### Title

Unfair Treatment and Periodontitis Among Adults in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)




### Journal

Journal of Racial and Ethnic Health Disparities, 5(5)

### ISSN

2197-3792



### Authors

Finlayson, Tracy L
Lemus, Hector
Becerra, Karen
et al.



### Publication Date

2018-10-01

### DOI

10.1007/s40615-017-0459-5

Peer reviewed

HHS Public Access

Author manuscript

*J Racial Ethn Health Disparities*. Author manuscript; available in PMC 2019 October 01.

Published in final edited form as:

*J Racial Ethn Health Disparities*. 2018 October ; 5(5): 1093–1106. doi:10.1007/s40615-017-0459-5.

# Unfair treatment and periodontitis among adults in the Hispanic Community Health Study/ Study of Latinos (HCHS/SOL)

**Tracy L. Finlayson, PhD**,
Investigator on HCHS/SOL at the San Diego site and Associate Professor in Health Management and Policy at the San Diego State University Graduate School of Public Health in San Diego, CA, USA.

**Hector Lemus, PhD**,
Investigator on HCHS/SOL at the San Diego site. He is a Lecturer in Biostatistics at the San Diego State University Graduate School of Public Health in San Diego, CA, USA.

**Karen Becerra, DDS, MPH**,
Investigator on HCHS/SOL at the San Diego site and she conducted dental examinations at the San Diego field site in San Diego, CA, USA.

**Linda M. Kaste, DDS, MS, PhD**,
Investigator on HCHS/SOL at the Chicago field site. She is Professor, Pediatric Dentistry, at the University of Illinois at Chicago, College of Dentistry in Chicago, Illinois, USA.

**Shirley M. Beaver, PhD, RDH**,
conducted dental examinations at the Chicago field site. She is with the Department of Periodontics, College of Dentistry, University of Illinois Chicago in Chicago, IL, USA.

**Christian R. Salazar, PhD, MPH**,
Investigator on HCHS/SOL at the Bronx field site. He is Assistant Professor at the Department of Epidemiology and Health Promotion, New York University College of Dentistry, New York, NY, USA

**Richard H. Singer, DMD, MS**,
PhD student (Epidemiology), University of Miami, Miller School of Medicine, Department of Public Health Sciences, Oral Health Sub-Committee member for the HCHS/SOL Miami Field Center, in Miami, FL, USA, and Associate Professor at Nova Southeastern University, College of Dental Medicine, Ft. Lauderdale, FL, USA.

**Marston E. Youngblood, PhD**
HCHS/SOL Project Director at the Collaborative Studies Coordinating Center at the University of North Carolina-Chapel Hill, in Chapel Hill, NC, USA.

Address Correspondence: San Diego State University, Graduate School of Public Health, 5500 Campanile Drive, San Diego, CA 92182-4162, tfinlays@mail.sdsu.edu.

**Conflict of Interest:** None of the authors have any conflict of interest.

**Ethical approval:** All procedures performed in studies involving human participants were in accordance with the ethical standards of each institution's institutional review board and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent:** All participants provided informed consent.

## Abstract

This study investigates how perceived unfair treatment, towards self and observed towards others due to ethnicity, are associated with periodontitis among diverse Hispanic/Latino adults, accounting for socio-demographic, health behavior, and acculturation factors. Baseline (2008–2011) dental and survey data from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL), a multi-center epidemiologic study, were analyzed (N=12,750). Crude and adjusted prevalence ratios and confidence limits were estimated. Half (49%) reported never being treated unfairly, while 41% reported they were sometimes, and 10% reported it often/always. One-third (32%) never saw others treated unfairly, while 42% reported it sometimes, and 26% reported it often/always. In the final fully adjusted model, the prevalence of periodontitis was higher among adults who were: non-Dominican, older, male, had a past year dental visit, current and former smokers, and among those who observed unfair treatment towards others. Lower prevalence was associated with: higher income, higher educational attainment, less than full-time employment, reporting experiencing unfair treatment, higher acculturation scores, and having health insurance. Perceived unfair treatment towards self was negatively associated with periodontitis prevalence, while observed unfair treatment towards others was positively associated with the outcome among diverse Hispanics/Latinos. The associations between unfair treatment and periodontitis warrant further exploration.

### Keywords

Hispanic/Latino; periodontal diseases; discrimination; acculturation; oral health

## Introduction

Oral health is critically important for overall health. While oral health has improved for most adults in the United States (U.S.) in recent decades, racial/ethnic disparities exist.[1,2] Periodontal disease is an inflammatory chronic disease. Periodontitis is common among adults, potentially interfering with eating, speaking, and quality of life. Ultimately, periodontitis can lead to pain and tooth loss. More severe chronic periodontitis is found among lower socio-economic status (SES) individuals and members of racial/ethnic minority groups.[3] Hispanics/Latinos are an extremely diverse population, with about one-half born outside of the U.S.[4] In the U.S., Hispanics/Latinos comprise the largest ethnic minority group (17.6% in 2015)[5] and are overrepresented among the poor.[6] Yet, little is known about the impact of Hispanic/Latino background heterogeneity upon oral health disparities.

Oral health data for U.S. Hispanics/Latinos from diverse backgrounds, prior to the recent Hispanic Community Health Study/Study of Latinos (HCHS/SOL), are lacking. The first national assessment, the 1982–1984 Hispanic Health and Nutrition Examination Survey (HHANES), included Mexican-Americans, Cubans, and Puerto Ricans. Ismail and Szpunar[7] reported the highest prevalence of chronic periodontitis among Puerto Ricans in HHANES. The next major effort was within the 1985–6 National Survey of Oral Health in U.S. Employed Adults and Seniors.[8] This assessment showed that Hispanic Americans had similar periodontal health as non-Hispanic Blacks; both had poorer health compared to

non-Hispanic Whites. The National Health and Nutrition Examination Survey (NHANES) III's sampling strategy allowed for estimates of Mexican-Americans for 1988–1994, again showing similarities to non-Hispanic Blacks, and poorer health than non-Hispanic Whites.[9,10] Subsequent continuous NHANES assessments measured periodontal disease, and report outcomes for Mexican-Americans. In NHANES 2009–2012, among adults 30 and older, overall prevalence of periodontitis was 46%, and highest among Mexican-Americans (64% versus 41% for non-Hispanic Whites).[2] In HCHS/SOL, the prevalence and severity of periodontal disease differed by Hispanic/Latino background group,[11,12] supporting the need to further study factors related to heritage that may vary.

Low acculturation has been associated with poorer oral health and fewer dental visits among Hispanic adults.[13–15] Many Hispanic/Latino adults lack access to dental care[16] and acculturation is instrumental in accessing services;[17] English-speakers were more likely to visit the dentist in the prior year than Spanish-speakers.[18–20] Better clinically-assessed oral health has been documented among Mexican immigrants compared to U.S.-born Hispanics/Latinos[21,22] and the more acculturated.[17]Better self-rated oral health quality of life has been documented among first-generation Hispanic/Latino adults than U.S.-born Hispanics/Latinos or White counterparts.[23]

Research has examined broader social, psychological, and socio-cultural determinants of oral health in efforts to elucidate the processes underlying disparities.[24–27] According to epidemiological theories of the social production of disease, SES influences an individual's exposure to potential stressors and access to resources that may affect health.[28–30] This study draws on ecosocial theory[31–33], which is derived from social epidemiology. This theory focuses on discrimination and unfair treatment, and recognizes that social factors and our social experiences can affect health. We take a direct, individual-level approach, and used self-reported survey measures to assess unfair treatment to self and others in this cross-sectional study. Given available data, we examine perceived unfair treatment while accounting for sociodemographic and SES characteristics. We further adjust for acculturation factors related to language, ethnic identification and nativity. We then account for behavioral factors that can affect oral health status, including dental utilization history and insurance status, cigarette use, and medications.

Lower SES and racial/ethnic minority status often exposes individuals to more stressors, like financial hardships and discrimination, and act as barriers to coping resources.[34] A systematic literature review identified increasing stress and other psychological stressors were positively correlated with increases in periodontitis in over half (57%) of the studies.[35,36] In the last two decades, various psychosocial stressors and periodontal disease have been studied,[37–43] however, no previous studies have examined unfair treatment and periodontal disease prevalence among Hispanics/Latinos. Moreover, little is known about the heterogeneity of that association among Hispanic/Latino background groups.

Unfair treatment due to ethnicity is an understudied potential stressor for U.S. Hispanics/Latinos. In 2016, experiences of ethnic discrimination were self-reported by about half of Hispanics/Latinos.[44] Hispanic/Latino subgroups also have divergent views about their ethnic identity.[45] Self-reported experiences of discrimination have been positively

associated with poor mental health outcomes. While reports of associations with physical health outcomes are less consistent, collectively, evidence suggests the cumulative effects of discrimination act as a stressor, with negative impacts on health.[46,47] Very few studies have explored unfair treatment and oral health. They all relied on self-reported oral health outcomes (self-rated oral health status, tooth loss, or toothache), and most did not report any significant findings.[48–50] One study found a significant association between high levels of reported racism and self-reported toothaches among pregnant women.[51]

Thus there is a research gap. Unfair treatment due to ethnicity has not been explored in oral health, especially for clinically-determined periodontal health status, among diverse Hispanics/Latinos. This study investigates how unfair treatment, towards oneself and observed unfair treatment towards others due to ethnicity, are associated with periodontal health in a large sample of adults with different Hispanic/Latino heritage identities in the HCHS/SOL. The analysis accounts for socio-demographic characteristics and unfair treatment, and further adjusts for acculturation factors and behavioral factors. It is hypothesized that lower SES individuals and those who perceive more frequent unfair treatment due to ethnicity will have periodontitis.

## Methods

### Participants

The Hispanic Community Health Study/Study of Latinos (HCHS/SOL) is a large, multi-center, population-based prospective cohort study of Hispanic/Latino adults (18−74 years). The HCHS/SOL study design and methods are detailed elsewhere.[52,53] In brief, the purpose of HCHS/SOL is to investigate and identify risk factors for several diseases, and to examine the relationship between acculturation and health status. Baseline assessments (2008–2011) included about 4,000 adults from each of four U.S. field centers (Bronx, NY; Chicago, IL; Miami, FL; San Diego, CA), with older adults (45–74 years) oversampled. All participants provided written informed consent, then completed questionnaires and comprehensive physical and dental examinations.

### Measures

**Periodontitis—**The outcome of interest for this analysis was periodontitis. Dental examiners conducted periodontal assessments for dentate participants who did not require prophylactic antibiotics. Probing pocket depth (PD) and gingival recession were measured at six sites per tooth (distal-facial, mid-facial, mesial-facial, mesial-lingual, mid-lingual, distal-lingual) to calculate clinical attachment loss (AL). The Centers for Disease Control and Prevention (CDC) and American Academy of Periodontology (AAP) case definition for mild, moderate and severe periodontitis was used in this study.[54,55] This case definition classified mild periodontitis as 2 or more interproximal sites with AL ≥ 3mm, or 2 or more interproximal sites with PD ≥4mm (not on the same tooth), or 1 site with PD ≥ 5mm. Moderate periodontitis was defined as 2 or more interproximal sites with AL ≥ 4 mm (not on same tooth), or 2 or more interproximal sites with PD ≥ 5 mm (not on same tooth). Severe periodontitis was defined as 2 or more interproximal sites with AL ≥ 6 mm (not on same tooth) and at least 1 interproximal site with PD ≥5 mm. Dental exams were conducted by 18

examiners, trained and calibrated in NHANES methodology. The examiners assessed number of teeth present, and caries, restorations, and periodontal status for all permanent teeth, excluding third molars. Examiner agreement was high for PD (95.8%) and AL (92.85%), and additional examiner training details and statistics for the periodontal assessments were reported by Sanders and colleagues.[12] The final outcome variable combined mild, moderate, and severe periodontitis into an “any periodontitis” group versus “none.” This classification has been used in other recent research using national health data examining periodontitis and acculturation among Mexican-origin adults in the U.S.[56] Dominicans were the reference group with the lowest prevalence of periodontitis.

**Socio-Demographic Characteristics—**Participants self-identified their Hispanic/Latino background as Dominican (reference), Central American, Cuban, Mexican, Puerto Rican, South American, more than one background, or other Hispanic/Latino heritage. Age (continuous) and sex were reported. Annual household income was grouped as: <$10,000, $10,000−<$20,000, $20,000−<$40,000, $40,000−<$75,000 or ≥$75,000. Marital status was classified as single, married or living with a partner, separated, divorced, or widowed. Educational attainment was grouped as less than a high school diploma, attainment of a high school diploma or equivalent, or education beyond high school. Employment status was classified as full-time, part-time, retired, or unemployed.

**Unfair Treatment—**Two items assessed unfair treatment, to self or towards others, attributable to ethnicity.[57] Participants reported how often they have seen friends (others) treated unfairly, and how often people treat them (self) unfairly because they are Hispanic/Latino. The response options were never, sometimes, often, or always, with the latter two categories combined for analysis.

**Acculturation—**Nativity was defined as foreign-born or U.S.-born. Acculturation level was measured using the language subscale of the Short Acculturation Scale for Hispanics (SASH),[58] with the exclusion of the two items pertaining to the language preferred for watching TV programs and listening to radio programs. The SASH-language scale focused on language and social interaction preferences, and was scored on a 5-point Likert scale (1=Only Spanish/All Hispanic/Latino, to 5=Only English/All non-Hispanic/Latino). Higher SASH-language scores corresponded to a higher degree of acculturation. In this sample, the SASH-language scale had high internal reliability ($\alpha$=0.93). The ethnic identification score was the average of two items from the Multigroup Ethnic Identity Measure[59] to address a sense of belonging and pride in one’s ethnic group, and higher scores indicated stronger ethnic identity. Each item used a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

**Behavioral factors—**Participants indicated whether or not they had health insurance and reported time since last dental visit. Possible response options (≤1 year, >1 year, ≤5 years, >5 years or never visited) were collapsed to indicate whether or not participants had a dental visit in the previous 12 months. Cigarette use captured whether participants were current, former, or never smokers. Never smokers were those that have never smoked 100 cigarettes. Former smokers had to have smoked at least 100 cigarettes in their entire life and also report

that they do not currently smoke. Current smokers were those that smoked at least 100 cigarettes in their entire life and reported currently smoking some days or daily. Whether or not the participant was taking one or more medication associated with dry mouth (including any of 12 different classes of diuretics or anti-psychotics) was assessed.

### Analysis

The HCHS/SOL enrolled 16,415 participants, and 15,848 also completed a dental examination at baseline. There were 2,370 individuals with insufficient periodontal information to determine case definition, along with 31 with undefined Hispanic/Latino background, and 697 missing data for other covariates that were excluded from this analysis. Thus, the analytic sample included 12,750 persons without missing data across any variables.

Statistical analysis was conducted using SAS 9.3 (SAS Institute Inc., Cary, North Carolina, U.S.). The methodology employed for all analyses accounted for the complex sampling design, and applied the overall normalized sampling weights that were calibrated to the U.S. 2010 Census within the HCHS/SOL target areas, such that estimates reported generalize to the non-institutionalized Hispanic/Latino population age 18–74 living in these geographic areas.

All descriptive analyses were conducted across the analytic sample and separately across the seven Hispanic/Latino background heritage groups and by periodontitis status. Combined periodontitis based on the CDC-AAP case definition was modeled as a single binary dependent variable for the multivariable survey logistic regression model analysis. Survey logistic regression estimated crude (CPR) and adjusted prevalence ratios (APR), and 95% confidence limits (95% CL) for each covariate. A series of models were fitted. Model 1 included only sociodemographic characteristics and unfair treatment variables, and in Model 2, acculturation variables were added. The final fully adjusted Model 3 included sociodemographic characteristics, unfair treatment, acculturation variables, and health behavior variables together, and multicollinearity was not found.

## Results

Sample characteristics by Hispanic/Latino heritage are summarized in Table 1. There was a high concentration of different Hispanic/Latino heritage at each Center, and only heritage group was included in the final adjusted models. Overall, 63% were less than 50 years old, half the sample was female, 44% earned < $20,000, and half were married. Notably, Dominicans were younger relative to other heritage groups. Most (70%) attained a high school education or more, and 37% worked full-time.

Variation in the distribution of perceived unfair treatment by background group was observed. Overall, half of the participants (49%) reported they were never treated unfairly, but the rest reported more frequent experiences: sometimes (41%), often/always (10%). Individuals reported seeing others being treated unfairly because they were Hispanic/Latino more often than they perceived unfair treatment due to ethnicity themselves. Only about one-

third (32%) never saw others treated unfairly, while 42% reported sometimes, and 26% reported often/always observing others treated unfairly due to ethnicity.

The mean ethnic identification score was 3.18 (approximately median value), and ranged from 3.08 among Puerto Ricans to 3.27 among Central Americans. Acculturation scores indicated only 3.9% were highly acculturated and 77% were foreign-born. Half the sample did not have health insurance, and 50% had not been to a dentist in the last year. Twenty percent took one or more medications, and 20% were current smokers, 17% were former smokers, and the majority (63%) never smoked cigarettes.

Table 2 presents the distribution of each covariate by periodontal health status. Overall, about half (51%) of participants were in periodontal health, and 10%, 30% and 8% had mild, moderate, or severe periodontitis, respectively. Dominicans had the highest prevalence of periodontal health (68%), followed by those of mixed Hispanic heritage (65%). Among the other heritage groups, periodontal health ranged from a low of 42% (among Cubans) to 55% (among Puerto Ricans).

Unadjusted and adjusted logistic regression model results are presented in Table 3. All variables were statistically significantly associated with periodontitis in the unadjusted bivariate models, and crude prevalence ratios (CPR) and CLs are shown in the left column. In Model 1, which adjusted for sociodemographic characteristics and unfair treatment, marital status and observing others treated unfairly were no longer statistically significant, though the unfair treatment variable approached $p<.05$, and was significant in Models 2 and 3, after adjusting for acculturation and behavioral factors. Marital status remained insignificant in all adjusted models. In Models 2 and 3, ethnic identification scores and nativity status were not statistically significant, though nativity status was borderline significant ($p=.06$ and $p=.05$ in the respective models). Results from the final, fully adjusted Model 3 are described below.

Compared to Dominicans (reference group), the prevalence of periodontitis was higher in all other Hispanic/Latino background groups, with disease prevalence more than twice as high for Central Americans (APR 2.09, 95% CL 1.64–2.67) and Mexicans (APR 2.10, 95% CL 1.67–2.63), 92% higher in Cubans (95% CL 1.49–2.47), 62% higher in Puerto Ricans (95% CL 1.25–2.11), 40% higher in South Americans (95% CL 1.06–1.86), and 53% higher for Mixed/Others (95% CL 1.14–2.70). The prevalence of any periodontal disease increased with increasing age, and was 71% higher for males than females (95% CL 1.51–1.95). Gradients were observed for income and education. Individuals with incrementally higher income or greater education demonstrated lower prevalence of periodontitis than those in the lowest respective categories. Additionally, individuals working less than full-time had a lower prevalence of periodontitis compared to those employed full-time in the workforce.

Each of the two unfair treatment measures demonstrated significant, yet inverse, associations with periodontal disease prevalence in the final adjusted model. When individuals self-reported they experienced more frequent unfair treatment themselves, it appeared to be protective, and adjusted disease prevalence was lower than for individuals that never reported unfair treatment. However, periodontitis prevalence was higher for individuals that

observed more frequent unfair treatment of others, relative to those who never observed unfair treatment of others due to being Hispanic/Latino.

Higher SASH acculturation scores were protective. Periodontitis prevalence was 36% higher for current smokers (95% CL 1.16–1.58) and 18% higher for former smokers (95% CL 1.01–1.39) compared to never-smokers, and 27% higher for those with a past year dental visit (95% CL 1.13–1.43) compared to those with a visit more than one year ago.

## Discussion

Our study represents the first attempt to examine the association between perceived unfair treatment due to ethnicity and periodontal disease status in a large population-based cohort of diverse Hispanic/Latino adults in the U.S. The positive association of frequently observing unfair treatment in others with periodontal disease prevalence was found in the final, fully adjusted model, and is consistent with our study hypothesis and other literature suggesting more frequent unfair treatment experiences or greater perceived discrimination are often health risk factors [60,61]. In contrast, those who perceived unfair treatment towards themselves demonstrated a negative association with periodontal disease prevalence in the crude and final adjusted models, contrary to our study hypothesis. Assessments for multicollinearity and additional analyses (not shown) demonstrated that the two measures of unfair treatment were independent. Similar associations were also found using different versions of each variable.

No other known studies have examined unfair treatment and periodontitis among U.S. Hispanic/Latino adults. This study's results related to observing unfair treatment in others due to ethnicity are similar to the positive association between racism and self-reported toothaches reported by pregnant Australian women[51]. The study findings are contrary to the null results reported by other studies, which used the Everyday Discrimination scale to examine associations between self-reported oral health status among adults in the U.S. [48,49] and Brazil[50]. The Everyday Discrimination scale inquires how often one has experienced different types of unfair treatment, which can be attributed to different causes, including, but not limited to, race. Our study assessed observed unfair treatment in others due to ethnicity, which was not assessed in other oral health studies. This study's results may have differed from the null reports due to the use of different measures. There are multiple valid scales available to measure perceived discrimination, in general and due to race or ethnicity, and care should be taken to select an appropriate measure to answer the research question. See Bastos et al.[62] for a systematic review of scales and their psychometric properties.

HCHS/SOL utilized two single-item measures, which captured global perceptions of unfair treatment towards themselves and others due to ethnicity. It is difficult to completely measure such a complex construct with only two single items. The survey items assessed perceived frequency (never, sometimes, often, or always) rather than explicit counts of experiences within a specific time period, and perceptions may indeed differ for an individual reflecting about themselves versus others. Half the sample reported never perceiving unfair treatment themselves, but about two-thirds reported observing others being

treated unfairly. There was no assessment of experiencing different types of unfair treatment under varying circumstances. Unfair treatment can range from minor interactions that could occur routinely in daily life (like a salesperson or co-worker being rude) to more extreme examples that are more rare (like being fired). Major events like firing occur less often, but may be more salient and have a greater influence on global perceptions of unfair treatment and perceived ethnic discrimination if the incident is clearly attributable to being Hispanic/Latino. These occurrences may also be motivated by reasons other than ethnicity.

The common observation that other Hispanics/Latinos are regularly treated unfairly can be a constant source of stress and a health risk factor. Exposure to discrimination is likely to have a greater negative impact not only if it is more frequent, but also if occurrences are more intense.[60] Previous assessments of U.S. Latinos showed that experiences of discrimination varied by sex, nativity, and ethnicity.[63] Some stressors may be potentially modifiable, although it is difficult for an individual to reduce perceptions of discrimination, a potent factor that often results in emotional stress. Perhaps more important is how the individual deals with unfair treatment and stress. Discriminatory experiences negatively affect mental health, in terms of higher stress levels and more depressive symptoms, among Hispanics/Latinos.[64] Past research has also demonstrated an association between inadequate coping and periodontal health.[38,65] Additionally, stress may negatively affect the body's immune system, making the individual more susceptible to inflammatory periodontal disease and diminish participation in healthy behaviors and hygiene practices that would promote oral and periodontal health over time.[42,66] Such findings coupled with our study results suggest that stress reduction mediated by teaching and supporting active coping strategies and successful stress management techniques may prove a worthwhile intervention for reduction of periodontal disease among Hispanics/Latinos. Further studies exploring stress, including unfair treatment due to ethnicity, along with coping strategies and other psychosocial factors, and acculturation are needed.

Unfair treatment and discrimination among Hispanics/Latinos has not been explored in-depth. Past studies on this topic have focused primarily on Mexican-Americans[67], but not other Hispanic/Latino heritage groups, who may have very different experiences [64]. Perceptions of unfair treatment towards others is often stronger if it is grounded in personal experience and if an individual directly observed another being treated unfairly versus just being told about an incident from a family member or friend afterwards. Additional supplemental analyses (not shown) explored the different social contexts and examined the frequency of unfair treatment across the four different study sites. Unfair treatment was less commonly reported by participants in Miami than the other sites. Participants across all study sites more frequently reported observing unfair treatment in others than perceived unfair treatment towards themselves. Unfair treatment due to ethnicity is complex, and the perceptions about unfair treatment can be influenced by broad social and political institutions and social environments. Among Hispanic/Latinos, discrimination attributable to race/ethnicity may be related to a range of possible indicators of belonging to a particular ethnic group, such as physical markers like skin tone, or English language proficiency or speaking with an accent.[64] Some of these may be more or less salient in communities where a particular Hispanic/Latino heritage group comprises a majority rather than the minority. The HCHS/SOL sites were in four different states, and selected because the

particular Hispanic/Latino heritage groups comprised the majority in those communities. Further, experiences of unfair treatment can vary in different contexts, and in frequency, intensity, and duration in those different contexts. It is not clear how unfair treatment might operate in the healthcare setting and affect dental service utilization or oral health status. There may be other social context factors in these communities that are still unaccounted for that would illuminate the potential pathways and help explain why the perceptions of unfair treatment had inverse associations with the outcome in this study.

A qualitative research approach is a needed next step to gain a deep understanding of the process of how adults from different Hispanic/Latino heritage groups experience and perceive unfair treatment due to their ethnicity, and its effect on their healthcare seeking and other health behaviors and oral health status. One recent ethnographic study of Latino farmworkers reported on injury and perceived discrimination, primarily from employers, and based on their ethnicity, ability to speak English, and nativity.[68] In the present study, we do not know the source of unfair treatment, or circumstances, and these social context factors can influence how strongly one feels discriminated against. Further, some evidence suggests that qualitatively studying experiences of unfair treatment may yield markedly different results than what is reported on closed-ended surveys.[31]

Acculturation is a complex construct, and has also mostly been explored mostly for Mexican-Americans, and in terms of changing towards the dominant culture.[69] Acculturation is often only assessed by nativity, and years in the U.S. by foreign-born individuals. These two measures alone do not completely and accurately capture this construct or shed light on the pathways by which it can affect health behaviors or status, and additional future research is needed. Other studies of the HCHS/SOL cohort reported no differences in very frequent discrimination based on time lived in the U.S.[70] Kershaw and colleagues [70] included nativity, the SASH-language subscale, and ethnic identity to measure acculturation. The SASH-language subscale was negatively associated with periodontitis prevalence in this study. Language preferences may be relevant for health in terms of being better able to access health services, and understand health information. The HCHS/SOL dataset also captured ethnic identity, which was not significant in the final adjusted model. This is in contrast to a recently published findings exploring acculturation (in terms of language preference and nativity status) and periodontitis among Mexican-origin adults using 2009–2012 NHANES data which found that language preference was an important correlate; Spanish-speaking adults being 1.8 times more likely to have periodontitis compared to English-speaking counterparts.[56]

Ethnic identity and health are understudied among diverse Hispanic/Latino adults, and it is unknown how it may affect oral health outcomes. Ethnic identification is relevant to consider in relation to ethnic discrimination.[71] Those that strongly identify with being Hispanic/Latino may be more prone to be affected by unfair treatment attributable to their ethnicity. Further, perceptions of ethnic discrimination may vary for individuals based on other factors. A subsample of the HCHS/SOL cohort also participated in a Socio-Cultural Ancillary Study (SCAS)[72] and completed additional psychological scales, including a different discrimination scale than what was available for use in this analysis. The SCAS used the 17-item Brief Perceived Ethnic Discrimination Questionnaire-Community Version and its

subscales.[73] Analyses exploring ethnic discrimination among the SCAS subsample concluded that regional geographic field center effects were more important than Hispanic/Latino background group effects.[74]

This study makes a unique contribution to the oral health disparities literature by exploring unfair treatment, a potential psychosocial stressor, in a large, diverse sample of Hispanic/Latino adults in the population-based HCHS/SOL cohort. The HCHS/SOL dataset does not include a non-Hispanic comparison group. This cross-sectional analysis precludes statements of causal inferences, however, to our knowledge, no studies have demonstrated that observed unfair treatment was a relevant psychosocial factor positively associated with periodontitis in the Hispanic/Latino population in the U.S., while unfair treatment towards self was negatively associated. Future research into unfair treatment, towards self and others, as well as other psychosocial factors, and the possible mechanisms by which it can potentially affect periodontal health are needed. Further research could prove impactful and accelerate development of preventive interventions that address psychosocial stressors that may affect periodontitis.

## Acknowledgements:

The authors thank the staff and participants of HCHS/SOL for their important contributions. A complete list of staff and investigators has been provided by Sorlie, P. et. a. in Ann Epidemiol. 2010 Aug;20:642–649 and is also available on the study website: http://www.cscc.unc.edu/hchs.

**Funding**: The Hispanic Community Health Study/Study of Latinos was carried out as a collaborative study supported by contracts from the National Heart, Lung, and Blood Institute (NHLBI) to the University of North Carolina (N01-HC65233), University of Miami (N01-HC65234), Albert Einstein College of Medicine (N01-HC65235), Northwestern University (N01-HC65236), and San Diego State University (N01-HC65237). The following Institutes/Centers/Offices contribute to the HCHS/SOL through a transfer of funds to the NHLBI: National Center on Minority Health and Health Disparities, the National Institute of Deafness and Other Communications Disorders, the National Institute of Dental and Craniofacial Research, the National Institute of Diabetes and Digestive and Kidney Diseases, the National Institute of Neurological Disorders and Stroke, and the Office of Dietary Supplements.

## Glossary

| | |
|---|---|
| **AAP** | American Academy of Periodontology |
| **APR** | adjusted prevalence ratios |
| **AL** | attachment loss |
| **CDC** | The Centers for Disease Control and Prevention |
| **CL** | confidence limit |
| **CPR** | crude prevalence ratios |
| **HCHS/SOL** | Hispanic Community Health Study/Study of Latinos |
| **HHANES** | Hispanic Health and Nutrition Examination Survey |
| **NHANES** | National Health and Nutrition Examination Survey |
| **PD** | Probing pocket depth |

| | |
|---|---|
| **SASH** | Short Acculturation Scale for Hispanics |
| **SES** | socioeconomic status |
| **U.S.** | United States |

## References


1. Dye BA, Tan S, Smith V, et al. Trends in oral health status: United States, 1988–1994 and 1999–2004. 4 2007.
2. Eke P, Dye BA, Wei L, et al. Update on prevalence of periodontitis in Adults in the United States:L NHANES 2009 to 2012. J Periodontol. 2015;86:611–622. [PubMed: 25688694]
3. Borrell LN, Crawford ND. Socioeconomic position indicators and periodontitis: examining the evidence. Periodontology 2000. 2012;58(1):69–83. [PubMed: 22133367]
4. Krogstad JM, Lopez MH. Hispanic Nativity Shift: U.S. births drive population growth as immigration stalls. Washington, D.C.: Pew Research Center's Hispanic Trends project; 4 2014.
5. U.S. Department of Commerce. Profile America facts for features: CB16-FF.16. Hispanic Heritage Month 2016, available at https://census.gov/content/dam/Census/newsroom/facts-for-features/2016/cb16-ff16.pdf, accessed April 18, 2017 2016.
6. DeNavas-Walt C, Proctor BD, Smith JC. Income, poverty, and health insurance coverage in the United States: 2009 In: U.S. Census Bureau CPR, P60–238, ed: US Government Printing Office, Washington D.C.; 2010.
7. Ismail AI, Szpunar SM. The prevalence of total tooth loss, dental caries, and periodontal disease among Mexican Americans, Cuban Americans, and Puerto Ricans: Findings from HHANES 1982–1984. American Journal of Public Health. 1990;80(Suppl):66–70.
8. Watson MR, Brown LJ. The oral health of U.S. Hispanics: evaluating their needs and their use of dental services. Journal of the American Dental Association. 1995;126(6):789–795. [PubMed: 7797736]
9. Brown LJ, Brunelle JA, Kingman A. Periodontal status in the United States, 1988–1991: prevalence, extent, and demographic variation. J Dent Res. 1996;75(Spec No:672–83).
10. Albandar JM, Brunelle JA, Kingman A. Destructive periodontal disease in adults 30 years of age and older in the United States, 1988–1994. Journal of Periodontology. 1999;70(1):13–29. [PubMed: 10052767]
11. Jiminez MC, Sanders AE, Mauriello SM, Kaste LM, Beck JD. Prevalence of periodontitis according to Hispanic or Latino background among study participants of the Hispanic Community Health Study/Study of Latinos. The Journal of the American Dental Association. August 1, 2014 2014;145(8):805–816. [PubMed: 25082929]
12. Sanders AE, Campbell SM, Mauriello SM, et al. Heterogeneity in periodontitis prevalence in the Hispanic Community Health Study/Study of Latinos. Annals of epidemiology. 2014;24(6):455–462. [PubMed: 24731697]
13. Ismail AI, Szpunar SM. Oral health status of Mexican Americans with low and high acculturation status: Findings from southwestern HHANES, 1982–84. J Public Health Dent. 1990;50:24–31. [PubMed: 2295999]
14. Stewart DC, Ortega AN, Dausey D, Rosenheck R. Oral health and use of dental services among Hispanics. J Pub Health Dent. 2002;62(2):84–91. [PubMed: 11989211]
15. Jaramillo F, Eke PI, Thornton-Evans GO, Griffin SO. Acculturation and dental visits among Hispanic adults. Prev Chronic Dis. 2009;6(2):A50. [PubMed: 19288993]
16. Paskulin LM, Vianna LA. Sociodemographic profile and self-referred health conditions of the elderly in a city of Southern Brazil. Rev Saude Publica. 2007;41.
17. Gao XL, McGrath C. A review on the oral health impacts of acculturation. J Immigr Minor Health. 2011;13(2):202–213. [PubMed: 21082253]
18. Jaramillo F, Eke PI, Thornton-Evans GO, Griffin SO. Acculturation and dental visits among Hispanic adults. Prev Chronic Dis 2009;6(2): http://www.cdc.gov/pcd/issues/2009/apr/2008_0134.htm.

19. Riley III JL, Gibson E, Zsembik BA, Duncan RP, Gilbert GH, Heft MW. Acculturation and Orofacial Pain Among Hispanic Adults. J Pain. 2008; 9(8): 750–8. [PubMed: 18456564]
20. Graham MA, Tomar SL, Logan HL. Perceived social status, language and identified dental home among Hispanics in Florida. J Am Dent Assoc. 2005;136:1572–1582. [PubMed: 16329424]
21. Spolsky VW, Marcus M, Der-Martirosian C, Coulter ID, Maida CA. Oral health status and the epidemiologic paradox within latino immigrant groups. BMC Oral Health. 2012;12:39. [PubMed: 22958726]
22. Vaux A Variations in social support associated with gender, ethnicity, and age. J Soc Issues. 1985//1985;41.
23. Sanders AE. A Latino advantage in oral health-related quality of life is modified by nativity status. Soc Sci Med 2010;71(1):205–211. [PubMed: 20434250]
24. Watt RG. From victim blaming to upstream action: tackling the social determinants of oral health inequalities. Community Dent Oral Epidemiol 2007;35:1–11. [PubMed: 17244132]
25. Watt RG. Emerging theories into the social determinants of health: implications for oral health promotion. Community Dent Oral Epidemiol. 2002;30:241–247. [PubMed: 12147165]
26. Newton JT, Bower EJ. The social determinants of oral health: New approaches to conceptualizing and researching complex causal networks. Community Dent Oral Epidemiol. 2005;33:25–33. [PubMed: 15642044]
27. Patrick D, Lee R, Nucci M, Grembowski D, Jolles C, Milgrom P. Reducing oral health disparities: A focus on social and cultural determinants. BMC Oral Health. 2006;6(Suppl 1):S4. [PubMed: 16934121]
28. Link BG, Phelan J. Social conditions as fundamental causes of disease. J Health Soc Behav. 1995;35(extra issue):80–94.
29. Krieger N Epidemiology and the web of causation: has anyone seen the spider? Soc Sci Med. 1994;39(7):887–903. [PubMed: 7992123]
30. Krieger N Theories for social epidemiology in the 21st century: an ecosocial perspective. Int J Epidemiol. August 1, 2001 2001;30(4):668–677. [PubMed: 11511581]
31. Krieger N Embodying Inequality: A Review of Concepts, Measures, and Methods for Studying Health Consequences of Discrimination. Int J Health Services 1999;29(2):295–352.
32. Krieger N A glossary for social epidemiology. J Epidemiol Community Health. 2001;55:693–700. [PubMed: 11553651]
33. Krieger N Methods for the Scientific Study of Discrimination and Health: An Ecosocial Approach. Am J Pub Health. 2012;102(5):936–944. [PubMed: 22420803]
34. Taylor SE, Seeman TE. Psychosocial resources and the SES-health relationship. Ann NY Acad Sci. 1999;896:210–225. [PubMed: 10681899]
35. Reners M, Brecx M. Stress and periodontal disease. Int J Dent Hyg. 2007;5(4):199–204. [PubMed: 17927631]
36. Peruzzo DC, Benatti BB, Ambrosano GMB, et al. A Systematic Review of Stress and Psychological Factors as Possible Risk Factors for Periodontal Disease. J Periodontol. 2007;78(8): 1491–1504. [PubMed: 17668968]
37. Monteiro da Silva AM, Oakley DA, Newman HN, Nohl FS, Lloyd HM. Psychosocial factors and adult onset rapidly progressive periodontitis. J Clin Periodotol. 1996;23(8):789–794.
38. Genco RJ, Ho AW, Grossi SG, Dunford RG, Tedesco LA. Relationship of stress, distress, and inadequate coping behaviors to periodontal disease. J Periodontol. 1999;70:711–723. [PubMed: 10440631]
39. Dumitrescu AL, Kawamura M. Involvement of psychosocial factors in the association of obesity with periodontitis. J Oral Sci. 2010;52(1):115–124. [PubMed: 20339242]
40. Ng SKS, Keung Leung W. A community study on the relationship between stress, coping, affective dispositions and periodontal attachment loss. Comm Dent Oral Epidemiol. 2006;34(4):252–266.
41. Moss ME, Beck JD, Kaplan BH, et al. Exploratory case-control analysis of psychosocial factors and adult periodontitis. J Periodontol. 1996;67:1060–1069.

42. Croucher R, Marcenes WR, Torres MC, Hughes F, Sheiham A. The relationship between life-events and periodontitis: A case-control study. J Clin Periodontol. 1997;24(1):39–43. [PubMed: 9049796]
43. Rosania AE, Low KGM CM, Rosania DA. Stress, depression, cortisol, and periodontal disease. J Periodontol. 2009;80(2):260–266. [PubMed: 19186966]
44. Krogstad JM, Lopez G. Roughly half of Hispanics have experienced discrimination. Available at http://www.pewresearch.org/fact-tank/2016/06/29/roughly-half-of-hispanics-have-experienced-discrimination/ accessed April 17, 2017 Washington, DC: Pew Research Center;2016.
45. Taylor P, Lopez MH, Martinez J, Velasco G. When Labels Don't Fit: Hispanics and Their Views of Identity. Available at http://www.pewhispanic.org/2012/04/04/when-labels-dont-fit-hispanics-and-their-views-of-identity/, accessed April 18, 2017 Washington DC: Pew Research Center;2012.
46. Paradies Y, Ben J, Denson N, et al. Racism as a Determinant of Health: A Systematic Review and Meta-Analysis. PloS One. 2015:10.1371/journal.pone.0138511.
47. Paradies Y A systematic review of empirical research on self-reported racism and health. Int J Epidemiol. 2006;35(4):888–901. [PubMed: 16585055]
48. Finlayson TL, Williams DR, Siefert K, Jackson JS, Nowjack-Raymer R. Oral health disparities and psychosocial correlates of self-rated oral health in the National Survey of American Life. Am J Public Health. April 1, 2010 2010;100(S1):S246–255. [PubMed: 20147685]
49. Watson JM, Logan HL, Tomar SL. The influence of active coping and perceived stress on health disparities in a multi-ethnic low income sample. BMC Public Health. 2008;8:41. [PubMed: 18230164]
50. Celeste RK, Gonçalves LG, Faerstein E, Bastos JL. The role of potential mediators in racial inequalities in tooth loss: the Pró-Saúde study. Comm Dent Oral Epidemiol. 2013;41(6):509–516.
51. Ben J, Paradies Y, Priest N, et al. Self-reported racism and experience of toothache among pregnant Aboriginal Australians: the role of perceived stress, sense of control, and social support. J Public Health Dent. 2014;74(4):301–309. [PubMed: 24989691]
52. Sorlie PD, Avilés-Santa ML, Wassertheil-Smoller S, et al. Design and implementation of the Hispanic Community Health Study/Study of Latinos. Ann Epidemiol. 2010;20(8):629–641. [PubMed: 20609343]
53. Lavange LM, Kalsbeek WD, Sorlie PD, et al. Sample design and cohort selection in the Hispanic Community Health Study/Study of Latinos. Ann Epidemiol. 2010;20(8):642–649. [PubMed: 20609344]
54. Page RC, Eke PI. Case definitions for use in population-based surveillance of periodontitis. J Periodontol. 2007;78(7s):1387–1399.
55. Eke PI, Page RC, Wei L, Thornton-Evans G, Genco RJ. Update of the case definitions for population-based surveillance of periodontitis. J Periodontol. 2012;83(12):1449–1454. [PubMed: 22420873]
56. Garcia D, Tarima S, Glasman L, Cassidy LD, Meurer J, Okenseri C. Latino Acculturation and Periodontitis Status Among Mexican-Origin Adults in the United States: NHANES 2009–2012. Fam Community Health 2017;40(2):112–120. [PubMed: 28207674]
57. Finch BK, Hummer RA, Kol B, Vega WA. The role of discrimination and acculturative stress in the physical health of Mexican-origin adults. Hisp J Behav Sci. 2001;23(4):399–429.
58. Marin G, Sabogal F, Marin BV, Otero-Sabogal R, Perez-Stable EJ. Development of a Short Acculturation Scale for Hispanics. Hisp J Behav Sci. 1987;9(2):183–205.
59. Roberts R, Phinney J, Masse L, Chen Y, Roberts C, Romero A. The structure of ethnic identity in young adolescents from diverse ethnocultural groups. J Early Adol. 1999;19:301–322.
60. Williams DR, Mohammad SA. Discrimination and racial disparities in health: evidence and needed research. J Behav Med. 2009;32(1):20–47. [PubMed: 19030981]
61. Pascoe EA, Smart Richman L. Perceived discrimination and health: a meta-analytic review. Psychol Bull. 2009;135(4):531–554. [PubMed: 19586161]
62. Bastos JL, Celeste RK, Faerstein E, Barros AJD. Racial discrimination and health: A systematic review of scales with a focus on their psychometric properties. Soc Sci Med. 2010;70(7):1091–1099. [PubMed: 20122772]

63. Nadal KL, Mazzula SL, Rivera DP, Fujii-Doe W. Microaggressions and Latina/o Americans: An Analysis of Nativity, Gender, and Ethnicity. J Latina/o Psychology. 2014;2(2):67–78.

64. Araújo BY, Borrell LN. Understanding the Link Between Discrimination, Mental Health Outcomes, and Life Chances Among Latinos. Hisp J Behav Sci. 2006;28(2):245–266.

65. Wimmer G, Janda M, Wieselmann-Penkner K, Jakse N, Polansky R, Pertl C. Coping with stress: Its influence on periodontal disease. J Periodontol. 2002;73(11):1343–1351. [PubMed: 12479640]

66. Preeja C, Ambili R, Nisha KJ, Seba A, Archana V. Unveiling the role of stress in periodontal etiopathogenesis: an evidence-based review. J Investig Clin Dent. 2013;4(2):78–83.

67. Ortiz V, Telles E. Racial Identity and Racial Treatment of Mexican Americans. Race Soc Prob. 2012;4(1):10.1007/s12552-12012-19064-12558.

68. Snipes SA, Cooper SP, Shipp EM. "The Only Thing I Wish I Could Change Is That They Treat Us Like People and Not Like Animals": Injury and Discrimination Among Latino Farmworkers. J Agromedicine. 2017;22(1):36–46. [PubMed: 27749157]

69. Lopez-Class M, Castro FG, Ramirez AG. Conceptions of acculturation: A review and statement of critical issues. Soc Sci Med. 2011;72(9):1555–1562. [PubMed: 21489670]

70. Kershaw KN, Giacinto RE, Gonzalez F, et al. Relationships of nativity and length of residence in the U.S. with favorable cardiovascular health among Hispanics/Latinos: The Hispanic Community Health Study/Study of Latinos (HCHS/SOL). Prev Med. 2016;89:84–89. [PubMed: 27196144]

71. Pérez DJ, Fortuna L, Alegria M. Prevalence and Correlates of Everyday Discrimination among U.S. Latinos. J Comm Psych. 2008;36(4):421–433.

72. Gallo LC, Penedo FJ, Carnethon M, et al. The Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study: sample, design, and procedures. Eth Dis. 2014;24(1):77–83.

73. Brondolo E, Kelly KP, Coakley V, et al. The Perceived Ethnic Discrimination Questionnaire: Development and Preliminary Validation of a Community Version1. J Appl Soc Psych. 2005;35(2):335–365.

74. Arellano-Morales L, Roesch SC, Gallo LC, et al. Prevalence and Correlates of Perceived Ethnic Discrimination in the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study. J Latina/o Psych. 2015;3(3):160–176.

**Table 1.**

Descriptive statistics[a,b] of sample characteristics by Hispanic/Latino heritage, Hispanic Community Health Study/Study of Latinos, 2008–2011

| Characteristic | N | Dominican (n=1,114) | Central American (n=1,337) | Cuban (n=1,583) | Mexican (n=5,546) | Puerto Rican (n=1,911) | South American (n=872) | Mixed/ Other (n=387) | Total (n=12,750) |
|---|---|---|---|---|---|---|---|---|---|
| **Center**[a] | 12,750 | | | | | | | | |
| Bronx | | 94.18 (1.30) | 18.32 (2.51) | 1.36 (0.32) | 7.68 (1.18) | 67.92 (2.41) | 23.18 (2.85) | 38.32 (4.59) | 26.67 (1.48) |
| Chicago | | 0.94 (0.26) | 16.59 (2.11) | 1.05 (0.48) | 26.62 (1.95) | 24.24 (2.21) | 21.84 (2.92) | 11.50 (2.14) | 17.75 (1.12) |
| Miami | | 4.43 (1.22) | 60.52 (3.74) | 96.97 (0.73) | 1.10 (0.30) | 4.57 (0.78) | 50.36 (3.76) | 29.15 (4.05) | 26.53 (2.00) |
| San Diego | | 0.45 (0.32) | 4.57 (1.05) | 0.62 (0.39) | 64.60 (2.30) | 3.26 (1.00) | 4.62 (1.54) | 21.02 (3.88) | 29.05 (1.90) |
| *Socio-demographics* | | | | | | | | | |
| **Age (years)**[a] | 12,750 | | | | | | | | |
| 18—34 | | 20.10 (1.84) | 14.08 (1.47) | 10.11 (1.04) | 18.78 (1.04) | 16.32 (1.43) | 12.43 (1.92) | 30.73 (3.29) | 16.88 (0.60) |
| 35—49 | | 44.16 (2.17) | 52.29 (2.16) | 39.96 (1.47) | 50.48 (1.28) | 41.11 (1.99) | 45.39 (2.80) | 49.01 (3.77) | 46.47 (0.80) |
| 50—64 | | 31.11 (1.90) | 29.17 (1.76) | 37.38 (1.19) | 26.68 (1.03) | 34.31 (1.74) | 36.18 (2.21) | 16.83 (2.93) | 30.34 (0.65) |
| ≥ 65 | | 4.64 (0.90) | 4.46 (0.84) | 12.54 (1.22) | 4.06 (0.42) | 8.26 (1.13) | 6.01 (1.14) | 3.43 (1.06) | 6.31 (0.36) |
| **Sex**[a] | 12,750 | | | | | | | | |
| Female | | 59.28 (2.25) | 51.46 (1.96) | 44.9 (1.28) | 52.39 (1.10) | 47.18 (1.65) | 52.57 (2.25) | 51.89 (3.97) | 50.91 (0.68) |
| Male | | 40.72 (2.25) | 48.54 (1.96) | 55.1 (1.28) | 47.61 (1.10) | 52.82 (1.65) | 47.43 (2.25) | 48.11 (3.97) | 49.09 (0.68) |
| **Household Income**[a] | 12,750 | | | | | | | | |
| < $10,000 | | 16.09 (1.44) | 15.01 (1.34) | 16.66 (1.21) | 9.98 (0.81) | 17.93 (1.53) | 9.54 (1.26) | 8.74 (1.70) | 13.19 (0.55) |
| $10,000—< $20,000 | | 37.88 (2.62) | 37.45 (2.15) | 35.98 (1.53) | 28.12 (1.40) | 29.19 (1.56) | 33.47 (2.07) | 22.23 (2.95) | 31.28 (0.83) |
| $20,000—< $40,000 | | 32.87 (2.24) | 33.59 (1.89) | 31.55 (1.57) | 36.70 (1.17) | 27.81 (1.81) | 38.17 (2.19) | 38.71 (3.82) | 34.06 (0.71) |
| $40,000—< $75,000 | | 10.72 (1.20) | 11.21 (1.40) | 10.53 (1.01) | 17.75 (1.06) | 17.47 (1.39) | 14.04 (1.65) | 18.40 (2.74) | 15.15 (0.64) |
| ≥ $75,000 | | 2.45 (0.87) | 2.75 (0.63) | 5.28 (0.92) | 7.44 (1.28) | 7.60 (0.99) | 4.77 (1.12) | 11.93 (2.66) | 6.32 (0.70) |
| **Marital Status**[a] | 12,737 | | | | | | | | |
| Single | | 46.37 (2.13) | 37.25 (1.80) | 25.73 (1.39) | 28.05 (1.13) | 47.69 (1.75) | 30.24 (2.43) | 50.15 (3.75) | 34.02 (0.73) |
| Married/ Partner | | 38.83 (2.16) | 49.19 (1.80) | 53.85 (1.47) | 60.39 (1.32) | 34.12 (1.73) | 51.69 (2.40) | 33.18 (3.58) | 50.9 (0.85) |

| Characteristic | N | Dominican (n=1,114) | Central American (n=1,337) | Cuban (n=1,583) | Mexican (n=5,546) | Puerto Rican (n=1,911) | South American (n=872) | Mixed/ Other (n=387) | Total (n=12,750) |
|---|---|---|---|---|---|---|---|---|---|
| Sep./ Divorced/ Widowed | | 14.80 (1.34) | 13.56 (1.08) | 20.42 (1.23) | 11.56 (0.75) | 18.18 (1.30) | 18.08 (1.92) | 16.66 (3.02) | 15.08 (0.52) |
| **Education Attainment**[a] | 12,518 | | | | | | | | |
| < High School | | 32.91 (1.87) | 35.67 (1.88) | 17.90 (1.19) | 34.76 (1.33) | 30.58 (1.65) | 20.75 (2.01) | 17.98 (3.36) | 29.70 (0.74) |
| High School | | 24.73 (2.14) | 26.60 (1.57) | 30.14 (1.76) | 30.57 (1.06) | 30.05 (1.42) | 26.36 (1.97) | 22.15 (3.87) | 29.00 (0.64) |
| > High School | | 42.37 (2.02) | 37.72 (1.88) | 51.96 (1.79) | 34.67 (1.63) | 39.37 (1.83) | 52.88 (2.34) | 59.87 (4.15) | 41.31 (0.92) |
| **Employment** | 12,666 | | | | | | | | |
| Retired | | 5.86 (0.87) | 3.78 (0.63) | 10.08 (1.12) | 3.47 (0.38) | 14.29 (1.44) | 4.58 (0.90) | 5.40 (2.59) | 6.59 (0.43) |
| Unemployed | | 40.00 (2.44) | 34.39 (1.66) | 41.69 (1.65) | 37.40 (1.20) | 39.54 (1.72) | 29.12 (1.82) | 37.73 (3.58) | 38.08 (0.76) |
| Part-time | | 20.04 (1.73) | 23.37 (1.41) | 12.04 (0.90) | 20.33 (0.93) | 12.56 (1.21) | 23.90 (1.66) | 22.02 (4.05) | 18.19 (0.52) |
| Full-Time | | 34.10 (2.20) | 38.46 (1.77) | 36.18 (1.50) | 38.80 (1.15) | 33.61 (1.83) | 42.41 (2.08) | 34.85 (3.28) | 37.13 (0.74) |
| *Unfair Treatment* | | | | | | | | | |
| **Treated Unfairly, Self**[a] | 12,717 | | | | | | | | |
| Never | | 43.75 (2.07) | 49.17 (1.89) | 67.01 (1.66) | 43.87 (1.11) | 46.59 (1.63) | 49.98 (2.36) | 47.01 (4.14) | 49.11 (0.78) |
| Sometimes | | 40.92 (2.35) | 39.81 (1.81) | 26.50 (1.46) | 46.02 (1.18) | 41.20 (1.65) | 41.66 (2.25) | 41.03 (4.19) | 40.54 (0.73) |
| Often/Always | | 15.33 (2.24) | 11.02 (1.08) | 6.49 (0.72) | 10.11 (0.71) | 12.21 (1.02) | 8.36 (1.28) | 11.96 (3.21) | 10.35 (0.49) |
| **Treated Unfairly, Others**[a] | 12,719 | | | | | | | | |
| Never | | 26.87 (1.59) | 31.36 (1.56) | 51.20 (1.58) | 26.85 (1.23) | 25.71 (1.34) | 36.01 (2.30) | 29.86 (3.53) | 31.83 (0.77) |
| Sometimes | | 41.56 (2.29) | 38.51 (1.95) | 34.89 (1.51) | 46.33 (1.09) | 44.06 (1.69) | 33.08 (1.90) | 46.73 (3.75) | 42.33 (0.71) |
| Often/Always | | 31.57 (2.20) | 30.14 (1.74) | 13.91 (1.13) | 26.82 (1.03) | 30.23 (1.70) | 30.91 (1.95) | 23.41 (3.33) | 25.84 (0.66) |
| *Acculturation Factors* | | | | | | | | | |
| **Acculturation Level**[a] | 12,741 | | | | | | | | |
| 1 | | 48.28 (2.52) | 65.17 (2.25) | 71.29 (1.72) | 47.70 (1.25) | 15.23 (1.11) | 55.97 (2.37) | 20.63 (3.97) | 47.60 (0.98) |
| 2 | | 24.35 (1.83) | 18.92 (1.70) | 15.31 (1.20) | 24.42 (0.93) | 17.08 (1.46) | 31.24 (2.16) | 18.20 (2.99) | 21.44 (0.62) |
| 3 | | 18.84 (1.73) | 9.71 (1.23) | 9.39 (1.13) | 16.37 (0.87) | 24.77 (1.51) | 8.20 (1.18) | 28.64 (4.34) | 16.26 (0.57) |
| 4 | | 8.00 (2.02) | 5.55 (1.06) | 3.37 (0.69) | 8.88 (0.77) | 29.12 (1.71) | 3.25 (0.83) | 20.79 (2.80) | 10.80 (0.57) |

| Characteristic | N | Dominican (n=1,114) | Central American (n=1,337) | Cuban (n=1,583) | Mexican (n=5,546) | Puerto Rican (n=1,911) | South American (n=872) | Mixed/ Other (n=387) | Total (n=12,750) |
|---|---|---|---|---|---|---|---|---|---|
| 5 | | 0.53 (0.37) | 0.66 (0.29) | 0.63 (0.26) | 2.63 (0.43) | 13.80 (1.41) | 1.34 (0.55) | 11.73 (2.18) | 3.90 (0.33) |
| **Ethnic ID Score**[b] | 12,707 | 3.22 (0.03) | 3.27 (0.02) | 3.26 (0.02) | 3.15 (0.01) | 3.08 (0.02) | 3.23 (0.02) | 3.10 (0.05) | 3.18 (0.01) |
| **Nativity**[a] | 12,750 | | | | | | | | |
| Foreign Born | | 84.71 (2.13) | 93.78 (1.02) | 92.36 (1.06) | 76.19 (1.10) | 48.25 (1.83) | 94.25 (1.07) | 44.58 (3.95) | 76.55 (0.80) |
| US Born | | 15.29 (2.13) | 6.22 (1.02) | 7.65 (1.06) | 23.81 (1.10) | 51.75 (1.83) | 5.75 (1.07) | 55.42 (3.95) | 23.45 (0.80) |
| ***Behavioral Factors*** | | | | | | | | | |
| **Health Insurance**[a] | 12,657 | | | | | | | | |
| No | | 31.08 (2.16) | 69.32 (2.09) | 60.91 (1.65) | 57.37 (1.55) | 24.06 (1.49) | 58.94 (2.31) | 43.55 (4.06) | 50.98 (0.98) |
| Yes | | 68.92 (2.16) | 30.68 (2.09) | 39.09 (1.65) | 42.63 (1.55) | 75.94 (1.49) | 41.06 (2.31) | 56.45 (4.06) | 49.02 (0.98) |
| **Past year dental visit**[a] | 12,707 | | | | | | | | |
| No | | 34.41 (2.08) | 57.46 (2.04) | 52.10 (1.62) | 54.39 (1.29) | 46.05 (1.89) | 46.69 (2.53) | 47.95 (3.50) | 50.40 (0.82) |
| Yes | | 65.59 (2.08) | 42.54 (2.04) | 47.90 (1.62) | 45.61 (1.29) | 53.95 (1.89) | 53.31 (2.53) | 52.05 (3.50) | 49.60 (0.82) |
| **Cigarette Use**[a] | 12,733 | | | | | | | | |
| Never | | 78.40 (1.85) | 73.01 (1.63) | 56.21 (1.79) | 64.01 (1.16) | 51.69 (1.81) | 66.07 (2.28) | 56.83 (4.09) | 62.67 (0.69) |
| Former | | 10.70 (1.05) | 13.70 (1.08) | 18.88 (1.23) | 18.19 (0.91) | 15.03 (1.08) | 21.86 (1.77) | 18.13 (2.79) | 16.98 (0.50) |
| Current | | 10.90 (1.81) | 13.29 (1.22) | 24.91 (1.42) | 17.81 (0.97) | 33.27 (1.74) | 12.08 (1.54) | 25.04 (3.60) | 20.34 (0.63) |
| **Medication**[a] | 12,750 | | | | | | | | |
| None | | 75.36 (1.99) | 85.08 (1.13) | 71.07 (1.58) | 84.65 (0.90) | 71.05 (1.65) | 86.44 (1.43) | 81.79 (3.33) | 79.39 (0.68) |
| At least one | | 24.64 (1.99) | 14.92 (1.13) | 28.93 (1.58) | 15.35 (0.90) | 28.95 (1.65) | 13.56 (1.43) | 18.21 (3.33) | 20.61 (0.68) |
| ***Outcome*** | | | | | | | | | |
| **Periodontal disease status**[a] | 12,750 | | | | | | | | |
| None | | 67.88 (2.04) | 46.47 (1.81) | 42.20 (1.66) | 49.24 (1.28) | 55.22 (1.85) | 53.95 (2.36) | 64.72 (3.44) | 51.85 (0.74) |
| Mild/ Moderate/Severe | | 32.12 (2.04) | 53.53 (1. 81) | 57.80 (1.66) | 50.76 (1.28) | 44.78 (1.85) | 46.05 (2.36) | 35.28 (3.44) | 48.15 (0.74) |

[a]Statistic presented is percent (standard error).

[b]Statistic presented is mean (standard error).

**Table 2.**

Descriptive statistics[a,b] of sample characteristics by periodontal health status, Hispanic Community Health Study/Study of Latinos, 2008–2011

| Characteristic | N | Periodontal Health | Mild periodontitis[a] | Moderate periodontitis[b] | Severe periodontitis[c] |
|---|---|---|---|---|---|
| **All subjects** | 12,750 | 51.39 (0.79) | 10.11 (0.44) | 30.30 (0.67) | 8.20 (0.32) |
| **Center** | 12,750 | | | | |
| Bronx | | 68.07 (1.54) | 7.33 (0.74) | 17.46 (1.12) | 7.14 (0.57) |
| Chicago | | 40.57 (1.29) | 14.03 (0.83) | 35.30 (1.21) | 10.09 (0.58) |
| Miami | | 43.59 (1.25) | 6.34 (0.60) | 40.25 (1.25) | 9.81 (0.73) |
| San Diego | | 49.82 (1.55) | 13.69 (1.02) | 29.93 (1.22) | 6.56 (0.54) |
| *Socio-demographics* | | | | | |
| **Hispanic/Latino heritage** | 12,750 | | | | |
| Dominican | | 67.88 (2.04) | 7.23 (1.31) | 18.04 (1.56) | 6.85 (0.88) |
| Central American | | 46.47 (1.81) | 10.81 (1.14) | 35.71 (1.67) | 7.01 (0.76) |
| Cuban | | 42.20 (1.66) | 5.23 (0.73) | 41.54 (1.72) | 11.03 (0.88) |
| Mexican | | 49.24 (1.28) | 13.36 (0.78) | 30.39 (0.98) | 7.00 (0.40) |
| Puerto Rican | | 55.22 (1.86) | 9.49 (0.88) | 24.23 (1.49) | 11.05 (1.02) |
| South American | | 53.95 (2.36) | 8.12 (1.15) | 29.79 (2.07) | 8.14 (1.20) |
| Mixed/Other | | 64.72 (3.44) | 7.86 (1.85) | 23.77 (3.17) | 3.66 (0.93) |
| **Age** | 12,750 | | | | |
| 18—34 | | 77.55 (1.61) | 10.80 (1.09) | 11.59 (1.19) | 0.07 (0.05) |
| 35—49 | | 55.87 (1.18) | 11.98 (0.68) | 27.59 (1.05) | 4.57 (0.38) |
| 50—64 | | 34.33 (1.01) | 8.11 (0.55) | 41.17 (1.02) | 16.39 (0.69) |
| ≥ 65 | | 30.46 (2.65) | 4.09 (0.79) | 48.05 (2.70) | 17.40 (1.86) |
| **Sex** | 12,750 | | | | |
| Female | | 57.40 (1.03) | 10.13 (0.60) | 26.38 (0.85) | 6.09 (0.35) |
| Male | | 45.17 (1.06) | 10.08 (0.62) | 34.36 (0.95) | 10.4 (0.53) |
| **Household Income** | 12,750 | | | | |
| < $10,000 | | 48.64 (1.86) | 8.49 (0.95) | 34.13 (1.56) | 8.74 (0.73) |
| $10,000—<$20,000 | | 49.82 (1.34) | 9.65 (0.64) | 30.79 (1.10) | 9.74 (0.59) |
| $20,000—<$40,000 | | 49.78 (1.20) | 11.00 (0.74) | 31.07 (1.04) | 8.15 (0.53) |
| $40,000—<$75,000 | | 55.88 (1.80) | 11.01 (1.20) | 27.56 (1.55) | 5.56 (0.62) |
| ≥ $75,000 | | 62.85 (2.83) | 8.74 (1.24) | 22.27 (2.16) | 6.14 (1.64) |
| **Marital Status** | 12,737 | | | | |
| Single | | 63.43 (1.28) | 11 (0.80) | 20.64 (1.00) | 4.93 (0.47) |
| Married/Partner | | 46.28 (1.03) | 10.02 (0.57) | 34.76 (0.86) | 8.93 (0.43) |
| Separated/Divorced/ Widowed | | 41.52 (1.57) | 8.15 (0.75) | 37.18 (1.58) | 13.15 (1.05) |
| **Education Attainment** | 12,518 | | | | |
| < High School | | 43.09 (1.40) | 10.09 (0.72) | 35.44 (1.19) | 11.38 (0.61) |
| High School | | 53.84 (1.34) | 10.61 (0.70) | 29.29 (1.19) | 6.25 (0.47) |
| > High School | | 55.63 (1.13) | 9.90 (0.75) | 27.32 (0.94) | 7.15 (0.49) |

| Characteristic | N | Periodontal Health | Mild periodontitis[a] | Moderate periodontitis[b] | Severe periodontitis[c] |
|---|---|---|---|---|---|
| **Employment** | 12,666 | | | | |
| Retired | | 32.24 (2.94) | 5.91 (1.15) | 45.37 (2.89) | 16.49 (1.75) |
| Unemployed | | 54.91 (1.27) | 9.88 (0.76) | 27.46 (1.06) | 7.76 (0.47) |
| Part-time | | 58.11 (1.51) | 11.74 (1.12) | 24.42 (1.21) | 5.73 (0.60) |
| Full-time | | 47.64 (1.12) | 10.37 (0.66) | 33.49 (1.05) | 8.49 (0.52) |
| *Unfair Treatment* | | | | | |
| **Treated unfairly, self** | 12,717 | | | | |
| Never | | 49.79 (0.95) | 9.69 (0.59) | 31.50 (0.87) | 9.02 (0.48) |
| Sometimes | | 52.65 (1.10) | 10.61 (0.65) | 29.26 (0.91) | 7.48 (0.46) |
| Often | | 53.28 (2.42) | 10.80 (1.30) | 29.03 (1.96) | 6.89 (0.95) |
| Always | | 54.79 (4.61) | 8.03 (2.04) | 28.75 (3.74) | 8.43 (1.57) |
| **Treated unfairly, others** | | | | | |
| Never | | 50.61 (1.29) | 9.14 (0.69) | 31.23 (1.15) | 9.02 (0.57) |
| Sometimes | | 52.32 (1.06) | 11.13 (0.73) | 28.60 (0.88) | 7.95 (0.48) |
| Often | | 50.11 (1.58) | 9.43 (0.80) | 32.99 (1.53) | 7.47 (0.61) |
| Always | | 52.92 (2.84) | 10.39 (1.45) | 28.47 (2.14) | 8.22 (1.31) |
| *Acculturation Factors* | | | | | |
| **Acculturation Level** | 12,741 | | | | |
| 1 | | 43.22 (0.96) | 8.64 (0.51) | 37.14 (0.90) | 11.01 (0.52) |
| 2 | | 50.92 (1.53) | 11.56 (1.03) | 30.04 (1.23) | 7.47 (0.64) |
| 3 | | 63.56 (1.68) | 11.39 (1.08) | 20.79 (1.32) | 4.26 (0.58) |
| 4 | | 61.58 (2.46) | 12.72 (1.52) | 20.44 (1.77) | 5.27 (0.99) |
| 5 | | 74.52 (2.87) | 7.51 (1.61) | 15.43 (2.29) | 2.54 (0.68) |
| **Ethnic ID Score**[d] | 12,707 | 3.16 (0.01) | 3.15 (0.02) | 3.20 (0.01) | 3.23 (0.02) |
| **Nativity** | 12,750 | | | | |
| Foreign Born | | 47.25 (0.81) | 9.42 (0.45) | 33.79 (0.72) | 9.54 (0.37) |
| US Born | | 64.92 (1.59) | 12.34 (1.04) | 18.90 (1.10) | 3.84 (0.53) |
| *Behavioral Factors* | | | | | |
| **Health Insurance** | 12,657 | | | | |
| No | | 47.16 (1.05) | 11.08 (0.60) | 33.39 (0.92) | 8.37 (0.45) |
| Yes | | 55.39 (1.08) | 9.19 (0.59) | 27.34 (0.87) | 8.09 (0.44) |
| **Past year dental visit** | 12,707 | | | | |
| No | | 47.38 (1.07) | 11.26 (0.60) | 32.43 (0.95) | 8.92 (0.46) |
| Yes | | 55.42 (0.97) | 8.81 (0.57) | 28.26 (0.84) | 7.52 (0.43) |
| **Cigarette Use** | 12,733 | | | | |
| Never | | 55.81 (0.86) | 10.48 (0.54) | 27.28 (0.76) | 6.43 (0.34) |
| Former | | 37.81 (1.47) | 9.76 (0.94) | 40.62 (1.55) | 11.80 (0.85) |
| Current | | 49.15 (1.86) | 9.25 (0.93) | 30.91 (1.53) | 10.69 (0.79) |
| **Medications** | 12,750 | | | | |
| None | | 53.64 (0.87) | 10.57 (0.48) | 28.45 (0.75) | 7.34 (0.34) |
| At least one | | 42.75 (1.55) | 8.30 (0.85) | 37.43 (1.43) | 11.52 (0.77) |

[a] Mild periodontitis ≥ 2 interproximal sites with ≥ 3mm CA loss and ≥ 2 interproximal site with ≥ 4mm pocket depth (not on same tooth); or 1 site with ≥ 5mm PD

[b] Moderate periodontitis > 2 interproximal sites with CA loss > 4mm (not on same tooth); or >2 interproximal sites with PD > 5mm (not on same tooth)

[c] Severe periodontitis > 2 interproximal sites with CA loss > 6mm (not on same tooth) and > 1 interproximal site with PD > 5 mm

[d] Statistic presented is mean (standard error).

**Table 3.**

Crude (CPR) and adjusted prevalence ratios (APR) and 95% confidence limits (CL) for associations between sociodemographic characteristics, unfair treatment, acculturation and behavioral factors and periodontitis, Hispanic Community Health Study/Study of Latinos, 2008—2011 (n=12,750)

| | Unadjusted | | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|---|---|
| **Characteristic** | **CPR (95% CL)** | **p-value** | **APR (95% CI)** | **p-value** | **APR (95% CI)** | **p-value** | **APR (95% CI)** | **p-value** |
| *Socio-demographics* | | | | | | | | |
| **Heritage group (ref: Dominican)** | | <.01 | | <.01 | | <.01 | | <.01 |
| Central American | 2.43 (1.95, 3.03) | | 2.50 (1.98, 3.16) | | 2.47 (1.95, 3.13) | | 2.09 (1.64. 2.67) | |
| Cuban | 2.89 (2.31, 3.63) | | 2.34 (1.83, 2.98) | | 2.28 (1.78, 2.92) | | 1.92 (1.49, 2.47) | |
| Mexican | 2.18 (1.77, 2.68) | | 2.46 (1.98, 3.07) | | 2.47 (1.98, 3.09) | | 2.10 (1.67, 2.63) | |
| Puerto Rican | 1.15 (0.82, 1.62) | | 1.61 (1.28, 2.04) | | 1.79 (1.39, 2.30) | | 1.62 (1.25, 2.11) | |
| South American | 1.71 (1.37, 2.14) | | 1.66 (1.26, 2.19) | | 1.65 (1.25, 2.18) | | 1.40 (1.06, 1.86) | |
| Mixed/Other | 1.80 (1.39, 2.34) | | 1.69 (1.15, 2.47) | | 1.77 (1.18, 2.65) | | 1.53 (1.03, 2.27) | |
| **Age** | 1.05 (1.05, 1.06) | <.01 | 1.05 (1.05, 1.06) | <.01 | 1.05 (1.05, 1.06) | <.01 | 1.06 (1.05, 1.06) | <.01 |
| **Sex (ref: female)** | | <.01 | | <.01 | | <.01 | | <.01 |
| Male | 1.64 (1.47, 1.83) | | 1.86 (1.64, 2.11) | | 1.88 (1.66, 2.13) | | 1.71 (1.51, 1.95) | |
| **Household Income (ref: < $10,000)** | | <.01 | | <.01 | | <.01 | | <.01 |
| $10,000—<$20,000 | 0.95 (0.79, 1.14) | | 1.01 (0.84, 1.23) | | 1.02 (0.85, 1.24) | | 1.00 (0.82, 1.20) | |
| $20,000—<$40,000 | 0.96 (0.81, 1.19) | | 0.98 (0.81, 1.18) | | 0.99 (0.82, 1.19) | | 1.00 (0.83, 1.19) | |
| $40,000—<$75,000 | 0.75 (0.61, 0.91) | | 0.76 (0.60, 0.96) | | 0.78 (0.61, 0.98) | | 0.84 (0.66, 1.07) | |
| ≥ $75,000 | 0.56 (0.42, 0.74) | | 0.46 (0.33, 0.66) | | 0.47 (0.33, 0.67) | | 0.56 (0.39, 0.81) | |
| **Marital Status (ref: Single)** | | <.01 | | .21 | | .38 | | .41 |
| Married/Partner | 2.01 (1.78, 2.28) | | 1.13 (0.98, 1.30) | | 1.10 (0.95, 1.27) | | 1.10 (0.95, 1.27) | |
| Separated/Divorced/Widowed | 2.44 (2.08, 2.87) | | 1.13 (0.94, 1.36) | | 1.11 (0.93, 1.34) | | 1.10 (0.91, 1.32) | |
| **Education (ref: < High School)** | | <.01 | | <.01 | | <.01 | | <.01 |
| High School | 0.65 (0.56, 0.75) | | 0.83 (0.72, 0.97) | | 0.86 (0.74, 1.00) | | 0.87 (0.75, 1.02) | |
| > High School | 0.60 (0.52, 0.70) | | 0.73 (0.62, 0.86) | | 0.76 (0.64, 0.89) | | 0.78 (0.66, 0.92) | |
| **Employment (ref: Full-time)** | | <.01 | | <.01 | | <.01 | | <.01 |
| Retired | 2.24 (1.72, 2.92) | | 0.54 (0.40, 0.72) | | 0.55 (0.41, 0.74) | | 0.65 (0.49, 0.86) | |
| Unemployed | 0.75 (0.66, 0.86) | | 0.83 (0.72, 0.95) | | 0.83 (0.73, 0.95) | | 0.83 (0.72, 0.95) | |
| Part-time | 0.60 (0.52, 0.69) | | 0.72 (0.61, 0.85) | | 0.72 (0.61, 0.86) | | 0.72 (0.61, 0.84) | |

| Characteristic | Unadjusted CPR (95% CL) | p-value | Model 1 APR (95% CI) | p-value | Model 2 APR (95% CI) | p-value | Model 3 APR (95% CI) | p-value |
|---|---|---|---|---|---|---|---|---|
| *Unfair Treatment* | | | | | | | | |
| **Treated unfairly, self (ref: Never)** | | <.01 | | .03 | | .02 | | .02 |
| Sometimes | 0.89 (0.80, 0.99) | | 0.84 (0.73, 0.97) | | 0.84 (0.73, 0.96) | | 0.84 (0.73, 0.96) | |
| Often/Always | 0.86 (0.70, 1.04) | | 0.78 (0.62, 0.98) | | 0.78 (0.62, 0.98) | | 0.77 (0.62, 0.97) | |
| **Treated unfairly, others (ref: Never)** | | .04 | | .07 | | .03 | | .04 |
| Sometimes | 0.93 (0.87, 1.14) | | 1.22 (1.01, 1.47) | | 1.24 (1.04, 1.47) | | 1.24 (1.04, 1.47) | |
| Often/Always | 1.00 (0.82, 1.14) | | 1.21 (1.02, 1.44) | | 1.25 (1.03, 1.51) | | 1.24 (1.02, 1.49) | |
| *Acculturation factors* | | <.01 | | | | <.01 | | <.01 |
| **Acculturation Level** | 0.48 (0.42, 0.56) | | | | 0.87 (0.79, 0.95) | | 0.88 (0.81, 0.97) | |
| **Ethnic ID Score** | 1.09 (0.98, 1.21) | <.01 | | | 1.02 (0.92, 1.14) | .69 | 1.03 (0.92, 1.14) | .65 |
| **Nativity (ref: Foreign Born)** | | <.01 | | | | .06 | | .05 |
| US Born | 0.71 (0.67, 0.75) | | | | 1.24 (0.99, 1.55) | | 1.25 (1.00, 1.56) | |
| *Behavioral factors* | | | | | | | | |
| **Health Insurance (ref: No)** | | <.01 | | | | | | <.01 |
| Yes | 0.72 (0.64, 0.81) | | | | | | 0.76 (0.66, 0.88) | |
| **Past year dental visit (ref: No)** | | <.01 | | | | | | <.01 |
| Yes | 1.38 (1.24, 1.53) | | | | | | 1.27 (1.13, 1.43) | |
| **Cigarette Use (ref: Never)** | | <.01 | | | | | | <.01 |
| Current | 1.31 (1.22, 1.52) | | | | | | 1.18 (1.01, 1.39) | |
| Former | 2.08 (1.82, 2.38) | | | | | | 1.36 (1.16, 1.58) | |
| **Medications (ref: None)** | | <.01 | | | | | | .07 |
| At least one medication | 1.55 (1.35, 1.78) | | | | | | 0.86 (0.73, 1.01) | |

*J Racial Ethn Health Disparities*. Author manuscript; available in PMC 2019 October 01.