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# EFFECTIVENESS OF VISUAL AIDS ON PREVENTIVE DENTAL GOALS

A thesis submitted in partial fulfillment of the requirements for the degree of Masters of  
Science in Dentistry at Virginia Commonwealth University.

By

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## **Abstract**

### **EFFECTIVENESS OF VISUAL AIDS ON PREVENTIVE DENTAL GOALS**

By Kristin Sherée Hodgson, DMD

A thesis submitted in partial fulfillment of the requirements for the degree of Masters of Science in Dentistry at Virginia Commonwealth University.

Virginia Commonwealth University, 2013

Director: Tegwyn H. Brickhouse, D.D.S., Ph.D.  
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**Purpose:** To assess a caregiver's oral health attitudes, habits, and behaviors pre and post intervention, and to determine whether a particular delivery-style (verbal-only or with visual supplementation) of a motivational interviewing session is more effective in improving oral health behaviors as well as improving success of a chosen preventive goal.

**Methods:** N=140 caregivers of pediatric dental patients were given questionnaires to assess readiness to change and current preventive oral health behaviors. Oral health education was communicated in a MI style (verbal-only or with visual supplementation). One preventive oral health goal was selected to focus on. The home preventive behavior survey was re-administered at follow-up.

**Results:** Preventive home behaviors improved, with no significant difference between interventions. There was significance in the amount of change in items specified as a goal.

**Conclusions:** Behaviors improved significantly after a MI educational intervention. Goal setting and providing oral health education in a MI style can improve home preventive behaviors.

## **Introduction**

Out of all the diseases that affect our children, dental decay in early childhood stands as the most common childhood disease.<sup>1</sup> In fact, early childhood dental caries is a widespread problem, affecting 28% of children in the United States.<sup>2</sup> By the time they reach kindergarten, more than 40% of children have dental decay.<sup>3</sup> Often times, due to the age of the child and extent of disease, treatment for early childhood caries necessitates being completed in a hospital setting under general anesthesia. The problem is further perpetrated by the fact which, for these children treated for severe early childhood caries, more than 50% of them experience recurrent dental disease.<sup>2</sup>

The impact of early childhood caries does not limit itself to the child's teeth, it extends to effects on the child's development, behavior and performance in school, family and society.<sup>4</sup>

### **Caries Development and Etiology**

Assessment of carious activity must involve an acknowledgement of the etiology of caries.<sup>5</sup> The etiology of dental caries is multifactorial, encompassing the host (comprised of teeth and saliva), the microflora (bacterial content of plaque), and the substrate (diet), but most notably, a fourth factor: time.<sup>6</sup> Oral hygiene practices; fluoride use, fermentable carbohydrate intake, cariogenic bacterial counts, and socioeconomic aspects must be taken into account.<sup>5</sup>

From the perspective of the "medical model", the goal is to have patient-centered prevention of disease, and management of the caries process before irreversible damage occurs. With this model, the etiologic agents are balanced against those factors that are protective.

<sup>7</sup>While an acidic environment would tilt the balance towards caries initiation, oral hygiene practices such as brushing with fluoridated toothpaste have the ability to serve as protective factors. <sup>8</sup> This delicate balance between both preventive and pathological components can be tipped in favor of caries prevention and intervention when the dentist takes an active role. <sup>9</sup>Thus, an appropriate assessment of caries risk should be based upon the focus of the caries balance. <sup>9</sup>

### **Caries Risk Assessment**

Assessing a child's risk for dental decay is a way to gauge the probability of that child having dental caries in the future. Risk assessment focuses on the disease process, rather than solely treating disease outcome. <sup>9</sup>The etiology of the caries process is multifactorial, encompassing a balance between both pathological and protective factors. <sup>9</sup>Caries risk assessment involves identifying individual risk and protective factors, both biological and non-biological. Knowing a child's caries risk status helps guide the dental healthcare team to create an individualized intervention plan. <sup>10</sup>The principal goal of caries risk assessment is to prevent and manage the caries disease process before cavitation occurs. <sup>7</sup> Assessing a child's caries risk involves determining the likelihood of new carious lesions or a change in the activity of present lesions. <sup>6</sup>It is important to begin assessing a child's caries risk at an early age, as studies have shown that caries in the primary dentition is a strong indicator of caries in the permanent dentition. <sup>11</sup>

There are a variety of caries risk-assessment forms available from both professional organizations and publications. Typically, these forms identify the caries disease indicators, protective factors, and risk factors. The American Academy of Pediatric Dentistry (AAPD) has developed two forms to help dental providers determine a child's caries risk: one form for children 0-5 years of age, and another for children over 5 years of age. <sup>8</sup> Since a child's risk of

developing dental disease has the potential to change over time, the AAPD recommends that the determination of a child's caries risk assessment be repeated regularly to maximize effectiveness.

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Along with forms to aid in the determination of a child's caries risk, there are a variety of caries management protocols to guide the dental provider in clinical decision-making. The caries management protocol recommendations by the American Academy of Pediatric Dentistry are based on evidence from current literature, clinical experience, and judgment of expert panels.<sup>8</sup> Another common caries management protocol is described in the Caries Management by Risk Assessment (CAMBRA) program, providing an additional source of guidance to improve a patient's oral health.<sup>10</sup>

The Caries Management by Risk Assessment protocol for children under the age of six includes a helpful visual tool to encourage parents to change home behavior.<sup>10</sup> The caregiver is asked to select two goals to focus on from the worksheet, comprised of visual representations of self-management goals, and is informed that the oral health care providers will follow-up on those goals with them at the next appointment. The visual goal platform is designed to encourage caregivers to focus on positive preventive dental behaviors at home.

Educating parents about oral healthcare for their children is of pivotal importance concerning the battle against early childhood caries. The means by which professionals go about educating the parents can influence whether or not the desired results are achieved. Simply educating a parent has been found to be ineffective, as it is practiced without regard of the parent's willingness or readiness to change.<sup>13</sup>

## **Infant Dental Examination**

Almost all infants have an oral environment that is at risk for dental disease. Evidence suggests that prevention of oral disease must begin in infancy.<sup>14</sup> The American Academy of Pediatric Dentistry recommends that the first dental examination is at the time of the eruption of the first tooth, and no later than 12 months of age.<sup>12</sup> A foundation of oral health can be built early in life, and an early examination and establishment of a dental home can provide the caregiver and child the resources that they need to manage and prevent oral disease. The goal of the first infant visit is to assess the individual's caries risk, establish a preventive program, and to provide anticipatory guidance.<sup>14</sup> Educating caregivers of infants on infant oral health is with the intention to decrease the child's caries risk as he/she matures.

## **Readiness to Change**

The effectiveness of oral health education depends on the individual's readiness to not only accept new knowledge, but also their readiness to change existing behaviors. The amount of dental disease in a child has been associated with a parent's stage of change.<sup>15</sup> The Readiness Assessment of Parents concerning Infant Dental Decay (RAPIDD) Scale was developed to assess a parent's stage of change as it relates to the dental health of his/her child. These stages of change are: precontemplative, contemplative, or action. Parents in either a precontemplative or contemplative stage had children with more dental disease than those parents in the action stage.

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The Readiness Assessment of Parents Concerning Infant Dental Decay Scale is based upon the work by Prochaska and DiClemente, measuring parental beliefs concerning care for their child's teeth.<sup>15, 16</sup> The instrument is comprised of four main constructs: Openness to Health Information, Valuing Dental Health, Convenience and Change Difficulty, and Child

Permissiveness. The first two constructs (Openness to Health Information and Valuing Dental Health) assess positive attributes, while the second two constructs (Convenience and Change Difficulty and Child Permissiveness) assess the barriers to change.<sup>15</sup>

A study specified the reliability (internal consistency) and validity (construct validity) of the RAPIDD Scale.<sup>15</sup> The study provides evidence that the Stages of Change Theory applies in understanding the beliefs and behaviors of parents with children at high risk for early childhood caries.<sup>15</sup>

### **Assessment of Oral Health Behaviors**

The questionnaire to assess a caregiver's oral health behaviors was adapted from the self-management goal sheet featured in the Caries Management by Risk Assessment protocol for children under the age of six.<sup>10</sup> This visual tool was designed to encourage parents to change home behaviors, and it is what was used in this study as the Goal Selection Sheet. Each goal was then converted into a statement followed by answer choices in a Likert-scale format. This survey, used to assess oral health behaviors of the caregiver, was titled Dental Questions About You and Your Child (see appendices). Each statement/goal was assigned to one of three categories: Favorable Dental Habits (FDH), Favorable Oral Health Behaviors (FOHB), and Unfavorable Oral Health Behaviors (UOHB).

### **Motivational Interviewing**

Motivational interviewing is a brief counseling approach with the intention of motivating. This method of communication provides strategies to encourage patients to progress from inaction to action.<sup>17</sup> One crucial skill in motivational interviewing is to encourage patients to hear themselves explaining their own reasons for change. By the patient hearing his or her own verbal expression of a need to change, this strengthens the patient's commitment to change.<sup>18</sup>

One study suggests that counseling parents of young dental patients in motivational interviewing style has an effect on children's health that is greater than the effect of traditional health education.<sup>13</sup> Another study demonstrated that motivational interviewing had a modest effect on changing some high-risk parental behaviors that contribute to early childhood caries.<sup>19</sup> In a similar study, children whose caregivers were presented with motivational interviewing were much less likely to have caries two years later than the children whose caregivers were in the control group.<sup>20</sup>

The use of motivational interviewing has shown potential in aiding parents to reduce behaviors that increase a child's risk of developing early childhood caries.<sup>19</sup> A recent study concluded that a single motivational interviewing session might positively impact parental behaviors concerning their child's oral health.<sup>21</sup> An effective motivational interviewing session not only reduces a patient's resistance to change, it also increases their desire and readiness to change.<sup>22</sup>

The purpose of this study is to assess a caregiver's readiness for change and their oral health related behaviors pre and post intervention. We examined motivational interviewing's impact with written and illustrated supplementation between the initial and follow-up visit versus motivational interviewing without visual supplementation (verbal only). Identifying parental readiness to change and oral health-related behaviors are useful in planning how to communicate with the parent about dental habits and both favorable and unfavorable oral health related behaviors.<sup>15</sup>



## **Methods**

### **Study Design**

Caregivers of pediatric dental patients and their children that presented to the Virginia Commonwealth University School of Dentistry's pediatric clinic were recruited for the study. Inclusion criteria were that the pediatric patient was from 0-4 years of age while presenting for a periodic or new patient exam, and that the caregiver could both speak, understand and read English. The Virginia Commonwealth University Institutional Review Board approved this study. Participants were randomly assigned to one of two educational interventions: a visual presentation group and a verbal presentation group.

### **Readiness to Change and Assessment of Oral Health Behaviors**

After obtaining informed consent, the caregivers completed two questionnaires: The Readiness Assessment of Parents concerning Infant Dental Decay (RAPIDD) and, Dental Questions About You and Your Child, to assess their current oral health related behaviors. The RAPIDD scale questionnaire assessed caregiver's readiness to change related to infant oral health. The questionnaire to assess a caregiver's oral health behaviors was adapted from the self-management goal sheet featured in the Caries Management by Risk Assessment protocol for children under the age of six.<sup>10</sup> This visual tool was designed to encourage parents to change home behaviors, and it is what was used in this study as the Goal Selection Sheet. Each goal was then converted into a statement followed by answer choices in a Likert-scale format.

## **Dental Examination**

A Virginia Commonwealth University pediatric dental resident then performed a calibrated dental exam, recording the caries-status of each presenting tooth surface. The presenting tooth surfaces were scored as being caries-free (0), non-cavitated white spot lesion (1), caries cavitated into enamel (2), and caries cavitated into dentin (3).

## **Delivery of Oral Health Information**

Infant oral health information was delivered in one of two ways, depending on which group the caregiver was randomly assigned to. A flipbook was used during the delivery of infant oral health information to caregivers in the intervention group. The flipbook provided visual supplementation with both pictures and the written word, and it is modeled to reflect the guidelines set forth by the American Academy of Pediatric Dentistry. The control group received infant oral health information in verbal-only format, and an outline was followed to ensure that the information provided verbally was identical to the information provided to the intervention group.

The delivery of infant oral health information was enhanced with motivational interviewing. Motivational Interviewing is built upon the foundation of progressing from inaction to action.<sup>17</sup> A major component of motivational interviewing involves encouraging patients to hear themselves explaining their own reasons for change. By the patient hearing his or her own verbal expression of a need to change, this strengthens the patient's commitment to change.<sup>18</sup> Effort was made to understand the caregiver's unique circumstances that may provide a barrier to improving their child's oral health. Once this barrier was identified, an open discussion was held with the intention of discovering realistic solutions for overcoming it.

### **Selection of Preventive Dental Goal**

The questionnaire to assess the caregiver's home preventive behaviors was reviewed by the resident, and the three lowest scoring categories were identified. Each statement in the instrument is associated with a goal on the Goal Selection Sheet. At this initial visit, the caregiver was then asked to select one goal from the three identified goals to focus on at home. On a numerical scale of 1-10 (with 1 being least confident and 10 being most confident), each caregiver indicated how confident they were that they would achieve their selected goal before the 3-month re-evaluation visit.

### **Re-evaluation Visit**

Caregivers and their child were asked to return to the Virginia Commonwealth University School of Dentistry's pediatric clinic for a 3-month re-evaluation visit. Forty-eight of the 120 caregivers returned with their child. The caregivers completed another "Dental Questions About You and Your Child" form to re-assess their current home Oral Health behaviors. Each child received a calibrated dental examination, and the caries-status of each presenting tooth surface was recorded.

### **Variables**

The variables recorded from the caregivers and the children are as follows:

**Demographics:** Using the questionnaire labeled Infant Oral Health Survey (see the first Appendix), the following demographic characteristics were recorded: Hispanic, race, years of caregiver education, caregiver age, child age, number of children in the household, and number of adults in addition to the caregiver. Subject demographics were determined on the initial visit.

**RAPIDD:** The 11 Readiness Assessment of Parents concerning Infant Dental Decay questions were collected using the questionnaire labeled Infant Oral Health Survey (see the first Appendix).

Caregivers were asked to respond on a Likert scale ranging from “strongly agree” to “strongly disagree”. The responses are scored on a 5 point scale where “strongly agree” is scored 1 and “strongly disagree” is scored 5. Openness to Health Information (Openness) is calculated as the mean of items 1 and 3. Valuing Dental Health (Valuing) is calculated as the mean of items 4–7. Convenience and Change Difficulty (Convenience) is calculated as the mean of items 2 and 9 and item 8—reverse scored. Child Permissiveness (Permissiveness) is calculated as the mean of items 10 and 11. Note that, using this scoring, smaller values are the preferred response except for Permissiveness, where larger values are the preferred response. The RAPIDD variables were determined on the initial visit.

**Oral Health Behaviors:** Assessment of oral health behaviors was recorded on the questionnaire labeled Dental Questions about You and Your Child (see the second Appendix). These 11 items were assessed on either a 5 or 6 point Likert scale, either using a “strongly disagree” to “strongly agree” scale or a “very frequently” to “never” scale. The items were grouped into Favorable Dental Habits (FDH), Favorable Oral Health Behaviors (FOHB) (items 3, 9, 11), and behaviors having to do with Unfavorable Oral Health-Related Behaviors (UOHB). Three scales were created from the mean responses from each of the groups of items. Note that, using this scoring, smaller values are preferred for Favorable Habits and Favorable Behaviors and larger values are preferred for Unfavorable Habits. The assessment of oral health related behaviors occurred on the initial visit and on the follow-up visit.

**Goals** After the assessment of oral health behaviors at the initial visit; caregivers chose to focus on one goal, corresponding to one of the 11 oral health behaviors items. In addition to choosing a goal, they were asked “on a scale of 1–10, how confident are you that you can accomplish the goals?” where 1 was indicated as “not likely” and 10 is “definitely.” The goals were grouped into

similar groups. That is, goal group = 1 favorable dental habits, 2 = favorable oral health behaviors, or 3 = unfavorable oral health behaviors. Goal setting occurred on the initial visit only.

### **Statistical Methods**

Data was entered into RedCap for analysis.<sup>23, 24</sup> All analyses were performed using SAS software (SAS version 9.3, JMP version 10, SAS Institute, Inc., Cary NC). For discrete variables, summary statistics such as frequencies and percentages were calculated. For continuous outcome variables, means and standard deviations were calculated. Relationships between continuous variables are determined using Pearson's correlation coefficient. When independent groups are compared on a single outcome, either a chi-square analysis or ANOVA was used, depending upon the outcome. When multiple groups are compared on a continuous outcome, multi-way ANOVA was used. Change across time was assessed using a repeated-measures mixed-model ANOVA. When there were differences, the mean estimate and the standard error of the estimate was shown, along with the p-value associated with the comparison of interest. Statistical significance was declared at  $\alpha=0.05$ .

### **Specific Aims**

The specific aims of this study include analyses of the population at the initial visit, as well as comparing follow-up data with data from the initial visit. Considering the initial visit, we determined the demographic characteristics of the caregivers and children, as well as the extent that the two educational interventions, RAPIDD indices, and oral health habits and behaviors were comparable on these characteristics. In addition, the oral health habits and behaviors of the caregivers were assessed and compared across the two educational interventions. Also, we assessed the level of Readiness Assessment of Parents concerning Infant Dental Decay (RAPIDD), and determined to what extent the two educational interventions and oral health

habits and behaviors were comparable on these scales. We determined the most common goals chosen by caregivers, as well as any differences between the goals chosen as they relate to demographic characteristics and the RAPIDD indices. Concerning the follow-up visit, we determined the oral health habits and behaviors of the caregivers and how successful they were in meeting their goals. Also, we determined if the change in oral health habits and behaviors were different depending on the educational intervention and specific goal selected.

## **Results**

First, the characteristics of the caregivers and children at the initial visit are described and analyzed. Following this, the changes in oral-health habits and behaviors are described and analyzed. The results of the study are described in sections. The first section describes the patients' demographics and assesses whether there were differences between the educational intervention groups. In the second section, the Readiness Assessment of Parents concerning Infant Dental Decay (RAPIDD) results are summarized and the comparability of the educational intervention groups is discussed. Oral health habits and behaviors and selected goals are then reviewed. In the final sections, the changes in oral health habits and behaviors are described.

### **Description of patients**

All of the  $n=140$  patients who completed the initial visit are included in the analyses below. The demographic characteristics of patients in the study are shown in Table 1. Note that the ethnicity and race demographics are "check all that apply" and so the percentages do not add to 100. The average age of patients in the study was 31.9 months ( $SD = 13.8$ , range = 3 to 84). The average number of children in the household was 2.4 children ( $SD = 1.37$ , range = 1 to 6) and there was an average of 1.3 adults in addition to the caregiver in each household ( $SD = 0.79$ , range = 0 to 4). There were  $n=71$  subjects randomly assigned to the Visual intervention (51%) and  $n=69$  assigned to the Verbal intervention (49%). There was no significant differences ( $P<0.05$ ) on demographic characteristics between the intervention groups.

## Readiness Assessment of Parents Concerning Infant Dental Decay

The Readiness Assessment of Parents concerning Infant Dental Decay (RAPIDD) results are summarized in Table 2 and Figure 1. On the *Openness* to health information items, caregivers generally responded with “agree” and the average score being 1.95. In *Valuing* dental health there is uniform agreement—at least 93% either “strongly agree” or “agree.” This corresponds to an average score of 1.19. On the *convenience* and change difficulty items, 64% either “strongly agree” or “agree” overall, but 52% of caregivers either “disagree” or “strongly” disagree with the “... put my baby to sleep ...” item. This corresponds with a mean convenience and change difficulty score of 2.25 on the initial visit. For the child *permissiveness* items, the preferred response is to “strongly disagree.” On the “... something sweet in his/her bottle” items approximately 61% of the caregivers either “disagree” or “strongly disagree” but only 31% give the preferred response to the “... not sweet, don’t taste good...” item. And this corresponds to a mean score of 3.63. As expected (since the survey instrument was completed before the intervention), there was no difference between the intervention groups on the four subscales ( $P > 0.4$ ).

The RAPIDD scales were analyzed to determine if at the initial visit there were any differences on any of the demographic characteristics shown in Table 1, or the goals they chose. Table 3 shows the results of this multi-way ANOVA and the model indicates no differences in *openness* ( $P > 0.3$ ), *valuing* ( $P > 0.5$ ), or *convenience* ( $P > 0.11$ ). In the case of *permissiveness*, the model does indicate some initial visit differences ( $df = 15$ ,  $P = 0.0095$ ). Those who are American Indian more strongly disagree with the two permissiveness items (Mean = 3.3 vs 2.5). As the amount of education increases, disagreement with the permissiveness items increases (from



Mean = 2.02 in the less than high school group, to mean = 3.02 in the high school group, to mean = 3.29 in the come college or finished college groups).

### **Assessment of Oral Health Habits and Behaviors**

The questions used to formulate patient goals are summarized in Table 4. These 11 items were assessed on either a 5 or 6 point Likert scale, either using a “strongly disagree” to “strongly agree” scale or a “very frequently” to “never” scale. The items were grouped into Favorable Dental Habits (FDH), Favorable Oral Health Behaviors (FOHB), and Unfavorable Oral Health Behaviors (UOHB). For the favorable dental habits score, low values are preferred but on these three items only about 17% of caregivers respond with “strongly agree” or “agree.” This corresponds to a mean score of 3.74 (on a scale of 1 to 5), which is consistent with the observation that approximately 75% of caregivers either “disagree” or “strongly disagree” with these items. For the favorable oral health behaviors items, low values are preferred and about 76% of caregivers respond with “very frequently” or “frequently” to the “my child eats healthy snacks” item. However, only 10% either “very frequently” or “frequently” chew xylitol gum. Overall, this corresponds with a mean score of 3.42 (on a scale from 1 to 6), which is consistent with approximately 34% in the “very rarely” or “never” range. Unfavorable oral health behaviors are to be avoided and this corresponds to larger scores. The mean score was 3.76 (on a scale from 1 to 6) and corresponds to only 36% in the “very rarely” or “never” range.

To determine if the oral health habit and behavior scales were related to demographics, a multi-way ANOVA was used. The results are summarized in Table 5. As expected there was no differences between the educational intervention groups ( $P > 0.2$ ) but there were demographic differences on the unfavorable behaviors scale ( $P = 0.0007$ ). On the unfavorable behaviors score, recall that larger numbers are preferred. As education increased, more preferred responses

occurred ( $P = .0080$ ). Those who finished college were significantly higher (mean = 4.13) whereas all others had a mean of approximately 3.4. There was a positive correlation ( $r = 0.19$ ,  $P = 0.0362$ ) between the number of children and the unfavorable behaviors scale. That is, those with 1 child had an average score of approximately 4.03 and those with 5 children had a score of approximately 4.52.

To determine the relationship between oral health behaviors and the RAPIDD scores, the correlations between these scores are shown in Table 7. Those who appeared to score low in *convenience* appear to have the understanding that it will be easy to change their current home behaviors. Those who report the least frequency of UOHB (very rarely or never) appeared to be the least permissive with their child. There was no correlation between FDH and RAPIDD indices. As may be seen, unfavorable oral health behaviors is positively correlated with permissiveness. That is, the more unfavorable health behaviors items a caregiver engages in, the more permissive they tend to be with their child, and the less unfavorable health behavior items a caregiver engages in, the less permissive they tend to be with their child. And, UOHB is negatively correlated with *convenience*. That is, engaging in fewer unfavorable health behaviors is associated with attitudes towards doing what may be inconvenient or difficult when the decision will benefit their child. Conversely, those caregivers who engage in unfavorable health behaviors have attitudes valuing convenience and easiness. There is no other correlation between health habits and behaviors and the RAPIDD constructs.

### **Goal Selection**

Caregivers chose to focus on one goal and these are summarized in Table 6. There was no difference in choice of goal according to visual or verbal educational intervention. Overall 55% chose a goal related UFOB. Twenty-nine percent chose a FOHB goal, and 16% chose a

FDH goal. There were no significant differences in caregiver demographics associated with goal chosen.

When considering the RAPIDD scales, there were differences on the goals selected, where those choosing a FOHB goal disagreed more strongly with the *permissiveness* items ( $P = 0.03$ , mean = 4.0) as compared with those who chose an UOHB goal (mean = 3.4). Those choosing favorable dental habits goals (mean = 3.8) were not significantly different from the other goal groups.

### **Changes in Oral Health Habits and Behaviors at Follow-up Visit**

In this section, we consider whether the health behaviors change across time and whether the change differs depending upon the educational intervention or upon the goal groups. First we consider the favorable habits scale. Table 8 and Figure 4 show that there was a change across the visits ( $P = 0.0109$ ) and the change was consistent across the interventions ( $P = 0.5431$ ). Within the *verbal* intervention group, there was a significant increase ( $P = 0.0208$ ) but within the *visual* intervention group, there was no indication of a change from initial to follow-up ( $P = 0.1122$ ). At the initial visit, the interventions were not different ( $P = 0.4908$ ), nor were they different at follow-up ( $P = 0.2542$ ).

Second, the favorable behaviors scale was considered (see Figure 5). There was no change across the visits ( $P = 0.1377$ ) and the change was consistent across the interventions ( $P = 0.1024$ ). At the initial visit, the interventions were not different ( $P = 0.2104$ ), nor were they different at follow-up ( $P = 0.3357$ ).

Third, the unfavorable behaviors scale was considered (see Figure 6). There was a change across the visits ( $P = 0.0216$ ) and the change was consistent across the interventions ( $P = 0.0546$ ). At the initial visit, the interventions were not different ( $P = 0.9060$ ), nor were they different at

follow-up ( $P = 0.0757$ ). Within the *verbal* group, there was a significant increase ( $P = 0.0033$ ) but within the *visual* intervention, there was no indication of a change ( $P = 0.5906$ ). Additionally, change in behaviors across the two visits was analyzed to determine if there were any differences depending upon the goal group, and there were no significant differences.

An additional analysis was performed to test whether there was a change across the two visits for each item. As in the overall analysis, there was no difference between the interventions ( $P = 0.5219$ ) but there was an overall change between the two visits across the 11 items ( $P = 0.0011$ ). There was no difference in the amount of change depending upon the intervention ( $P = 0.3776$ ). Table 9 shows the estimated mean for each of the items on both visits and shows which items changed across time. All three favorable dental habits got worse between the initial visit and the follow-up visit ( $P < .0005$ ). The only item that improved was the "... water in sippy cup" item ( $P < .0001$ ) which changed from more often than "frequently" (mean = 2.59) to more often than "occasionally."

And finally, the above repeated-measures ANOVA also tested whether the change in goal-related items was different than the change in items not specified as a goal (see Figure 7). Indeed there was a difference in the amount of change in items specified as a goal, as compared to all the other items ( $P = 0.0008$ ). For non-goal items, there was a small change (initial = 3.71 vs. follow-up = 3.88,  $P = 0.0152$ ). For items specified as a goal, there was a much larger change (initial = 3.14 vs. follow-up = 3.85,  $P < .0001$ ).

## **Discussion**

This study describes the enrollment of n=140 caregivers and their children. The population consisted of caregivers of pediatric dental patients ages 0-4 years and their child who presented to the pediatric dental clinic at Virginia Commonwealth University. Demographically, more than half of the caregivers were African American (57%), followed by Caucasian (32%), Hispanic (8%) and other (6%). Caregivers had the option of identifying with more than one race. In order to decrease language barriers, caregivers were required to be able to both speak and read English.

The RAPIDD questionnaire provides insight into how open a caregiver of a pediatric dental patient may be to both receiving oral health information and engaging in positive oral health behaviors at home. Identifying a caregiver's openness to information and their value of dental health allows the practitioner to provide a motivational interviewing session tailored to the caregiver's individual needs.

Those who are American Indian more strongly disagree with the two permissiveness items, implying a more desirable outlook upon their child's acceptance of non-sweet food and beverage items. Also, for the UOHB, as education of the caregiver increased, more preferred responses occurred (disagreement with permissiveness items).

Of the goals chosen by caregivers, the majority (55%) of caregivers chose to improve an unfavorable oral health behavior. Of these unfavorable oral health-related behaviors, the most commonly chosen goal was to decrease or eliminate their child's consumption of juice

(44%). Many caregivers were unaware of the American Academy of Pediatrics' recommendation of no more than 4 – 6 ounces of juice per day from a cup for children 1-6 years of age and as part of a meal or snack.<sup>25</sup>

There was a relationship between the RAPIDD scales and the goal group chosen. There was a significant relationship with Openness, Valuing, Convenience and Permissiveness. Caregivers choosing to focus on favorable dental habits tend to not be as open to oral health information, yet highly value dental health. Those choosing to decrease unfavorable oral health behaviors are lower on Permissiveness and, conversely, those choosing to increase favorable oral health-related behaviors are higher on Permissiveness.

A total of n=58 caregivers and their children presented for a follow-up visit. There was a mean of 89 days between the initial and follow-up visits.

In comparing home oral health-related behavior of caregivers pre- and post- intervention, there were significant changes. For the FDH items, there was a positive change in frequency of behaviors, irrespective of type of intervention. For the UOHB items, there was a significant decrease in the frequency of UOHB, irrespective of intervention type. Studies have demonstrated that motivational interviewing and setting goals can be effective in eliciting positive behavior change.<sup>26, 27</sup> There was a significant difference in the amount of change in items specified as a goal, as compared to the non-goal items.

Decreasing a child's caries risk is pivotal. Dental caries can affect a child's development, behavior and performance in school.<sup>4</sup> In fact, more than fifty-one million school hours are lost to dental illness each year.<sup>1</sup> Active interventions, such as motivational interviewing, show promise in promoting positive oral health behaviors in caregivers of pediatric dental patients. The goal of decreasing a child's caries risk is aided by increasing positive oral-health practices at home.

In this study, ten different pediatric dental residents conducted the motivational interviewing sessions. A limitation of the study is that while each resident was calibrated in motivational interviewing, each has his or her own style of delivery and there was no quantitative measure of calibration. Another limitation of the study is that most motivational interviewing sessions took place with the child present. With this study focusing on children ages 0-4, caregivers may have been distracted while answering questions or engaging in the motivational interviewing session, especially when accompanied by active, energetic children. Also, responses at follow-up may have been more accurate, both aided by increased caregiver awareness of behaviors, as well by rapport built between caregiver and resident. Due to small representation of specific demographics, seemingly significant demographic results may be due to coincidence.

More research is needed concerning motivational interviewing and goal setting programs such as CAMBRA in the pediatric dental setting. A study assessing impact of motivational interviewing style on the decay levels collected in this study is a valuable next step.

## **Conclusion**

The aim of this study was to assess a caregiver's readiness for change, and then discover if motivational interviewing with written and illustrated supplementation has a positive effect on frequency of oral health behaviors as well as the likeliness of a caregiver to achieve a pre-determined goal. This is important, as the use of motivational interviewing may encourage parents to accept dental recommendations about the prevention of caries in their children.<sup>28</sup> Identifying parental readiness to change is useful in planning how to communicate with the parent about problematic parenting behaviors.<sup>15</sup>

This study demonstrates:

- ☐ Based on the RAPIDD scale, the caregivers were open to receiving health information and valued infant oral health.
- ☐ Reducing or eliminating juice consumption was the most frequent goal chosen by caregivers.
- ☐ Performance by caregivers of the favorable dental habit items improved significantly after a MI educational intervention.
- ☐ Frequency of unfavorable oral health behaviors significantly decreased after a MI educational intervention.
- ☐ Goal setting may be a powerful tool to use with caregivers in order to improve their oral health habits and behaviors.



- Providing oral health information in a motivational interviewing-style to caregivers can improve their home preventive behaviors.

### Literature Cited

1. United States Department of Health Human Services. Oral Health in America: A report of the Surgeon General. *National Institute of Dental and Craniofacial Research, National Institutes of Health*. 2000.
2. Palmer CA. Diet and caries-associated bacteria in severe early childhood caries. *J Dent Res*. 2010;89:1224.
3. Pierce K, Rozier R, Vann W. Accuracy of pediatric care providers' screening and referral for early childhood caries. *Pediatrics*. 2002;109:E82-2.
4. Casamassimo P. Beyond the dmft: the human and economic cost of early childhood caries. *J Am Dent Assoc*. 2009;140:650.
5. Braga MM, Mendes FM, Ekstrand KR. Detection Activity Assessment and Diagnosis of Dental Caries Lesions. *Dent Clin N Am*. 2010:479-493.
6. Reich E, Lussi A, Newbrun E. Caries-risk assessment. *Int Dent J*. 1999;49:15-26.
7. Fontana M, Young D, Wolff M. Evidence-Based Caries, Risk Assessment, and Treatment. *Dent Clin N Am*. 2009:149-161.

8. American Academy of Pediatric Dentistry. Guideline on Caries-risk Assessment and Management for Infants, Children, and Adolescents. *Reference Manual*. 2012;34:118-125.
9. Featherstone J. Caries Prevention and Reversal Bases on the Caries Balance. *Pediatr Dent*. 2006;128-132.
10. Ramos-Gomez F, Crall J, Gansky S, Slayton R, Featherstone J. Caries Risk Assessment Appropriate for the Age One visit. *J.Calif.Dent.Assoc*. 2007;35:687-702.
11. Peretz B, Ram D. Preschool caries as an indicator of future cares: a longitudinal study. *Pediatr Dent*. 2003;25:114-118.
12. American Academy of Pediatric Dentistry. Guideline on Periodicity of Examination, Preventive Dental Services, Anticipatory Guidance/Counseling, and Oral Treatment for Infants, Children and Adolescents. *Reference Manual*. 2012;34:110-116.
13. Weinstein P. Motivating parents to prevent caries in their young children: one-year findings. *J Am Dent Assoc*. 2004;135:731.
14. Nowak A. Rationale for the timing of the first oral evaluation. *Pediatr Dent*. 1997;19:8-11.
15. Weinstein P, Riedy CA. The reliability and validity of the RAPIDD scale: readiness assessment of parents concerning infant dental decay. *ASDC J Dent Child*. 2001;68:129-35, 142.
16. Prochaska JO, DiClemente CC. *The Transtheoretical Approach: Crossing Traditional Boundaries of Therapy*. Homewood, Ill.: Dow Jones-Irwin; 1984.

17. Heather N. Effects of brief counseling among male heavy drinkers identified on general hospital wards. *Drug Alcohol Rev.* 1996;15:29.
18. Hettema J, Steele J, Miller WR. Motivational interviewing. *Annu Rev Clin Psychol.* 2005;1:91-111.
19. Freudenthal JJ, Bowen DM. Motivational interviewing to decrease parental risk-related behaviors for early childhood caries. *J Dent Hyg.* 2010;84:29-34.
20. Harrison R, Benton T, Everson-Stewart S, Weinstein P. Effect of motivational interviewing on rates of early childhood caries: a randomized trial. *Pediatr Dent.* 2007;29:16-22.
21. Ismail AI, Ondersma S, Jedele JM, Little RJ, Lepkowski JM. Evaluation of a brief tailored motivational intervention to prevent early childhood caries. *Community Dent Oral Epidemiol.* 2011;39:433-448.
22. Tahan HA, Sminkey PV. Motivational interviewing: building rapport with clients to encourage desirable behavioral and lifestyle changes. *Prof Case Manag.* 2012;17:164-72; quiz 173-4.
23. Harris P, Taylor R, Thielke R, Payne J, Gonzalez N, Conde J. Research electronic data Capture (REDCap) - A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform.* 2009;42:377-381.
24. Center for Clinical and Translational Research (CCTR) and VCU Technology Services grant support. CTSA Award Number UL1TR000058.

25. American Academy of Pediatrics Committee on Nutrition. Policy statement: The use and misuse of fruit juices in pediatrics. 107(5):1210-3. Reaffirmed October, 2006. *Pediatrics*. 2001;107:1210-1213.
26. Schwartz R, Hamre R, Dietz W. Office-based motivational interviewing to prevent childhood obesity: a feasibility study. *Arch Pediatr Adolesc Med*. 2007;161:495-501.
27. Shilts M, Horowitz M, Townsend M. Goal setting as a strategy for dietary and physical activity behavior change: a review of the literature. *Am J Health Promot*. 2004;19:81-93.
28. Weinstein P, Harrison R, Benton T. Motivating mothers to prevent caries: confirming the beneficial effect of counseling. *J Am Dent Assoc*. 2006;137:789-793.

## Tables

**Table 1.** DEMOGRAPHIC CHARACTERISTICS OF PATIENTS BY EDUCATIONAL INTERVENTION GROUP (N = 120)

Demographics	Visual (N=71)		Verbal (N=69)	
	N	Percent	N	Percent
White	24	34	21	30
Black/ African American	38	54	42	61
American Indian	1	1	1	1
Asian	3	4	0	0
Native Hawaiian or Pacific Islander	0	0	1	1
Other	1	1	2	3
Hispanic	6	8	6	9
Years of Education				
Less than high school	3	4	5	7
High school/GED	21	30	26	38
Some college/Technical school	27	39	20	29
Finished college	19	27	17	25
	Mean	STD	Mean	STD
Adult age (years)	31.1	6.91	30.1	6.15
Child age (months)	32.7	13.39	31.1	14.31
Number of children	2.4	1.26	2.5	1.48
Number of adults in addition to caregiver	1.4	0.79	1.2	0.78

Abbreviations: N = frequency, STD = standard deviation.

**Table 2.**SUMMARY RESULTS FOR READINESS ASSESSMENT OF PARENTS CONCERNING INFANT DENTAL DECAY

Item	Percentage of Caregivers					n	Mean <sup>1</sup>	STD
	SA	A	N	D	SD			
<b>Openness to Health Information</b>						140	1.95	0.68
I get help on how to take care of my baby from TV, magazines, newspaper, books or the internet.	18	26	29	22	4	140	2.69	1.13
I feel comfortable asking questions at my health care provider regarding the baby.	82	16	1	0	1	140	1.21	0.52
<b>Valuing Dental Health</b>						140	1.19	0.43
Keeping my babys teeth healthy is important to me.	91	7	0	0	1	140	1.10	0.42
My baby will benefit from my cleaning his/her teeth.	89	10	1	0	1	140	1.14	0.47
I like the idea of a health person putting medicine on my babys teeth to protect them from getting cavities.	74	19	4	1	1	140	1.35	0.70
Dental visits are as important as regular medical check-ups.	86	13	1	0	1	140	1.17	0.49
<b>Convenience and Change Difficulty</b>						140	2.25	0.72
It will be easy to change any habits I may have to help decrease my childs chance of getting cavities.	40	45	9	4	1	140	1.82	0.88
My baby gives me a hard time when I try to brush his/her teeth.	17	14	21	31	16	140	3.14	1.33
I am able to put my baby to sleep without feeding/nursing him/her.	47	25	9	14	6	140	2.06	1.27
<b>Child Permissiveness</b>						140	3.63	1.00
My baby is happier, when I give him/her something sweet in his/her bottle.	6	16	16	36	25	140	3.58	1.21
Foods and drinks that are not sweet, dont taste good to my baby.	8	9	17	39	26	140	3.68	1.19

Abbreviations: SA = strongly agree, A = agree, N = neutral, D = disagree, SD = strongly disagree, n = frequency, STD = standard deviation.

<sup>1</sup> The mean and standard deviation were scored using SA=1 through SD = 5.

**Table 3.**MULTIWAY ANOVA OF THE INITIAL CHARACTERISTICS OF SUBJECTS OF RAPIDD SCALES (P-VALUES)

Source	df	Openness	Valuing	Convenience	Permissiveness
Model	15	0.3099	0.5164	0.1041	<b>0.0095</b>
White	1	0.6053	0.6033	0.9828	0.2735
Black	1	0.9378	0.2467	0.8142	0.3552
American Indian	1	0.2159	0.8037	0.0751	<b>0.0451</b>
Asian	1	0.9691	0.7600	0.0930	0.3699
Hispanic	1	0.0983	0.7974	0.1697	0.6861
Years of Education	3	0.8472	0.2216	0.3694	<b>0.0062</b>
Adult age	1	0.6922	0.5263	0.5110	0.5594
Child age	1	0.9966	0.0838	0.0871	0.5998
Number of children	1	0.6961	0.2503	0.7462	0.7520
Number of adults	1	0.8039	0.6177	0.2590	0.6360
Goal group	2	0.2032	0.4494	0.4176	0.0645
Intervention	1	0.5167	0.5486	0.4170	0.8200

Abbreviation: df = degrees of freedom



**Table 4.**ASSESSMENT OF ORAL HEALTH HABITS AND BEHAVIORS

Item	Visit	Percentage of Caregivers					n	Mean <sup>1</sup>	STD
		SA	A	N	D	SD			
<b>Favorable dental habits</b>	Initial						140	3.74	0.86
	Follow-up						58	4.12	0.84
My child goes to the dentist regularly	Initial	9	4	7	46	33	140	3.89	1.19
	Follow-up	3	5	2	43	47	58	4.24	0.98
My family regularly receives dental care:	Initial	6	9	4	58	24	140	3.85	1.06
	Follow-up	3	9	3	47	38	58	4.07	1.04
My child's teeth are brushed with fluoride toothpaste at least two times a day	Initial	7	17	12	49	14	138	3.47	1.15
	Follow-up	5	7	0	53	35	57	4.05	1.06

Item	Visit	Percentage of Caregivers						n	Mean <sup>1</sup>	STD
		VF	F	O	R	VR	N			
<b>Favorable oral health behaviors</b>	Initial							140	3.42	0.91
	Follow-up							58	3.17	0.94
My child eats healthy snacks	Initial	20	56	19	1	3	0	139	2.11	0.84
	Follow-up	28	55	14	2	2	0	58	1.95	0.80
My child drinks tap water	Initial	21	24	21	6	6	21	140	3.19	1.82
	Follow-up	26	22	14	10	14	14	58	3.05	1.79
I chew gum with xylitol	Initial	4	6	14	6	9	61	140	4.93	1.56
	Follow-up	5	9	19	10	12	45	58	4.50	1.65
<b>Unfavorable oral health behaviors</b>	Initial							140	3.76	0.91
	Follow-up							58	4.09	0.80
My child drinks soda	Initial	1	6	19	22	17	35	140	4.54	1.33
	Follow-up	0	5	16	12	40	28	58	4.69	1.19
My child drinks juice	Initial	15	35	30	8	8	4	140	2.71	1.29
	Follow-up	11	28	39	14	7	2	57	2.84	1.13
My child has a liquid other than water in their sippy cup	Initial	14	34	21	8	4	19	140	3.08	1.68
	Follow-up	2	29	22	9	5	33	58	3.84	1.71
My child takes a bottle to bed	Initial	8	10	4	4	2	72	140	4.99	1.76
	Follow-up	3	7	3	2	2	83	58	5.40	1.43
My child eats candy or junk food	Initial	1	15	44	20	10	9	140	3.50	1.18
	Follow-up	4	11	39	18	25	5	57	3.65	1.22

Abbreviations: VF = very frequently, F = frequently, O = occasionally, R = rarely, VR = very rarely, N = never, STD = standard deviation.

<sup>1</sup> The mean and standard deviation were scored using VF=1 through N = 6.

**Table 5.**MULTIWAY ANOVA OF ORAL HEALTH HABITS AND BEHAVIORS (P-VALUES)

Source	df	Favorable Dental Habits	Favorable Oral Health Behaviors	Unfavorable Oral Health Behaviors
Model	15	0.6805	0.1765	<b>0.0007</b>
White	1	0.3354	0.2430	0.4484
Black	1	0.2123	0.5332	0.3929
American Indian	1	0.5667	0.9592	0.4122
Asian	1	0.5822	0.5902	0.1187
Hispanic	1	0.3335	0.4967	0.9615
Years of Education	3	0.1950	0.7949	<b>0.0080</b>
Adult age	1	0.4251	0.2496	0.9640
Child age	1	0.8770	0.1215	0.0937
Number of children	1	0.7602	0.8357	<b>0.0362</b>
Number of adults	1	0.8219	0.6137	0.1975
Goal group	2	0.2338	0.1793	0.0023
Intervention	1	0.4946	0.2164	0.9308

Abbreviation: df = degrees of freedom.

**Table 6.**GOALS CHOSEN AFTER THE ASSESSMENT OF ORAL HEALTH HABITS AND BEHAVIORS

Goal	Visual (N=71)		Verbal (N=69)	
	N	Percent	N	Percent
<b>Favorable dental habits</b>	<b>9</b>	<b>13</b>	<b>13</b>	<b>19</b>
Regular dental visits for child	0	0	0	0
Family receives dental treatment	0	0	1	1
Brush with fluoride toothpaste at least twice daily	9	13	12	17
<b>Favorable oral health behaviors</b>	<b>26</b>	<b>37</b>	<b>15</b>	<b>22</b>
Healthy snacks	3	4	4	6
Drink tap water	4	6	2	3
Less or no candy and junk food	19	27	9	13
<b>Unfavorable oral health behaviors</b>	<b>36</b>	<b>51</b>	<b>41</b>	<b>59</b>
No soda	3	4	4	6
Less or no juice	16	23	18	26
Only water or milk in sippy cup	9	13	13	19
Wean off bottle (At least no bottle for sleeping)	6	8	6	9
Chew gum with xylitol	2	3	0	0

Abbreviations: N = number of subjects.

**Table 7.**CORRELATION BETWEEN THE BEHAVIORS AND READINESS

Health Habits and Behaviors scores	RAPIDD scores			
	Openness to Health Information	Valuing Dental Health	Convenience and Change Difficulty	Child Permissiveness
Favorable dental habits	0.10	-0.01	-0.03	0.06
Favorable oral health-related behaviors	0.04	0.01	-0.02	-0.16
Unfavorable oral health-related behaviors	-0.02	0.12	-0.28 **	0.26 **

Note: \*P < 0.05, \*\*P < 0.01.

**Table 8.**CHANGE IN ORAL HEALTH HABITS AND BEHAVIORS

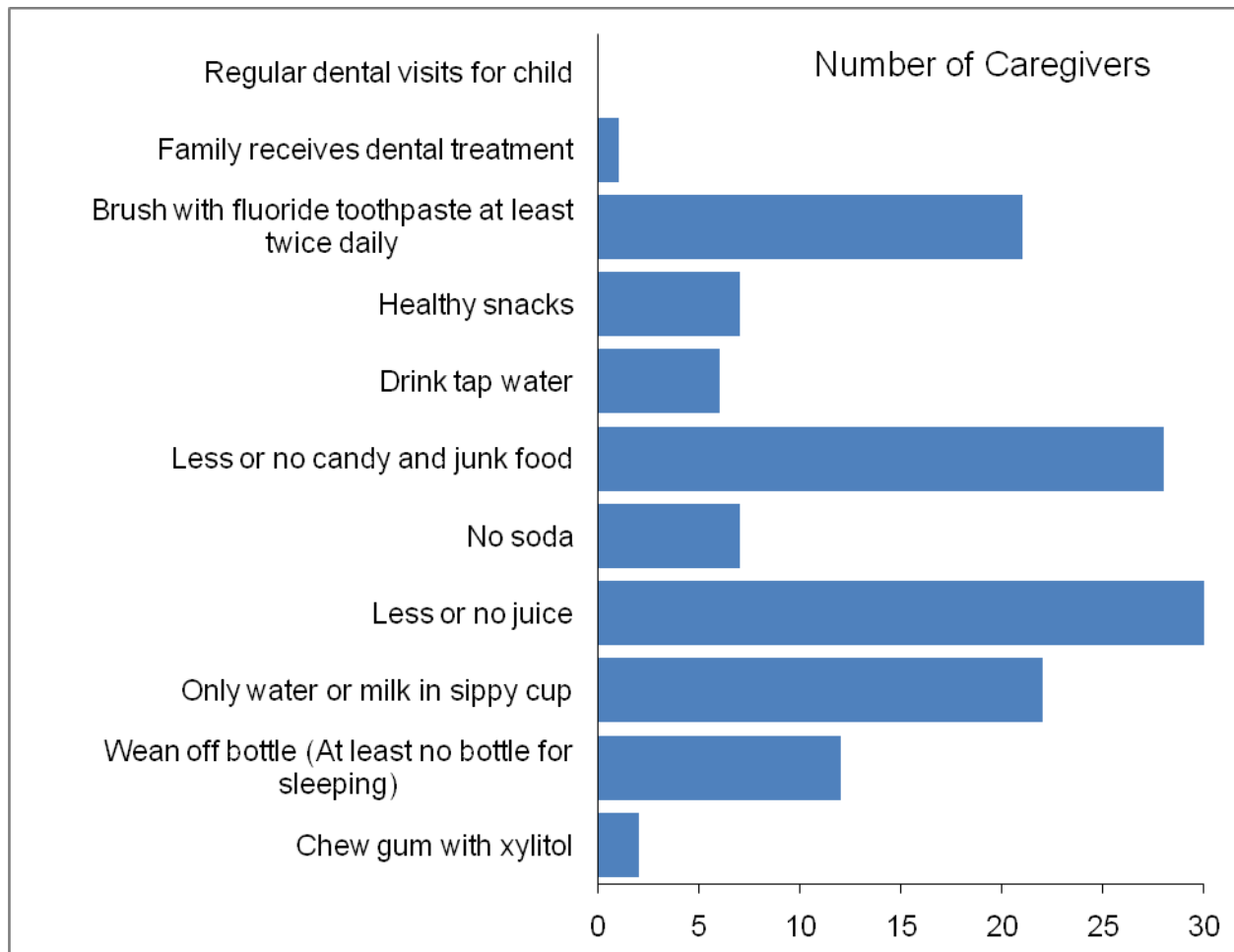
Intervention	Visit	Favorable habits		
		Mean	95% CI	
Verbal	Initial	3.77	0.12	3.55
	Follow-up	4.15	0.21	3.74
Visual	Initial	3.69	0.11	3.47
	Follow-up	3.84	0.20	3.45
Favorable behaviors				
Verbal	Initial	3.37	0.12	3.13
	Follow-up	3.05	0.20	2.66
Visual	Initial	3.17	0.12	2.93
	Follow-up	3.17	0.19	2.79
Unfavorable behaviors				
Verbal	Initial	3.85	0.12	3.61
	Follow-up	4.13	0.17	3.80
Visual	Initial	3.90	0.12	3.66
	Follow-up	3.97	0.17	3.63

**Table 9. CHANGE IN ORAL HEALTH HABITS AND BEHAVIOR ITEMS**

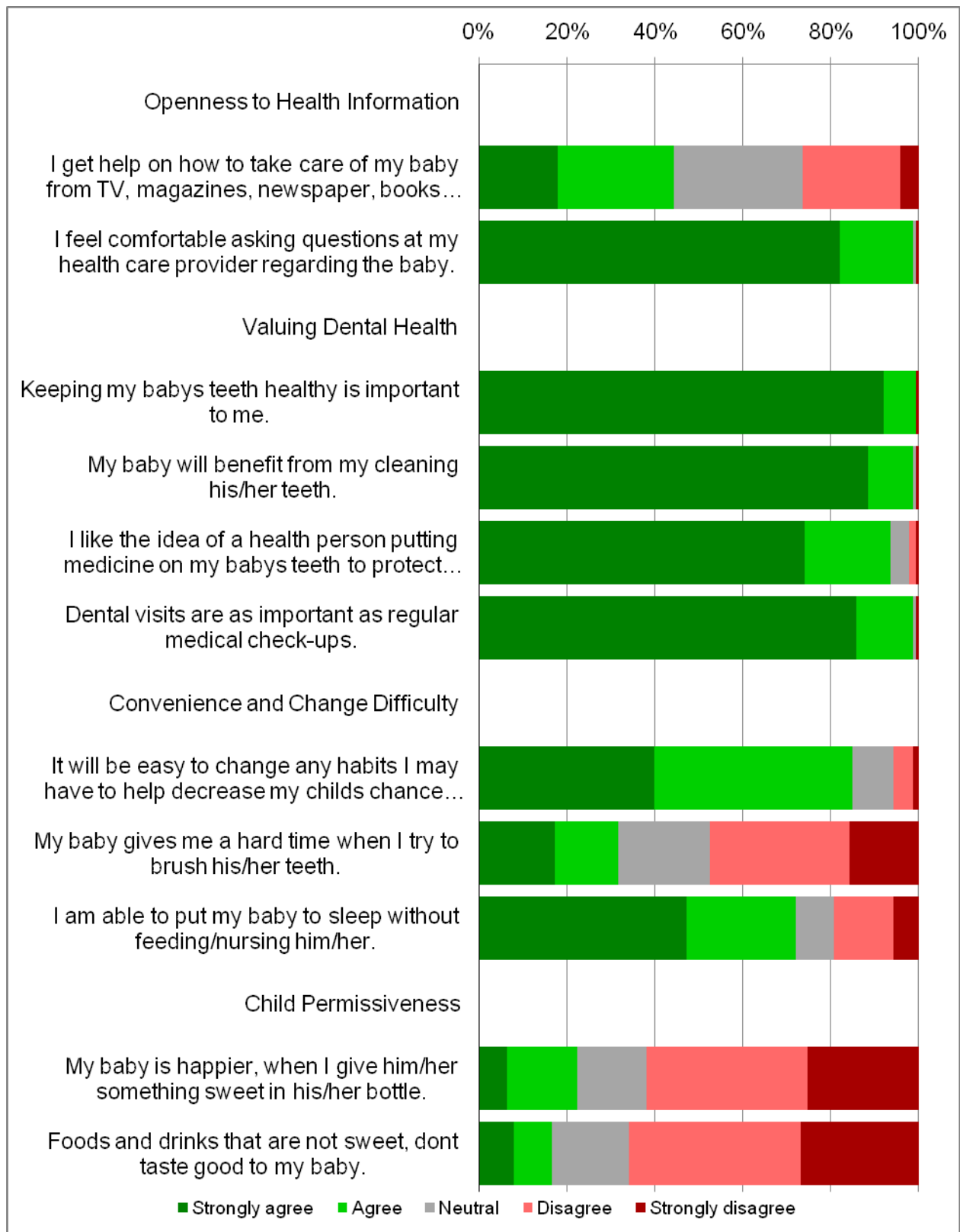
Item	Visit	Est. Mean	SE	95% CI		P-value	
My child goes to the dentist regularly	Initial	3.61	0.111	3.39	3.83	<.0001	*
	Follow-up	4.31	0.154	4.00	4.61		
My family regularly receives dental care:	Initial	3.57	0.103	3.37	3.77	0.0005	*
	Follow-up	4.11	0.142	3.83	4.39		
My child's teeth are brushed with fluoride toothpaste at least two times a day	Initial	3.27	0.102	3.06	3.47	<.0001	*
	Follow-up	4.00	0.140	3.72	4.27		
My child eats healthy snacks	Initial	1.85	0.085	1.68	2.02	0.6862	
	Follow-up	1.90	0.121	1.67	2.14		
My child drinks tap water	Initial	2.93	0.161	2.61	3.24	0.4746	
	Follow-up	3.10	0.222	2.66	3.53		
I chew gum with xylitol	Initial	4.65	0.143	4.37	4.93	0.8651	
	Follow-up	4.62	0.197	4.23	5.00		
My child drinks soda	Initial	4.29	0.114	4.06	4.51	0.0073	
	Follow-up	4.75	0.157	4.44	5.05		
My child drinks juice	Initial	2.57	0.105	2.36	2.77	0.0461	
	Follow-up	2.88	0.145	2.60	3.17		
My child has a liquid other than water in their sippy cup	Initial	2.88	0.146	2.59	3.17	<.0001	
	Follow-up	3.87	0.199	3.48	4.26		
My child takes a bottle to bed	Initial	4.75	0.147	4.46	5.04	0.0128	
	Follow-up	5.30	0.202	4.90	5.69		
My child eats candy or junk food	Initial	3.33	0.103	3.13	3.53	0.0307	
	Follow-up	3.67	0.146	3.38	3.96		

Abbreviations: Est. Mean = mean estimated from repeated-measures ANOVA, SE = standard error, 95% CI = 95% confidence interval, P-value = p-value comparing initial to follow-up within each item, \* = p-value < .05/11 Bonferroni correction.

## Figures

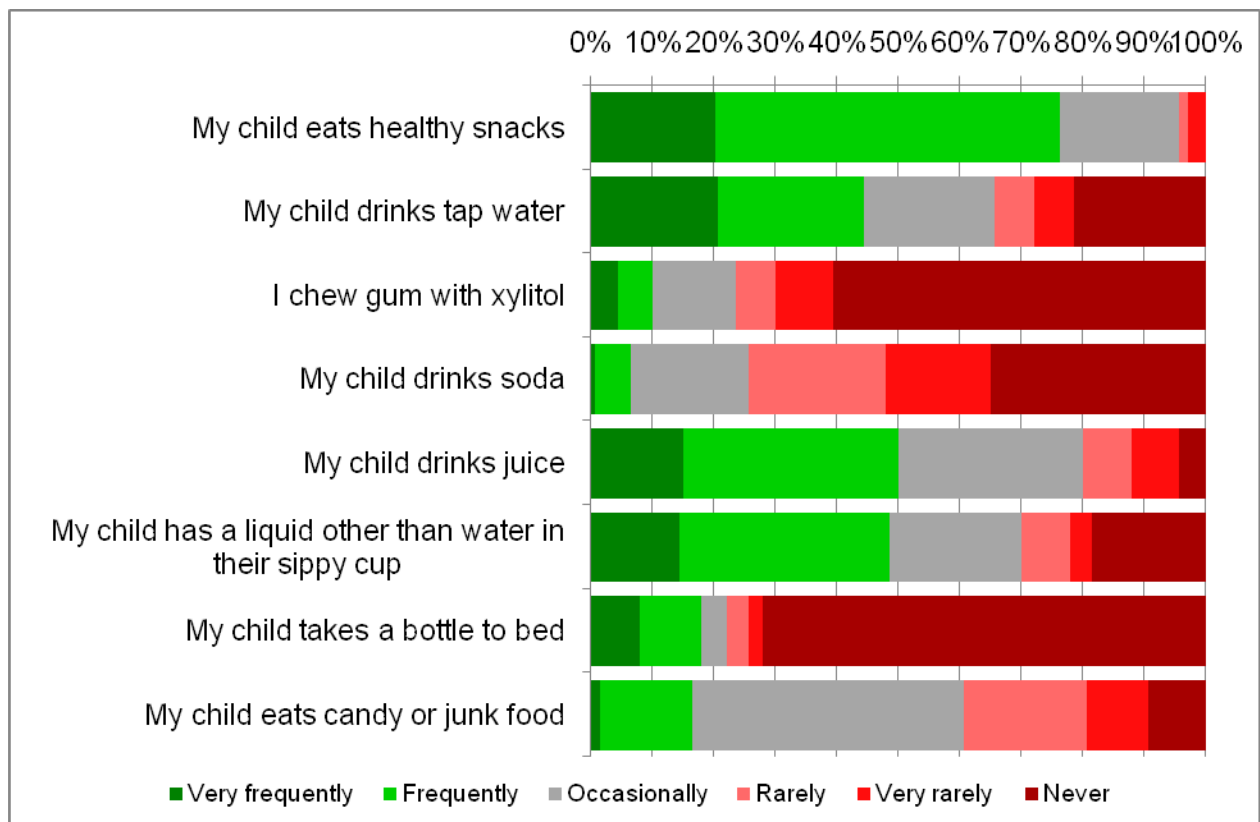
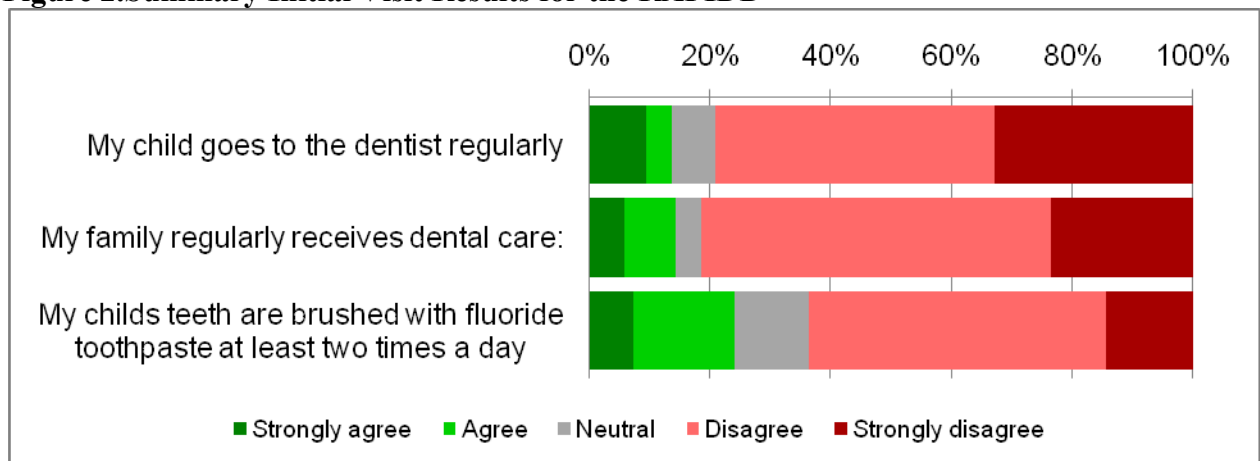


**Figure 1. Goals**

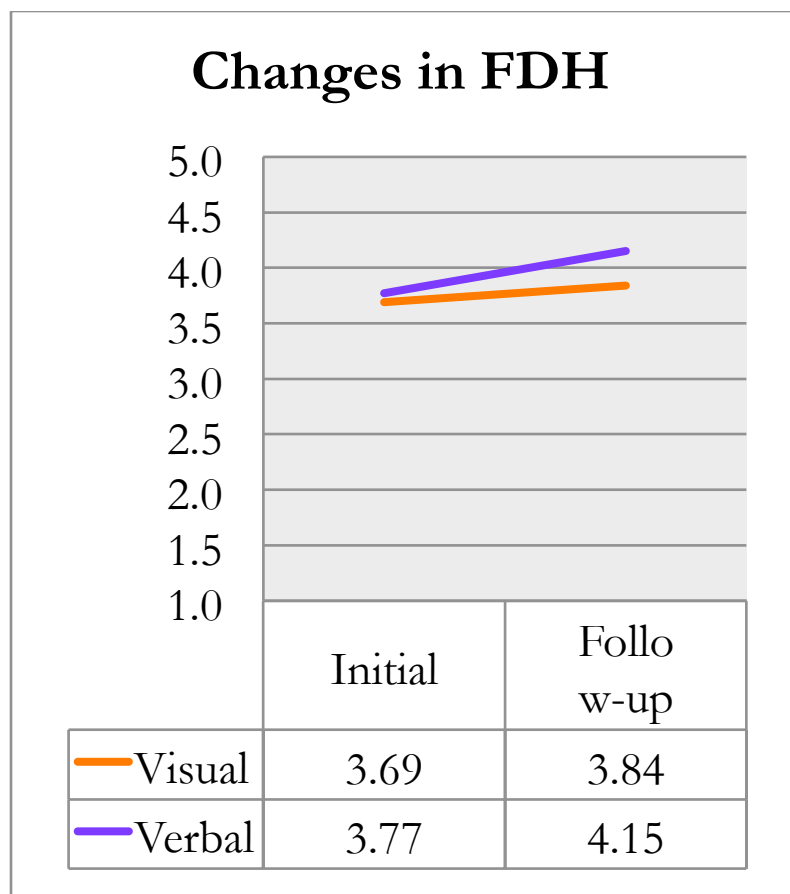




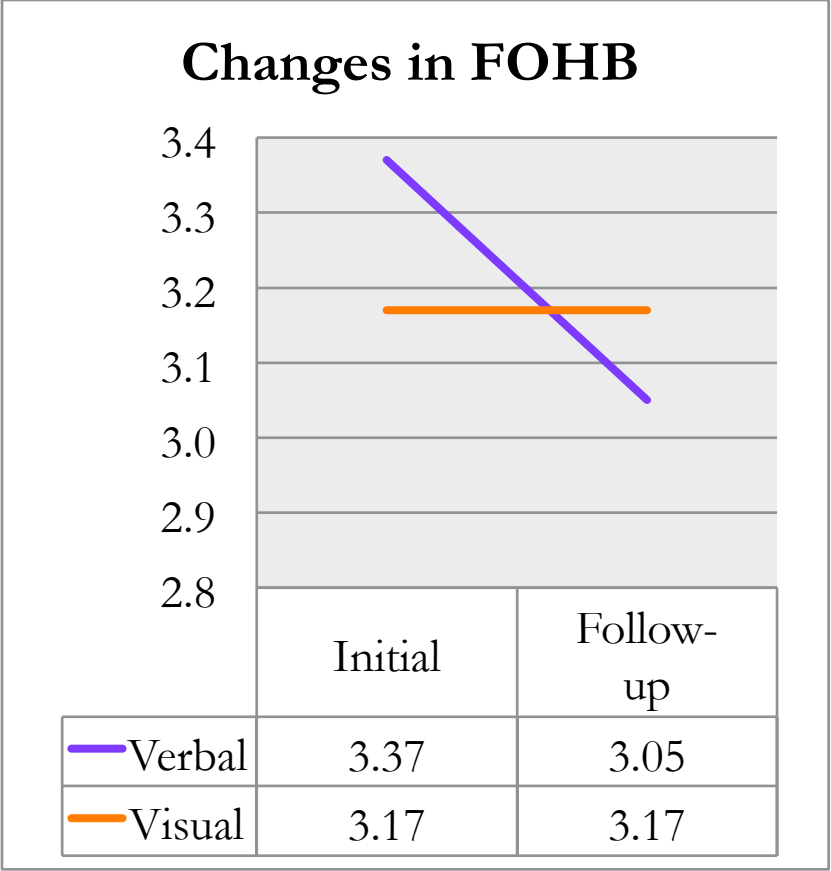
**Figure 2. Summary Initial Visit Results for the RAPIDD**



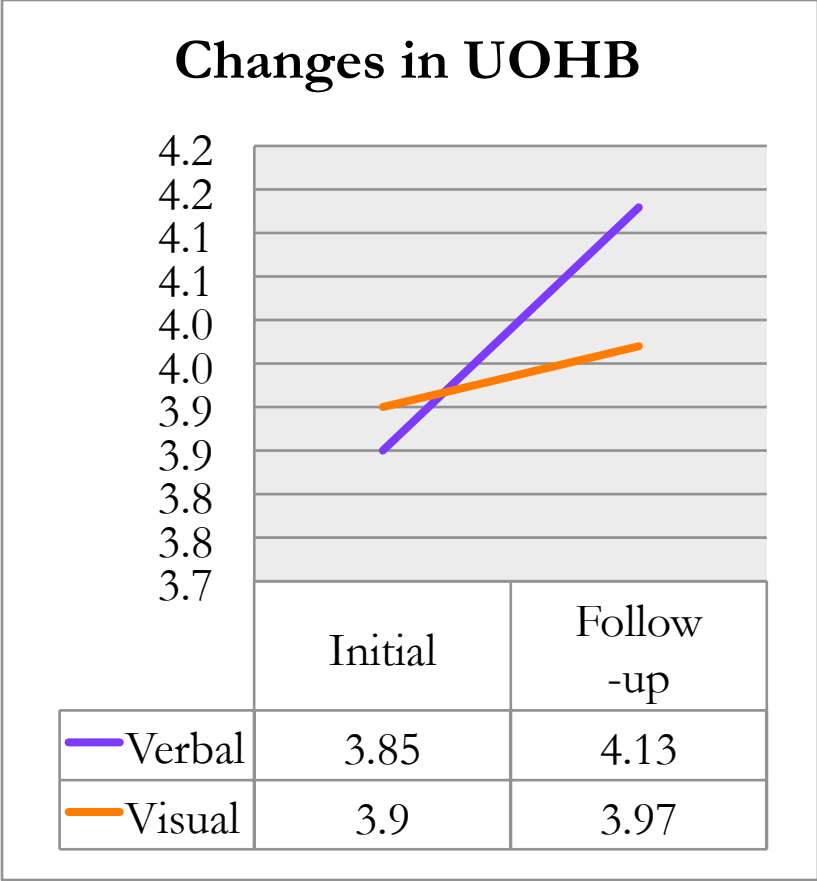
**Figure 3. Initial Visit Oral Health Behaviors**



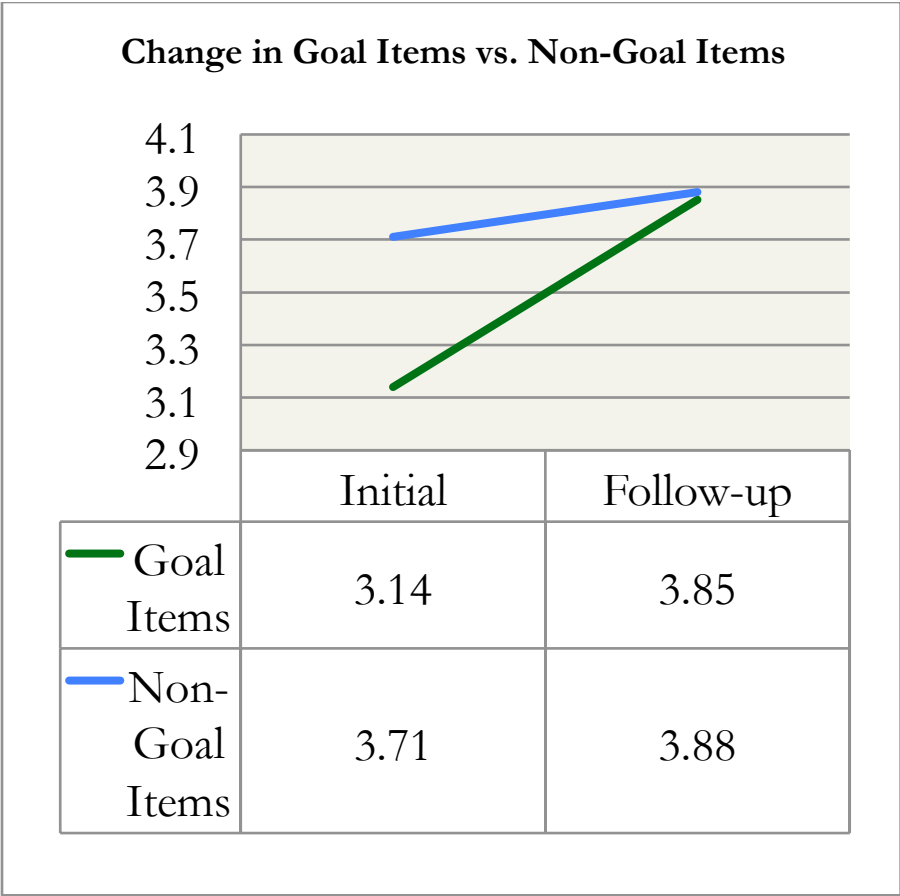
**Figure 4.Changes in Favorable Dental Habits**



**Figure 5.Changes in Favorable Oral Health Behaviors**



**Figure 6.Changes in Unfavorable Oral Health Behaviors**



**Figure 7.**Change in Goals

## Appendices

### Infant Oral Health Survey

1. I get help on how to take care of my baby from TV, magazines, newspaper, books or the internet.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

2. It will be easy to change any habits I may have to help decrease my child's chance of getting cavities.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

3. I feel comfortable asking questions at my health care provider regarding the baby.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

4. Keeping my baby's teeth healthy is important to me.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

5. My baby will benefit from my cleaning his/her teeth.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

6. I like the idea of a health person putting medicine on my baby's teeth to protect them from getting cavities.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

7. Dental visits are as important as regular medical check-ups.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

8. My baby gives me a hard time when I try to brush his/her teeth.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

9. I am able to put my baby to sleep without feeding/nursing him/her.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

10. My baby is happier, when I give him/her something sweet in his/her bottle.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

11. Foods and drinks that are not sweet, don't taste good to my baby.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

*Thank you*

Are you Hispanic or Latino?

☐ Yes

☐ No

In your opinion, which group best represents your race?

☐ American Indian or Alaska Native

☐ White

☐ Asian

☐ Black/African American

☐ Other \_\_\_\_\_

☐ Native Hawaiian/Pacific Islander

How many years of education do you have?

☐ Less than High School

☐ High School/GED

☐ Some College/Technical School

☐ Finished College

What is your age?  Years

Child's age?  years / months

Number of Children in Household

Adults in household that will help care for your child besides you?  number



## Dental Questions about You and Your Child

Circle the response which best describes you or your child.

My child goes to the dentist regularly:

Strongly Disagree Disagree Undecided Agree Strongly Agree

My family regularly receives dental care:

Strongly Disagree Disagree Undecided Agree Strongly Agree N/A

My child eats healthy snacks:

Very Frequently Frequently Occasionally Rarely Very Rarely Never

My child's teeth are brushed with fluoride toothpaste at least two times a day:

Strongly Disagree Disagree Undecided Agree Strongly Agree

My child drinks soda:

Very Frequently Frequently Occasionally Rarely Very Rarely Never

My child drinks juice:

Very Frequently Frequently Occasionally Rarely Very Rarely Never

My child has a liquid other than water in their sippy cup:

Very Frequently Frequently Occasionally Rarely Very Rarely Never

My child takes a bottle to bed:

Very Frequently Frequently Occasionally Rarely Very Rarely Never

My child drinks tap water:

Very Frequently Frequently Occasionally Rarely Very Rarely Never

My child eats candy or junk food:

Very Frequently Frequently Occasionally Rarely Very Rarely Never

I chew gum with xylitol:

Very Frequently Frequently Occasionally Rarely Very Rarely Never

## Goal Selection Sheet

Select the goal that you would like to work towards by circling it.

Then, on a scale of 1-10, circle how confident you are that you can accomplish the goal.

### Self-management Goals for Parent/Caregiver

Patient Name \_\_\_\_\_ DOB \_\_\_\_\_



Regular dental visits for child



Family receives dental treatment



Healthy snacks



Brush with fluoride toothpaste at least twice daily



No soda



Less or no juice



Wean off bottle (At least no bottle for sleeping)



Only water or milk in sippy cup



Chew gum with xylitol



Drink tap water



Less or no candy and junk food

**IMPORTANT:**  
The last thing that touches your child's teeth before bed-time is the toothbrush with fluoride toothpaste.

Circle the goals you will focus on between today and your next visit.

On a scale of 1-10, how confident are you that you can accomplish the goals? 1 2 3 4 5 6 7 8 9 10

Not likely

Definitely

My promise: I agree to the goals circled and understand that staff may ask me how I am doing with my goals.

Date: \_\_\_\_\_ Signed by: \_\_\_\_\_

Review Date: \_\_\_\_\_ Comments: \_\_\_\_\_ Staff Initials: \_\_\_\_\_

Review Date: \_\_\_\_\_ Comments: \_\_\_\_\_ Staff Initials: \_\_\_\_\_

## **Vita**

Kristin Sherée Hodgson was born on June 15, 1984 in Tampa, Florida. In 2006, she received her Bachelor of Science in Biomedical Sciences at the University of South Florida. She attended Nova Southeastern University's College of Dental Medicine, where she obtained the degree of Doctor of Dental Medicine in 2010. Kristin practiced general dentistry in Florida before entering the Pediatric Dentistry Residency Program at Virginia Commonwealth University's School of Dentistry.