black and 105,170 White teenage mothers. They found that the rate of African American subjects who smoked during pregnancy decreased from 37 percent in 1978 to less than 22 percent in 1990. The authors go on to state that a large part of this reduction is attributed to changes among Black teenage mothers, whose smoking during pregnancy declined from 35.8 percent to 7.2 percent (Land and Stockbauer, 1993).

The Black church historically has played an important role in the social, political, spiritual, and health lives of African Americans. In this regard, Brown and Gary (1994) found that low frequency of church attendance among African American males is associated with current smoking status. Since the parents and/or grandparents of many African American youths require them to attend church, religious involvement may be an initial brake on smoking. It is also possible that the many young Blacks who do

not attend church begin smoking earlier, but this hypothesis has yet to be investigated or tested. Taylor and colleagues (1999), drawing on 63 in-depth interviews of White and African American teenagers, found that Blacks ranked parental influence, death, and moral/ethical principles as major themes explaining why people choose not to smoke. Additionally, there is some research showing that African American high school seniors prefer dating nonsmokers and are less likely than Whites to state that they "don't mind" being around people who are smoking (Lynch and Bonnie, 1994).

There are differing findings on the role of family and friends in the etiology of African American teenage smoking. Some research suggests that African American youths are more influenced by their families' and friends' beliefs about cigarette smoking than are their White counterparts (Gritz *et al.*, 1998; Mermelstein *et al.*, 1999; U.S. DHHS, 1994 & 1998). Although Gritz and colleagues (1998) found that African American adolescents were significantly less susceptible to smoking, they also found that, across Whites, Latinos, and African Americans, the most important predictor of both ever-smoking and susceptibility to smoking was the smoking status of a youth's three best friends. Similarly, Botvin and associates (1994) reported that friends and peers were the most important social influences in predicting smoking behavior among inner-city African American and Latino 7th graders. In another study, Botvin and colleagues found that friends' smoking, attitudes concerning the harmful effects of smoking, and low self-esteem concerning school performance were predictive of behavioral intention to smoke among young African Americans (Botvin *et al.*, 1992). More broadly, Gritz and associates (1998) speculate that African American community norms may protect adolescents from smoking initiation.

On the other hand, Landrine and colleagues (1994) reported, as distinct from Gritz and Botvin, that smoking among peers was the best predictor of smoking among White adolescents. These authors showed that peer smoking accounted for 23.5 percent of the variance among White adolescents, but accounted for only 15 percent of the variance for Latino subjects, 9.6 percent of the variance for Asian American subjects, and none of the variance for African American youths (Landrine *et al.*, 1994). Other researchers have discovered similar findings. Headen and associates (1991) sought the correlates and potential causes of adolescent smoking among 1,277 current nonsmokers aged 12 to 24 years. They found that having a best friend who smoked increased the odds of initiating smoking more than two-fold for Whites, but had no effect on the odds of smoking for Blacks. Griesler and Kandel (1998) also suggested that that lack of maternal smoking effects and perceived peer pressure to smoke affected African American adolescents differently compared with Whites. These authors maintained that role-modeling and interpersonal influence may be more important determinants of smoking for White than for African American adolescents.

Discrepancies in interpreting the role of depression also exist when assessing African American teen smoking. Several researchers determined that depression is a predictor of African American youth smoking, whereas

Gritz and colleagues reported that depression is not a predictor of African American smoking (Gritz *et al.*, 1998; Landrine *et al.*, 1994; Landrine and Klonoff, 1996; Klonoff and Landrine, 1996). Furthermore, Landrine and Klonoff (1996) found that racial discrimination is highly correlated with depression and smoking. Clearly, more research is needed on these relationships and the role of social and psychological factors in the initiation of smoking among African American teens.

An unexpected factor that may initially temper cigarette smoking among African American youths is the use of marijuana prior to smoking cigarettes. Charyn Sutton, President of the Onyx Group in Philadelphia, calls the phenomenon the reverse gateway effect (Gross, 1998). Traditionally, White youths have proceeded from the use of legal substances to that of illegal substances. Sutton found that many African American youths were smoking marijuana before trying tobacco, taking the opposite path. Though this is counterintuitive and not to be applauded, the use of marijuana by African American teens may initially be delaying the onset of cigarette smoking in this population. Unfortunately, it may truly serve as a gateway to tobacco (see the discussion of marijuana and "blunts" below).

The above review shows the complex interaction of class, culture, and race. It is clear that some of these protective factors began to break down with the rise of tobacco smoking in African American teenagers during the 1990s.

AN INCREASE IN RISK FACTORS AND A DECLINE IN PROTECTIVE FACTORS EQUALS AN INCREASE IN AFRICAN AMERICAN TEEN SMOKING RATES

Smoking rates have increased across the board for teens from all ethnic groups (U.S. DHHS, 1998). Many of the factors driving the overall increase in teenage smoking rates also affect adolescent African Americans, including the glamorization of tobacco products (especially cigars) in the movies and on television in the 1990s (Stockwell and Glantz, 1997). At the same time, there are unique circumstances surrounding the increase in African American teenage smoking and these must be addressed. Research suggests that seven factors are converging to raise smoking rates in this population:

1) the tobacco industry marketing directly to African Americans generally, and to teens specifically;
2) tobacco industry sponsorships;
3) the adoption of cigarettes, cigars, and marijuana (*i.e.*, smoking) by segments of the commercial hip-hop culture;
4) cigarettes used in conjunction with marijuana;
5) greater access to tobacco products;
6) greater access to cheaper tobacco; and
7) the increasing impoverishment, racial discrimination, and marginalization of inner-city African American youths.

The recent release of tobacco industry documents has confirmed years of suspicion that tobacco companies had directly targeted African Americans for tobacco and cigarette consumption, and that they continue

to do so. Documents show that, as early as the 1960s, the motivations of the "Negro" tobacco consumer were a major concern of R.J. Reynolds (Meier, 1998; Randall, 1998). Moreover, other documentation confirms that R.J. Reynolds (manufacturer of Salem) and Brown & Williamson (manufacturer of Kools) were constantly contending over the African American mentholated cigarette market (Meier, 1998; Randall, 1998). In the 1990s, alcohol and cigarettes remained the most advertised products in African American communities (Goldstein, 1991; Randall, 1998). Billboards advertising tobacco products are placed in Black communities four to five times more often than in White communities (Skolnick, 1993). Additionally, such advertisements targeted to the African American community usually promote menthol cigarettes (Law, 1992; Randall, 1998). Menthol cigarettes tend to be higher than nonmenthol cigarettes in tar and nicotine, and they also may catalyze independent effects on addiction and dependency, effects which have not been adequately studied (Randall, 1998).

Billboard advertising is just one way that the tobacco industry has targeted African American youths. Special brands of cigarettes also have been created for African Americans. In 1990, R.J. Reynolds planned to market a new menthol cigarette called "Uptown" (Ramirez, 1990; Randall, 1998). Only the pressure of public outrage forced the company to suspend production of the product. In 1997, R.J. Reynolds came out with a mentholated version of Camel that was clearly aimed at the African American community (Greene, 1997; Randall, 1998).

The impact of years of targeted advertising is seen in the brand loyalty of African American teenagers. About 75 to 90 percent of Black smokers report a preference for menthol cigarettes, compared with only 23 to 25 percent of White Americans (CDC, 1994; Randall, 1998). Generally speaking, Marlboro and Camel portray White images and characters, and these are the brands of choice among White teens. On the other hand, Kool and Newport use Black and other minority images and are favored by African American teens. Additionally, it is known from previous research that teens mimic their parents in their smoking habits; White adults smoke Marlboro and Camels, African American adults smoke mentholated brands.

The tobacco industry's sponsorship of African American community events has increased in the 1990s as well, especially those activities attended by Black teens. One of the more conspicuous expressions of targeted marketing is the Kool Jazz Festival, which annually travels the country promoting cigarette smoking and attracting large numbers of young African Americans (Randall, 1998).

Broad sectors of the Rap music industry have adopted smoking images as part of the rebellious argot of the hip-hop generation. Musical artists are seen smoking marijuana, cigarettes, or cigars in promotions, in videos, and in person. Just a walk through many African American inner-city communities will show multiple images of rappers smoking cigarettes and cigars. DuRant and colleagues (1997) found that at least one fourth (25.7 percent) of MTV videos portrayed tobacco use. It would be interesting to do the same type of analysis of Black Entertainment Television (BET), Music Box™,

and other Black media dedicated to young African American audiences. Moreover, popular African American, youth-oriented magazines not only carry cigarette advertisements, but also pepper their fashion and lifestyle spreads with pictures of Black youths smoking. These latter pictures do not necessitate the Surgeon General's warning since they aren't directly sponsored by the tobacco industry.

An increase in tobacco use among young African Americans has also been linked to marijuana use. Robin Mermelstein, Ph.D., of the University of Illinois at Chicago, speaking of the findings from focus groups held among 1,200 teenagers, points out that many Black teens were drawn to cigarettes because nicotine intensifies their marijuana high (Gross, 1998). As was pointed out above, initial marijuana use may postpone the use of cigarettes by African American teens while preparing youths for adoption of the more deadly habit. In addition, some young African Americans empty out the insides of cigars and refill them with marijuana and/or crack cocaine, among other substances. These concoctions— called variously "Philly Blunts," "blunts," or sometimes "Caviar"—have augmented cigar and tobacco use among teenage Blacks. It is important to note that, while crack cocaine use has declined, marijuana and, increasingly, tobacco use appear to be growing among African American youths.

Some research suggests that African American youths had greater access to tobacco products in the 1990s. In a large bi-racial sample of 7th graders, Robinson and associates (1997) found that the best predictor of experimentation with cigarettes was the perception that they were easily available. In another study of White, Latino, and African American adolescents who attempted to buy cigarettes in southern California convenience stores, researchers found that older Black children (16 years of age), irrespective of gender, were the single most likely group to be sold cigarettes (Klonoff *et al.*, 1997). *MMWR* reports confirm that adolescent access was easiest in small stores (CDC, 1996a & 1996b). Landrine and colleagues found the same result in a follow-up to the above-referenced Klonoff study, namely a bias toward selling cigarettes to Black youngsters, but not White ones (Landrine, 2000).

Another factor that may increase smoking rates among young African Americans is the availability of loose, single cigarettes ("loosies"). There is a scarcity of studies on this issue, but Landrine and associates speculate that, despite California laws banning the sale of single cigarettes, minors' rate of access to them in poorer communities—and, hence, the rate of access by African American youths—is probably significantly higher than for non-minority youths (Landrine *et al.*, 1998). Similarly, in a convenience sample of 206 stores, Klonoff and colleagues (1994) have demonstrated that single cigarettes were least likely to be sold in White neighborhoods, more likely to be sold in integrated neighborhoods, and most likely to be sold in minority neighborhoods. These investigators go on to show that minors were able to purchase single cigarettes in 34.4 percent of the visits to White neighborhoods, but could do so in 71.2 percent of the visits to minority neighborhoods.

On the other hand, other researchers have shown that the availability of cheaper cigarettes is not likely to be a cause of increased smoking initiation by adolescents (Gilpin and Pierce, 1997). These authors suspect that tobacco industry marketing probably plays a larger role in adolescent smoking uptake than increased access. While it would seem to be a reasonable assumption that cheaper generic cigarettes would be used frequently by young African Americans, research shows this not to be the case. Cavin and Pierce (1996) have demonstrated, in a cross-sectional sample of California smokers, that non-Hispanic Whites, rural residents, and lower income smokers were twice as likely to buy generics compared to other smokers. Moreover, even though access may be greater for African American teens, research shows that 7th-grade African American boys were less likely to have purchased cigarettes than their White counterparts (Robinson *et al.*, 1998). This later finding is consistent with the lower smoking rates found among African American teens.

Some authors suggest that there is a relationship between poverty, racism, segregation in the inner cities, and increases in African American youth smoking. It seems intuitive that the stress and oppression arising from racial discrimination would give rise to cigarette smoking. Landrine and Klonoff (1996) tackled this understudied phenomenon in a groundbreaking article, demonstrating that "racism is rampant in the lives of African Americans and is strongly linked to psychiatric symptoms and to cigarette smoking." These authors found that African American smokers reported significantly more frequent racist discrimination throughout their lives than did nonsmokers. The growing marginalization and heightened racial oppression of many inner-city African American youths may be one of the main factors increasing their cigarette smoking during the 1990s.

Other authors identify the changing, difficult, and demanding living conditions of African American youths as predictors of risk-taking behavior. Richardson and colleagues (1993) found that adolescents who were unsupervised at home were slightly more likely to engage in problem behavior than youths with home supervision. This is an important finding since many African American families are living in increasingly impoverished and marginalized conditions in the inner city and cannot tend to their children 24 hours a day. Swing and graveyard shifts, reliance on public transportation, long distances to and from work, lack of affordable childcare, few after-school programs, multiple jobs, or no jobs all contribute to the unsupervised character of many adolescent African Americans and may, therefore, create the conditions for increasing their smoking rates (Richardson *et al.*, 1993).

Plainly, some of the protective factors that surrounded African American teens have broken down and their risk factors have increased. Most likely, it is some combination of the two.

VALIDITY OF AFRICAN AMERICAN SELF-REPORTS ABOUT CIGARETTE SMOKING

The two articles reviewed for this chapter come to divergent conclusions as they relate to the validity African Americans self-report about tobacco consumption. One study, using biochemical measures to compare the validity of self-reports of tobacco use of 1,823 Black and White adolescents, found that African American adolescents were more likely than White American adolescents to underreport tobacco use, and that White adolescents were more likely than their African American counterparts to overreport tobacco use (Bauman and Ennett, 1994). On the other hand, Wills and Cleary (1997) found that the lower smoking rates reported by African American adolescents are real and are not substantially a consequence of reporting artifacts. Both studies reported higher biochemically confirmed rates of tobacco use among White adolescents compared to African American adolescents. These investigators compared the validity of self-reports of cigarette smoking for African American, Hispanic, and White respondents. Self-reported cigarette smoking was compared to a measure of carbon monoxide among the multiracial sample of 8th, 9th, and 10th graders. The validity of self-reports of smoking was generally comparable across ethnic groups (Wills and Cleary, 1997). The above contradictory findings are further complicated by other research that has demonstrated that Whites exhibit digit preference (the tendency to report rounded numbers of cigarettes per day—*i.e.*, 10, 15, 20, etc.) significantly more than African Americans in self-reported smoking (Klesges *et al.*, 1995).

Another potential threat to the validity of African American youth self-reported smoking lies with the identities of the people asking the questions. African American youths may be hesitant to reveal any illegal practices, even if their interviews are covered by human subjects protections and immunity.

There are many potential threats to the generalizability of self-reported data of African American teen smoking. Since nearly a third of all African American male teens are incarcerated either in prisons, juvenile facilities, or halfway houses, we know that they have not been part of any sample of cigarette smoking behavior. Moreover, incarcerated adolescents, both male and female, generally have been those involved in risk-taking behavior, which includes smoking cigarettes. Cigarettes often function as currency in prisons, are highly valued, and are exchangeable for most other goods and services. Olubodun, in reporting the inmate health at a community prison, showed that not only was blood pressure proportionately related to the length of an inmate's stay, but that 67 percent of all prisoners reported smoking (Olubodun, 1996). The above fact, coupled with the historic under-representation of African Americans in survey research (the U.S. Census included), should be of some concern for tobacco researchers. It seems that large sectors of African American teens that are not part of the many national samples are smoking.

It may be possible that there is a bi-modal distribution of cigarette smoking among African American adolescents. Although rising, rates among African American teens who are not in jail remain lower than rates

among any other racial/ethnic group. On the other hand, incarcerated Black youths probably have significantly higher smoking rates than their counterparts on the outside, though this hypothesis is yet to be tested.

OUTSTANDING QUESTIONS Just from the review presented above, numerous questions stand out. For example, the community norms and the African American church may not be exerting the same strong protective influence that they did in the past. Amey and associates (1996), using Monitoring the Future data, report that, although religion does provide some protection from drug use (*i.e.*, marijuana, cigarettes, and illegal drugs), religiosity has less of an impact on the drug use of Black adolescents compared to White youths.

It seems that, with the rise in educational status of African Americans, cigarette smoking rates are also increasing. Heretofore, it has been shown that higher educational levels were consistent with lower cigarette smoking levels (see Chapter 2). Now, some researchers are showing that smoking differences between Blacks and Whites may be inversely related to education, with greater smoking risk associated with less education for Whites and more education for Blacks (Werch *et al.*, 1997; U.S. DHHS, 1998). Increased educational attainment has brought African Americans into greater contact with Whites and other ethnic groups and has increased the possibilities of racist encounters. It seems logical that "middle class stress" and enduring increased racist remarks would predispose this group of African Americans to greater cigarette smoking and tobacco use generally.

African American teen tobacco smoking coupled with marijuana usage also presents new challenges and thorny questions that tobacco control experts and nicotine addiction researchers will have to grapple with. Scientists know that both nicotine and tetrahydrocannabinol (THC), the active ingredient in marijuana, influence the dopaminergic pathway, which is involved in the neural reward mechanism. Is it possible there is a synergistic effect of these two drugs on brain chemistry? Does the combined use of tobacco and marijuana produce greater neuropharmacological effects than if the two drugs are used separately? Does THC extend the addictive qualities of nicotine? Behavioral scientists are faced with still other questions. Why do White youths typically proceed from tobacco to marijuana while many Black youths proceed from marijuana to tobacco? Has the cigar smoking craze, promoted by the tobacco industry and Hollywood, exacerbated "Philly Blunt" use among African American teens?

There still remains the task of understanding the neuropharmacological effects of menthol in cigarettes. Does menthol bolster the addictive qualities of nicotine? Might the fact that African Americans often smoke menthol cigarettes contribute to their high rates of lung cancer, heart disease, and mortality from cigarette smoking? Why is it that African Americans have more illness associated with smoking, despite the fact that they start smoking later in life and smoke fewer cigarettes (Randall, 1998)?

Furthermore, comparative research would go a long way toward teasing out the differences between young African Americans who are incarcerated and those who are not. This is no small question. Since mandatory/minimum sentences have confined nearly a third of African American males behind bars, it is necessary for tobacco researchers to study the prison population and compare it with its counterpart on the outside. Unfortunately, the prison population will not diminish soon. Those African American youths who are not in prison remain, for the most part, in America's urban inner cities. Is the greater poverty and marginalization experienced by these youths driving increased smoking rates? On the other hand, some states and many counties have established prohibitions against smoking. The impact of these laws and their differential impact on the smoking practices of African Americans and others behind bars still need to be looked into.

KEY QUESTION Plainly, the key question facing those researchers interested in youth smoking is, "How can African American rates of smoking be so low during adolescence and then become so high in adulthood?" It seems that many of the protective factors that keep the most devastating aspects of racism and discrimination away from African American youths begin to erode when they venture out into the "real world." This is a world of little opportunity, low-paying jobs, and the possibility of an increase in police harassment. Many young adults fight back, and many to no avail.

An old adage states: "Why not smoke, I am going to die anyway." That comes from the life experience of Black people and they are right. African American people live shorter and less healthy lives. It may not start out that way, but by the time that they are adults, they suffer from disproportionate rates of heart disease, stroke, diabetes, hypertension, AIDS, and death from gun shots, among other maladies and incidents. In addition, smoking cigarettes is a major culprit in the etiology of many of the above-mentioned maladies. Understanding and deciphering the puzzle surrounding the low-youth, high-adult smoking rates among the African American population remains the key question facing tobacco-use researchers.

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Understanding Tobacco-Use Research among Hispanic/Latino Adolescents: A Sociocultural Perspective

Lourdes Baezconde-Garbanati

INTRODUCTION According to the Surgeon General's Report (U.S. DHHS, 1998; see Chapter 2), smoking rates in the United States among adolescent Hispanics/Latinos have been on the rise after what had been several years of substantial decline. Even in California, where smoking rates for Hispanic/Latino high school students traditionally have been low, there has been an increase in the prevalence of current smoking among adolescents. Between 1993 and 1996, there was a 52.1 percent increase in the number of those aged 12-17 years who reported smoking in the last 30 days (Pierce et al., 1998). Due to the large and growing numbers of Hispanics/Latinos and the youthfulness of this population around the country, this substantial increase in adolescent smoking is particularly troubling. Among older teens (16-17 years of age), overall smoking rates historically have been higher and, in 1998, this continued to be the case nationwide.

There are well over 12 million Hispanic/Latino children and youths in the United States, representing one of the largest segments of the Hispanic/Latino population (Campbell, 1996). Increases in the number of Hispanics/Latinos throughout the country are predicted to continue unabated due in part to high immigration and high fertility rates (Hayes-Bautista et al., 1994). By the year 2020, it is predicted that there will be over 54.3 million Hispanic/Latino adults, children, and youths in the United States. By the year 2080, the population will have expanded into well over 140 million (Marin and Marin, 1991). However, in many states, Hispanics/Latinos, and youths in particular, have not received the needed attention in terms of culturally competent research, services, or language-appropriate prevention and cessation programs designed to effectively curb smoking rates.

If we are to better understand these increases and the methods for preventing adolescent Hispanics/Latinos from further uptake of smoking, there is a need for research that is more refined and tailored to the realities of Hispanic/Latino adolescent life. Research with this population group calls for a clear understanding of the sociocultural context in which Hispanic/Latino adolescents lead their lives. Such research may be useful in understanding smoking rates in the Hispanic population. It may also be useful in the development of research questions, the language and youth-centered idiomatic expressions used in surveys, the recruitment and reten-

tion of Hispanic/Latino adolescents into research studies, the conduct of research and analyses of data in culturally and age-appropriate ways, and the culturally specific interpretation of data for the Hispanic/Latino population.

This monograph presents an important effort across the country to understand youth tobacco use and the research that supports it. This document will serve to better inform program planning for the nation as a whole, and to identify gaps in research for this population. This monograph includes findings from some of the largest data sets available on smoking behaviors of Hispanic/Latino adolescents.

Unfortunately, until recently, data for Hispanic/Latino adolescents have been lacking, not just in terms of tobacco use, but in general. When it is available, much of the information lacks the level of specificity needed to better understand the realities of youth smoking (Castro and Baezconde-Garbanati, 1987). For example, it is often hard to find information on youth smoking prevalence among the various sub-Hispanic/Latino groups by country of origin (i.e., Mexican versus Puerto Rican, Cuban, or Central American, among others), by gender, or by predictors of Hispanic/Latino youth smoking in particular. This lack has been due in part to the limitations of existing data collection systems and to a lack of uniformity in methods, conceptualization, operationalization of terms, and analyses (Nuno et al., 1998). Other studies contain small sample sizes and varying sampling schemes that make it difficult to draw conclusions. Even though much progress has been made in study design, the different degrees of sophistication and scope of existent tobacco-use data collection systems in various states make it hard to obtain comparable data. Even more difficult is obtaining information compiled in culturally competent ways, particularly so in the case of Hispanic/Latino youths. One attempt at culturally competent data collection is the recent focus group research effort conducted by the Centers for Disease Control and Prevention (CDC). These data promise to address some of the specificity needed to better understand larger scale studies on Hispanic/Latino adolescents (Crawford et al., 1998).

The data from various states presented in this monograph represent another attempt at understanding youth smoking rates from a broader perspective. But to better grasp these data on Hispanic/Latino adolescent tobacco use rates, it is important to provide a culturally relevant framework that places these rates into the context of Hispanic/Latino adolescent life across the country. This framework will help to address the complex scenario in which Hispanic/Latino adolescent smoking is initiated, proceeds from experimentation to intermittent use, on to regular use, and ends in addiction (U.S. DHHS, 1994). At the same time, it may help to shape an understanding of the complexities of research that must take into account the interactions among culture, gender, acculturation, immigration, socioeconomic status, and the historical and environmental factors that impact Hispanic/Latino adolescent smoking. An examination of these data within a cultural perspective may generate new questions and open new avenues for research and practice. In turn, this may help to better shape the understanding of tobacco use among Hispanic/Latino adolescents throughout the country.

A SOCIOCULTURAL FRAMEWORK FOR HISPANIC/LATINO ADOLESCENT TOBACCO USE RESEARCH

Hispanic/Latino Heterogeneity

Hispanics/Latinos in the United States have been characterized by their heterogeneity based on a series of variables that include, but are not limited to, country of origin, the geographic region in which they reside, immigration status, language capabilities, acculturation levels, age, education, and socioeconomic status, among others (Castro and Baezconde-Garbanati, 1987). While some Hispanics/Latinos in specific regions of the country have been characterized as having high poverty rates, low educational attainment, elevated numbers of high school drop outs, and high levels of unemployment (Chapa and Valencia, 1993; Perez and Salazar, 1993), others have achieved a prominent status in society.

Nevertheless, newly arrived immigrant population groups, especially adolescent Hispanics/Latinos, often struggle between traditional family values and the lure of the new culture. Newly arrived Hispanic/Latino adolescents may experience high levels of acculturative stress (Mena et al., 1987). For some Hispanic/Latino adolescents and their families, the stress of being undocumented (Melville, 1978; Mirowsky and Ross, 1987) and the limitations it imposes are critical constraints in their lives. For example, undocumented youths may not be able to obtain a valid California driver's license—an important right of passage for Hispanic/Latino adolescents.

Hispanic/Latino heterogeneity is also apparent in terms of immigration and documentation, since some adolescents may have overstayed student or tourist visas or may have entered the country illegally, undocumented, or on a seasonal status. Others (i.e., Cuban and some Central Americans) are political refugees. Still others, such as Puerto Ricans, are considered U.S. citizens. Some may come from families in which parents may be undocumented while the children or some of the children were born in the United States. Therefore, within the same family, a younger sibling may be a U.S. citizen while an older child may be in the country illegally. Other youths may trace their roots back four or five generations to a time when California was a part of Mexico. Still others consider themselves of Spanish descent (i.e., from Spain) rather than Latin American. Therefore, the reasons for immigration and the experiences of each adolescent Hispanic/Latino group in the various states in the United States may vary widely.

Some adolescent Hispanics/Latinos may have come with family members fleeing political persecution or with families that feared their young children would be recruited into guerrilla warfare groups. Others may have immigrated with their families looking for economic or educational advancement and a better life in the United States. Some adolescents may have not had a choice and may have immigrated into the United States involuntarily, while others may have come willingly. The voluntary nature of immigration helps to frame the experiences in this country (Salgado de Snyder and Padilla, 1987) for these young people.

Latino heterogeneity is also exemplified by urban versus rural differences and by regional variations based on country of origin. For example, Hispanics/ Latinos tend to concentrate in nine (9) different states across the

United States. Individuals of Mexican origin tend to concentrate in California, Illinois, Colorado, New Mexico, and Arizona. Central Americans tend to concentrate in California, as well as in the northeastern part of the United States, such as Washington, D.C. and New York. Cubans, on the other hand, concentrate in Florida, and have spread through other parts of the United States. Puerto Ricans and Dominicans are often found in New York, New Jersey, and Pennsylvania. These groups have attained various levels of education, political strength, and economic stability and have influenced American life in multiple ways.

Although little is available on adolescent Hispanic/Latino subgroups, data presented in this monograph show that Hispanic/Latino adolescent smoking seems to vary by state. However, there are few data on how rates vary within the United States by country of origin. The California Youth Survey data point to wide variations in daily smoking among 12th graders, from 22 percent among those of Cuban origin to 16 percent among South Americans and 10 percent among Mexican and Central American youths (Johnson, 2000). Smoking level variations by acculturation have also been noted among Hispanics in general (Marin et al., 1989), as has the presence of strong parental sanctions against adolescent smoking (California Department of Health Services, 1998).

Sociodemographic Factors and Hispanic/Latino Adolescent Tobacco Use

With its high rates of poverty, unemployment, and high school drop outs, Hispanic/Latino adolescents are particularly vulnerable to engaging in tobacco use in its various forms. One study conducted in California (Morris, 1993) revealed that disadvantaged Latino youths (ages 9-12) were three times more likely to smoke or experiment with tobacco than non-Latino youths. In another study (Johnston et al., 1996), Latino 8th graders had the highest rates of lifetime and 30-day cigarette smoking. Early tobacco experimentation may be linked to alcohol and to experimentation with other drugs among Latino youths (Escobedo and Peddicord, 1996).

According to the Surgeon General's Report (U.S. DHHS, 1998), there are multiple factors associated with smoking among Hispanics and Latinos. Some of these factors include drinking alcohol, working and living with other smokers, having peers who smoke, being in poor health, enduring acculturative stress, being depressed, and being exposed to tobacco advertising and promotion strategies.

Among Hispanic adolescents, the interaction of many complex factors within the various Hispanic/Latino communities accounts for observed patterns of tobacco use. Thus, data for Hispanic/Latino adolescents that appear in this monograph need to be interpreted within the context of the complex interaction and the cultural and socioeconomic realities of this population group.

Cultural Factors Some factors that influence smoking among Hispanic/Latino adolescents are socioeconomic, but others are cultural in nature, and both types interact with other important factors. Some factors are environmentally determined, such as excessive tobacco promotion in sporting and cultural events by the tobacco industry or heavy advertising and promotion of pro-tobacco messages in magazine ads and movies. Other factors are cultural and these include language spoken at home, highly traditional versus less traditional norms, the quality of family functioning, household composition, attitudes about smoking, and the smoking status of parents and peers (including familial peers, such as cousins).

Language Language capabilities and preferences of Hispanic/Latino adolescents need to be considered at all levels of tobacco control, from the conduct of research to the development and delivery of anti-tobacco messages to this special group. Ad Americas (1999) research, for example, shows that, in California, Hispanic/Latino adolescents live in a true bilingual, bicultural world. Data showed 54 percent of Hispanic/Latino teens surveyed by Ad Americas were bilingual, 19 percent were English dependent, while another 27 percent were Spanish dependent. How these numbers vary by state is still unclear.

These data suggest that, to reach a Hispanic/Latino teen population in California, one must survey in both languages. They also suggest a need to segment advertising that is directed at these youths. Male Hispanic/Latino immigrant teens, for example—who prefer Spanish and who tend to smoke more than immigrant females—may need to be recruited for surveys in a different way than those youths who are bilingual or prefer English. English language surveys could potentially target the more acculturated Hispanic/Latino girls, who tend to smoke more than their less acculturated counterparts.

In addition, language issues among Hispanic/Latino adolescents go beyond Spanish/English level variations to incorporate terms and concepts of the Hispanic/Latino youth culture. Idiomatic expressions with varying meanings may be found for otherwise identical words. This is an area that needs further exploration if instruments developed to grasp the realities of Hispanic/Latino adolescent tobacco use are to be relevant to those completing such surveys.

Other cultural factors among Hispanic/Latino adolescents may be common to other groups as well. Recent reports (U.S. DHHS, 1998; Penn, 1998; Lew, 1998) show that some of the same factors that contribute to adolescent smoking in other racial/ethnic groups, such as African Americans, American Indians, and Asian/Pacific Islanders, also contribute to tobacco use in Hispanic adolescents. Specifically, peers and parents who smoke (California Department of Health Services, 1998; Penn, 1998) and cultural norms that favor smoking in various ethnic/racial groups, such as giving cigarettes at weddings or as gifts in the Asian/Pacific Islander groups (Lew, 1998), also have been associated with adolescent smoking among Hispanics/Latinos. For example, among Hispanic/Latinos, pricey American cigarettes and liquor may be highly valued and often requested as gifts during periodic visits back to the home country.

The Role of Acculturation Income, education, and acculturation may interact in significant ways to promote smoking among Hispanic/Latino adolescents. Higher acculturation levels have been closely tied to higher education and higher income in the Hispanic/Latino community. When individuals have been in the United States for a number of years, they tend to become more similar to the general culture in terms of income and education. For example, there is higher educational attainment among Mexican Americans than among Mexican immigrants (Hayes-Bautista, 1992). In the same manner, Latino immigrants with initially lower smoking rates, especially among women, upon arrival to the United States, tend to increase their smoking as they become more educated and more acculturated (Marin et al., 1989). This characteristic, which is found mainly among Hispanic/Latinos and African Americans, is the reverse of that found among non-Hispanic Whites, who generally exhibit lower smoking rates with increasing educational attainment. The need to belong and assimilate into the general culture, to absorb the norms and reap the benefits and promises of the new culture motivates Hispanic/Latino women—and adolescent girls in particular—to be more likely to smoke the longer they are in the United States.

To understand these and other influences of acculturation, data for Hispanic/Latino adolescents need to be dissaggregated. Data that are dissaggregated will help to clarify varying patterns in smoking rates among Hispanic/Latino adolescents. This clarification is important because research among adults (Cantero et al., 1999) has already shown that more acculturated Latinas, for example, especially those in their middle years (45-64), tend to engage in less preventative health behaviors than their immigrant counterparts. Cantero et al. (1999) showed that acculturated Latinas (45-64 years of age) participated less in physical activity programs, had less healthy eating patterns, got less sleep, and smoked more than their less acculturated counterparts. Disaggregating data for Hispanic/Latino adolescents may help both to better identify consistent patterns among several differing groups and to understand their differences.

Immigration Status Once they arrive in the United States, immigrant communities are especially at risk for increased rates of smoking. Although rates for immigrant women and adolescent girls appear to be initially relatively low, some of these rates may be masked in part by immigration characteristics (Baezconde-Garbanati et al., 1999a). Such masking characteristics may include, but are not limited to, original smoking rates in the countries of origin, exposure to promotion and advertising by the immigrant group, age at immigration, and positive attitudes toward the tobacco industry. Positive industry attitudes are often the result of seeing the industry as a major source of economic wealth for a country that sends immigrants into the United States or of seeing it as a friend in the community.

For example, varying smoking prevalence rates are found in various Latin American countries that send immigrants into the United States, ranging from a low of 11 percent to a high of 20 percent in some regions. According to data from the Pan American Health Organization (Baezconde-

Garbanati et al., 1999a), 1987 smoking rates for women in Costa Rica were 11 percent, 12 percent for women in El Salvador, 11 percent for women in Honduras, 18 percent for women in Mexico and Guatemala, and 20 percent for women in Nicaragua.

Depending on cultural attitudes about tobacco promotion and advertising, it is possible that individuals with low smoking rates in countries of origin will have largely different smoking patterns once in the United States. Among those with already high smoking rates, the influence of advertising and promotion in the United States may not be as marked. However, little research addresses these issues in tobacco control or compares population groups in countries of origin with immigrants in the United States.

New research from the Transdisciplinary Tobacco Use Research Center (TTURC) at the Institute for Prevention Research at the University of Southern California promises to offer some insights into variations in cultural norms among adolescents of Asian/Pacific Islander and Hispanic/Latino origin in the United States and abroad (Johnson, 1999).

Gender Issues in Tobacco Use among Hispanic/Latino Adolescents

Marin et al. (1989) found some gender differences with acculturation on the attitudes, norms, and expectations regarding tobacco use. They also report that more acculturated females tend to smoke more than their less acculturated counterparts. Hispanic/Latino adolescent females who are trying to fit into the dominant culture will tend to take on the values of that culture in their attempts to break away from the more traditional nonsmoking norms.

As in other population groups, more Hispanic/Latino adolescent males than females smoke. However, although smoking rates may still be relatively low among Hispanic/Latino girls, especially immigrants, these rates are increasing rapidly (U.S. DHHS, 1998). A high level of teen pregnancy only adds to the complexities of Hispanic/Latino adolescent girls' smoking behavior (LCHC, 1999; Baezconde-Garbanati et al., 1999a). Although smoking among pregnant Hispanic/Latino adolescent girls is not a large problem at this time, increasing smoking rates among a population at risk for early pregnancy means we may see more cases of fetal and newborn problems related to smoking within the Hispanic/Latino community. Other problems confronted by pregnant teens may be exposure to secondhand smoke from either their peers, their boyfriends, or a parent who smokes. Exposure to secondhand smoke has been linked to the delivery of low-birth-weight babies, Sudden Infant Death Syndrome (SIDS), and high infant mortality rates (CDC, 1994).

Special attention needs to be given to Hispanic/Latino adolescent girls and exposure of the fetus to cigarette smoking. There is a high percentage of Puerto Rican women and adolescent girls who deliver low-birth-weight infants; these problems are less prevalent among those of Mexican origin (Zambrana, 1991). But these statistics are cause for concern, as data from the UCLA Center for Health Policy Research (Brown et al., 1997) reveal that one of every three Latinas younger than age 17 is uninsured. Furthermore,

rates of early prenatal care among Mexican-origin women in California are even lower than rates of prenatal care for women in Mexico (Secretaría de Gobernación, 1996). If smoking rates do not decline, education and research on maternal smoking among this young population will be vital to the continued health of the Hispanic/Latino community.

Hispanic/Latino Social Networks

According to several authors (Hayes-Bautista, 1992; Hayes-Bautista et al., 1994; Vega et al., 1998; Gilbert and Cervantes, 1986; Marin et al., 1989; Baezconde-Garbanati, 1994), in spite of some serious risk factors, immigrant Latino subgroups experience some very positive behaviors. These include low levels of alcohol consumption, relatively low overall rates of adult smoking, less psychopathology, and less depression. Some of these positive behaviors have been tied to traditional cultural values and the strong presence of familial networks (Hayes-Bautista et al., 1994; Baezconde-Garbanati, 1994). These networks are reinforced by the continuous communication back and forth between the United States and the immigrants' countries of origin. This contact with extended families and often with a nonfamilial fictive kin system offers support and helps preserve the values of the culture among adolescent Hispanic/Latinos; it may also at times protect these youths from engaging in unhealthy behaviors (Golding and Baezconde-Garbanati, 1990; Baezconde-Garbanati, 1994). However, these mechanisms often erode as young people live longer in the United States, move across the country to different areas, or achieve mobility within the social and educational strata of society (Vega et al., 1998).

Peer and family influences are considered the strongest predictors of smoking initiation among Puerto Rican and Central American adolescents (Morris et al., 1993). For example, data show that peer, parental, and familial modeling are all critical aspects of adolescent smoking among Hispanic/Latinos. In California, significantly more of the youths who smoke, versus those who do not smoke, report living with a parent who also smokes (55 percent versus 33 percent). Research has shown (Marin et al., 1989) that, in the Hispanic/Latino population, males tend to smoke more than females, and there are varying attitudes about parental and youth smoking, many of which are gender based.

Spanish-speaking adults, for example, are more likely than other groups to believe that smoking is not addictive and that, as smokers, they themselves are not addicted (Palinkas et al., 1993). They perceive themselves as being less susceptible to addiction than other groups. Although they may recognize the harmful effects of nicotine, there is a certain belief of invulnerability, such that they feel they can quit at any time. These beliefs are passed on to younger members of the family, especially when living arrangements for Hispanic/Latino adolescents may include the presence of other same-age or older extended-family members, such as cousins and uncles, inside the home.

Hispanic/Latino individuals with lower incomes have better possibilities of economic survival if they live together with other individuals and/or family members. It is not uncommon for Hispanic/Latino adolescents to live in a household in which the home has been opened to newly arrived immigrant relatives, for example, in an effort to facilitate the process of adaptation and provide financial means while exchanging goods and services (Baezconde-Garbanati et al., 1999a). It is possible, however, that these extended familial arrangements are composed of individuals of several generations that may have varying norms and rules about smoking within the same Latino households, and some may even see smoking as a "right of passage" for the Latino youth.

In focus groups conducted among Hispanic/Latino adolescents in California by Ad Americas (1999), both male and female youths expressed being highly influenced in their decision to smoke by familial peers, such as older brothers, cousins, and other such extended-family members.

Parental norms against smoking significantly affect the smoking patterns of adolescents. Testimony before the U.S. Congress by a panel of youths, including Hispanic/Latino teens, revealed that one of the most important factors to influence teen smoking is the value their parents and families place on youth smoking (Penn, 1998). Even though the majority of smoking and nonsmoking parents (90 percent) have rules against youth smoking, only 41 percent of smoking parents versus 70 percent of nonsmoking parents actually prohibited smoking in the home (Pierce et al., 1998). This is an important fact for Hispanic/Latinos, due to the traditional values placed on the family and the high influence of familial members, including extended family members. The lack of enforcement of parental household rules on smoking among Hispanic/Latinos may also be tied to the traditional values of "simpatía" and "personalismo" (Marin and Marin, 1991), which emphasize respect and politeness and frown on confrontational situations and direct criticisms (Marin et al., 1989, Marin and Marin, 1991). Furthermore, Hispanic/Latinos highly value family relationships. This value of "familismo" defines families within nuclear and extended kinship networks, such as compadres (godparents), that promote feelings of loyalty and reciprocity for the exchange of goods and services among family members and those who associate closely with them as fictive kinships (Bird and Canino, 1982). It is important to Hispanic/Latinos to maintain these ties throughout life.

Inasmuch as Hispanic/Latinos value smooth social relationships and smooth social personal interactions with people, it may be difficult in some families to ask other extended-family members, especially if it is a father or grandparent, not to smoke. This reluctance may translate into a lack of enforcement on household rules, which may in turn imply easy access by Hispanic/Latino teens to cigarettes around the home. It may also promote the purchase of tobacco products for Hispanic/Latino adolescents by familial social sources.

While peer and family influences are considered critically important (Nuno et al., 1998), broader environmental influences affect Hispanic/Latino youths and their peers and families alike. For example, the relationship between tobacco use among Hispanic/Latino adolescents is highly influenced by the extensive media advertising and promotion campaigns that have targeted youths, women, and ethnic minorities in the United States, especially African American and Hispanic/Latino youths.

ENVIRONMENTAL FACTORS: TOBACCO ADVERTISING AND PROMOTION

Hispanic/Latino youths are particularly vulnerable to the extensive pro-tobacco advertising and promotion that has targeted communities with large minority populations. The influence of advertising and promotion, and of the entertainment industry, is particularly important among adolescent Hispanic/Latinos. Advertising, promotion, and movies portray highly acculturated heroes and models living a life of glamour and success that is very appealing to Hispanic/Latino youths. It is especially appealing to those striving to "fit in" to the dominant culture. Advertising, promotion, and the entertainment industry present those who smoke as living a life of glamour and sexual prowess. They appeal to a sense of manliness or "machismo" among Hispanic/Latino boys and a sense of freedom and breaking away from traditional cultural and family norms for Hispanic/Latino girls. This promotion has come in many forms and is increasingly focusing on the distribution of attractive gear with smoking messages and on the sponsorship of cultural events at which Hispanic/Latino youths tend to participate. According to the Federal Trade Commission (1995), the tobacco industry, in 1993, spent over $6 billion on advertising and promotion, much of it in minority communities, including Hispanic/Latino communities. The CDC (1994) reported that the tobacco industry advertises heavily in ethnic communities using ads that are particularly appealing to youths and women. Evans et al. (1995) revealed that adolescents have a greater probability of taking up smoking if exposed to heavy advertising and promotion of cigarettes. According to this study, the influence of advertising is even more critical than peer pressure, family members who smoke, or scholastic behavior.

But with the new multi-state Master Settlement Agreement, promotion and advertising by the tobacco industry may soon take a different shape in minority communities. According to the Hispanic/Latino Tobacco Education Network (Baezconde-Garbanati et al., 1999b), there has been an increase in the number of alcohol and tobacco messages that appear in much of the print advertising in magazines widely read by Hispanics/Latinos.

In addition, industry promotion in Hispanic/Latino communities has taken the shape of providing funds and scholarships for students to be able to attend college or trade schools, a direct targeting of 18- to 24-year-old Hispanic/Latino young adults. In the Hispanic/Latino community, the industry has been strategic in associating themselves with trusted community gatekeepers in order to promote the image of a contributor to the financial stability of impoverished communities (Durazo Communications,

1998). They do so through the funding of cultural events, Hispanic/Latino chambers of commerce, and other grassroots-level organizations and community groups. Due to these types of activities, communities see the tobacco industry as a partner with trusted organizations that have traditionally attracted youths, and this view helps to shape community attitudes that favor tobacco use.

In the fall of 1999, the industry invested over $100 million in an image-remaking campaign (Brown and Houseman, 2000). Apparently, one of the expected outcomes of this campaign was to change people's attitudes about the industry itself, so it would be seen as a good corporate citizen that cares about the causes communities care about. The purpose seems to be to focus attention on what the industry does for the community rather than on its continuous sale of a deadly product. As part of the campaign, television advertising was released regarding programs to feed the hungry, assist flood victims, and fund anti-domestic violence programs. However, Brown and Houseman (2000) point out that, almost simultaneously, the industry released a $40 million advertising campaign targeting women and produced a new brand of cigarettes, Marlboro Milds, which attracts a predominantly African American and Hispanic market. These authors point out that, although the industry invested some $2 million in anti-domestic violence programs, it spent close to $100 million to let communities know about it. This is the kind of media environment youths are exposed to when making decisions about smoking. Due to the poverty and domestic violence issues existing in many minority communities, these are powerful conflicting messages that youths may not know how to counter.

RESEARCHING TOBACCO USE AMONG HISPANIC/ LATINO ADOLESCENTS

If we are to change Hispanic/Latino adolescent smoking behavior, it is imperative to understand the sociocultural environment, the heterogeneity of the population, its cultural values and norms regarding tobacco use, and to interpret data within the context of Hispanic/Latino adolescent life. Hispanic/Latino adolescents are not a monolithic population. They are influenced by cultural smoking norms in their own homes and respective countries of origin, as well as by the influence of American culture once in the United States. Although there is a youth culture that seems to unite Hispanic/Latino adolescents with other groups, subcultural and ethnic variations permeate Hispanic/Latino adolescent life.

Regardless of the stage at which we find Hispanic/Latino youths—some are trying to break away from cultural traditions, some struggling to find their center in later adolescence, while others fit in with more acculturated groups—the prevalence of Hispanic/Latino adolescent smoking needs to be researched and interpreted within the historical, demographic, environmental, cultural, and socioeconomic context of their lives. The consideration of sociocultural issues in the planning, development, conduct, analyses, and interpretation of scientific data will lead to better program planning that may directly impact adolescent smoking rates.

Research data on Hispanic/Latino adolescent tobacco use cannot be interpreted in isolation from the realities that make Hispanic/Latinos in the United States who they are today. For example, the interaction between acculturation, education, and smoking rates among Hispanic/Latino adolescents needs to be explored further. Several authors have shown that, when research data are analyzed accounting for variations and interactions between different levels of acculturation with varying degrees of education, significant differences are observed in the various Latino subgroups (Flores et al., 1995; Balcazar et al., 1995). This is especially true related to socioeconomic indicators, such as income, employment, health insurance, self ratings on health and perceptions of satisfaction, and attitudes toward healthy behaviors.

Tobacco-use data for Hispanics/Latinos, and especially Hispanic/Latino adolescents, should be considered a product of the historical, political, social, and economic realities of the population (Flores et al., 1995). The migration history of Hispanic/Latino adolescents is important, as are the sociocultural, environmental, and psychological impacts of migration (Williams, 1990) and the ways in which this migration may have influenced attitudes about smoking and cultural smoking norms. According to Flores et al. (1995), the culturally appropriate interpretation of data for Hispanic/Latinos must begin with an understanding of the geographical areas from which Hispanic/Latinos originate. This understanding must include their geographic distribution throughout the United States and the historical underpinnings and conditions of immigration by the various Hispanic/Latino groups into the United States. These are important because they provide for Hispanic/Latino adolescents the context of acceptance within the United States. The experiences of children of highly educated Cuban refugees, versus those of Puerto Rican U.S. citizens, undocumented immigrants, or of individuals fleeing conditions of war or economic hardships in countries of origin are all incredibly different. Yet, in unique ways, they form the context for resiliency in engaging in risk behaviors or challenge-coping strategies of adolescents during a critical stage of their lives.

Once in the United States, the conditions and quality of life for Hispanic/Latino adolescents working in fields and labor camps as part of migrant farm-working families are also very different realities from those for young Hispanics/Latinos in the inner city. The context of Hispanic/Latino children and adolescents includes variations by neighborhood or cities, safety issues within those neighborhoods, engagement in gangs, and other risk behaviors that adolescents are exposed to. This context goes beyond tobacco-specific issues that may include policies within the schools and communities and enforcement of laws and regulations against smoking; there are also interactions between sociocultural, environmental, and psychological factors that affect adolescent groups. Sociocultural and socioeconomic factors (income, education, occupation, age, gender, acculturation, and high school dropout rates) are also important to consider when interpreting Hispanic/Latino adolescent smoking data.

In essence, tobacco use research among Hispanic/Latino adolescents needs to be planned to consider the complexities of adolescent life in the United States. As Hispanic/Latino children grow and mature, traditional norms from their younger years that protect against smoking are challenged by the broader society. Societal engagement of Hispanic/Latino adolescents implies interactions with multiple ethnic and racial groups, various cultures, and individuals with varying social and cultural norms regarding tobacco use. The mixture of values and norms creates new expectations and challenges at a time when young people are truly beginning to define themselves and are searching for who they are as individuals. Pro-tobacco media has deceptively portrayed experimentation with tobacco use, smoking uptake, and having a choice in continued tobacco use as important parts of the exploration in becoming an adult. The influences exercised by these conditions are important areas for research among Hispanic/Latinos and other adolescent groups. These are critical aspects of the contextual environment of adolescent life that all have important effects on smoking behavior. If we are to develop better program planning and implementation, and to evaluate the successes of programmatic tobacco control activities, the scientific foundation for these endeavors needs to be grounded in the cultural and social realities of Hispanic/Latino adolescent life. Doing otherwise will delay Hispanic/Latino adolescents from reaping the benefits of a life free of tobacco-related diseases. The real choice for our youths is to use their culture and adolescent energy in protecting their health and that of others. It is time for adolescent awakening grounded in scientific endeavors helping to create a new generation of tobacco-free adults that will live free of tobacco-related diseases well into the 21st century.

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Asian American and Pacific Islander Adolescent Cigarette Smoking: A Review

Betty M. Hong

INTRODUCTION Tobacco use is the leading cause of preventable death and illness in the United States. Despite declines in the smoking rates among adults over the past few decades, smoking rates have begun to increase again in the 1990s among adolescents of all racial and ethnic groups. Of the more than 1 million Americans who become new smokers each year, or nearly 3,000 who start smoking each day, the majority are recruited from the ranks of children and adolescents (Pierce *et al.*, 1989; CDC, 1998). As stated by U.S. Surgeon General, Dr. David Satcher, "If tobacco use continues to increase among minority adolescents, we can expect severe health consequences to begin to be felt in the early part of the next century" (U.S. DHHS, 1998).

Patterns of tobacco use and exposure among and within Asian American and Pacific Islander (AAPI) communities are of particular concern. Because of the diversity found among the various ethnic subgroups of AAPIs—including differences in lifestyles, cultural beliefs and practices, and environmental exposures—no single factor can be considered the determinant of tobacco use or exposure. For this reason, rigorous surveillance and prevention research must be conducted in order to unveil the many specific factors that influence tobacco use and exposure among AAPIs, particularly the influences resulting from differences between ethnic subgroups and from the effects of acculturation to "Western lifestyles."

DEMOGRAPHICS AAPIs are the fastest growing racial/ethnic group nationwide. On July 1, 1998, AAPIs represented approximately 3.8 percent of the U.S. population and its associated Pacific Island Jurisdictions compared to only 0.4 percent of the nation's population in 1960. From 1980 to 1990, the U.S. AAPI population increased by over 95 percent. In the same time period, the Hispanic population increased 51.5 percent, the Native American population 27.7 percent, the African American population 13.2 percent, and the non-Hispanic White population 4.2 percent. Between July 1, 1990 and July 1, 1998, AAPIs again had a higher rate of population growth than any other race in the nation—37 percent. The Census Bureau projects that size of the AAPI population will reach 34.4 million by the year 2050, representing almost 10 percent of all Americans. Immigration to the United States and resettlement of refugees from Southeast Asia in the mid-1970s have accounted for much of the population growth (86 percent). However, several Asian groups, such as the Chinese and Japanese, have been in the United States for generations; relatively few Pacific Islanders are foreign-born, and Native Hawaiians are the indigenous people of the state of Hawaii, having settled there more than 2,000 years ago (U.S. Bureau of the Census, 1995).

According to the 1990 U.S. Census, the single racial category referred to as "Asian American and Pacific Islander" is comprised of almost 30 percent youths and children (0-17 years old) and just over 6 percent elderly (65 years and over). Of the 13 AAPI ethnic subgroups reported in the 1990 Census, recent immigrant populations, such as the Hmong, had the highest percentage of children and youths—60 percent. By comparison, youths within the same age band represented less than 20 percent of the Japanese-American population.

The AAPI population is extremely heterogeneous and has a high proportion of immigrants and refugees. The AAPI single racial classification consists of approximately 30 Asian and 25 Pacific Island nationalities, all with distinct languages, cultures, immigration histories, and community norms, many of which have impacts on community members' health and well being. Some of the ethnic subgroups included in the category "Pacific Islander" are the Chamorro (Guam/Commonwealth of Northern Mariana Islands), Chuukese, Fijian, Hawaiian, Kosraean (Federated States of Micronesia), Melanesian, Palauan (Republic of Palau), Pohnpeian, Samoan (American and Western Samoa), Tongan, and Yapese. Ethnic subgroups in the category "Asian" include Afghani, Asian Indian, Bangladeshi, Burmese, Cambodian, Chinese, Filipino, Hmong, Indonesian, Iwo-Jiman, Japanese, Korean, Laotian, Malaysian, Mien, Nepali, Okinawin, Pakistani, Sikkim, Sri Lankan, Thai, and Vietnamese. The six largest AAPI subgroups are from China, the Philippines, India, Japan, Korea, and Vietnam (Gardner, 1994).

Nearly 40 percent of the nation's AAPI population live in California. Other states with large AAPI communities include New York (9.3 percent), Hawaii (8.3 percent), Texas (4.7 percent), New Jersey (3.9 percent), Illinois (3.8 percent), and Washington (3.0 percent) (National Center for Health Statistics, 1995). According to the March 1994 Current Population Survey, AAPIs were more likely than non-Hispanic Whites to reside in metropolitan areas (95 percent versus 75 percent). Although over 50 percent of all AAPIs live in the western part of the United States, the AAPI population has increased significantly in other regions: by 139 percent in both the South and Northeast, and by 97 percent in the Midwest (Takeuchi and Young 1998).

Another example of a variable distribution within the AAPI population is evident through examination of English proficiency. The 1990 U.S. Census shows that almost 60 percent of the U.S. Hmong population live in households in which no persons over 14 years of age speak English "very well." Yet only 1 percent of the Hawaiian population lives in similar conditions. Based on the 1990 Census, approximately 95 percent of AAPIs living in the United States were employed; yet, a sizable proportion of the AAPI population was uninsured—28 percent, compared to 20 percent of non-Hispanic Whites (National Center for Health Statistics, 1995).

The many distinct AAPI ethnic subgroups reflect not only cultural and linguistic differences, but also socioeconomic, educational, and generational differences, all of which influence the decision-making skills and social support networks necessary for prevention of adolescent tobacco use and exposure in the AAPI community.

AAPI TOBACCO RESEARCH: EPIDEMIOLOGY & BEHAVIORAL

It is difficult to produce an accurate, nationwide profile of the current tobacco use prevalence among youths of AAPI descent due to the absence of published research conducted with this racial/ethnic group. Because national data are aggregated, the data that do exist often mask health disparities between different ethnic AAPI sub-populations. Moreover, the generalizability of results is limited by the lack of adequate sample sizes for AAPIs within national data systems (*e.g.*, National Health Interview Survey) and in epidemiological and behavioral research studies. Of particular concern is the fact that AAPIs are historically and persistently under-represented in federal and state government, academic, and foundation research studies. More often than not, an entire segment of the AAPI immigrant population is overlooked because research studies limit their design solely to English-speaking populations.

National survey data reveal that adult smoking prevalence was lower among AAPIs (15.3 percent) than among Hispanics (18.9 percent), Whites (25.9 percent), African Americans (26.5 percent), and American Indians and Alaskan Natives (39.2 percent) (U.S. DHHS, 1998). However, significant variations in smoking prevalence emerge when AAPI data are disaggregated. In particular, higher smoking rates are seen among Asian men, ranging from Korean males (30 percent; Han *et al.*, 1989) to Laotian males (70 percent; Levin, 1985), Kampuchean males (71 percent; Rumbaut, 1989), and Chinese-Vietnamese males (71 percent; Rumbaut, 1989).

Reviewed literature shows considerable variation in AAPI sample size, and the majority of studies have been conducted with adults only. The following are highlights of some of the tobacco-related AAPI studies that have been completed:

AAPI Adults Only

- A study conducted in Boston during 1994 and 1995 showed that 32 percent of the study population—99 recent Vietnamese immigrants—were smokers. Smoking prevalence was substantially different between Vietnamese men and Vietnamese women (54 percent versus 9 percent respectively; Nelson *et al.*, 1997).
- A 1994 Korean American Community Health Survey found that 39 percent of men and 6 percent of women were current smokers. Level of English proficiency impacted the awareness of smoking as a health hazard. Eighty-seven percent of the study population who were English proficient knew that smoking is related to heart disease, while only 76 percent of those who spoke little or no English understood that fact (Wismer *et al.*, 1997).
- AAPI immigrants who are limited in their English proficiency are more likely to be smokers than their American-born counterparts. A study in Oakland's Chinatown found that 40 percent of Chinese men did not know that smoking could cause heart disease (Chen, 1992).

AAPI Youth Only

- Approximately 21 percent of Asian American high school boys smoke compared to 14 percent of Asian American high school girls (U.S. DHHS, 1998).
- Asian youths' susceptibility to smoking has increased by 30-50 percent, and their smoking rates have also increased dramatically—by more than 50 percent in California from 1993 to 1996 (CDHS, 1997).
- A 1993 study in San Diego, California found that the highest average number of tobacco displays was found in Asian-American stores (6.4), compared to Hispanic (4.6) and African-American (3.7) stores (Elder *et al.*, 1993).
- Data from the 1990-1996 California Youth Tobacco Survey can be examined for patterns of smoking behavior among subgroups of Asian-American youths in California (grades 7-12). As illustrated in Table 6-1, different ethnic subgroups of Asian-Americans vary widely in their smoking behaviors. In addition, higher levels of acculturation are associated with higher smoking prevalence rates and earlier age of smoking onset. Breakdowns of this type are important because few studies exist that directly examine Asian and Pacific Islander immigrant versus AAPI American-born youth populations with respect to levels of acculturation and associated smoking prevalence rates.

Clearly, these studies suggest that, in order to support the refinement of tobacco control programs, we need to more clearly investigate factors like age, gender, language barriers, and cultural differences, both between AAPI ethnic subgroups (*e.g.*, Korean versus Chinese youth) and within the AAPI subgroups themselves (*e.g.*, Vietnamese immigrant versus Vietnamese American-born youth). The challenge in building a successful tobacco control program for such a diverse population will be to clearly understand the factors affecting AAPI youth smoking. In addition to understanding the differences between and among AAPI ethnic subgroups, it will be necessary to establish a level of "trust" with the AAPI youth and to build within them a sense of both self and community. With that foundation, it will be possible to design effective tobacco control prevention and intervention strategies that are culturally and linguistically accessible and appropriate for AAPI youth.

Table 16-1
Disaggregated AAPI Subgroup-Specific Analyses Revealed Significant Lifetime Smoking Prevalence Differences among AAPIs in California: 1990-1996 California Youth Tobacco Survey

	Lifetime Smoking Prevalence	30-Day Smoking Rate
Aggregated	16.1% for Asians 26.1% for non-Asians	
Filipinos	18.9%	8.6%
Japanese	17.3%	7.4%
Koreans	16.3%	8.3%
Chinese	11.0%	2.8%
Asian Americans	13.7%	7.2%

FACTORS AFFECTING AAPI YOUTH SMOKING

Factors that influence the initiation of tobacco use among AAPI youth are both complex and interrelated. Such factors include experimentation and peer pressure, cultural norms and family smoking, and the environment.

Experimentation and Peer Pressure

A California tobacco survey was conducted with 454 Filipino-American youths in Southern California in 1999 (Youth UNITE, 1999). Of the youths surveyed, 45.5 percent were born outside of the United States (the majority of those were born in the Philippines) and the remaining 54 percent were born within the United States. Of those who smoked, 86.7 percent had smoked for more than 1 year, and more than half of the smokers smoked at least one pack a day. According to the youths who identified themselves as smokers, the two biggest factors influencing their decision to become smokers were experimentation (48.3 percent) and peer pressure (22.8 percent). An overwhelming majority of Filipino youths preferred Marlboro as their brand of choice (63 percent). Of the smokers who preferred Marlboro, most did so because they liked the taste and the advertisements. It is noteworthy that, even though the distribution of single cigarettes is illegal in California, the youths surveyed reported single cigarettes from liquor stores to be their major source of tobacco.

In recent tobacco control work conducted by the Asian and Pacific Islander American Health Forum in California, focus group findings of Chinese (Mandarin and Cantonese), Vietnamese, and Korean youths revealed that immigrant Asian youths are highly influenced by their friends (U.S. DHHS, 1999). Consistently, these Asian youths commented that they understood both the financial burden of cigarettes and the negative impact of smoking (health hazards, social problems related to smoking around nonsmokers, environmental tobacco smoke issues, etc.).

Overall, few of the smokers or nonsmokers knew that cessation clinics and free cessation hotlines were available. The majority of youths interviewed were never advised by a health professional to quit smoking. Some of the smokers believed that they would be able to quit with no assistance from family or peer support groups and also believed they could quit without using nicotine replacement therapy (*e.g.*, nicotine gum, patches, etc.).

Similar to previous research conducted with adolescents, the findings revealed that teens tend to view life as black or white, rely on their immediate experience, often have an attitude of invincibility, and do not necessarily believe in preventative health measures. It is clear from the focus group results that influencing these teens to deter or stop their smoking requires multi-dimensional strategies in support of tobacco-use cessation (*e.g.*, integration of culturally and linguistically acceptable tobacco control messages from peers, family, and the environment).

Cultural Norms and Family Smoking

Socioeconomic and cultural factors play important roles in self-identification and behavioral risk towards tobacco use or acceptance among AAPI youths; cultural factors include language, cultural beliefs, and immigration status. Because a majority of AAPIs are immigrants and refugees, it is essential to understand the cultural context of tobacco and how that context influences acceptance, or lack thereof, among AAPI youths. In Asia, cigarette smoking is common in men, ranging from 30 to 70 percent. For Asian women, smoking prevalence is much lower, approximately 3-10 percent (U.S. DHHS, 2001).

For some developing countries (*e.g.*, Vietnam and China), tobacco use is culturally accepted and is often considered an attribute of wealth. For other Asian and Pacific Rim countries (*e.g.*, Cambodia), tobacco is used as a gift and is provided, much like alcohol, to guests in one's home. In some Asian traditions, cigarettes are distributed at social gatherings and are used in healing practices.

As noted earlier, AAPI adult smoking patterns vary across ethnic subgroups. One study showed that, among Southeast Asian men, those who had higher English language proficiency and had lived in the United States longer were less likely to be smokers (Chen *et al.*, 1993; McPhee *et al.*, 1993). Using questionnaire items from the Youth Risk Behavior Survey translated into Vietnamese for a school-based sample of Vietnamese adolescents in Worcester, Massachusetts, Weicha (1996) found that the prevalence of cigarette smoking among Vietnamese boys (27.9%) was similar to that for White boys (28.3%) and was higher than that for Hispanic boys (19.7%) or African American boys (18.9%). Vietnamese girls smoked rarely (3.7%). They were also significantly less likely than others to have smoked their first cigarette at age 12 years or younger. Among Vietnamese adolescents over age 16, increasing length of time in the United States was associated with decreasing smoking prevalence. To uncover the factors that influence smoking initiation among AAPI youths, more research is needed that not only disaggregates national AAPI data in order to more closely monitor different ethnic subgroups, but also dissects acculturation influences such as age of arrival in the United States, English language proficiency, educational experiences, and cultural norm changes. Little tobacco control research has been conducted to compare and contrast newly arrived AAPI immigrants, acculturated AAPI immigrants (with 5 years or more of residency), and AAPI American-born youths.

Studies have shown that a majority of adolescent smokers have parents who smoke. Consistent with other research focusing on adolescents is the finding that teenagers are three times more likely to smoke if their parents and at least one older sibling smoke (Moss *et al.*, 1992). In a tobacco survey conducted among Filipino youths in Southern California, a significant number of youth smokers had family members who were also smokers (59.7 percent). Of those surveyed, 22.7 percent had more than four other family members who smoked.

Members of traditional Asian cultures place great value on social order and control of emotions and feelings (Hirayama and Hirayama, 1986). Like youths of other minority groups for whom respect of elders is an important cultural norm and practice, AAPI youths value parental acceptance and are loath to take actions that could be seen as bringing shame to their family. This makes tobacco use by other family members an especially strong obstacle to overcome, particularly when it is the parents or other elders who smoke. Although surveyed youths may have knowledge that smoking is harmful to both their health and that of others, respect for their elders and the acceptance of tobacco within their family do not provide an environment within which behavior modification could be easily accomplished.

Environment Successful strategies to prevent the use of tobacco, alcohol, and other drugs have incorporated the following approaches in modifying behavior among adolescents (Perry, 1987):

- Transfer knowledge of why people of their age smoke cigarettes or use other drugs;
- Provide information to youths on how the tobacco industry has manipulated the public in associating positive characteristics with smoking through film, advertising, older role models, and peers;
- Educate youths on how to resist the influences urging them to smoke or use other drugs; and
- Provide opportunities for using life skills and competencies to counterbalance the functions served by cigarette smoking and other drug use.

Recent research has shown improved effectiveness of health education and other prevention measures when the age level of adolescents is considered. For example, general communication-based prevention is more likely to succeed with younger teens before they become addicted and socially entwined in peer reinforcements (Worden *et al.*, 1988). In order to effectively understand the influences on AAPI youths and tobacco uptake, research must consider the age segment of the youth population, immigration and the number of years in the United States, culture, language, and the environment of the AAPI community itself (geographic, socioeconomic, etc.).

To further support the rationale for community participation models, it has been documented within the literature that adults are more likely to pursue community change when they believe that change is worthwhile and achievable and that they have the skills to achieve the desired change

(Zimmerman, 1995). Similarly, teens who have a strong sense of self-determination and of being in control can benefit from community participation and youth empowerment models that build their skills and competencies.

For example, the Asian Pacific Islander Tobacco Education Network convened a conference to bring together Pacific Islander youths to increase their awareness of how tobacco issues impact their community and to provide a forum for these youths to begin building life skills within a Pacific Islander community context. When queried about new information learned at the Gathering of Pacific Islanders forum, Pacific Islander youths stated that they learned that "Pacific Islanders do care about youth learning to improve their lives and the lives of others."

Although Pacific Islander Americans as a whole tend to be fluent in English and to share a strong belief in the importance of both the family unit and traditional values, different ethnic groups tend to have experienced different degrees of marginalization due to various social, political, and economic histories in the United States (*e.g.*, Hawaiians, Samoans, Tongans, Chamorros, etc.). Forums like the Gathering of Pacific Islanders are beneficial in allowing youths from diverse cultures to have a sense of community with others of their own racial/ethnic background.

In 1995, a community-needs assessment study was conducted in selected AAPI communities to identify the extent and scope of alcohol, tobacco, and other substance abuse (Bueno and Lau, 1996). The select AAPI ethnic subgroups included Chinese, Filipino, Japanese, Korean, and Vietnamese communities in Los Angeles County. A survey instrument that was culturally acceptable and accessible was designed. In addition, researchers collected data through three methods: a) door-to-door survey; b) survey of participants in community events/sites; and c) surveys that were supported by the elementary school authorities who facilitated the process of getting the students to bring home the surveys for their parents to complete.

From every aspect of the research project, designated community participants were integrated into the various levels of decision-making. These levels included the variables to be surveyed, the methods to be used in data collection, the times for conducting the surveys, the flyers to be used in promoting the survey in the target areas, and the feasibility of the areas to be surveyed (*e.g.*, venue selection such as cultural events).

When asked the question, "Why do people abuse alcohol, tobacco, and other drugs (ATOD)?" respondents among all AAPI target areas identified the following factors that they felt contributed to ATOD abuse:

- Emotional problems
- Moral weakness/easy access
- Peer pressure
- Adjustment to problems of immigration
- Family smokes/drinks

Another important finding of this community-needs assessment was that all respondents from the five AAPI target communities stated that they would hesitate to seek out services designed to assist those attempting to overcome alcohol, tobacco, or other drug abuse. The basis for low utilization of social services may be due to lack of confidence in existing services that may not be culturally appropriate or to the lack of awareness on the value of these services (Bueno and Lau, 1996).

DOMESTIC AND INTERNATIONAL ADVERTISING AND PROMOTION

AAPI youths, like other minority youths, are susceptible to tobacco advertising and promotion. The lure for minority youths is marketing "American" themes such as sophistication, stardom, sexual prowess, "being cool," and "fitting in." As the U.S. tobacco market declines due to restrictions on advertising and promotions, the tobacco industry is unveiling new strategies for promoting its products, including a large amount of indirect advertising. Indirect advertising includes sponsorship of sporting events and teams, ethnic culture events, discos, and the arts. In addition to sponsorship, the tobacco industry has pushed "brand stretching," which markets its logos on products such as clothing lines, racing boats, back packs, coffee, and umbrellas (Economic Research Services, 1997). To further gain market share with girls and women, both domestically and internationally, Philip Morris launched a $40 million advertising campaign for Virginia Slims targeting African American, Hispanic, and Asian American women. The theme of the ad campaign is "Find Your Voice" and centers on magazines that will display the 4- to 6-page insert. Participating magazines include *Glamour*, *Ladies' Home Journal*, *People*, *Essence*, *Vibe*, and *Latina* (Virginia Slims Has Come A Long Way, Bebe, 1999). Such indirect advertising requires new strategies to combat its influence. In California, for example, the Asian Pacific Islander Tobacco Education Network has worked closely with cultural event organizers to persuade them to adopt policies refusing tobacco sponsorship.

Given the current global trends, more than 10 million people will die worldwide from tobacco-related disease by the year 2025. As three out of the five countries in the world that have the largest cigarette markets are Asian countries (China sold 1.7 trillion cigarettes in 1996), it is projected that a majority of these deaths will originate from Asia and the Pacific Rim (Hammond, 1998). Given these projections, the AAPI youth population—both those who have recently immigrated and those who are continuously exposed to overseas print, videos, and film from their countries of origin—are at risk from unregulated tobacco advertising and promotions overseas. As tobacco control expert Judith Mackay notes, "If multinational tobacco companies could capture the China market, it wouldn't make a difference if every American stopped smoking tomorrow" (Lin, 1997). The global aspects of tobacco use prevalence are far reaching and impact the AAPI youth directly because mediums of communication across borders cannot be controlled (*e.g.*, cigarette promotional items, no bans on selling cigarettes to minors in many Asian countries, and no health warnings required by law on cigarette packs overseas).

CONCLUSIONS Research investigating tobacco use and exposure among AAPI youths has been extremely limited. Understanding the differences among and between AAPI ethnic subgroups is essential in designing relevant qualitative tobacco control research nationwide—for both youths and adults. In order to conduct community-based research in the AAPI community, researchers will need to consider many factors, including socioeconomic status; cultural characteristics; acculturation factors; stresses; advertising targets, both domestic and international; prices of tobacco products; and capacities of communities to mobilize against tobacco influences (*e.g.*, the roles of community, schools, and family and social networks).

As the nation moves into the 21st century, it is clear that the AAPI population will continue to contribute to the multicultural fabric of this society. As tobacco control advocates and researchers, it is necessary that we take responsibility within and across the borders of the United States to protect the health of all our children from tobacco health hazards.

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American Indian and Alaska Native Teen Cigarette Smoking: A Review

Felicia Schanche Hodge

INTRODUCTION Although high cigarette smoking rates have been documented among all racial/ethnic groups, American Indian and Alaska Native (AI/AN) teens in particular have consistently been reported to have the highest percentage of cigarette smokers in the nation (Bachman *et al.,* 1991; U.S. DHHS, 1998). The 1998 United States Surgeon General's Report documents American Indian teen smoking rates of 41.1 percent for males and 39.4 percent for females (U.S. DHHS, 1998). Not only is this smoking statistic the highest in the nation, it also closely mirrors that reported for adult American Indians and Alaska Natives (39.2 percent). Table 17-1 shows smoking prevalence rates for various different North American Indian groups.

Several studies suggest that smoking rates are particularly high among the Native American population in the northwestern regions of the United States, in Canada, and in Alaska. Smoking rates have been documented to fall between 40 and 50 percent for northern California urban and rural Indians (Hodge *et al.*, 1995) and to be over 50 percent for Alaskan and Canadian Natives (Gaudette *et al.*, 1993). Among Arctic youths, research has documented smoking rates as high as 70 percent among the Inuit and 64 percent among the Dene (Millar, 1990). In the Southwest, Navaho youth smoking rates have been reported to be 54 percent (Wolfe and Carlos, 1987). A 1988–1990 U.S. National Youth Survey documented smoking rates of 80 percent among reservation 12th graders and 74 percent among reservation 8th graders. Non-reservation Indian smoking rates were 10 percent lower and White smoking rates were 50 percent lower (Beauvais, 1992).

TRADITIONAL USE OF TOBACCO Tobacco has long played a significant role in the American Indian culture (Seig, 1971; Paper, 1989). Historically, tobacco was used in medicinal and healing rituals, in ceremonial or religious practices, and as an instructional or educational device. Traditionally, tobacco was seen as a gift of the earth. It was burned and the rising smoke was used to cleanse and heal. Symbolically, smoke from tobacco was called "Spirits paths" (Linton, 1924). It served to channel the evil or bad spirits. Tobacco was often sprinkled around the beds of ailing individuals to protect and to act as a healing agent. In addition, tobacco was used for social and peaceful purposes to promote well-being and good thoughts. Prior to important meetings, tobacco was smoked as a ritualistic exchange. Furthermore, tobacco was also used as a powerful teaching tool (Linton, 1924). Elders, healers, and tribal leaders used tobacco leaves in their storytelling. Tobacco was also tossed into the air to demonstrate that the wind travels just as humans do.

Table 17-1
North American Indian Smoking Prevalence Rates

Population (Adults)	Sample Size	Percentage Use	Associations	Source
US Probability Sample of Adults	300,540 22.6	44.5 (Indian men) 26.6 (Indian women) 25.7 (White men) 23.0 (White women)	Indians smoked fewer cigarettes per day. Rates related to social class for Indians— inversely related for Whites.	CDC, 1992
Northwest Territories Of Canada: Adults	20,000	70.0 (Inuit) 60.0 (Status Indian) 50.0 (White) 30.0 (All Canada)	Inuit women have the highest rate of lung cancer ever recorded	Gaudette *et al.*, 1993
Western US: Blackfeet Of Montana: Adults	463	34.0 (men) 50.0 (women)	None listed	Goldberg *et al.*, 1991
Southwest and Plains Adults	805	18.1 (SW men) 14.7 (SW women) 48.4 (Plains men) 57.3 (Plains women)	None listed	Sugarman *et al.*, 1992
South Central: Cherokee Adult sample	144	27.8 (Indian)	None listed	Hill *et al.*, 1994
Western: California Adult sample	1,369	47.0 (Indian men) 37.0 (Indian women)		Hodge *et al.*, 1995

Population (Adolescents)	Sample Size	Percentage Use	Associations	Source
US High School Seniors: 1976–1989	17,000	36.8 (Indian males)	Indian students had highest rate among all ethnic groups	Bachman *et al.*, 1991
US Indian Health Service Reservation Areas: Grades 7–12	13,454	20.5 (Alaska area) 10.6 (Other areas)	Students with "below average" grades had highest rates	Blum *et al.*, 1992
US National Youth Survey: 1988–1990	102,194	80.0 (Reservation 12th graders) 74.0 (Reservation 8th graders)	Non-Reservation Indian rates were 10% lower. "White" rates were 50% lower	Beauvais, 1992
Canadian Arctic Youth Ages 15–19	230	75.0 (Inuit) 64.0 (Dene/Metis) 43.0 (Non-Indian)	None listed	Millar, 1990
North Central USA: 7th Grades	4,319	33.0 (Indian)	None listed	Murray *et al.*, 1987
Southwest Indian Youth	226	54.0 (Navaho)	None listed	Wolfe *et al.*, 1987
South Central: Cherokee Youth Grades 9-12	972	38.1 (Indian) 25.8 (Whites)	Indian users had lower expectations for college, lower school, religion, and family involvement, and higher alcohol and marijuana use.	Soloman *et al.*, 1994

There were specific rules to the smoking of tobacco, which were just as important as the act of smoking itself. Small puffs of smoke were taken and held in the mouth. Deep inhaling was not encouraged, as the smoke was not to be enjoyed, but was a symbolic gesture meant to cleanse the air, the heart, and the mind. It became a facilitator to the spirits, so that peaceful exchange could be obtained and prayers could be heard.

CULTURAL FACTORS There is a rich diversity in the American Indian and Alaska Native culture. Over 500 federally recognized tribes are concentrated in 25 reservation states (U.S. Bureau of the Census, 1990). Over 150 Indian languages continue to be spoken today. These native languages—coupled with Indian customs, values, and beliefs—provide a wealth of cultural richness. But the diversity in culture also presents a challenge as we address the needs, concerns, and culturally specific issues in the various communities.

Several culturally specific factors have been found in recent studies to influence patterns of tobacco use. These factors include a group's changing lifestyles and its levels of knowledge, attitudes, and beliefs toward tobacco. A prevalence survey of 1,369 adult Indians in northern California found that, although levels of knowledge were high regarding the harmful effects of smoking, this knowledge did not influence attitudes or behavior regarding tobacco use.

Further, attitudes held by Indians were lenient with regard to smoking behaviors (Hodge *et al.*, 1995). Ninety-five percent of the sample was reluctant to be assertive in issues surrounding smoking (*e.g.*, asking others to stop smoking). In particular, Indian adults were reluctant to prohibit youths from smoking. American Indians have a tradition of non-interference that influences behaviors even in situations regarding smokers. It is often not culturally acceptable to tell elders, guests, or even youths not to smoke—even in one's own home. This cultural value has presented a challenging element in the tobacco control movement.

The values held by many tribal groups may be in conflict with those of the larger society. Acknowledging the rights of individuals while retaining a strong sense of tribal identity is common practice in Indian communities. Behavior that is non-assertive and non-interfering is held in high esteem. The long historic role that tobacco has played in traditional ceremonial and medicinal uses, along with the values of the culture, may have an impact on a tribal group's attitude and behavior toward smoking.

Relocation from traditional lands to an urban environment has added to the abusive use of tobacco products. This is a major issue as urban Indians now constitute a larger group than rural or reservation Indians. As many as 100 tribes may be represented in one urban site. Once in the cities, lifestyles change and a different set of stresses exists. Housing needs, unemployment, and the lack of nearby relatives and social support mechanisms become important stresses as well as acculturation factors. Habits such as cigarette smoking are readily adopted by adults and teens alike. Indeed, research has documented that the rate of smoking increases dramatically in urban sites (Hodge *et al.*, 1996).

The Federal Relocation and Termination Program of 1947 created a sudden population explosion of American Indians in urban areas. Under this program, people were moved from reservations to cities, where they were to be quickly trained and placed into employment. However, lack of information for survival and subsequent poor planning resulted in acculturation problems that have remained throughout the years. The transition from the predictable routine of reservation life to the unknown urban setting resulted in isolation, loneliness, and inadequate provision for the maintenance of health services, housing, and economic assistance. The isolation factor was also compounded by acculturation. With subsequent generations in the cities, many are removed from the traditions of the reservation and rural life—they are more influenced by peers who may not be Indian or who may hold different values and beliefs. Exposure to targeted media campaigns and more access to television stations and advertisements resulted in pressures to adopt the lifestyles and habits of the mainstream. The roles of family members, the close-knit communities, the authority of the tribe to reinforce accepted behaviors, and the protective circle of a teenager's life were all severely disrupted in the urban setting. No provisions were made to develop programs to reinforce these cultural elements. Although the new urban population is multi-tribal—and although Indians of various tribes can be grouped together—a sense of isolation can remain.

SMOKING PREVENTION AND CONTROL

Over the past 20 years, there has been a national effort to decrease the dependence that smokers have on tobacco products. This campaign for tobacco control includes extensive scientific research, education, and prevention strategies. Although these public health efforts directed at reducing the prevalence of smoking have been somewhat successful, the rate of decline in tobacco use has varied among diverse socio-demographically defined groups such as the American Indians and Alaska Natives (Rhoades, 1990). The smoking patterns of these groups are of special concern because of their poor health status, high smoking rates, and slower smoking quit rates. The Public Health Service has also reported that impoverished populations have very high rates of tobacco-product use, due in part to the lack of information on the harmful effects of tobacco (U. S. DHHS, 1991).

American Indians may not be fully aware of the health hazards associated with tobacco abuse. Not only are adult Indians at high risk for smoking and for smokeless tobacco use, but American Indian and Alaska Native youths have been identified as having significant increases in their use of tobacco products. Shelton (1993) reports that American Indian adolescents smoke cigarettes more heavily than non-Indians. Thus, there is an ongoing need for the development and implementation of smoking cessation and control programs. A stronger proactive leadership is needed to confront and halt multi-media efforts of targeted advertising.

Efforts are also required to decrease the social acceptability of smoking. In a study in northern California, adult Indian smokers and non-smokers were shown to be statistically more lenient in their attitudes toward the acceptability of smoking (Hodge *et al.*, 1995) than the general California

population. They were reluctant to tell others to quit smoking, to move away from smokers, and even to establish a no-smoking policy in their homes. The cultural value of non-interference may be a significant factor in the social acceptability of smoking in some Indian communities.

POLICY ISSUES American Indians are in a unique situation in that the development and enforcement of smoking cessation policies may be more viable in their communities than in other non-Indian communities. In general, Indians residing on reservations do not have to follow state regulations since federal law governs reservations. Tribes develop and enforce their own policies for the general welfare of their community. Many reservation tribes have their own court system and jurisdiction that govern their land and their tribal members.

New policies are now needed to govern the sale, distribution, and use of cigarettes and chewing tobacco products. There are two areas in which policy development and enforcement are recommended. The first area involves economic issues and the second is concerned with the social acceptance of the abusive use of cigarette smoking.

To discuss the economic issues surrounding cigarette smoking among American Indians, one must realize that there are two major pathways for tobacco to enter reservation lands. The first is through the on-site tribal smoke shops and the second is via the local markets and shops. Limiting or prohibiting the establishment of smoke shops would provide a strong message regarding the restricted support for cigarettes on reservations. The loss of the smoke shop revenue would require some other income-generating project to counteract the effect of the closed smoke shops. Furthermore, requiring a license for the sales and distribution of cigarettes would provide some control regarding the selling of such products to minors. Other activities could include prohibiting cigarette sales to youths, banning the distribution of free tobacco samples, prohibiting cigarette vending machines, and enforcing the minimum age for the purchase of cigarettes.

There is a need for tobacco control efforts in American Indian communities that include information sharing, education, intervention, and policy making. Assisting American Indians to reduce and control the abusive use of cigarettes will go a long way toward combating the health hazards of addictive cigarette abuse.

SUMMARY The implications of American Indian teen smoking rates are very serious. The health consequences of cigarette smoking are well documented. The lack of sanctions from the family and community bodes of increasing or sustained trends in smoking rates. The upward trend in teenage Indian smoking rates reported in this chapter calls for culturally appropriate intervention and targeted research in terms of health education, smoking cessation, and prevention intervention.

There is a special relationship between tobacco and Indian ceremonial activities and beliefs. Tobacco continues to play an important role in American Indian communities. Once seen as the symbol for peace and heal-

ing among American Indians, tobacco is quickly becoming a symbol for death and has been transformed from a healing herb to a life-threatening habit. Cigarette smoking has become one of the leading causes for death and disability for the Indian population.

In contemporary times, the use of cigarettes can no longer be seen solely in a cultural context. Traditionally, tobacco was not used on a daily basis and not just any member of the tribe could smoke. The ashes were not stepped on once the tobacco was burned, nor was it flung away to be forgotten. Today, cigarette smoking serves a different function. Tobacco has become an abusive habit in which the traditional practices are no longer employed.

Our challenge is to retain the cultural value of tobacco products and to reduce the harmful effects of smoking in a manner that is culturally appropriate, informative, and non-threatening. American Indian and Alaska Native teens can take an active role in the leadership of tobacco control initiates. Opportunities need to be developed for American Indians to lead their nations to a healthier lifestyle by controlling the abusive use of tobacco while allowing their traditions to continue. This may result in a substantial reduction in the high smoking rates among Indian teenagers.

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