The effect of early dental care on pediatric patient behavior

Thesis

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By

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Abstract

**Purpose:** The purpose of this study was to determine if early dental care had an effect on the behavior of a child. The American Academy of pediatric dentistry recommends a child have their first dental visit by age one. Research shows this recommendation of an early dental visit is beneficial in prevention due to early childhood caries being so prevalent amongst the pediatric patient population, but there is no current research suggesting early dental care will affect a child's behavior at dental appointments.

**Methods:** A retrospective study was completed using a convenience sample of patients in a private pediatric dental practice. To be included in the study patients had to have at least a twoyear dental history in the dental practice, they had to be between the ages of six months to eight years old, and their first visit had to include a prophylaxis. Patients with a medical alert were excluded from this study. The Frankl behavior scale was used to measure patient behavior.

**Results:** The results showed a slight positive correlation between patient age and Frankl behavior (r=.282, p=.001). There was no significant difference of behavior based on gender. There was also no significant in the age of a child at their first dental visit and the behavior of a child at their first dental visit.

**Conclusion:** Evidence suggests a slight positive behavior change as a child increases in age. This study also showed no significant evidence of the age of a child at their first dental visit having a direct effect on the child's behavior as they get older and gain more dental experiences. Establishing a dental home by the recommended age of the AAPD (age one) is important in educating parents on prevention of decay, but according to this study, establishing a dental home at an early age does not affect behavior.

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# FIELDS OF STUDY

Major field: Dental Hygiene

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## **Chapter 1: Introduction**

## Background of the problem

Dental care is important for pediatric patients as it can set a pattern of oral health into adulthood. Some general dentists will not see children in their practices until they are at least three years of age.<sup>1</sup> By this time, children typically have a full primary dentition and have been exposed to decay-causing bacteria.<sup>1</sup> If decay is present, and a child undergoes restorative treatment, anxiety may be experienced, and could potentially affect behavior at future dental visits.<sup>2-5</sup>

Early childhood caries (ECC) is one of the most common chronic childhood diseases and one of the greatest unmet healthcare concerns affecting children. <sup>6,7</sup> This disease is five times more common than asthma.<sup>1,8</sup> More than thirty percent of children from lower socioeconomic statuses exhibit caries by age three.<sup>1</sup> Restorative dental treatment for children can be very difficult and traumatic, therefore, establishing regular dental visits at an early age can be important in identifying patients at high risk for dental caries in an effort to reduce their risk of restorative treatment needs. The American Academy of Pediatric Dentistry (AAPD) recommends children have their first dental visit by their first birthday.<sup>9</sup> Nowak and Casamassimo state having a dental home early will provide preventive oral health for children and early intervention if a problem already exists.<sup>10</sup> Volpato et al. discovered parents who do take their children to the dentist before age three, do so for curative treatment instead of preventation.<sup>11</sup>

Having a first dental visit by the age one, as recommended by the AAPD, not only establishes a dental home for children and supports the prevention of decay by educating parents, but there could possibly be an effect on a patient's behavior at the dentist as they get older. Establishment of a dental home by age one has been shown to be important in prevention and treatment of ECC, but consideration should also be given to a child's behavior during their dental experiences.

## Significance of the Problem

There has been much controversy regarding when a child should have their first dental visit. In 1986, the AAPD adopted the recommendation that the first dental visit be by age one as part of the Guidelines on Infant Oral Health Care rather than by age three as typically recommended by a general dentist.<sup>9</sup> Not only is this age of initial visit recommended because dental decay is the most common chronic infectious disease among children in the country, it is believed that this early initial visit has a positive effect on the behavior of pediatric patients as they get older.<sup>10</sup>

This study is significant to dental hygiene science and practice because it will allow dental hygienists to provide evidence-based recommendations for pediatric patients on whether the age recommended by the AAPD will have a direct effect on a child's behavior during a dental appointment as the child gets older and has more dental experiences. The rationale of this research study is based on the assumption that taking your child to the dentist before age three will have a positive effect on their behavior at future dental visits.

## Research Question

- 1. Does behavior change as a child gets older, during dental appointments?
- 2. Does the behavior of a child whose first dental visit was before age three, differ from the behavior of a child whose first dental visit was at or after age three

during dental appointments?

## Definition of terms

**Frankl scale**- behavior rating scale for pediatric patients in dentistry, 1 being the least cooperative and 4 being the most cooperative<sup>12</sup>

- 1- definitely negative. Refusal of treatment, forceful crying, fearfulness, or any other overt evidence of extreme negativism
- 2- negative behavior. Reluctance to accept treatment, uncooperative, some evidence of negative attitude but not pronounced
- **3-** positive behavior. Acceptance of treatment, conscious behavior at times; willingness to comply with the dentist, at time with reservation, but patient follows dentist directions cooperatively.
- 4- definitely positive behavior. Good rapport with dentist, interest in dental procedures, laughter and enjoyment

**Early childhood caries (ECC)**-the most common chronic disease in children, which can develop as soon as teeth erupt. It results when simple sugars are broken down by the oral bacteria, streptococci mutans, which produce an acid that demineralizes tooth structure, and results in a cavitation.<sup>1, 9</sup>

**Dental anxiety**-fear of visiting the dentist for preventative dental care or treatment

**Pediatric Patient**- infants, children and adolescents ranging in age from six months-eighteen years<sup>13</sup>

Behavior-the way a patient conducts themselves during their dental visit

**Dental Home**- a philosophy embraced by the dental practice that can provide access to preventive and emergency services for children<sup>11</sup>

## **Chapter 2: Review of literature**

#### Access to care

The most common unmet health care need amongst children is dental care, with children from low socioeconomic statuses being the most affected.<sup>7,13</sup> Mouradian authored a paper which discussed critical issues regarding children's oral health and dental education. This paper stressed that change in dental education is needed to help address the unmet dental needs of children.<sup>13</sup> The paper identified a shortage of trained dental professionals in caring for young children and the need for collaboration with primary care doctors. Mouradian observed the consequences of children's oral health problems as well as their oral health needs and access to dental care and found that approximately 52 hours of school are lost due to dental problems and treatment of dental problems account for 20-30 percent of healthcare costs for families.<sup>13</sup> This paper presented a need for general dentists to have more training in the care of pediatric patients<sup>.13</sup>

Dental professionals have not only addressed the need for access to dental care, but other community groups have also published articles concerning the access to dental care issue. The Health Care for the Homeless Clinicians' Network is a membership group that connects hands-on providers from a variety of disciplines who are committed to improving the health and quality of life of people experiencing homelessness.<sup>14</sup> In 2007 the National Healthcare for the Homeless Council (HCH) Clinicians Network, published

an article stating poor access to dental care can lead to negative outcomes for children.<sup>14</sup> It further stated families from low socioeconomic statuses have limited access to dental care because dentists who accept Medicaid are limited.<sup>14</sup> The article provided examples of devastating outcomes of children who did not have appropriate access to dental care. One such example included a story of a homeless family in a rural area of Maryland who had limited access to dental care. The Driver family had Medicaid insurance but did not have regular dental visits. One son from this family suffered frequent pain due to multiple abscesses for approximately four months because of the lack of dental providers who accepted their insurance type. Another son from this family suffered from headaches, which doctors later discovered, were caused by a brain infection initially caused by untreated tooth decay. After two brain surgeries and being hospitalized for six weeks, the second son experiencing tooth decay, died unexpectantly.<sup>15</sup> The article further described ways to promote oral health of underserved children through educating parents and clinicians, utilizing mobile dental care vans, establishing programs for early intervention and anticipatory guidance.<sup>14</sup> Having access to care at the age recommended by the AAPD can introduce oral health information and prevention methods to parents in an effort to prevent tooth decay for pediatric patients.

The need for a dental home was proposed after dental professionals reviewed the concept of a medical home. Nowak and Casamassimo discussed the importance of the establishment of a dental home at the age recommended by the AAPD, one year of age. According to their article, the notion of a dental home will provide early intervention and anticipatory guidance for pediatric patients.<sup>10</sup> There would also be a reduction in disease

disparities as a result of increased opportunities for preventive oral health care. Establishing a dental home at an early age would also create a dentist-child relationship causing more familiarity, resulting in children being less anxious during their dental visits.<sup>10</sup> Having a dental home would also provide children a place to receive emergency dental care, allowing a child to visit an oral health care professional they are familiar with in an emergency situation. Access to dental care is major issue for children, but having a dental home can improve their access to oral health care.<sup>10</sup>

## Oral Health of the Pediatric Patient

Dental caries is a common occurrence among the pediatric patient population.<sup>16</sup> Ghazel et al. used a baseline age of one year in 96 African-American children, who were recruited and followed for three years to determine the prevalence and incidence of ECC. Trained dentists used portable dental equipment to conduct examinations annually, assessing dmfs (decayed, missing, filled surfaces).<sup>16</sup> The authors concluded the prevalence of dental caries increased with age. The findings suggested 1.1% of the children in the study had cavities by age one, 12.8% by age two, 39.3% at age three and 65.8% at age four.<sup>16</sup> In addition, there was an increased incidence of children with filled teeth and extractions at follow-up examinations.<sup>16</sup>

Pierce et al. compared the accuracy of dental screenings and referrals by primary care physicians to pediatric dentists at a private pediatric group practice. This study consisted of 258 pre-school children with an average age of 21.2 months. Pediatric primary care providers received two hours of infant oral health training, which included

instructions for the study and pictures of different stages in the caries process. Any child having one or more cavitated lesions, soft tissue pathology, or evidence of trauma to their teeth or mouth needed to be referred. The same exam was conducted by the primary care physician and the pediatric dentist in different rooms. The findings from the exams were not allowed to be discussed between the medical professionals until after the dismissal of the child from the clinic. The number of children with cavitated and precavitated lesions by age, the number of teeth and children with cavities found by the pediatric primary care providers compared with the dentist and the number of children receiving a dental referral by disease state and provider type were recorded. Pierce et al. concluded from this study that primary care physicians were accurate in identifying children with one or more cavitated carious lesions but further research is needed in order to discover why pediatric primary care providers only refer 70% of the children they identified having dental disease.<sup>16</sup> Moreover, this study determined that the regular routine of a pediatric primary care primary care provider if dental screenings are added.<sup>17</sup>

In another study completed on pediatric dental referrals, Long et al. evaluated general dentist's (GDs) opinions of the American Academy of Pediatrics' (AAP) guidelines and also discussed barriers in dental referral acceptance from pediatricians for children under age three.<sup>18</sup> One thousand GDs practicing in North Carolina were randomly selected from a list provided by the State Board of Dental Examiners. Of the 1000 surveys sent to GDs, 493 were returned, resulting in a 49% response rate. Eighty-six percent of these respondents met the requirements to be included in this study and 78% (328 surveys) contained complete data that could be used for analysis. The majority

of the sample population was Caucasian males who graduated from The University of North Carolina at Chapel Hill School of Dentistry. This study revealed that GDs lacked knowledge in the AAPs and the AAPDs oral health guidelines.<sup>18</sup> General dentists are in agreement that they need to work together with pediatric care providers in the oral health of infants, but they are not confident in providing care to children under age three, resulting in an inconsistency between their beliefs and their actions.<sup>18</sup>

Volpato et al. studied when and why parents seek dental care for children before the age of 36 months. They found that parents primarily take their children to the dentist for curative treatment and not preventive treatment.<sup>11</sup> The study used 844 children from 0 to 36 months who were enrolled in an oral health baby clinic program. While being observed by a trained investigator, parents were asked why they enrolled their child in this program. The results of this study revealed the mean age a child had their first dental visit was at 14.92 months.<sup>11</sup> This study also showed prevention as the main reason for a dental visit for parents of children under thirty-six months.<sup>11</sup> Additionally, this study showed that many parents take their child to the dentist for curative treatment in the 30-36-month age group.<sup>11</sup> The study suggests parents should give more attention to prevention of problems in their child's oral health. Infant oral health care is the basis on which a lifetime of preventive education and dental care can be founded, in order to promote optimal oral health into childhood.<sup>11</sup>

In a review studying the effectiveness of early preventive dental visits (EPDVs) on the improvement of children's oral health outcomes, Bhaskar et al. searched PubMed

and Embase electronic databases for the culmination of studies. The results of this review concluded EPDVs are only beneficial for those pediatric patients with a high caries risk or existing dental decay.<sup>19</sup>In general, they found the first year dental visit recommendation ineffective, yet the involvement of a more diverse population is needed for future research.<sup>19</sup>

#### Dental Anxiety and Behavior

Dental anxiety and behavior problems are common in the dental setting. Studies have been conducted in an effort to understand the relationship between the psychological factors of dental fear, dental anxiety and dental behavior.<sup>2-6,20</sup> Winer reviewed children's behavior in a dental setting. The purpose of this literature review was to make psychologists aware of the findings of dental fears and anxiety and to present behavior generalizations and relate research findings to the background issues of fear and factors that influence the presence of fears.<sup>6</sup> This review initially identified dental anxiety not being highly specific and difficult to determine a relationship between dental anxiety and general anxiety. Winer reviewed measurements of dental fear, and age changes. Although some studies showed an increase in dental anxiety with age, there was minimal evidence showing a correlation between the two.<sup>6,20</sup>

Klingberg et al. conducted a literature review that examined articles published in 1982 and compared it to literature published in 2006. This review determined mild fear and anxiety only become a concern when fear and anxiety display a dominance over the

potential threat present and daily functioning is compromised.<sup>20</sup> This review revealed dental fear and anxiety (DFA) and dental behavior management problems (DBMP) are not uncommon in dental offices.<sup>20</sup> It also revealed 9% of child and adolescent populations are affected by DFA and DBMP, with there being an association of psychological factors with these problems.<sup>20</sup> Additionally, the review showed a decrease in DFA and DBMP with age and revealed girls are more anxious in a dental setting and presented with a higher rate of DBMP than boys.<sup>20</sup>

Venham et al. reported children became more comfortable with dental procedures through their dental experiences.<sup>21</sup> This study examined 29 preschool children with no previous dental experience between the ages of two and five. Each child received an initial examination visit, (a mirror and explorer examination, cleaning, and fluoride application), four restorative treatment visits, and their last visit included polishing their restorations, cleaning and fluoride application. Each child's heart rate and clinical anxiety and cooperation was assessed. A picture test asking the children to choose the picture of a little boy who feels most comparable to them was also used to measure their anxiety level. Three calibrated judges rated clinical anxiety and cooperative behavior while independently viewing video tapes of each child's visit. Each child's dental visit was divided into three periods; heart rate, clinical anxiety and cooperative behavior and the judges scored each period. An average of the three scores was produced for their visit. This study revealed that children can be desensitized to dental stress with increased dental experience. It also showed a reduced negative response when a child knows the difference between stressful dental procedures and non-stressful dental procedures.<sup>21</sup>

#### Behavior Guidance for the Pediatric Patient

The stress of dental fear and anxiety can affect a child's behavior during their dental visit and disrupt their quality of care. Studies have shown that the popular pediatric behavior management technique "tell-show-do," explaining and then demonstrating the process of the appointment and instruments that will be used, is the most commonly used behavior management technique used in pediatric dentistry.<sup>22</sup> Farhat-McHayleh et al. compared live modeling, acquiring a behavior through the observation of a model, to "tell-show-do" to determine the effects of both behavior management techniques on the heart rate of children during treatment. An increased heart rate is the most common physiologic indicator of anxiety and fear.<sup>22</sup> One hundred fiftyfive children ranging in age from five to nine, presenting for the first time at Saint Joseph University Dental Care Centre in Beirut, Lebanon, were used for this study. They were separated into three groups. Each group received an oral exam and a cleaning. The first group used the mother as the live model, the second group used the father as a live model and the third group used "tell-show-do" without live modeling, but utilized active participation of the child that included asking questions. The duration of the trial was fourteen minutes: 5 minutes for preparation of either live modeling or "tell-show-do", 3.5 minutes for attaching the oximeter to monitor heart rate and 5.5. minutes for performing the oral examination and cleaning.<sup>22</sup> The authors concluded that live modeling by the mother was more effective in reducing heart rate than live modeling by the father. Furthermore, live modeling was more effective than the "tell-show-do" method.<sup>21</sup> This study also revealed the most stressful part of the appointment for children was the use of

rotating instruments during the cleaning, and the effect of live modeling with the father showed an increase when the rotating instruments were being used.<sup>22</sup> This study concluded live modeling is an effective behavior management technique and should be practiced more in pediatric dentistry.<sup>22</sup>

Although live modeling was not demonstrated, Eaton et al. found that "tell-showdo" was the most accepted behavior management technique among parents.<sup>23</sup> The purpose of their study was to examine the attitude of contemporary parents toward different behavior management techniques. Forty-six parents who brought their children to the Columbus Children's Hospital for outpatient dental care participated in this study. The tools used to examine parents' attitudes toward behavior management techniques were a videotaped presentation and a questionnaire asking for demographics (age, gender, education level and occupation). "Tell-show-do", nitrous oxide sedation, passive restraint, voice control, hand-over-mouth, oral premedication (sedation), active restraint and general anesthesia were observed in this specific order, previously resulting from random selection. A visual analog scale (VAS) ranging from completely acceptable, to completely unacceptable, was utilized in this study. The authors found "tell-show-do" to be the most accepted behavior technique followed by nitrous oxide sedation, general anesthesia, active restraint, oral sedation, voice control and the least accepted was handover-mouth.23

Although early oral healthcare visits are recommended, dental anxiety is fairly common, especially among pediatric patients.<sup>24</sup> According to Lyons, dental anxiety and

fear are considered psychologic and learned either from experience during medical or dental procedures, or as a consequence of observing an anxious parent.<sup>24</sup> Theory shows that having the ability to promote a positive, cooperative dental experience without using non-invasive, non-pharmacologic techniques, encourages lifelong comprehensive oral healthcare.<sup>24</sup> Treating an uncooperative dental patient can sometimes be challenging depending on the type of dental procedure taking place, so adequate behavior management skills are a must for dental professionals. Consistent with the traditional pediatric theory, children 30 to 36 months are cognitively able to have a positive response to dental treatment.<sup>11</sup> This means this age group of pediatric patients should have the skills necessary to cope with stressful situations, and a skilled dental professional who exercises good behavior management techniques can assist in the development of these coping skills in young patients. Lyons discussed the following noninvasive, nonpharmacologic behavior support techniques: voice control, nonverbal communication, tell-show-do, positive reinforcement, contingent escape, noncontingent escape, distraction, parental presence/absence, modeling, shaping, flexibility, consistency, desensitization, repetitive tasking, hypnosis, and escape extinction.<sup>24</sup> Lyons concluded that dental care is best managed when non-invasive, non-pharmacologic techniques are utilized.<sup>24</sup>

## Measuring Pediatric Patient Behavior: Behavior Scales

Fear and anxiety are common occurrences in the dental office, especially amongst the pediatric patient population. Measuring the behavior of pediatric patients is done in a variety of ways. The Frankl behavior rating scale was developed by Frankl, Shiere, and Fogels in 1962 and is one of the most common and reliable behavior rating scales used today.<sup>6,12</sup> This rating scale contains four categories of behavior ranging from definitely cooperative to definitely uncooperative.<sup>6,25</sup> Shinohara et al. used the Frankl behavior scale for the evaluation of child behavior in their study.<sup>25</sup> They determined an uncooperative attitude will be displayed by a patient who exhibits anxiety and fear of the dental treatment.<sup>25</sup> This study examined 33 children at the Department of Pediatric Dentistry of Tsurumi University Dental Hospital during their first visit. They ranged in age from three to nine years old and had no specified issues of anxiety or being uncooperative. Six pediatric dentists with over eight years' clinical experience evaluated behaviors through video recordings of exams of the 33 children.<sup>25</sup> The Frankl behavior scale and Behavior Evaluation Scale (BES) were used to evaluate the patient's behavior. The BES is a classification of child behavior during dental treatment that utilizes 37 observation items, but it does not easily allow observation of the 37 items.<sup>25</sup> This study only used items from the BES scale that were observed in more than 10% of children. These included "moving the hands", "putting hands over mouth", "crying loudly", "shaking the legs", "moving the body left and right", and "moving the hands up and down."<sup>24</sup> The analysis of this study exemplified three factors of the BES: escape, selfdefense, and facial expression, that correlated with the Frankl behavior scale patient ratings.<sup>25</sup> This study concluded an essential relationship in pediatric patient behavior while receiving dental treatment, displaying three key factors that could be beneficial for child behavior in a dental setting.<sup>25</sup>

Asokan et al. created a novel behavior prediction scale with the idea that prediction of a child's behavior in the operatory from observing the child's behavior in the waiting room.<sup>26</sup> Two hundred and ninety-six children were observed between two locations during this study. The child's behavior was observed in the waiting room by an observer who utilized a questionnaire containing positive behavior predictors and negative behavior predictors. Then the child's behavior was evaluated by the dentist once they were in the operatory using a modified version of the Frankl behavior scale, describing behavior as positive or negative.<sup>26</sup> Treatment type was also examined in this study and the children were separated into an injection group and a non-injection group dependent on the need for local anesthesia.<sup>26</sup> This study determined this behavior prediction scale can be beneficial in a pediatric dental office. Asokan et al. concluded that a behavior prediction scale of this type is simple, less time consuming and could potentially help increase productivity.<sup>26</sup>

Erfanparast et al. conducted a study to determine if there was a correlation between a child's self-concept and their dental anxiety and behavior. They selected 235 preschoolers ages four to six years to receive the same treatment, a restoration on a mandibular primary molar. Prior to treatment a self-concept scale was assessed and scored. During this treatment clinical anxiety rating scale and the Frankl behavior scale were used to measure anxiety and behavior. The results of this study showed a substantial correlation between the behavior and anxiety of a child with their concept of self. The authors concluded the higher the self-concept the less anxious a child is thus resulting in better behavior during dental treatment.<sup>27</sup> Although there are numerous behavior scales

used in pediatric dentistry assessing a variety of patient behaviors, the Frankl behavior scale appears to be reliable, easily implemented and utilized, and used most often in the office setting.

In a study evaluating the relationship between ECC and behavior, Williamson et al. utilized a child behavior checklist (CBC). Healthy (ASA 1) children 30 to 59 months of age who were diagnosed by a dentist within the past six months as being caries free (CF) or children who needed restorative treatment under general anesthesia or caries active (CA) were participants in this study; they were taken from Nationwide Children's Hospital (NCH) and two private practice dental offices in Franklin County.<sup>28</sup> One of two trained assistants gave parents or caregivers a 100 question CBC. The parents or caregivers had to answer questions about their child's behaviors with either 0 (not true), 1 (somewhat or sometimes true) or 2 (very true or often true). This study resulted in 60 CF and 60 CA children divided equally between NCH and the private practices. There was no significant difference for gender and race amongst this patient population but there was further conclusion that sleep problems, anxiety/depression, aggressive behavior, attention deficit/hyperactivity problems, and total behavior problems were at a higher rate among children with active caries than those who were caries free.<sup>28</sup>

The effect of early dental care for pediatric patients was studied to determine how this played a role on the behavior of a child in the dental office, and to determine if this had an effect on behavior as a child grows older. It is assumed that the earlier a child has their first dental visit, the better their behavior will be at future dental visits. Survey

methodology was used to collect data from a patient data base and past behaviors ratings according to Frankl behavior scale was examined and compared to proceeding dental visits in correlation with the patients' age at these appointments.

The purpose of this study was to determine if a cause and effect relationship existed between the age a child first has a dental appointment and their behavior at the dentist at forthcoming dental appointments.

#### **Chapter 3: Methodology**

This was a retrospective study, utilizing a convenience sample to represent the pediatric population. This study was approved by The Ohio State University's Institutional Review Board. A report of patients who had a recare visit within the last six months was printed. Patients not older than eight years, who had at least a two-year history in the practice, whose first dental visit included a prophylaxis and had no medical alert were selected from this list until there was a sample of 100 subjects. Behavior ratings for these patient were recorded using the Frankl behavior rating scale, the most common behavior rating scale used in pediatric dentistry, with 1 being the least cooperative behavior and 4 being the best. The behavior rating from the patient's first dental visit until their most recent visit, in comparison with the age of their first visit, was examined. In addition, gender and insurance type was recorded.

#### Research Design

This study was a retrospective chart review, with a goal of documenting the age of a child's first visit to the dentist and their behavior at their subsequent dental visits.

### Research Question

Frankl scale ratings and ages were collected from a data set of patients and a pattern, if any, was examined in order to answer the questions; does the behavior of child whose first dental visit was before age three differ from the behavior of a child whose

first dental visit was at or after age three during dental appointments? Does behavior change as a child gets older during dental appointments?

#### Subject Selection

As part of this study, a convenient sample of 100 pediatric patients not exceeding eight years of age was chosen from a private pediatric dental practice. A list of patients was printed who had dental recares in the past six months. In order to qualify for this study, the subjects had to be established patients with at least a two-year dental history, the first visit had to include a prophylaxis and the subject had no medical alert. Frankl behavior score and age were recorded from their first dental visit. Each proceeding dental visit thereafter was also recorded up to a maximum 10<sup>th</sup> visit.

Data was collected from this convenience sample of patients in a pediatric dental practice. Collected data included current age, age at the first dental visit, behavior at the first dental visit and behavior at proceeding dental visits up until the current age. It was also noted if the patient had treatment appointments in between six month recare visits. Behavior modifications, gender and insurance type were recorded as well. The hypothesis in this study, is children who visit the dentist before age three behave better than those who have their first dental visit after age three.

## Statistical Analysis

This study used the nominal scale of measurement, organizing the age of a patient and their behavior at their dental visit. Age and behavior are mutually exclusive categories but neither group is ranked higher than the other. Age was recorded numerically utilizing decimals and behavior was coded from 1-4. These two classifications had no numeric relationship. The Spearman's Rho correlation test was used to measure the strength of association between patient age and Frankl behavior score. The Mann-Whitney U test was used to measure whether the behavior of a child whose first dental visit was before age three differed from the behavior of a child whose first dental visit was at or after age three.

#### **Chapter 4: Results and Discussion**

#### <u>Results</u>

The purpose of this retrospective study was to determine if the behavior of a child who had their first dental visit before or at age three differs from the behavior of a child who had their first dental visit after age three. A convenience sample of 100 patient records was reviewed from a patient database of a pediatric dental practice and the Frankl behavior scale was used to record patient behaviors. Forty-four percent of the patients were female and 56% were male and most carried private insurance. (Table 1)

Ten dental visits were recorded. The patient numbers decreased starting at the fifth visit from 100 to 65 patients and ten patients had ten visits that were recorded. For every dental visit age and Frankl score were recorded. The mean age at the first visit was 3.04 years compared to the mean age at the  $10^{\text{th}}$  visit, 7.56 years (Table 2). The Spearman's Rho correlation coefficient analysis revealed a slight positive correlation between patient age and Frankl behavior in this patient population (r= .282, p<.001).

Additionally, the behavior of a child having their first dental visit before age three was compared to the behavior of a child who had their first dental visit at age three or older. Only data for the first five visits were analyzed due to the decrease in the numbers at subsequent visits over five. No significant difference was found between age and behavior of a child at their first dental visit during the first five visits. (Table 3) Additionally, for each Frankl score rating of one to four, there was no difference between the behavior of males or females (Table 4). Results of this study showed the age of a

child's first dental visit does not have an effect on a child's behavior at their dental visits as they get older

## **Discussion**

The results of this study report a slight positive behavior change as a child grows older, and no significant difference between gender and Frankl score. This study also showed no significant difference between a child's age at their first dental visit and the behavior of a child at their first dental visit.

Winer also examined pediatric patient behavior. His review included dental anxiety and uncooperative behaviors concerning dental treatment, occurrence of dental fear and changes in age. Some studies in his review showed dental anxiety increased with age, but there was minimal evidence revealing a significant relationship between the two.<sup>6</sup> Winers review compares to my study in that we both studied pediatric patient behaviors. In contrast to this study, Winers review demonstrated dental anxiety to increase with age. While dental anxiety was not considered in this study, it revealed as a child grows older, there is a slight positive change in their behavior, whereas Winer's review concluded as a child gets older they are more anxious, which can in turn have a negative effect on their behavior.

Similar to the results of this study, Venham et al. examined children's behavior response to sequential dental visits from age three. Their initial visit was an examination, followed by four restorative appointments and a final visit that included polishing restorations, a cleaning, and fluoride application. Venham's study revealed children

become more comfortable at the dentist after having multiple dental experiences.<sup>21</sup> This study focused on behavior at subsequent recare visits and showed a slight positive correlation between patient age and Frankl behavior. This could be attributed to not only age but comfort with the dental visit, having multiple dental experiences. Williamson et al. use the Child Behavior Checklist (CBC) to study the association between ECC and behavior. This study found behavior problems to be significantly more prevalent in caries-active children than in caries-free children. In contrast to this study, they found no significant differences in behavior based on age, but again, reinforces the establishment of a dental home by age one for patients at high risk for caries as recommended by the AAP, AAPD and Nowak and Casamassimo.<sup>7,9,10,28</sup>

This study yielded similar results to Murray et al's study comparing the influence of a child's dental experience to dental anxiety. Both studies resulted in no significant differences between gender and behavior changes. Murray et al. studied children between 9 and 12 years of age. They found that dental anxiety increased in children who did not see a dentist regularly, but only visited the dentist for invasive dental treatment.<sup>29</sup> Klingberg et al. produced a different result, that girls are more anxious in dental settings and presented with higher DBMP than boys.<sup>20</sup>

Nowak and Casamassimo refer to a dental home as the primary care oral health concept.<sup>10</sup> Their article discusses the foundation for creation of a dental home and its importance in pediatric oral health care. It is recommended by the AAPD and the AAP that a child have an established dental home by age one.<sup>7,9,10</sup> The advantages of a dental home include early intervention, anticipatory guidance for parents, and preventative

intervention personalized to the child's needs.<sup>10</sup> There is no mention of the early establishment of a dental home by age one having a direct effect on a child's behavior. This is consistent with the findings of this study, as no significant difference in the behavior of a child who had their first dental visit before age three and the behavior of a child who had their first dental visit at or after age three was found.

## Limitations

One limitation to this study was sample of patients. The patient sample was taken from one pediatric dental office in the suburb of Gahanna Ohio, which is reported being predominantly white (82.1%).<sup>30</sup> The majority of patients in this population also carried private dental insurance (90%). A more varied sample of patients, sampling patients from different geographic locations and different dental clinics and/or offices, could have yielded broader results, resulting in a more diverse patient population that used a variety of insurance types.

Another limitation is there is no inter-rater reliability on the Frankl score recordings due to the retrospective nature of this study. Different practitioners may have a contradictory view of patient behaviors and record the Frankl score differently. This study did not document who the clinician was providing the Frankl score at their recall appointment was. There are different practitioners in pediatric dental practices, such as dentists, dental hygienists and coronal polishers. Scoring of the patient behaviors were not calibrated.

Additionally, the patients' medical records were not assessed and there was no attempt in verifying if their healthy status played a role in their behavior. Health status has been shown to affect the behavior of a child. For example, children with ADHD are reported to have more behaviors management difficulties and problems staying focused during dental appointments.<sup>31</sup>

Another limitation of this study was the population of the patients was generally well behaved, with most Frankl scores being a 4. Due to this limited variance, the frequency of Frankl scores was not normally distributed.

#### <u>Conclusion</u>

Results from this study indicate a slight positive behavior change with the increase of a child's age, but no significant difference in a child's age at initial dental visit and behavior. Future research should use a larger sample size of patients, utilizing multiple dental practices in different geographic locations. This would expand the results and make for a more diverse population sample. Race and ethnicity should be recorded as well, in hopes of discovering a relationship between race and dental behavior patterns. Provider type should also be specified (dentist, dental hygienist or coronal polisher) and the use of an interrater calibration system should be employed.

The AAPD recommends having a first dental visit by age one because it establishes a dental home for children and it educates parents on prevention of decay. Having a first dental visit by the recommended age of the AAPD has been shown to be imperative in prevention and treatment of ECC, but this study reveals no significant

evidence of the age of a child at their first dental visit having a direct effect on their behavior as they get older and have more dental experiences.

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Appendix A: Tables

Gender	Patients
	N=100
Male	56
Female	44
Insurance	N= 100
Private	90
Private Medicaid	90 7
Private Medicaid None	90 7 2

Table 2. Age and Behavior at subsequent office visits
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Office	N=patients	Mean age	Mean Frankl	Median Frankl
visit		(yrs) (SD	Score (SD ±)	Score
		±)		
1	100	$3.04 \pm 1.53$	$3.36 \pm .79$	4.00
2	100	$3.67 \pm 1.48$	3.39 ± .81	4.00
3	100	$4.26 \pm 1.49$	$3.48 \pm .74$	4.00
4	98	$4.76 \pm 1.48$	$3.63 \pm .66$	4.00
5	65	$4.98 \pm 1.27$	3.72 ± .54	4.00
6	54	$5.36 \pm 1.10$	3.76 ± .47	4.00
7	35	$5.80 \pm .90$	3.83 ± .45	4.00
8	27	$6.35 \pm .80$	3.74 ± .52	4.00
9	17	7.01 ± .75	3.88 ± .33	4.00
10	10	$7.56\pm.58$	3.80 ± .42	4.00

Visit	Mean Frankl	P=
	Score (SD ±)	
1	3.36± .786	.062
2	3.39±.815	.011
3	3.48±.745	.088
4	3.63±.057	.057
5	3.72±.545	.223

Table 3. Comparison of age group and behavior at first five visits

Table 4. Comparison of Frankl behavior rating and gender at first 3 visits

Visit	Mean Frankl Score (SD ±)	P=
1	3.36±.798	.230
2	3.38±.815	.209
3	3.48±.745	.112