Oral Health Disparities in Children of Immigrants: Dental Caries Experience at Enrollment and during Follow-Up in the New England Children's Amalgam Trial

Nancy Nairi Maserejian, ScD; Felicia Trachtenberg, PhD; Catherine Hayes, DMD, SM, DrMedSc; Mary Tavares, DMD, MPH

Abstract

Objectives: *Previous research shows increased dental decay among immigrants, but little is known about the oral health of the growing population of children of immigrants. We compared the children of immigrants to the children of US-born caregivers in their caries experience at enrollment and their new caries increments during the 5-year New England Children's Amalgam Trial (NECAT).* ***Methods:*** *NECAT recruited 283 Boston-area children aged 6 to 10 with untreated caries and offered free semiannual preventive and restorative dental care during the trial. Sociodemographic factors and caregiver immigrant status were assessed through interviews. Multivariate negative binomial models evaluated the association between caregiver immigrant status and clinically assessed carious surfaces.* ***Results:*** *Forty percent of these Boston-area children had immigrant caregivers. At baseline, the children of immigrants had more carious surfaces (11.5 versus 9.4, adjusted for race/ethnicity, age, gender, and caregiver smoking status). Caregiver language preference explained some of this association. Immigrant status and language preference were not associated with 5-year caries increments.* ***Conclusions:*** *Prevalent disparities in the unmet dental needs of the immigrants' children were quickly ameliorated during participation in NECAT. Dental initiatives that target neighborhoods and are sensitive to acculturation levels may help improve and maintain the oral health of immigrant families.*

Key Words: immigrants, dental care for children, pediatric dentistry, health services delivery, public health dentistry, caries, incidence, disparities

Introduction

Despite overall improvements in the dental caries experience of children in the United States over the past few decades, substantial disparities exist across sociodemographic groups, particularly by race/ethnicity and income (1,2). Immigrant children also appear to be at a significant disadvantage in terms of untreated caries, a pattern similar to that seen for immigrant adults (3,4). However, little is known about the oral health of immigrants' children (who may or may not have been born in the United States), rather than immigrant children per se. Children of immigrants are the fastest growing portion of the United States child population: an estimated 30 percent of all children in the United States are expected to have one or more foreign-born parents by the year 2020 (5).

Compared to children of US-born caregivers, children of immigrants are reportedly three times as likely to have poor or fair health and almost four times as likely to lack a usual source of health care (6); thus, important differences in their oral health needs are highly plausible. While oral health of immigrant families may benefit from the availability of preventive products or services in the United States, barriers in accessing care are likely, as immigrants often face language, cultural, and financial difficulties. Also, relocation could lead to adoption of negative behaviors, such as increased consumption of cariogenic foods and beverages. Public oral health policies generally aim to reach families of lower socioeconomic status or certain races/ethnicities, but immigrants with unmet needs may be particularly hard to reach. It is currently unknown whether public policies are effective in improving the oral health of immigrant families. Longitudinal studies are essential to identify causes for any observed disparities and to specify useful interventions.

The New England Children's Amalgam Trial (NECAT) recruited children aged 6 to 10 with untreated dental caries and provided free dental care semiannually to participants for 5 years during the trial. NECAT provides a unique opportunity to examine the longitudinal caries experience of children who are comparable to the target group of governmental programs – i.e., children with unmet treatment needs at enrollment. The purpose of this

Send correspondence and reprint requests to Nancy Nairi Maserejian, New England Research Institutes, 9 Galen Street, Watertown, MA 02472. Tel.: 617-923-7747 ext. 229; Fax: 617-926-0144; e-mail: nmaserejian@neriscience.com. Nancy Nairi Maserejian and Felicia Trachtenberg are with the New England Research Institutes, 9 Galen St. Watertown, MA. Catherine Hayes is with the Tufts University School of Dental Medicine, Department of Public Health and Community Service, Boston, MA. Mary Tavares is with the Forsyth Institute, Clinical Collaborative, Boston, MA. Dr. Nancy Nairi Maserejian initiated the concept, analyzed the data, and wrote the manuscript. Dr. Felicia Trachtenberg provided critical review to the analyses and manuscript drafts. Drs. Catherine Hayes and Mary Tavares helped to establish outcome measurements and reviewed the manuscript. **Source of support:** Supported by a cooperative agreement (U01 DE11886) between the New England Research Institutes and the National Institute of Dental and Craniofacial Research. Manuscript received: 3/6/07; accepted for publication: 7/15/07.

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analysis is to compare the caries experience of participants with immigrant caregivers to those with US-born caregivers. A particular objective is to compare the association between immigrant status and extent of untreated caries at enrollment (i.e., *baseline*) to the association between immigrant status and caries *increments* (i.e., new decay) following NECAT's comprehensive dental care. Furthermore, we explored the potential sociodemographic and behavioral mediators of any observed associations between immigrant status and caries experience. An understanding of the extent and trajectory of unmet dental needs is fundamental to improve the oral health and overall well-being of the estimated 11.5 million children living in foreign-born households in the United States (7).

Methods

Study Population. NECAT was a randomized controlled trial to assess potential neuropsychologic and renal effects of dental amalgams in children. Details of the study design and main results have been published (8,9). Briefly, English-speaking children aged 6 to 10 with two or more posterior carious teeth, no prior or existing amalgam fillings, and no neuropsychologic or renal disorders were eligible. Enrollment occurred from 1997-99. Follow-up lasted for 5 years. As part of the trial, participants were offered free semiannual preventive and restorative dental care, with an annual monetary incentive of $40 for neuropsychologic testing conducted at convenient locations. Of the 5,116 children screened from urban Boston and rural Maine, 598 were eligible and 534 provided written parental consent and child assent. The study was approved by the institutional review boards of all participating sites.

Because less than 2 percent of the 243 rural children had immigrant caregivers and there were significant demographic differences between Boston and Maine participants (e.g., Boston caregivers were more likely to be poor, single parents, and racially diverse), the current analysis was conducted among children in Boston only ($n = 291$). We excluded eight Boston-area children who were missing data on immigrant status of the primary caregiver, resulting in a total of 283 children in this analysis.

Assessment of Sociodemographic Factors and Immigrant Status. Family and sociodemographic data were collected by in-person interviews with the primary caregiver of the child at initial study visits. The primary caregiver was most often the participant's biologic mother (88 percent biologic mother, 7 percent biologic father, 5 percent other female relative). All interviewers were trained and certified at New England Research Institutes' Survey Research Center (Watertown, MA).

Caregivers self-reporting a birthplace outside of the 50 United States and Washington, DC, were categorized as immigrants. This criterion was chosen to obtain a measure that reflected differences in cultural or social factors of first generation residents without regard to legal status or citizenship. Thus, we included Puerto Ricans ($n = 7$; four of seven reported Spanish as their preferred language) as immigrants.

Dental Treatment Interventions and Measurement of Dental Caries. The dental treatment intervention provided to all participants was free comprehensive dental care, which included semiannual dental examinations, bitewing x-rays, prophylaxis, application of fluoride treatments, resin-based sealants, and restoration of caries, for the duration of the 5-year trial. In addition to providing the care at no cost to the patients, NECAT protocol included reminders to all patients using both postal and telephone contact to encourage attendance to semiannual preventive dental visits.

Baseline number of untreated carious surfaces was clinically measured at the initial dental examination by the NECAT dentist. Lesions into pulp, clinically detectable lesions in dentine, and clinically detectable cavities limited to enamel were counted as carious, corresponding to a diagnostic threshold of D2 (10). Because of the eligibility requirements, most children had no preexisting composite restorations. All caries were restored at baseline according to NECAT's protocol.

At semiannual follow-up dental visits, the NECAT dentist recorded and restored new carious lesions, using the same D2 diagnostic threshold as at baseline. The number of new carious or restored surfaces was summed at each follow-up visit to obtain total net caries increment post baseline for each participant (11).

The age range of NECAT children (6 to 10 at baseline) is a mixed dentition phase when both primary and permanent teeth are at risk for caries, sharing the same exposures related to caries development. To best plan and implement preventive strategies, it is important to be aware of the entire extent of decay and treatment needs, including both primary and permanent dentitions. For this reason, we summed caries in primary and permanent dentition to obtain a total measure of the disease burden.

Statistical Analysis. The primary analyses compared children of immigrants to children of US-born caregivers. Considering the nonnormal distribution of carious surface counts, we used negative binomial models to evaluate the association between having an immigrant caregiver and number of carious surfaces at baseline, adjusting for age, gender, race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, other race/ethnicity), and smoking status of the primary caregiver (never, former, current). Model fit was assessed with deviance statistics, and the negative binomial was well suited to handle the overdispersion of carious surfaces. Because the caregiver's smoking status was associated with immigrant status and caries, and changed the estimate of the immigrant–caries association more than 10 percent, and is unlikely to be an intermediate factor in the immigrant–caries association, it was included in the main multivariate model as a confounder. The

multivariate model was used to calculate the adjusted mean number of carious surfaces and provide estimates of the association between immigrant status and caries.

We then attempted to elucidate possible mechanisms for any observed associations by individually considering each of the following factors in the baseline caries model: caregiver's language preference, education (<high school, high school, post-high school), employment status, marital status, and dental care utilization (regular versus nonregular); household income (≤$20,000, $20,001 to 40,000, ≥$40,000), welfare use, Medicaid/Medicare use, meeting the federal poverty level, and neighborhood [categorical; Boston Redevelopment Authority Planning Districts (12)]; child's toothbrushing frequency (<1/day, 1/day, ≥2/day); and drinking water sources (well versus municipal supply, bottled versus tap). Factors changing the beta estimate for immigrant status by more than 10 percent were considered important intermediate factors.

Forty-eight children withdrew from NECAT during follow-up. We compared withdrawal by caregiver immigrant status using the chi-square test, and we compared the number of baseline carious surfaces and the number of attended dental visits during follow-up using the Wilcoxon rank-sum test. Five-year caries increment data were missing for 64 participants (31 children of immigrants, 33 US-born). To allow valid statistical inferences about caries increments using all participants (i.e., including withdrawers), we used multiple imputation, followed by negative binomial models. In addition to the factors considered in the analysis of baseline caries, the following factors were also considered as potential confounders or intermediary factors in the analysis of caries increments: number of baseline carious surfaces, number of attended dental visits, and precise length (days) of follow-up. The final models adjusted only for age and number of carious surfaces at baseline.

In secondary exploratory analyses, we considered a three-category variable that considered the child's birthplace to roughly account for recency of immigration (immigrant child/immigrant caregiver versus US-born child/immigrant caregiver versus US-born child/caregiver). In a separate exploratory analysis, we considered the child's birthplace as an independent variable. All analyses were conducted using SAS v. 9.1 (SAS Institute, Cary, North Carolina, USA).

Results

Table 1 compares the characteristics of the children of the immigrants and nonimmigrants. Approximately half of the immigrant caregivers came from the Caribbean. Compared to children of US-born caregivers, who were mostly non-Hispanic White or Black, the children of the immigrants were more likely to be Hispanic or multiracial. Although the most commonly preferred language for both groups of caregivers was English, 44.2 percent of immigrant caregivers preferred another language, most often Spanish, compared to only 2.4 percent of US-born caregivers. Immigrant caregivers were more likely to be employed, but also more likely to have lower household incomes. Education differed accordingly: fewer immigrants had completed high school, while more US-born caregivers had a post-high school education. Welfare or public aid use was less common among immigrants. A noteworthy difference was in smoking status, with 71 percent of US-born caregivers having ever smoked cigarettes (48 percent current smokers), compared to only 20 percent of immigrants (9 percent current smokers).

Extent of Decay at Enrollment (Baseline). The number of carious surfaces at enrollment was significantly greater among children of immigrants, with a 30 percent increased count ($\beta = 0.26$, standard error = 0.10, rate ratio = 1.30, 95 percent confidence interval = 1.07 to 1.59) in the multivariate model that adjusted for age, gender, race/ethnicity, and smoking status (Figure 1 and Table 2). The children of the immigrants had on average two more carious surfaces at baseline compared to children of nonimmigrants.

To evaluate what may account for the association between immigrant status and caries at baseline, we considered possible intermediate factors, including the caregivers' language preference, education, income, employment, marital status, poverty status, public aid use, dental visits, and the child's toothbrushing frequency. Language preference was the only factor significantly associated with both immigrant status ($P < 0.0001$) and carious surfaces ($P = 0.03$). The inclusion of this factor in the multivariate model lowered the beta estimate of the association between immigrant status and carious surfaces by 17 percent (language-adjusted model: immigrant $P = 0.04$; language $P = 0.06$; data not shown). The children of the caregivers who preferred to speak non-English languages tended to have more carious surfaces than those who stated that they preferred English (Table 3). The highest mean carious surface count was observed among those who preferred less common languages categorized as "other," particularly Chinese, Albanian, or Bengali.

Although individual-level sociodemographic factors did not alter the association between the immigrant status and carious surfaces, neighborhood seemed to serve as an intermediary factor by decreasing the estimate and statistical significance of immigrant status (neighborhood-adjusted model: immigrant $P = 0.03$, beta estimate decreased 18 percent; neighborhood $P = 0.07$, data not shown). However, the direction of the association between immigrant status and caries was not consistent across neighborhoods, and exploratory analyses showed a statistically significant interaction term between immigrant status and neighborhood ($P = 0.02$). In all, immigrant status remained the factor most strongly associated with baseline caries.

Table 1
Baseline Characteristics of 283 Boston-Area Participants of the New England Children's Amalgam Trial by the Primary Caregivers' Immigrant Status*

	Immigrant caregiver† ($n = 113$)	US-born caregiver ($n = 170$)
Age, mean (standard deviation), years	8.1 (1.7)	7.8 (1.2)
Gender	%	%
Male	44.3	51.2
Female	55.8	48.2
Race		
Non-Hispanic White	13.3	41.8
Non-Hispanic Black	29.2	37.7
Hispanic	24.8	5.9
Other and multiracial	32.7	14.7
Language preference of primary caregiver		
English	55.8	97.7
Spanish	18.6	2.4
Creole	11.5	0
Other	13.3	0
Birthplace of primary caregiver		
Africa	12.4	0
Asia	12.4	0
Caribbean	52.2	0
Central or South America	9.7	0
Europe	13.3	0
United States	0	100
Education level of primary caregiver		
<High school	26.6	14.7
High school graduate	31.0	33.5
Any post-high school education	42.5	51.8
Employment status of primary caregiver		
Employed	76.9	67.5
Unemployed	23.2	32.5
Total household income		
≤$20,000	50.4	27.7
$20,001-40,000	32.7	41.2
≥$40,000	16.8	31.2
Welfare or public aid use		
Yes	5.4	12.6
No	94.6	87.4
Marital status of primary caregiver		
Married couple/equivalent	62.2	51.8
Single-headed household	37.8	48.2
Smoking status of primary caregiver		
Never	80.0	29.1
Former	10.6	23.2
Current	9.4	47.7
Toothbrushing frequency		
<1/day	2.7	6.0
1/day	36.0	41.9
≥2/day	61.3	52.1

* For language preference, information was missing for one immigrant caregiver; for employment status, five immigrants and seven US-born; for welfare use, two immigrants and three US-born; for marital status, two immigrants and six US-born caregivers; for smoking status, 28 immigrants and 19 US-born; for toothbrushing frequency, two immigrants and three US-born.
† Caregivers whose self-reported place of birth was outside of the 50 United States or Washington, DC.

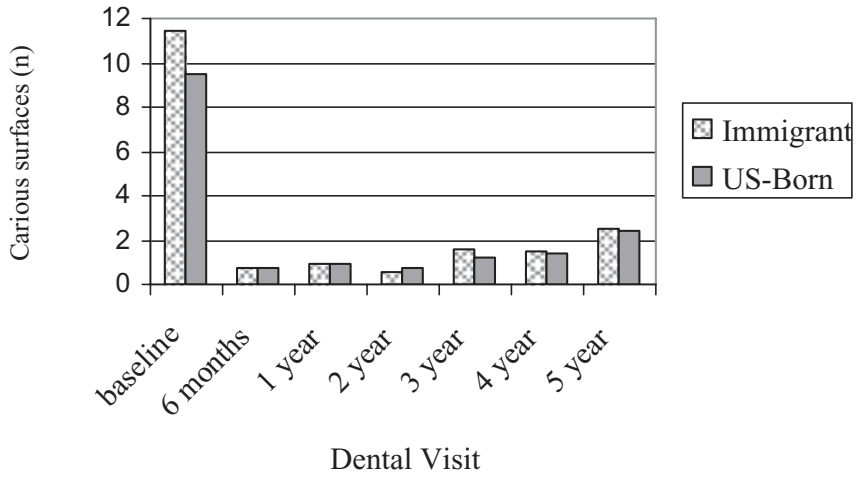
Increment of Carious Surfaces during Follow-Up. In contrast to the observed difference in the extent of carious surfaces at enrollment, there was no significant difference in the 5-year net increment of carious surfaces between the children of the immigrants and nonimmigrants, with or without control for number of baseline caries (US-born: 7.3 ± 1.8 carious surfaces; immigrant: 7.7 ± 1.2; $P = 0.9$, Table 2). The lack of association was apparent at the first follow-up visit (6 months after enrollment) and continued through the end of the trial (Figure 1).

The only factors that predicted the development of new carious surfaces were older age ($P = 0.05$) and more baseline carious surfaces ($P = 0.03$). Language, neighborhood, and sociodemographic indicators were not associated with caries increment.

Recency of Immigration and Child Birthplace. Exploratory analysis showed that the immigrant children ($n = 36$) of presumably more recently immigrated families had more carious surfaces at baseline, compared to US-born children of the immigrants (12.3 ± 1.7 versus 11.0 ± 1.5 carious surfaces, $P = 0.3$, $n = 77$ US-born; data not shown). Although this difference was not statistically significant, most likely because of the small sample sizes, there was a clear trend toward fewer carious surfaces with increasing time in the United States. In the analysis of the 5-year increments, US-born children of the immigrants had similar caries increments as children of native US families (7.5 ± 1.9 versus 7.4 ± 1.9 carious surfaces), but immigrant children had a nonsignificantly higher increment (8.7 ± 2.8).

To explore if the child's immigration status was more relevant to baseline carious surfaces than the caregiver's immigration status, we included both correlated binary factors in the multivariate model. Here, the caregiver's immigration status retained greater statistical significance and had a stronger association with caries than did the child's immigration status (data not shown).

Figure 1
Carious surfaces present at baseline and new caries increments through follow-up by the caregivers' immigration status



Withdrawal. During the 5-year follow-up, 48 Boston-area children withdrew from NECAT. The children of the immigrants were significantly more likely to withdraw from the study ($P = 0.03$, Table 4). Language preference or recency of immigration was not associated with withdrawal (data not shown). Although most participants did not provide a reason or simply lost contact, the most common reason given for withdrawing among US-born caregivers was that their child transferred to a non-NECAT dentist; no immigrant caregivers reported this reason. Despite the difference in withdrawal rates, the mean number of attended dental visits was similar for the children of the immigrants and nonimmigrants, and the children who withdrew did not significantly differ from the children who completed the trial in their number of carious surfaces at baseline.

Discussion

In this prospective cohort of children with unmet dental needs, the children of the immigrants had a significantly higher burden of carious dentition at enrollment compared to the children of US-born caregivers. During the course of the 5-year trial, the participants developed new caries, but caregiver immigrant status was no longer important in determining the new caries experience. In this discussion, we consider reasons that the children of the immigrants may present with greater treatment needs, and furthermore, the extent to which the observed similarity in caries increments is because of the dental care provided to all children in NECAT. An understanding of possible causes and remedies for oral health disparities is fundamental to improve the well-being of this growing portion of the US child population (5).

Our finding that the children of the immigrants had greater unmet dental needs upon enrollment is consistent with previous cross-sectional studies of immigrants and dental health (3,4). However, previous reports studied either immigrant children or immigrant adults, and have generally ignored the increasing group of US-born children raised by immigrant families. Over one-fifth of children in the United States live in immigrant households (6), and 78 percent of these children are US-born (7). Because our sample included both US-born and immigrant children of immigrants (68 percent of NECAT's children of immigrants were US-born), our results are the first to extend poor oral health correlates to all children of immigrants, regardless of the child's birthplace.

Reasons for the association between caregiver immigrant status and children's unmet dental health needs may include differential access and use of dental care, cultural beliefs, dietary habits, and biologic factors (13-16). An analysis using the data from the National Survey of American Families found that immigrant children were four times as likely as children from native US families to lack health insurance and 1.75 times as likely to have had no dental visit in the past year (14). Studies in other countries suggest that immigrant caregivers are less likely to utilize available dental care for their children (17,18). In our study, it is noteworthy that the children of the immigrants were significantly more likely to withdraw from NECAT, despite our extensive efforts to maintain contact and participation. Although reports of moving homes and insurance confusion contributed slightly to the difference in withdrawal, the difference was mostly because of the fact that immigrant caregivers simply did not maintain contact with NECAT. If we view NECAT as a relatively straightforward way to obtain free, convenient, and comprehensive dental care, it seems that immigrant caregivers may have been less willing to continue such care for their children.

The differences in utilization observed in our study as well as others suggest that immigrant caregivers gradually adapt to newly available dental care delivery systems. This process is related to acculturation, whereby individuals modify values and behaviors as a result of continuous exposure to a new cultural system. Greater acculturation has been associated with fewer decayed teeth in adolescent and adult immigrants (13,19). Language is directly important in that oral health education and outreach are less effective when conducted in the caregivers' nonnative languages (20). Also, recent immigrants are more likely than nonrecent immigrants to be partially acculturated (i.e., separated from their traditional culture, but not yet integrated into the dominant culture), which may put them at a greater risk for adverse

Table 2
Carious Surfaces at Baseline and Net Carious Surface Increment during 5-Year Follow-Up, Comparing Children of Immigrants (n = 113) to Children of US-Born Caregivers (n = 170)

	US-born	Immigrant	*P*-value	β (SE)	Rate ratio (95% CI)
Baseline caries (mean + SD)*	9.4 ± 7.1	11.5 ± 7.3	0.01	0.26 (0.10)	1.30 (1.07, 1.59)
Five-year net increment (mean + SD)†	7.3 ± 1.8	7.9 ± 2.1	0.80	0.03 (0.11)	1.03 (0.83, 1.28)

* Adjusted for age, gender, race, and smoking status of primary caregiver. Rate ratio was calculated from multivariate negative binomial model.
† Adjusted for age and baseline number of carious tooth surfaces. Rate ratio was calculated from multivariate negative binomial model, using multiple imputation for missing data (including children who withdrew from the New England Children's Amalgam Trial).
CI, confidence interval; SD, standard deviation; SE, standard error.

Table 3
Carious Surfaces at Baseline by the Primary Caregivers' Language Preference*

	n†	Mean (standard deviation)
English	229	9.9 (2.3)
Spanish	25	10.7 (2.2)
Haitian/Creole	13	8.9 (1.9)
Other‡	15	16.5 (3.0)

* $P = 0.004$, from negative binomial model adjusted for age, gender, race, neighborhood, household income, and primary caregivers' educational and smoking status.
† Preferred language was missing for one immigrant caregiver.
‡ Other languages were Albanian, Bengali, Chinese, Dominican, Polish, Portuguese, and Vietnamese.

Table 4
Withdrawals and Number of Dental Visits Attended during the New England Children's Amalgam Trial (NECAT) among 283 Boston-Area Participants by the Caregivers' Immigration Status, 1997-2005

	Immigrant caregiver (n = 113)	US-born caregiver (n = 170)	*P*-value
Attended dental visits (mean ± SD)*	6.7 ± 3.1	7.2 ± 3.1	0.12
Withdrew from NECAT, %†	23.0	12.9	0.03
Baseline carious surfaces among withdrawals (mean ± SD)	10.9 ± 6.6	10.3 ± 5.8	0.85
Reasons for withdrawal, % of withdrawn			
Administratively withdrawn due to lack of contact	50.0	40.9	
Moving or moved	19.2	13.6	
Got a new dentist	0	18.2	
No interest in research topic	7.7	13.6	
Disliked research topic	7.7	0	
Time commitment	7.7	9.1	
Insurance confusion	7.7	0	
Clinic too far	3.9	0	
Not enough incentive	0	4.6	

* Mean number of attended dental visits includes withdrawals. Among withdrawals, US-born mean = 2.1 ± 1.2 visits; immigrant mean = 3.2 ± 2.1 visits. Among nonwithdrawals, US-born mean = 7.9 ± 2.5 visits; immigrant mean = 7.7 ± 2.5 visits.
† Average length of follow-up before withdrawal was 1.2 ± 1.1 years for immigrants and 1.5 ± 2.0 years for US-born.
SD, standard deviation.

outcomes (13,19,21). Although NECAT did not construct an acculturation scale, our exploration of recency of immigration and language preference suggests that acculturation beneficially influences children's dental health. For example, immigrants who prefer less common languages (categorized as "other") may have few culturally similar or linguistically similar neighbors who can help them feel comfortable with a new health care delivery system or adapt oral health values, which may explain our finding that their children had the most carious surfaces at baseline. The fact that, in our analysis, neighborhood was the only additional factor to substantially modify the association between immigrant status and baseline caries with a statistically significant interaction indicates the importance of the community network. That is, acculturation effects may be modified by neighborhood or community characteristics. Further research into ethnic density of neighborhoods, acculturation of individuals, and unmet oral health needs would help clarify minority groups and geographic areas that may benefit most from policy changes or outreach efforts.

During the 5-year follow-up, the dental care provided by NECAT was most likely the primary reason that caregiver immigrant status was not associated with new caries increments. NECAT not only provided free preventive and restorative care semiannually, but also strongly encouraged its use, with multiple appointment reminders and locations. For caregivers who preferred to speak Spanish, materials and com-

munication were in Spanish. Thus, it may be that once immigrant and nonimmigrant caregivers joined an effort that facilitated free dental care, their children's treatment needs were balanced. The similarity in the number of new carious surfaces as soon as 6 months after enrollment strengthens the notion that it was NECAT's dental care, rather than acculturation through time, that most affected caries development. Supporting this notion, research in other countries suggests that acculturation resulting in improved oral health may not occur within NECAT's time frame (22,23). For example, a Swedish longitudinal study found that the poorer oral health of immigrant children at baseline continued through 3 years of follow-up, despite the public dental service's prevention efforts (23).

Our ability to definitively compare immigrant caregivers by recency or birth country was precluded by limited data and small sample sizes, as NECAT was not designed to analyze directly the various effects of immigration status. Considering that there is substantial variability in immigrant families depending on origin country (5), the participants may not be representative of all the children of the immigrants. In NECAT, more foreign-born caregivers were from Latin America (62 versus 48 percent) and less from Asia (12 versus 24 percent) compared to Boston's 2000 census. However, the most common origin countries and language preferences were similar. Also, our observed differences in sociodemographic characteristics by immigrant status are consistent with other studies, e.g., the US Current Population Survey found that immigrants were less likely to be smokers (24). NECAT's eligibility criteria of two or more untreated caries and self-selection of participants may actually be viewed as advantages when one considers that governmental oral health programs target children with unmet treatment needs and strive to provide them affordable dental care, as was done by NECAT.

Indeed, as the overall prevalence of caries decreases in the United States, it is important to focus limited resources and time-consuming efforts on children who are most in need of caries prevention and treatment (25). In this regard, our results are the first to show that children of immigrants are likely to present with greater unmet needs when enrolling in an initiative that offers free comprehensive dental care in the United States. Importantly, once enrolled, the extent of new treatment needs no longer differed by immigrant status, as early as 6 months later and through 5 years of dental visits. The fact that immigrant families were more likely to withdraw, often simply by losing contact with NECAT administrators, indicates that more effort may be required to keep immigrant families involved in various initiatives that provide low-cost dental care. Efforts to improve the oral health of immigrant families may be most effective when targeted at the neighborhood level and when they take into account language preferences and acculturation of families.

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