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Bilingual flipcharts help improve oral health-related knowledge and self-efficacy of Korean American caregivers of preschoolers

Abstract

Objective—We have limited knowledge on ways to improve oral health-related behaviors for caregivers of minority preschoolers. Our objective was to evaluate the effectiveness of a bilingual educational flipchart.

Methods—We piloted a bilingual flipchart with Korean American caregivers of preschoolers (N=219) and administered pre-/post-intervention surveys. The paired t-test evaluated changes in knowledge and self-efficacy (for all caregivers and stratified by acculturation).

Results—There were significant improvements in knowledge on the bacterial etiology of tooth decay ($P=.02$), mother-to-child transmission of tooth decay ($P=.03$), fluoride toothpaste safety ($P<.0001$), and dental visit frequency ($P<.0001$). Caregivers' self-efficacy to keep their child's teeth healthy also improved ($P<.0001$). There were differences in knowledge measures based on caregivers' acculturation.

Conclusions—Bilingual educational materials help improve the oral health-related knowledge and self-efficacy of Korean American caregivers of preschoolers. Larger confirmatory studies are needed and future work should evaluate clinical outcomes associated with improved knowledge and self-efficacy.

Keywords

oral health; infants; early childhood caries; Korean American caregivers; self-efficacy; Health Belief Model; acculturation

INTRODUCTION

Dental caries is the most prevalent childhood disease (1). Data suggest caries prevalence for U.S. children ages 2–5 years increased to 27.9% (1999–2004) from 24.2% (1988–1994) (2). A potential explanation is the growing number of children of immigrants (3), who are at increased risk for caries and poor oral health (4), in part, because of acculturation (5), defined as the degree of change in caregiver cultural norms, preferences, and behaviors. Korean American children may be at increased risk for poor oral health (6). While caregivers' oral health-related knowledge and self-efficacy are important determinants of child oral health, no studies to date have evaluated oral health-related educational materials for Korean American caregivers of young children that address language-related barriers to

Corresponding Author: Donald L. Chi dchi@uw.edu University of Washington School of Dentistry Department of Dental Public Health Sciences, Box 357475 Seattle, WA, 8195 United States.

Co-authors: Alice Ko alicekkh@hotmail.com Tufts University, Boston, Massachusetts, United States Jeffrey Y. Kim jykim1@uw.edu University of Washington, Oral Health Sciences, Seattle, Washington, United States

oral health. In addition, studies have not examined how educational materials may differentially influence caregivers by acculturation.

We adopted the Health Belief Model (HBM) to guide this mixed-methods study. The HBM is based on the premise that knowledge is a key determinant of oral health-related beliefs measured as perceived susceptibility, severity, benefits, and barriers (7). We hypothesized that bilingual flipcharts would improve the oral health-related knowledge and self-efficacy of Korean American caregivers of preschoolers. A secondary hypothesis was that the intervention would have differential effectiveness based on the caregivers' degree of acculturation.

METHODS

Study Design

This prospective study was part of a community-based public health program involving two phases: (1) development of a flipchart through focus groups with Korean American caregivers; and (2) administration of the flipchart intervention and measurement of changes in knowledge and self-efficacy. The University of Washington Institutional Review Board approved this study.

Flipchart Development

We conducted four focus groups with a purposive community-based sample of eight Korean American caregivers of preschoolers in Seattle prior to flipchart development. The focus group script included open-ended questions on caregivers' personal experiences with oral health and topics related to their own child's oral health (e.g., diet, dental visits, toothbrushing, fluoride). The focus group script was pretested in Korean and English with two caregivers using cognitive interviewing methods. Each focus group was held in a private room and lasted about one hour.

Two research team members transcribed and coded the focus group data, upon which we developed a 12-page bilingual flipchart. Flipchart topics included the role of baby teeth, tooth decay etiology, fluoridated toothpaste safety, when to brush a child's teeth, dietary behaviors, and dental visits. All topics were consistent with the HBM's main premise that knowledge and self-efficacy are important determinants of oral health-related behaviors. We included images of Korean American preschoolers to maximize cultural saliency (e.g., children dressed in traditional *hanbok*, important milestones such as the first birthday or *dol*). We pilot tested the flipchart with three bilingual Korean American caregivers and modified it to improve clarity ([hyperlink](#)).

Participants, Intervention, and Measures

We tested our intervention on a purposive sample of Korean American caregivers of preschoolers under age six years (N=219) recruited in person at churches, community centers, and Korean ethnic festivals in the Seattle metropolitan area. All activities were conducted in Korean or English based on the caregiver's stated preference. One undergraduate and two second-year dental students were trained to deliver a single session

one-on-one intervention consisting of five minutes of verbal education to caregivers using the flipchart. Prior to the study, each bilingual student recited the intervention in Korean and English to the study PI until intervention delivery was standardized. After obtaining consent, we administered a 19-item pre-intervention survey, the flipchart intervention, and a 13-item post-intervention survey. Parents were permitted to ask questions after the intervention. The survey included demographic questions (Table 1) and 13 questions assessing caregivers' knowledge and self-efficacy regarding children's oral health (Table 2). Our predictor variable was whether the participating caregiver preferred the intervention and survey to be administered in Korean or English – a proxy for acculturation (8). We pre-tested the surveys in Korean and English with two bilingual Korean American caregivers and modified it to improve flow and clarity. Study participants received a copy of the flipchart, a toothbrush, and fluoride toothpaste as an incentive.

Statistical Analyses

From the 219 completed surveys, we excluded 19 surveys from the analyses because of uncertainty about the age of the survey respondent's child ($n=15$) and incomplete or unclear responses ($n=4$). We used the paired t-test to evaluate pre-/post-intervention changes and ran our analyses on all caregivers and stratified by acculturation. All analyses were conducted using PASW Statistics version 18.0 for Windows (Chicago, IL).

RESULTS

Descriptive Statistics

Three-in-four study participants were female and 84.5% had completed at least some college (Table 1). Over 80% were born in Korea and 69% had an annual household income greater than \$45,000. Sixty-nine percent of caregivers preferred Korean and 31% preferred English.

Intervention Effects

There were significant improvements for all caregivers on knowledge measures related to fluoride toothpaste safety and dental visit frequency (Table 2). There were also improvements in knowledge about the bacterial etiology of cavities, the ability to transmit cavities from mother to child, and the age at which a child's first dental visit should take place, but only caregivers who completed the surveys in Korean showed statistically significant improvements. There were improvements in caregivers' beliefs about whether close friends and family thought it was important to keep baby teeth healthy, but the improvements were limited to caregivers who were surveyed in English. **All caregivers** showed improvements in self-efficacy ($P<.0001$).

DISCUSSION

We had three main findings. The first is that flipcharts help improve oral health-related knowledge for Korean American caregivers of preschoolers. More specifically, there were significant increases for all caregivers across the following knowledge measures: fluoride toothpaste safety, age of the first dental visit, and dental visit frequency. This suggests that health providers can use bilingual flipcharts to improve caregivers' knowledge, which can

address barriers related to appropriate oral health behaviors. Our intervention gave caregivers the opportunity to ask questions, which may be an important aspect of meaningful interventions.

The second finding is improvement in self-efficacy, which is inconsistent with the only other published study involving an oral health educational intervention that reported no changes in self-efficacy (9). A possible explanation is that our flipcharts were tailored to Korean Americans and delivered using the caregivers' preferred language. Previous work suggests cultural tailoring is an important contributor to improving self-efficacy in diabetes self-management for minorities (10). Educational interventions seeking to improve self-efficacy should be culturally and linguistically tailored.

The third main finding is heterogeneity in outcomes by acculturation. Only English language respondents showed improvements on whether they believed their family and friends think healthy baby teeth are important, number of times per day teeth should be brushed, and how much fluoride toothpaste should be used. One possible explanation is differences in baseline knowledge between the two groups. Larger proportions of caregivers surveyed in English incorrectly believed that no fluoride toothpaste should be used during toothbrushing than those surveyed in Korean (23% and 8%, respectively), leaving greater room for improvement for caregivers in the former group. Caregivers who completed the study in Korean showed improvements in knowledge on the recommended age at first dental visit, which might be explained by differences between Korea and the U.S. regarding professional recommendations on when to take a child to the dentist for their first dental visit. Acculturation is an important factor in developing culturally-tailored oral health interventions, underscoring the importance of adequate pre-intervention work with the population of interest.

There are three limitations. First, the flipcharts covered multiple behaviors relevant to optimal oral health. Future studies should identify which behaviors are amenable to change through brief educational interventions versus those that require more intensive interventions. Second, we do not know if improvements in knowledge and self-efficacy are sustained or result in changes in oral health behaviors and outcomes. In addition, we did not assess whether statistically significant improvements in knowledge and self-efficacy translate to clinically meaningful improvements in health. Longitudinal studies involving the collection of clinical oral health data are needed to evaluate whether brief interventions result in meaningful **oral health** outcomes. Third, we did not calculate statistical power a priori because this project was part of a community-based public health program. Study participation was limited by the number of flipcharts we were able to print. Thus, our findings may be underpowered. Future work should include a priori sample size calculations to ensure adequate power.

Despite these limitations, this is the first known study to demonstrate that a brief educational intervention delivered by trained students using bilingual flipcharts improves the oral health-related knowledge and self-efficacy of Korean American caregivers of preschool-aged children. Patient education by lay health workers could help improve health outcomes without significantly increasing long-term health care costs. Additional research is needed to

understand the extent to which improvements in oral health knowledge and self-efficacy can lead to meaningful changes in behavior that help to address persisting disparities in children's oral health. This knowledge can then be used to develop and disseminate evidence-based interventions focusing on immigrant children at the greatest risk for poor oral health.

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TABLE 1

Demographic Characteristics of Study Population of Korean American Caregivers of Young Children under Age 6 Years (N=200) and Bivariate Analyses of Demographic Characteristics and Caregivers' Survey Language Preference

Demographic Characteristic	All Surveys N=200 N (%)	Korean Surveys N=138 N (%)	English Surveys N=62 N (%)	p-value
Sex				<.0001
Male	54 (27.0%)	23 (16.7%)	31 (50.0%)	
Female	146 (73.0%)	115 (83.3%)	31 (50.0%)	
Age Category (years)				.26
22–29	7 (3.5%)	3 (2.2%)	4 (6.5%)	
30–34	55 (27.5%)	39 (28.3%)	16 (25.8%)	
35–39	70 (35.0%)	50 (36.2%)	20 (32.3%)	
40–44	44 (22.0%)	27 (19.6%)	17 (27.4%)	
45 & above	18 (9.0%)	13 (9.4%)	5 (8.0%)	
Declined to answer	6 (3.0%)	6 (4.3%)	0 (0.0%)	
Country of Birth				<.0001
Korea	162 (81.0%)	124 (89.9%)	38 (61.3%)	
U.S.	30 (15.0%)	9 (6.5%)	21 (33.9%)	
Other	3 (1.5%)	0 (0.0%)	3 (4.8%)	
Declined to answer	5 (2.5%)	5 (3.6%)	0 (0.0%)	
Highest Level of Education Completed				<.0001
High school or some college	5 (2.5%)	0 (0.0%)	5 (8.0%)	
College/university	125 (62.5%)	96 (69.6%)	29 (46.8%)	
Graduate school	44 (22.0%)	18 (13.0%)	26 (41.9%)	
Declined to answer	26 (13.0%)	24 (17.4%)	2 (3.2%)	
Annual Household Income				.60
<\$20,000	17 (8.5%)	13 (9.4%)	4 (6.5%)	
\$20,000 to \$45,000	30 (15.0%)	21 (15.2%)	9 (14.5%)	
>\$45,000	138 (69.0%)	90 (65.2%)	48 (77.4%)	
Declined to answer	15 (7.5%)	14 (10.2%)	1 (1.6%)	
Preferred Language of Flipchart Intervention and Survey				n/a
Korean	138 (69.0%)	n/a	n/a	
English	62 (31.0%)	n/a	n/a	

TABLE 2

Pre- and Post-Intervention Survey Responses and Differences between Pre-Intervention and Post-Intervention Responses, Mean (Standard Deviation)

Outcome Measure	Pre- and Post-Intervention Responses and Pre-/Post-Intervention Differences, Mean (Standard Deviation) All Surveys	p-value	Pre- and Post-Intervention Responses and Pre-/Post-Intervention Differences, Mean (Standard Deviation) Korean Surveys	p-value	Pre- and Post-Intervention Responses and Pre-/Post-Intervention Differences, Mean (Standard Deviation) English Surveys	p-value
Knowledge						
I believe it is important for my child to have healthy baby teeth [*]	Pre: 1.04 (0.23) Post: 1.02 (0.15) Difference: 0.02 (0.18)	.10	Pre: 1.02 (0.15) Post: 1.02 (0.15) Difference: 0.00 (0.00)	.99	Pre: 1.09 (0.35) Post: 1.02 (0.13) Difference: 0.07 (0.32)	.10
Baby teeth are important [^]	Pre: 1.01 (0.11) Post: 1.01 (0.80) Difference: 0.006 (0.13)	.57	Pre: 1.01 (0.09) Post: 1.01 (0.09) Difference: 0.00 (0.13)	.99	Pre: 1.02 (0.14) Post: 1.00 (0.00) Difference: 0.02 (0.14)	.32
Most of my close friends and family think it is important for all children to have healthy baby teeth [*]	Pre: 1.20 (0.42) Post: 1.15 (0.37) Difference: 0.06 (0.28)	.01	Pre: 1.14 (0.34) Post: 1.10 (0.30) Difference: 0.04 (0.27)	.10	Pre: 1.35 (0.52) Post: 1.26 (0.48) Difference: 0.09 (0.29)	.02
Dental cavities are caused by bacteria [^]	Pre: 1.07 (0.25) Post: 1.02 (0.15) Difference: 0.05 (0.26)	.02	Pre: 1.07 (0.26) Post: 1.02 (0.15) Difference: 0.05 (0.25)	.03	Pre: 1.06 (0.23) Post: 1.02 (0.14) Difference: 0.04 (0.27)	.32
A mother with untreated cavities can transmit cavities to her child [^]	Pre: 1.26 (0.44) Post: 1.20 (0.41) Difference: 0.06 (0.33)	.03	Pre: 1.19 (0.40) Post: 1.11 (0.32) Difference: 0.08 (0.35)	.01	Pre: 1.42 (0.50) Post: 1.42 (0.50) Difference: 0.00 (0.28)	.99
Young children should brush their teeth on their own [^]	Pre: 1.79 (0.41) Post: 1.80 (0.40) Difference: -0.01 (0.43)	.73	Pre: 1.81 (0.40) Post: 1.80 (0.40) Difference: 0.01 (0.43)	.84	Pre: 1.74 (0.45) Post: 1.79 (0.41) Difference: -0.06 (0.41)	.32
How many times per day should your child's teeth be brushed? [^] #	Pre: 2.97 (0.18) Post: 2.99 (0.08) Difference: -0.03 (0.20)	.059	Pre: 2.98 (0.13) Post: 2.99 (0.10) Difference: -0.01 (0.16)	.57	Pre: 2.92 (0.27) Post: 3.00 (0.00) Difference: -0.08 (0.27)	.04

Outcome Measure	Pre- and Post-Intervention Responses and Pre-/Post-Intervention Differences, Mean (Standard Deviation) All Surveys	p-value	Pre- and Post-Intervention Responses and Pre-/Post-Intervention Differences, Mean (Standard Deviation) Korean Surveys	p-value	Pre- and Post-Intervention Responses and Pre-/Post-Intervention Differences, Mean (Standard Deviation) English Surveys	p-value
Toothpaste with fluoride is safe for babies [^]	Pre: 1.52 (0.50) Post: 1.14 (0.34) Difference: 0.39 (0.55)	<.0001	Pre: 1.50 (0.50) Post: 1.11 (0.32) Difference: 0.39 (0.57)	<.0001	Pre: 1.58 (0.50) Post: 1.19 (0.40) Difference: 0.40 (0.49)	<.0001
How much fluoridated toothpaste should be put onto a toothbrush? [@]	Pre: 1.94 (0.46) Post: 2.01 (0.20) Difference: -0.07 (0.47)	.07	Pre: 2.02 (0.42) Post: 2.02 (0.23) Difference: 0.00 (0.44)	.99	Pre: 1.77 (0.51) Post: 1.98 (0.14) Difference: -0.21 (0.50)	.004
Fruit juice is healthy for your child's teeth [^]	Pre: 1.95 (0.21) Post: 1.97 (0.18) Difference: -0.01 (0.24)	.53	Pre: 1.95 (0.22) Post: 1.96 (0.20) Difference: -0.01 (0.24)	.71	Pre: 1.96 (0.19) Post: 1.98 (0.14) Difference: -0.02 (0.24)	.57
At what age should your child first visit the dentist? ^{&}	Pre: 2.14 (0.43) Post: 2.05 (0.27) Difference: 0.09 (0.43)	.006	Pre: 2.15 (0.40) Post: 2.05 (0.28) Difference: 0.10 (0.42)	0.01	Pre: 2.13 (0.48) Post: 2.06 (0.23) Difference: 0.08 (0.47)	.25
How frequently should you take your child to the dentist? [%]	Pre: 1.88 (0.33) Post: 1.99 (0.08) Difference: -0.11 (0.32)	<.0001	Pre: 1.89 (0.32) Post: 1.99 (0.09) Difference: -0.11 (0.32)	<.0001	Pre: 1.87 (0.34) Post: 2.00 (0.00) Difference: -0.13 (0.34)	.01
Self-Efficacy						
I am confident that I can help keep my child's baby teeth healthy [*]	Pre: 1.16 (0.38) Post: 1.07 (0.25) Difference: 0.09 (0.32)	<.0001	Pre: 1.11 (0.34) Post: 1.04 (0.20) Difference: 0.07 (0.26)	.002	Pre: 1.26 (0.44) Post: 1.13 (0.34) Difference: 0.13 (0.44)	.03

* Strongly agree=1, Agree=2, Disagree=3, Strongly disagree=4

[^] True=1, False=2

[#] Once (in the morning)=1, Once (at night)=2, Twice (morning & night)=3

[@] No fluoridated toothpaste should be used=1, A smear=2, As much as you can put onto the toothbrush=3

[&] At birth=1, Age 12 months=2, Immediately before your child enters kindergarten=3

et al.

% Once a year=1, Every 6 months=2

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