Can parents predict and accurately assess their child’s behavior during a first dental restorative procedure?

THESIS

Presented in Partial Fulfillment of the Requirements for the Degree Master of Science in the Graduate School of The Ohio State University

By

Katherine Huston Payne

Graduate Program in Dentistry

The Ohio State University

2017

Master's Examination Committee:

Dr. Ashok Kumar, DDS, MS - “Advisor”

Dr. Paul Casamassimo, DDS, MS

Dr. Dennis McTigue, DDS, MS

Dr. Daniel Coury, MD
Copyright by
Katherine Huston Payne
2017
Abstract

Purpose:

To determine whether parents can predict their child’s behavior during the first restorative visit and to examine agreement between parental post-treatment behavior assessments with provider post-treatment behavior assessment.

Methods:

Parents/guardians of healthy Spanish and English speaking patients between ages 4 and 8 years old presenting to the dental clinic at Nationwide Children’s Hospital for a first-time restorative treatment were asked to complete an 18-question demographic survey while in the waiting room. The first three questions of this survey served as a parental prediction of whether they felt their child would be able to cope with dental treatment. The remaining 15 questions were related to patient and family characteristics. The parents were given a written explanation of the Frankl score, a well-known and validated tool used to report patient’s behavior during dental treatment. Parents were then asked to observe the restorative treatment completed by one of 6 calibrated providers and to give their child a final Frankl behavior score on completion of the treatment, blinded to the provider’s Frankl rating.

Results:

The sample consisted of 53 parent/patient pairs. Thirteen percent of patients exhibited negative behavior during treatment and 87% of patients exhibited positive
behavior during treatment as assessed by the provider. Ninety-two percent of the time when parents predicted positive behavior, the behavior was rated positive by the clinician, indicating that parents are very good predictors of positive behavior. However, no parents of patients who exhibited negative behavior predicted that they would behave negatively. Parent and provider post-treatment assessment was determined to have substantial agreement using Cohen’s Kappa Statistic. Agreement between parent and provider occurred 100% of the time when the patient was rated positive by the provider. When behavior was deemed negative by the provider, the agreement was reduced to 57%. Forty-three percent of the time when a provider gave a patient a negative behavior score, the parent felt that the patient’s behavior was positive.

Conclusions:

It is of clinical significance to note that while parents are reliable predictors of behavior for the large portion of restorative patients who behave positively – parents had trouble predicting negative behavior. Additionally, though parent and provider agreement was established for post-treatment behavior scores, this agreement was lower when negative behavior was observed by the provider. Parents tend to be more lenient when assigning Frankl scores to their child’s behavior than the clinician. This may indicate a misunderstanding of behavior needed to complete dental treatment. Due to the low number of negatively behaved patients in this sample, no reliable statistical significance was found and more research is needed on this topic.
Dedication

This document is dedicated to my parents, Helen & Douglas Payne and my research mentors Drs. Ashok Kumar, Paul Casamassimo & Dennis McTigue.
Acknowledgments

I would like to thank my co-residents and the members of my committee for their time, support, and invaluable advice. I would also like to thank Melissa Moore-Clingenpeel for her patience and expertise. Lastly, thank you to my program director, Dr. Homa Amini for her endless help and thoughtfulness.
Vita

2009...............................................................B.S. Biology, UNC – Chapel Hill

2015...............................................................D.D.S., UNC – CH School of Dentistry

2015 to present.............................................Graduate Teaching Associate, Department

of Pediatric Dentistry, The Ohio State University

2015 to present.............................................Resident, Pediatric Dentistry, Nationwide

Children’s Hospital

Fields of Study

Major Field: Dentistry
# Table of Contents

Abstract ......................................................................................................................... ii

Dedication ..................................................................................................................... iv

Acknowledgments ......................................................................................................... v

Vita ............................................................................................................................... vi

Table of Contents ........................................................................................................... vii

List of Tables ................................................................................................................ viii

Literature Review ......................................................................................................... 1

Methods ....................................................................................................................... 6

Results ......................................................................................................................... 10

Discussion ................................................................................................................... 17

Conclusions ................................................................................................................. 24

Appendix A: Information Sheet .................................................................................. 25

Appendix B: Demographic Survey ............................................................................... 27

Appendix C: Frankl Score ........................................................................................... 30

References ................................................................................................................... 31
List of Tables

Table 1. Family Demographic Information ................................................................. 11
Table 2. Patient Characteristics ................................................................................. 12
Table 3. Parent Prediction Summary ........................................................................ 12
Table 4. Behavior Score Outcomes - Parent Predicted, Parent Post-Treatment, and Provider Post-Treatment ........................................................................................................ 13
Table 5 Predicted v. Parental Post-Treatment Assessment ........................................ 14
Table 6. Predicted v. Provider Post-Treatment Assessment ........................................ 14
Table 7. Parent-Provider Agreement .......................................................................... 15
Table 8. Patient/Family Factors Associated with Behavior ........................................ 16
Literature Review

The ability to manage difficult behavior is arguably the defining characteristic of a successful pediatric dentist. Pediatric dentists are skilled in a variety of behavior management techniques ranging from communicative techniques (tell-show-do, positive reinforcement, rewarding), more advanced techniques (protective stabilization – passive and active, voice control), and pharmacological techniques (sedation, general anesthesia). Knowing when to use each behavior management strategy is key to an effective restorative appointment in pediatric dentistry – choosing the wrong technique can result in poor cooperation, fear, and compromised dental treatment. Typical clinical samples show that about 20% of children exhibit disruptive behavior – body movements and crying being most common – in a restorative appointment setting [1]. Knowing in advance which patients are going to present behavioral challenges could make an impact on office scheduling, parental education, and preparation of advanced behavior techniques ahead of time [2].

Past research provides conflicting views on factors that could be predictive of a child’s behavior during dental treatment. Parental dental anxiety, stranger anxiety, and history of relationships with medical providers can be predictive of behavior management problems in children [3]. Factors such as socio-economic status, television consumption and attending a daycare program can impact how a child behaves during dental treatment.
Parenting style may also significantly affect cooperation during a dental visit. A recent study by Howenstein et al indicated that authoritative parenting style, which tends to be the most common, yields the best behavior during a dental appointment and the lowest caries rate when compared to permissive parenting and authoritarian parenting styles [5]. These correlations have been tested in conjunction with non-invasive dental procedures such as routine dental cleanings, but it is unclear whether these predictive qualities would carry over to more invasive restorative treatments where approximately 20% of patients are expected to exhibit disruptive behavior [2].

Since parents have significant influence on their child’s emotional development, they may be able to predict how their child will respond to dental treatment [6] [7]. A 1993 study completed on 3-year-old patients indicated that parents can accurately predict their child’s behavior but only for non-invasive treatment [8]. In a 2009 study, involving only patients with HIV, parents often over-predicted negative behavior in stressful/painful more invasive dental situations [9]. A 2011 Turkish study also indicated that parents tended to predict that their child would have worse behavior than the child exhibited [10]. Parents of children with autism tend to overestimate their child’s ability to cooperate during dental treatment [11]. To date, minimal and often conflicting research describes whether parents can accurately predict a healthy child’s behavior in a more invasive restorative appointment setting.

If parents can predict accurately, it may make behavior guidance more efficient when it comes to difficult patients. Parents may tend to ignore their own role in completion of treatment on a crying or difficult patient [12], but if a parent believes that a
child will not cooperate for dental treatment he or she may be more open to certain behavior management techniques by the provider [11]. Several recent studies indicate that parental acceptance of behavior management techniques is changing and that pediatric dentists use more aversive methods such as voice control and restraint less frequently, leaning more heavily on sedation and general anesthesia [10, 13]. Many pediatric dentists feel that these changes in perception of behavior management are related to changes in parenting styles that are also blamed for worsening patient behavior [13]. A wide array of studies indicate the tell-show-do, positive reinforcement, and “perceived control” are now the most widely accepted behavior management techniques [14] [15] [10] with general anesthesia and sedation options becoming increasingly favorable over passive and active restraint and voice control [14].

Lawrence et al found that parents are more likely to accept a behavior management technique if they understand the rationale for its use [16]. Another study of parents of patients with autism indicated that parents of uncooperative children, when aware that their child has difficulty cooperating, are more likely to be accepting of behavior management techniques that are considered aversive [11]. Additionally, parents of children who had previously undergone the use of passive restraint, or who were provided a detailed explanation of voice control prior to its use, tend to be more accepting of these advanced behavior management techniques [15] [11].

Variance between perceived behavior by parents and behavior goals of the clinician could contribute to a misunderstanding of behavior management techniques and their purposes, and rejection of more aversive but necessary techniques. If we could
understand parents’ perceptions of their child’s behavior in a dental setting and compare them with the clinician’s perception, we might be better able to provide necessary management techniques that are accepted by parents, and avoid issues with consent and liability.

Behavior assessment is a component of many studies – typically related to attempts at determining the predictive factors of behavior discussed above or the effectiveness of certain behavior management techniques. Studies use various behavioral assessment indices, which makes it difficult to compare the parental behavior assessment with the provider assessment and complicates inter-study comparisons of behavior. For example, a 1982 study used the “North Carolina Behavior Rating Scale” which quantifies occurrence of unwanted behaviors – hand movement, leg movement crying and oral-physical resistance [17]. A 2009 study utilized a scale in which children, mostly of pre-cooperative age, are rated as “collaborator,” “partially collaborator,” and “non-collaborator” to describe cooperation levels [18]. A 2006 study asked the parent a series of questions to predict the child’s intraoperative pain and anxiety and then a calibrated dental hygienist rated behavior using a more objective scale of 1-5, increasing with increasing anxiety and quantity of problem behaviors [19]. The use of two different methods from parent and observer seems to create a difficulty in comparing the prediction to the behavior outcome. A cross-sectional study completed in 2014 asked both parents and patients to complete the “Children’s Fear Survey Schedule – Dental Subscale” prior to their treatment, treatment was then completed and behavior rated by the dental provider using the widely known Frankl tool [20]. A comparison was then
made to see whether increased scores on the dental fear survey correlated with more negative Frankl behavior scores – this was completed without determining how the parent felt the child was cooperating during treatment.

The Frankl score is a widely used and validated behavior scoring tool which often results in a high inter-examiner agreement, often over 90% [21-23]. Behavior is rated on a scale of 1 (definitely negative), 2 (negative), 3 (positive), and 4 (definitely positive). Some research allows parents to use the Frankl score to rate their child’s behavior – but none compare it with the provider’s assessment. This could potentially create a direct comparison of behavior evaluations and could prove to be an important factor in improving parental awareness of the necessity of certain behavior management techniques and even increase their acceptance.

The primary purpose of this study is to compare parents’ predictions and self-assessments of their child’s behavior during their first restorative dental treatment appointment with that of the clinician. These predictions and assessments will both be made using a Frankl score designation so that parents’ pre-treatment prediction and post-treatment assessment can be directly compared to one another and to the provider’s Frankl assessment.
Methods

Approval for this survey-based study was obtained from the Institutional Review Board at Nationwide Children’s Hospital, Columbus, Ohio. Surveys were conducted from August 18, 2016 to February 24, 2017, in concert with restorative visits.

Include and Exclusion Criteria:

The sample consisted of patients scheduled for restorative appointments with no history of treatment in our dental clinic other than routine cleaning and exam. Patients were also required to have no previously charted restorations, extractions, or sealants – indicating they may have had treatment elsewhere. Prior emergency visits only excluded patients from the study if treatment was performed other than examination. The inclusion criteria for age was set between 4 and 8 years-old to eliminate pre-cooperative temperament as a factor. Spanish and English speaking patients were included in the study. English was not required to be the primary language; however, the utilization of an interpreter for a language other than Spanish disqualified patients from the study. This was due to the inability to have documents interpreted in languages other than English and Spanish, and the desire to keep added appointment time under 10 minutes. Patients were required to be cognitively and behaviorally healthy, with no diagnosis of developmental or behavioral disorder other than ADHD. This exception was made due to the increasing commonality of the diagnosis.
Procedure:

Patients were screened in advance via scheduling software to determine qualification, due to the limited number of patients qualifying for the study a convenience sample was used and no randomization occurred. Initially, four second year dental residents were selected and calibrated on Frankl score assessment using pre-validated behavior videos [7]. After 6 months of residency training, two first year dental residents were calibrated and added to the study. All providers assessed calibration videos correctly with the exception of one provider and one video, this provider was counselled and re-tested which lead to 100% raw inter-examiner reliability.

When patients met inclusion criteria for the study, they were moved to an available calibrated provider’s schedule and the provider was notified. Prior to the patient being moved from the waiting room to the dental clinic, the provider met the parent and provided a brief explanation of the research project and its goals. No script was provided to clinicians, leading to some variability in instructions. Parents were asked if they were willing to participate in the research project once there was a mutual understanding that their child would receive the same dental treatment whether or not they chose to participate. If the parent(s) consented to the study, they were asked to fill out Part 1 of the survey (Appendix B). Part 1 of the survey is an 18-question demographic survey.

The first three survey questions addressed the parents’ prediction of their child’s behavior during dental treatment (Appendix B, page 1). The survey was designed so these questions would gauge whether the parent felt the patient would be apprehensive at
all, and if they felt the child would allow treatment to be completed. The third question in the “prediction” series asked the parent to predict how the child will handle the dental treatment using the same rating scale as the Frankl score. The Frankl score wording was written out but no explanation of defining characteristics for each level of cooperation given – 1) Definitely negative, 2) Negative, 3) Positive, 4) Definitely positive (Appendix B).

The remaining survey questions, available in Appendix B, involved more information regarding the parent and child: parental age, marital status, income, education level, child’s level of anxiety with strangers, amount of television viewed daily, whether the child sleeps in his or her own bed, whether the child attends school or daycare. The purpose of the remainder of the survey was to determine whether there was a correlation between any of these variables with behavior as predicted or assessed by the parent, or provider.

Parents were asked to complete Part 2 of the survey after treatment was completed. This section provided a detailed explanation of our Frankl tool and asked parents to give their child a behavior score (Appendix C). This time, the Frankl score options were given as -/- (definitely negative), - (negative), + (positive), +/- (definitely positive). This was done to keep the post-treatment Frankl assessment consistent with the clinician’s assessment. Nationwide Children’s Hospital Dental clinic Epic software allows providers to select Frankl ratings of -/-, - , +, or +/-.

The provider placed the patient’s medical record number on the survey, and placed it in a protected collection folder in clinic without reading the answers to the
survey or parental response to the Frankl score question. The provider then completed the usual appointment documentation, complete with the Frankl assessment of the patient. The data was randomly assigned to a number 1-53 for tracking purposes, and input into a spreadsheet without the medical record or name identifiers.

Data Analysis:

Data analysis was completed using SAS 9.4 (SAS Institute, Cary, NC) with two-sided p-values <.05 signifying significance. Due to the smaller proportion of patients who elicited Frankl behavior scores of 1 or 2, the Frankl data scale was collapsed into two categories for analysis: Frankl 1-2 v. Frankl 3-4 with distinction between “negative” and “positive” behavior. The association between pre and post-procedure behavior ratings from parents were examined using McNemar tests for paired proportions. Cohen’s Kappa was utilized to assess the agreement between parent and provider post-behavior ratings. All other variables surveyed were explored using Wilcoxon rank-sum tests for continuous variables and chi-square or Fisher’s exact tests for categorical variables.
Results

The study consisted of 53 total patients presenting for first-time restorative appointments at Nationwide Children’s Hospital’s dental clinic between August 18, 2016 and February 24, 2017. The caregiver sample was predominately Caucasian (33%) or African American (31%) and female (75%). Family characteristics are summarized in Table 1 and the demographic survey can be referenced in Appendix B. A majority of the sample was married or engaged in a partnership (62%). The “single” category (38%) consisted of parents who reported being single, separated, or divorced. 6% of parents reported completing up to 7th grade education level, 4% of parents reported completing up to 9th grade, 8% of parents reported completing high school until 11th grade and 37% of parents reported obtaining a high school diploma. Completion of one year of college was reported by 21% of surveyed caregivers, while 19% obtained college degrees and 6% obtained graduate degrees. A large majority of the sample was insured through Medicaid, or one of the Ohio Medicaid PPOs (70%), which is in accordance with 65% of the families treated in this study being low or moderate income and 64% having three or more children.
Table 1. Family Demographic Information

<table>
<thead>
<tr>
<th>Demographic Variable</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parent Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>40 (75%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>13 (25%)</td>
<td></td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>20 (38%)</td>
<td></td>
</tr>
<tr>
<td>Married/Partner</td>
<td>33 (62%)</td>
<td></td>
</tr>
<tr>
<td><strong>Education Level</strong></td>
<td>7th grade</td>
<td>All/part of High School</td>
</tr>
<tr>
<td>3 (6%)</td>
<td>25 (49%)</td>
<td>10 (19%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>16 (31%)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>13 (25%)</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>17 (33%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>6 (12%)</td>
<td></td>
</tr>
<tr>
<td><strong>Insurance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>14 (26%)</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>37 (70%)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>2 (4%)</td>
<td></td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td>0-&lt;$20K</td>
<td>$20K-$40K</td>
</tr>
<tr>
<td>12 (24%)</td>
<td>20 (41%)</td>
<td>17 (35%)</td>
</tr>
<tr>
<td><strong># of children in home</strong></td>
<td>1-2</td>
<td>3</td>
</tr>
<tr>
<td>19 (36%)</td>
<td>18 (34%)</td>
<td>16 (30%)</td>
</tr>
</tbody>
</table>

The age of sampled patients ranged from four to eight years old with a median age of five. Patient characteristics can be found in Table 2. Slightly more male (55%) than female (45%) patients were treated during the study. 79% of parents reported that their child attends a daycare or school program while 21% of patients stay home with parents or a babysitter without other children. Only 13% of parents reported that their child is a co-sleeper while 74% sleep in their own bed. Seventy-nine percent of parents reported that their child watches 2 or less hours of television per day with 19% of that 79% reporting less than 1 hour daily.
Table 2. Patient Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>24 (45%)</td>
<td>29 (55%)</td>
</tr>
<tr>
<td>Attend Daycare/School</td>
<td>Yes 41 (79%)</td>
<td>No 12 (21%)</td>
</tr>
<tr>
<td>Sleep Situation</td>
<td>Co-Sleep 7 (13%)</td>
<td>Own Bed 39 (74%)</td>
</tr>
<tr>
<td>Television Watched</td>
<td>Up to 2 hr 42 (79%)</td>
<td>3-4 hrs 10 (19%)</td>
</tr>
<tr>
<td>Stranger anxiety</td>
<td>No 22 (42%)</td>
<td>Yes but warm up quickly 18 (35%)</td>
</tr>
</tbody>
</table>

Three questions were asked in the demographic survey pertaining to parental prediction of behavior. Questions 1-3 of the survey can be found in Appendix B. The “predictive” questions are summarized in Table 3.

Table 3. Parent Prediction Summary

<table>
<thead>
<tr>
<th>Questions</th>
<th>Positive Outcomes</th>
<th>Negative Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sit in dental chair?</td>
<td>Yes - 51 (98%)</td>
<td>No - 2 (2%)</td>
</tr>
<tr>
<td>Allow complete treatment?</td>
<td>Yes - 38 (73%)</td>
<td>No/Maybe 15 (27%)</td>
</tr>
<tr>
<td>Predicted Behavior</td>
<td>Very Positive - 10 (19%)</td>
<td>Positive - 38 (73%)</td>
</tr>
<tr>
<td></td>
<td>Very Negative - 0 (0%)</td>
<td>Negative - 4 (8%)</td>
</tr>
</tbody>
</table>

An overwhelming majority of parents (98%) predicted their child would have no trouble sitting in the dental chair. Most parents (38%) felt that their children would be able to complete the planned dental treatment. Only 19% of parents predicted that their child would react very positively to treatment and no parents predicted that their child
would react very negatively. Table 4 shows the post-treatment behavior score summary for both parents and providers, along with predicted values from the parent. While only 19% of parents expected their child to perform very positively, 62% of patients earned this score post-treatment according to their parents. Providers rated patient’s performance “very positive” 51% of the time. In general, parents tended to predict worse behavior than was observed. It is of note that very few patients reacted very negatively or negatively to treatment which is a testament to patient selection and the wide array of treatment options available at Nationwide Children’s Hospital.

Table 4. Behavior Score Outcomes - Parent Predicted, Parent Post-Treatment, and Provider Post-Treatment

<table>
<thead>
<tr>
<th>Behavior outcomes</th>
<th>1 - Very Negative</th>
<th>2 - Negative</th>
<th>3 - Positive</th>
<th>4 - Very Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent Predictions</td>
<td>0 (0%)</td>
<td>4 (8%)</td>
<td>38 (73%)</td>
<td>10 (19%)</td>
</tr>
<tr>
<td>Parent Frankl Score</td>
<td>1 (2%)</td>
<td>3 (6%)</td>
<td>16 (30%)</td>
<td>33 (62%)</td>
</tr>
<tr>
<td>Provider Frank Score</td>
<td>2 (4%)</td>
<td>5 (9%)</td>
<td>19 (36%)</td>
<td>21 (51%)</td>
</tr>
</tbody>
</table>

It is of note that no parents predicted that their child would perform very negatively. While parents tended to be reasonable predictors with a tendency to expect slightly worse behavior than observed, this is true only for patients who behave positively during treatment, which was a majority of our sample. For further assessment, due to the low number of negatively scoring patients, the Frankl score was collapsed into two components: negative behavior, Frankl score 1 or 2, and positive behavior, Frankl score 3 or 4. As shown in Tables 5 and 6, 100% of patients who behaved negatively during treatment as rated by provider or parent were predicted to have positive behavior.
before treatment. Note that while this is clinically significant, due to the lack of parents who predicted that their child would exhibit very negative behavior, the p-value does not support statistical significance.

Table 5 Predicted v. Parental Post-Treatment Assessment

<table>
<thead>
<tr>
<th>Predicted Behavior</th>
<th>Parent Post-Treatment Assessment</th>
<th>Provider Post-Treatment Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Negative</td>
<td>0 (0%)</td>
<td>4 (8%)</td>
</tr>
<tr>
<td>Positive</td>
<td>4 (100%)</td>
<td>44 (92%)</td>
</tr>
</tbody>
</table>

Table 6. Predicted v. Provider Post-Treatment Assessment

<table>
<thead>
<tr>
<th>Predicted Behavior</th>
<th>Provider Post-Treatment Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative</td>
</tr>
<tr>
<td>Negative</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Positive</td>
<td>7 (100%)</td>
</tr>
</tbody>
</table>

The agreement between parent post-treatment assessment and provider’s post-treatment assessment was tested using Cohen’s Kappa statistic. The statistics and p-value are summarized in Table 7. If there was a behavior rating discrepancy between parent and provider, it was the parent rating their child positive while the provider rated the child negative. In no instance did the provider rate the patient positive and parent rate the patient negative. This leads to an abnormally low p-value despite substantial agreement according to the kappa statistic (.6983 with 95% confidence interval).
Table 7. Parent-Provider Agreement

<table>
<thead>
<tr>
<th>Parent Post-Procedure</th>
<th>Negative</th>
<th>Positive</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>4 (57%)</td>
<td>0 (0%)</td>
<td>.0833</td>
</tr>
<tr>
<td>Positive</td>
<td>3 (43%)</td>
<td>46 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

It is evident according to Table 7 that 100% of the time when a provider rates a patient as having positive behavior, the parent agrees. However, when a child is rated as negative, parents and providers only agree 57% of the time with 43% of the time the parent felt the patient was showing positive behavior when the provider rated them negatively. This indicates substantially more disagreement when evaluating negative behavior than positive behavior.

Lastly, associations between provider-rated behavior and tested demographic characteristics were explored for statistical significance using Wilcoxon rank-sum, Chi-square, and Fisher’s exact tests. A low percentage (13%) of patients who exhibited negative behavior during first time restorative treatment affecting conclusions on significance. Results are reported in Table 8. Patients of single parents tended to exhibit better behavior. This is because in the seven patients that providers rated with negative behavior, none happened to belong to single parents. Additionally, we found that patients from families with only 1 or 2 children tended to behave better during restorative treatment than patients from larger families.
Table 8. Patient/Family Factors Associated with Behavior

<table>
<thead>
<tr>
<th>Variable</th>
<th>Negative (% all Negative pts)</th>
<th>Positive (% of all positive pts)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Anesthesia</td>
<td>4 (57%)</td>
<td>37 (80%)</td>
<td>0.1832</td>
</tr>
<tr>
<td>Female Parent</td>
<td>5 (71%)</td>
<td>35 (76%)</td>
<td>&gt;.9999</td>
</tr>
<tr>
<td>Single Parent</td>
<td>0 (0%)</td>
<td>20 (43%)</td>
<td><strong>0.0365</strong></td>
</tr>
<tr>
<td>College Degree</td>
<td>3 (43%)</td>
<td>10 (22%)</td>
<td>0.3473</td>
</tr>
<tr>
<td>Race: African American Parent</td>
<td>1 (14%)</td>
<td>15 (33%)</td>
<td>0.398</td>
</tr>
<tr>
<td>Hispanic Parent</td>
<td>2 (29%)</td>
<td>11 (24%)</td>
<td></td>
</tr>
<tr>
<td>White Parent</td>
<td>2 (29%)</td>
<td>15 (33%)</td>
<td></td>
</tr>
<tr>
<td>Other Race Parent</td>
<td>2 (29%)</td>
<td>4 (9%)</td>
<td></td>
</tr>
<tr>
<td>Rural Living Location</td>
<td>2 (29%)</td>
<td>8 (19%)</td>
<td>0.6157</td>
</tr>
<tr>
<td>Insurance (Private v. Medicaid)</td>
<td>3 (43%)</td>
<td>11 (25%)</td>
<td>0.3763</td>
</tr>
<tr>
<td>Employed Parent</td>
<td>7 (100%)</td>
<td>38 (86%)</td>
<td>0.5779</td>
</tr>
<tr>
<td>Income: Low</td>
<td>1 (17%)</td>
<td>11 (26%)</td>
<td>0.745</td>
</tr>
<tr>
<td>Moderate</td>
<td>2 (33%)</td>
<td>18 (42%)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>3 (50%)</td>
<td>14 (33%)</td>
<td></td>
</tr>
<tr>
<td>Children in home: 1-2</td>
<td>2 (29%)</td>
<td>17 (37%)</td>
<td><strong>0.0219</strong></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4+</td>
<td>5 (71%)</td>
<td></td>
</tr>
<tr>
<td>Daycare/School Attendance</td>
<td>4 (57%)</td>
<td>37 (82%)</td>
<td>0.1542</td>
</tr>
<tr>
<td>Sleep in patient's own bed</td>
<td>4 (57%)</td>
<td>35 (76%)</td>
<td>0.3638</td>
</tr>
<tr>
<td>Watching &gt;2 hrs TV per day</td>
<td>3 (43%)</td>
<td>8 (17%)</td>
<td>0.1471</td>
</tr>
<tr>
<td>Parent Age (Median)</td>
<td>34</td>
<td>32</td>
<td>0.7097</td>
</tr>
</tbody>
</table>

Of note, patients that attended daycare or school programs made up 82% of positively behaved children, suggesting that attending one of these programs may be protective of positive behavior. Additionally, 43% of the negatively behaved group watched more than 2 hours of television per day, suggesting that this could be a risk factor for negative behavior during dental treatment although statistical significance was not found.
Discussion

Existing research exploring parental behavior predictions and parental assessment of a child’s behavior during treatment is conflicting and often limited to non-invasive dental treatment. Some studies indicate that parents tend to over-estimate their child’s cooperation, while others suggest that they tend to predict more negative behavior – these studies are also limited to a narrow scope of children: three-year-olds or children with autism or HIV, for example, and are difficult to apply to the general population. This study attempted to allow parents to predict the behavior of healthy children during a first time restorative dental treatment, and assess behavior post-treatment it in the same manner as the practitioner.

While some research shows that negative behavior during restorative treatment is seen in as high as 40% of the population [19], the parameters of the study were set up using research that suggests that approximately 20% of a normal clinical population will exhibit disruptive behavior during restorative dental treatment [1]. In our study, we experienced significantly less negative behavior with only 7 of our 53 patient sample (13%) exhibiting Frankl 1 or 2 behavior during treatment as assessed by providers. We also found that no parents predicted their child would exhibit “very negative” behavior prior to treatment. Both the lack of negatively behaved patients, and the lack of parents who predicted that their child would respond “very negatively” affected our statistical
analysis and significance findings. The low number of negatively behaved patients in our sample overall led to difficulty finding statistical significance and resulted in high p-values even when clinical significance was indicated.

Though this low percentage of negatively behaved patients was a surprise and may be considered a limitation to the study, it will be helpful for future research in the dental clinic at Nationwide Children’s Hospital. Using data from this study will help determine an effective sample size for significance in future behavior research involving restorative treatment.

According to Table 4, parents were more likely to predict that their child would behave “positively” than “very positively.” Broadly, parents tended to slightly underestimate their children’s ability to be cooperative during treatment with 81% of behavior predictions being “Negative” or “Positive.” Post-treatment results ended with 92% of parents and 87% of providers rating patients “Positive” or “Very Positive.” Post treatment assessment scores of “Very positive” were more likely to be given by parents than by providers. Only one parent rated behavior as “very negative,” while two providers rated patients “very negative.” Parents tended to underestimate behavior in predictions, but were more lenient with their behavior ratings post treatment than providers.

In general, parents tended to be good predictors of their child’s behavior during dental treatment unless the patient behaved negatively. Table 6 compares the parental prediction to the provider’s calibrated post treatment behavior assessment. Table 4 summarizes all behavior scores – predicted and assessed. Four parents (8%) predicted
that their child would perform negatively during dental treatment, Table 6 indicates that no patient who parents predicted would exhibit negative behavior did so. Clinically, this is significant because in general, when a parent predicts that their child will respond positively to dental treatment, they will. Most of the time we can rely on parents’ predictions as most patients exhibit positive behavior. However, this also indicates that 100% of parents in this study were “blind-sided” by their child’s negative behavior. We already know that parents who believe before treatment that their child will be uncooperative are more open to behavior management techniques than parents who do not expect negative behavior [11], and it is evident from our data that in our clinical population – parents’ generally do not have a good understanding of when their child will be uncooperative.

Table 7 indicates that though substantial agreement was found using the Kappa Satistic between parents and providers post-treatment assessments, the agreement is much lower (57%) when the provider rated the patient as behaving negatively compared to when the provider rated the patient as behaving positively (100%).

It may be viewed as a limitation of this study that providers were calibrated to the Frankl score rating prior to rating patient’s behavior and parents were not. The purpose of the study was to determine whether parents understood the level of cooperation needed to be considered “positive behavior” during dental treatment without calibration. The Frankl Score ratings were described to parents – Appendix C – but no additional instruction was given. We felt that allowing parents to watch calibration videos may change their perception of positive/negative behavior and cause a bias, when we were
looking for a parent’s “raw” perception of behavior and utilizing the provider’s calibrated assessment as “correct.” It would be valuable to continue this study with the addition of a comparison of parents who undergo the same calibration as the provider to parents who do not. This would help to determine whether calibrating parents prior to restorative treatment would increase parent-provider agreement of negative behavior assessment.

Previously studies have shown that parents who understand behavior management techniques are more likely to approve of them [16], so perhaps parents who better understand the behavior we are looking for will also be more open to management techniques.

Anecdotally, parents of patients seen in Nationwide Children’s Hospital Dental Clinic undergo a high amount of stressors. As shown in Table 1 a majority of our families have 3 or more children, and are considered low income. These factors contribute to toxic stress and cause parents to be tight for time and attention. Parents desire large amounts of treatment to be completed quickly, without allowing time for desensitization and use of extensive communicative behavior management techniques before jumping to sedation or general anesthesia. If the agreement in assessing negative behaviors can be increased, it is possible that behavior management technique acceptance could increase as parents in our clinic may have a better understanding of why we limit treatment to short appointments, spend time completing tell-show-do and even occasionally utilize voice control or protective stabilization.

The low number of negatively behaved patients as another limitation to the study is worth exploring further. The low number can be attributed to behavior management
education and the availability of treatment options at Nationwide Children’s Hospital’s dental clinic. The patient is initially assessed during the hygiene visit – which was a prerequisite step for participation in our study. Not only could this potentially serve as a desensitization visit, but if the patient responds poorly or questionably to the exam, radiographs, and cleaning and has extensive treatment needs, the patient is often recommended for sedation, or general anesthesia, so some selection bias occurred. In private practice, and many other public health clinics, general anesthesia and sedation options are much less accessible and treatment may be attempted or completed in a traditional manner on less cooperative children in order to provide the care that they need in a timely fashion.

Additionally, a large portion of patients in our clinic are first seen on an emergency basis. Another limitation of the study was how difficult it was to obtain a sample of first-time restorative patients who had not previously been treated for extraction or pulp and crowns during an emergency visit. While pain during emergency visits complicates patient behavior, when so many of our patients experience their first restorative treatment during emergency appointments, perhaps we should have incorporated this into our study. This population is also more likely to exhibit negative behavior and may have provided a more diverse range of behavior experiences.

While it was not surprising to find a relationship between smaller family size and positive behavior, it was surprising to find that one of the few statistically significant relationships found was relating single parent homes to positive behavior outcomes during treatment. It is widely known that being part of a single parent home is a social
risk factor. Social risk factors often contribute to emergency care-seeking behaviors, poor health outcomes, negative behavior, and even poor cognitive development [24] [25]. To rule out a confounding variable, the age groups of patients in the single parent homes were compared with the age group of patients in non-single parent homes, no significance was found (p = .1247). Out of the 53 patient sample, 62% reported that they were married or with a partner. With only 7 negatively behaved patients in the sample of majority married/with partner families, there is a large chance that no negative patients belonged to the single parent group solely by chance. In future studies, the relationship between single families and smaller family size should be studied as it could contribute to this finding.

Research regarding behavior of patients undergoing multiple restorative visits is also conflicting. Desensitization is a behavior management technique recommended by the AAPD Guidelines, however dental research indicates that having a non-invasive desensitizing visit prior to restorative treatment does not significantly alter the patient’s behavior during treatment, positively or negatively [26]. Medical research indicates that patients who undergo repeated venipuncture for chemotherapy tend to actually do better with more instances of venipuncture [27]. Venham et al found in several studies that behavior tends to decline over several restorative visits, but a very young population of patients age 2-5 years old was used and increasing cooperation with some portions of treatment were found [28] [29]. It would be of interest to continue this current study and expand it to patients undergoing multiple visits to monitor behavior trends.
While the limitations of the study and study design exist – difficulty finding patients to meet inclusion criteria, lack of negatively behaved patients, and lack of parents predicting their child would exhibit very negative behavior – there is certainly clinical significance to be obtained from this research.
Conclusions

In general, parents tend to be good predictors of their child’s behavior during a first time restorative visit when the patient exhibits positive behavior. Parents are less successful at predicting negative behavior. Additionally, parents and provider post-treatment assessments tend to be in agreement. This agreement is 100% when patients behave positively, but reduced by more than half when patient’s exhibit behavior deemed negative by the provider. Further research on this topic would be very useful to improve behavior management efficiency and acceptance.
Appendix A: Information Sheet

Study Title: Parental Prediction Study
Principal Investigator: Ashok Kumar

1. Introduction – Why are we doing this research study?
   We invite you to be in this research study because of its potential to improve pediatric dental care in the future. This is a study to find whether parents can predict how their child will behave during their first dental treatment procedure other than a cleaning. The study will also measure how the parent and the dentist measure behavior during the appointment, and whether they are the same. If you choose to be in the study, you will be given a demographic survey to complete prior to your child entering the dental clinic, and a behavior rating to fill out after the treatment is completed. The study should not increase the length of the dental visit more than 5-10 minutes.

2. Participation is voluntary.
   Participation is voluntary. If you do not want to be involved with this study, all regular and standard medical and dental care will still be available to you here or at another institution. You also have the right to leave this study at any time, even if you agree to join now.

3. What are possible Risks/Discomforts?
   We believe that there is very little risk associated with being in this study. It is possible that you could feel upset when answering questions about your diagnosis or medical treatment, but it may be more likely that you find the questions or feedback process a little boring. If you do find any of the questions upsetting or don’t want to answer a question, you don’t have to, and the study coordinator will be available to discuss this with you further. Although we will take every precaution, there is a small chance of loss of confidentiality of your study information.

4. What are potential Benefits?
   Although there may be no benefit to you from being in this study, we hope to learn something that could help other children and parents seeking dental treatment in the future. We continue to strive for improvement in dental visits for children and parents.

5. How will my information be kept private?
Information collected for this study includes information that can identify you. This is called “protected health information” or PHI. By agreeing to be in this study, you are giving permission to Dr. Ashok Kumar and the study staff to collect and analyze your PHI for this research study and for future research purposes.

6. **Is there any payment/compensation for participation?**
   There is no extra charge or compensation for participating in this study. The treatment done during today’s dental visit as a part of routine clinical care will be billed to you and to your insurance company or third party payer. You may have to pay any costs that the insurance company or third party payer does not pay.

7. **Who can I contact for additional information?**
   If you have questions about anything while on this study or you have been injured by the research, you may contact the Principal Investigator at 614-722-5650, Monday – Friday, between 9AM and 5PM.
   
   If you have questions, concerns, or complaints about the research; if you have questions about your rights as a research volunteer; if you cannot reach the Principal Investigator; or if you want to call someone else - please call (614) 722-2708, Nationwide Children’s Hospital Institutional Review Board, (IRB, the committee that reviews all research involving human subjects at Nationwide Children’s Hospital).
Appendix B: Demographic Survey

Demographic Questionnaire - Please answer the following questions about yourself & your family for our study
- the responses will not be linked to your medial chart

Please answer questions #1-#3 prior to your child’s treatment

1. Do you think your child will sit in the dental chair?
   a. Yes
   b. No

2. Do you think your child will allow us to complete dental treatment?
   a. Yes
   b. No
   c. Maybe: (please specify) comment _______________________________

3. How do you think your child will cooperate during dental treatment overall?
   a. Very Positively
   b. Positively
   c. Negatively
   d. Very Negatively

4. Are you?
   a. Male
   b. Female

5. What is your marital Status?
   a. Single
   b. With Partner
   c. Married
   d. Divorced
   e. Other: ______________________________

6. What is the highest grade you completed?
   a. 7th grade or below
   b. 9th grade
   c. 11th grade
   d. High School Diploma
   e. At least one year of college
   f. Attained college degree
   g. Graduate or professional training
7. What is your race/ethnicity?
   a. African-American
   b. White/Caucasion
   c. Asian-American
   d. Hispanic
   e. American Indian
   f. Somali
   g. Other: (please specify): __________________________

8. How old are you? _______

9. What type of area do you live in?
   a. City, Urban
   b. Rural

10. What type of medical insurance do you have?
    a. Medicare/Medicaid
    b. Private insurance
    c. No insurance –out of pocket

11. Are you or your partner/spouse currently employed
    a. Yes
    b. No

12. What is your estimated household annual income?
    a. $0-$9,000
    b. $10,000-$19,000
    c. $20,000-$39,000
    d. $40,000-$49,000
    e. $50,000-$79,000
    f. $80,000 or more

13. How many children do you have?
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5 or more

14. Does your child (that we are treating today) attend a daycare or school program?
    a. Yes
       i. How many children are in the daycare/school class?
       ii. How many different adults give care to your child?
    b. No
       i. The child stays home with a parent
       ii. The child has a babysitter
15. Does your child experience what you would consider “stranger anxiety” or “shyness with strangers?”
   a. Yes
   b. Yes and they warm up quickly
   c. No

16. Has your child been diagnosed with any specific behavioral problems or disorders?
   a. No
   b. Yes, please specify: ___________________________

17. Where does your child sleep?
   a. In their own bed
   b. In a bed with a sibling
   c. Co-sleep with mom or dad

18. How much television does your child watch per day?
   a. <1 hour
   b. 1-2 hours
   c. 3-4 hours
   d. More than 4 hours a day
Appendix C: Frankl Score

Frankl Score

The Frankl Scale is what most dentists use to track how your child handles having dental treatment. It helps dentists give the best care for your child. “Poor behavior” only applies to how the child is handling the treatment, and we understand that it does mean that they are poorly behaved children. Please read the descriptions below and give your child a Frankl Score rating for today’s visit.

-/-: Definitely poor behavior. Unable to complete treatment, forceful crying, very scared, or any other extreme negative behavior

-: Poor behavior. Allows treatment to be completed, but is not happy about it. Uncooperative, some negative behaviors but patient may be more quiet than usual

+: Positive. Acceptance of treatment: cautious behavior at times: willingness to comply with the dentist, at times with reservation, but patient follows directions cooperatively.

+/+: Definitely positive. Good rapport with the dentist, interest in the dental procedures, laughter and enjoyment.

My score for my child’s visit today: _____________________

Comments:
References


