

# Race and Cigarette Smoking Among United States Adolescents: The Role of Lifestyle Behaviors and Demographic Factors

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**ABSTRACT.** *Objective.* Cigarette smoking is on the rise among adolescents in the United States. Although both African-American and white adolescents have experienced increases in cigarette smoking over time, the prevalence of smoking has remained consistently lower among African-American adolescents than their white counterparts. The purpose of this study was to determine whether the race differential in the prevalence of cigarette smoking is attributed to differences in selected lifestyle behaviors and demographic factors.

*Design.* A cross-sectional study was conducted among African-American and white adolescents (aged 12 to 17 years) who participated in the Youth Risk Behavior Survey supplement to the 1992 National Health Interview Survey. Analyses were restricted to those who had complete data on all study variables ( $n = 5569$ ). Logistic regression analysis was used to estimate the prevalence odds ratios (POR) of current smoking for white adolescents (versus African-American adolescents) before and after adjustment for confounding factors.

*Results.* The crude POR of current smoking for white adolescents compared with African-American adolescents was 2.8 (95% confidence interval = 2.1 to 3.9). Simultaneous adjustment for confounding factors resulted in a POR of 2.6 (95% confidence interval = 1.8 to 3.7).

*Conclusions.* Selected lifestyle behaviors and demographic factors do not account for the race differential in the prevalence of adolescent cigarette smoking. This study underscores the need for more research on contributors to the race gap. Such research could advance theoretical understanding of the etiology of cigarette smoking among adolescents and lead to more effective smoking prevention programs for all youths. *Pediatrics* 1998;101(2). URL: <http://www.pediatrics.org/cgi/content/full/101/2/e4>; smoking, adolescence, African-Americans, prevalence.

ABBREVIATIONS. YRBS, Youth Risk Behavior Survey; NHIS, National Health Interview Survey; POR, prevalence odds ratio.

Cigarette smoking is on the rise among adolescents in the United States. Although both African-American and white adolescents have experienced increases in cigarette smoking over time, the prevalence of smoking has remained con-

sistently lower among African-American adolescents than among white adolescents.<sup>1</sup>

Previous studies have not been able to explain the race differential.<sup>2-4</sup> However, these studies did not take into account the collective contribution of health-compromising (eg, nonuse of seat belts), intentional injury (eg, weapon carrying), and other drug use behaviors (eg, binge drinking) that covary with cigarette smoking.

In response, a cross-sectional study was conducted among African-American and white adolescents (aged 12 to 17 years) who participated in the Youth Risk Behavior Survey (YRBS) supplement to the 1992 National Health Interview Survey (NHIS). The purpose of this study was to determine whether the race differential in the prevalence of cigarette smoking is attributed to differences in lifestyle behaviors and demographic factors.

Specifically, the objectives were to: 1) estimate the prevalence of cigarette smoking among African-American and white adolescents, 2) calculate the crude prevalence odds ratio (POR) of current smoking for white adolescents (versus African-American adolescents), and 3) estimate the POR of current smoking for white adolescents after simultaneous adjustment for lifestyle behaviors and demographic factors.

## METHODS

### Study Population and Data Collection

The 1992 NHIS was conducted among a representative sample of the civilian noninstitutionalized US population, using a multi-stage cluster-area probability design of approximately 128 000 persons representing approximately 49 000 households. The YRBS was conducted as a supplement to the 1992 NHIS among a representative sample of US adolescents and young adults drawn from sampled households.<sup>5</sup> Based on information collected at the time of the basic NHIS interview, a roster was prepared listing all youths aged 12 to 21 years and their school status. From this roster, one in-school youth and up to two out-of-school youths from each family were randomly selected to the NHIS-YRBS. Participation was voluntary. For adolescents aged 12 to 17 years, the consent of a parent or another responsible adult was required.<sup>5,6</sup>

Interviews took place approximately 2 months after the basic household interview, from April 1992 through March 1993. Using headsets, respondents listened to a tape recording of the questionnaire and recorded their responses on a standardized answer sheet. A weighting factor was applied to each record to adjust for nonresponse and the oversampling of out-of-school youths.<sup>5,6</sup>

The NHIS-YRBS interviews were completed for 10 645 youths aged 12 to 21 years, representing an overall response rate of 73.9%.<sup>5</sup> For this analysis, the eligible population consisted of African-American and white adolescents from 12 to 17 years of age ( $n = 6242$ ). Six hundred seventy-three respondents (10.8%) were excluded because of missing data on at least one study

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variable. Thus, the final study population consisted of 5569 adolescents for whom information was complete.

## Study Variables

In this study, race was the exposure variable; and current smoking was the outcome variable. Based on a question about main racial background and ethnic origin, respondents to the NHIS-YRBS described themselves as non-Hispanic white or non-Hispanic African-American. To determine smoking status, respondents were asked, "During the past 30 days, on how many days did you smoke cigarettes?" Respondents who had not smoked in the last month were considered nonsmokers, and those who had smoked on 1 or more days were classified as current smokers.

Various demographic and behavioral correlates of cigarette smoking among adolescents<sup>7</sup> were selected as control variables for this study. The demographic factors included: gender (female, male); age (12 to 13 years, 14 to 15 years, 16 to 17 years), and parental education (<12 years, 12 years, 13 to 15 years, 16 or more years).

Behavioral factors were classified as health-compromising, intentional injury, or drug use behaviors. The health-compromising behaviors included nonuse of seat belts and physical inactivity. Respondents to the NHIS-YRBS were asked, "How often do you wear a seat belt when riding in a car driven by someone else?" Response options were: "always," "most of the time/sometimes," and "rarely/never." Physical activity was assessed by asking respondents, "On how many of the past 7 days did you exercise or participate in sports activities that made you sweat and breathe hard, such as basketball, jogging, fast dancing, swimming laps, tennis, fast bicycling, or similar aerobic activities?" Responses options were: "3 or more days," "1 to 2 days," and "0 days."

The intentional injury behaviors included weapon carrying and physical fighting. The NHIS-YRBS assessed weapon carrying by asking respondents, "During the past 30 days, on how many days did you carry a weapon such as a gun, knife, or club?" Response options were "0 days," "1 to 5 days," and "6 or more days." Physical fighting was measured by asking respondents, "During the past 12 months, how many times were you in a physical fight?" Response options were: "0 times," "1 to 3 times," and "4 or more times."

The drug use behaviors included binge drinking, use of marijuana, and use of other illegal drugs. Binge drinking was assessed by asking respondents, "During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?" Response options were: "not during life," "0 days," "1 to 2 days," and "3 or more days." Marijuana use was measured by asking respondents, "During the past 30 days, how many times did you use marijuana?" Response options were: "not during life," "0 times," and "1 or more times."

Other illegal drug use was determined by respondents' answers to two questions: "During your life, how many times have you used any form of cocaine, including powder, crack, or free-base?" and "During your life, how many times have you used any other type of illegal drug such as LSD, PCP, ecstasy, mushrooms, speed, ice, heroin, or pills without a doctor's prescription?" Those who answered "0 times" to both questions were considered never users; all others were considered ever users.

## Statistical Analysis

First, weighted percentages were used to estimate the prevalence of current smoking among the two groups of adolescents. Then, logistic regression analysis<sup>8</sup> was used to estimate the PORs of current smoking for white adolescents versus African-American adolescents before and after simultaneous adjustment for lifestyle behaviors and demographic factors. For the multivariate model, correlations among control variables were moderate and did not present problems of multicollinearity.<sup>8,9</sup> SUDAAN,<sup>10</sup> a procedure for analyzing complex sample survey data, was used to calculate weighted percentages and their corresponding 95% confidence intervals and to estimate the PORs and their corresponding 95% confidence intervals.

## RESULTS

The distribution of the covariates by race is displayed in Table 1. Although the gender and age

distributions of the two groups of adolescents were similar, there were considerable race differences in years of parental education. White adolescents were more than twice as likely as African-American adolescents to have parents with 16 or more years of education.

The two groups also differed with respect to the health-compromising, intentional injury, and drug use behaviors. African-American adolescents were more likely than white adolescents to rarely or never wear seat belts, to have engaged in no physical activity during the last 7 days, and to be involved in 1 to 3 physical fights during the past 12 months. On the other hand, white adolescents were more likely than African-American adolescents to have participated in binge drinking on 3 or more days in the past month, to have used marijuana at least once in the past 30 days, and to have ever used other illegal drugs. There were no significant race differences in weapon carrying.

In 1992, 9.5% of African-American adolescents were current smokers, compared with 23.0% of white adolescents. The crude POR was 2.8 (95% confidence interval = 2.1 to 3.9).

In Table 2, the crude POR is adjusted for multiple confounding factors. The adjusted POR of 2.6 (95% confidence interval = 1.8 to 3.7) was virtually identical with the crude POR. In addition to race, other significant correlates of current smoking included age, seat belt use, physical activity, weapon carrying, physical fighting, binge drinking, use of marijuana, and use of other illegal drugs.

## DISCUSSION

These data suggest that racial differences in selected lifestyle behaviors and demographic factors do not account for the race differential in the prevalence of adolescent cigarette smoking. The present findings are consistent with previous studies<sup>2-4</sup> and contribute new knowledge by adjusting for a broad range of lifestyle behaviors.

The exclusion of 10.8% of the study participants because of missing data is not likely to have affected the results. The crude POR reported here (2.8) excludes those with missing values. However, when the crude POR was recalculated for the whole population (individuals with and without missing values), the POR was still 2.8.

Two limitations of this study must be considered. First, the data are cross-sectional, meaning that there is no way of knowing whether any of the demographic, health-compromising, intentional injury, or drug use behaviors actually predict smoking initiation. Second, differential misclassification could be operating; that is, African-American adolescents may be more likely than white adolescents to underreport their smoking habits,<sup>11,12</sup> resulting in an overestimation of effect. Differential misclassification alone, however, is not likely to fully account for the observed association between race and current smoking. Investigators have found that the race differential in cigarette smoking among adolescents persists,

**TABLE 1.** Distributions of Covariates Among African-American and White Adolescents—United States, 1992\*

Variable	Race			
	African-American (n = 962)		White (n = 4607)	
	%*	(95% Confidence Interval)	%	(95% Confidence Interval)
Gender				
Female	50.0	(46.5, 53.6)	49.7	(48.2, 51.3)
Male	50.0	(46.4, 53.5)	50.3	(48.7, 51.8)
Age				
12–13 years	34.5	(30.8, 38.2)	34.2	(32.7, 35.8)
14–15 years	35.3	(31.8, 38.8)	33.5	(31.9, 35.0)
16–17 years	30.2	(26.9, 33.6)	32.3	(30.7, 33.9)
Parental education				
Less than 12 years	20.6	(17.6, 23.6)	11.9	(10.3, 13.5)
12 years	42.6	(38.5, 46.8)	34.5	(32.6, 36.4)
13–15 years	23.8	(20.2, 27.3)	24.2	(22.8, 25.7)
16 or more years	13.0	(10.3, 15.7)	29.3	(27.5, 31.1)
Seat belt use				
Always	26.2	(22.6, 29.7)	34.4	(32.4, 36.4)
Most of the time/sometimes	52.1	(48.6, 55.6)	50.0	(48.3, 51.8)
Rarely/never	21.7	(18.0, 25.5)	15.6	(14.1, 17.1)
Physical activity in past 7 days				
3 or more days	58.3	(54.8, 61.7)	64.8	(63.1, 66.5)
1–2 days	18.5	(15.8, 21.2)	19.2	(17.9, 20.5)
0 days	23.3	(20.3, 26.3)	16.0	(14.6, 17.4)
Weapon carrying in past 30 days				
0 days	86.8	(84.3, 89.4)	84.9	(83.6, 86.1)
1–5 days	9.3	(7.2, 11.3)	9.0	(8.0, 9.9)
6 or more days	3.9	(2.2, 5.6)	6.2	(5.2, 7.1)
Physical fights in past 12 months				
0 times	43.4	(39.1, 47.6)	57.5	(55.8, 59.2)
1–3 times	43.0	(39.3, 46.6)	30.7	(29.2, 32.2)
4 or more times	13.7	(10.8, 16.6)	11.8	(10.7, 12.9)
Binge drinking in past 30 days				
Not during life	60.1	(56.0, 64.1)	48.6	(46.8, 50.4)
0 days	33.9	(30.2, 37.7)	33.6	(32.0, 35.2)
1–2 days	4.3	(2.6, 5.9)	10.9	(9.9, 11.9)
3 or more days	1.7	(0.9, 2.6)	6.9	(6.0, 7.7)
Marijuana use in past 30 days				
Not during life	88.8	(86.2, 91.4)	83.6	(82.3, 84.8)
0 times	7.3	(5.2, 9.4)	8.7	(7.8, 9.7)
1 or more times	3.9	(2.4, 5.4)	7.7	(6.8, 8.6)
Other illegal drug use in lifetime				
Never	97.7	(96.5, 98.9)	90.6	(89.7, 91.4)
Ever	2.3	(1.1, 3.5)	9.4	(8.6, 10.3)

\* Weighted percentages, adjusted for sampling design and nonresponse.

even when biochemical measures of cigarette smoking are used.<sup>11</sup>

More research is needed to identify other factors that might contribute to the race differential in adolescent smoking. One potentially fruitful area of research would be an examination of race differences in parental control of tobacco use. Studies suggest that when parents establish and reinforce a standard of no tobacco use for their children, adolescents are less likely to take up the habit.<sup>13</sup>

Studies also suggest that African-American parents take stronger actions against their children's cigarette smoking than white parents.<sup>14–16</sup> For example, Koepke et al<sup>14</sup> found that African-American parents were more likely than white parents to believe that it was extremely important for them to be involved in the smoking prevention activities at their children's school. When asked how they could best help their children not to smoke, African-Americans were more likely than whites to report that they would threaten their children with punishment. Questions were also asked about home-smoking policies. African-American parents were more likely

than white parents to report that only adults were allowed to smoke in the home.

If African-American parents take stronger actions against cigarette smoking than white parents, and if a high degree of parental control of tobacco use is associated with reduced adolescent smoking, then race differences in parental control of tobacco use may help explain the race gap in teen smoking.

There are other possible explanations for why African-American youths are less likely to smoke cigarettes than white youths. One is that African-American adolescents may be more likely to believe that tobacco products are being marketed specifically to them.<sup>16</sup> Another is that African-American females may be less likely to use smoking as a weight-control strategy,<sup>17,18</sup> and finally, African-American youths may be less likely to consider cigarette smoking to be fun.<sup>16</sup>

In conclusion, this study found that the POR of current smoking for white adolescents compared with African-American adolescents persisted, even after multivariate adjustment for confounding factors. These findings underscore the need for more

**TABLE 2.** Adjusted Prevalence Odds Ratio (POR) of Current Smoking for White Versus African-American Adolescents—United States, 1992\*

Variable	N	%	POR	(95% Confidence Interval)
Race				
African-American	89	9.5	1.0	
White	1029	23.0	2.6	(1.8, 3.7)
Gender				
Female	552	20.1	1.0	
Male	566	21.5	0.9	(0.8, 1.1)
Age				
12–13 years	175	8.8	1.0	
14–15 years	386	22.3	1.7	(1.3, 2.2)
16–17 years	557	32.2	1.6	(1.2, 2.2)
Parental education				
Less than 12 years	186	22.0	1.0	
12 years	411	22.1	1.0	(0.7, 1.5)
13–15 years	272	21.8	0.9	(0.6, 1.4)
16 or more years	249	17.6	0.9	(0.6, 1.3)
Seat belt use				
Always	242	14.4	1.0	
Most of the time/sometimes	576	20.9	1.3	(1.0, 1.6)
Rarely/never	300	33.2	1.5	(1.1, 2.0)
Physical activity in past 7 days				
3 or more days	631	18.7	1.0	
1–2 days	260	24.4	1.6	(1.2, 2.0)
0 days	227	24.5	1.4	(1.0, 1.8)
Weapon carrying in past 30 days				
0 days	786	17.2	1.0	
1–5 days	195	40.1	1.7	(1.2, 2.4)
6 or more days	137	44.4	1.5	(1.0, 2.2)
Physical fights in past 12 months				
0 times	439	14.8	1.0	
1–3 times	425	23.5	1.4	(1.1, 1.7)
4 or more times	254	41.0	2.6	(1.8, 3.9)
Binge drinking in past 30 days				
Not during life	112	4.3	1.0	
0 days	467	26.6	4.6	(3.5, 6.1)
1–2 days	314	59.0	10.5	(7.1, 15.6)
3 or more days	225	64.9	7.7	(5.1, 11.6)
Marijuana use in past 30 days				
Not during life	538	12.2	1.0	
0 times	269	58.1	3.8	(2.8, 5.1)
1 or more times	311	78.2	5.3	(3.7, 7.7)
Other illegal drug use in lifetime				
Never	806	16.4	1.0	
Ever	312	69.7	2.0	(1.4, 2.7)

\* Current smoking defined as having smoked on 1 or more days in the past 30 days. Percentages reflect weighted prevalence of current smoking in each subgroup. Crude POR = 2.8 (95% confidence interval = 2.1 to 3.9).

research on contributors to the race differential in adolescent smoking. Such research could advance theoretical understanding of the etiology of cigarette smoking among adolescents and lead to more effective smoking prevention programs for all youths.

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