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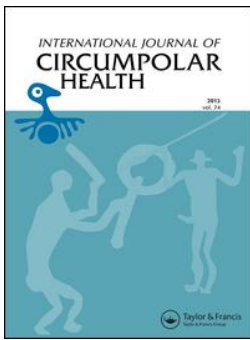
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## Oral health beliefs and oral hygiene behaviours among parents of urban Alaska Native children

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### ABSTRACT

American Indian/Alaska Native (AI/AN) children have a prevalence rate of early childhood caries 5 times that of the overall US population. Oral hygiene and oral health beliefs have not been described among AI/AN parents. This study explored constructs of the health belief model informing oral health beliefs and oral hygiene behaviours of parents of AI/AN children ages 0–6 years. The study aimed to determine the toothbrushing behaviour in parents of AI/AN children and the relationship between parent oral health beliefs and toothbrushing frequency.

A cross-sectional survey which included the Oral Hygiene Scale, Oral Health Belief Questionnaire and the Early Childhood Oral Health Impact Scale was administered to a convenience sample of parents of AI/AN children 71 months or younger attending outpatient paediatric primary care appointments (N=100). Analyses were conducted to determine parent toothbrushing and the relationship between parent health beliefs and child toothbrushing.

The odds of regular child toothbrushing were 49.10 times higher when the parent brushed their own teeth regularly (confidence interval (CI)=11.46–188.14;  $p<0.001$ ). Parental toothbrushing had a strong positive association with the belief that oral health is as important as physical health.

This research endorses parent-focused toothbrushing interventions to reduce AI/AN early childhood caries rates.

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oral hygiene; Early childhood caries; oral health; parent; self-report; Native Americans

## Introduction

Dental caries are the leading cause of chronic disease in childhood [1]. Children from disadvantaged backgrounds are more likely to have early childhood caries (ECC) with varying severity and prevalence rates for childhood tooth decay across populations [2]. Individuals who are racial and ethnic minorities, immigrants and persons of lower socioeconomic position have a greater prevalence and severity of caries [3,4]. The prevalence of ECC within the American Indian and Alaska Native (AI/AN) population is approximately 400% higher than all races in the United States [5].

Despite the high prevalence of ECC in the AN population, no recent studies have described parental and child toothbrushing behaviours. Health beliefs, attitudes and behaviours of caregivers influence the health behaviours of children in their care. Although the patho-physiological determinants of ECC are known [5], little research is available that utilises public health theory-driven interventions, particularly among parents of AI/AN children. The health belief model describes the process an individual undertakes as he or she makes health decisions [6]. Identifying a parent's oral health beliefs can assist in the developing and

implementing culturally appropriate ECC prevention programmes for the AI/AN paediatric population.

This study sought to explore constructs of the health belief model informing oral health beliefs and oral hygiene behaviours of parents of AI/AN children aged 71 months or younger. The aims of this study were (1) to determine the toothbrushing behaviour in parents of AI/AN children and (2) to determine the relationship between parent oral health beliefs and toothbrushing frequency among AI/AN children 6 years and younger.

## Methods

### Study design

This descriptive, convenience sample study was conducted in a non-profit tribal health-care organisation that provides a wide range of medical, dental and behavioural health services to more than 65,000 AI/AN people in southcentral Alaska. Walden University and the Indian Health Service's Alaska Area Institutional Review Board approved this study. Community-level review and approval was obtained from Southcentral

Foundation and the Alaska Native Tribal Health Consortium. Eligibility criteria included (1) be the parent/caregiver of an AI/AN child, (2) their child must be 71 months or younger, (3) their child must be eligible for services within the tribal health-care organisation and (4) the individual could read the English language.

### Measures

After obtaining informed consent, we administered a paper-based 31-item composite survey based on select survey items drawn from the Oral Hygiene Scale [7], Oral Health Belief Questionnaire [8], the Early Childhood Oral Health Impact Scale (ECOHIS) [9] and demographic items. The Oral Hygiene Scale and Oral Health Belief Questionnaire have been previously assessed for reliability and validity in AI/AN populations [7,8].

The Oral Hygiene Scale was included to determine frequency of oral hygiene practices among parents and their children. The composite survey used one of the Oral Hygiene Scale items 'How often do you usually brush your teeth?' and modified the item to address child oral hygiene 'How often do you usually brush your child's teeth?' Responses allowed for oral hygiene questions were assessed on a 0- to 6-point ordinal scale corresponding to the options of none, once per month, few (2–3) times per month, once a week, few (2–6) times a week, once a day and 2 or more times a day. Davidson et al. [7] found that the toothbrushing and flossing variables regressed into a single, ranked oral hygiene scale with assigned continuous values between 1 and 4. Within our study, responses were dichotomously coded according to meeting the American Academic of Pediatric Dentistry recommendations [5] for oral hygiene (met recommendations/did not meet recommendations).

The Oral Health Belief Questionnaire contains 18 items, 9 of which were used in the composite survey, which measure dimensions of the health belief model grouped into 5 oral health belief scales: perceived seriousness, benefit of preventative practices, benefit of plaque control, efficacy of dentists and perceived importance [8]. Items are scored on a 4-point Likert scale that range from strongly agree to strongly disagree [8]. Demographic questions included age (continuous variable), child ECC status (ECC yes/no), relationship to child (mother/father/grandmother/grandfather/guardian/other), highest education level (high school or less/greater than high school), family income (less than \$30,000 a year/more than \$30,000 a year) and race (AI/AN or non-AI/AN). ECOHIS variables focused on quality of life due to ECC status and are reported elsewhere.

### Data collection

Potential participants were recruited at the Anchorage Native Primary Care Center in February 2013. Participants completed the survey in the waiting room or examination room. Participants received children's toothbrushes as compensation for their time.

### Analysis

Descriptive statistics were conducted for parent demographics, oral hygiene behaviours and health beliefs. Bivariate analyses using Pearson chi-square were conducted comparing each behaviour, belief and quality of life variable to each demographic variable to assess confounders of parent age, income, gender, education and race. Odds ratios (ORs) were calculated for each cross-tabular analysis. Ordinal logistic regression was conducted where variables were included in the model which had a univariate p-value of 0.25 or less and confounding variables in the model from the bivariate analysis. Data analysis was completed in SPSS 20.0 (IBM Corp., Armonk, NY). A p value of <0.05 is considered significant.

## Results

### Descriptive statistics

The survey response rate was 82%. The sample (N=100) included parents who were between 18 and 74 years of age with children who were between 3 days and 6 years of age. The majority of respondents were female (80%), between 18 and 40 years old (70%), had an education level greater than high school (62%), reported having a family income over \$30,000 a year (56%) and self-identified as being AI/AN (82%) (Table 1). Parents reported that 43% of their children assessed had caries with ECC rates increasing as children aged.

### Oral hygiene

The majority of participants reported toothbrushing for both themselves and their child at least 1 time a day. Participants reported a lower frequency of toothbrushing for their child with only 42% of the children receiving toothbrushing at least 1 time a day. No demographic variables were found to have a statistically significant association with regular parent or child toothbrushing. The OR of regular child toothbrushing occurring when the parent brushed regularly was 49.10 (confidence interval (CI)=11.46–188.14;  $p<0.001$ ).

**Table 1.** Demographic, oral hygiene indicators and oral health beliefs and child regular toothbrushing status.

Variables	Not meeting recommendations n (%)	Meeting recommendations n (%)	OR (95% CI)	p-value
<b>Demographics</b>				
Gender (N=98)	Female (n=80) Male (n=18)	50 (62.5%) 10 (55.6%)	1.33 (0.47–3.75)	0.585
Education level (N=97)	High school or less (n=35) Greater than high school (n=62)	24 (68.6%) 36 (58.1%)	1.58 (0.66–3.78)	0.306
Family income level (N=97)	Less than \$30,000 a year (n=41) More than \$30,000 a year (n=56)	25 (61.0%) 34 (60.7%)	1.01 (0.44–2.31)	0.979
Race (N=96)	AI/AN (n=82) Non-AI/AN (n=14)	49 (59.8%) 10 (71.4%)	0.60 (0.17–2.05)	0.407
<b>Oral health behaviour</b>				
Parent regular toothbrushing* (N=99)	Not meeting recommendations (n=51) Meeting recommendations (n=48)	47 (92.2%) 13 (27.1%)	31.64 (9.50–105.35)	<0.001
ECC status (N=99)	No (n=43) Yes (n=56)	29 (67.4%) 32 (57.1%)	1.55 (0.68–3.56)	0.296
<b>Oral Health Beliefs</b>				
Value of dental health (N=99)	Disagree (n=13) Agree (n=87)	10 (76.9%) 51 (58.6%)	2.35 (0.61–9.16)	0.207
Importance of dental health* (N=100)	Disagree (n=11) Agree (n=89)	10 (90.9%) 51 (57.3%)	7.45 (0.91–60.73)	0.031
Fear of dental pain (N=99)	Disagree (n=50) Agree (n=49)	31 (62.0%) 30 (60.0%)	1.09 (0.49–2.43)	0.838
Availability of dentists (N=100)	Disagree (n=16) Agree (n=84)	13 (81.2%) 48 (57.1%)	3.25 (0.86–12.26)	0.070
Extension of health problems (N=100)	Disagree (n=4) Agree (n=96)	3 (75.0%) 58 (60.4%)	1.97 (0.20–19.60)	0.558
Daily affects (N=99)	Disagree (n=4) Agree (n=95)	3 (75.0%) 57 (60.0%)	2.00 (0.20–19.95)	0.548
Protective fluoride toothpaste (N=100)	Disagree (n=17) Agree (n=83)	11 (64.7%) 50 (60.2%)	1.21 (0.41–3.59)	0.731
Impact of diet (N=98)	Disagree (n=12) Agree (n=89)	10 (83.3%) 49 (57.0%)	3.78 (0.78–18.28)	0.081
Fluoride harm (N=97)	Disagree (n=38) Agree (n=59)	19 (50.0%) 40 (67.8%)	0.48 (0.21–1.10)	0.080

\*p&lt;0.05.

## Oral health beliefs

Within the Oral Health Belief scale, participants responded to items corresponding to the oral health belief constructs of perceived importance, barriers, perceived seriousness and benefits. Parents placed value on dental health. The barriers of dental fear and low availability of dentists were not strongly endorsed within the sample. Parents strongly endorsed oral health problems as serious health concerns. The responses to the question on fluoride were the most widely dispersed in the entire survey.

### Oral health beliefs and oral hygiene

Bivariate analyses using chi-square where belief responses were dichotomised to agree/disagree were conducted. Only 2 oral health beliefs (the importance of dental health and fluoride harm) were found to have statistical significance at the 0.05 threshold ( $p=0.024$  and  $p=0.015$ , respectively). The belief of importance of dental health had an OR of 22.87 (95% CI=0.09–4.74) for regular parent toothbrushing, and the belief that fluoride was harmful had an OR of 0.16 (95% CI=0.04–0.70). Parent daily oral hygiene had a strong positive association with the belief that oral health is as important as physical health. There were no statistically significant associations between demographic variables and ECC nor were there statistically significant associations found between oral health beliefs and ECC.

The oral health belief found to have a statistically significant association was importance of dental health ( $p=0.006$ ) with regular parent toothbrushing. The oral health belief found to have a statistically significant association was importance of dental health (OR=7.45, CI=0.49–2.43;  $p=0.031$ ) with regular child toothbrushing (Table 2).

**Table 2.** Binary logistic regression models for the association of oral health beliefs with child oral hygiene status (N=86).

Oral health beliefs	Estimate	Standard error	p-value	OR (95% CI)
Value of dental health <sup>a</sup>	0.417	1.006	0.679	0.66 (0.01–2.06)
Importance of dental health <sup>a*</sup>	–3.13	1.388	0.024	22.87 (0.09–4.74)
Fear of dental pain <sup>a</sup>	0.484	0.530	0.361	0.62 (0.22–1.74)
Availability of dentists <sup>a</sup>	–0.201	0.680	0.767	1.22 (0.32–4.64)
Extension of health problems <sup>a</sup>	–0.476	1.320	0.718	1.61 (0.12–21.39)
Daily affects <sup>a</sup>	0.308	1.805	0.864	0.73 (0.002–25.28)
Protective fluoride toothpaste <sup>a</sup>	–1.697	0.964	0.078	5.46 (0.83–36.09)
Impact of diet <sup>a</sup>	–0.594	0.876	0.498	1.81 (0.32–10.09)
Fluoride harm <sup>a*</sup>	1.83	0.751	0.015	0.16 (0.04–0.70)

<sup>a</sup>Adjusted for covariates of parent gender, race, income and education.  
\* $p<0.05$ .

## Discussion

Dental caries in children are the most prevalent chronic health condition among children globally and are preventable [10]. Prevention of caries initiation and halting caries progression can occur through addressing and encouraging parent and child oral hygiene [4,11–13], control of cariogenic foods in the diet [14] and community fluoridation of water supplies [13,15]. In this study, 43% of the children considered in the survey had ECC, whereas another recent study of a rural dwelling AN population had a 75% ECC rate indicating that AI/AN children in the urban setting might have better oral health than their rural counterparts [16]. However, the Healthy People 2010 objective for dental caries experience among a comparable age group of 2- to 4-year-olds, however, is 11%, indicating that the children of the surveyed parents do not currently meet the target ECC level despite having a better ECC rate than their rural dwelling counterparts.

Toothbrushing should be performed for children by a parent twice daily [5]. This study found that the majority of AI/AN children's parents did not meet this recommendation. The study also found that the OR of children receiving the recommended level of toothbrushing was 49 times more likely when their parents brushed their own teeth at least twice a day. Vallejos-Snachez et al. found that mother's attitude towards oral health and use of dental care resulted in a 2.4 higher likelihood of child regular toothbrushing in a Campeche, Mexico population [17]. Finlayson et al. found that mothers of African American children were more likely to have their teeth brushed at bedtime when the mother brushed her teeth at bedtime [18]. The ORs of child toothbrushing when parents regularly brushed their teeth found within this study were much higher than those reported elsewhere in the literature.

When considering health beliefs within the study population, few statistically significant associations were found between ECC presence and socio-economic factors; however, a statistically significant association was the importance of dental health ( $p=0.006$ ) with regular parent tooth brushing. Furthermore, when parents endorsed a belief of importance of dental health, regular child toothbrushing occurred nearly 7.5 more times. Schroth et al. found that caregivers who believed primary teeth were important, which could be considered placing importance on dental health, had children with significantly less tooth decay [19].

The benefit of fluoride use in toothpaste, as a topical agent, and fluoride within a community water supply does

not seem to be seen as a benefit within the sampled population as nearly half of respondents did not agree that fluoride was harmless or useful in decay prevention. Gussy et al. and Blinkhorn et al. found that parents were unclear as to the amount of toothpaste that should be used with children and infants and whether fluoride toothpaste should be used with children [20,21]. The survey did not assess caregiver oral health knowledge; thus, it remains unknown as to the reasons why respondents did not endorse fluoride use in a more positive light.

### Limitations of the study

The cross-sectional, non-randomised, convenience sample nature of the study design limits result interpretation as associations are estimates and causation cannot be determined. Parent responses may have been subject to recall bias as the respondent may have inaccurately recalled oral health care or may not have been the child's primary caregiver. The survey was conducted at a health care-facility, and thus, respondents might have provided responses they felt were more socially desirable.

### Conclusion

This study has provided information on the oral health practices and beliefs. AI/AN regular oral hygiene is most likely to be achieved when parents of the child regularly brush their own teeth. Providing education and oral health support to parents of AI/AN children before childbirth, and throughout the child's life, may assist parents in brushing their own teeth at the recommended frequency. Understanding parent views on fluoride, dental health access and dental health importance may assist in shaping health messages for a future intervention. Since the majority of the health belief model constructs did not reach statistical significance, future studies should seek to determine the health beliefs that drive oral health behaviour within this population. Studies might also explore the role of community norms, traditional oral health practices and past family history with ECC on ECC severity and preventative oral hygiene behaviours and beliefs. Future studies should seek to determine the causal pathways of beliefs, behaviours, social norms and health outcomes.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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