Preventive Oral Health Behaviors among African-Americans and Whites in Detroit

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Abstract

Objective: This study compared the preventive oral health behaviors of African-Americans and whites. *Methods:* Face-to-face interviews were conducted with a probability sample of 384 African-American and 358 white adults living in the greater Detroit area. Questions focused on brushing, flossing, and dental visits. *Results:* More than 95 percent of both groups reported brushing daily; however, whites were more likely to brush all teeth, including parts that do not show. Frequency of flossing did not differ between groups. African-Americans, however, were less likely to floss all of their teeth. Whites were more likely than African-Americans to get dental check-ups at least once a year and much less likely to indicate they had never had a dental check-up. African-Americans tended to have less education and lower family income than whites and were more likely than whites to have Medicaid. Race differences in brushing thoroughness and annual check-ups were greatly reduced when income, education, and insurance were controlled statistically. *Conclusions:* African-Americans are less likely than whites to brush thoroughly, floss thoroughly, and get dental check-ups. These differences are partly traceable to differences in socioeconomic status and access to professional oral health care. [J Public Health Dent 1998;58(3):234-40]

Key Words: preventive dental behavior, African-Americans, whites, dental self-care, plaque control, oral health education, health services accessibility.

Oral health authorities recommend that adults thoroughly brush and floss their teeth at least once a day and have regular dental check-ups to prevent and to obtain timely treatment for oral health problems (1,2). Oral health and adherence to these recommendations in the United States have greatly improved over the past half century; nevertheless, some of the recommendations are followed only by a minority (3,4). In addition, some subgroups within the population such as African-Americans remain at high risk for dental diseases and may be less likely to practice preventive oral health behaviors. At 12 percent, African-Americans are the largest minority group in the United States (5); however, little is known about their oral health and oral health care behaviors. Past studies generally have found that African-Americans have worse oral health and

receive less professional oral health care than white Americans (6-12). Several studies found African-Americans to have more plaque and calculus than whites (13,14). The studies comparing oral self-care of African-Americans and whites found little if any difference in frequency of oral self-care behaviors (15,16). Some probability sample studies that assessed self-care behaviors had too few African-Americans for separate analysis (3,17). In addition, most of the studies with adequate samples of African-Americans did not assess self-care behaviors. To our knowledge, no study has compared the thoroughness of oral self-care behaviors of African-Americans and whites.

The purposes of the current study are (1) to provide a contemporary comparison of the preventive oral health behaviors of African-Ameri-

cans and whites living in the Detroit tricounty area, including information about the thoroughness of brushing and flossing; (2) to identify demographic and socioeconomic variables that predict preventive oral health behaviors and might help to understand differences in oral health behaviors between African-Americans and whites; and (3) to identify demographic and socioeconomic subgroups least likely to perform preventive oral health behaviors. Besides helping to describe and understand the preventive oral health behaviors of African-Americans and whites, the findings may be helpful for targeting interventions to groups that most need them.

Based on past studies (7,9,15,16), we hypothesize that (1) there will be at most slight race differences in the frequency of brushing and flossing, (2) African-Americans will get dental check-ups less often than whites, (3) check-ups will be strongly associated with dental insurance and socioeconomic status (SES), and (4) the relationship between race and dental check-ups will be greatly reduced when SES and dental insurance are controlled statistically. In light of the absence of past research, we had no hypotheses about race differences in thoroughness of brushing or flossing.

Methods

The study uses results from a disproportionate probability sample survey of adults 18 years of age or older living in housing units (e.g., apartments, single-family houses) in the Detroit tricounty area. Sampling was done using stratified, clustered, area probability sampling techniques based on census tracts. To maximize the ability to compare African-Americans with whites and to separate the effects of race/ethnicity from SES, the

sampling design was disproportion- ate, with African-Americans oversampled and African-Americans in higher income census tracts further oversampled. One randomly selected adult was interviewed in each housing unit. Weights based on the sampling design corrected for the disproportionate sampling; hence, weighted results are representative of adults living in the greater Detroit area.

Data were collected by face-to-face interviews conducted from May to September 1994. Interviews were conducted by 31 professional interviewers from the Survey Research Center of the University of Michigan Institute for Social Research. Questions from the written questionnaire were asked verbatim by the interviewers. The overall response rate was 71 percent and 787 interviews were completed. Analyses in this paper were limited to the 384 non-Hispanic African-Americans and 358 non-Hispanic whites in the sample, a total of 742 cases.

All variables other than sex were assessed by self-report. The survey questionnaire was developed by the authors and staff of the Survey Research Center. Question wording was guided by past research and theory and by concerns expressed and terminology used in eight focus groups. The questionnaire was refined based on feedback from three rounds of pilot interviews and comments from consultants. Responses for each variable were coded into two to four categories for the current analyses.

Oral Health Behaviors. Only dentate subjects were asked questions about and included in analyses of brushing and flossing. Brushing and flossing frequency were each assessed by a single question: "In general, how often did you (brush) (floss) your teeth during the past year?" For the current analyses, the answers were coded 1 if the person took the action at least once a day and 0 if less. Thoroughness of brushing was assessed by two questions: "Do you brush all of your teeth or do you usually miss some of them?" and "Do you usually brush the parts of the teeth that don't show when you smile?" For the analyses, the answers to these questions were combined into a single dichotomous variable scored 1 if the person reported brushing all teeth including the parts that don't show, and 0 otherwise.

Thoroughness of flossing was as-

sessed by the question, "When you floss, do you usually floss all of your teeth, most of your teeth, about half of your teeth, or just one or two teeth?" In the analyses, answers were coded 1 if the person reported flossing all of their teeth, and 0 otherwise. Dental check-ups were defined for the subjects as "... visits to a dental office, clinic, or other source of dental care made not because of any dental problem." Two questions were asked to assess frequency of dental check-ups. The first asked, "Have you ever gotten a dental check-up?" For subjects who said yes, a follow-up question asked, "During the past five years, how often have you had dental check-ups?" For most of the analyses, information from these questions was recoded into one dichotomous variable coded 1 if the person reported getting check-ups at least once a year and 0 otherwise, and a second dichotomous variable coded 1 if the person ever had a dental check-up and 0 if never.

Race and Other Predictor Variables. Only non-Hispanic whites and non-Hispanic African-Americans are included in the analyses. Hispanic ethnicity was determined from the question, "Do you consider yourself Hispanic or Latino?" Race was determined from the question, "Do you consider yourself primarily white or Caucasian, black or African-American, Asian or Pacific Islander, or American Indian, Eskimo, or Aleut?" Sex was assessed by interviewer observation. Age was determined from self-reported birth date. Education was assessed by the question, "What is the highest grade of school or year of college you completed?"

Family income in dollars for the previous completed year was assessed by the question, "What was (your/your family's) total combined income in 1993 before taxes, including salaries, wages, pensions, dividends, interest, and all other income?" Subjects who did not respond to this question were asked, "Was (your/your family's) total income in 1993 $20,000 or above?" Unless subjects did not know or refused to answer, they were then asked a series of up to seven dichotomous questions that together placed their family income into categories. Most subjects ($n=519$ of 787) gave their income directly in dollars; about half of the others ($n=136$) answered the dichotomous questions; the remaining subjects ($n=132$) did not provide income data. Dental insurance coverage was assessed by the combination of two questions, "Do you have any kind of dental insurance?" and for subjects with such insurance, "Is your dental insurance Medicaid, or is it Blue Cross-Blue Shield, or Delta Dental, or is it some other plan, or do you have more than one dental plan?" Answers to these two questions were combined into a single three-category variable: no insurance was coded 1, Medicaid insurance only was coded 2, and other (i.e., non-Medicaid) insurance (including multiple coverage) was coded 3. Dentate status was coded 1 for subjects with teeth and 0 for edentulous subjects.

Analyses. Relationships among variables were tested by chi-square tests of association and by bivariate and multivariate logistic regression, with significance level set at .05. All analyses were conducted using

TABLE 1
Dental Behaviors of African-Americans and Whites (Weighted Data)

Behaviors	Number of Persons	% African-Americans	% Whites	P-value*
Brush at least once/day	678	96.7	96.1	.666
Brush thoroughly	676	85.2	91.9	.025
Floss at least once/day	678	35.0	32.3	.482
Floss all teeth	596	47.4	64.4	<.001
Check-up frequency	730			<.001
Never		13.2	1.3	
Less than once/year		29.2	25.8	
At least once/year		57.6	72.9	

*Chi-square test.

weights in SUDAAN, to obtain appropriate confidence intervals and significance tests in light of the complex sampling design.

Results

Respondents. Demographic characteristics of the sample are similar to results from the 1990 US Census for the Detroit tricounty area (5), suggesting the sample is representative of the population (data available from the authors).

Preliminary Race Comparisons. Table 1 compares African-American and white subjects on preventive oral health behaviors. African-Americans and whites did not differ on frequency of brushing or flossing, with over 95 percent of each group brushing daily and about one-third of each group flossing daily. African-Americans were significantly less likely than whites, however, to brush their teeth thoroughly, to floss all their teeth, and to get dental check-ups at least once a year. A much higher proportion of African-Americans than whites had never had a dental check-up. The focus of the further analyses is on examining demographic, socioeconomic, and other variables that may predict these behaviors and provide insight into these differences in oral health behaviors between African-Americans and whites.

Chi-square tests of association were conducted using SUDAAN to compare whites and African-Americans on background characteristics. Among these variables, African-Americans and whites were equally likely to be edentulous (7%), and had similar age and sex distributions; however, they differed significantly on education, income, and type of dental insurance. African-Americans generally had lower education and income than whites. For example, 20 percent of African-Americans and 10 percent of whites reported less than 12 years of education, while 37 percent of African-Americans and 16 percent of whites reported family incomes below $20,000. African-Americans were much more likely than whites (13% vs 2%) to depend on Medicaid for dental insurance. (Detailed data are available from the authors.) Thus, race differences in preventive oral health behaviors in this sample may be due to differences in education, income, or insurance.

Bivariate and Multivariate Analyses Predicting Each Dental Behavior. Tables 2 through 4 present the bivariate and multivariate relationships for brushing thoroughness, annual check-ups, and ever having a check-up. The left sides of these tables describe the bivariate relationships between each behavior and each predictor by show-

TABLE 2
Associations Between Brushing Thoroughness and Predictor Variables (Weighted Data n=572)

	Bivariate Statistics			Multivariate Statistics	
	% Brushing Thoroughly	Odds Ratio	P-value	Odds Ratio (95% CI)	P-value
Race			.020		.116
White non-Hispanic	91.3	1		1	
Black non-Hispanic	84.7	0.53		0.63 (.37, 1.09)	
Age (years)			.167		.108
18–29	91.1	1.95		2.30 (1.10, 4.80)	
30–39	84.0	1		1	
40–54	92.2	2.26		2.15 (1.01, 4.58)	
55+	91.0	1.93		2.49 (1.07, 5.77)	
Sex			.217		.174
Male	87.0	1		1	
Female	92.4	1.81		2.02 (0.76, 5.34)	
Education (years)			.199		.331
<12	80.2	0.47		0.48 (0.16, 1.44)	
12	89.6	1		1	
13–15	92.6	1.45		1.43 (0.60, 3.42)	
16+	90.2	1.07		0.78 (0.51, 1.20)	
Income			.161		.220
<$20,000	85.3	0.83		0.85 (0.41, 1.78)	
$20,000–$39,999	87.4	1		1	
$40,000–$69,999	89.4	1.22		1.14 (0.46, 2.84)	
$70,000+	95.7	3.19		3.38 (0.91, 12.55)	
Insurance			.375		.585
None	86.4	1		1	
Only Medicaid	89.7	1.37		2.46 (0.71, 8.52)	
Other insurance	91.2	1.63		1.26 (0.45, 3.52)	

ing the percent of persons in each sub-group performing the behavior, the odds ratios from logistic regressions predicting the behavior from each pre-dictor separately, and the P-values from these regressions. Each predictor was coded into one or more dummy variables. The odds ratio of 1 indicates the reference category to which the other categories are compared. Per-centages and odds ratios from the bi-variate logistic regressions are shown to clarify the interpretation of odds ratios and to help identify target groups for interventions.

The right sides of Tables 2 through 4 describe the multivariate relation-ship of each behavior to the predictors by presenting the P-values from the multiple logistic regressions predict-ing the behavior from all predictors,

the odds ratios from these regressions, and confidence intervals for the odds ratios. The multivariate logistic regres-sions characterize the relationships when all other predictors are control-led statistically.

Brushing. African-Americans and whites were about equally likely to report daily brushing (Table 1), so de-tailed results from the logistic regres-sion analyses for brushing frequency are not displayed. Brushing frequency had a statistically significant relation-ship with sex only. Women were more likely than men to brush their teeth at least once a day.

Brushing thoroughness had a statis-tically significant relationship with race, but not with other variables, in the bivariate analysis (Table 2). Afri-can-Americans were less likely than

whites to brush thoroughly, with 84.7 percent of African-Americans and 91.3 percent of whites reporting thorough brushing. In the multivariate analysis, none of the predictors of brushing thoroughness were statistically sig-nificant. In an additional multiple lo-gistic regression model not tabled, race was a significant predictor of brushing thoroughness (P=.026) when education and income were not con-trolled.

Flossing. Whites and African-Americans were about equally likely to report daily flossing (Table 1), so detailed results are not displayed. Only sex had a statistically significant relationship with flossing frequency. Women were almost twice as likely as men (40.2% vs 23.1%) to floss at least once a day. Flossing thoroughness had

TABLE 3
Associations Between Annual Check-ups and Predictor Variables (Weighted Data n=616)

	Bivariate Statistics			Multivariate Statistics	
	% Getting Annual Check-ups	Odds Ratio	P-value	Odds Ratio (95% CI)	P-value
Race			.034		.206
White non-Hispanic	71.9	1		1	
Black non-Hispanic	57.9	0.54		0.72 (0.44, 1.18)	
Age (years)			.051		.606
18–29	65.3	0.89		1.28 (0.75, 2.19)	
30–39	67.9	1		1	
40–54	79.3	1.81		1.51 (0.84, 2.73)	
55+	58.8	0.68		1.42 (0.87, 2.32)	
Sex			.958		.102
Male	68.7	1		1	
Female	68.5	0.99		1.53 (0.94, 2.49)	
Education (years)			.027		.775
<12	43.6	0.45		0.91 (0.36, 2.29)	
12	63.1	1		1	
13–15	73.5	1.63		1.35 (0.78, 2.36)	
16+	80.8	2.46		1.26 (0.54, 2.93)	
Income			.001		.036
<$20,000	39.3	0.37		0.48 (0.28, 0.80)	
$20,000–$39,999	63.7	1		1	
$40,000–$69,999	75.5	1.76		1.43 (0.64, 3.21)	
$70,000+	89.6	4.93		4.04 (1.29, 12.70)	
Insurance			<.001		.101
None	53.9	1		1	
Only Medicaid	41.0	0.59		1.31 (0.50, 3.42)	
Other insurance	76.8	2.84		1.88 (1.11, 3.18)	
Dentate status			<.001		.002
Dentate	71.8	1		1	
Edentulous	25.1	0.13		0.12 (0.04, 0.37)	

a statistically significant relationship with race (P<.001), but not with other variables (all Ps>.1), in both the bivariate and multivariate analyses (not tabled). About two out of three whites reported flossing thoroughly (i.e., all of their teeth), while fewer than half of the African-Americans reported flossing thoroughly.

Check-ups. Annual check-up frequency had statistically significant bivariate relationships with race, education, income, insurance, and dentate status (Table 3). Whites were more likely than African-Americans to get at least one check-up a year. The likelihood of annual check-ups increased with increasing education and income. Respondents with Medicaid insurance were least likely to get annual check-ups. Dentate respondents were much more likely to get annual check-ups than edentulous respondents.

In the multivariate analysis, only income and dentate status were significant predictors of annual check-ups. Thus, controlling for the influence of other predictors, race, education, and insurance became nonsignificant in the multivariate analysis. In an additional multiple logistic regression model dropping education and income, race was statistically significant (P=.046).

The relationships of ever having had a check-up with race, age, education, income, and insurance were statistically significant in the bivariate analysis (Table 4). Whites were more likely than African-Americans to have had a check-up. Respondents in the 40–54-year-old age category were most likely to have had a check-up, and respondents in the 55-year-old and older age category were least likely to have ever had a check-up. The likelihood of having had a check-up increased with increasing education and income. Respondents with Medicaid insurance were least likely to have had a check-up. In the multivariate analysis, race, age, sex, and insurance had statistically significant relationships with ever having had a check-up.

Discussion

Using a nonexperimental cross-sectional design, this study does not provide evidence about the directions of

TABLE 4
Associations Between Ever Having a Check-up and Predictor Variables (Weighted Data n=616)

	Bivariate Statistics			Multivariate Statistics	
	% Ever Had Check-up	Odds Ratio	P-value	Odds Ratio (95% CI)	P-value
Race			<.001		<.001
White non-Hispanic	98.5	1		1	
Black non-Hispanic	87.3	0.10		0.15 (0.06, 0.38)	
Age (years)			<.001		.012
18–29	97.3	1.41		2.50 (0.64, 9.87)	
30–39	96.2	1		1	
40–54	99.0	4.03		2.28 (0.82, 6.35)	
55+	90.6	0.39		0.24 (0.12, 0.48)	
Sex			.760		.018
Male	95.7	1		1	
Female	96.1	1.09		2.54 (1.26, 5.11)	
Education (years)			.029		.846
<12	87.7	0.39		1.28 (0.52, 3.17)	
12	94.8	1		1	
13–15	98.0	2.70		1.73 (0.56, 5.34)	
16+	98.5	3.65		1.14 (0.21, 6.30)	
Income			<.001		.204
<$20,000	87.7	0.24		0.50 (0.23, 1.07)	
$20,000–$39,999	96.7	1		1	
$40,000–$69,999	97.7	1.41		0.96 (0.31, 3.00)	
$70,000+	99.9	28.46		13.06 (1.26, 135.56)	
Insurance			<.001		.009
None	96.2	1		1	
Only Medicaid	70.1	0.09		0.10 (0.02, 0.43)	
Other insurance	97.7	1.68		1.13 (0.47, 2.73)	
Dentate status			.079		.983
Dentate	96.2	1		1	
Edentulous	91.6	0.43		1.01 (0.34, 3.06)	

causal relationships. All variables except sex were assessed by self-report and may be subject to measurement error due to communication difficulties, memory errors, and self-presentation tactics. The careful construction of the questionnaire using focus groups and extensive pilot testing reduces this potential problem. A previous study using very similar questions found that self-report of daily flossing and annual check-ups predicted plaque, calculus, gingivitis, and periodontal destruction (11,12)—findings that also contribute to confidence in the measures used in this study.

Bivariate Comparisons of Oral Health Behaviors of African-Americans and Whites. The first goal of the study was to compare the preventive oral health behaviors of African-Americans and whites. In light of past studies (7,9,15,16), we hypothesized that African-Americans and whites would be very similar in frequency of brushing and flossing, but that African-Americans would have dental check-ups less frequently than whites. These hypotheses were supported. Although no hypotheses were proposed about thoroughness (because no previous studies compared African-Americans and whites on thoroughness), the bivariate analyses found clear race differences on these variables, with African-Americans less likely than whites to brush and floss thoroughly.

Identifying Predictors of Oral Health Behaviors/Understanding the Differences. The second goal was to identify predictors of oral health behaviors other than race, and to determine whether race differences in oral health behaviors would be reduced or eliminated when these predictors were statistically controlled. If so, the race differences found in the bivariate analyses might be interpreted as being due to these other variables, rather than being due to race per se. Based on past studies (7,9,15,16), we hypothesized that dental insurance and socioeconomic status, indicated by education and income, would be strongly associated with dental check-ups and that the relationship between race and check-ups would be greatly reduced when SES and insurance were statistically controlled. When check-up frequency was coded as at least once a year versus less than once a year, these hypotheses were supported. Race dif-

ferences became nonsignificant, while income remained significant when insurance and SES were controlled.

When check-up frequency was coded as ever versus never having a check-up, the hypothesis that race differences would be reduced when insurance and SES were controlled was not supported. The race difference in ever having a check-up remained strong and statistically significant. In hindsight, it is not surprising that race differences in lifetime nonuse of dental services are not "explained" by current income and insurance.

We had not proposed hypotheses about brushing and flossing thoroughness, but found race differences in bivariate analyses of these measures. Race was a significant predictor of brushing thoroughness when education and income were not controlled, but not when they were controlled in multivariate analyses. In contrast, race differences in flossing thoroughness were not notably reduced when other factors were statistically controlled.

In sum, bivariate analyses found that African-Americans were less likely than whites to brush thoroughly, floss thoroughly, ever have dental check-ups, and have annual dental check-ups. Notable parts of the race difference in annual check-ups may be due to race differences in SES and insurance, rather than to race per se. Differences in SES and insurance explained notable parts of the race differences in getting annual check-ups. In contrast, none of the tested variables were useful in interpreting the race differences in thoroughness of flossing or in ever having a dental check-up. Understanding these differences will probably require examining cultural variables such as health beliefs and norms (18-20) and may require qualitative research (21,22) to explore the influences of culture and community.

Selecting Target Groups. The third goal of the study was to identify demographic and socioeconomic subgroups least likely to practice dental preventive behaviors, as potential target groups for interventions. Reviewing Tables 2 through 4 and untabled results for brushing and flossing frequency and flossing thoroughness reveals that males, low-income persons, and African-Americans were less likely than others to perform preven-

tive dental behaviors. However, the subgroups least likely to carry out the actions differ from behavior to behavior. Regular and thorough brushing were least common among males and low-income persons. Regular flossing was least common among males. Thorough flossing was least common among African-Americans. Getting dental check-ups was least common among African-Americans, persons 55 years of age and older, persons with low income, and persons without private dental insurance. These findings suggest that males would be important targets for self-care behaviors, African-Americans would be important targets for interventions to increase the thoroughness of flossing, and African-Americans and persons with low income who have either Medicaid or no insurance would be important targets for interventions to increase use of professional dental services. The finding that 13 percent of African-Americans reported never having had a dental check-up implies that interventions to increase frequency of preventive dental visits must not be restricted to persons who already get check-ups. Interventions must reach out to those who only use dental services for acute problems and those who never receive dental services.

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