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Child's Temperament and Conscious Sedation Outcomes

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CHILD'S TEMPERAMENT AND CONSCIOUS SEDATION OUTCOMES

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

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Abstract

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The purpose of this study was to investigate the role of child temperament and its effect on the outcome of conscious sedation using the following agents: Chloral Hydrate (35mg/kg), Meperidine (2mg/kg), and Hydroxyzine (2mg/kg).

The Emotionality, Activity, Sociability (EAS) Temperament Survey for Children was used to measure the child's temperament. The temperament survey measures three realms (Emotionality, Activity, Sociability/Shyness). The sedation outcomes were rated using the modified North Carolina Behavior Rating Scale (NCBRS) from 1-4 (Quiet, Annoyed, Upset, and Wild).

The final sample population consisted of 34 children, 24 girls (71%) and 10 boys (29%), ranging in age from 0-9 years old (M=5.6 years old, SD=1.8 years old). The sample population showed moderate emotionality (M=2.56, SD=0.96, p=0.5707), high activity (M=4.15, SD=0.72, p=0.2423), high sociability (M=3.63, SD=0.60, p=0.7853), and moderate shyness (M=2.50, SD=0.86, p=0.9930). Of the critical events, local anesthesia (F=74%, M=1.31, SD=0.58) and rubber dam placement (F=77%, M=1.26, SD=0.51) showed the most disruptive behaviors. Correlation results showed no significant temperament influence on overall effectiveness of sedation for the EAS sub-scales.

Individual EAS scores, moderate emotionality, high activity, high sociability, and moderate shyness, did not predict the overall effectiveness of the sedation in this population.

BACKGROUND AND SIGNIFICANCE

Conscious Sedation in Pediatric Dentistry

The science of behavior management is an ever-changing component of pediatric dentistry. As parental attitudes and societal norms evolve, pediatric dentists must reexamine currently accepted practices to ensure optimal patient care. Conscious sedation allows pediatric dentists to perform dental operations on children who are unable to cooperate. Sedation regimens employed by pediatric dentists have been shown to be safe and effective.[1]

Several recently published studies and surveys highlight the evolution of practitioners' philosophies over the past three decades. Wilson et al. reports that 10-25% of children require physical restraint or pharmacological management during delivery of dental care.[2] In addition, they report an increased trend toward behavior management via pharmacological use in pediatric dental practices in the United States due to increased amount of time spent educating pediatric dental residents about sedations, increased ACLS or PALS certification of residents and faculty, and increases in the number of emergency drills practiced during ones training.[2]

With a decrease in practitioner use of physical forms of behavior management, conscious sedation remains a viable option for pediatric dentists to use for children who are

frightened, too young to cooperate with dental treatment, possess a delayed cognitive development, or have a difficult temperament. The popularity of conscious sedation among pediatric dentists is underscored by the safe and effective means by which sedative drugs are used to accomplish in-office dental treatment when practitioners adhere to the *Clinical Guideline on the Elective Use of Conscious Sedation, Deep Sedation, and General Anesthesia in Pediatric Dental Patients.*[1]

Temperament

Temperament can be defined as a child's innate personality or behavioral style. It is, in essence, how he or she communicates or interacts with the environment. Temperament is thought to be genetically based and stable across the individual's lifetime, but interestingly, it is also modifiable by environmental influences.[3] A child's temperament may contribute significantly to how he or she behaves in unfamiliar situations, such as during a dental visit.[4] It is therefore important for all health practitioners who care for children to understand the important role temperament plays in every interaction they have with children.

Anxiety and fear are universally experienced emotions that a child is forced to cope with when undergoing any type of stress, such as invasive dental treatment. Crying, kicking, screaming, and uncontrollable movements are typical behavior patterns observed that interfere and interrupt a dentist's communication attempt with the child. Communication is the single most important skill a pediatric dentist must possess in order to effectively treat a child. Therefore, if a child is not mentally, emotionally, socially, and cognitively

capable of communicating with a dentist, other behavior management modalities such as physical, pharmacological, aversive, reward-oriented, and linguistic techniques should be considered.[5]

As a general rule, children by the age of 3 to 4 years old should be competent in the domain of language. Children less than 3 years old are less competent in language and thus cannot be managed effectively by the use of language.[5] Age and emotional status are essential factors in determining the need for pharmacological management. In addition, there are a plethora of reasons why young children cannot tolerate dental treatment without additional management: they may be immature cognitively; they may have mental, emotional, and psychological medical issues; they may lack coping mechanisms during stressful situations; they may have subjective fear passed on from siblings and peer exaggerations; or they may have social, cultural and linguistic issues that interfere with routine care.[6] Pediatric dental patients often require conscious sedation due to young age, anxiety, and behavioral problems that make conventional treatment not a viable option.

There is an interest among pediatric dental professionals to find parent-report measures via a survey that may provide an insightful perspective on their child's personality and behavior tendencies. Quinonez et al. used the EAS Temperament Survey for Children to examine the role of temperament and the risk for Early Childhood Caries (ECC). [7] The EAS Model is composed of three components: Emotionality, Activity, and Sociability. A fourth component, shyness is considered a subset of sociability.

The EAS Temperament Survey for Children consists of twenty questions wherein parents are asked to rate their children on a five-point scale (1=not characteristic, 5=very

characteristic). Information extrapolated from the parental ratings provides a measure of the EAS factors. The three-factor EAS model (Emotionality, Activity, and Sociability/Shyness) is thought to be a better predictor of personality and behavior. Emotionality measures distress-proneness (e.g., crying, tantrums). Activity measures behavioral arousal (e.g., high rates of speaking and moving). Sociability measures preference for being with others versus being alone (e.g., sharing, attention-seeking). Shyness is a derivative of sociability which measures the tendency to be tense and inhibited with strangers or casual acquaintances. The EAS scale shows good test-retest reliability (M=.70) and internal consistency (M=.83) for children 1 to 9 years of age. [11]

Temperament and Conscious Sedation

Conscious sedation is defined as a controlled, pharmacologically induced, minimally depressed level of consciousness where the patient is able to independently maintain a patent airway and respond appropriately to physical stimulation and/or verbal commands. [8] Conscious sedation for very young children and difficult-to-manage children has been used for decades as a pharmacological behavior management technique, however, strong clinical science has not evolved nor paralleled the art of selecting patients for conscious sedation. Several factors contribute to the decision-making process, such as: the degree of patient cooperation, child and doctor interaction, extent of dental needs, parental concerns, financial issues, practitioner training and comfort with sedation techniques, practitioner confidence for successful outcome of other behavioral management techniques, and of particular interest, child temperament. [6]

Based on summary data, successful conscious sedation outcomes can be expected 50% to 75% of cases using therapeutic doses of sedative agents regardless of the combinations used.[6] To date, few dental-related studies have examined the role of temperament as a predictor of behavior for conscious sedation in pediatric dentistry. A study by Lochary et al., using the Toddler Temperament Scale (TTS) found that approachability/withdrawal tendency is an important determinant of a sedated child's behavior during dental treatment. However, no definitive conclusions were made because of low and inequitable distribution of patients within the nine temperament categories: Activity Level, Rhythmicity, Adaptability, Approach or Withdrawal, Threshold of Responsiveness, Intensity of Reaction, Attention Span and Persistence, Quality of Mood, and Distractibility.[9] Further analyses and evidence suggest that the Toddler Temperament Scale has no empirical basis, and that a more valid predictor of later personality and behavior during dental treatment is the Emotionality, Sociability, and Activity (EAS) Model. [7,9]

Conscious Sedation Outcomes

This study will focus on behavioral outcomes when using conscious sedation for dental treatment. There are several behavioral assessment methods reported in the conscious sedation literature. Such as the Ohio State University Behavior Rating Scale (OS) in addition to the North Carolina Behavior Rating Scale (NCBRS).[7,9] All of these validated measures of behavioral assessment include categories based on bodily movements, crying, and physical resistance and both provide a qualitative assessment of behavior at specific time periods in the procedure, in addition to a quantitative component of observed

behavior such as of how many times specific behaviors occurred overall. This study will use a modified version of the NCBRS scale to provide a behavioral rating at critical event points throughout the procedure in addition to a rating of overall effectiveness of sedation. A more defined explanation of these processes appears in the methods section.

SPECIFIC AIMS AND HYPOTHESIS

To our knowledge, no studies to date have related child's temperament to conscious sedation outcomes using the Emotionality, Activity, Sociability, and Shyness (EAS) Temperament Survey for Children. The EAS parent-report survey provides an insightful perspective on their child's personality, and we hypothesize there to be correlation between EAS, the behavioral assessment and ultimately with sedation outcomes.

The first hypothesis to be tested is that children with high emotionality, activity, and shyness scores will have higher levels of "upset" and "wild" behaviors than children with lower emotionality, activity, and shyness scores. The second hypothesis is that children with high sociability scores will have more rating of "quiet" behavior than children with low sociability scores. The third hypothesis is that those children with high sociability will have more "satisfactory" sedation outcomes than children with low sociability. In all cases, we will test the null hypothesis.

The purpose of this study was to investigate the role of child temperament and its effect on the outcome of conscious sedation using a standardized drug regimen of: Chloral Hydrate (CH) (35mg/kg), Meperidine (M) (2mg/kg), and Hydroxyzine (H) (2mg/kg).

MATERIALS AND METHODS

Patient Sample and Design

This double-blinded, observational study, with a cross-sectional design, was used to examine the relationship between child temperament and oral conscious sedation dental treatment outcomes. Information extrapolated from the twenty-question EAS Temperament Survey for Children was used in conjunction with the conscious sedation outcomes to determine if child temperament plays an essential role in conscious sedation success.

A total of 34 healthy children (American Society of Anesthesiologist patient status Class I or Class II), ranging from 0-9 years in age were enrolled in the study. Prior to treatment, medical histories were reviewed with the primary caregiver, a pre-operative physical assessment was completed (auscultation of the chest and oropharyngeal examination to determine tonsil size), and an overview of the study was reviewed with the parent or legal guardian. Parents and legal guardians were informed that the research included parental permission to videotape their child while undergoing dental treatment under conscious sedation. Informed consent for dental treatment, immobilization, and participation in the research study was obtained and the survey was completed. Immobilization of the patient

sometimes is necessary to protect the patient, practioner, and/or the dental staff from injury while providing dental care. Consent for immobilization included permission to use a papoose board, pedi wrap, molt mouth prop, or active immobilization of the child. Immobilization was determined by a flip of a coin. If the coin was "heads", children were placed on a papoose board and wrapped in the usual fashion. If the coin was "tails", the children were not immobilized. Children were placed in the dental chair with no restraints. This study was approved by the Virginia Commonwealth University Institutional Review Board.

Assessment Protocol and Procedure

All eligible children were clinically evaluated in a dental chair using a light source, mirror, and explorer to assess the need for dental treatment under conscious sedation. Parents were informed that their child's dental treatment under conscious sedation was going to be videotaped for research purposes. In addition to the EAS Temperament Survey for Children, the following data was collected: gender, race, restorative treatment, weight in kilograms, and age. **Figure 1.** delineates the data collection process.

Temperament

The major explanatory variable is the temperament survey. Each question in the survey measures for a particular temperament, Emotionality, Activity, Sociability, or Shyness. The EAS parent-report survey was used to yield a behavioral profile based on the three-factor model of temperament: Emotionality, Activity, and Sociability. Emotionality

measures distress proneness. Activity measures behavioral arousal. And Sociability measures whether a person prefers to be with others or alone. A fourth component, Shyness is considered to be a derivative of Sociability. It measures a child's tendency to be tense and inhibited with strangers or acquaintances. Parents were asked to rate their child's behavior tendencies on a five-point scale (1=not characteristic, 2=Occasionally characteristic, 3=Somewhat characteristic, 4=Characteristic, 5=Very Characteristic). The EAS has demonstrated test-retest reliability (M=.70), internal consistency (M=.83) and construct validity in children 1 to 9 years-old across different cultures. [11] A copy of the temperament survey has been included in Appendix A.

Behavioral Assessment

All sedation appointments were videotaped with a video camera (Canon ® ZR90 Digital Video Camcorder) standing approximately six feet away from the patient's entire body. Taping commenced from the time the patient entered the operatory until the completion of the dental treatment. Tapes were identified by the patient's initials, date of sedation appointment, and the operator's name.

The only individual with access to these tapes was the primary investigator. The primary investigator transferred the videotapes onto DVD's using a standardized format to include segments of all critical events, totaling approximately 15 minutes.

The raters used the modified North Carolina Behavior Rating Scale (NCBRS) to assess patient behavior during the critical events: preoperative, local anesthesia, rubber dam placement, operative, and postoperative (Table 1). Behaviors described as "undesirable" consisted of crying, screaming, head movements, torso movements, or foot movements. Behavior codes were recorded into an automated behavior rating software system according to the codes 1-Q, 2-A, 3-U, and 4-W (Table 1). Additionally, the overall sedation outcome was recorded using the ratings 1 through 4: 1) Satisfactory;
2) Moderately Successful; 3) Mildly Successful; and 4) Unsuccessful.

To establish reliability and permit rater training, ten randomly selected DVD's were selected to calibrate the examiners. The kappa statistic for examiner calibration was kappa=.83 (95% CI0.50-1.00).

The raters were blinded both to the information from the EAS Temperament Survey for Children and the sedation of the child. After behavior ratings were completed for all tapes, the frequency of each of the four types of behavior (Quiet, Annoyed, Upset, or Wild) was calculated.

Control Variables

Additional control variables were collected from a chart audit and the demographic information given by the caregiver on the EAS survey consisting of: age, race, gender, weight, length of treatment, number of previous sedations, ASA classification, medical history, and dental procedures completed.

Statistical Analyses

The independent variable in this study was the temperament survey. The principal outcome variables were the behavioral assessment and conscious sedation outcomes. Descriptive statistics such as group means were calculated for patient demographics, EAS Temperament scores, behavioral assessments at critical events, and overall sedation outcomes. A Pearson's correlation statistic was used to test for associations between temperament scores and behavioral assessment scores. A linear regression analysis was completed to examine the association between temperament and overall sedation outcomes controlling for gender, age, restraint, extractions, and length of sedation.

RESULTS

The specific aim of this study was to determine if there is a correlation between EAS, the behavioral assessment, and ultimately the sedation outcome. We hypothesized that children with high emotionality (distress-proneness), activity (behavioral arousal), and shyness (tense and inhibited) would have higher levels of "upset" and "wild" behaviors. The second hypothesis was that children with high sociability (preference for being with others) would have higher levels of "quiet" behaviors. The third hypothesis was that children with high sociability would have more "satisfactory" sedation outcomes.

Demographics and Descriptive Analyses

The final sample population consisted of 34 children, 24 girls (71%) and 10 boys (29%), ranging in age from 0-9 years old (M=5.6 years old, SD=1.8 years old). The results are presented in Table 3. Of the sample, 1 was Asian (3%), 17 were African American (50%), 14 were Caucasian (41%), and 2 were Caucasian/African American (6%). In terms of restorative treatment involving extractions, 15 required extractions (44%) and 19 did not require extractions (56%). The population weight ranged from 12.5 to 35 kg, with a mean weight of 20.8 kg (SD=5.1 kg).

Temperament

The sample population showed moderate emotionality (M=2.56, SD=0.96, p=0.5707), high activity (M=4.15, SD=0.72, p=0.2423), high sociability (M=3.63, SD=0.60, p=0.7853), and moderate shyness (M=2.50, SD=0.86, p=0.9930). These scores were comparable to data from the Colorado Adoption Project (Rowe and Plomin 1977). Rowe and Plomin (1977) reported means and standard deviations for 182 children of diverse age (1-9 years).[11] The means and standard deviations for the EAS Temperament Survey for Children: Parental Ratings in Rowe and Plomin's study was similar for girls and boys and for younger and older children. The means and standard deviations were as follows: Emotionality (Girls, M=2.07, SD=0.73; Boys, M=2.12, SD=0.77), Activity (Girls, M=2.48, SD=0.66; Boys, M=2.50, SD=0.64), and Sociability/Shyness (Girls, M=4.17, SD=0.52; Boys, M=4.25, SD=0.51). Children enrolled in our study demonstrated higher emotionality (distress-proneness), lower activity (behavioral arousal), and lower sociability/shyness (preference for being with others/tense and inhibited) than the children enrolled in Rowe and Plomin study. However, our sample population demonstrated less emotionality and shyness that we had originally hypothesized. The study temperament characteristics are presented in Table 4.

Behavioral Assessment during Critical Events

Of the critical events, local anesthesia (M=1.31, SD=0.58) and rubber dam placement (M=1.26, SD=0.51) showed the most disruptive behaviors, 74% and 77%, respectively. The least to the most disruptive behaviors during critical events were as follows: post-

operative (M=1.06, SD=0.24), pre-operative (M=1.14, SD=0.49), operative (M=1.17, SD=0.45), rubber dam placement (M=1.26, SD=0.51) and local anesthesia administration (M=1.31, SD=0.58). The ratings for the overall effectiveness of sedation using the Operator/Monitor Success Scale indicate that 83% of the sedations were classified as "Satisfactory", 17% were classified as "Moderately Successful", and 0% were classified as "Mildly Successful" or "Unsuccessful". Frequencies are presented in Table 5.

Temperament and Overall Sedation Rating

A Pearson's correlation statistic was used to examine the association between temperament scores and overall sedation outcomes. As seen in Table 6, the study population demonstrated moderate emotionality (M=2.56), high activity (M=4.15), high sociability (M=3.63), and moderate shyness (M=2.5). There was also no correlation between the temperament constellations (emotionality, activity, sociability, and shyness) and overall sedation outcomes. The correlation between temperament and overall sedation ratings were: Emotionality (p=0.5707); Activity (p=0.2423); Sociability (p=0.7853); and Shyness (p=0.9930). The results of the linear regression in Table 7, examine the association between temperament and overall sedation outcomes controlling for gender, age, restraint, extractions, and length of sedation found no significant correlations between temperament traits and overall sedation ratings.

DISCUSSION

The present study is one of the first temperament studies to link child's temperament and conscious sedation outcomes using the EAS Temperament Survey for Children. The EAS Temperament Survey for Children was used to help determine if there is a correlation between temperament and conscious sedation outcomes while controlling for other demographic and treatment factors. All patients received the same conscious sedation inducing agents: Chloral Hydrate (CH) (35 mg/kg), Meperidine (M) (2 mg/kg), and Hydroxyzine (H) (2mg/kg).

Temperament

In terms of temperament, our study population demonstrated similar findings to past temperament studies. The 34 healthy children enrolled in the study demonstrated moderate emotionality, high activity, high sociability, and moderate shyness. This means the study population demonstrated moderate crying/tantrums, high rates of speaking and moving, high preference for being with others than alone, and moderate shyness.

Quinonez et al used the EAS Temperament Survey for Children to determine if there is a correlation between temperament and trait anxiety. In her study, "Temperament and Trait Anxiety as Predictors of Child Behavior Prior to General Anesthesia for Dental Surgery", her sample population demonstrated moderate emotionality (SD=2.95±.83), high

activity (SD=4.32±.69), high sociability (SD=3.71±.69) and moderate shyness (SD=2.47±.92). The EAS Temperament Survey for Children in this study demonstrated moderate emotionality, high activity, high sociability, and moderate shyness. This study's EAS characteristics are consistent with the pediatric dental population study by Quinonez et al.

Quinonez et al. also found trait anxiety to be correlated positively with emotionality and shyness, and negatively with activity and sociability. Together, emotionality and sociability predicted trait anxiety. Children with higher emotionality and lower sociability tend to be higher in terms of trait anxiety. Research shows that 15-20% of infants are classified as shy. Shyness is thought to be heritable, stable, and predictive of multiple phobias several years later. Shyness has also been linked to being classified as distress prone. Younger and shyer boys tend to show more disruptive behavior as observed by Quinonez et al. Improved awareness of temperament influences can help predict a child's anticipated behavior during dental treatment. Understand the role of temperament in patient selection will assist parents and dental professionals in choosing the correct treatment modality for the specific child. [3]

Another study by Lochary et al used the Toddler Temperament Scale (TTS) created by Thomas and Chess to evaluate "Temperament as a Predictor of Behavior for Conscious Sedation in Dentistry". Nine temperament categories were identified: activity level, biological rhythmicity, initial approach/withdrawal, adaptability, intensity, mood, persistence/attention span, distractibility, and sensory threshold. Depending on the constellations of scores within the nine different categories, children were classified into

one of three clinical groupings: easy (24%), difficult (24%), and slow-to-warm-up (0%). Fifty-two percent of the sample did not fit into a constellation. In terms of temperament categories and their relationships to behavior, two temperament categories, approach/withdrawal and adaptability, were found to predict the percentage of all struggling behavior. Approach/withdrawal refers to a child's initial reaction to unfamiliar situations, such as a new person or environment. A child whom is very approachable is not shy and will speak to a stranger. A withdrawn child will not speak to a stranger when spoken to, withdraws physically, looks scared or frightened, and may even cry. Approach/withdrawal significantly predicted all struggling behavior. Children who scored less approachable or more withdrawn on the TTS exhibited more disruptive behavior during dental treatment. The TTS hypothesizes that a more withdrawn child will be less likely to cooperate under sedation than a more approachable child. Adaptability measures how easy or difficult it is to alter a child's behavior. A very adaptive child will respond directly to parent's instructions even if it is against the child's own inclinations, whereas a poorly adapting child does not modify his or her behavior despite frequent attempts at intervention by a parent. Adaptability was not statistically significant in predicting the percentage of all negative behavior. [9]

In terms of temperament constellation and their relationship to behavior, Lochary et al. found no measure of behavior during dental treatment to be significant for the categories of easy, difficult, and slow-to-warm-up. Like other temperament/sedation studies, no final conclusions regarding temperament constellations can be drawn because of the limited and inequitable distribution of patients within both personality traits and

behavioral outcome categories. [9] It appears that the children who are enrolled in sedation studies are somehow similar in respect to their behavioral outcomes. It can by hypothesized that there may be biases in patient recruitment. Biases include failure to enroll patients into the study due to the patient's age, extent of dental work required, practioner comfort level with sedating a child perceived to be uncooperative, practioner comfort level with behavioral management of a sedated uncooperative child, practioner preference for using other drug combinations or therapeutic doses, increased accessibility to treating the child under general anesthesia, and finally, parental preference for treating the child under general anesthesia.

Behavioral Outcomes

Our study used the modified North Carolina Behavior Rating Scale to assess patient behavior. Undesirable behavior consisted of crying, screaming, head movement, torso movement, or hand/foot movement at critical events. Each patient was given a rating of 1-Q through 4-W based on behavior during the critical events. Using the 1-Q through 4-W rating allows qualitative analysis by behavior group, Q through W, or quantitatively by severity, 1-4. In terms of behavior during critical events, the most disruptive behaviors were observed during local anesthesia administration (74%) and rubber dam placement (77%). The frequency values can be found in Table 5.

Lochary et al used the Ohio State University Behavior Rating Scale (OSUBRS) in her aforementioned temperament/sedation study. This scale was designed to measure the disruptive behavior of patients in a restraining device and was modeled after the NCBRS.

The OSUBRS analyzes four types of behavior: 1) Quiet behavior, no movement; 2) Crying with no struggling; 3) Struggling movement without crying; and 4) Struggling with crying. Rapid and intense head or foot movements or sustained posturing against the restraint were indicative of struggling behavior. Using the OSUBRS, Lochary et al observed the following behaviors: "Quiet" (62.4%±28.0), "Crying Alone" (25.7%±23.3), "Struggling with Crying" (10.5%±11.0), and "Struggling Alone" (1.5%±1.3). [3] These findings are similar to the behaviors observed in our study where the following behaviors were observed for all critical events (Table 5.): 91% were "Quiet", 3% were "Annoyed" and 6% were "Upset" for preoperative treatment; 74% were "Quiet", 20% were "Annoyed" and 6% were "Upset" for local anesthesia administration; 77% were "Quiet", 20% were "Annoyed" and 3% were "Upset" for rubber dam placement; 86% were "Quiet", 11% were "Annoyed" and 3% were "Upset" for operative treatment; 94% were "Quiet", 6% were "Annoyed" and 0% were "Upset" for postoperative treatment. Of the critical events, no patients were rated "Wild".

The overall effectiveness of sedation outcomes of this study were rated on a scale from 1-4 (Satisfactory, Moderately Successful, Mildly Successful, and Unsuccessful). The overall sedation outcomes can be found in Table 5. The sample population exhibited the following behavior outcomes: Satisfactory (83%), Moderately Successful (17%), Mildly Successful (0%) and Unsuccessful (0%).The results of this double-blinded cross-sectional study indicated that there was no significant correlation between temperament using the EAS subscale and behavior outcomes (Table 6).

The regression analysis as noted in Table 7 also shows no correlation between temperament and overall sedation outcomes while controlling for gender, age, restraint, extractions, and length of sedation. The temperament trait of "Activity" was the only construct that approached having a significant influence on sedation outcomes. According to estimates, it appears that children with higher reported "Activity" are more likely to have higher sedation outcome scores representing less successful sedations. The lack of variability in behavior tendencies and number of patients enrolled in the study were not great enough to detect statistically significant differences between temperament constructs. Similar to previous research studies, no final conclusions regarding temperament and effectiveness of sedation can be drawn. A larger population sample and a greater spectrum of personality extremes may have provided more information.

Study Limitations

This study did not demonstrate patient behavior variability. This is perhaps due to the fact that the majority of the children selected to be sedated were overall cooperative children to begin with, or the children perceived to be uncooperative at their new patient exam were automatically scheduled to be placed under general anesthesia for restorative treatment. To increase the power of the study, more children must be enrolled in the study. In addition, all healthy ASA I or II children with extensive dental work regardless of perceived patient behavior tendencies should be enrolled in this study to help determine if in fact temperament plays a role in sedation outcomes.

This was a cross-sectional clinical study of children seen at the VCU School of Dentistry Pediatric Dental Clinic for dental treatment under conscious sedation. Ideally, the study design would be a prospective randomized controlled trial, but a research design of this nature on a population this size would be extraordinarily costly and probably unethical due to treatment rationales regarding conscious sedation understanding that not all children are candidates nor require conscious sedation for dental treatment. Because the VCU Pediatric Dental Clinic serves a predominately urban and rural publicly insured population, our results may be limited in their generalizability to a suburban or higher socioeconomic population. However, because these children have been documented to be a high-risk population, the results will be readily transferable to similar child patient populations.

Although no direct correlation was found between temperament and sedation outcome, tools still need to be discovered to best identify children who are appropriate candidates for conscious sedation. This research project has explored tools for patient selection in regards to dental treatment under conscious sedation. Suggestions for future studies to improve patient selection for conscious sedation include: the influence of birth order, IQ levels, types of discipline children receive at home, analysis of practitioner's ability to determine patient temperament prior to treatment, and the influence of parental temperament on children.

CONCLUSIONS

- The sample population showed moderate emotionality, high activity, high sociability, and moderate shyness.
- Of the critical events, local anesthesia and rubber dam placement showed the most disruptive behaviors.
- Of the sample population, 83% demonstrated “Satisfactory” behavior, 17% demonstrated “Moderately Successful” behavior, and 0% demonstrated “Mildly Successful” and “Unsuccessful” behavior for the overall effectiveness of sedation
- No correlation between temperament and overall sedation outcomes were observed.

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Literature Cited

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APPENDIX A

THE EAS TEMPERAMENT SURVEY FOR CHILDREN:
"PARENT RATINGS"

1=Not characteristic or typical of your child
2=Occasionally characteristic or typical of your child
3=Somewhat characteristic or typical of your child
4=Characteristic or typical of your child
5=Very characteristic or typical of your child

1. Child tends to be shy.	1 2 3 4 5
2. Child cries easily.	1 2 3 4 5
3. Child likes to be with people.	1 2 3 4 5
4. Child is always on the go.	1 2 3 4 5
5. Child prefers playing with others rather than alone.	1 2 3 4 5
6. Child tends to be somewhat emotional.	1 2 3 4 5
7. When child moves about, he usually moves slowly.	1 2 3 4 5
8. Child makes friends easily.	1 2 3 4 5
9. Child is off and running as soon as he wakes up in the morning.	1 2 3 4 5
10. Child finds people more stimulating than anything else.	1 2 3 4 5
11. Child often fusses and cries	1 2 3 4 5
12. Child is very sociable.	1 2 3 4 5
13. Child is very energetic.	1 2 3 4 5

14.	Child takes a long time to warm up to strangers.	1 2 3 4 5
15.	Child gets upset easily.	1 2 3 4 5
16.	Child is something of a loner.	1 2 3 4 5
17.	Child prefers quiet, inactive games to more active ones.	1 2 3 4 5
18.	When alone, child feels isolated.	1 2 3 4 5
19.	Child reacts intensely when upset.	1 2 3 4 5
20.	Child is very friendly with strangers.	1 2 3 4 5

Figure 1. Data Collection Process

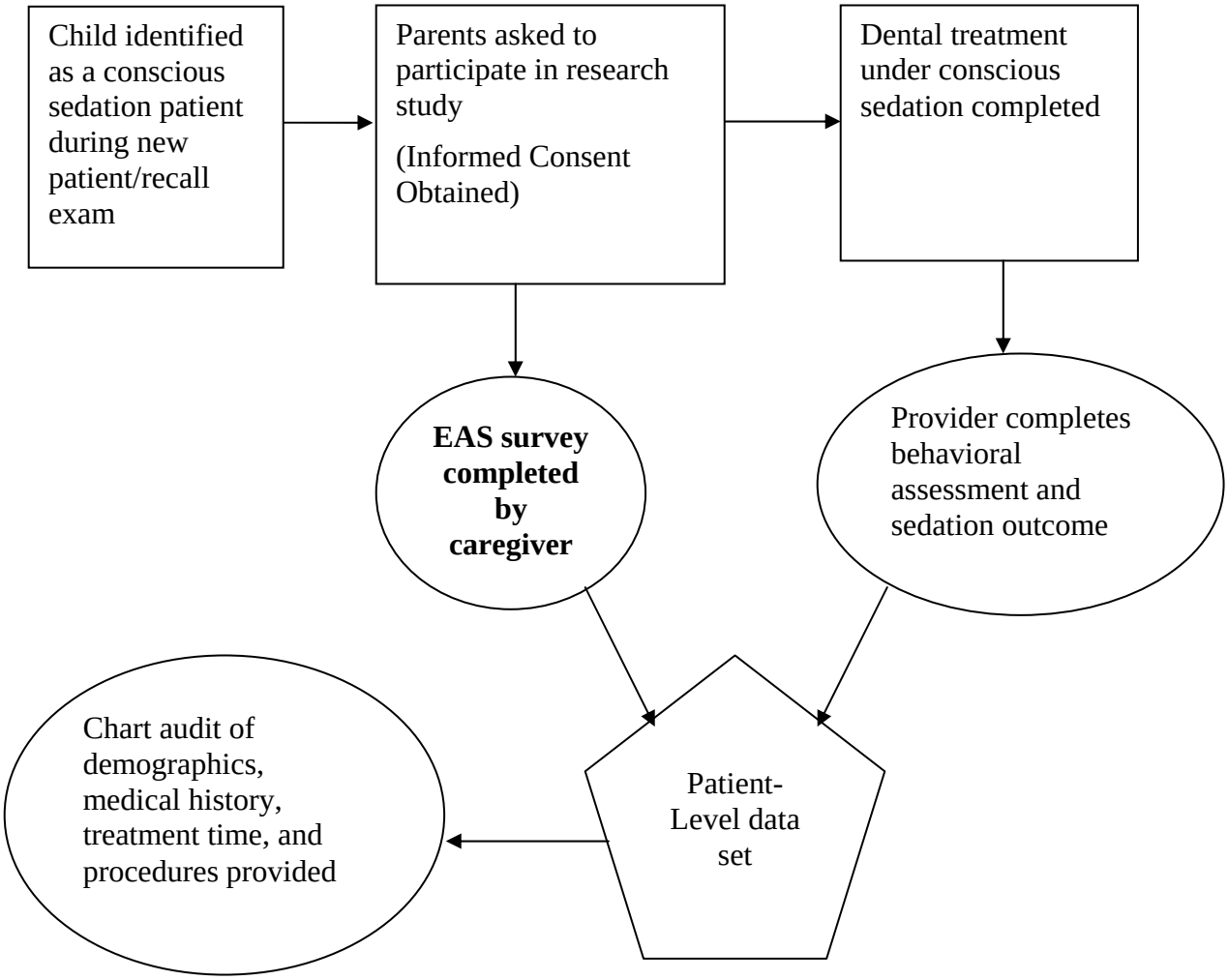

Table 1. Modified NCBRS Behavioral Assessment

Rating	Behavior Criteria
1-Q	**Quiet**- patient quiet and/or sleeping with only extraneous, inconsequential movements.
2-A	**Annoyed**- patient cooperative for treatment, but with one or two of the undesirable behaviors*.
3-U	**Upset**- patient noticeably disturbed, with two to three undesirable behaviors* present, making treatment difficult but possible.
4-W	**Wild**- patient extremely defiant with presence of all undesirable behaviors* making treatment extremely difficult.
Critical Events	**Description**
Preoperative	Monitors being attached to topical anesthetic application
Local anesthetic delivery	Topical placement to rubber dam clamp placement
Rubber dam placement	Clamp placement to bur penetrating tooth
Operative	Bur penetrating tooth to rubber dam removal
Postoperative	Rubber dam removal to removal of child from the operatory

***An undesirable behavior consists of crying, screaming, head movement, torso movement, or hand/foot movement at critical events. 1-Q through 4-W for each critical event. This allows qualitative analysis by behavior group, or quantitatively by severity 1-4.**

Table 2. Overall Sedation Outcome

Rating	Description
1	**Satisfactory**- patient slept throughout procedure with only minimal crying/movement.
2	**Moderately successful**- successful sedation with moderate amounts of crying and movement, but behavior did not hinder progress of sedation
3	**Mildly successful**- treatment was accomplished as planned, but due to screaming/combative movements throughout the sedation; the progression of portions of the treatment were hindered
4	**Unsuccessful**- continuous crying/movement throughout sedation; treatment was performed with difficulty; the progression of all treatment was hindered

Table 3. Descriptive Table of Study Population

Characteristic		n	%
Sex			
	F	24	71
	M	10	29
Race			
	A	1	3
	B	17	50
	C	14	41
	CB	2	6
Restorative			
	Y	34	100
Extractions			
	Y	15	44
Weight (kg)			
	Mean	20.8	
	SD	5.1	
	Range	12.5	35
Age			
	Mean	5.6	
	SD	1.8	
	Range	0	9

Table 4. Mean Scores and Standard Deviations for EAS Temperament Survey Categories (N=34)

EAS subscale	n	Mean	SD	Min	Median	Max
Emotionality	34	2.38	0.84	1.2	2.4	5.0
Activity	34	4.20	0.67	2.4	4.2	5.0
Sociability	34	3.61	0.62	1.6	3.7	5.0
Shyness	34	2.41	0.82	1.0	2.2	4.4

Table 5. Mean Scores and Standard Deviations using the Modified NCBRS

	Frequency (%)					
Critical Events	1	2	3	4	Mean	SD
Pre-operative	32 (91)	1 (3)	2 (6)		1.14	0.49
Local Anesthesia	26 (74)	7 (20)	2 (6)		1.31	0.58
Rubber Dam	27 (77)	7 (20)	1 (3)		1.26	0.51
Operative	30 (86)	4 (11)	1 (3)		1.17	0.45
Post-Operative	31 (94)	2 (6)	0 (0)		1.06	0.24
Overall Rating	29 (83)	6 (17)	0 (0)		1.17	0.38

Table 6. Correlation Between Temperament and Overall Sedation Rating

				Overall Rating	
EAS subscale	n	Mean	SD	r	p-value
Emotionality	35	2.56	0.96	0.10	0.5707
Activity	35	4.15	0.72	0.20	0.2423
Sociability	35	3.63	0.60	-0.05	0.7853
Shyness	35	2.50	0.86	0.00	0.9930

Table 7. Linear Regression

Effect	Estimate	SE	t-value	p-value	Beta
Intercept	-0.027	0.751	-0.040	0.9718	
Emotionality	0.132	0.082	1.600	0.1211	0.333
Activity	0.190	0.105	1.810	0.0823	0.360
Sociability	-0.104	0.127	-0.820	0.4187	-0.163
Shyness	0.035	0.079	0.440	0.6638	0.079
Sex[F]	-0.030	0.078	-0.390	0.6984	-0.073
Age	0.017	0.048	0.340	0.7333	0.070
PB[N]	0.089	0.085	1.050	0.3043	0.199
Extractions[N]	-0.047	0.079	-0.600	0.5519	-0.123
Length of Sedation (min.)	0.007	0.004	1.710	0.1005	0.302

VITA

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