

Maternal self-efficacy and 1–5-year-old children's brushing habits

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Abstract – *Objectives:* This study investigates the relationships between maternal cognitive, behavioral, and psychosocial factors and brushing practices in low-income African-American preschool children. *Methods:* Data are from a population-based sample of 1021 African-American families with at least one child <6 years of age and living in the 39 low-income Census tracts in Detroit, Michigan. Analyses were limited to 1–5-year-old children and their mothers ($n = 719$). Mothers were surveyed about oral health-related self-efficacy (OHSE), knowledge about appropriate bottle use (KBU), knowledge about children's oral hygiene (KCOH), oral health fatalism (OHF), their own toothbrushing behavior, depressive symptoms (CES-D), parenting stress, practical social support, and their child's dental history. Children's 1-week reported brushing frequency was the main outcome measure. Analyses were conducted in SUDAAN to account for the complex sampling design. *Results:* Children's 1-week brushing frequency (range 0–40) averaged 8.50 times per week among 1–3-year olds and 9.75 among the 4–5-year olds. Maternal OHSE was a strong and significant predictor of children's brushing frequency; for each unit increase in OHSE, 1–3-year olds were expected to brush 18% more frequently on average during 1 week [incidence density ratios (IDR) = 1.18, 95% confidence interval (CI) 1.08–1.28; $P < 0.001$], and 4–5-year olds were expected to brush 9% more often (IDR = 1.09, 95% CI 1.00–1.19; $P < 0.10$). Mothers' KCOH score was also significantly positively associated with brushing frequency; for each unit increase on the KCOH scale, 1–3-year olds were expected to brush 22% more frequently (IDR = 1.22, 95% CI 1.10–1.35; $P < 0.001$) and 4–5-year olds were expected to brush 13% more frequently (IDR = 1.13, 95% CI 1.02–1.26; $P < 0.05$). If a mother brushed her own teeth at bedtime during the week, her 1–3-year old child's brushing frequency was expected to increase by one-third (IDR = 1.34, 95% CI 1.12–1.60; $P < 0.01$) and among the 4–5-year olds, the child's frequency was expected to increase by one-quarter (IDR = 1.26, 95% CI 1.12–1.42; $P < 0.001$). Availability of help with transportation and financial support were also relevant variables for 1–3-year olds. Higher family income and dental insurance coverage were both positively associated with brushing among 4–5-year olds. *Conclusions:* Several maternal cognitive, behavioral, and psychosocial factors were associated with young children's brushing practices. Oral health-specific self-efficacy and knowledge measures are potentially modifiable cognitions; findings suggest that intervening on these factors could help foster healthy dental habits and increase children's brushing frequency early in life.

Key words: African-Americans; dental hygiene; oral hygiene; preschool-aged children; psychosocial risk factors; self-efficacy

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The dominant paradigm for health promotion efforts during the 1970s to 1980s focused on trying to improve oral health by attempting to

change knowledge, and in turn, individuals' behaviors. Contemporary health promotion efforts are starting to shift away from this paradigm,

recognizing that education is a necessary but not sufficient component of any health behavior change intervention. There is a growing realization that oral health promotion efforts need to adopt a broader perspective and address multiple determinants of oral health (1). Research aimed at informing health promotion efforts cannot focus narrowly on individuals and their biology and behavior alone, but should consider psychosocial and physical aspects of the individuals' environment as well.

Recently, interest in understanding the social determinants of disease and the behavioral and psychological forces that influence children's oral health outcomes has increased (2). Psychosocial factors include both cognitive elements, such as dental knowledge, beliefs, attitudes, and feelings, and broader social forces like living conditions that can influence engagement in oral health-promoting behaviors and outcomes. This paper explores how maternal psychosocial factors relate to 1–5-year-old children's brushing habits in a sample of low-income African-American families.

Young children's health behaviors and outcomes are influenced by their parent's knowledge and beliefs, which affect oral hygiene and healthy eating habits. Without basic knowledge of caries risk factors and how to take care of teeth, it is difficult to employ effective disease prevention strategies. Although it is easier to educate parents about how to protect their children's teeth than influence long-term behavioral change, both are difficult, and improvement in parents' knowledge of oral health has generally not been related to changes in oral health behavior (3, 4). At present, there is no conclusive evidence that traditional interventions designed to improve oral hygiene behaviors reduce dental caries (3).

Research has shown that broader psychosocial factors can influence engaging in and maintaining health-promoting behaviors, and risk factors that have been found to adversely affect parents' ability to engage in preventive health practices include poverty, chronic stress, and depression (5–8). However, the role of such factors in children's oral health disparities has been understudied, and little is known about how psychosocial factors relate to the disease process or affect children's dental health (2).

Importantly, African-American mothers are overrepresented among the poor, and a number of studies have documented their exposure to multiple sources of chronic stress (8–13). High

levels of depressive symptoms have also been reported in this group (6, 14). However, the stress and depression engendered by poverty and material hardship can be moderated to some extent by support from families, extended kin, and friends (15–18).

The theoretical framework for this analysis is social cognitive theory (SCT), a comprehensive approach to understanding human behavior, motivation, affect, and thought processes (19–22). SCT is widely used in health behavior research; key constructs include self-efficacy, knowledge, beliefs, and observational learning. SCT posits that self-efficacy, defined as one's perceived capacity for success in organizing and implementing a new pattern of behavior based on experience with similar actions or circumstances, is a critical determinant of behavior (19–23).

The body of literature on self-efficacy and oral health is fairly small, but promising. Reisine and Litt (24) investigated reported brushing habits, sugar intake in the diet, social class, stressful life events, dental health locus of control, dental self-efficacy, tooth decay, and bacteria in saliva among Connecticut Head Start children, and caregivers' low self-efficacy was found to be associated with higher caries rates in their children. In the same population one year later, in a structural equations model, self-efficacy was an important predictor of sugar intake (children of more efficacious mothers had lower sugar intake), which in turn predicted bacterial levels and dental caries (25). In another follow-up study using different analysis methods, self-efficacy at baseline was not a significant predictor of decay 1 year later in these children (24). Pine et al. (26) conducted an international study with 3–4-year-old children and their parents, focusing on cultural differences in parental attitudes about brushing, sugar, and ECC. Self-efficacy was found to be the strongest significant predictor of children's brushing habits.

In this paper, we investigate the relationships between several maternal cognitive, behavioral, and psychosocial factors and brushing practices in low-income African-American preschool children. We hypothesized that maternal oral health related self-efficacy, oral health-related beliefs and knowledge, toothbrushing behavior, and social support would be associated with children's more frequent brushing, while maternal depressive symptoms and parenting stress would be inversely related to brushing frequency.

Methods

Study design and sample

Data for this study are from the Detroit Dental Health Project (DDHP), one of five Centers funded by the National Institute of Dental and Craniofacial Research (NIDCR grant U-54 DE 14261) to conduct research on reducing oral health disparities (27). The DDHP focuses on understanding the social, familial, biological, and neighborhood context of oral health in a large, population-based sample of low-income African-American families in Detroit, Michigan. The sample was selected using a multi-stage area probability sample design. The DDHP research team selected the 39 Census tracts with the lowest median household income in the city of Detroit based on 2000 Census data. Families were eligible if they had at least one child <6 years of age at baseline and were below 250% of federal poverty line. Of the 12 265 randomly selected housing units, 9781 were successfully contacted and an adult living in the unit responded to the project staff (77.3% contact rate). Of the 9781 contacted housing units, 1386 (14.2%) had an eligible African-American child <6 years of age. Of the 1386 families with eligible children, 1021 completed the study (73.7%).

Trained staff conducted face-to-face interviews with participants during 2002–2003 at the DDHP Dental Examination Center in Detroit. Caregivers were surveyed about their oral health beliefs and behavior and a broad array of psychosocial factors using a series of structured questionnaires. The present study analyzed data from children aged 1–5 years and their biological mothers ($n = 749$). The 11% of fathers, grandparents, or other primary caregivers were excluded from these analyses, as they may have very different experiences and psychosocial characteristics than biological mothers. Some research suggests that male primary caregivers in particular are not as good at guiding their children's oral health behaviors (28) and father caregivers increased their young children's Early Childhood Caries (ECC) risk sixfold in one study (29).

Study variables

Children's 1-week brushing frequency was the main outcome examined in this study and was measured by the mothers' report of the total number of times the child's teeth were brushed in the last week by the child, caregiver, or someone else. Four sets of independent variables

explored in the analyses included: (i) a set of variables operationalizing social cognitive theory (SCT), (ii) psychosocial factors, (iii) sociodemographic characteristics, and (iv) the child's dental history.

The SCT variables included four scales designed to operationalize key constructs in the SCT framework and relate them to children's oral health: oral health-related self-efficacy (OHSE), knowledge about appropriate bottle use (KBU) and knowledge about children's oral hygiene (KCOH), and belief in oral health fatalism (OHF). A detailed description of the development of these scales is available elsewhere; analyses conducted by the authors supported their reliability and validity, with alpha reliabilities ranging from 0.76 to 0.91 (30).

Self-efficacy was assessed with the following question: 'Every parent experiences moments (times) when it is difficult to get their children's teeth brushed. For each situation or feeling that I read please indicate how confident you are that you can get your child's teeth brushed when it is not automatically done at bed time. When you are ___ (insert one of nine item statements), how confident are you that you can have your child's teeth brushed before bedtime?' Sample item statements include being under a lot of stress, depressed, feeling like you do not have the time, and being tired. Possible responses ranged from 4 = 'very confident,' to 1 = 'not at all confident' and were averaged to generate a single OHSE score.

Four items were used to construct the scale reflecting KBU. A sample item is 'there is nothing wrong with putting the baby to bed with a bottle.' Six items were used to construct the scale measuring mothers' KCOH; sample statements include 'cavities in baby teeth don't matter since they fall out anyway' and 'children don't need to brush every day until they get their permanent teeth.' Mothers were asked to express their level of agreement with each statement on a Likert scale (1 = strongly disagree, 5 = strongly agree). Responses to each set of items were averaged to construct each scale.

A dummy variable for oral health-related fatalism was created to reflect maternal agreement with the statement that 'most children eventually develop dental cavities.' In addition, a dummy variable indicating whether or not the mother reported brushing her own teeth at bedtime in the past week was included as a measure of the opportunity for observational learning.

Psychosocial factors included maternal self-reports of depressive symptoms, parenting stress, and social support. Depressive symptoms were assessed using the Center for Epidemiological Studies Depression Scale (CES-D), a reliable and well-validated 20-item scale with standard scoring widely used in research to assess depressive symptoms in the general population (31). A dummy variable was created and coded '1' for mothers scoring 16 or above, the standard cutoff for identifying individuals at risk of depression (32). The Chronbach's alpha for the CES-D in our sample was 0.89. Parenting stress was measured by the average score of six items from the Parenting Stress Index (PSI), a standard measure of perceived stress in the caregiver role (33). Mothers responded on a scale from 1 = 'never' to 5 = 'almost always' to items such as 'having too little time to spend by yourself' and 'child gets on your nerves.' The alpha reliability for this scale in our sample was 0.76.

Social support was assessed by whether or not mothers responded positively to being asked if there was someone they could count on to: (i) run errands, (ii) lend them money, (iii) watch their children, and (iv) lend them a car or give them a ride if needed (15–17). Dummy variables for each of the four specific types of support were created.

All analyses included standard sociodemographic variables, including the mothers' age (continuous variable), education level (coded as completing high school or more), annual household income (categorized as <\$10 000 as the reference, \$10 000–19 999, and ≥\$20 000), and household size (continuous variable). The child's age, dental insurance status (1 = insured), and dental visit history (1 = past visit) were examined as well.

Statistical analysis

The very few missing items (<4% for any individual item) in the survey data were imputed with Imputation and Variance Estimation software (IVEware, Survey Research Center, Institute for Social Research, University of Michigan, Ann Arbor, MI, USA). Imputation was done for individual items before calculating scores for scales, allowing a more consistent sample size to be used in analyses. Cases with missing demographic data (household size, education, and income) were not imputed and were excluded from analyses.

All data management steps were performed in SAS 2000 (version 8) (34), and all statistical analyses were conducted in SUDAAN (2001) (version 8) (35)

software to account for the complex sample design and produce robust variance estimations. SUDAAN's log-link procedure was used to estimate brushing incidence density ratios (IDR), which are similar to odds ratios but are appropriate for count variables and reflect the ratio of average event rates per unit time (in this case, the event rate is the number of times teeth were brushed during a 1-week interval) for each one-unit increase in the covariate (36). IDRs >1 reflect a positive association with the covariate, and unit increases in the covariate correspond to expected increases in brushing frequency. Similarly, for IDRs <1, unit increases in the covariate correspond to reductions in brushing frequency. SUDAAN uses generalized estimating equation (GEE) methodology to produce the parameter estimates and the Taylor series linearization technique to produce variance estimations for all of the Poisson regression models (36).

All analyses were also adjusted with a sample weight created to account for the unequal probability of selection, participant nonresponse, and a poststratification control (all features of the complex sample design) to make the sample representative of the population of children in Detroit in terms of race, gender, and age. As children rapidly grow and develop during the first 5 years, and brushing practices were expected to be related to age and developmental stage, child's age was controlled by grouping 1–3- and 4–5-year-old children together and also including age as an independent variable in the model.

Results

The characteristics of the final sample of 719 mother-child dyads without missing data are summarized in Table 1 by children's age group. Overall, the sample is very impoverished, and nearly half (46%) of the mothers reported their annual household income to be <\$10 000 to support an average household size of four. Additionally, 49% did not finish high school. The mothers' average age was 28 years. Most mothers had relatively high levels of self-efficacy, endorsed a fatalistic oral health belief, and were fairly knowledgeable about appropriate bottle use and children's oral hygiene needs. In terms of psychosocial characteristics, the majority of mothers (78% or more) reported having each type of social support available to them. Parenting stress scale scores were fairly normally distributed, and most

Table 1. Background sample characteristics for African-American children aged 1–5 years and their mothers, by age group

Variable	Age 1–3 years (<i>n</i> = 446)	Ages 4–5 years (<i>n</i> = 273)	Range (items)
<i>Social cognitive theory variables</i>			
Self-efficacy (mean, SE)	3.00 (0.04)	2.98 (0.06)	1–4 (9)
Fatalistic belief (<i>n</i> , %)	344 (76.76)	224 (81.56)	
Knowledge–hygiene needs (mean, SE)	1.48 (0.04)	1.50 (0.06)	1–5 (6)
Bottle use knowledge (mean, SE)	1.97 (0.05)	2.05 (0.08)	1–5 (4)
Mother brushed at bedtime (<i>n</i> , %)	248 (57.63)	151 (55.74)	
<i>Psychosocial characteristics</i>			
Depressive symptoms/CES-D ≥ 16 (<i>n</i> , %)	162 (35.10)	96 (34.33)	
Parenting Stress Scale (mean, SE)	2.98 (0.06)	3.07 (0.05)	1–5 (6)
Instrumental support available (<i>n</i> , %)			
Errands	349 (80.86)	203 (73.75)	
Money	366 (83.20)	209 (75.36)	
Childcare	406 (90.35)	238 (87.98)	
Transportation	375 (85.54)	216 (77.93)	
<i>Background characteristics</i>			
Mothers' age (mean, SE)	26.37 (0.32)	29.65 (0.54)	16–49
Education (<i>n</i> , %)			
Less than High School (reference)	215 (49.03)	132 (48.36)	
High School or more	231 (50.97)	141 (51.64)	
Household income (<i>n</i> , %)			
Less than \$10 000 (reference)	195 (45.75)	132 (46.61)	
\$10 000–\$19 999	127 (28.26)	69 (26.25)	
\$20 000 or above	124 (25.99)	72 (27.14)	
Household size (mean, SE)	4.06 (0.09)	4.29 (0.16)	2–14
<i>Child's dental history (<i>n</i>, %)</i>			
Child's age (<i>n</i> , %)			
1 year old	143 (19.42)		
2 years old	155 (18.48)		
3 years old	148 (19.06)		
4 years old		138 (21.84)	
5 years old		135 (21.20)	
Dental insurance (<i>n</i> , %)	389 (89.05)	239 (87.88)	
No past dental visit (reference)	350 (78.39)	88 (31.77)	
Child has past dental visit (<i>n</i> , %)	96 (21.61)	185 (68.23)	
Child's brushing frequency (mean, SE)	8.42 (0.36)	9.75 (0.32)	0–40

Values given are weighted percentages and standard errors (SE).

mothers reported that they 'sometimes' experienced feelings of stress. Depressive symptoms were prevalent in this sample and 35% scored 16 or more on the CES-D. Most (89%) children did have some type of dental insurance coverage, typically Medicaid, and a majority (78%) had not been to a dentist yet.

Children's 1-week brushing frequency was a continuous measure which ranged from 0–40 and averaged 8.5 among the 1–3-year olds and 9.75 among the 4–5-year olds. Expected peaks in reported brushing frequency were observed at seven times per week (once per day) and 14 times per week (twice per day). The entire distribution of responses is presented in Fig. 1.

Many of the social cognitive variables were significantly associated with children's brushing frequency (Table 2). As expected, maternal oral health self-efficacy (OHSE) was a strong and

significant predictor of children's brushing frequency among the 1–3-year olds, and was a marginally significant predictor among the 4–5-year olds. More frequent brushing was related to higher levels of efficacy; for each unit increase on the four-point OHSE scale, 1–3-year olds were expected to brush 18% more frequently on average during 1 week [IDR = 1.18, 95% confidence interval (CI) 1.08–1.28; $P < 0.001$], and 4–5-year olds were expected to brush 9% more often (IDR = 1.09, 95% CI 1.00–1.19; $P < 0.10$). Mothers' knowledge of children's hygiene needs (KCOH) scale was also significantly positively related to brushing frequency. For each unit increase on the KCOH scale, 1–3-year olds were expected to brush 22% more frequently (IDR = 1.22, 95% CI 1.10–1.35; $P < 0.001$) and 4–5-year olds were expected to brush 13% more frequently (IDR = 1.13, 95% CI 1.02–1.26; $P < 0.05$).

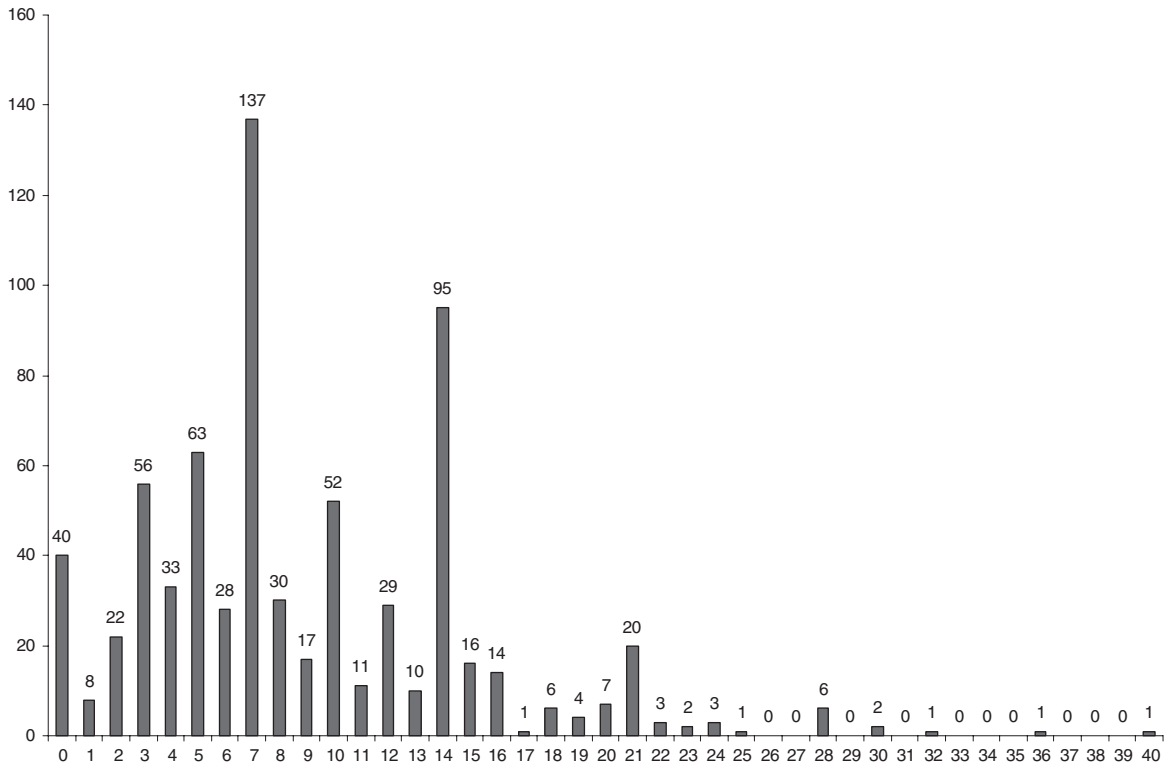


Fig. 1. Distribution of the total number of times a child's teeth were brushed during 1 week.

Table 2. Estimated incidence density ratios (IDRs) and 95% confidence intervals (CIs) for young children's 1-week brushing frequency

	Ages 1–3 (<i>n</i> = 446)		Ages 4–5 (<i>n</i> = 273)	
	IDR	95% CI	IDR	95% CI
Social cognitive theory variables				
Self-efficacy	1.18****	1.08–1.28	1.09*	1.00–1.19
Fatalistic belief	0.83*	0.69–1.01	0.94	0.78–1.13
Knowledge–hygiene needs	1.22****	1.10–1.35	1.13**	1.02–1.26
Bottle use knowledge	0.98	0.92–1.05	0.98	0.92–1.04
Mom brushes (1 = yes)	1.34***	1.12–1.60	1.26****	1.12–1.42
Psychosocial factors				
Depressed (CES-D ≥ 16)	1.04	0.85–1.26	0.98	0.80–1.21
Parent Stress Score	1.01	0.93–1.09	0.94	0.87–1.02
Errands help (1 = yes)	1.05	0.87–1.27	0.98	0.81–1.19
Money help (1 = yes)	0.80**	0.65–0.97	0.96	0.74–1.24
Childcare help (1 = yes)	1.14	0.97–1.33	1.10	0.81–1.50
Transportation (1 = yes)	1.28*	0.98–1.68	1.08	0.93–1.25
Background characteristics				
Less than high school	1.00		1.00	
High school or more	1.09	0.94–1.26	1.09	0.93–1.28
Less than \$10 000	1.00		1.00	
\$10 000–19 999	0.91	0.76–1.09	1.24**	1.05–1.46
\$20 000+	0.89	0.75–1.06	1.28***	1.09–1.51
Household size	1.01	0.96–1.05	1.01	0.97–1.05
Mom's age	1.00	0.99–1.02	0.99	0.98–1.01
Child's dental history				
Child's age	1.23****	1.10–1.39	1.15**	1.02–1.29
Insurance	0.81	0.59–1.12	1.30***	1.11–1.54
No past dental visit	1.00		1.00	
Past dental visit	0.81	0.91–1.33	1.08	0.93–1.25

P* < 0.10; ** *P* < 0.05; * *P* < 0.01; *****P* < 0.001.

A trend emerged suggesting that fatalistic mothers had children who were expected to brush less often than those with non-fatalistic mothers. The fatalism variable approached significance ($P < 0.10$) among the 1–3-year olds and the effect was in the expected direction. Mothers' knowledge of bottle use was the only social cognitive variable that was not related to children's brushing practices.

Moreover, as anticipated, the behavioral report measure, whether or not the mother brushed, was strongly and significantly associated with children's brushing frequency. If a mother brushed her own teeth at bedtime during the week, her 1–3-year-old child's brushing frequency was expected to increase by one-third (IDR = 1.34, 95% CI 1.12–1.60; $P < 0.01$) and among the 4–5-year olds, the child's frequency was expected to increase by one-quarter (IDR = 1.26, 95% CI 1.12–1.42; $P < 0.001$).

Mothers' psychosocial characteristics were generally not related to their children's brushing frequency, although whether or not mothers of 1–3-year-old children reported having someone to count on for a loan was found to be significant. Surprisingly, having financial help had a significant negative effect on children's brushing (IDR = 0.80, 95% CI 0.65–0.97; $P < 0.05$). The transportation support variable, defined as having a car or ride available if needed, approached significance and had a marginally significant positive effect on the number of times a child brushed during 1 week.

Older children brushed more frequently, which is not surprising given children's rapid developmental advancement during this stage of life, and increased skill and ability to take care of their own hygiene needs. Older children brushed more frequently among the 1–3-year-old children (IDR = 1.23, 95% CI 1.10–1.38; $P < 0.001$). Five-year olds also brushed more often than 4-year olds during 1 week (IDR = 1.15, 95% CI 1.02–1.29; $P < 0.05$).

Among the 4–5-year olds, income and insurance were also positively associated with brushing frequency. Children from families earning \$10 000–19 999 (IDR = 1.24, 95% CI 1.05–1.46; $P < 0.05$) and \$20 000 or above (IDR = 1.28, 95% CI 1.09–1.51; $P < 0.01$) were likely to brush more often in 1 week than their counterparts from families earning less than \$10 000 annually. Dental insurance coverage was also positively associated with brushing frequency in this age group (IDR = 1.30, 95% CI 1.11–1.54; $P < 0.01$).

Discussion

Although our findings are cross-sectional and need to be confirmed by longitudinal research, the present study is one of the first to investigate the association between multiple maternal cognitive, behavioral, and psychosocial factors and toothbrushing practices in a large, population-based sample of low-income African-American children at high risk for dental disease.

There are some limitations to the study. Children's 1-week toothbrushing frequency was selected as the main outcome measure because it is a positive oral health promoting behavior, and a more proximate and immediate outcome than a measure of disease based on decayed, missing, and filled surfaces. Additionally, as the model focused on SCT and self-efficacy measure was specific to toothbrushing behavior, it was useful to examine brushing frequency as an outcome. Nevertheless, as a self-reported measure, toothbrushing frequency is highly subject to recall and socially desirable response biases. The reported number of times the child's teeth were brushed during the last week may likely be overestimated in mothers' retrospective reports or a rough guess at best. It is possible the associations detected in this analysis may be distortions of the real underlying relationships if the self-reported data are misrepresentations of actual behaviors. However, variations of the brushing variable, such as dichotomizing the rate into once or twice a day or more, were tested in the multivariable models (analyses not shown) and generally yielded the same findings as models with the continuous variable. The same pattern of significant associations was also found when the most extreme values (mothers who reported that the child brushed 30–40 times per week) were dropped from the continuous brushing frequency variable.

It is also worthwhile to note that higher reported rates of brushing may not necessarily reflect more effective plaque removal or better hygiene habits than those reporting less frequent brushing, as there was no way to assess the quality of toothbrushing in this study. Careful cleaning, and not just frequent brushing, is thought to be relevant for oral health (37). Young children who are learning to brush on their own may or may not be doing a sufficient job. Some research suggests that children cannot brush their own teeth adequately until they are about 5 years old (38) and one study that closely examined toothbrushing patterns in a

cohort of 6–60-month-old children found that most mothers assisted their children with brushing, and brushing frequency increased with the child's age (39). Children in the process of learning to brush may also play with the brushes in their mouths and not actually 'brush' their teeth. While it is possible that the brushing frequency was inflated by counting children playing with toothbrushes in their mouths as instances of toothbrushing, some anecdotal evidence from focus groups suggested that these instances were not counted in their responses.

Mothers who were more knowledgeable about their children's oral hygiene needs, felt more efficacious, and brushed their own teeth had children who brushed more frequently. Young children depend on their mothers to take care of their oral health needs, so mothers play a very key role in influencing her child's habits and health status. Thus, the findings that maternal self-efficacy, feelings of fatalism, knowledge about appropriate bottle behaviors and children's oral hygiene needs, and whether or not the mother brushes her own teeth at bedtime were all associated with children's brushing warrant attention. Mothers have some power to control or change each of these factors. Bandura (40) and Gist and Mitchell (41) provide some useful strategies and direction for enhancing self-efficacy. Results from this study have direct implications for the development of tailored educational programs and cognitive-behavioral based interventions in this population.

Two social support variables were associated with brushing habits among 1–3-year-old children. The availability of transportation help approached significance and was associated with more frequent brushing, while having someone available to help financially had a significant negative effect on brushing frequency. The negative effect was not expected, although there can be negative consequences associated with giving and receiving certain forms of social support, for example, in exchanges where money is concerned (42). All the families in this study were very poor and are not likely to have the resources to offer adequate financial support to one another. It could be distressing for a poor mother to have to ask someone (someone she likely knows to be poor also) for a loan. This distress could translate to other realms of life, and in turn negatively affect oral health by disrupting routines like regular brushing.

Dental insurance coverage was a positive factor for 4–5-year-old children's brushing frequency. This relationship is especially relevant and has actionable policy implications in Michigan, where the *Healthy Kids Dental (HKD)* demonstration program has successfully increased access to dental services for children on Medicaid since 2000 (43). Currently, Detroit's Wayne County is not one of the 37 counties included in the *HKD* program, but improving insurance coverage could help increase access to needed services and foster dental health promoting habits that include regular brushing and preventive dental visits for children in this study, most of whom are on Medicaid.

Our findings suggest the need to move beyond traditional risk factors and more closely examine the impact of the social environment on oral health beliefs, behavior, and outcomes. It is not enough to focus on beliefs and behavioral risk factors; there is a need to contextualize individual-level risk factors by examining the social conditions and processes that cause individuals to be exposed to health risks and protective factors differentially. Attempting to alter beliefs, behaviors, and access to services will not likely influence health outcomes or reduce oral health disparities if the 'fundamental' social determinants of disease are not considered as well (44). The study of psychosocial factors and their determinants is a promising area for future oral health research.

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