Racial/Ethnic Disparities in Self-Reported Pediatric Orthodontic Visits in the United States

Christopher Okunseri, BDS, MSc; Nicholas M. Pajewski, BS; Emily L. McGinley, MS, MPH; Raymond G. Hoffmann, PhD

Abstract

Objective: *Studies in orthodontics have focused primarily on clinical care and techniques. Little, however, has been reported from epidemiological studies using national data on orthodontic dental visits as a measure of orthodontic service utilization and access to care in minority populations. We examined the effect of race/ethnicity and socioeconomic factors on pediatric orthodontic visits in the United States.* ***Methods:*** *We analyzed data from the Medical Expenditure Panel Survey, 1996-2004. Descriptive and multiple regression analyses were performed, with self-reported orthodontic visits in a given year as the main outcome variable.* ***Results:*** *The prevalence of an orthodontic visit among children ages 9 to 18 years remained relatively constant (ranged between 14.3 percent and 16.8 percent) from 1996 to 2004. Multiple regression analyses revealed significantly lower odds of an orthodontic visit for Black and Hispanic children in comparison with White children. Males, children from low-income families, children eligible for Medicaid, and children with other public or no insurance were generally less likely to have made an orthodontic visit.* ***Conclusion:*** *Substantial racial/ethnic disparities in self-reported orthodontic visits exist for Black and Hispanic children even after adjusting for possible covariates. Children from lower-income families and those without private health insurance were less likely to report an orthodontic visit in the United States.*

Key Words: orthodontic visits, race/ethnicity, children, oral health disparities

Introduction

Orthodontic treatment is seen largely as cosmetic care because it is aimed at the correction of variations from an arbitrary norm and not an intervention for disease or pathology *per se* (1,2). However, failure to treat patients with moderate to severe malocclusion can result in poor oral function, lack of self-esteem, and reduced social acceptability (3). This combination of factors can impact a person's quality of life and overall well-being (4). Oral health represents an integral component of maintaining general health. Attainment of good oral health requires adequate functioning of the craniofacial complex, which affects speech, chewing, and kissing (5).

Studies in orthodontics primarily focus on clinical care, biomaterials, imaging techniques, and the use of removable or fixed appliances to improve patient care (6-10). Other studies have examined the prevalence of malocclusion and orthodontic treatment need using clinically driven outcome measures and patient-based assessment instruments (11-16). For example, the third National Health and Nutrition Examination Survey showed that 2.3 percent of children 8 to 11 years of age have severe crowding, while 19 percent have maxillary diastema and severe overjet, even without the eruption of all their permanent teeth (11). Another study reported that 10.2 million youths in America have specified occlusal defects, such as large anterior overbites or openbites that should be evaluated by orthodontists (16). Black children have a higher prevalence of severe malocclusion compared with White children (12).

Nationally, to the best of our knowledge, only one study has attempted to examine orthodontic visits or utilization patterns in the United States. Manski et al., using the 1987 National Medical Expenditure Survey and the 1996 Medical Expenditure Panel Survey (MEPS), showed a disparity in orthodontic visits between White and non-White groups (17). They estimated that approximately 3.5 percent of the White population had an orthodontic visit, while only 2 percent of the non-White population had a visit (17). While the White group may be considered a homogenous group, results from the non-White group give the impression that they too are a homogenous group. However, in reality, both are composed of different racial/ethnic minority groups. Both groups are also composed of individuals with different cultures, values and beliefs, religion, and primary languages.

This study investigates differences in utilization patterns for Blacks and Hispanics, as well as for smaller minority groups such as Asians. The study tests the hypothesis that Black and Hispanic children exhibit a disparate level of orthodontic utilization compared to their overall population size. In addition, the study uses

Send correspondence and reprint requests to Christopher Okunseri, BDS, MSc, DDPHRCSE, FFDRCSI, Department of Clinical Services Room 356, Marquette University School of Dentistry, P.O. Box 1881, Milwaukee, WI 53201-1881. Tel.: 414-288-6524; Fax: 414-288-3586; e-mail: christopher.okunseri@marquette.edu. Christopher Okunseri is with the Department of Clinical Services, Marquette University School of Dentistry, Milwaukee, WI. Nicholas M. Pajewski and Raymond G. Hoffmann are with the Department of Population Health, Division of Biostatistics, Medical College of Wisconsin, Milwaukee, WI. Emily L. McGinley is with the Epidemiology Data Service Center, Division of Epidemiology, Medical College of Wisconsin, Milwaukee, WI. Manuscript received: 2/16/07; accepted for publication: 5/19/07.

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multiple regression techniques to investigate whether the racial/ethnic disparities observed by Manski et al. (17) persists after adjusting for socioeconomic differences. The study restricts its analysis to the pediatric population, given that children account for the vast majority of orthodontic visits.

Methods

We analyzed data from alternating years of the MEPS Household Component to determine the overall orthodontic utilization and associated factors among children in the United States, 1996-2004. Conducted by the Agency for Healthcare Research and Quality, MEPS is a national survey of health care use and expenditures that represent the civilian noninstitutionalized population of the United States (18). Oversampling techniques are used to gather more accurate information for underrepresented subsets of the population. Person-level data in the MEPS sample were weighted to provide national population-based estimates.

Study Design. Each calendar year of MEPS data consists of the incoming participants from the previous year and the incoming participants of the current year (e.g., 1997 contains Panel 1 participants who entered MEPS in 1996 and Panel 2 participants who entered MEPS in 1997). Because of this 2-year panel structure, data were analyzed separately in alternating years (1996, 1998, 2000, 2002, and 2004) to avoid the double counting of participants in cross-sectional years. Analyses were performed individually for each year to investigate possible time trends in disparities in orthodontic utilization and to preserve the complex survey weighting structure of the MEPS sample. Children who were <18 years of age when they entered MEPS were considered eligible for this study. Children who were not within the study scope, i.e., part of the noninstitutionalized population for the entire year, were excluded from all analyses.

Study Variables. Orthodontic utilization was defined as the weighted percentage of children who reported at least one orthodontic visit during the current year of their participation in MEPS (1996-2004). We examined demographic characteristics of age, categorized as primary to early mixed dentition stage (0 to 8 years), late mixed dentition stage (9 to 11 years), and permanent dentition stage (12 to 18 years). Other demographic factors included were sex and race/ethnicity (White, Black, Hispanic, Asian or Pacific Islander, and other). We also examined socioeconomic factors, including insurance and household income. For 1996 and 1998, information was only available for health insurance, defined as private insurance, Medicaid, or other public/uninsured. For 2000, 2002, and 2004, respondents were also asked if they had dental coverage at three time points during the year. Respondents were classified as having dental insurance if they had no lapses in coverage during the year. This self-report of dental insurance was separate from dental coverage afforded by Medicaid eligibility. To account for multicollinearity with health insurance, this self-report of dental insurance was combined with health insurance status to provide a joint indicator of insurance (private with dental, private without dental, Medicaid, and other public/uninsured). In our analyses, income levels were categorized as poor/near poor-low income (<200 percent of poverty line), middle income (between 200 and 400 percent), and high income (>400 percent). The MEPS survey also provides information concerning parental education, which was defined as the highest level of education attained by a child's parent(s). Parental education was categorized as high school or less, greater than high school but less than 4 years of college, 4 or more years of college, and unknown. We also included information concerning a child's dental visits, categorized as none in the current year and one or more in the current year.

Statistical Analysis. All analyses account for the complex survey design of MEPS using appropriate survey weights to produce national-level estimates from the person-level data (19,20). Descriptive and logistic regression analyses were performed to examine the effect of demographic and socioeconomic variables on the outcome of having had at least one orthodontic visit in a year. For all regression analyses, age was dichotomized as late mixed dentition (9 to 11 years) and permanent dentition stages (12 to 18 years). Children younger than 9 years old were excluded because the majority of orthodontic procedures occur during or following the late mixed dentition stage. Family income level and insurance status were used as markers of socioeconomic status (SES) in each analysis. Parental education was excluded because of multicollinearity issues with family income level. We also performed regression analyses using parental education in lieu of family income; however, the results were highly similar and are not reported here. The results for each regression are reported utilizing only the main effects for each of the possible covariates. We also investigated possible interactions between race, insurance, income, and dental visits but were unable to detect any significant interactions between those variables. All analyses were performed using the svy: package in STATA v.9 (StataCORP, College Station, TX). A significance level of 0.05 was used throughout to denote statistical significance. This study was approved by the institutional review board of Marquette University.

Results

Weighted estimates for demographic and socioeconomic characteristics of the US pediatric population are presented in Table 1. Table 2 provides estimates of pediatric orthodontic utilization among children in the late mixed and primary dentition stages (9 to 18 years of age). The prevalence of children with at least one orthodontic visit in this age group ranged from a low of 14.3 percent [95 percent confidence intervals (CI): 12.5 to 16.3]

Table 1
Eligible Study Sample Size and Weighted US Population Characteristics by Year

	1996 (%)	1998 (%)	2000 (%)	2002 (%)	2004 (%)
Eligible sample size	6,323	7,015	7,147	11,463	10,026
Sex					
Male	51.8	51.2	51.5	51.2	51.1
Female	48.2	48.8	48.5	48.8	48.9
Age (years)					
0-8	44.9	44.6	45.0	43.5	42.7
9-11	16.8	16.9	16.8	16.8	16.6
12-18	38.4	38.5	38.3	39.8	40.7
Race/ethnicity					
White	65.6	64.7	63.4	60.1	58.8
Black	15.6	15.7	15.6	14.9	15.1
Latino/Hispanic	14.5	15.5	16.2	18.1	19.2
Asian/Pacific Islander	3.3	3.4	3.5	4.0	4.0
Other	1.0	0.7	0.9	3.0	2.8
Insurance					
Any private	69.7	69.9	70.4	66.8	64.6
Medicaid	19.1	20.0	20.2	25.3	27.8
Other public	0.4	0.5	0.4	0.6	0.4
Uninsured	10.8	9.7	9.1	7.4	7.2
Dental insurance*					
Yes	NA	NA	42.1	40.8	41.3
Parental education					
High school or less	49.3	45.3	45.2	46.2	43.6
>HS but <4 years of college	21.9	25.1	22.9	23.5	24.5
4 years of college or more	25.1	26.4	29.1	27.5	29.0
Unknown	3.7	3.2	2.8	2.9	2.9
Household income					
Poor/low income	42.4	39.3	36.2	37.9	39.2
Middle income	34.2	33.2	33.8	34.5	32.7
High income	23.4	27.5	30.0	27.7	28.1
Dental visits					
One or more in current year	60.2	59.4	59.6	57.9	55.9
None in current year	39.8	40.6	40.4	42.1	44.2

* Self-report of dental insurance. Does not account for subjects eligible for Medicaid.
NA, Not available in current study year.

in 1998, to a high of 16.8 percent (95 percent CI: 15.4 to 18.4) in 2004. Although these estimates possibly indicate an increasing trend in utilization, this variation was not statistically significant (*trend P*-value = 0.18).

Table 3 describes weighted estimates of children 9 to 18 years old (for 2000 and 2004) who made at least one orthodontic visit by demographic and socioeconomic factors. Clear differences exist in terms of age, race/ethnicity, insurance status, income distribution, parental education, and dental visits in comparison with the composition of the population for that age group. In 2004, children aged 12 to 18 years accounted for 78.6 percent of the subjects with an orthodontic visit, while they comprise 71.0 percent of the population (children 9 to 18 years old). Similarly, White children accounted for 77.1 percent of subjects with a visit, while they constitute 59.9 percent of the population. Children from low-income families accounted for 12.4 percent of orthodontics users, while they represent 35.9 percent of the population. This suggests that racial/ethnic minority groups constitute a smaller proportion of users of orthodontic services in comparison to their overall population size (Figure 1).

The results of the logistic regression analysis (Table 4) show that the race/ethnicity and socioeconomic differences observed in Table 3 persist even after adjusting for other possible covariates. Because the odds ratio (OR) CI overlap for each significant factor, there appear to be no apparent temporal trends in terms of differential utilization patterns. Due to the lack of differences over time, we only discussed the results for the latest year, 2004. Children over the age of 11 were more likely to have made an orthodontic visit (OR: 1.86, 95 percent CI: 1.47-2.36) in comparison with children between the ages of 9 and 11 years. Black children were less likely to have made a visit compared with White children (OR: 0.57, 95 percent CI: 0.39-0.83). Hispanic children were less likely to have made an orthodontic visit compared with White children (OR: 0.80, 95 percent CI: 0.55-1.19); however, it was not statistically significant. As shown in Table 4, Hispanic children were significantly less likely to have made a visit in 1998, 2000, and 2002. This suggests a disparity in orthodontic visits among Hispanic children, although it is subtler than that seen in Black children. Children eligible for Medicaid as well as children with other public insurance/uninsured were less likely to have reported a visit in comparison with children with private health insurance and dental insurance (OR: 0.44, 95 percent CI: 0.29-0.67 and OR: 0.36, 95 percent CI: 0.20-0.65, respectively). In 2004, women did not have higher odds of an orthodontic visit compared with men, although they had significantly higher odds in all other years analyzed. This result is most likely not indicative of a shift in usage among male and female children as the OR CI overlap for each year. The result for gender differences in 2004 probably relates to sampling variability.

In order to validate the racial disparities observed in our regression analyses, we also conducted a comparison of the racial populations in a subset of the most likely orthodon-

Table 2
Weighted US Population Estimates of Pediatric Orthodontic Visits for Children (Ages 9 to 12 Years Old)

Year	Prevalence of orthodontic visit among US children (95% CI)	Prevalence of an orthodontic visit among White children (95% CI)	Prevalence of an orthodontic visit among non-White children (95% CI)
1996	15.9 (14.1, 18.0)	19.7 (17.2, 22.5)	8.2 (6.3, 10.6)
1998	14.3 (12.5, 16.3)	18.6 (16.2, 21.2)	6.0 (4.6, 7.8)
2000	16.6 (14.6, 18.7)	21.8 (19.2, 24.7)	6.8 (5.2, 8.8)
2002	15.3 (13.99, 16.6)	20.3 (18.5, 22.2)	7.3 (6.0, 8.8)
2004	16.8 (15.4, 18.4)	21.7 (19.5, 24.0)	9.6 (8.0, 11.6)

CI, confidence intervals.

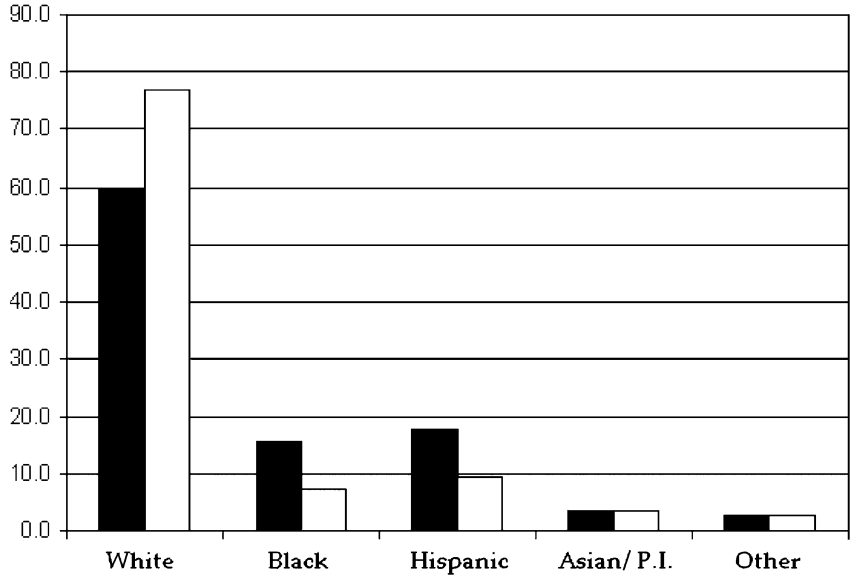
Table 3
Weighted US Population Characteristics of Children (Ages 9 to 18 Years Old) with at Least One Orthodontic Visit

	2000† (%)	Overall 2000‡ (%)	2004† (%)	Overall 2004‡ (%)
Sex				
Male	45.2 (40.3-50.2)	50.8 (48.6-53.1)	47.5 (42.8-52.3)	51.0 (49.2-52.7)
Female	54.8 (49.8-59.7)	49.2 (46.9-51.5)	52.5 (47.8-57.2)	49.0 (47.3-50.8)
Age (years)				
9-11	23.0 (18.7-28.0)	30.5 (28.6-32.4)	21.4 (18.2-25.1)	29.0 (27.5-30.5)
12-18	77.0 (72.0-81.3)	69.5 (67.6-71.4)	78.6 (75.0-81.8)	71.0 (69.5-72.5)
Race/ethnicity				
White	85.7 (0.81-89.5)	65.2 (61.8-68.4)	77.1 (72.4-81.3)	59.9 (57.4-62.4)
Black	4.5 (2.8-7.3)	15.6 (12.9-18.7)	7.3 (5.1-10.3)	15.7 (13.8-17.9)
Latino/Hispanic	6.7 (4.9-9.0)	15.1 (12.7-18.0)	9.3 (6.9-12.5)	17.9 (15.9-19.9)
Asian/Pacific Islander	2.5 (1.0-6.0)	3.2 (2.3-4.4)	3.5 (2.2-5.7)	3.7 (2.9-4.7)
Other	0.6 (0.2-1.9)	0.9 (0.4-2.1)	2.7 (1.5-5.1)	2.8 (2.1-3.7)
Insurance				
Any private	90.9 (88.1-93.1)	72.1 (69.2-74.8)	90.7 (88.2-92.7)	67.0 (64.7-69.2)
Medicaid	4.2 (2.7-6.7)	17.1 (15.1-19.4)	6.4 (4.8-8.5)	24.3 (22.3-26.4)
Other public	0.1 (0.0-0.08)	0.4 (0.2-0.7)	0.4 (0.1-1.4)	0.3 (0.2-0.7)
Uninsured	4.7 (3.1-7.3)	10.4 (8.9-12.2)	2.5 (1.4-4.4)	8.5 (7.4-9.7)
Dental insurance*				
Yes	54.4 (48.6-60.0)	43.8 (40.8-46.9)	55.8 (50.5-61.0)	42.6 (40.4-44.8)
Parental education				
High school or less	26.3 (21.5-31.7)	46.4 (43.6-49.1)	25.1 (21.1-29.5)	45.0 (42.6-47.4)
>HS but <4 years of college	25.4 (21.3-30.0)	23.2 (21.5-25.0)	24.0 (19.6-29.0)	24.8 (22.8-26.9)
4 years of college or more	47.2 (41.1-53.4)	26.8 (24.3-29.4)	50.0 (44.2-55.7)	26.6 (24.4-29.0)
Unknown	1.1 (0.5-2.5)	3.7 (3.0-4.4)	1.0 (0.5-2.1)	3.6 (3.0-4.3)
Household income				
Poor/low income	15.3 (11.9-19.3)	33.2 (30.4-36.1)	12.4 (9.8-15.6)	35.9 (33.6-38.2)
Middle income	32.1 (26.4-38.4)	33.7 (31.3-36.3)	30.9 (26.2-35.9)	33.9 (31.4-36.5)
High income	52.6 (46.7-58.5)	33.1 (30.4-35.9)	56.7 (51.4-61.9)	30.2 (28.0-32.6)
Dental visit				
One or more in current year	66.7 (60.9-72.1)	54.0 (51.4-56.5)	72.1 (67.9-76.0)	51.8 (49.5-54.1)
None in current year	33.3 (27.9-39.1)	46.0 (43.5-48.6)	27.9 (24.0-32.0)	48.2 (45.9-50.5)

* Self-report of dental insurance. Does not account for subjects eligible for Medicaid.
† Denotes population percentage for children ages 9-18 with an orthodontic visit.
‡ Denotes population percentage for children ages 9-18.
Values inside parentheses denote 95% confidence intervals.

tics users (Table 5). This subgroup was composed of children over the age of 11 years from high socioeconomic backgrounds, defined as middle to high-income families with both private health insurance and dental insurance. In comparison with White children, Black children were less likely to have made a visit in all years, while Hispanic children were less likely in 1998, 2000, and 2002. Because Black and Hispanic children were less likely to be users of orthodontics services even among high-SES children, this may suggest some specific cultural differences leading to the observed differences in orthodontic utilization.

Figure 1
Racial and ethnic characteristics of the 2004 Medical Expenditure Panel Survey sample. Dark bars represent the weighted percentage of children 9-18 years old. White bars denote the weighted percentage among children (9-18 years old) with at least one orthodontic visit. PI = Pacific Islander



Discussion

We did not identify any significant differences between White and Asian children in term of self- or parent-reported orthodontic visits. This result appears consistent with findings that Asians do not have difficulty obtaining needed care (21). However, we identified that Black and Hispanic children were significantly less likely to report orthodontic visits even after adjusting for possible covariates. This result is particularly disturbing given that minority groups have greater treatment needs and higher prevalence of severe malocclusion (12,14). In addition, Ahmed et al., in a study conducted in the UK on the agreement between normative and perceived need among deprived multiethnic schoolchildren, reported that Black children were significantly less likely to concur on normative and perceived need scores and to perceive less need for treatment than the dentist (22). Although this study did not investigate the effect of language on self-reported orthodontic visits, the disparity identified among Hispanic children could be a result of the language barrier. Johnson et al. suggested that Hispanics feel that they would have received better medical care if they spoke English as their primary language (23). This language barrier could potentially affect a child's reported orthodontic visit or utilization even if a child's normative and perceived need were correctly assessed.

These results show that disparities in self-reported orthodontic visits represent another major racial/ethnic disparity in oral health and dental care. This is a cause for concern, given the substantial literature documenting that these minority groups have the highest risk for early childhood caries, dental caries, edentulousness, oral cancer, poor access to dental care, and fewer dental visits in the past year (1,24-27). Possible causes for these disparities go beyond the scope of this study, although some explanations include low orthodontist participation in Medicaid, low fee reimbursement from Medicaid, uncooperative patients, and high rates of noncompliance to care (28).

Another troubling facet of these racial disparities relates to the projected future change in the racial landscape of the US population. Findings on the weighted characteristics of our study population reported in Table 1 show a decline (65.6 percent in 1996 to 58.8 percent in 2004) in the proportion of White children and an increase (14.5 percent in 1996 to 19.2 percent in 2004) in the Hispanic population. This result suggests that racial disparities in orthodontic utilization could worsen if not addressed, especially when it is projected that racial/ethnic minority groups will constitute the "majority group" of the US population by 2030 (29).

Our results support the finding by Manski et al. that children from higher-income families with private insurance were more likely to report an orthodontic visit. Even though Medicaid covers orthodontic care especially for the most severe cases, Medicaid-eligible children were still less likely to report an orthodontic visit compared with children with private and dental insurance. Although the difference in gender was not significant in 2004, female children were more likely to be users of orthodontic care in all other years analyzed. Therefore, our results appear in line with that of Wheeler et al. (30), who reported a higher female demand for orthodontic services among third- and fourth-grade US schoolchildren. Wheeler et al. also reported a higher need for orthodontic care among male schoolchildren. Our results appear to indicate that this higher need has not translated into an increase in usage for male children. The prevalence of pediatric orthodontic visits was more closely associated with children in the permanent dentition stage. Children older than 11 years were two times more likely to have reported an orthodontic visit. This result is not at all surprising given the limited number of orthodontic procedures that can be performed prior to a child reaching the permanent dentition stage.

Our study results should be considered in light of some limitations.

Table 4
Weighted US Population Estimates from Multiple Regression Analysis (Adjusted Odds Ratios) for Factors Associated with Pediatric Orthodontic Visits

	Year							
	1996		1998		2000		2002	
Factor	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Sex (ref = male)								
Female	1.32	1.06-1.66	1.39	1.09-1.78	1.33	1.07-1.65	1.20	0.97-1.50
Age (ref = 9-11 years)								
>11 years old	1.74	1.28-2.38	1.40	1.02-1.92	1.59	1.21-2.08	2.12	1.71-2.64
Race (ref = White)								
Black	0.43	0.24-0.77	0.36	0.22-0.61	0.30	0.18-0.50	0.40	0.27-0.58
Latino/Hispanic	0.72	0.49-1.06	0.55	0.36-0.85	0.53	0.38-0.74	0.56	0.41-0.75
Asian/Pacific Islander	1.54	0.76-3.13	0.90	0.40-2.00	0.57	0.24-1.32	0.92	0.60-1.41
Other	1.19	0.33-4.31	0.59	0.13-2.74	0.83	0.19-3.57	0.76	0.40-1.47
Insurance (ref = private)								
Medicaid	0.49	0.30-0.83	0.34	0.19-0.63	–	–	–	–
Other public/uninsured	0.44	0.26-0.75	0.70	0.36-1.35	–	–	–	–
Insurance (ref = private & dental)								
Private and no dental	–	–	–	–	1.12	0.86-1.46	1.11	0.88-1.40
Medicaid	–	–	–	–	0.28	0.09-0.86	0.42	0.18-1.00
Other public/uninsured	–	–	–	–	0.41	0.28-0.61	0.43	0.30-0.61
Income (ref = poor/low)								
Middle income	1.71	1.15-2.56	1.63	1.07-2.48	1.17	0.81-1.69	2.01	1.46-2.77
High income	3.24	2.16-4.85	2.92	1.82-4.69	1.75	1.20-2.55	3.27	2.32-4.63
Dental visits (ref = no dental visit)								
One or more dental visits	2.23	1.70-2.93	2.38	1.78-3.18	2.01	1.51-2.67	1.95	1.60-2.37

CI, confidence intervals.

Table 5
Weighted US Population Comparisons of Orthodontic Visits for High-SES Children

	Odds ratio with White children as Referent Group (95% CI)				
Race/ethnicity	1996	1998	2000	2002	2004
Black	0.38 (0.16, 0.90)	0.33 (0.17, 0.64)	0.11 (0.03, 0.46)	0.45 (0.26, 0.79)	0.45 (0.22, 0.99)
Latino/Hispanic	0.71 (0.42, 1.21)	0.34 (0.17, 0.67)	0.11 (0.03, 0.46)	0.45 (0.26, 0.79)	0.70 (0.37, 1.35)
Asian/Pacific Islander	1.92 (0.70, 5.31)	1.27 (0.63, 2.58)	1.51 (0.49, 4.66)	1.37 (0.75, 2.49)	0.87 (0.37, 2.04)
Other	1.72 (0.28, 10.49)	not estimable	2.09 (0.13, 35.04)	0.85 (0.35, 2.03)	0.77 (0.31, 1.88)

SES, socioeconomic status; CI, confidence intervals.

First, the orthodontic visit data were self- or parent-reported, and no attempt was made to cross-check the responses with actual provider data or treatment records. Self-reported data could lead to under- or over-reporting of orthodontic dental visits. Another limitation is the retrospective nature of the data, which gives little information about future orthodontic dental demand or need, thus making it difficult to adequately project future need for orthodontic dental specialists. Despite these limitations, this study provides nationally representative estimates of pediatric orthodontic visits important for understanding the magnitude and trend of orthodontic utilization in the United States.

In light of the observed disparities in orthodontic visits, the following steps could represent potential solutions for health professionals and policymakers. One useful measure would be to increase reimbursement fees for orthodontic services for Medicaid enrollees. Another possible measure is to increase enrollment of racial/ethnic minority dentists into orthodontic residency programs. This solution is thought to be essential because it would create a workforce that would be more responsive and culturally sensitive to the needs of racial/ethnic minority populations in the United States.

Conclusion

This study identified substantial racial/ethnic disparities in orthodontic visits for Black and Hispanic children even after adjusting for possible covariates. In addition, children from lower-income families, with Medicaid insurance, and those without private insurance and dental insurance were less likely to report an

orthodontic visit. To address the disparity identified in orthodontic visits among Blacks, Hispanics, and male children, programs and policies should be developed to reduce access barriers for orthodontic care in the United States.

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