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## Smoking differences among African American, Hispanic, and White middle school students in an urban setting

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### Abstract

**Introduction:** Cross-sectional studies have repeatedly observed that African American adolescents are less likely to smoke when compared to White and Hispanic adolescents. Although much is known among high school samples, few scientifically based studies have reported these race and ethnic differences in cigarette smoking among younger samples. **Methods:** This study employed a secondary analysis of data from a 3-year middle school violence prevention project. The study design was a 3-year serial cross-sectional survey, out of which a cohort of students from sixth to eighth grade was formed. Smoking measurements were taken yearly. **Results:** 8865 students responded in 1994, 9115 in 1995, and 9364 in 1996; 1589 students are in the 3-year cohort. Smoking prevalence rates from both measurement periods confirm the disparity between African Americans, Whites, and Hispanic youth. Although weak in sixth grade, by eighth grade, White and Hispanic students are smoking at two to four times the rate of their African American classmates. **Conclusions:** Clearly, more etiological research needs to be conducted to understand the social, cultural, and intrapersonal forces that operate to inhibit the onset of smoking in African American youth and promote the onset of smoking in White and Hispanic youth.

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## 1. Introduction

A great deal is known about the distribution and risk factors for the onset of cigarette smoking among youth. The prevalence of adolescent smoking has been variously estimated by many studies, and many of these have been summarized in the 1994 Surgeon General's Report (U.S. Department of Health and Human Services, 1994). Although significant declines in teenage smoking were observed during the 1970s, very little change was observed for 15 years until the mid-1990s when smoking increased and today has leveled off. Recent data from *Monitoring the Future* reported that 65% of 12th grade students have tried cigarettes and 35% are current smokers, whereas 44% of eighth grade students have tried cigarettes and 18% are current smokers (Johnston, O'Malley, & Bachman, 2000).

Cross-sectional studies have repeatedly observed that African American adolescents are less likely to smoke when compared to White and Hispanic adolescents (Gritz et al., 1998). According to the Youth Risk Behavior Surveillance System (Centers for Disease Control and Prevention, 2000), 39% of White high school students are current smokers, followed by Hispanics (33%) and African Americans (20%). Among African American youth, 12th grade daily smoking prevalence has declined 1–3% nearly every year between 1976 and 1995, while the smoking rate has remained generally constant among the same subgroup of White and Hispanic youth (Nelson et al., 1995; U.S. Department of Health and Human Services, 1998).

In Texas, the site of the present study, adolescent smoking prevalence rates for minorities are slightly higher than the national statistics. Hispanic secondary students were more likely to be current smokers than Whites or African Americans (58%, 55%, and 41%, respectively; Texas Commission on Alcohol and Drug Abuse, 1998). Although the overall rates of smoking are similar to the national statistics, young African American Texans smoke cigarettes at a slightly higher rate than the national average. Among Texas public middle school students, Hispanics (25% and 19%) have the highest prevalence of current cigarette smoking compared to African Americans (21% and 16%) and Whites (18% and 12%), respectively, for 1998 and 1999 (Texas Department of Health, 1999, 2000). The increase in cigarette smoking prevalence among younger African Americans indicates a change in smoking trends in African American youth.

There is compelling evidence that most smokers take up the habit as adolescents. The National Household Survey on Drug Abuse conducted in 1991 (U.S. Department of Health and Human Services, 1994) revealed that among 30–39-year-old adults, who had ever smoked daily, 89% first tried smoking and 71% became daily smokers before the age of 19 years. The mean age of first experimentation with cigarette use was 14.6 years, and the mean age of developing a daily smoking habit was 17.7 years (U.S. Department of Health and Human Services, 1994). Gilpin has reported that virtually no regular smoking initiation occurs among the US tobacco users after the age of 20 years (Gilpin, Lee, Evans, & Pierce, 1994).

Although much is known among high school samples, few scientifically based studies have reported these race and ethnic differences in cigarette smoking among younger samples.

This paper describes the distribution of smoking prevalence among middle school youth in an urban setting in three cross-sectional samples and in a cohort sample.

## 2. Methods

### 2.1. Design

This study employs a secondary analysis of data from students participating in the Students for Peace project, a 3-year program designed to evaluate a comprehensive, school-based intervention that aimed to prevent violence among students (sixth, seventh, and eighth grades) in eight urban middle schools of a large school district in Texas (Kelder et al., 1996). Surveys were administered to all students in the spring of 1994, 1995, and 1996. Cohort students are defined as sixth-grade students present at 1994 baseline survey and at the two subsequent surveys.

### 2.2. Sample

The baseline cross-sectional sample consisted of 8858 students (4477 boys and 4381 girls), representing 89% of students registered to attend these schools. The second cross-sectional sample (1995) consisted of 9115 students, and the third cross-sectional sample (1996) consisted of 9364 students. Of the baseline sample, 19% were African American, 66% were Hispanic, 8% were White, 4% were Asian, and 3% were other (not included in further analyses). The 3-year cohort sample consisted of 1589 students (778 boys and 811 girls), representing 55% of the students measured in 1994 at baseline. According to school district records, 36% of the student population had transferred out of the project schools during the 3 years. Thus, in the cohort sample, we measured 86% of the students who remained in the same school over the 3 years.

No information about socioeconomic status was collected at the individual level. At the school level, the percentage of students considered at-risk of dropping out of school ranged between 35% and 80% among schools (average for the district was 50%). The percentage of students receiving free or reduced-cost lunch ranged between 37% and 61% among schools (average for the district was 55%).

### 2.3. Survey administration

The student survey, as well as the use of passive informed consent, was approved by the Committee for the Protection of Human Subjects of The University of Texas Health Science Center at Houston and by the school district's research department. Before the administration of the questionnaire, a letter signed by the school principal was sent to parents explaining the purpose and content of the evaluation. Parents who did not wish their child to participate in this evaluation could sign the letter and return it to the school. Research staff administered the questionnaire following standardized instructions. The importance of the study and the

procedures to assure confidentiality were explained to students. Students who did not wish to answer the questionnaire or whose parent signed the letter were given another activity ( $n < 50$  per year). The questionnaire was confidential and anonymous for students in the cross-sectional evaluation. For the longitudinal evaluation, names and birthdates were linked to a code number on a detachable card fastened to the survey; the code number on the detachable card identified the survey. Cards were removed from the surveys as the participants submitted their surveys to the trained data collectors. The cards were kept in a locked file. The personal identifiers and survey responses were kept physically separate in two different datasets. Confidentiality of responses was assured by the research staff. Trained data collectors administered surveys to students during homeroom periods or gym classes (approximately 45–60 min). In order to obtain the maximum number of student responses, reasonable efforts (at least two attempts within a 2-week period of the original survey date) were exerted to locate and survey cohort students who were absent during scheduled administration days.

#### *2.4. Survey instruments and measures*

The survey instrument was translated into Spanish, back translated into English, and pilot tested prior to administration. In May of 1994, students completed a survey instrument, which included the items pertaining to the violence prevention study and measures of cigarette use. Follow-up administrations occurred in the spring of 1995 and 1996. Other measures included in this paper are ethnicity, usual school grades, mother and father level of education, and parental guardianship.

#### *2.5. Cigarette smoking*

The measures for cigarette smoking, the focus for this paper, included standardized self-reported items taken from the Center for Disease Control and Prevention Youth Risk Behavior Survey (Kolbe, 1990). A single smoking variable was utilized, taken from the YRBS: During the past 30 days, on how many days did you smoke cigarettes? This self-reported item is similar to that used in many other youth smoking research studies with known and acceptable reliability and validity (Pechacek et al., 1984). The reliability for these YRBS questions was published at  $\kappa = 0.80$  (Brener, Collins, Kahn, Warren, & Williams, 1995).

#### *2.6. Analysis methods*

Both cross-sectional and cohort data were used to examine ethnic smoking prevalence differences. For the cross-sectional analyses, all participants were included. For the cohort analyses, only those participants at baseline and follow-up surveys were included. Logistic regression was used to quantify the strength of the ethnicity/smoking relationship. Covariance adjustments were made with students' usual school grades, a variable found to be significantly related to smoking. Analyses were stratified for grade in school and gender.

To predict smoking onset (smoking incidence), the 1994 cohort students (sixth graders) were stratified by smoking status and their 1995 seventh grade smoking and 1996 eighth grade smoking prevalence were calculated for the nonsmoking sixth graders. All analyses were conducted using SAS version 6.11.

### 3. Results

Table 1 provides demographic information on students at baseline and those in the cohort who were measured at all three time points. Students were evenly distributed by gender and grade. Of the total sample, the majority self-identified themselves as Hispanic followed by

Table 1  
Demographic characteristics of students at baseline, 1994

Demographic characteristics	Cross-section			Cohort ( <i>n</i> = 1589; %)
	Sixth grade ( <i>n</i> = 3150; %)	Seventh grade ( <i>n</i> = 2881; %)	Eighth grade ( <i>n</i> = 2803; %)	
Gender				
Boys	52.5	50.0	48.8	49.2
Girls	47.5	50.0	51.2	50.8
Race/ethnicity				
Hispanic	66.4	65.7	65.6	69.8
African American	18.9	19.9	19.0	15.5
White	8.2	7.4	9.1	7.7
Asian	3.3	3.5	3.5	4.0
Other	2.1	2.4	1.7	3.0
Mother's education				
<High school	27.8	33.0	35.7	27.5
High school	15.4	17.6	18.9	17.2
Some college	25.3	25.0	25.2	24.2
Not sure	29.6	24.5	20.2	30.9
Father's education				
<High school	22.1	26.8	30.0	23.2
High school	17.1	16.8	18.0	16.6
Some college	23.5	24.3	25.1	22.9
Not sure	37.3	32.1	26.1	37.3
Guardianship				
Mother and father	58.7	58.7	57.6	66.2
M or F and step-parent	15.1	12.6	13.8	12.0
M or F only (single parent)	21.6	23.3	23.1	17.9
Grandparent, uncle, aunt	4.7	5.5	5.6	3.9
Usual grades				
A's and B's	43.5	35.7	34.0	48.6
B's and C's	41.4	46.1	47.5	40.5
C's and D's	11.9	14.5	15.1	8.9
D's and F's	3.2	3.7	3.4	2.0

African American, White, and other. Six of the schools were greater than 60% Hispanic (range 65–98%); the other two schools were predominantly African American (58% and 52%). Nearly a third of parents had not completed high school, and 50% of students lived with both parents; the number increasing to 70% if one of those parents is a stepparent.

Tables 2 and 3 present the unadjusted and adjusted monthly and weekly smoking prevalence by gender and race for each of the three cross-sectional surveys, 1994–1996. Also included are the odds of smoking for Whites and Hispanics compared to African Americans and accompanying 95% confidence interval for the odds ratio. Smoking

Table 2

Smoking prevalence (weekly and monthly) by grade, race, and cross-sectional evaluation, boys

	Sixth grade			Seventh grade			Eighth grade		
	Black	White	Hispanic	Black	White	Hispanic	Black	White	Hispanic
1994									
Weekly									
% unadj	7.8	8.3	5.8	6.2	9.3	10.0	10.3	11.2	16.4
% adj	8.5	10.0	6.8	6.9	11.7	10.7	11.8	14.2	17.3
OR	ref	1.27	0.78	ref	1.94	1.72	ref	1.26	1.66
95% CI	ref	(0.58, 2.76)	(0.44, 1.28)	ref	(0.84, 4.52)	(0.98, 3.01)	ref	(0.63, 2.55)	(1.06, 2.62)
Monthly									
% unadj	17.5	15.0	17.3	18.3	22.6	23.1	20.2	25.6	29.9
% adj	18.8	18.6	19.2	18.9	23.7	23.1	22.0	29.5	31.0
OR	ref	0.98	1.03	ref	1.33	1.32	ref	1.55	1.66
95% CI	ref	(0.55, 1.75)	(0.71, 1.49)	ref	(0.72, 2.47)	(0.95, 1.98)	ref	(0.93, 2.60)	(1.18, 2.36)
1995									
Weekly									
% unadj	5.9	7.1	9.1	6.7	11.8	9.2	9.7	21.6	14.5
% adj	5.5	7.5	8.7	7.9	15.1	10.7	10.6	24.6	15.8
OR	ref	1.37	1.59	ref	2.53	1.49	ref	3.10	1.67
95% CI	ref	(0.52, 3.62)	(0.93, 2.75)	ref	(1.17, 5.47)	(0.91, 2.45)	ref	(1.55, 6.25)	(1.02, 2.75)
Monthly									
% unadj	16.3	22.6	22.7	17.7	21.6	22.9	22.1	34.1	30.8
% adj	17.1	24.2	23.6	19.9	27.9	25.5	22.9	39.3	32.4
OR	ref	1.54	1.52	ref	1.71	1.45	ref	2.30	1.67
95% CI	ref	(0.86, 2.88)	(1.07, 2.16)	ref	(0.96, 3.04)	(1.04, 2.03)	ref	(1.31, 4.03)	(1.16, 2.40)
1996									
Weekly									
% unadj	4.8	3.9	7.5	7.8	15.3	10.2	7.7	17.4	10.3
% adj	6.6	5.8	9.1	9.7	19.1	11.9	8.8	19.4	11.4
OR	ref	0.81	1.59	ref	2.76	1.34	ref	2.91	1.39
95% CI	ref	(0.23, 2.93)	(0.87, 2.91)	ref	(1.25, 6.09)	(0.83, 2.17)	ref	(1.43, 5.92)	(0.85, 2.26)
Monthly									
% unadj	15.4	9.1	24.7	18.2	25.0	27.6	20.8	23.9	27.8
% adj	19.8	13.4	27.6	21.1	31.2	30.0	23.0	27.4	27.0
OR	ref	0.56	1.79	ref	1.80	1.68	ref	1.28	1.24
95% CI	ref	(0.24, 1.32)	(1.25, 2.57)	ref	(0.97, 3.36)	(1.21, 2.33)	ref	(0.72, 2.26)	(0.89, 1.71)

Odds ratios and smoking prevalence are adjusted for self-reported usual grades received in school.

Table 3

Smoking prevalence (weekly and monthly) by grade, race, and cross-sectional evaluation, girls

	Sixth grade			Seventh grade			Eighth grade		
	Black	White	Hispanic	Black	White	Hispanic	Black	White	Hispanic
1994									
Weekly									
% unadj	1.5	0.9	3.5	3.4	4.0	4.8	3.9	13.7	7.3
% adj	2.5	2.6	4.4	5.3	7.7	6.5	5.4	17.0	8.8
OR	ref	0.61	2.35	ref	1.20	1.43	ref	3.86	1.92
95% CI	ref	(0.07, 5.56)	(0.81, 6.75)	ref	(0.36, 3.98)	(0.69, 2.98)	ref	(1.71, 8.70)	(0.97, 3.78)
Monthly									
% unadj	7.3	6.6	11.5	9.7	14.0	19.1	9.8	20.9	20.2
% adj	9.4	10.5	13.4	13.0	21.4	22.0	13.3	28.4	23.8
OR	ref	1.12	1.63	ref	2.20	2.20	ref	3.45	2.44
95% CI	ref	(0.45, 2.79)	(0.97, 2.70)	ref	(1.07, 4.50)	(1.41, 3.46)	ref	(1.85, 6.44)	(1.55, 3.84)
1995									
Weekly									
% unadj	1.4	3.2	5.1	0.7	6.2	5.8	2.3	5.9	8.2
% adj	2.3	4.9	6.4	2.6	9.4	7.5	3.6	8.5	9.3
OR	ref	2.87	4.28	ref	14.16	8.91	ref	3.31	3.77
95% CI	ref	(0.51, 16.25)	(1.51, 12.10)	ref	(2.76, 72.6)	(2.17, 36.8)	ref	(0.85, 12.84)	(1.49, 9.47)
Monthly									
% unadj	6.9	14.3	16.6	9.0	13.5	20.9	10.6	19.1	23.7
% adj	9.1	18.7	19.7	14.3	21.3	25.4	13.7	24.8	26.4
OR	ref	2.61	2.82	ref	1.96	2.62	ref	2.39	2.63
95% CI	ref	(1.12, 6.07)	(1.73, 4.60)	ref	(0.95, 4.03)	(1.70, 4.02)	ref	(1.12, 5.07)	(1.66, 4.19)
1996									
Weekly									
% unadj	1.5	6.3	4.0	4.5	4.5	7.2	5.2	8.6	4.7
% adj	1.9	6.8	4.5	7.7	7.7	9.8	7.3	11.8	6.5
OR	ref	4.52	2.85	ref	1.00	1.50	ref	2.24	0.86
95% CI	ref	(1.09, 18.6)	(1.00, 8.11)	ref	(0.27, 3.66)	(0.81, 2.80)	ref	(0.89, 5.63)	(0.47, 1.59)
Monthly									
% unadj	9.4	14.3	16.5	15.0	19.4	22.7	10.3	15.1	18.4
% adj	11.5	18.1	18.6	21.1	25.5	27.6	13.1	20.4	20.8
OR	ref	1.78	1.85	ref	1.39	1.57	ref	1.89	1.96
95% CI	ref	(0.78, 4.04)	(1.18, 2.89)	ref	(0.69, 2.79)	(1.09, 2.27)	ref	(0.94, 3.81)	(1.28, 3.0)

Odds ratios and smoking prevalence are adjusted for self-reported usual grades received in school.

prevalence and odds were adjusted for self-reported usual grades at school. For boys, in all but four comparisons, both for monthly and weekly smoking, the point prevalence was higher for White and Hispanic students compared to their African American counterparts. For girls, African American smoking prevalence was lower than White and Hispanic in all comparisons. Although for both boys and girls many comparisons failed to reach statistical significance, the consistency of finding across three separate cross-sectional samples is striking, in some cases with a threefold difference.

Table 4 presents the onset of smoking in the 1994 sixth grade cohort of students. To predict smoking onset, 1995 seventh grade and 1996 eighth grade smoking prevalence were calculated

Table 4

Incidence of smoking by grade, race, and cohort evaluation among nonsmoking sixth graders

	Seventh grade			Eighth grade		
	Black	White	Hispanic	Black	White	Hispanic
<b>Boys</b>						
Incidence	9.7	14.8	14.7	19.3	23.7	20.9
OR	ref	1.70	1.68	ref	1.36	1.11
95% CI	ref	(0.55, 5.29)	(0.77, 3.66)	ref	(0.54, 3.44)	(0.60, 2.06)
<b>Girls</b>						
Incidence	9.8	11.2	16.4	5.2	15.5	14.3
OR	ref	1.19	2.00	ref	3.37	3.01
95% CI	ref	(0.37, 3.72)	(0.95, 4.10)	ref	(1.13, 9.89)	(1.27, 7.15)

Odds ratios and smoking incidence were adjusted for self-reported usual grades received in school.

for the nonsmoking 1994 sixth grade cohort. No significant differences were seen in the seventh grade across the groups. In eighth grade, only girls achieved statistical significance.

#### 4. Discussion

Smoking prevalence rates from all three measurement periods offer evidence supporting the disparity between African Americans, Whites, and Hispanic youth that other surveys have reported. Although weak in sixth grade, the effect grew larger as the students aged, and by eighth grade, White and Hispanic students (in most comparisons) were smoking at two to three times the rate of their African American classmates. This finding is consistent across time periods and offers a unique perspective in that few surveys report tobacco use by ethnicity among middle school children. For White versus Black comparisons, several large associations (odds ratio greater than 2) failed to reach statistical significance, owing to the smaller sample of White students (less than 10% of total sample). Nevertheless, the overall pattern of association supports differences in smoking rates across time. This is particularly true for girls where the incidence relative risk differences for White and Hispanics were greater than 3.0. With few exceptions, odds ratios were similar within age strata across year of survey indicating a robust finding. The exception being in 1995 for seventh grade girls when Black smoking prevalence was less than 1%, making an unstable estimate.

The potential limitation of this study is that only two questions on smoking behavior were asked and no biochemical measures were used to validate smoking status. We believe, however, that this limitation is unlikely to compromise the quality of the obtained results for two reasons. Firstly, the essentiality of biochemical validation of smoking surveys has been questioned by distinguished experts in cigarette smoking research (Glasgow et al., 1993). Secondly, incorporation of smoking items in the SFP survey that is focused predominantly on more sensitive violence issues may actually increase the reliability of self-reported smoking data. Although record tracking was used for the longitudinal evaluation participants, confidentiality and anonymity were assured since the data analyst had no knowledge of names and other identifying information.

Unfortunately, these data only report solely from an epidemiological perspective and cannot offer explanations as to why the ethnic smoking differences exist. Clearly, more etiological research needs to be conducted to understand the social, cultural, and intrapersonal forces that operate to inhibit the onset of smoking in African American youth and promote the onset of smoking in White and Hispanic youth, specifically the functional meanings attached to smoking, cultural influences, and parenting practices (Epstein, Gilbert, & Diaz, 1998). Should these factors be uncovered, then more specific interventions could be developed to reduce other problem behaviors among African American youth and youth of other ethnic groups. In particular, once understood, specific messages could be targeted to White and Hispanic youth to reduce smoking onset based on the identification of smoking inhibitors in African American youth.

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