

Changes in Parental Perceptions of Their Care of Their Children's Oral Health From Age 1 to 4 Years

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Abstract

Introduction: In this 3-year longitudinal study, parent/child attended 3 dental visits and in between, parents were called every 4 months and asked if their child had visited the dentist and if fluoride varnish had been applied. **Methods:** Objectives were to assess changes in parents' perceptions of how well they do in taking care of their children's teeth and/or gums across these 3 time points (at age 1, 2.5, and 4 years), assess differences in parents' perceptions of how well they do taking care of their children's teeth and/or gums versus taking care of their children's medical health, and determine factors associated with parental perceptions of how well they do in taking care of the children's teeth and/or gums longitudinally. **Results:** Participant pairs (1325) were enrolled and over time there was a significant improvement in parental perceptions of their job taking care of their children's teeth and/or gums, increasing from 86% perceiving it to be excellent/very good/good at their child's 1 year of age to 92% at child's age 4 years. The estimated odds of parents perceiving they provided excellent/very good/good versus fair/poor care for the children's teeth and/or gums were higher for those who cleaned and checked inside the children's mouth and/or gums daily (odds ratio 4.74) or took their children to the dentist yearly or twice yearly (odds ratio; 2.73). **Conclusions:** Parents' perceptions of the care of their children's teeth and/or gums improved over time. Parents consistently perceived that they provided better medical care than dental care for their child.

Keywords

parent perception, oral health care, dental health, longitudinal study, children, health promotion

Introduction

Providing oral health home care and access to professional medical and dental care for children are key responsibilities of parents. This article reports on parental perceptions of how well they did in providing for their children's medical and oral health needs from age 1 to 4 years. It is part of a longitudinal study designed to develop a caries risk assessment questionnaire for use in primary care practices.¹ Previously it was reported that, when child participants in this longitudinal study were one year of age, parents who perceived they did a good job caring for their infants' teeth and/or gums generally provided good oral health care.² However, two-thirds of these same parents perceived that they did a better job of taking care of their children's medical health as compared with their children's dental health.² Parental perceptions of the care they provide are important because their decisions impact the well-being of their children, since they are the main decision makers with regard to

their children's health. A key difference between provision of medical versus oral health is that the parents generally provide *access* to medical care by getting the child to a physician or other health care provider, whereas for oral health, in addition to seeking professional dental care, there is much hands-on participation by parents during tooth brushing and making sure sugary foods are not consumed in excess. Factors that have been associated with children's oral health status and need for oral care include, for example, low family education level,³ low household income,⁴⁻⁶ racial/ethnic minority status,^{3,6} children having oral health

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problems (eg, dental caries,^{5,6} children having anterior open bite,⁴ parent not being likely to have a dental visit,³ and perception that children have general health that is not excellent.⁵

While there are some studies inclusive of parental ratings of their children's oral and medical health,⁷⁻⁹ our previous publication is the only one found that assessed parental perceptions of their care of their children's oral and medical health.² Other researchers have found that parents rate their children's overall health status to be superior to their oral health status.^{7,8} In a survey of 707 parents of 8-year-old children (with 437 in mainstream classrooms and 270 in special education classes) in San Mateo County, California, parents from both types of classrooms generally rated their children's overall health status to be superior to their oral health status.⁷ This is similar to our perception finding from our baseline data, where 1246 (94%) parents of children aged 1 year (± 3 months) rated their perception of taking care of their children's medical health as excellent/very good compared with the 569 (43%) parents who perceived their care of their children's teeth and/or gums to be excellent/very good.² In the 2016 US National Survey of Children's Health (NSCH),⁸ 92.8% of parents rated their children's (age 0-5 years) general health status as excellent/very good and 86.5% rated their children's teeth as excellent/very good.⁸

This longitudinal study² presented the opportunity to assess whether parents' perceptions of their care of their children's teeth and/or gums and medical health change over time.^{1,2,10} In this study, we sought to develop and validate a tool to be used in medical settings to identify young children at highest risk for developing dental caries.² At baseline, children were about 1 year old and a detailed questionnaire was completed by the parents. Every 4 months after the baseline visit, the parents were contacted by telephone, email, or letter to maintain contact and retention for the 2.5- and 4-year follow-up face-to-face visits. At these contacts, parents were asked if their children had visited the dentist during the previous 4 months. If yes, they were asked if fluoride varnish was applied.

It was hypothesized that being asked these questions every 4 months for a total of 8 times during the time their child was aged 1 to 4 years, with face-to-face dental study visits at age 1, 2.5, and 4 years, would be associated with increased oral health awareness and improved perceptions of how well the parents were taking care of their children's teeth and/or gums. The objectives of this study were to (a) assess changes in parents' perceptions of how well they do in taking care of their children's teeth and/or gums from age 1 to 2.5 to 4 years, (b) assess differences in parents' perceptions of how well they do taking care of their children's teeth and/or gums versus how well they do taking care of the children's medical health at ages 1, 2.5, and 4 years, and

(c) determine factors associated with parental perceptions of how well they do in taking care of the children's teeth and/or gums longitudinally across the 3 visits.

Methods

The study's principal investigator and Data and Clinical Coordinating Center (DCCC) are at the University of Michigan School of Dentistry (Ann Arbor, MI). The 3 clinical sites are Duke University (Duke) (Durham, NC), Indiana University (IU) (Indianapolis, IN), and The University of Iowa (UI) (Iowa City, IA). All 4 universities received institutional review board approval. Recruitment and baseline information has been reported previously.¹⁰

In November 2012, parent/child pairs were enrolled in a longitudinal, prospective study to develop and validate a tool to be used in medical settings to identify young children at highest risk for developing dental caries. Children received a dental screening examination and parents completed a self-administered written questionnaire at baseline when the child was aged 1 year (± 3 months). During the period May 2014 to November 2015, 18 months after their baseline visit, each parent/child pair was invited to complete a follow-up dental exam and repeat questionnaire (second visit) when the children were 2.5 years old. The process was repeated again 30 months after baseline (third visit) between June 2015 and March 2017, when the children were 4 years old.

Parent Questionnaire

The same questionnaire was used at each visit. It was a 53-item investigator-developed questionnaire, with 5 items concerning the child's teeth; 27 concerning the child's tooth care, eating habits, parent behavior with child, child's dental care, health insurance, race/ethnicity, and delivery; 18 concerning the parent's tooth care, eating habits, and demographics; and 1 each about the parent's perception of how well they take care of the child's teeth and/or gums and a similar question relating care of the child's medical health. These perception questions read: "I do a _____ job taking care of the child's teeth and/or gums," and "I do a _____ job taking care of the child's medical health." These 2 questions were recorded using an ordinal scale, with codes of excellent = 1, very good = 2, good = 3, fair = 4, and poor = 5.¹⁰ At the third visit, a question about parents' highest level of education was added to the questionnaire.

The patient questionnaire originally included 143 items from existing caries risk instruments and through a pilot 12-month trial of 399 toddlers, the questionnaire was then refined.¹¹ The current version of the questionnaire demonstrates construct and criterion validity from the 1325 children enrolled in this current study.¹²

Statistical Analysis

Descriptive analyses were completed for all key variables to assess the distributions of responses. A nonparametric, Friedman chi-square test was used to compare parents' perceptions of taking care of the children's teeth and/or gums across the 3 visits. The Friedman chi-square test is a nonparametric test for repeated measures and the ordinal outcome variable. The Cochran-Mantel-Haenszel option in SAS was used to account for the association across the 3 visits for each subject. When there was a statistically significant difference ($P < .05$) in parents' perceptions of taking care of their children's teeth and/or gums across the 3 visits, paired comparisons of each pairing, that is every 2 visits, were performed. Wilcoxon signed-rank tests were used to compare differences, separately at each of the 3 visits in the assessments of parents' perceptions of taking care of the children's teeth and/or gums and medical health, with $P < .05$ considered a significant difference. All statistical analyses were performed using SAS version 9.4 (SAS Institute Inc, Cary, NC).

In this longitudinal study, the relationships between each of the possible associated factors and the parental perceptions of how well they do in taking care of the children's teeth and/or gums as the dependent variable were assessed. Each perception response was dichotomized into "excellent/very good/good" referred to as positive versus "fair/poor" referred to as negative. Potential associated factors were dichotomized into 2 categories depending on the types and distributions of responses (eg, yes vs no/don't know; daily vs weekly/monthly/never; 3 or more times a day/1 or 2 times a day vs weekly/monthly/never; and twice yearly/yearly vs only when in pain/every other year/never). Household income was divided into 2 groups ($< \$40\,000$ vs $\geq \$40\,000$). The questions and collapsed categories are found in the tables. Regardless of the numbers of visits completed, all participant responses were used in the models.

The general linear mixed model was used to build the models to examine the relationships between the dependent variable, parental perception of their care of their child's teeth and/or gums, and each of the associated factors. The logit link function was used to estimate the log-odds of reporting "excellent/very good/good" care of the child's teeth/gums. The study site random effects were assumed to be normally distributed. The nested within subject random effects were assumed to be normally distributed and have a variance component covariance structure. The relationship of the dependent variable, parental perception, with each of the potential associated factors over the three visits first was examined individually. The significant ($P < .10$) variables from the individual models were put into multivariable models. A manual backward selection method was used to remove nonsignificant variables until all variables were statistically significant ($P < .05$).

Results

A total of 1325 participants were enrolled in the study at baseline, with 434 (33%) from Duke, 543 (41%) from IU, and 348 (26%) from UI. Of these, 1062 completed the second dental visit 18 months post-baseline (351 from Duke, 404 from IU, and 307 from UI), and 985 completed the third dental visit 36 months post-baseline (322 from Duke, 387 from IU, and 276 from UI). At baseline, 49% of the children were female and the majority (94%) of the primary caregivers were female, with a mean age of 28.7 years (see Table 1). The distributions of demographic and socioeconomic factors were similar over time. A total of 928 participants completed all 3 visits. Of the 985 participants who completed the third visit, 57 did not complete the second visit.

Results of the 2 parental perception questions regarding the children's teeth and/or gums and medical health at each visit are presented in Table 2. Nearly all parents perceived that they did a positive job in taking care of their children's medical health at each time point (99.5% at 1 year, 99.8% at 2.5 years, and 99.3% at 4 years). At 1 year, only 1 parent perceived that he/she provided poor care of the child's medical health, while a few (37) perceived that they provided poor care of their children's teeth and/or gums and; at the 2.5- and 4-year visits, those perceptions of poor tooth care were reported by only 4 and 3 parents, respectively (see Table 2).

Parental perceptions of doing a positive job taking care of their children's teeth and/or gum increased from 85.9% perceiving it to be at 1 year to 91.2% at 2.5 years and 92.3% at 4 years, respectively (see Table 2). The nonparametric Friedman test across the 3 visits revealed a statistically significant difference in parental perceptions of their job taking care of their children's teeth and/or gums ($P < .0001$). Post hoc paired comparisons showed that perceptions were significantly better at age 2.5 years compared with 1 year ($P < .0001$) and at age 4 years compared with 1 year ($P < .0001$), but there was no significant difference between ages 2.5 and 4 years.

Separate Wilcoxon signed-rank tests demonstrated there were significantly better parents' perceptions of care of their children's medical health than their perceptions of care for the infants' teeth and/or gums at each of the three visits, respectively (all $P < .0001$). Comparing the percentage of "excellent" ratings for provision of medical versus dental care, medical was 67.8% and dental 22.1% at 1 year; at 2.5 years, medical was 58.9% and dental 20.2%; and at 4 years, medical 55.4% and dental 23.5% (see Table 2). Over time, the percentage of exact agreement in ratings for oral versus medical increased, especially in the very good category. Thirty-four percent reported the same level of perception of care for oral and medical health at the first visit, increasing to 39.9% at the second visit and 47.5% agreement at the third visit.

Table 1. Demographic and Socioeconomic Status of Parents and Children at Ages 1, 2.5, and 4 Years.

Characteristic	Age of Child		
	1 Year (n = 1325), n (%)	2.5 Years (n = 1062), n (%)	4 Years (n = 985), n (%)
<i>Parents</i>			
<i>Sex</i>			
Male	79 (6.0)	65 (6.1)	61 (6.2)
Female	1246 (94.0)	997 (93.9)	924 (93.8)
Age, years, mean \pm SD	28.7 \pm 6.0	30.7 \pm 6.0	32.4 \pm 6.0
<i>Race</i>			
Black/African American	544 (41.1)	392 (36.9)	364 (37.0)
Native American	9 (0.7)	6 (0.6)	7 (0.7)
Asian	31 (2.3)	27 (2.5)	24 (2.4)
White	667 (50.3)	582 (54.8)	540 (54.8)
Unknown	74 (5.6)	55 (5.2)	50 (5.1)
<i>Ethnicity</i>			
Hispanic	146 (11.0)	121 (11.4)	114 (11.6)
Non-Hispanic	1179 (89.0)	941 (88.6)	871 (88.4)
<i>Annual household income</i>			
<\$10 000	309 (23.3)	192 (18.1)	151 (15.3)
\$10 000 to <\$40 000	344 (26.0)	309 (29.1)	280 (28.4)
\$40 000 to <\$80 000	251 (18.9)	214 (20.2)	207 (21.0)
\geq \$80 000	257 (19.4)	255 (24.0)	284 (28.8)
Don't know	164 (12.4)	92 (8.7)	63 (6.4)
<i>Education</i>			
High school or less	Not asked	Not asked	275 (27.9)
Some college or college degree			512 (52.0)
Graduate or above			197 (20.0)
Unknown			1 (0.1)
<i>Children</i>			
<i>Sex</i>			
Male	676 (51.0)	543 (51.1)	501 (50.9)
Female	649 (49.0)	519 (48.9)	484 (49.1)
Age, months, mean \pm SD	11.9 \pm 2.0	29.2 \pm 2.3	47.2 \pm 2.5
<i>Race</i>			
Black/African American	506 (38.2)	357 (33.6)	339 (34.4)
Native American	5 (0.4)	3 (0.3)	4 (0.4)
Asian	21 (1.6)	17 (1.6)	15 (1.5)
White	599 (45.2)	529 (49.8)	490 (49.8)
More than one race	173 (13.1)	140 (13.2)	123 (12.5)
Unknown	21 (1.6)	16 (1.5)	14 (1.4)
<i>Ethnicity</i>			
Hispanic	177 (13.4)	142 (13.4)	133 (13.5)
Non-Hispanic	1143 (86.3)	920 (86.6)	852 (86.5)

Of the 27 infant/child factors that could have been associated with parents' perceptions care of their children's teeth and/or gums, individual bivariate GLIMMIX models of association showed that 13 factors had significant odds ratios (ORs) ($P < .05$). The factors included daily brushing of child's teeth (OR 11.7, 95% CI 8.1-16.7), child's teeth brushed with toothpaste (OR 9.0, 95% CI 5.9-13.6), child's teeth brushed with nonfluoride toothpaste (OR 2.4, 95% CI 1.7-3.4), child's teeth checked for anything unusual (OR

2.5, 95% CI 1.8-3.4), cleaned inside the child's mouth and/or gums (OR 5.8, 95% CI 4.3-7.9), took their child to the dentist yearly or twice yearly (OR 3.0, 95% CI 2.1-4.4), child sharing their toothbrush with another (OR 0.3, 95% CI 0.1-0.8), drinking anything other than water before going to bed (OR 0.4, 95% CI 0.3-0.6), giving the child sugary drinks (OR 0.7, 95% CI 0.5-1.0), and sharing/tasting food with the child with the same utensil (OR 0.7, 95% CI 0.5-0.9), difficulty getting the child to the physician or dentist

Table 2. Parental Perceptions of Their Job Taking Care of Their Children's Teeth/Gums and Medical Health at Ages 1, 2.5, and 4 Years.^a

Age 1 Year		Parental Perceptions of Their Job Taking Care of Their Children's Medical Health at Age 1 Year					
		Excellent, n (%)	Very Good, n (%)	Good, n (%)	Fair, n (%)	Poor, n (%)	Total, n (%)
Parental perceptions of their job taking care of their infants' teeth/gums	Excellent	284 (21.4)	8 (0.6)	1 (0.1)	0	0	293 (22.1)
	Very good	287 (21.7)	114 (8.6)	2 (0.2)	0	0	403 (30.4)
	Good	217 (16.4)	177 (13.4)	48 (3.6)	1 (0.1)	0	443 (33.4)
	Fair	87 (6.6)	43 (3.3)	14 (1.1)	5 (0.4)	0	149 (11.3)
	Poor	23 (1.7)	8 (0.6)	6 (0.5)	0	0	37 (2.8)
	Total	898 (67.8)	350 (26.4)	71 (5.4)	6 (0.5)	0	1,325
Age 2.5 Years		Parental Perceptions of Their Job Taking Care of Their Children's Medical Health at Age 2.5 Years					
		Excellent, n (%)	Very Good, n (%)	Good, n (%)	Fair, n (%)	Poor, n (%)	Total, n (%)
Parental perceptions of their job taking care of their children's teeth/gums	Excellent	209 (19.7)	5 (0.5)	1 (0.1)	0	0	215 (20.2)
	Very good	250 (23.5)	174 (16.4)	2 (0.2)	0	0	426 (40.1)
	Good	132 (12.4)	157 (14.8)	38 (3.6)	0	0	327 (30.8)
	Fair	32 (3.0)	34 (3.2)	22 (2.1)	2 (0.2)	0	90 (8.5)
	Poor	3 (0.3)	1 (0.1)	0	0	0	4 (0.4)
	Total	626 (58.9)	371 (34.9)	63 (5.9)	2 (0.2)	0	1062
Age 4 Years		Parental Perceptions of Their Job Taking Care of Their Children's Medical Health at Age 4 Years					
		Excellent, n (%)	Very Good, n (%)	Good, n (%)	Fair, n (%)	Poor, n (%)	Total, n (%)
Parental perceptions of their job taking care of their children's teeth/gums	Excellent	224 (22.7)	5 (0.5)	2 (0.2)	0	0	231 (23.5)
	Very good	216 (21.9)	182 (18.5)	3 (0.3)	0	0	401 (40.7)
	Good	74 (7.5)	146 (14.8)	56 (5.7)	1 (0.1)	0	277 (28.1)
	Fair	30 (3.1)	27 (2.7)	11 (1.1)	5 (0.5)	0	73 (7.4)
	Poor	2 (0.2)	0	0	0	1 (0.1)	3 (0.3)
	Total	546 (55.4)	360 (36.6)	72 (7.3)	6 (0.6)	1 (0.1)	985

^a n (%) are of total sample.

Table 3. Multivariable General Linear Mixed Model of Factors Associated With Parental Perceptions of Excellent/Very Good/Good Versus Fair/Poor Job of Taking Care of Their Children's Teeth and/or Gums at Ages 1, 2.5, and 4 Years.^a

Factors	Odds Ratio (95% CI)	P
Cleans inside child's mouth and/or gums daily ^b	4.74 (3.47-6.47)	<.0001
Takes child to the dentist yearly to twice yearly ^b	2.73 (1.86-4.01)	<.0001
Checks child's teeth for anything unusual daily ^b	1.75 (1.26-2.41)	.0008
Number of people living in the house	0.85 (0.76-0.94)	.0023
Shares/tastes food with child using the same utensil daily ^b	0.65 (0.47-0.88)	.0064
Difficult to get child to dentist (yes vs no)	0.50 (0.30-0.85)	.0105
Child eats or drinks anything other than plain water (and after they have brushed their teeth) before going to bed daily ^b	0.49 (0.36-0.68)	<.0001

^a n = 1325 at age 1 year, n = 1062 at age 2.5 years, and n = 985 at age 4 years.

^b The variables were dichotomized into more frequently versus less frequently.

(OR 0.4, 95% CI 0.2-0.6), and the child being non-Hispanic (OR 0.6, 95% CI 0.4-0.9). Factors not significantly related were sex of child, frequency of gums bleeding while brushing, child drinking from bottle or sippy cup, frequency of drinking tap water, frequency of giving the child sugary snacks, frequency of dipping child's pacifier in a sweet

drink, frequency of cleaning child's pacifier in parent's mouth, frequency of parent kissing child on the mouth, child's health insurance coverage, and child's participation in public assistance programs.

Table 3 summarizes the results of the multivariable GLIMMIX modeling of the relationships between parents'

perceptions of their care of their children's teeth and/or gums and associated factors, adjusting for other factors in the model. The estimated odds of parents perceiving they provided positive care for their children's teeth and/or gums were higher for those who cleaned (with or without a tooth brush) inside their children's mouth and/or gums daily (OR 4.74, 95% CI 3.47-6.47), took their children to the dentist yearly or twice yearly (OR 2.73, 95% CI 1.86-4.01), or checked their children's teeth for anything unusual daily (OR 1.75, 95% CI 1.26-2.41). The estimated odds of parents perceiving they provided excellent/very good/good care for their children's teeth and/or gums were lower if there were more people living in the household (OR 0.85, 95% CI 0.76-0.94), if parents shared/tasted food with the children using the same utensil (OR 0.65, 95% CI 0.47-0.88), if they felt it was difficult to get their children to the dentist (OR 0.50, 95% CI 0.30-0.85), or if their children ate or drank anything other than plain water before going to bed daily (OR 0.49, 95% CI 0.36-0.68), given the other factors in the model (see Table 3).

Discussion

As hypothesized, parents' perceptions of the job they did caring for their children's teeth and/or gums improved from age 1 year to 4 years. Their perceptions of the job they did caring for their children's medical health remained about the same, with almost all positive. It is possible that the frequent telephone contacts with the parent between the study visits impacted their perceptions. The 2 perceptions became more congruent over time, possibly due in part to the ongoing intermittent parent contacts asking about their children's dental care and a ceiling effect of parents' perceptions of how well they take care of the child's medical health. From the visit at age 1 year and factors associated with parental perceptions, a few changes were noted over time.² Parents' dental check-ups were no longer associated while the child's dental check-ups were associated with parental perceptions. Parents sharing food with their child using the same utensil was also new compared with the first visit when the children were 1 year old. These changes may be reflective of the children having more teeth and eating all foods at age 4 years.

No literature regarding the 2 perceptions staying the same or changing over time was found. Findings at each time period for this study were slightly better than those from the cross-sectional study of Butani and et al⁷ conducted in 2006 in San Mateo County, California, where 85.6% of parents rated their 8-year-old children's overall health to be positive and 64.5% rated their oral health as positive. In the US NSCH of 2000,⁹ 90% of parents rated their 10- to 18-month-old children's health status as excellent/very good, slightly less than the 92.8% of parents in the NSCH study of 2016.⁸ For the 1- to 5- year-olds in the 2016 NSCH study, 86.5% rated their children's teeth as excellent/

very good, higher than our results of 44.6%.⁸ The American Academy of Pediatrics provides a set of comprehensive health guidelines for well-child care, which includes dental care, brushing teeth, and fluoridation of water.¹³ If these guidelines were to be inclusively used at all well-child visits, there would be a continued reinforcement of the importance of dental health, which could be similar to the 6 intermediate contacts for this study, with about 5 well-child check visits in the same time frame.

In contrast with results from other studies that found significant associations of perceptions of oral health with demographic characteristics for household income,⁴⁻⁶ race,^{3,6} and ethnicity,^{3,6} these variables and sex of the child were not significantly associated in this study. Low family education was another significant variable in other studies³ but could not be included in our model, as the education data were only collected at the age 36-month follow-up visit. The only statistically significant association of a demographic variable with positive perception of their job taking care of their children's teeth and/or gums was having a smaller number of persons living in the household. The actual care the parents reported for cleaning inside the children's mouth and/or gums, checking the children's teeth for anything unusual daily, and taking the children to the dentist yearly or twice yearly were significantly associated with parents' positive perceptions of their job taking care of their children's teeth and/or gums. These results are similar to those obtained by Al Agili et al³ in a study where 3- to 19-year-old children were not likely to have a dental visit and parents had poor perception of their oral care. Two other factors not found in other studies that were significantly associated with positive parental perception of their job taking care of their children's teeth and/or gums were not sharing/taking the children's food with the same utensil and the children not having anything but plain water (after they have brushed their teeth) before going to bed.

Dental caries is a preventable disease, yet unfortunately, it is one of the most common chronic diseases of childhood.¹⁴ In standardized clinical examinations from the 2015-2016 National Health and Nutrition Examination Survey (NHANES), 17.7% of children aged 2 to 5 years had caries experience and 8.8% had untreated caries.¹⁵ Untreated dental caries can cause pain, problems with eating and speaking, and infections.¹⁶ To help those children who have limited access to dental services, those in low socioeconomic or minority groups, and those having untreated cavities in primary teeth, medical health care providers should collaborate with dentists to assess and prevent dental caries.^{17,18} Childhood caries is preventable through several approaches, such as fluoridated tap water, application of fluoride varnish, tooth brushing with fluoride toothpaste, application of pit-and-fissure sealants to the chewing surfaces of teeth, and having healthcare providers at well-child visits review dental health with the parents.

The American Academy of Family Physicians currently has 71 300 active family medicine members providing comprehensive medical care to patients of all ages.¹⁹ Of the current members, 74% provide care for infants and children.¹⁹ If family physicians increase their involvement in oral health prevention, all children and especially those with difficulty in accessing dental care, could have improved prevention. Children who participate in well-child visits on a regular basis would have the opportunity for early assessment for dental caries. Some family physician practices have begun implementing oral health assessments and application of fluoride varnish for pediatric patients.²⁰ In 2015, the American Academy of Family Physicians promoted support for routine medical care to deliver preventive oral health care with actionable steps regarding asking about oral health problems, examining the oral cavity, reviewing results with parents and children, delivering preventive interventions and documenting the events.²¹

One limitation of this study is that the participants are a convenience sample and not a representative sample. Also, parental education was not included in the multivariable general linear mixed model, since the question was not included until the third dental visit questionnaire. If it had been included in the model, too much missing data with the smaller sample size at age 4 years would have hindered the analysis. A second limitation of the multivariable general linear mixed model is collinearity of many of the questionnaire variables, especially for variables having to do with care inside of the mouth (eg, brushing the teeth, cleaning the mouth). The question regarding cleaning inside child's mouth and/or gums was strongly associated with both the variables brushing teeth and brushing teeth with toothpaste, so we only included cleans inside the child's mouth and/or gums in the final model. In addition, although the variable sharing a tooth brush with another person was statistically significant in the final model with lower odds of perceiving they provided excellent/very good/good care for their children's teeth and/or gums, only 1.4% of subjects answered yes, so we eliminated it from the final model. Strengths of this study are that participants received intermediate telephone contacts every four months, which assisted with retention and the tracking of changes in contact information and there was external monitoring of data management and entry at all 3 sites. In addition, on-site quality management review was conducted every year, with institutional review board review and 10 randomly selected subjects' Case Report Forms reviewed.

Conclusion

Parental perceptions of their job taking care of their children's teeth and/or gums increased from 85.9% being excellent/very good/good at 1 year to 92.3% at 4 years. Those parents with excellent/very good/good perceptions

of their job taking care of their children's teeth and/or gums reported they provided suitable care of their child's daily oral care, use of food utensils, oral intake after brushing the child's teeth before bed, and provision of dental services. Parents are ultimately responsible for their children's health care, including oral health. At baseline, two-thirds of the parents perceived that they provided better care of their children's medical health than their infants' oral health. As the children went from age 1 to 4 years, the exact agreement in perceptions regarding how well medical and oral health care were provided increased substantially from 34% to 47%.

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