

Dental Caries and Preventive Dental Visits Among Children in the U.S.: The Impact of Race/Ethnicity and Immigration



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Introduction: National data on dental caries and dental service use among immigrant children in U.S. are limited. It is not known whether race/ethnicity would interact with immigration status to increase these disparities. Using a nationally representative sample, this study assessed the interaction effects of immigrant generation status and race/ethnicity on dental caries and dental visits among children in the U.S.

Methods: Data were from the 2020 and 2021 National Survey of Children's Health. All data were self-reported by parents/guardians. The 2 outcomes were (1) dental caries (yes/no) in the past 12 months and (2) preventive dental visits (yes/no) in the past 12 months. Racial/ethnic groups included non-Hispanic White, Black, Hispanics, and Asian Americans. The analytical sample included 66,167 children aged 2–17 years, including 1,243 first-generation immigrant children; 11,017 second-generation immigrant children; and 53,907 nonimmigrant children. Study authors ran separate multiple logistic regression models for the 2 outcome variables. All analyses accounted for the survey design of National Survey of Children's Health.

Results: First-generation immigrant children were more likely to have dental caries than nonimmigrant children (AOR=1.44). The interaction of race/ethnicity and immigrant generation status was significant ($p=0.04$) in the preventive dental visits model, indicating increased challenges in getting dental visits among minority immigrant children in comparison with that among non-Hispanic White immigrant children, especially among first-generation immigrant children of Asian Americans (AOR=0.41) and non-Hispanic Black immigrant children (AOR=0.37).

Conclusions: First-generation immigrant children were less likely to see a dentist and more likely to have dental caries than nonimmigrants. Moreover, first-generation immigrant children from minority racial/ethnic groups were the least likely to seek dental services. To further reduce disparities in oral health and dental use among children in the U.S., culturally sensitive health promotion is warranted to improve oral health literacy and reduce barriers to dental care for immigrants, especially immigrant children of the minority groups.

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INTRODUCTION

Dental caries is the most common chronic disease among U.S. children, yet it is often neglected, leading to substantial decreases in quality of life and up to 10 million missed school days annually.¹ To prevent dental caries, the American Academy of Pediatric Dentistry recommends regular preventive dental examinations and cleanings for children starting from the time their first tooth appears or by age 1 year.² Existing data show that dental caries and untreated caries are more prevalent in racial and ethnic minority children than in non-Hispanic White children,^{3–5} and the rate of preventive dental visits among children is lower in minority groups.^{6–9}

More than 44.9 million first-generation immigrants live in the U.S., accounting for 13.7% of the U.S. population; 1 in 4 immigrants are children.¹⁰ National data on dental caries and dental service use among immigrant children in U.S. are limited. Prior studies on oral health and dental utilization among immigrant children have mostly focused on specific racial/ethnic groups (e.g., Hispanics or Chinese immigrant children) in a limited geographic area.^{11–15} An exception is a study using the early 2003 National Survey of Children's Health (NSCH)—reported that foreign-born minority children were less likely to receive preventive dental care than U.S.-born White children.¹⁶ More recent data on differences in oral health and dental services use between immigrant and nonimmigrant children across racial/ethnic groups are not available.

Intersectionality theory postulates that inequality based on sex, race, ethnicity, sexual orientation, disability, class, and other forms of discrimination intersects/interacts to create adverse effects.¹⁷ These factors are assumed to work together and constitute a system of oppression, leading to profound health inequality. Thus, according to this theory, immigration status may intersect with other factors, such as race, sex, and class,¹⁸ subsequently affecting immigrants' health.¹⁸

Extending from prior research, this study's authors investigated the interaction effects of 2 risk factors—race/ethnicity and immigration—on oral health and dental service use in children. Authors hypothesized that children being immigrants and being minority in the U.S. would be more likely to have dental caries and less likely to have preventive dental visits.

METHODS

Study Sample

Data were from the 2020 and 2021 NSCH. NSCH is an annual nationally representative survey of children and

youth aged 0–17 years across the 50 U.S. states and the District of Columbia. Survey instruments are in both English and Spanish.¹⁹ NSCH provides rich data on multiple aspects of children's lives, including sociodemographics; physical, mental, and oral health; access to quality health care; the child's family; and neighborhood conditions. All data were self-reported by parents/guardians who are familiar with the child's health and healthcare needs. Details on NSCH survey methodology and data collection can be found elsewhere.²⁰ A total of 93,669 children aged 0–17 years participated in the 2020 and 2021 surveys. Given the objectives of this study, the authors excluded children aged <2 years ($n=7,443$), children whose or both parents' places of birth data were missing ($n=14,508$), and children of other racial/ethnic groups ($n=5,551$, including American Indians or Alaska Natives, Native Hawaiian and other Pacific Islanders, and 2 or more races) because the sample size for the first-generation immigrant children from this other groups is not sufficient. Thus, the analytical sample included 66,167 children aged 2–17 years, including 1,243 first-generation immigrant children; 11,017 second-generation immigrant children; and 53,907 nonimmigrant children. This study was exempt from IRB review because it used publicly available data.

MEASURES

The study included 2 independent variables: (1) immigrant status of a child was defined by both children's own nativity and that of their parents.^{21–23} Children were classified into 3 groups²²: first-generation immigrant children (i.e., child and parents born outside the U.S.), second-generation immigrant children (i.e., child born in the U.S. and 1 or both parents born outside the U.S. or child born outside the U.S. and 1 parent born in the U.S.), and non-immigrant children (i.e., third generation or higher, both parents and children born in the U.S.). (2) Race/ethnicity: racial/ethnic groups included 4 groups: non-Hispanic White, non-Hispanic Black, Hispanics, and non-Hispanic Asian Americans (referred to as Asian Americans for short in the remaining parts of this paper).

Two self-reported outcome variables were assessed in this analysis: (1) dental caries (yes/no)—whether the child had decayed teeth or cavities during the past 12 months—and (2) preventive dental visit (yes/no)—whether the child saw a dentist or other oral healthcare provider for preventive dental care, such as checkups, dental cleaning, dental sealants, or fluoride treatment in the past 12 months.

Covariates were selected on the basis of existing literature on the topic^{11,16,24} and data availability in NSCH: age (2–5, 6–8, 9–11, 12–15, and 16–17 years), sex,

parents' highest education (less than high school, high school, some college, and college or above), household income (in relation to Federal Poverty Level [FPL]: 0%–99%, 100%–199%, 200%–399%, and $\geq 400\%$ FPL), insurance coverage (no insurance, private insurance, public insurance, and both public and private), medical home (yes/no), children with special healthcare needs (yes/no), family structure (living with 2 married parents, 2 parents but not married, grandparents, and other caregivers), and total number of children in the household. Neighborhood conditions were assessed by 4 different variables: (1) neighborhood amenities (a score of 0–4, a neighborhood with certain amenities—parks, recreation centers, sidewalks, or libraries); (2) poor neighborhood conditions (a score of 0–3, neighborhood where there is litter or garbage on the street or sidewalk, poorly kept or rundown housing, or vandalism such as broken windows and graffiti); (3) supportive neighborhood (yes/no), which was based on a response of *definitely agree* or *somewhat agree* to the question *To what extent do you agree with these statements about your neighborhood or community?* a) *People in this neighborhood help each other out;* b) *We watch out for each other's children in this neighborhood;* c) *When we encounter difficulties, we know where to go for help in our community;* (4) safe neighborhood (yes/no), which was based on a response of *definitely agree* or *somewhat agree* to the following statement: *This child is safe in our neighborhood.*²⁵ Acculturation factors—English speaking at home (yes/no) and years in the U.S. (ranging from 0 to 17 years)—were included in the model analyses for the sample of immigrants only.

Statistical Analysis

First, the study team calculated the weighted rates of the 2 outcomes—dental caries and preventive dental visits by racial/ethnic groups and immigration status. Then, they conducted 3 sequential logistic regression models for each of the outcome variables and reported the AORs and 95% CIs: Model I only included the independent variables (immigration status and race/ethnicity); in Model II, covariates were added to Model I; and then in Model III, an interaction term between race/ethnicity and immigration status was added to Model II. The interaction term was removed from Model III if it was not statistically significant. Third, among immigrants only (i.e., first- and second-generation immigrant children), the authors assessed the association between acculturation factors and the 2 outcome variables. Data analysis was conducted in Stata 16 (StataCorp). Sampling weights were incorporated into all the analyses to obtain national estimates. A significance level of 0.05 was used in this analysis.

RESULTS

Table 1 presents the characteristics of children by having dental caries (yes/no) and having a preventive dental visit (yes/no). For dental caries, about 18.7% of first-generation immigrant children had dental caries, compared with 13.3% for second-generation immigrant children and 12.2% for nonimmigrant children ($p < 0.05$). Hispanic children had the highest rate of dental caries (15.7%), followed by Asian American children at 13.1% and non-Hispanic Black children at 12.7%, whereas non-Hispanic White children had the lowest prevalence of dental caries at 11.3% ($p < 0.001$). The overall prevalence of dental caries was 12.7% (95% CI=12.1%, 13.4%). For dental visits, approximately 64.1% of first-generation immigrant children and 76.3% of second-generation immigrant children had a preventive dental visit in the past 12 months, compared with 80.4% for the nonimmigrant children ($p < 0.001$). Asian American children had the lowest rate of preventive dental visits at 70.2%, followed by non-Hispanic Black children at 71.9% and Hispanic children at 75.8%, whereas non-Hispanic White children had the highest rate of preventive dental visits at 82.3% ($p < 0.001$). Overall, 78.9% (95% CI=78.1%, 79.6%) of children had a preventive dental visit in the past year. The bivariate analysis results show a statistically significant association between covariates (except sex and the total number of kids in the family) and the 2 outcome variables—having dental caries and having preventive dental visits (all $p < 0.01$) (Table 1).

Table 2 presents the results of the dental caries model. In Model II, first-generation immigrant children (AOR=1.44; 95% CI=1.01, 2.05) were more likely to have caries than nonimmigrant children. Other significant factors included age, children with special healthcare needs, insurance coverage, family structure characteristics, and total number of kids in the household (all $p < 0.01$). Moreover, children who had a preventive dental visit (AOR=1.41; 95% CI=1.16, 1.71) were more likely to have caries. Two neighborhood factors were also significant: children living in neighborhoods with poor conditions were more likely to have dental caries (AOR=1.13; 95% CI=1.03, 1.23), whereas children living in supportive communities were less likely to have dental caries (AOR=0.80; 95% CI=0.70, 0.92). The interaction between race/ethnicity and immigration status was not significant ($p = 0.124$). So, results from this set of analysis are not presented.

Table 3 presents the results of the preventive dental visits model. In Model II, first-generation immigrant children (AOR=0.53; 95% CI=0.40, 0.72) were less likely to have had a preventive dental visit than nonimmigrant children. Non-Hispanic Black (AOR=0.78; 95%

Table 1. Characteristics of Children by Dental Caries and Preventive Dental Visits

Variables	Sample size		Dental caries		Dental visits	
	Unweighted	Weighted %	Weighted % (mean)	p-value	Weighted % (mean)	p-value
Immigrant status				0.009		<0.001
Nonimmigrants	53,907	72.7	12.2		80.4	
First generation	1,243	3.5	18.7		64.1	
Second generation	11,017	23.7	13.3		76.3	
Race/ethnicity				<0.001		<0.001
Non-Hispanic White	48,280	55.0	11.3		82.3	
Non-Hispanic Black	3,584	10.7	12.7		71.9	
Hispanic	9,701	28.6	15.7		75.8	
Asian	4,602	5.6	13.1		70.2	
Age groups, years				<0.001		<0.001
2–5	20,462	25.4	9.4		63.1	
6–8	10,330	18.1	19.2		84.2	
9–11	10,316	18.9	15.5		85.3	
12–15	15,650	25.6	10.9		82.5	
16–17	9,409	12.0	10.1		81.5	
Sex				0.758		0.319
Male	34,329	51.2	13.3		77.6	
Female	31,838	48.8	12.3		79.4	
Family structure				<0.001		<0.001
Two parents, married	53,631	74.4	10.9		81.7	
Two parents, not married	4,102	7.9	17.7		71.1	
Single parents	6,507	14.3	15.6		74.3	
Grand parents	1,410	2.4	17.3		70.4	
Other	452	1.1	15.8		60.8	
Total kids in the household, mean	66,167	2.3	2.4 (2.2) ^a	<0.001	2.2 (2.2) ^a	0.058
Preventive dental visits				0.002		
No	12,423	21.1	10.8		NA	
Yes	53,485	78.9	13.4		NA	
Parent education				<0.001		<0.001
Less than high school	1,596	9.5	19.0		67.8	
High school	7,528	17.9	16.0		71.2	
Some college	13,387	19.0	15.0		76.2	
College or above	43,656	53.6	9.6		84.1	
Family income				<0.001		<0.001
0%–99% FPL	6,757	15.9	17.7		69.3	
100%–199% FPL	9,991	20.6	15.5		73.4	
200%–399% FPL	20,319	29.8	12.5		78.8	
≥400% FPL	29,100	33.8	8.4		86.9	
Insurance				<0.001		<0.001
No insurance	2,846	7.1	19.2		55.9	
private	12,172	27.2	18.0		73.4	
Public only	47,942	61.5	9.2		84.1	
Both public and private	2,351	4.2	16.3		76.8	
CSHCNs				<0.001		<0.001
No	51,109	80.2	11.8		77.9	
Yes	15,058	19.8	16.6		80.7	
Medical home				<0.001		<0.001
No	30,065	51.9	14.6		73.9	

(continued on next page)

Table 1. Characteristics of Children by Dental Caries and Preventive Dental Visits (*continued*)

Variables	Sample size		Dental caries		Dental visits	
	Unweighted	Weighted %	Weighted % (mean)	p-value	Weighted % (mean)	p-value
Yes	36,080	48.1	10.8		83.7	
Neighborhood conditions						
Amenities, mean	65,209	2.6	2.5 (2.6) ^a	<0.001	2.7 (2.5) ^a	<0.001
Poor condition, mean	65,428	0.4	0.5 (0.4) ^a	<0.001	0.4 (0.5) ^a	<0.001
Community support				<0.001		<0.001
No	24,222	41.4	15.1		74.3	
Yes	41,108	58.6	10.9		81.8	
Community safety				<0.001		<0.001
No	2,071	4.6	17.2		66.4	
Yes	63,617	95.4	12.6		79.3	
Dental caries						0.002
No	59,268	87.3	NA		78.0	
Yes	6,706	12.7	NA		81.9	

^aThe number in the parenthesis is the weighted mean for not having dental caries or not having dental visits CSHCN, children with special healthcare need; FPL, Federal Poverty Level; NA, not applicable.

CI=0.66, 0.92) and Asian American (AOR=0.64; 95% CI=0.52, 0.80) children were less likely, but Hispanic (AOR=1.19; 95% CI=1.02, 1.38) children were more likely to have had a preventive dental visit than non-Hispanic White children. Other significant factors were age, female, parents' education at college or higher, income level (>400% of FPL), insurance coverage, family structure characteristics, total number of children in the household, and having a medical home (all $p<0.01$). Having dental caries was associated with having a preventive dental visit (AOR=1.38; 95% CI=1.14, 1.68). Children living in supportive neighborhoods (AOR=1.28; 95% CI=1.15, 1.41) were more likely to have a preventive dental visit.

In Model III, the interaction between race/ethnicity and immigration status was significant ($p=0.04$). Specifically, first-generation non-Hispanic Black (AOR=0.37) and first-generation Asian American (AOR=0.41) immigrants were less likely to have a preventive dental visit than nonimmigrant and non-Hispanic White children. In addition, second-generation immigrant Asian children (AOR=0.55) were less likely to have a preventive dental visit than non-immigrant non-Hispanic White children (Table 3). The predicted probability of having a preventive dental visit by race/ethnicity and immigration status is displayed in Figure 1: a much lower probability of having a dental visit is observed among first-generation, minority immigrant children, and there is a great variability across the racial/ethnic groups within the first-generation immigrant children (shown in the middle of the Figure). The variability is much smaller across the racial/ethnic groups within the nonimmigrant and second-generation immigrant children.

The authors conducted additional analyses (data not shown but available upon request) focusing on the immigrant sample to assess the impacts of acculturation on the outcome variables. Two similar models as mentioned earlier were conducted. In the dental caries model, no significant differences in dental caries were found across racial/ethnic immigrant groups or between first- and second-generation immigrants. Speaking English at home was associated with lower odds of having dental caries (AOR=0.38; 95% CI=0.22, 0.64). In the dental visits model, Asian immigrant children were less likely to have a preventive dental visit than non-Hispanic White immigrant children (AOR=0.54; 95% CI=0.32, 0.93). In addition, speaking English at home was associated with higher probability of having dental visits (AOR=1.72; 95% CI=1.01, 2.93).

DISCUSSION

National data on dental caries and dental service use among immigrant children in the U.S. are limited. It is not known whether race/ethnicity would interact with immigration status to increase these disparities. This study addressed these gaps in literature by analyzing the most recent 2020–2021 NSCH data.

In this study, no significant interaction effect of race/ethnicity by immigration status was observed for having dental caries. The findings did not support the first hypothesis. Yet, the results show that first-generation immigrant children were more likely to have dental caries than nonimmigrant children, suggesting poor oral health in immigrant children.

Table 2. Logistic Regression Model Results of Having Dental Caries

Variables	Model I			Model II				
	AOR	95% CI	p-value	AOR	95% CI	p-value		
Immigrant status (vs nonimmigrant)								
First generation	1.38	1.00	1.91	0.053	1.44	1.01	2.05	0.044
Second generation	0.91	0.75	1.09	0.313	0.97	0.80	1.18	0.777
Race (vs non-Hispanic White)								
Non-Hispanic Black	1.16	0.97	1.39	0.107	0.84	0.68	1.03	0.092
Hispanic	1.57	1.33	1.86	<0.001	1.10	0.91	1.33	0.349
Asian	1.21	0.95	1.55	0.120	1.15	0.89	1.49	0.288
Age (vs 2–5), years								
6–8								
9–11					2.24	1.85	2.71	<0.001
12–15					1.63	1.34	1.98	<0.001
16–17					1.02	0.83	1.25	0.863
Female					0.89	0.78	1.01	0.064
CSHCNs					1.35	1.17	1.54	<0.001
Parent education (vs less than high school)								
High school					1.04	0.76	1.43	0.797
Some college					0.99	0.72	1.36	0.955
College or above					0.82	0.60	1.13	0.224
Household income (vs 0%–99% FPL)								
100%–199% FPL					1.00	0.81	1.24	0.977
200%–399% FPL					1.02	0.81	1.28	0.873
≥400% FPL					0.88	0.69	1.11	0.284
Insurance (vs no insurance)								
Private					0.79	0.59	1.06	0.122
Public only					0.51	0.39	0.68	<0.001
Both public and private					0.68	0.48	0.97	0.032
Family structure (vs 2 parents, married)								
2 parents, not married					1.19	0.92	1.53	0.184
Single parents					1.35	1.11	1.65	0.003
Grand parents					1.35	0.94	1.93	0.106
Other					1.41	0.85	2.32	0.183
Number of kids in the household					1.12	1.05	1.19	<0.001
Preventive dental visit					1.41	1.16	1.71	0.001
Medical home					0.89	0.78	1.02	0.091
Community amenities					0.98	0.94	1.03	0.514
Poor conditions of community					1.13	1.03	1.23	0.006
Community support					0.80	0.70	0.92	0.001
Community safety					1.07	0.77	1.48	0.703

CSHCN, children with special healthcare need; FPL, Federal Poverty Level.

There was a significant interaction effect of race/ethnicity by immigration status on having preventive dental visits, indicating that immigrant children from minority racial/ethnic groups were less likely to have a preventive dental visit than nonimmigrant children of non-Hispanic White race/ethnicity. Thus, the second hypothesis was supported. These findings may suggest that immigrant children of minority racial/ethnic groups may face more challenges when accessing dental

services. The interaction effects were more pronounced for first-generation non-Hispanic Black and first-generation Asian immigrant children (i.e., intersectionality between race/ethnicity and immigration). In addition, the interaction was also significant for second-generation Asian immigrant children. Several reasons may account for these findings: (1) there was limited access to dental care professionals for immigrant children of minority groups.^{26,27} It may be challenging for them to

Table 3. Logistic Regression Model Results of Having Dental Visits

Variables	Model I			Model II			Model III					
	AOR	95% CI	p-value	AOR	95% CI	p-value	AOR	95% CI	p-value			
Immigrant status (vs U.S. born)												
First generation	0.53	0.41	0.69	0.00	0.53	0.40	0.72	<0.001	0.92	0.53	1.61	0.781
Second generation	0.94	0.82	1.07	0.34	0.87	0.75	1.01	0.053	0.89	0.71	1.11	0.287
Race/ethnicity (vs non-Hispanic White)												
Non-Hispanic Black	0.57	0.50	0.65	0.00	0.78	0.66	0.92	0.002	0.84	0.70	1.00	0.056
Hispanic	0.74	0.65	0.84	0.00	1.19	1.02	1.38	0.023	1.14	0.95	1.37	0.154
Asian	0.56	0.47	0.67	0.00	0.64	0.52	0.80	<0.001	0.98	0.64	1.50	0.920
Age (vs 2–5), years												
6–8					3.43	2.92	4.02	<0.001	3.43	2.93	4.02	<0.001
9–11					3.98	3.41	4.65	<0.001	3.99	3.42	4.66	<0.001
12–15					3.46	3.01	3.97	<0.001	3.47	3.03	3.99	<0.001
16–17					3.59	3.04	4.24	<0.001	3.60	3.05	4.26	<0.001
Female					1.20	1.09	1.33	<0.001	1.20	1.08	1.33	<0.001
CSHCNs					1.00	0.88	1.13	0.948	1.00	0.88	1.13	0.942
Parent education (vs less than high school)												
High school					0.92	0.70	1.19	0.513	0.93	0.71	1.21	0.568
Some college					0.98	0.76	1.27	0.896	1.00	0.78	1.29	0.994
College or above					1.39	1.08	1.78	0.011	1.41	1.10	1.82	0.008
Family income (vs 0%–99% FPL)												
100%–199% FPL					1.00	0.83	1.19	0.966	0.99	0.83	1.19	0.929
200%–399% FPL					1.00	0.83	1.20	0.963	0.99	0.82	1.19	0.894
≥400% FPL					1.58	1.31	1.92	<0.001	1.58	1.30	1.91	<0.001
Insurance (vs no insurance)												
Private					2.93	2.34	3.68	<0.001	2.94	2.35	3.68	<0.001
Public only					3.05	2.47	3.76	<0.001	3.07	2.50	3.79	<0.001
Both public and private					2.65	1.92	3.65	<0.001	2.65	1.92	3.66	<0.001
Family structure (vs 2 parents, married)												
Two parents, not married)					0.86	0.72	1.03	0.107	0.86	0.71	1.03	0.101
Single parents					0.80	0.67	0.96	0.013	0.78	0.66	0.93	0.007
Grand parents					0.73	0.55	0.96	0.026	0.72	0.55	0.96	0.023
Other					0.40	0.27	0.61	<0.001	0.40	0.26	0.61	<0.001
Number of kids in the household					1.15	1.08	1.22	<0.001	1.15	1.08	1.22	<0.001
Dental caries					1.38	1.14	1.68	0.001	1.39	1.14	1.69	0.001
Medical home					1.43	1.29	1.59	<0.001	1.43	1.29	1.59	<0.001
Community amenities					1.01	0.98	1.05	0.496	1.01	0.97	1.05	0.565
Poor conditions of community					0.96	0.89	1.03	0.259	0.96	0.89	1.03	0.234
Community support					1.27	1.14	1.41	<0.001	1.28	1.15	1.42	<0.001
Community safety					1.31	1.00	1.71	0.052	1.30	0.99	1.70	0.062
Immigration status by race/ethnicity (vs nonimmigrant) and non-Hispanic White												
First generation by Blacks									0.37	0.16	0.87	0.023
First generation by Hispanics									0.57	0.27	1.17	0.126
First generation by Asians									0.41	0.18	0.96	0.039
Second generation by Blacks									0.84	0.55	1.28	0.415
Second generation by Hispanics									1.11	0.79	1.56	0.530
Second generation by Asians									0.55	0.32	0.92	0.024

CSHCN, children with special healthcare need; FPL, Federal Poverty Level.

navigate the healthcare system, such as applying for the dental service benefits provided by the state Medicaid and Children's Health Insurance Programs and

scheduling for an appointment owing to limited English proficiency. (2) Many of these immigrant parents may have low oral health literacy.¹³ Parents of immigrant children

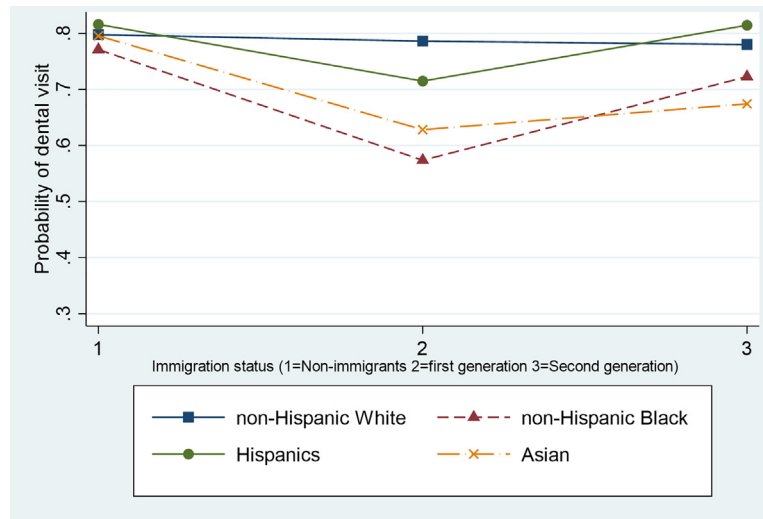


Figure 1. Predictive margins of dental visit by immigration status × race.

might think that there is no need for dental visits,^{15,28} which is considered as a rite of childhood.²⁹ Thus, dental care providers should be aware of immigrant' cultural beliefs.³⁰ Furthermore, health promotion messages should be culturally tailored and ask members of the immigrants' own community to present the message to ensure acceptance.^{31,32} These messages should emphasize the importance of daily oral hygiene practices, use of fluoridated tap water, and use and amount of fluoridated toothpaste.³³ Moreover, schools are ideal places for oral health promotion because they can reach most school-aged children.³² School-based programs can also help increase children's access to dental services, especially those from disadvantaged socioeconomic backgrounds.³⁴ Parents can play a critical role in preschool children's dietary patterns and oral health behaviors. It is necessary that parents be engaged in oral health promotion programs to improve their oral health literacy.^{35,36}

In summary, this study found a higher prevalence of dental caries in first-generation immigrant children and lower rates of preventive dental visits. No significant difference was found between second-generation immigrant children and nonimmigrant children in dental caries, but the difference in dental visits was bordering significance ($p=0.053$) (Table 3 [Model II]). These findings deserve more attention. Preventive dental services such as dental sealant placement and topical fluoride application are effective in preventing dental caries, and sealants can be cost saving when delivered to children at high risk for tooth decay.^{37–40} Children should be screened for caries and, on the basis of risk, should have fluoride varnish applied 2–4 times per year.⁴¹ If minority immigrant children had limited access to dental care, they may miss the best opportunity to prevent dental

caries early in the life course. This study's results show that speaking English at home is a protective factor for dental caries and a contributing factor for having dental visits, which suggests that better acculturated families may be able to navigate the healthcare system and obtain dental care for their children.

In the analyses, the authors also treated the 2 outcome variables as covariates in the model analyses, and both were statistically significant. In the dental caries model, having a preventive dental visit was associated with the odds of developing dental caries. Likewise, in the preventive dental visits model, having dental caries was associated with the odds of having a preventive dental visit. It is possible that parents learned that their children had dental caries at a preventive dental visit to a dentist. Alternatively, dental caries may have necessitated a dental visit, and preventive dental services were delivered as well as treatment services. Nonetheless, regular dental visits and proper oral hygiene practices should be promoted in children.

This study found that neighborhoods with poor conditions were a risk factor for dental caries, whereas neighborhoods where people supported each other were a protective factor for dental caries. Similarly, living in a supportive neighborhood contributed to having preventive dental visits. These findings provide additional evidence on how social determinants of health affect health outcomes. Specifically, the physical/built environment impacts oral health and dental service use among children. These findings are useful information for dental public health: programs on improving oral health should address environmental factors as suggested in the social ecologic model.⁴²

Immigration is increasingly understood as a sociopolitical determinant of health.⁴³ For immigrant children,

they will experience a culture change, including adoption of new foods and drinks and health behaviors, which may put them at higher risk of dental caries. From a life-course perspective,⁴⁴ early childhood caries can have a profound deleterious lifelong effect on an individual's dentition status because early childhood caries often is a precursor of caries and consequences in adults. As such, it is of utmost importance to reduce dental caries in immigrant children. Moreover, preimmigration life experiences may have cumulative impacts on health outcomes, including oral health. Many immigrant families may have experienced discrimination and prejudice during and after immigration, which can also have cumulative allostatic impacts on their health.⁴⁵ Future research on oral health of immigrants, including children, should account for environmental factors (e.g., SES of country of origin, ethnic enclaves in host country), psychosocial factors (e.g., discrimination, social network), and behavioral factors (e.g., dental hygiene and dental visits).⁴⁶

Limitations

This study has several limitations. Owing to its inherent characteristics, cross-sectional data do not permit the analysis of temporal relationships. Oral health was measured on the basis of parental report rather than on clinical examination, so there is the possibility that some children with dental caries were not identified as such. Therefore, the prevalence of dental caries may be underestimated, especially in individuals who have not had recent dental visits. Some children may be excluded from the survey owing to language barriers. Finally, no data were available on oral health-related practices (e.g., tooth brushing) and oral health literacy from both children and parents.

CONCLUSIONS

The study found that first-generation immigrant children were less likely to see a dentist and more likely to have dental caries than nonimmigrants. Moreover, first-generation immigrant children from minority racial/ethnic groups were the least likely to seek dental services. To further reduce disparities in dental use and oral health among children in the U.S., culturally sensitive health promotion is warranted to improve oral health literacy and reduce barriers to dental care for immigrants, especially immigrant children of the minority groups.

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Huabin Luo: Conceptualization, Project administration, Supervision, Writing — original draft, Writing — review & editing. Bei Wu: Conceptualization, Writing — review & editing. Yanyan Wu: Data curation, Writing — review & editing. Mark E. Moss: Conceptualization, Writing — review & editing.

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