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Differences in Self-Reported Oral Health Among Community-Dwelling Black, Hispanic, and White Elders

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Abstract

Objectives—To compare differences in self-rated oral health among community-dwelling Black, Hispanic, and White adults aged 60 and older.

Method—A total of 4,859 participants in the National Health and Nutrition Examination Survey (1999–2004) provided self-report information on oral health.

Results—Blacks and Hispanics reported poorer self-rated oral health than Whites. In separate dentate and edentulous groups, socioeconomic status, social support, physical health, clinical oral health outcomes, and dental checkups accounted for much of the difference in self-rated oral health in Blacks, but significant differences remained for Hispanics.

Discussion—The study findings may have important implications for health policy and program development. Programs and services designed for minority populations should target treatments for dental diseases and include components that take into account subjective evaluations of oral health conditions and perceived dental needs of the individuals.

Keywords

Hispanic health; African Americans; social factors; geriatrics

Introduction

Racial/ethnic health disparities among the elderly have been identified as a significant public health policy issue (Bulatao & Anderson, 2004; Metros, 2006). A report from the Surgeon General noted ongoing racial/ethnic disparities in oral health across all ages (U.S. Department of Health and Human Services, 2000), and it stressed the need for research to explain these differences among ethnic groups. As the population of older Americans

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becomes more ethnically diverse, public health officials, policymakers, geriatricians, and dental care professionals may benefit from a better understanding of how social factors and medical conditions contribute to racial/ethnic disparities in oral health.

Self-reported health status is an important health indicator that is strongly associated with functional decline and mortality for older adults (Lee, 2000; Shadbolt, Barresi, & Craft, 2002; Winter, Lawton, Langston, Ruckdeschel, & Sando, 2007). Self-rated oral health can be used as a general indicator of treatment needs or to estimate the effect of oral conditions on daily life. Self-reported information has the advantage of being easier to gather in population-based samples compared to collecting data by clinical examinations. Self-report data can also be used to assess and monitor improvements in the oral health status of society (Jones et al., 2001). Subjective assessment of health status is strongly related to health-seeking behaviors. Studies have shown that individuals who perceive better oral health have a higher frequency of seeking preventive dental care (Gilbert, Shelton, Travers & Bradford, 2003; Woolfolk, Lang, Borgnakke, Taylor & Nyquist, 1999).

Although recent findings have shown that among middle-aged and older adults, White Americans rate their general health more positively than Black Americans who in turn rate their health more positively than Hispanics (Liang et al., 2010), there is little comparable research on self-rated oral health across racial/ethnic groups. One study found that White adults rated their oral health more positively than non-Whites (Matthias, Atchison, Lubben, Jong & Schweitzer, 1995). Using two separate datasets, another study found African Americans rated their oral health more negatively than Whites, but no differences were found between self-rated oral health for Hispanics and Whites (Atchison & Gift, 1997). The datasets in this study did not allow comparison of Blacks, Hispanics, and Whites in the same models. While ethnic minorities may report worse oral health status than Whites, studies have typically been limited to either small or regionally based samples and have used a limited number of key covariates in the models. We are not aware of any studies that have examined racial/ethnic differences in self-rated oral health status in older adults with a nationally representative sample.

Gaining a better understanding of self-rated oral health across racial/ethnic groups is an essential part of addressing oral health disparities in the United States. Studies have shown that a single-item self-rated oral health measure is significantly correlated with multiple-item oral health measures such as the 12-item Geriatric Oral Health Assessment Index (Atchison & Dolan, 1990) and the 49-item Oral Health Impact Profile (OHIP; Locker, Wexler, & Jokovic, 2005). For example, all six OHIP subscale scores showed significant positive associations (Spearman r s ranged from 0.25 to 0.42), with self-rated oral health indicating that those endorsing more symptoms, dysfunction, and disability on the OHIP reported poorer perceived oral health (Locker et al., 2005). Hence some investigators have suggested that the single-item global rating of oral health may be as useful as the longer self-reported oral health scales and indexes in assessing the oral health status of clinical and nonclinical samples (Locker, Maggias, & Wexler, 2009; Rowan, 1994). Evidence shows that self-rated oral health is also related to self-rated esthetics, perceived mouth dryness, worry about teeth (Atchison et al., 1993; Matthias et al., 1995), oral pain and discomfort, and oral functional decline (Gilbert, Duncan, Heft, Dolan, & Vogel, 1998; Locker, 2002). Self-rated oral health is also correlated with clinical measures of oral health including dentition status, coronal caries, and mobile teeth (Atchison et al., 1993; Jones et al., 2001; Matthias et al., 1995). For instance, the correlation was 0.30 between self-rated oral health and number of missing teeth, 0.25 for decayed teeth, and -0.19 for filled teeth among community-dwelling Canadians above age 52 (Locker et al., 2005).

The present study examines differences in self-rated oral health across White, Black, and Hispanic adults aged 60 and older from the National Health and Nutrition Examination Survey (NHANES 1999–2004). This study entails three key innovative refinements on earlier work. First, we compared self-reported oral health status for White, Black, and Hispanic older adults using recent data from a nationally representative sample. Second, we examined perceived oral health in both edentulous and dentate individuals. There have been no studies specifically examining the perceived oral health status of edentulous individuals, but there are many reasons to predict that the perception of oral health may differ between dentate and edentulous older adults. Third, we investigated a comprehensive array of factors that may individually or in combination with each other explain the relationship between race/ethnicity and self-rated oral health: socioeconomic status (SES), social support, health behaviors, chronic medical conditions, functional limitations, clinical measures of oral health, and dental care use.

Conceptual Framework

The dimensions of social stratification thought to be influential in oral health are similar to those for general health status: age, gender, race/ethnicity, and socioeconomic status (SES). Previous studies have suggested that self-reported oral health status may be confounded by individuals' socioeconomic status (SES) and their access to dental insurance, which have been shown to differ by ethnicity (Aday & Forthofer, 1992; Atchison et al., 1993; Huntington, Krall, Garcia & Spiro, 1999).

Oral health and dental care utilization are strongly associated (Gilbert et al., 2003). Studies regarding dental care use found that Blacks and Hispanics had a lower rate of utilization than Whites (Davidson & Andersen, 1997; Gilbert, Duncan, Heft, & Coward, 1997; Kiyak & Reichmuth, 2005; Randolph, Ostir, & Markides, 2001; Watson & Brown, 1995). Blacks and Hispanics were also more likely to visit dentists only in response to symptoms and emergent needs rather than for preventive reasons (Aday & Forthofer, 1992). Self-rated oral health has also been correlated with measures of physical health. Individuals with a higher number of chronic conditions are more likely to report poorer oral health (Atchison & Gift, 1997; Jones et al., 2001).

Another factor that contributes to oral health disparities is social support. Social support is associated with better preventive health behaviors, more compliance with preventive medical treatment, greater opportunity to improve dental health literacy and knowledge of dental care services, better communication with health care providers, and better access to health care (e.g., availability of transportation services; Andersen & Davidson, 1997; Lee, Arozullah, & Cho, 2004; Wu, Tran, & Khatutsky, 2005). The few studies that have examined the association between social support and oral health in older adults have shown that persons with low levels of social support (e.g., living alone, dissatisfaction with frequency of social contact, and smaller social networks) were more likely to have poor self-reported oral health (Huntington et al., 1999), and more oral problems based on clinical assessment (Avlund, Holm-Pedersen, Morse, Viitanen, & Winblad, 2003; Hanson, Liedberg & Öwell, 1994; McGrath & Bedi, 2002). Taken together, this suggests that race/ethnicity may be associated with self-rated oral health both directly and indirectly via SES, physical health, social support, clinical oral health outcomes, and dental care use.

In this study, we proposed three hypotheses.

Research Hypothesis 1: Minority elders would report poorer oral health than Whites.

Research Hypothesis 2: Hispanics would rate their oral health persistently worse than Blacks and Whites.

While there were no previous studies to draw upon in the dental literature regarding Hispanics compared to Blacks or both minority groups compared to Whites simultaneously, the hypothesis was built upon the findings of a study that examined self-rated general health status among the three ethnic groups (Liang et al., 2010).

Research Hypothesis 3: Racial/ethnic differences in self-reported oral health would be confounded by a combination of SES, behavioral factors, physical health status, dental care utilization, and oral health clinical outcomes.

Method

Data Source and Sample

This study used the NHANES (1999–2004), a population-based survey designed to collect information on the health and nutrition of the U.S. population. The NHANES used a stratified, multistage, clustered sampling design to obtain a representative sample of the noninstitutionalized civilian U.S. population. Data were collected during in-home interviews and dental and health examinations conducted in mobile examination centers. The in-home interviews were conducted by trained interviewers in either English or Spanish (National Center for Health Statistics, 2003). For the current study, we combined three waves of publicly available data collected over 6 years (1999–2000, 2001–2002, and 2003–2004) for a total of 4,984 individuals aged 60 and older who answered the question on self-rated oral health status. The sample consisted of 2,846 Whites, 811 African Americans, and 1,202 Hispanics. Due to small numbers for other ethnic groups, 125 Asians and American Indians were excluded from the study. Among the sample of 4,859 individuals, 3,414 were dentate elders, 1,094 were edentulous, and 351 did not complete clinical exams but completed the self-rated oral health question.

Measures

For self-rated oral health status, participants were asked to respond to the question, “How would you describe the condition of your mouth and teeth?” There were four possible responses to this question for the interviews administered from 1999 to 2002: *poor* (coded as 1), *fair* (2), *good* (3) and *very good* (4). In the 2003–2004 interview, *excellent* was added as a response option. For this study, we combined *very good* and *excellent* into one response category.

Race/ethnicity was categorized using dichotomous variables for Blacks and Hispanics with Whites serving as the reference group. For demographics and SES, we included age (measured in years), gender (*female* = 1), and an ordinal variable representing level of education (1 = *less than high school*, 2 = *high school*, and 3 = *some college or above*). Poverty Income Ratio, calculated as the ratio of family income versus the poverty threshold as determined annually by the U.S. Census Bureau, was included as a continuous variable with a higher ratio reflecting a higher level of income. Dental insurance coverage was included as a dichotomous variable.

Three dimensions of social support were measured: marital status (1 = *married/living with partner*, 0 = *otherwise*), number of close friends or relatives, and self-perception of whether someone else would provide financial support, if needed. Three health behaviors were included: smoking (1 = *current smoker*), alcohol use, and level of physical activity. Alcohol use was categorized as nondrinkers (the reference group), light or moderate drinkers (*between 12 drinks in the past 12 months and less than 2 drinks per day*) and heavy drinkers (*2 drinks per day in the previous 12 months*). Level of physical activity was measured dichotomously as either *little to no activity* (0) or *moderate to high level of activity* (1).

Health status was defined as functional impairment and/or the presence of one or more health conditions. Functional impairment was calculated as a summed score of self-reported limitations of Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs; range 0–8). Regarding health conditions, respondents were asked if a doctor had ever diagnosed them with diabetes, high blood pressure, heart disease, stroke, or lung disease. Each condition was treated as a dichotomous variable.

Dental care utilization was measured categorically as the time since the last regular dental checkup. In the 1999–2002 interviews, the following questions were asked: “During the past 3 years, have you been to the dentist for routine checkup or cleaning?” and “During the past 3 years, how often have you gone to the dentist for routine check-ups or cleanings?” In the 2003–2004 interviews, only one question was asked: “How long has it been since you had your teeth cleaned by a dentist or dental hygienist?” We combined responses to these questions to create an ordinal variable where “1” signified that the last dental visit was more than 3 years ago (including those who had never had a regular dental visit or cleaning), “2” indicated that the last dental visit had occurred within the past 3 years, and “3” indicated a dental visit within the past year.

The NHANES study included an oral health examination. The maximum number of teeth examined was 28; third molars were excluded because of their frequent extraction. Clinical oral health status was measured as: dentition status (1 = *individuals without any natural teeth*, 0 = *at least one natural tooth*). For dentate respondents, oral health status was further measured by the numbers of decayed teeth, missing teeth, and filled teeth. In each case, a higher number indicates poorer oral health status.

Analysis

We used SAS 9.1 for all analyses. ANOVA and the General Linear Model (GLM) procedures were used to test the differences in sample characteristics across the three ethnic groups and between groups. The Spearman correlation procedure was performed to examine the correlations between self-rated oral health status and clinically assessed oral health outcomes. To minimize the loss of respondents due to missing values, we undertook multiple imputations for missing values contained in covariates. We derived parameter estimates and their standard errors by averaging across five imputations and by adjusting for their variance. PROC SURVEY was used to take into account the weights provided in the data set yielding unbiased standard error estimates. PROC SURVEYLOGISTIC was used to perform ordered logit regression models on the dependent variable: self-rated oral health. For the edentulous subsample, clinical oral examinations were not done so these individuals were not included in the logistic regression analyses.

To determine the separate contributions of race/ethnicity and each of the groups of covariates, we used a hierarchical block design in multivariate analyses. The first step included race/ethnicity and demographic characteristics. The second step added socioeconomic status, social support factors, health behaviors, functional limitations, and health conditions. The third step added regular dental checkups. The final step added the dentition status variable for the overall sample and counts of decayed teeth, missing teeth, and filled teeth for the subsample of dentate elders.

Results

Sample characteristics are presented in Table 1. Minority elders had poorer oral health than Whites from both self-ratings and clinical examinations. Over 35% of Hispanics and 36.8% of Blacks reported their oral health as *poor* compared to 21.4% of Whites. Clinical findings also indicated that compared to Whites, Blacks and Hispanics had a higher number of

missing teeth ($M = 16.25$, $p < .001$ and $M = 14.72$, $p = .016$ respectively) and decayed teeth ($M = 1.05$, $p < .001$ and $M = 0.64$, $p < .001$ respectively; p value not shown in Table 1). Minorities in the sample were younger, had lower levels of education and income, but higher levels of dental insurance coverage. ANOVA results showed that minorities also differed significantly from Whites in measures of social support, health conditions, functional impairment levels, health behaviors, and average intervals between regular dental visits.

Table 2 shows that the measure of self-rated oral health was significantly correlated with outcomes from clinical examinations across ethnic groups. The Spearman correlations showed that as the number of missing and decayed teeth increased, oral health was rated more poorly. In contrast, as the number of filled teeth increased, the self-rating of oral health improved. Overall, the correlations between self-rated oral health and clinical outcomes (i.e., number of missing teeth and filled teeth) were the strongest among Whites and the weakest for Blacks ($p < .001$). No significant differences were detected with regard to correlations between self-rated oral health and number of decayed teeth across three groups.

Controlling for age and gender, Model 1 in Table 3 shows that Blacks more frequently reported poorer oral health than Whites (OR = 0.47, CI: 0.37, 0.61). The results for Hispanics were similar (OR = 0.45, CI: 0.33, 0.62). The full model (Model 4) shows that ethnic differences were less pronounced but remained significant despite the inclusion of socioeconomic status, social support measures, health behaviors, health conditions, functional limitations, and regular dental checkups. Compared to Whites, Blacks were 31% less likely to report good or very good oral health status (OR = 0.69, CI: 0.55, 0.88), whereas Hispanics had an even lower odds (OR = 0.66, CI: 0.49, 0.88). In addition, older age, higher education and income, light to moderate alcohol use, nonsmoking, higher level of functional status, and regular dental checks were positively related to better self-reported oral health.

Table 4 presents the logistic regression analysis results for the dentate subsample of older adults. Minority elders with at least one remaining tooth reported significantly poorer oral health than Whites. The odds ratios were 0.41 for both Blacks and Hispanics compared to Whites in Model 1 ($p < .001$). In the fully-specified model, the difference between Blacks and Whites were no longer significant (Model 4). In contrast, Hispanic respondents' self-rated oral health remained significantly worse compared to Whites after controlling for all other covariates (OR = 0.66, CI: 0.46, 0.94). Poorer self-rated oral health was associated with younger age, lower income, high blood pressure, more ADL and IADL impairments, less frequent regular dental visits, and higher numbers of decayed and missing teeth. On the other hand, light-to-moderate alcohol consumption improved ratings of oral health compared to nonconsumption.

Table 5 shows the results for edentulous respondents. Similar to the results from the dentate sample, Blacks (OR = 0.65, CI: 0.47, 0.90, $p < .01$) and Hispanics (OR = 0.50, CI: 0.33, 0.76, $p < .001$) with edentulism reported significantly poorer oral health than edentulous Whites after adjusting for age and gender (Model 1). When all covariates were added to the model (Model 3), Hispanics still showed significantly poorer self-reported oral health compared to Whites (OR = 0.56, CI: 0.33, 0.97), but the parallel association for Blacks was no longer significant. Better self-reported oral health was related to having a higher number of friends, a lower ADL and IADL impairment score, and more frequent regular dental checkups.

Discussion

This study is one of the first to examine a global rating of oral health across Black, Hispanic, and White elderly populations using a nationally representative sample. We found differences in self-reported oral health across elderly ethnic groups. The self-rated oral health differences between Blacks and Whites were partially explained by the differences in clinical oral health outcomes and other covariates. However, for Hispanics, significant differences remained even after covariates were accounted for in the analyses. This is an interesting finding and worth further discussion. Our finding was consistent with the results on self-reported general health from Liang and colleagues (2010). However, the results differ from another study that suggested that Hispanics are similar to Whites in their global self-rating of oral health which included information on oral health beliefs and attitudes in the models (Atchison & Gift, 1997). This information was not available in the present dataset but may be important to understanding the differences between the studies' results. Perception of health is socially constructed (Kaplan & Baron-Epel, 2003). Health beliefs and perceptions are rooted in social and cultural contexts and are influenced by prevailing social and medical ideologies. Responses to the self-rated oral health question may be the product of multiple present and past experiences. Factors such as differences in cultural perception and interpretation of overall health, and perceived needs of dental care, could contribute to the differences in self-rated oral health.

Our study also suggests that racial/ethnic differences in perceived oral health are confounded by population heterogeneity. These differences diminished when SES, social support, health behaviors, health status, and regular dental care use were taken into account. The discrepancy between Black and White dentate individuals lessened further when the clinical measures of oral health were taken into account. Hispanics still reported a significantly poorer level of oral health than Whites, but the difference was substantially smaller; whereas for Blacks, the difference became insignificant—particularly for edentulous elders. Hence the ethnic differences in oral health may be partially attributed to the fact that Black and Hispanic older adults are more disadvantaged than their White counterparts in SES, health status, health behaviors, and regular dental care. Using the same dataset (NHANES, 1999–2004), we have shown that Black and Hispanic elders have significantly poorer oral health based on clinical examinations (Wu, Liang, Plassman, Remle, & Bai, 2010). As suggested by our findings, worse self-rated oral health in minority groups is a reflection of worse clinically assessed oral health outcomes.

To better understand additional factors that might explain the differences in self-reported oral health, we examined the rates of reported dental care needs for the different racial/ethnic groups using data only available from the NHANES 2003–2004 survey. Respondents were asked a set of questions related to their dental needs in the survey, such as “Do you need any teeth filled or replaced (fillings, crowns, or bridges)?”, and “Do you need any teeth pulled?” Black and Hispanic elders reported much higher needs for dental care than their White counterparts. For example, 16% of Whites reported the need to have at least one tooth filled or replaced; the corresponding values were 33% for Blacks and 35% for Hispanics. Similarly, 7% of Whites reported needing to have teeth extracted compared to 19% of Blacks and 20% of Hispanics. More minorities also reported the need for full or partial dentures and for dental cleanings. In part, ethnic differences in perceived oral health may reflect oral health problems identified by clinical examinations and higher perceived need for dental care.

Among both dentate and edentulous older adults, ADL and IADL limitations were significantly related to self-rated oral health. Impairment in ADL and IADL performance could affect the quality and regularity of oral hygiene practice and pattern of regular dental

care use, which could result in a subsequent deterioration in oral health. For edentulism, these limitations could affect the quality or pattern of oral hygiene practices such as cleaning dentures. Therefore, functional limitation may be an important risk indicator for poorer oral health.

A global self-rating of health status is one of the most commonly used questions in health related surveys. Although some of the correlations between self-perceived oral health and clinical measures of oral health (i.e., number of missing, decayed, and filled teeth) were modest, our results showed that the associations were consistently significant across racial/ethnic groups. These results are consistent with previous findings showing that a single-item rating score is a valid measure of oral health (Jones et al., 2001; Locker et al., 2005; Matthias et al., 1995). We conducted additional analyses assessing whether the relationship between self-reported oral health status and clinical measures of oral health differed between native-born and foreign-born Hispanic individuals. These analyses showed that clinical measures contributed to self-rated oral health in a similar, significant pattern for both groups (results not shown).

Self-rated oral health could provide benefits to health care providers in monitoring outcomes and evaluating treatments. This measure could also be useful for estimating the resources needed to care for a specific population. A global-rating of oral health provides limited details of oral health outcomes, but in population-based studies, it is often not possible to ask several questions on each topic and clinical examinations are costly and often not feasible. Given these circumstances, a global self-rating of oral health provides valuable information about potential oral health problems and perceived care needs, and identifies potential risk factors for health-related outcomes.

Due to the cross-sectional nature of the data, the time sequence between some covariates and oral health was not well defined. There may be unmeasured factors such as cultural attitudes toward oral health and dental care, perceived discrimination, and institutional barriers that could contribute to the ethnic differences in self-rated oral health. Conceivably, our models could be further elaborated by incorporating neighborhood effects so that racial/ethnic differences in self-rated oral health could be ascertained across various neighborhood environments (Borrell, Burt, Neighbors, & Taylor, 2004). We are aware that Hispanics are a heterogeneous group with different cultural customs, values, immigration patterns and socioeconomic status. For this reason, the findings from this study may not generalize to other subgroups of Hispanics as a large majority of our Hispanic sample was Mexican American. Future research also needs to examine oral health differences among other ethnic groups, such as Asians and Native Americans. Longitudinal studies are needed to examine cohort differences across ethnic groups over time.

Much of the oral health differences across racial/ethnic groups reflect SES and dental care utilization disparities. Other variables such as social support, health behavior, and health status also are contributing factors that have a complex impact on the relationship between race/ethnicity and oral health. Each of the contributing factors may need to be addressed to reduce oral health disparities. Although it is important to provide dental coverage for elders, services and programs specific to minorities are needed to improve oral health for all individuals. Others have proposed that the finding that minority groups perceive their oral health as worse than that of Whites may have important implications for health policy (Atchison & Gift, 1997). Programs and services should not only target treatments for dental disease but should also include components that determine the subjective evaluation of the health conditions and perceived needs of the individuals.

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Table 1

Sample Characteristics: White, Hispanic and Black Older Adults Aged 60 and Above (weighted)^a

	Total sample		White		Black		Hispanic		F value
	Percentage/ M (SE)	Percentage/ M (SE)	Percentage/ M (SE)	Percentage/ M (SE)	Percentage/ M (SE)	Percentage/ M (SE)	Percentage/ M (SE)		
Sociodemographics									
Age (range 60–85)	71.20 (0.20)	71.44 (0.23)	69.96 (0.31)	69.86 (0.27)	69.86 (0.27)	69.86 (0.27)	69.86 (0.27)	69.86 (0.27)	210.36***
Female	56.44	55.80	60.10	59.38	59.38	59.38	59.38	59.38	0.66
Education				431.76***					
Less than high school	30.64	24.84	56.21	66.05	66.05	66.05	66.05	66.05	—
High school	29.03	31.54	17.08	14.76	14.76	14.76	14.76	14.76	—
More than high school	40.33	43.63	26.71	19.20	19.20	19.20	19.20	19.20	—
Dental coverage	33.93	31.53	52.57	38.40	38.40	38.40	38.40	38.40	100.02***
Poverty income ratio (range 0–5)	2.73 (0.06)	2.88 (0.08)	2.16 (0.06)	1.66 (0.09)	1.66 (0.09)	1.66 (0.09)	1.66 (0.09)	1.66 (0.09)	190.98***
Social support									
Anyone to help with financial support	77.76	78.29	77.10	72.57	72.57	72.57	72.57	72.57	4.52*
Number of close friends (range 0–50)	1.89 (0.02)	1.95 (0.02)	1.54 (0.02)	1.65 (0.04)	1.65 (0.04)	1.65 (0.04)	1.65 (0.04)	1.65 (0.04)	108.85***
Married or living with partner	59.30	61.87	38.31	54.70	54.70	54.70	54.70	54.70	52.73***
Health status									
Diabetes	13.21	11.88	23.47	16.36	16.36	16.36	16.36	16.36	54.15***
High blood pressure	53.41	51.81	70.61	51.51	51.51	51.51	51.51	51.51	46.30***
Heart disease	22.58	22.41	18.56	15.78	15.78	15.78	15.78	15.78	21.41***
Stroke	7.40	7.30	10.30	5.16	5.16	5.16	5.16	5.16	3.10*
Lung disease	18.19	18.55	16.32	16.28	16.28	16.28	16.28	16.28	10.56***
ADL and IADL score (range 0–8)	1.16 (0.04)	1.08 (0.05)	1.56 (0.08)	1.63 (0.06)	1.63 (0.06)	1.63 (0.06)	1.63 (0.06)	1.63 (0.06)	6.97***
Health behaviors									
Light to moderate alcohol use	31.55	33.46	20.40	22.98	22.98	22.98	22.98	22.98	21.85***
Heavy alcohol use	3.11	3.32	2.07	2.01	2.01	2.01	2.01	2.01	0.83
Current smoker	11.89	11.09	16.52	15.55	15.55	15.55	15.55	15.55	17.66***

	Total sample		White		Black		Hispanic		F value
	Percentage/ M (SE)		Percentage/ M (SE)		Percentage/ M (SE)		Percentage/ M (SE)		
At least moderate physical activity	48.86		51.68		32.64		35.95		53.16***
Dental care utilization									
Time since last regular dental visit							24.92***		
More than 3 years	18.77		17.84		28.60		21.10		—
1 year–3 years	14.47		13.22		22.89		23.05		—
Within 1 year	66.76		68.95		48.50		54.85		—
Oral health status ^a									
Self-rated oral health							113.98***		
Poor	23.83		21.44		36.84		35.53		—
Fair	24.70		24.07		26.23		29.98		—
Good	27.13		27.94		22.61		23.26		—
Very good/excellent	24.34		26.55		14.32		11.22		—
Oral health measures from clinical examination									
Edentulous	24.89		24.47		28.56		25.48		13.52***
Decayed teeth (range 0–28) ^b	0.43 (0.03)		0.36 (0.04)		1.05 (0.11)		0.64 (0.07)		61.25***
Missing teeth (range 0–28)	13.15 (0.36)		12.71 (0.43)		16.25 (0.36)		14.72 (0.55)		31.95***
Filled teeth (range 0–28) ^b	8.86 (0.20)		9.66 (0.23)		3.80 (0.23)		5.08 (0.20)		360.09***

Note: All count variables are presented in mean (SE) with a range of value from minimum to maximum, and all other variables are presented in percentage.

^aSample sizes were unweighted. However, estimates for means, proportions, and standard errors were weighted. The total sample size is 4,859. Among them, Whites: 2,846, Blacks: 811, and Hispanics: 1,202.

^bFor dentate respondents only. The sample size is 3,414.

* $p < .05$.

*** $p < .001$.

Table 2Correlation Between Self-Reported Oral Health and Outcomes From Clinical Examinations^{a,b}

Clinical outcomes	Self-reported oral health		
	White	Hispanic	Black
Missing teeth	−0.36 ***	−0.28 ***	−0.12 **
Decayed teeth	−0.27 ***	−0.28 ***	−0.22 ***
Filled teeth	0.26 ***	0.11 ***	0.09 *

^aDentate individuals only.^bThe values presented in the table are Spearman correlation coefficients.*
 $p < .05$ **
 $p < .01$ ***
 $p < .001$.

Table 3

Logistic Regression Analysis Results for Self-Rated Oral Health for Dentate and Edentulous Individuals Combined ($N = 4,859$; weighted)^a

	Model 1	Model 2	Model 3	Model 4 ^a
	Odds ratio (95% CI)	Odds ratio (95% CI)	Odds ratio (95% CI)	Odds ratio (95% CI)
Demographics				
Black	0.47 (0.37 0.61) ***	0.62 (0.48 0.80) ***	0.65 (0.51 0.82) ***	0.69 (0.55 0.88) **
Hispanic	0.45 (0.33 0.62) ***	0.61 (0.44 0.85) **	0.59 (0.44 0.78) ***	0.66 (0.49 0.88) **
Age	1.00 (0.99 1.01)	1.02 (1.01 1.03) ***	1.02 (1.01 1.03) ***	1.01 (1.00 1.03) **
Female	1.06 (0.94 1.16)	1.20 (1.05 1.37) **	1.11 (0.97 1.27)	1.10 (0.96 1.26)
Socioeconomic status				
Education	—	1.07 (0.97 1.19)	0.99 (0.91 1.09)	1.12 (1.01 1.24) *
Poverty Income Ratio	—	1.10 (1.03 1.18) **	1.06 (0.99 1.13)	1.10 (1.04 1.17) **
Dental coverage	—	1.09 (0.92 1.29)	1.03 (0.87 1.21)	1.00 (0.84 1.19)
Social support				
Anyone to help with financial support	—	1.09 (0.91 1.30)	1.06 (0.88 1.27)	1.06 (0.88 1.29)
Number of close friends	—	1.09 (1.00 1.20) *	1.06 (0.97 1.16)	1.07 (0.97 1.17)
Married or living with partner	—	1.06 (0.91 1.24)	1.02 (0.88 1.09)	1.00 (0.84 1.18)
Health behaviors				
Light to moderate alcohol use	—	1.31 (1.11 1.54) **	1.22 (1.04 1.43) *	1.18 (1.06 1.44) **
Heavy alcohol use	—	1.02 (0.68 1.53)	1.00 (0.66 1.52)	0.99 (0.64 1.54)
Current smoker	—	0.78 (0.64 0.96) *	0.94 (0.75 1.17)	0.80 (0.64 1.00) *
At least moderate physical activity	—	1.05 (0.90 1.22)	1.00 (0.86 1.16)	1.03 (0.88 1.21)
Health status				
Diabetes	—	1.08 (0.91 1.28)	1.15 (0.97 1.37)	1.14 (0.94 1.38)
High blood pressure	—	0.86 (0.74 1.00)	0.87 (0.75 1.02)	0.87 (0.74 1.02)
Heart disease	—	0.87 (0.74 1.01)	0.92 (0.79 1.07)	0.88 (0.74 1.05)
Stroke	—	1.20 (0.92 1.58)	1.24 (0.94 1.64)	1.13 (0.85 1.50)
Lung Diseases	—	0.90 (0.72 1.14)	0.93 (0.74 1.17)	0.95 (0.74 1.21)
ADL and IADL Score	—	0.87 (0.84 0.90) ***	0.88 (0.85 0.91) ***	0.87 (0.83 0.91) ***
Dental care utilization				
Regular dental checkup	—	—	1.79 (1.59 2.01) ***	2.10 (1.81 2.44) ***
Oral health status				
Edentulous	—	—	—	0.31 (0.26 0.38) ***
ROC	0.58	0.64	0.66	0.70

^aModel 4: added the variable edentulous rate. The model excluded 351 respondents who did not complete the clinical exams.

* $p < .05$.

** $p < .01$.

 $p < .001$.

Table 4

Logistic Regression Analysis Results for Self-Rated Oral Health for Dentate Individuals ($N = 3,414$; weighted)

	Model 1	Model 2	Model 2	Model 4
	Odds ratio (95% CI)	Odds ratio (95% CI)	Odds ratio (95% CI)	Odds ratio (95% CI)
Demographics				
Black	0.41 (0.31 0.54)***	0.63 (0.47 0.84)**	0.69 (0.52 0.93)*	0.80 (0.57 1.11)
Hispanic	0.41 (0.28 0.60)***	0.66 (0.46 1.00)*	0.70 (0.50 0.97)*	0.66 (0.46 0.94)*
Age	1.00 (0.99 1.01)	1.02 (1.00 1.03)*	1.01 (1.00 1.03)	1.02 (1.00 1.03)*
Female	1.06 (0.93 1.22)	1.28 (1.08 1.51)**	1.13 (0.96 1.34)	1.05 (0.90 1.24)
Socioeconomic status				
Education	—	1.23 (1.08 1.39)**	1.15 (1.01 1.31)*	1.05 (0.93 1.19)
Poverty income ratio	—	1.18 (1.09 1.28)***	1.13 (1.05 1.22)***	1.10 (1.02 1.17)**
Dental coverage	—	1.11 (0.93 1.33)	1.01 (0.84 1.22)	1.02 (0.84 1.23)
Social support				
Anyone to help with financial support	—	1.02 (0.84 1.02)	1.00 (0.83 1.22)	1.00 (0.83 1.21)
Number of close friends	—	1.08 (0.96 1.21)	1.02 (0.91 1.15)	1.04 (0.93 1.17)
Married or living with partner	—	1.02 (0.85 1.24)	0.99 (0.82 1.20)	0.91 (0.75 1.10)
Health behaviors				
Light to moderate alcohol use	—	1.33 (1.14 1.56)***	1.25 (1.06 1.48)**	1.18 (1.00 1.39)*
Heavy alcohol use	—	0.99 (0.62 1.55)	0.96 (0.59 1.58)	1.00 (0.61 1.64)
Current smoker	—	0.56 (0.41 0.76)***	0.64 (0.47 0.87)**	0.76 (0.57 1.00)
At least moderate physical activity	—	1.08 (0.94 1.24)	1.01 (0.88 1.15)	0.94 (0.81 1.09)
Health status				
Diabetes	—	0.95 (0.76 1.20)	1.07 (0.85 1.34)	1.16 (0.93 1.43)
High blood pressure	—	0.82 (0.71 0.95)**	0.82 (0.71 0.94)**	0.80 (0.68 0.94)**
Heart disease	—	0.90 (0.74 1.10)	0.95 (0.77 1.17)	0.94 (0.76 1.18)
Stroke	—	1.13 (0.84 1.52)	1.16 (0.83 1.61)	1.12 (0.80 1.57)
Lung diseases	—	0.91 (0.72 1.14)	0.97 (0.75 1.25)	0.98 (0.75 1.27)
ADL and IADL Score	—	0.88 (0.84 0.91)***	0.88 (0.85 0.93)***	0.88 (0.84 0.93)***
Dental care utilization				
Regular dental checkup	—	—	2.20 (1.91 2.55)***	1.96 (1.68 2.29)***
Oral health status				
Decayed teeth	—	—	—	0.71 (0.65 0.77)***
Missing teeth	—	—	—	0.94 (0.93 0.95)***
Filled teeth	—	—	—	0.98 (0.96 1.00)
ROC	0.59	0.67	0.70	0.73

* $p < .05$.

** $p < .01$.

 $p < .001$.

Table 5

Logistic Regression Analysis Results for Self-Rated Oral Health for Edentulous Individuals ($N = 1,094$; weighted)

	Model 1	Model 2	Model 3
	Odds ratio (95% CI)	Odds ratio (95% CI)	Odds ratio (95% CI)
Demographics			
Black	0.65 (0.47 0.90)**	0.80 (0.54 1.20)	0.84 (0.57 1.22)
Hispanic	0.50 (0.33 0.76)***	0.64 (0.37 1.09)	0.56 (0.33 0.97)*
Age	1.01 (0.99 1.03)	1.02 (1.00 1.04)*	1.02 (1.00 1.04)
Female	0.96 (0.78 1.18)	0.98 (0.77 1.25)	0.96 (0.74 1.23)
Socioeconomic status			
Education	—	1.11 (0.92 1.35)	1.06 (0.90 1.26)
Poverty income ratio	—	0.96 (0.86 1.08)	0.94 (0.82 1.04)
Dental coverage	—	0.94 (0.62 1.45)	0.87 (0.58 1.32)
Social Support			
Anyone to help with financial support	—	1.48 (1.03 2.13)*	1.35 (0.89 2.05)
Number of close friends	—	1.21 (1.07 1.37)**	1.19 (1.04 1.36)*
Married or living with partner	—	1.11 (0.84 1.48)	1.15 (0.84 1.57)
Health behaviors			
Light to moderate alcohol use	—	1.28 (0.89 1.83)	1.18 (0.80 1.74)
Heavy alcohol use	—	0.88 (0.47 1.62)	0.82 (0.40 1.70)
Current smoker	—	0.90 (0.68 1.19)	1.08 (0.80 1.46)
At least moderate physical activity	—	1.01 (0.69 1.48)	1.01 (0.68 1.49)
Health status			
Diabetes	—	1.22 (0.87 1.72)	1.23 (0.83 1.81)
High blood pressure	—	0.92 (0.60 1.41)	1.01 (0.65 1.56)
Heart disease	—	0.74 (0.55 1.01)	0.78 (0.57 1.07)
Stroke	—	1.17 (0.75 1.82)	1.14 (0.71 1.82)
Lung Diseases	—	0.90 (0.55 1.47)	0.86 (0.53 1.37)
ADL and IADL score	—	0.82 (0.77 0.88)***	0.85 (0.79 0.90)***
Dental care utilization			
Regular dental checkup	—	—	1.93 (1.62 2.29)***
ROC	0.55	0.63	0.68

* $p < .05$.

** $p < .01$.

*** $p < .001$.