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Characteristics Associated with Successful Dental Treatment in Children with Autism Spectrum Disorder

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CHARACTERISTICS ASSOCIATED WITH SUCCESSFUL DENTAL TREATMENT IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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A Thesis Presented to the Faculty of the College of Dental Medicine of Nova Southeastern University in Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE

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By

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I certify that I am the sole author of this thesis, and that any assistance I received in its preparation has been fully acknowledged and disclosed in the thesis. I have cited any sources from which I used ideas, data, or words, and labeled as quotations any directly quoted phrases or passages, as well as providing proper documentation and citations. This thesis was prepared by me, specifically for the M.S. degree and for this assignment.

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Dedication

To Shira,

This project completes ten years of our educational adventures together.

Thank you for always standing by me, for your constant encouragement, patience and understanding.

Today begins the rest of our lives together!

I love you.

Epigraph

“If you’ve met one person with Autism, you’ve met one person with Autism”

-Dr. Stephen Shore

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Abstract

CHARACTERISTICS ASSOCIATED WITH SUCCESSFUL DENTAL TREATMENT IN CHILDREN WITH AUTISM SPECTRUM DISORDER

DEGREE DATE: JUNE 23, 2017

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Background. ASD is a neurodevelopmental disability, responsible for social, communicative and behavioral deficits. The prevalence of children diagnosed with ASD in the United States has more than doubled in the past two decades, from 1 in 150 to 1 in 68. Children diagnosed with ASD have a very high occurrence of certain comorbidities, such as developmental delay, intellectual disability and speech delay. Unmet dental needs remain high among children with special health care needs (SHCN), with 78% reporting the need for dental care within the last 12 months. Recent studies have focused on barriers to care for these patients; the child's behavior has been identified as a major barrier to dental care. **Objective.** This study was conducted to examine and provide an overview of characteristics

of children with Autism Spectrum Disorder (ASD) undergoing dental care, specifically, an exploration of associations between patient demographic and health characteristics on the outcome of completing a cleaning. **Methods.** A retrospective chart review explored ASD patient demographics (including, but not limited to, ASD diagnosis, a variety of active therapies, comorbidities listed above, behavior and level of communication) and related them to successful dental treatments. Comparisons were made using t-test, bivariate and multivariate analyses. **Results.** Patients reporting non-verbal communication took more visits to complete the tasks (3.26 versus 2.64, P=0.028). Hispanic ethnicity [OR 0.073; (95% CI 0.017, 0.315); P=0.000] and parental lack of knowledge related to patient cooperation [OR 0.078; (95% CI 0.018, 0.344); P=0.001] were significantly associated with lower odds of completing the tasks. **Conclusion.** Educating dentists about key patient characteristics, including verbal/non-verbal communicative abilities, ongoing patient therapies, and cultural upbringings can potentially improve access to oral health care for children with ASD.

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CHAPTER 1: INTRODUCTION

1.1 Pediatric Oral Health

Unmet healthcare needs is not a new concept. Among children, unaddressed healthcare issues can have significant deleterious effects, as their bodies are still under development. Oral health, or lack thereof, is essential for everybody, but more so for developing children, as they require proper oral nutrient intake to ensure proper neuronal and physical development. Dental care has been the most unmet health care need among U.S. children with special health care needs (SHCN), including those with Autism Spectrum Disorder (ASD) [1, 2].

Recent studies have focused on unmet dental needs and related barriers to care with the SHCN population. Not surprisingly, the data reveals that 12-15% of children with ASD in particular have unmet dental needs, as compared to only 5% of those not affected children [3, 4]. Children with ASD have been associated with certain behaviors which make dental treatment difficult, including hyperactivity, sensory hypersensitivity and self-injurious behavior [5]. According to Lai et al., behaviors exhibited by children with SHCN are perceived as the greatest barrier to dental care; in fact, these authors found that poor behavior was directly correlated with a higher number of unmet dental needs [6]. Moreover, recent publications have listed a number of co-occurring ASD factors that associate with greater difficulty in permitting dental care. Some of these factors include young age, being non-verbal, intellectual disability, speech or developmental delay, and the inability to perform daily self-care routines such as brushing teeth, bathing and dressing [3, 7, 8].

1.2 Dental Home

In the early 1990's, the American Association of Pediatrics rolled out their policy statement on the medical home- a preventive concept which focused on regular health care maintenance, avoiding inefficient and expensive emergency visits [9]. The American Association of Pediatric Dentistry (AAPD) quickly followed suit and introduced their 'dental home' policy soon thereafter. A dental home is defined as the "ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care, delivered in a comprehensive, continuously accessible, coordinated and family-centered way". This partnership focuses on the spectra of oral health care needs, made available in a focused, easily accessible and coordinated manner. The dental home provides an opportunity to implement tailored preventive oral health regimens, decreasing the child's risk of preventable dental/oral infection. This setting should be instituted by no later than 12 months of age [10].

While many parents may be surprised at the young age with which the AAPD advises the first dental visit, this appointment is essential, as it creates a dentist-family partnership, where parental oral education is gauged and bolstered and ideally sets a child up for a lifetime of good oral health care. Given the potential physical and behavioral challenges necessitating the need for specialized care for those affected by ASD, oral health care all too often becomes a secondary priority. The concept of the dental home is a significant one for persons with ASD, and those who have one are more likely to receive appropriate preventive and routine care [11].

1.3 Autism Spectrum Disorder

Autism Spectrum Disorder is the umbrella term used in the newest Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (Published May 2013) to encompass diagnoses including autistic disorder, Asperger's disorder and pervasive developmental disorder not otherwise specified [12]. ASDs are neurobehavioral disorders often manifesting in the first 2 years of life [13]. In the United States, pediatricians screen for ASD between 18 and 30 months of age, looking for telltale markers including lack of eye contact, poor response to name called or a significant regression in learned language skills [14, 15]. A study by Valicenti-McDermott et al. concluded that the typical age at diagnosis of ASD was 38 ± 15 months, affirming that even two year old patients can be diagnosed correctly [16].

According to the Centers for Disease Control (CDC), ASD is about 4.5 times more common in boys than in girls and does not have predilection towards any one race, ethnicity or socioeconomic group [17]. The prevalence of ASD has increased almost threefold, from 1 in 150 during the year 2000 to 1 in 68 during the year 2010 [18]. What has caused this increase? Researchers seems to be undecided and many report that this increased diagnosis of ASD is due to a more acute clinical awareness of presenting symptomology together with improved access to care. Whether or not this is true, it remains expected that more such children with ASDs will be diagnosed in the future. With this increased prevalence in children with ASD, pediatric dentists will certainly begin treating greater numbers of these patient's in their practices.

1.3.1 Subtypes of ASD:

No single genetic linkage has currently been implicated resulting in ASD. Important to note is that ASD is not a disease, but rather a syndrome with multiple combinative factors including both those genetic and environmental in nature [19]. Children with ASD do not have associated dysmorphic phenotypic features or even a specified genotypic marker; they are diagnosed based on a set of behavioral criteria laid out in the DSM-5 by the American Psychiatric Association. The three main areas of development which are reviewed for diagnosis include: qualitative impairments in social interactions; restricted repetitive and stereotyped patterns of behavior, interests and activities; and qualitative impairments in communication [12]. These areas are expressed in the three types of ASD:

- Autistic Disorder (also known as “Classic Autism”) - Children with autistic disorder present with varying language delays (often significant), social and communication challenges and unusual behaviors and interests. They may also have intellectual disability.
- Asperger Syndrome- Typically present with milder symptoms than classic autism, however while they might encounter social challenges and engage in unusual behaviors and interest, they normally do not have language delays or intellectual disability.
- Pervasive Developmental Delay-Not Otherwise Specified (PDD-NOS; also known as “Atypical Autism”) - These patients only meet some of the diagnostic criteria for autistic disorder or Asperger syndrome. They typically

exhibit fewer and milder symptoms and may only experience social and communicative challenges.

Evidence has confirmed that autistic disorder can be correctly diagnosed as early as 24 months of age [14, 16]. Many children, however, remain undiagnosed until entering the school system around 3 years of age. Some factors identified with a later diagnosis include rural neighborhoods, low socioeconomic status, multiple primary care providers (unable to establish a baseline for the child) and mild language deficits [20].

As with most areas of medicine, the “earlier the better” concept applies to diagnosis and treatment of children with ASD. Multiple studies have confirmed that rigorous, well-coordinated, early intervention programming can drastically improve linguistic and communicative abilities and even modify social behaviors in children with ASD [21-23].

1.4 Behavioral Therapies

For some time now, it has been identified that behavioral interventions are the highest quality and most successful treatment modalities for children with ASDs [24]. These clinical treatment models are deeply rooted in the science of Applied Behavioral Analysis (ABA) therapy- a system dedicated to “understanding the laws by which the environment affects behavior, in order to address socially significant problems for individuals with disabilities” [25].

Using a combination of therapies leads to the most successful treatment of children with ASD, including but not limited to: ABA, speech and language therapy, physical

therapy, occupational therapy and even play and/or music therapy. These interventions are started as soon as a diagnosis is confirmed and should be incorporated into the child's routine at a minimum of 25 hours per week [24].

1.4.1 Applied Behavioral Analysis

ABA dictates that combinations of therapies should focus on creating positive dental interactions among the dental team and ASD patient. Traditional behavior guidance allows for multiple desensitization office visits, where the patient is engaged and exposed to the dental environment and equipment, gradually 'desensitizing' the patient to the 'seemingly new' equipment, office and dentist/auxiliary staff. Unfortunately sometimes emergent treatment dictates the use of advanced techniques, including protective stabilization or even sedations, both of which can set back the child's ability to desensitize to the office's surroundings.

Successful desensitization visits all incorporate reinforcements that are deemed positive and meaningful to the patient. This sense of active praise encourages cooperative behavior and even when the child grows tired, the importance of always ending the visit on a positive note cannot be understated. Unfortunately, desensitization requires an immense amount of office time, with reports indicating anywhere from 10 minutes to up to 2 hours per visit [26]. This chair-time factor acts as a natural barrier to care and discourages behavior modification visits from becoming commonplace in many offices.

1.4.2 Picture Exchange Communication System

The severity of a given behavior trait can regularly be connected to a language development issue. In children with ASD, a speech delay, or the inability to use verbal language, often plays a central role in the outcome of successful treatment engagement. For these children, the use of visual pedagogy, a ‘non-traditional’ behavioral approach to communication, offers an alternative method that utilizes their ability to respond better to pictures than to words [27]. One such example of visual pedagogy is the widespread use of the Picture Exchange Communication System (PECS), a communication aid for non-verbal individuals [8]. In the classroom setting, children utilizing PECS have their own set of communication cards and an exchange based system is implemented. For example, when a child feels thirsty and does not have the verbal ability to ask for a drink, they may present a card with a picture of a drink to the teacher and in turn receive a drink. Similarly, PECS in the MSC dental setting works by utilizing this already familiar communication method. It involves a pictorial outline of the treatment to be rendered and is interactive in nature by allowing patient’s to turn over the picture once the step is completed [28].

1.5 Purpose, specific aims and hypotheses

1.5.1 Purpose

Children with ASD represent an ever increasing population of SHCN. These children require dental treatment by individuals with specialized training who have the necessary accommodative measures in place to ensure quality care is delivered. The presence of oral disease can have significant negative impacts on

the health of children with ASD, adding to the everyday burden of the caregivers. It is well established that families with children with SHCN experience much larger monetary costs per child, due to increased health care needs, than those families with healthy children [29]. Moreover, studies in dentistry have concluded that children with ASD have a very high occurrence of certain comorbidities, such as developmental delay, intellectual disability and speech delay, which can further contribute as a barrier to their oral health care [7].

In order to develop a successful preventive care regiment to achieve favorable oral health outcomes among children with ASD, it is essential to establish an early pattern of daily, at-home, dental care. Research indicates that the formation of a “dental home” can assist in the creation of these early care routines to maximize oral health for children living with ASD. The Dental Home, essentially the relationship between the dentist and the patient, should ideally begin no later than 12 months of age and has an overarching goal of introducing individualized preventive oral health practices and strategies to reduce preventable oral disease. Most important with regard to patients with ASD, is that these children, unlike the normal population, most often do not grow up to recognize the importance of self-maintained oral hygiene. It has been conclusively demonstrated that patients of the SHCN variety who establish a dental home are more likely to receive appropriate preventive and routine care. Additionally, these children with SHCN eventually transition to adults, whose oral health care needs often begin to extend beyond the scope of practice of the pediatric dentist. By demystifying some of the characteristics often thought of as ‘difficult to treat’, perhaps our results can provide

data supporting the establishment of proper dental homes for so many children with SHCN.

The Nova Southeastern University pediatric dental clinic at the Mailman Segal Center for Human Development (MSC) has opened its doors for years as a center focused on providing care for children with SHCN, specifically those with ASD. Information in the literature regarding the factors associated with dental care in these special populations is limited.

The overall goal of this study is to examine and provide an overview of characteristics of children with ASD currently under care at the MSC. Specifically, the project will explore the health and behavioral characteristics associated with the successful completion of a comprehensive oral exam and prophylactic dental cleaning among children receiving care at the MSC clinic. Currently, children seen at the MSC clinic utilize a task strip (visual representation of steps- a picture exchange communication system) that outlines the 8 steps needed to successfully complete a comprehensive oral examination and prophylactic dental cleaning (Figure 1).

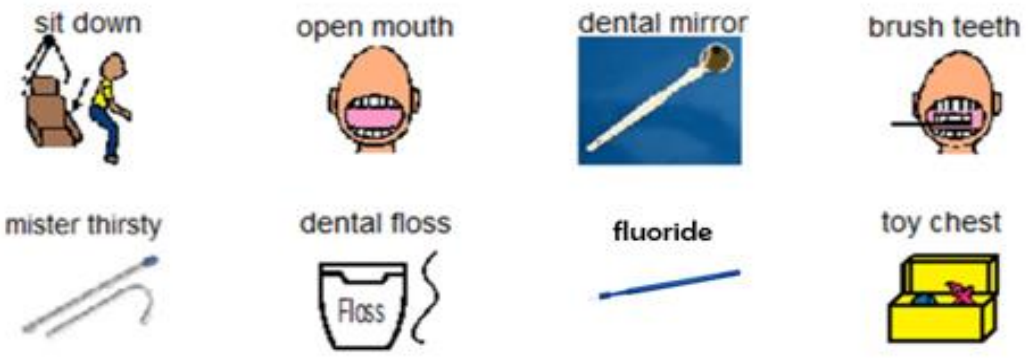

Figure 1: MSC task strip visualizations, 8 steps needed for completion of a comprehensive exam and prophylactic dental cleaning.

This retrospective analysis based on data collected at the MSC will serve as a valuable asset to the dental field in exposing existing barriers to treating children with ASD. Results will provide guidance to practitioners (dentists, generalists and specialists alike) as to the most effective treatment methods needed in order to successfully treat children with ASD.

1.5.2 Specific aims

This study will outline the basic demographic picture and medical/dental history of our target population, children with ASD receiving treatment at the MSC clinic. This exploratory effort will document the average number of patient visits needed to complete the task strip, which includes a comprehensive evaluation and prophylactic dental cleaning. Additionally, we will examine those patient characteristics associated with successful completion of the task strip. These characteristics include, but are not limited to, age, race/ethnicity, gender, Autism

diagnosis, medications, co-morbidities, dental needs, previous dental history, mean number of visits to complete the task strip and expected level of cooperation. All information will be extracted from the MSC pre-treatment assessment form (Appendix A) and patient medical records. Lastly, this research aims to confirm the potential effect of communication related comorbidities together with a diagnosis of ASD, and the completion of the task strip.

The overall goals of this project are to examine patient characteristics associated with favorable treatment outcomes, defined in this study as the successful completion of a comprehensive oral exam and prophylactic dental cleaning.

In particular, our specific aims are as follows:

1. Examine and describe patient demographics, health and behavioral characteristics, and the average number of visits associated with completion of the task strip (e.g., a comprehensive oral evaluation and a prophylactic dental cleaning).
2. Examine the association of self-reported developmental delay and completion of the task strip, controlling for appropriate covariates.
3. Examine the association of self-reported intellectual disability and completion of the task strip, controlling for appropriate covariates.
4. Examine the association of self-reported speech delay and completion of the task strip, controlling for appropriate covariates.

1.5.3 Hypotheses

Null Hypotheses:

1. There is no statistically significant association between completing the task strip and any of the patient characteristics measured, including age, race/ethnicity, gender, Autism diagnosis, medications, co-morbidities, dental needs, previous dental history, and expected level of cooperation.
2. There is no statistically significant association among self-reported developmental delay, mean number of appointments needed to complete the task strip, and completion of the task strip.
3. There is no statistically significant association among self-reported intellectual disability, mean number of appointments needed to complete the task strip, and completion of the task strip.
4. There is no statistically significant association among self-reported speech delay, mean number of appointments needed to complete the task strip, and completion of the task strip.

CHAPTER 2: METHODS

2.1 Study Design

This retrospective study used the patient chart data of 79 patients from the database of the Nova Southeastern University Postgraduate Pediatric Dental Clinic at the MSC. All the required data was collected as part of standard patient treatment and prior to initiating this project.

2.1.1. IRB Approval

IRB approval for this study (# 2016-392) was granted on September 12, 2016. Approval was in compliance with the requirements for the protection of human subjects described in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

2.1.2 Ethical Issues

In order to comply with IRB and HIPPA regulations, all Protected Health Information (PHI) identifiers were removed. Additionally, an Accounting of Disclosures Form for Research was added to each patient chart outlining project information. This retrospective study did not perform any procedures on human subjects. No ethical issues were identified as part of this research.

2.1.3 Grant

This research was awarded funding by the Health Professions Division Research Committee at Nova Southeastern University.

2.2 Sample Population

For this study, information was collected from a total sample of 79 patients from the pediatric dental clinic at the MSC. Demographic and treatment data was collected from a combination of patient's intake forms and chart notes. Patients who did not fit the inclusion/exclusion criteria were discarded. Data was grouped and charted by category and finally analyzed (Figure 2).

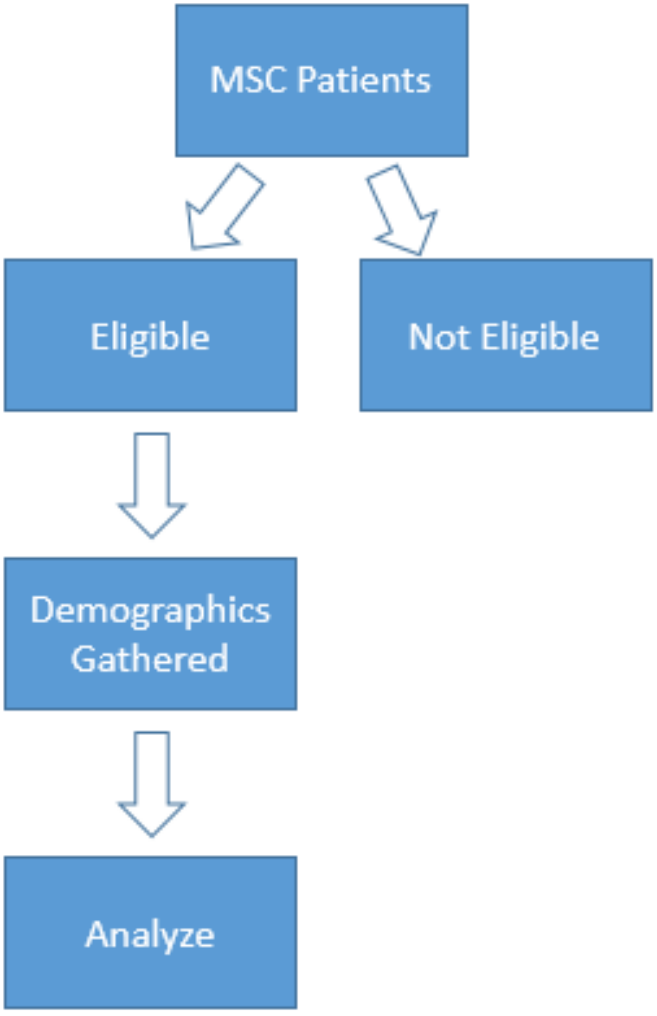

Figure 2: Flowchart of sample selection method.

Prior research has identified certain comorbidities, including speech delay, intellectual delay and development delay, which affect dental treatment in children with ASD [7]. Other research has focused on identifying cooperative factors for dental management of patients with ASD based on their communicative skills; these skills include toilet training, tooth brushing, academic achievement, haircuts and language development [30]. These and other factors often limit the successful use of traditional behavior management techniques in achieving positive outcomes in oral health care and act as barriers to dental care.

2.2.1 Inclusion and exclusion criteria

Inclusion Criteria:

1. Patients of record at the NSU pediatric dental clinic at the MSC.
2. Patients with a recorded diagnosis of ASD.
3. Patients with completed pre-treatment assessment forms.

Exclusion Criteria:

1. Patients who have not completed the task strip.

2.2.2 Dependent variable

The completion of the MSC task strip.

2.2.3 Independent variables

Self-reported intellectual disability, developmental delay and speech delay.

The number of visits required to complete the task strip.

2.2.4 Covariates

Covariates to be accounted for, which will be extracted from the chart data, include: gender, age, race/ethnicity, Medicaid status, autism diagnosis, medications, co-morbidities, dental needs, previous dental history, mean number of visits to complete the task strip and expected level of cooperation.

2.2.5 Sample size estimate

Given that the MSC is a specialized clinic, the entire population consists of approximately 100 active patients. Once applying the eligibility criteria of task strip completion, the sample size of the study dropped to 79. This small sample size is in line with other studies that have examined dental care among children with an ASD diagnosis. For example, recent studies performed by Marshall *et al.* in 2007 and Mathu-Muju *et al.* in 2016, also utilized smaller samples of children with ASD receiving dental care; these were used as references to help determine appropriateness of the sample size [7, 30].

2.3 Data collection and analysis

All patient chart data were collected from the servers on which they are stored as an electronic data record (Axium patient software). The principal investigator logged in to the Axium software and searched each patient chart number based upon a pre-populated list of all MSC active patients. Each chart was entered and the first step was to preview attachments, verifying completion of the pre-treatment assessment form. After confirmation of this, the patient's age at the start of treatment was calculated by subtracting their birthdate from their first clinic visit.

This age was recorded as a whole year. Following this, the patient medical record and pre-treatment forms were accessed in order to retrieve the necessary data for patient demographics as well as medical and behavioral records (see Appendix B for raw data).

All data were analyzed by the author using IBM SPSS Statistics, version 24. Descriptive statistics were calculated to describe the sample (N=79) in terms of patient demographics, and patient health, behavioral, and dental visit characteristics. *T*-tests were used to examine mean differences among all variables in relation to task strip completion. Bivariate logistic regression models were constructed and analyzed to predict task strip completion by patient demographics, and patient health, behavioral, and dental visit characteristics. Since almost all patients completed the task strip (N=77), the number of visits to complete the task strip was dichotomized to distinguish between those with less visits (three or less than three), as compared to others with more visits (four or five). Three or fewer visits was chosen as the threshold since it is the standard number of visits covered annually by Florida Medicaid for behavioral management in conjunction with another covered dental service [31]. Significance level was set at $p<0.05$ for all comparisons.

Logistic regression was used to determine which factors were significantly associated with the primary outcome variable of interest: number of visits taken to complete the task strip (dichotomized by level of completion, low versus high). Independent variables included in the regression model were selected by the author based on prior researchers' findings related to barriers experienced by

children with autism in receiving oral care [7]. Predictors that were significant in the bivariate logistic regression analyses ($p<0.05$) were added simultaneously to a multiple logistic regression model. The researchers found no evidence of multicollinearity among the predictor variables (Variance Inflation Factor, VIF<2 for all variables).

2.4 Data storage

The de-identified data were categorized and entered into an Excel© spreadsheet; this spreadsheet was stored within a password protected database. In order to comply with HIPAA regulations and to maintain patient privacy, no identifying codes were assigned to each data line and no PHI was extracted.

2.5 Quality control and data management

The principal investigator (PI) was the sole researcher responsible for data extraction and charting. In order to ensure accurate and valid data collection, an independent review was conducted by Dr. Oscar Padilla, attending faculty at the MSC. He reviewed randomized charts in order to maintain accuracy and uphold reliability of the coding. A copy of all data collected was maintained on a password protected hard drive for future research reference.

CHAPTER 3: RESULTS

3.1 Descriptive statistics

In this retrospective study, data from 79 patients were studied. The sample characteristics are displayed below in Table 1. The mean age of the sample was 3.51 (± 1.07 SD). More than half of the respondents were male (79.7%) and of Caucasian descent (70.9%); over a quarter of the sample was Hispanic (29.1%).

In terms of patient health characteristics, nearly all of the sample had an ASD diagnosis (94.9%), 22.8% reported being prescribed medication, and the most frequently reported co-occurring disorders included speech delay (86.1%) and developmental delay (34.2%). The majority of patients were receiving either speech (88.6%), occupational (77.2%), or ABA (63.3%) therapy.

When examining patient behavioral variables, parents reported a variety of anticipated issues related to cooperation: short attention span (29.1%), unknown or not focused (26.6%), age appropriate (19%), aggressive (16.5%), playful (15.2%) and other (27.8%), Over one quarter of the sample could communicate verbally (39.2%), and the most popular non-communication method was the picture exchange (67.1%).

In terms of dental visit characteristics, nearly half had visited a dentist before (45.6%), and the majority were coming in for a routine exam (78.5%); fewer than half reported coming in for a cleaning (40.5%). Task strip completion was achieved by almost the whole sample (97.5%), and nearly half of the patients (68.4%) completed the task strip in one to three visits (Table 2). The mean number of visits

required to complete the task strip was 3.00 (± 1.25 SD). Figures 3-6 below provides additional graphical layout of some demographic results as provided in Table 1.

Patient Demographics Mean patient age: 3.51 (± 1.07 SD, Range= 2-7)		
	N	**%**
Male gender	63	79.7%
Race		
Caucasian	56	70.9%
African American	14	17.7%
Asian	6	7.6%
American Indian	2	2.5%
Multi-race	1	1.3%
Hispanic ethnicity	23	29.1%
Non-Hispanic ethnicity	56	70.9%
Patient Health Characteristics		
ASD diagnosis	75	94.9%
Co-Occurring disorders		
Speech delay	68	86.1%
Developmental delay	27	34.2%
ADHD	6	7.6%
Seizure disorder	2	2.5%
Asthma	2	2.5%
Prescribed medication	18	22.8%
Patient Other Services		
Speech therapy	70	88.6%
Occupational therapy	61	77.2%
ABA	50	63.3%
Physical therapy	24	30.4%
Other	7	8.9%
Play therapy	6	7.6%
Music therapy	5	6.3%
Patient Behavioral Characteristics		
Patient level of cooperation		
Short attention span	23	29.1%
Other	22	27.8%
Don't know	21	26.6%
Non-focused	21	26.6%
Age appropriate	15	19.0%
Aggressive	13	16.5%
Playful	12	15.2%
Can communicate verbally	31	39.2%
Nonverbal communication method		
Picture exchange	53	67.1%
Sign language	9	11.4%
Sentence board or gestures	7	8.9%
Patient Dental Visit Characteristics		
Ever visited the dentist	36	45.6%
Patient needs		
Routine exam	62	78.5%
Cleaning	32	40.5%
Other/don't know	27	34.2%
Completed task strip	77	97.5%
Completed task strip in 1-3 visits	54	68.4%
Mean number of visits required to complete task strip: 3 (± 1.25 SD, Range= 1-5)		

Table 1: Patient Demographic, Health and Behavioral Characteristics (N=79).

Number of Visits Needed to Complete Task Strip	N (%)
1	8 (10.1%)
2	23 (29.1%)
3	23 (29.1%)
4	11(13.9%)
5	14 (17.8%)

Table 2: Number of visits needed to complete the task strip (N=79).

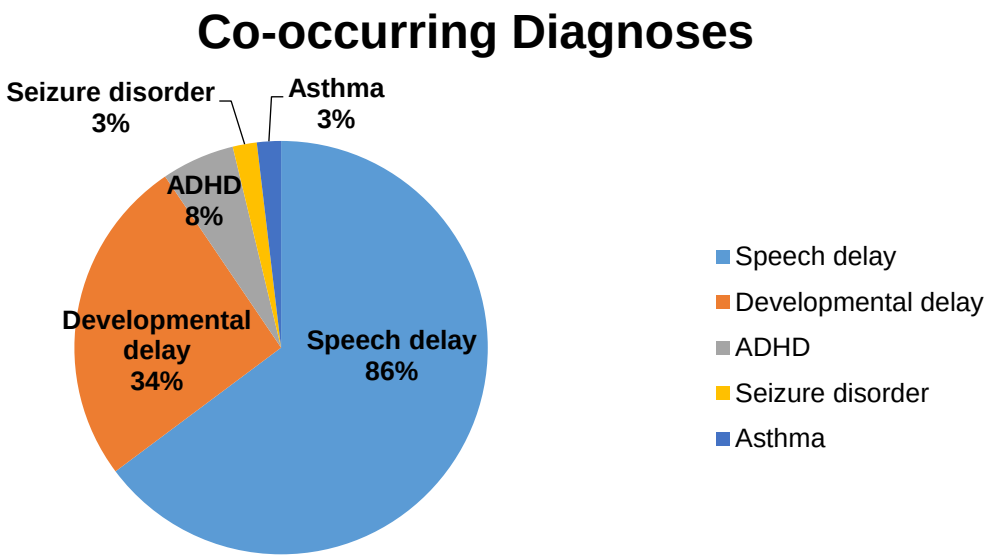

Figure 3: Chart identifying key co-occurring diagnosis for patients with Autism Spectrum Disorder.

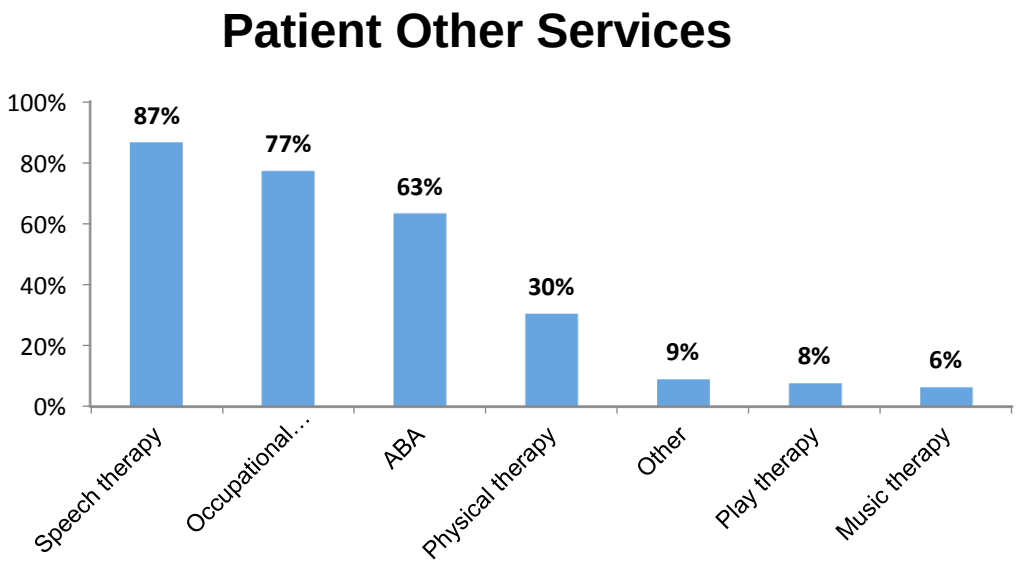

Figure 4: Other services patients with Autism Spectrum Disorder are receiving.

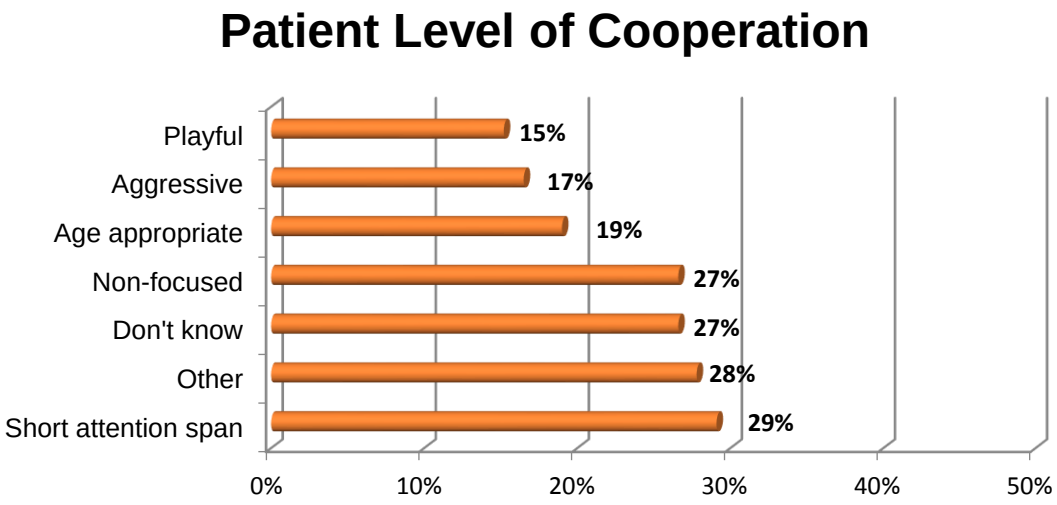

Figure 5: Patient's level of cooperation based on parental input during pre-treatment assessment form completion.

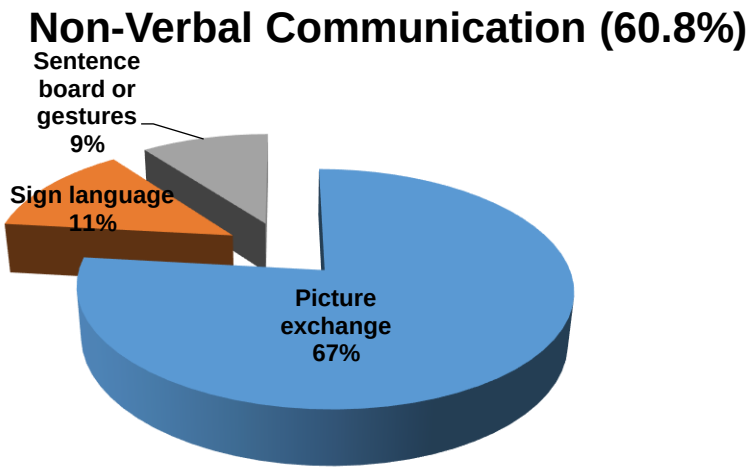

Figure 6: Graph outlining methods of non-verbal communication for those patients with Autism Spectrum Disorder.

3.2 Paired t-tests

T-test results revealed significant mean differences for race and ethnicity. In terms of race, Whites (or Caucasians) needed more time to complete the task strip than their non-white counterparts (3.18 visits versus 2.57 visits, P=0.047). Regarding ethnicity, Hispanics required more time (3.74 visits versus 2.70 visits, P=0.002) than their non-Hispanics counterparts. Those receiving occupational therapy also had significantly higher mean visits (3.20 versus 2.33, P=0.033). There were also significant differences in mean number of visits related to patient behaviors. Children of parents who reported that they did not know or could not anticipate issues related to cooperation during the visit took significantly longer to complete the task strip (3.67 visits versus 2.76 visits, P=0.004). Those who could communicate verbally took significantly fewer visits to complete the strip (2.61 versus 3.25, P=0.026), and those reporting non-verbal communication needed more visits to complete the task strip (3.26 versus 2.64, P=0.028). Patients coming in for a cleaning had significantly fewer visits (2.97 versus 3.02, P=0.053) (Table 2; Table 3; Figure 3).

Patient Demographics	Mean number of visits to complete task strip	P value
Gender		0.118
Male	2.89	
Female	3.44	
Race		***0.047***
White	3.18	
Non-white	2.57	
Ethnicity		***0.002***
Hispanic	3.74	
Non-Hispanic	2.70	
Patient Health Characteristics		
ASD Diagnosis		1.00
Yes	3.00	
No	3.00	
Co-Occurring disorders		
Speech Delay		0.439
Yes	3.04	
No	2.73	
Developmental delay		0.092
Yes	3.30	
No	2.85	
Prescribed medication		0.523
Yes	2.83	
No	3.05	
Patient other services		
Speech therapy		0.840
Yes	3.01	
No	2.89	
Occupational therapy		***0.033***
Yes	3.20	
No	2.33	
ABA		0.760
Yes	2.98	
No	3.07	
Physical therapy		0.243
Yes	3.25	
No	2.89	

Table 2: t-tests examining mean differences in task strip completion by Demographic and Health Characteristics (N=79)

Patient Behavioral Characteristics	Mean number of visits to complete task strip	P value
Patient level of cooperation		
Short attention span		0.167
Yes	2.70	
No	3.13	
Other		0.842
Yes	3.05	
No	2.98	
Don't know		***0.004***
Yes	3.67	
No	2.76	
Non-focused		0.840
Yes	2.95	
No	3.02	
Age appropriate		0.254
Yes	2.67	
No	3.08	
Aggressive		0.227
Yes	3.38	
No	2.92	
Playful		1.000
Yes	3.00	
No	3.00	
Can communicate verbally		***0.026***
Yes	2.61	
No	3.25	
Uses nonverbal communication		***0.028***
Yes	3.26	
No	2.64	
Nonverbal communication method		
Picture exchange		0.569
Yes	3.06	
No	2.88	
Sign language		0.399
Yes	3.33	
No	2.96	
Patient Dental Visit Characteristics		
Ever visited the dentist		1.000
Yes	3.00	
No	3.00	
Patient needs		
Routine exam		0.416
Yes	2.95	
No	3.18	
Cleaning		0.053
Yes	2.97	
No	3.02	

Table 3: t-tests examining mean differences in task strip completion by Behavior and Dental Visit Characteristics N=79).

t-test

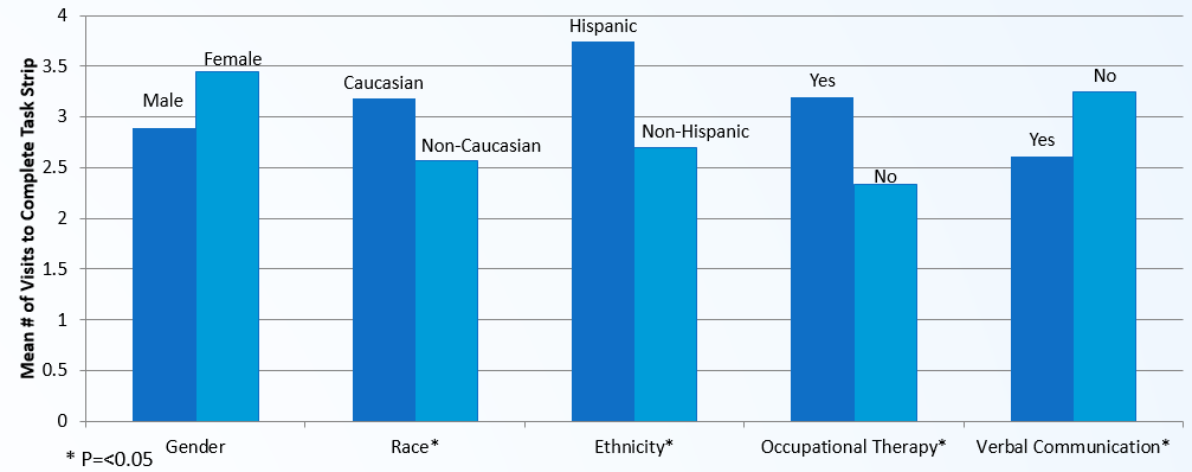

Figure 7: Select t-test results for the mean number of visits needed to complete the task strip.

3.3 Regression Models

Bivariate Analysis

The bivariate logistic regression model shows results that predict the completion of the task strip in one to three visits. Males had significantly higher odds of completing the task strip [OR 3.777; (95% CI 1.209, 11.798); P=0.022], whereas Hispanic ethnicity was associated with significantly *lower* odds of task strip completion in one to three visits [OR 0.210; (95% CI 0.074, 0.595) P=0.003]. Children of parents who reported that they did not know or could not anticipate issues related to cooperation during the visit also had significantly *lower* odds of task strip completion in one to three visits [OR 0.161; (95% CI 0.054, 0.476) P=0.001] (Table 4).

Multivariate Analysis

Table 3 also displays the multivariate logistic results. Hispanic ethnicity [OR 0.073; (95% CI 0.017, 0.315); P=0.000] and parent lack of knowledge related to patient cooperation [OR 0.078; (95% CI 0.018, 0.344); P=0.001] remained significantly associated with lower odds of completing the task strip (Table 4).

	Bivariate Analysis			Multivariate Analysis		
Variable	**Odds ratio**	**95% CI**	**P**	**Odds ratio**	**95% CI**	**P**
Patient Demographics						
Age	0.887	0.569, 1.382	0.596			
Male gender	***3.777***	***1.209, 11.798***	***0.022***	3.375	0.826, 13.794	0.090
Caucasian race	0.687	0.233, 2.029	0.497			
Hispanic ethnicity	***0.210***	***0.074, 0.595***	***0.003***	***0.073***	***0.017, 0.315***	***0.000***
Patient Health Characteristics						
ASD diagnosis	0.708	0.070, 7.169	0.770			
Speech delay	0.784	0.189, 3.247	0.737			
Developmental delay	0.889	0.329, 2.401	0.816			
Medication	0.658	0.220, 1.968	0.454			
Previous dental visit	1.097	0.423, 2.848	0.849			
Patient other services						
Speech Therapy	1.091	0.250, 4.768	0.908			
Occupational Therapy	0.544	0.159, 1.863	0.332			
ABA Therapy	1.382	0.624, 3.062	0.426			
Physical Therapy	0.754	0.416, 3.359	0.754			
Patient needs						
Routine Exam	0.601	0.174, 2.072	0.420			
Cleaning	1.031	0.392, 2.712	0.950			
Don't Know	1.143	0.354, 3.687	0.823			
Patient Behavioral Characteristics						
Patient level of cooperation						
Short attention span	2.000	0.645, 6.201	0.230			
Other	0.744	0.264, 2.099	0.576			
Don't know	***0.161***	***0.054, 0.476***	***0.001***	***0.078***	***0.018, 0.344***	***0.001***
Non-focused	0.900	0.310, 2.609	0.846			
Age appropriate	3.646	0.756, 17.594	0.107			
Aggressive	1.050	0.290, 3.802	0.941			
Playful	0.913	0.247, 3.372	0.891			
Can communicate verbally	1.577	0.581, 4.279	0.372			
Uses nonverbal communication	0.419	0.151, 1.165	0.096			
Nonverbal communication method						
Picture exchange	0.941	0.342, 2.592	0.907			
Sign language	0.536	0.131, 2.196	0.386			

Table 4: Bivariate and Multivariate logistic regression model of factors associated with task strip completion within 1-3 visits.

CHAPTER 4: DISCUSSION

4.1 Summary

This study reviews a sample of children with ASD who have undergone dental desensitization utilizing a task strip. The overall goal of this study was to examine patient characteristics and identify those which were more likely associated with a positive outcome of task strip completion. Specifically, the project explored the health and behavioral characteristics associated with the successful completion of a comprehensive oral exam and prophylactic dental cleaning. We hypothesized that children with self-reported speech delay, intellectual delay and/or developmental delay would complete the task strip, but only after a significantly greater number of visits than those not affected. Additionally, we hypothesized that certain patient characteristics would be associated with the number of visits required to complete the task strip.

4.2 Completing the task strip

The mean number of visits required to complete the task strip was three, with all patient's completing it by visit number five (Table 2). These results speak to the effectiveness of the interventions used within the clinic. The use of the task strip, for example, seems to serve as a very beneficial tool in aiding to desensitize children with ASD during basic oral exams, completing a cleaning and even for restorative treatment. Although task strip completion was noted on average around visit number three, all of the patients in our population pool typically continue to return for 1 to 3 month desensitization visits (data not shown). These

additional visits can be particularly useful when the patients' needs extend beyond the basic exam and cleaning. Unfortunately, with the caries rate still quite prevalent in the SHCN populations, restorative dentistry needs are often required [32]. We have found that by maintaining the patient in a quasi-desensitizing 1 to 3 month recare program, familiarity with the dental setting aids in future treatments and helps build an essential life skill, the ability to receive dental care.

4.3 Factors associated with success

Previous studies have identified factors associated with poorer levels of cooperation in completion of dental treatment for children with ASD. Some of these factors include younger age, speech delay, concurrent medical diagnosis and female sex [7, 8, 30, 33]. Consistent with previous findings by Marshal *et al*. [30], we identified that patients who could communicate verbally took significantly fewer visits to complete the strip (86% of the population reported a speech delay, however 100% of those patients also reported currently undergoing speech therapy). Additionally, among those patients undergoing occupational therapy, the very means of which identifies a functional deficiency of sorts, took significantly more visits to complete the task strip.

4.3.1 Male gender

Although male gender did not remain significant in the multivariate model, it still relays importance as significant in the bivariate model and confirms results in other studies. Males in our study had significantly higher odds of completing the task strip. We know that ASD is 4.5 times more common in males than in females; the

literature reveals that it is often females with ASD who are unable to cooperate to complete simple health care regimens [33].

4.3.2 Parental knowledge

Children of parents who reported that they did not know or could not anticipate issues related to cooperation during the visit took significantly longer to complete the task strip. This remained significant during the bivariate and multivariate analyses. In 2008, Marshal *et al*. identified that 50% of parents of ASD children accurately predicted cooperation for varied procedures [34]. In our study, almost 27% of parents stated that they did not know how their child would react (prior to the first visit). On the other hand, 73% of our samples parents' accurately predicted patient behavior during a dental office visit. Future direction could include parental expectations, not just at the initial appointment, but prior to each follow-up visit (identifying if parental expectations improve with each visit). Additionally, Marshal's study described levels of parental education (college v.s. high school) and correlated that to successful prediction of ASD patient behavior. Our pre-treatment assessment forms did not take into account the level of parental education; had we collected this information, we could have elaborated more on the parent's ability to predict behavior during treatment.

Lastly, our sample population age averaged around 3.5 years old, a stage which is notorious as a pre-cooperative stage. Half of our population was under 3.5 years of age and accurately predicting their behavior on any given day may just be a 'shot in the dark'. Perhaps in future studies when studying an older population pool, behavior prediction may be more indicative of parental knowledge and involvement

in patient care, but for now, although significant in our study, I am cautious to lend true significance to this piece of data.

4.3.3 Hispanic ethnicity

Hispanic ethnicity remained significant throughout the bivariate and multivariate analysis, with this population demonstrating lower odds of completing the task strip within one to three visits. A growing interest in Hispanic health care has identified numerous cultural differences resulting in variances of health conditions, health insurance, access to care and the use of health services [35]. The U.S. Hispanic population are less likely to pursue and receive health care, including oral health care. Additionally, they may experience barriers when seeking out needed care, including but not limited to, cultural and linguistic factors, and unfamiliarity/fear/mistrust of the health care systems put in place to help society [36]. Add to this the additional challenge of having a child with an ASD diagnosis; this likely creates an increased difficulty in seeking out and accessing care and other needed services.

Acculturation is a term which refers to the cultural and psychological changes that accompany merging civilizations. This concept of clashing cultures is not new, examined first with Native Americans and the arrival of the Europeans and now again, with the largescale migration of a Hispanic population into the U.S. Acculturation has four accompanying domains under which individuals may be categorized, including assimilation, separation, integration and marginalization [37]. In particular, those within the integration domain are able to adopt cultural

norms of the host civilization while retaining and assigning importance to their culture of origin. A review by Lara *et al.* examined Hispanics in the U.S. and identified that higher levels of integration result in positive effects on health care use and access as well as negative effects on health behaviors. A number of scales have been suggested in order to measure where individuals fall within these categories; these scales hold potential for future research where we could further dissect the issue of Hispanic ethnicity and oral health outcomes [38]. Additionally, language has been identified as a central impeding factor in health care treatment for U.S. Hispanic families that care for children with ASD [39].

Acculturation cannot be touted enough in the dental profession. With the Hispanic population continuing to grow and integrate in the U.S., many patients seeking care will fall under this category and present with added cultural complexities when it comes to treatment.

4.4 Limitations

In this study, potential bias exists namely due to the subjective self-reported nature of the data by parents. A social desirability bias may also be at play and it is difficult to tease out this bias without actual diagnostic reports from the patient physicians, instead of gathering parent reported data. Additionally, our data was gathered from a limited population of those children currently enrolled in Baudhain center school, located in the MSC. These children attend school in a highly collaborative center where special attention is given to each child. The very nature of the inter-professional environment and the dedicated services available for therapeutic

treatment of these ASD children may not allow our results to be generalizable to the overall target population. Lastly, as the MSC dental clinic is a part of the Nova Southeastern University pediatric dental residency program, variability undoubtedly exists in chart notes and recorded patient data among the residents that rotate through the clinic on a daily basis. Although numerous limitations exist, studies of this nature are of the utmost importance to contribute to the ever-growing body of literature in treating children with ASD.

CHAPTER 5: CONCLUSION

5.1 Conclusion

After examining patient demographics and associated health and behavioral characteristics, the results of this study identify a number of associations. The average number of office visits needed for a child with ASD to complete a comprehensive oral examination and prophylactic dental cleaning was 3 visits. Patients reporting the ability to verbally communicate and those not currently in need of or undergoing occupational therapies were more likely to complete the task strip in fewer dental visits.

No associations were identified between completion of the task strip and mean number of visits needed to complete the task strip and those patients with self-reported developmental delay or intellectual delay. We reject null hypotheses number two and three.

Those patient's reporting a speech delay, and by extension were delayed in their ability to verbally communicate, were significantly association with completion of the task strip. We have proved hypotheses number's one and four as some of the patient characteristics are associated with task strip completion, in particular verbal communicative ability.

Children with ASD truly are on a spectrum; each patient presents with a variety of differences, not only individually, but also among their families and services they receive. These differences play a role in how they manage, or fail to manage, the obstacles in life. Our results confirm prior research indicating that the treatment of children on this ever broadening spectrum requires a tailored multifactorial

approach, including identifying individual characteristics which may be helpful to clinicians treating this population.

5.2 Practice tips

- Use of a pre-treatment assessment form can not only facilitate smooth intake of new patients, but also allow for treating dentists to immediately identify factors associated with successful treatment outcomes in children with ASD.
- Utilization of a task strip with a visual pedagogy can help facilitate the desensitization process and create familiarity of dental procedures.
- Being knowledgeable about parental involvement and the child's behavioral/communicative factors is essential for dentists to decrease chair time and achieve successful outcomes.

APPENDIX A: PRE-TREATMENT FORM

Date: _____ **ID#:** _____

Parent/Guardian Name: _____
Parent/ Guardian Telephone: _____
Parent/Guardian Email Address: _____

PRE-TREATMENT ASSESSMENT FORM

(to be completed by Parent or Guardian)

Relation to Patient? ☐ Parent ☐ Guardian ☐ Caregiver

CHILD'S INFORMATION

Name: _____ **Birthdate:** _____

Sex: ☐ Male ☐ Female

Race: ☐ White ☐ African American ☐ Asian ☐ American Indian ☐ More than one race

Ethnicity: Hispanic/Latino ☐ Yes ☐ No

Does the child have any siblings? ☐ Yes ☐ No If yes, how many?_____

Was your child diagnosed with Autism Spectrum Disorder (ASD)? ☐ Yes ☐ No

What program is your child currently enrolled in?: ☐ Baudhuin Preschool ☐ The Academy ☐ Starting Right ☐ Other: _____

What other services is your child receiving? ☐ Physical Therapy ☐ ABA ☐ Play ☐ Occupational Therapy ☐ Speech ☐ Music ☐ Other: _____

Does you child have any other co-occurring diagnosis/es?

- ☐ ADHD
- ☐ Seizure Disorder
- ☐ Asthma
- ☐ Epilepsy
- ☐ Speech Delay
- ☐ Intellectually Disability
- ☐ Down Syndrome
- ☐ Seizure Disorder
- ☐ Developmental Delay
- **Mental Health Disorder:**
- ☐ Fragile X
- ☐ Other Genetic Disorder: _____
- ☐ Hypersensitivity/allergy-food
- ☐ Hypersensitivity-medications
- ☐ Depression ☐ Bipolar ☐ Anxiety

Is your child currently taking any medications? ☐ Yes ☐ No
If yes, please list the medications here: _____

Has the child ever visited the dentist? ☐ Yes ☐ No
If yes, when/describe: _____

Please describe your child' at-home dental care: _____

ADDITIONAL INFORMATION

The Patient needs *(check all that apply)* :

- ☐ Routine Exam
- ☐ Filling(s)
- ☐ Cleaning
- ☐ Extraction(s)
- ☐ Orthodontic Treatment
- ☐ Multiple Treatments
- ☐ Don't Know
- ☐ Other _____

See reverse side

The Patient's level of cooperation is likely to be *(check only one)* :

- ☐ Age Appropriate
- ☐ Aggressive
- ☐ Playful
- ☐ Short Attention Span
- ☐ Non-Focused
- ☐ Don't Know
- ☐ Other _____

Management techniques I would like the dentist to use on my child *(Check all that apply)* :

- ☐ Sedation
- ☐ Operating Room/ General Anesthesia
- ☐ Restraint
- ☐ Short, Multiple Visits
- ☐ Don't Know
- ☐ Other _____

The following statements are about the opinions you have about staying or not staying with the child in the dental treatment room when the child is being treated by the dentist. (Please circle)

It is best if I stay with the child because the child needs me to be there.	Agree	Disagree
It is best if I stay with the child because I can help the Doctor and Staff.	Agree	Disagree
It is best if I stay with the child because I need to be there.	Agree	Disagree
It is best if I wait in the waiting room because dentists make me nervous, and that won't help the situation.	Agree	Disagree
It is best if I wait in the waiting room because the dentist knows best how to handle the child's behavior.	Agree	Disagree

Things that I know will motivate the patient to try harder (i.e. computer time, DVD, iPad, video games, movies etc.)

_____

Has your child ever gotten their haircut? ☐ Yes ☐ No
If yes, what was the haircut experience like?

_____

Does your child have any other physical challenges that the dental team should be aware of?

_____

Is there any other information that the staff should know prior to working with this patient?

_____

Is your child able to communicate verbally? ☐ Yes ☐ No

Does your child use non-verbal communication? ☐ Yes ☐ No

Please check any of the following that the child uses:

- ☐ Mayer Johnson Symbols
- ☐ Sign Language
- ☐ Sentence board or gestures
- ☐ Picture Exchange Communication Systems

Please list any and all factors that contributed to you choosing our clinic (i.e. insurance, proximity to home, services offered, other)?

_____

APPENDIX B: RAW DATA

Variable Values

Value		Label
Gender	0	Male
	1	Female
Race	0	White
	1	African American
	2	Asian
	3	American Indian
	4	More than one race
Ethnicity	0	No
	1	Yes
ASD	0	No
	1	Yes
Cooccurring	0	No
	1	Yes
Otherser	0	No
	1	Yes
Medication	0	No
	1	Yes
Everdentist	0	No
	1	Yes
Patientneeds	0	No
	1	Yes
Coop	0	No
	1	Yes
Verbal	0	No
	1	Yes
Nonverbcom	0	No
	1	Yes
Taskstrip	0	No
	1	Yes

	A	B	C	D	E	F	G	H
1	Age (yrs)	Gender	Race	Ethnicity	ASD	CooccurringA	CooccurringB	CooccurringC
2						ADHD	Seizure	Asthma
3	4	0	0	0	1	0	0	0
4	4	0	0	0	1	0	0	0
5	3	0	0	0	1	0	0	0
6	4	0	1	0	1	0	0	0
7	4	0	0	0	1	0	0	0
8	2	0	2	0	1	0	0	0
9	4	0	1	0	1	0	0	0
10	4	0	1	0	1	0	0	0
11	3	0	0	0	1	0	0	0
12	5	0	0	0	1	0	0	0
13	4	1	0	0	1	0	0	0
14	2	0	0	0	1	0	0	0
15	4	0	0	1	1	1	0	0
16	2	0	0	0	1	0	0	0
17	5	0	0	1	1	0	0	0
18	2	0	2	0	1	0	0	0
19	4	0	0	1	1	0	0	0
20	3	0	0	1	1	0	0	0
21	3	0	2	0	1	1	0	0
22	5	0	0	0	1	0	0	0
23	6	0	0	0	1	0	0	0
24	4	0	0	0	1	0	0	0
25	3	0	3	0	1	1	0	0
26	2	1	1	0	1	0	0	0
27	3	0	0	0	1	0	0	0
28	2	0	0	0	1	0	0	0
29	4	1	1	0	1	0	0	0
30	4	1	1	1	1	0	0	0
31	3	0	0	0	1	0	0	0
32	5	1	0	0	1	0	0	0
33	3	0	0	0	1	0	0	0
34	4	0	0	0	1	0	0	0
35	4	1	1	0	1	0	0	0
36	3	0	0	1	1	0	0	0
37	3	0	2	0	1	0	0	0
38	4	0	0	0	1	0	0	0
39	4	0	0	1	1	0	0	1
40	4	0	1	0	1	0	1	0
41	2	0	0	1	1	0	0	0
42	2	1	0	0	0	0	0	0
43	2	0	2	0	0	0	0	0
44	4	0	0	1	1	0	0	0
45	4	0	0	1	1	0	0	0
46	3	0	0	1	1	0	0	0
47	3	0	2	0	1	1	0	0

	A	B	C	D	E	F	G	H
48	**Age (yrs)**	**Gender**	**Race**	**Ethnicity**	**ASD**	**CooccurringA**	**CooccurringB**	**CooccurringC**
49						**ADHD**	**Seizure**	**Asthma**
50	5	0	0	0	1	0	0	0
51	2	1	0	0	0	0	0	0
52	2	1	0	0	0	0	0	0
53	4	0	0	1	1	0	0	0
54	4	0	0	1	1	0	0	0
55	2	0	0	1	1	0	0	0
56	7	0	3	0	1	1	0	0
57	5	0	0	1	1	0	0	0
58	2	1	0	1	1	0	0	0
59	5	0	0	1	1	0	0	0
60	4	0	0	0	1	0	1	0
61	2	1	1	0	1	0	0	0
62	2	0	0	1	1	0	0	0
63	3	0	1	0	1	0	0	0
64	3	0	0	0	1	0	0	0
65	5	0	0	0	1	0	0	0
66	2	0	0	0	1	0	0	0
67	4	1	1	0	1	0	0	0
68	4	0	0	0	1	0	0	0
69	3	0	0	0	1	0	0	0
70	3	0	4	0	1	0	0	0
71	5	0	0	1	1	0	0	0
72	5	1	0	0	1	0	0	0
73	4	0	0	0	1	1	0	0
74	3	0	1	0	1	0	0	0
75	3	0	0	1	1	0	0	0
76	4	0	0	0	1	0	0	0
77	4	1	1	0	1	0	0	0
78	3	1	0	1	1	0	0	0
79	3	0	1	0	1	0	0	0
80	3	1	0	1	1	0	0	0
81	4	0	0	0	1	0	0	0
82	4	0	0	1	1	0	0	1
83	3	0	0	0	1	0	0	0

	I	J	K	L	M	N
1	**CooccurringD**	**CooccurringE**	**CooccurringF**	**CooccurringG**	**CooccurringH**	**OtherserA**
2	**Epilepsy**	**Speech Delay**	**Intellectual D**	**Down Sydrome**	**DD**	**PT**
3	0	1	0	0	1	0
4	0	0	0	0	0	0
5	0	1	0	0	0	0
6	0	1	0	0	0	1
7	0	1	0	0	1	1
8	0	1	0	0	0	0
9	0	1	0	0	0	0
10	0	1	0	0	0	0
11	0	1	0	0	0	0
12	0	1	0	0	0	0
13	0	1	0	0	0	0
14	0	1	0	0	0	1
15	0	0	0	0	0	0
16	0	1	0	0	1	0
17	0	0	0	0	0	0
18	0	1	0	0	0	0
19	0	1	0	0	1	1
20	0	1	0	0	1	0
21	0	0	0	0	0	0
22	0	1	0	0	0	0
23	0	0	0	0	0	0
24	0	1	0	0	1	0
25	0	0	0	0	1	1
26	0	1	0	0	0	1
27	0	1	0	0	0	0
28	0	1	0	0	0	0
29	0	1	0	0	1	0
30	0	1	0	0	0	0
31	0	1	0	0	0	0
32	0	1	0	0	1	1
33	0	1	0	0	1	1
34	0	0	0	0	0	0
35	0	1	0	0	0	0
36	0	1	0	0	1	0
37	0	1	0	0	0	0
38	0	1	0	0	1	1
39	0	1	0	0	0	0
40	0	1	0	0	1	1
41	0	1	0	0	1	0
42	0	1	0	0	1	1
43	0	1	0	0	0	0
44	0	1	0	0	0	1
45	0	1	0	0	1	1
46	0	1	0	0	1	0
47	0	1	0	0	0	0

	I	J	K	L	M	N
48	CooccurringD	CooccurringE	CooccurringF	CooccurringG	CooccurringH	OtherserA
49	Epilepsy	Speech Delay	Intellectual D	Down Sydrome	DD	PT
50	0	1	0	0	0	0
51	0	1	0	0	1	1
52	0	1	0	0	0	0
53	0	1	0	0	0	0
54	0	0	0	0	0	1
55	0	1	0	0	1	0
56	0	1	0	0	1	1
57	0	1	0	0	0	0
58	0	1	0	0	1	0
59	0	1	0	0	0	1
60	0	1	0	0	1	1
61	0	1	0	0	0	1
62	0	1	0	0	0	0
63	0	1	0	0	0	1
64	0	1	0	0	0	0
65	0	0	0	0	0	0
66	0	1	0	0	0	0
67	0	1	0	0	1	0
68	0	1	0	0	0	0
69	0	0	0	0	0	1
70	0	1	0	0	0	0
71	0	1	0	0	0	0
72	0	1	0	0	1	1
73	0	1	0	0	0	0
74	0	1	0	0	1	1
75	0	1	0	0	0	0
76	0	0	0	0	0	0
77	0	1	0	0	0	0
78	0	1	0	0	1	0
79	0	1	0	0	0	0
80	0	1	0	0	0	0
81	0	1	0	0	1	1
82	0	1	0	0	0	0
83	0	1	0	0	0	0

	O	P	Q	R	S	T	U	V
1	**OtherserB**	**OtherserC**	**OtherserD**	**OtherserE**	**OtherserF**	**OtherOther**	**Medication**	**Medicationtype**
2	**OT**	**ABA**	**Speech**	**Play**	**Music**	**Other**		
3	1	0	1	0	1	0	0	
4	0	0	1	0	0	0	0	
5	1	0	1	0	0	1	0	
6	1	9	1	0	0	0	0	
7	1	1	1	0	0	0	0	
8	0	1	1	0	0	0	1	Miralax, Iron vitamin
9	0	0	0	0	0	0	1	Albuterol
10	1	1	1	0	0	0	0	
11	1	1	1	0	0	0	0	
12	1	0	1	0	0	0	0	
13	1	0	1	0	0	0	0	
14	1	1	1	0	0	1	0	
15	0	0	1	0	0	0	0	
16	1	1	1	0	0	0	0	
17	0	1	0	0	0	0	0	
18	0	0	1	0	0	0	0	
19	1	1	1	0	0	0	0	
20	1	1	1	0	0	0	0	
21	0	1	1	0	0	0	0	
22	1	0	1	0	0	0	0	
23	0	1	0	0	0	0	0	
24	1	1	1	0	0	1	1	Multivitamins
25	1	1	1	0	0	0	1	probiotics
26	1	1	1	0	0	0	0	
27	1	1	1	0	0	0	1	probiotics + cal/mag
28	0	1	1	0	0	0	0	
29	1	1	1	0	0	0	1	supplements
30	1	1	1	1	0	0	1	Singulair
31	1	1	1	0	0	0	0	
32	1	0	1	1	1	1	0	
33	1	0	1	0	0	0	0	
34	0	0	0	0	0	0	0	
35	1	1	1	0	0	0	0	
36	1	1	1	0	0	0	1	obiotics + multivitam
37	0	1	1	0	0	0	0	
38	1	1	1	0	0	0	0	
39	1	1	1	0	0	0	0	
40	1	0	1	0	0	0	1	
41	1	0	1	0	0	0	0	
42	1	1	1	0	0	0	0	
43	0	0	1	0	0	0	0	
44	1	0	1	0	0	0	0	
45	1	1	1	0	0	0	0	
46	1	1	1	0	0	0	0	
47	0	1	1	0	0	0	0	

	O	P	Q	R	S	T	U	V
48	**OtherserB**	**OtherserC**	**OtherserD**	**OtherserE**	**OtherserF**	**OtherOther**	**Medication**	**Medicationtype**
49	**OT**	**ABA**	**Speech**	**Play**	**Music**	**Other**		
50	1	1	1	0	0	0	0	
51	1	1	1	0	0	0	0	
52	1	1	1	0	0	0	0	
53	1	0	1	0	1	0	0	
54	1	1	0	0	1	0	0	
55	1	1	1	0	0	0	0	
56	1	1	1	0	0	0	1	probiotics
57	0	0	1	0	0	0	1	prevacid
58	0	0	1	0	0	0	1	prevacid
59	1	1	1	0	0	0	0	
60	1	0	1	0	0	0	1	
61	1	1	1	0	0	0	0	
62	1	1	1	0	0	0	0	
63	1	0	1	0	0	0	0	
64	1	1	1	1	0	0	1	probiotics
65	0	1	0	0	0	1	0	
66	0	1	1	0	0	0	0	
67	1	1	1	0	0	0	1	Supplements
68	1	1	1	1	0	1	1	Singulair
69	1	0	0	1	0	0	0	
70	1	1	1	0	0	0	0	
71	1	1	1	0	0	0	0	
72	1	0	1	1	1	1	0	
73	1	0	1	0	0	0	0	
74	1	0	1	0	0	0	0	
75	1	1	1	0	0	0	0	
76	1	0	0	0	0	0	0	
77	1	1	1	0	0	0	0	
78	1	1	1	0	0	0	1	Probiotics
79	1	0	1	0	0	0	0	
80	0	0	0	0	0	0	1	multivitamins
81	1	1	1	0	0	0	0	
82	1	1	1	0	0	0	0	
83	1	1	1	0	0	0	0	

	W	X	Y	Z	AA	AB	AC	AD
1	Everdentist	PatneedsA	PatneedsB	PatneedsC	PatneedsD	PatneedsE	PatneedsF	PatneedsG
2		routine exam	fillings	cleaning	extractions	ortho tx	multiple tx	don't know
3	0	1	0	1	0	0	0	0
4	1	1	0	0	0	0	0	0
5	1	0	0	0	0	0	0	0
6	0	1	0	1	0	0	0	0
7	1	0	0	0	0	0	0	0
8	0	1	0	1	0	0	0	0
9	1	1	0	1	0	0	0	1
10	1	1	0	1	0	0	0	0
11	0	1	0	1	0	0	0	0
12	1	0	0	0	0	0	0	1
13	1	1	0	0	0	0	0	0
14	0	0	0	0	0	0	0	1
15	0	0	0	0	0	0	0	1
16	0	1	0	0	0	0	0	1
17	0	1	0	0	0	0	0	0
18	0	1	0	0	0	0	0	1
19	1	0	0	1	0	0	0	0
20	1	0	0	1	0	0	0	0
21	0	1	0	1	1	0	0	0
22	1	1	0	1	0	0	0	0
23	1	1	0	1	0	0	0	0
24	0	1	0	0	0	0	0	0
25	1	1	0	0	0	1	1	0
26	0	1	0	0	0	0	0	0
27	1	1	0	0	0	0	0	0
28	0	1	0	0	0	0	0	0
29	1	1	0	1	0	0	0	1
30	1	1	0	0	0	0	0	0
31	1	1	0	0	0	0	0	0
32	0	1	0	1	0	0	0	0
33	1	1	0	1	0	0	0	0
34	0	1	0	0	0	0	0	0
35	1	0	0	0	0	0	1	0
36	0	1	0	1	0	0	0	0
37	0	1	0	1	0	0	0	0
38	1	0	0	0	0	0	0	1
39	0	0	0	0	0	0	0	1
40	0	1	0	1	0	0	0	1
41	1	1	0	0	0	0	0	0
42	0	1	0	0	0	0	0	0
43	0	1	0	0	0	0	0	1
44	1	1	0	1	0	0	0	0
45	1	0	0	1	0	0	0	0
46	1	0	0	1	0	0	0	0
47	0	1	0	1	1	0	0	0

	W	X	Y	Z	AA	AB	AC	AD
48	**Everdentist**	**PatneedsA**	**PatneedsB**	**PatneedsC**	**PatneedsD**	**PatneedsE**	**PatneedsF**	**PatneedsG**
49		**routine exam**	**fillings**	**cleaning**	**extractions**	**ortho tx**	**multiple txs**	**don't know**
50	0	0	0	0	0	0	0	1
51	0	1	0	0	0	0	0	0
52	0	1	0	0	0	0	0	1
53	0	1	0	0	0	0	0	0
54	0	1	0	1	0	0	0	0
55	1	1	0	0	0	0	0	0
56	1	1	0	0	0	1	1	0
57	1	1	0	0	0	0	0	0
58	1	1	0	0	0	0	0	0
59	0	1	0	1	0	0	0	0
60	0	1	0	1	0	0	0	1
61	0	1	0	0	0	0	0	0
62	0	1	0	0	0	0	0	0
63	1	0	0	1	0	0	0	0
64	1	1	0	0	0	0	0	0
65	1	1	0	1	0	0	0	0
66	0	1	0	0	0	0	0	0
67	1	1	0	1	0	0	0	1
68	0	1	0	0	0	0	0	0
69	0	1	0	0	0	0	0	0
70	1	1	0	0	0	0	0	0
71	0	1	0	0	0	0	0	0
72	0	1	0	1	0	0	0	0
73	1	1	0	1	0	0	0	0
74	1	1	0	1	0	0	0	0
75	0	1	0	0	0	0	0	0
76	0	1	0	0	0	0	0	0
77	1	0	0	0	0	0	1	0
78	0	1	0	1	0	0	0	0
79	0	1	0	1	0	0	0	0
80	0	1	0	0	0	0	0	0
81	1	0	0	0	0	0	0	1
82	0	0	0	0	0	0	0	1
83	0	1	0	0	0	0	0	0

	AE	AF	AG	AH	AI	AJ	AK	AL
1	**PatneedsOth**	**CoopA**	**CoopB**	**CoopC**	**CoopD**	**CoopE**	**CoopF**	**CoopOther**
2	**other**	**age approp**	**playful**	**non-focus**	**aggressive**	**short attn**	**don't know**	**other**
3	0	0	0	0	0	1	1	0
4	0	0	0	1	0	1	0	1
5	0	0	1	0	0	0	0	0
6	0	0	0	0	0	1	0	0
7	0	0	0	0	1	0	0	0
8	0	0	1	0	0	0	0	0
9	0	0	0	0	0	0	0	1
10	0	0	1	0	0	1	0	0
11	0	1	0	1	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	1
14	0	1	0	0	0	0	0	0
15	0	1	0	0	0	1	0	1
16	0	0	0	0	1	0	0	0
17	0	0	0	0	0	1	0	1
18	0	0	0	0	0	0	0	0
19	0	0	1	0	1	0	0	0
20	0	1	1	0	1	0	0	0
21	0	0	0	0	0	0	0	0
22	0	0	1	0	0	0	0	0
23	0	1	0	0	0	0	0	0
24	0	0	0	0	0	0	1	0
25	0	0	0	1	0	1	0	0
26	0	0	0	1	0	1	1	0
27	0	0	0	0	0	0	0	1
28	0	0	0	0	0	1	0	0
29	0	0	0	0	0	0	1	0
30	0	0	0	0	0	1	0	0
31	0	0	0	0	0	0	1	0
32	0	0	1	1	0	0	1	1
33	0	1	0	0	0	0	0	1
34	0	0	0	0	0	0	0	1
35	0	0	0	1	1	0	0	1
36	0	0	0	1	0	1	0	0
37	0	0	0	0	0	0	1	0
38	0	0	0	0	1	0	0	0
39	0	0	0	1	0	1	1	1
40	0	0	0	1	0	1	0	0
41	0	0	0	0	1	0	0	0
42	0	1	0	0	0	0	0	0
43	0	0	0	0	0	0	1	0
44	0	0	0	1	0	1	1	0
45	0	0	1	0	1	0	0	0
46	0	1	1	0	1	0	0	0
47	0	0	0	0	0	0	0	1

	AE	AF	AG	AH	AI	AJ	AK	AL
48	**PatneedsOth**	**CoopA**	**CoopB**	**CoopC**	**CoopD**	**CoopE**	**CoopF**	**CoopOther**
49	**other**	**age approp**	**playful**	**non-focus**	**aggressive**	**short attn**	**don't know**	**other**
50	0	0	0	0	0	0	1	0
51	0	1	0	0	0	0	0	0
52	0	0	0	0	0	0	1	0
53	0	0	1	0	0	0	0	0
54	0	0	0	0	0	0	0	1
55	0	0	0	0	1	0	0	0
56	0	1	0	1	0	1	0	0
57	0	1	1	0	0	0	0	0
58	0	1	0	0	0	0	0	0
59	0	0	0	0	0	0	1	0
60	0	0	0	1	0	1	1	1
61	0	0	0	1	0	1	1	0
62	0	0	0	1	0	0	0	0
63	0	0	0	1	0	1	0	0
64	0	0	0	0	0	0	0	1
65	1	0	0	0	0	1	0	1
66	0	0	0	0	0	1	0	0
67	0	0	0	0	0	0	1	0
68	0	0	0	0	0	1	0	0
69	0	0	0	0	0	0	1	0
70	0	0	0	0	0	0	1	0
71	0	1	0	0	0	0	0	0
72	0	0	1	1	0	0	1	1
73	0	0	0	1	0	0	0	1
74	0	1	0	0	0	0	0	1
75	0	0	0	1	0	0	0	1
76	0	0	0	0	0	0	0	1
77	0	0	0	1	1	0	0	1
78	0	0	0	1	0	1	0	0
79	0	0	0	0	1	0	0	0
80	0	0	0	0	0	0	1	0
81	0	0	0	0	1	0	0	0
82	0	0	0	1	0	1	0	0
83	1	1	0	0	0	0	1	0

	AM	AN	AO	AP	AQ	AR	AS	AT
1	**Verbal**	**NonverbCom**	**NonverbComA**	**NonverbComB**	**NonverbComC**	**NonverbComD**	**TaskStrip**	**TaskStrip**
2			**mayer johnson**	**sentence board**	**sign language**	**pecs**	**Completed**	**#Visits**
3	0	1	0	0	0	1	1	3
4	1	0	0	0	0	0	1	1
5	0	1	0	0	0	1	1	3
6	0	1	0	0	0	1	1	2
7	0	0	0	0	0	0	1	3
8	0	1	0	0	0	1	1	1
9	1	1	0	1	0	1	1	1
10	1	0	0	0	0	0	1	1
11	0	1	0	0	0	1	1	2
12	1	1	0	0	0	1	1	2
13	1	1	0	0	1	1	1	3
14	0	0	0	0	0	0	1	3
15	0	1	0	0	0	1	1	5
16	0	1	0	0	0	1	1	3
17	1	1	0	0	1	1	1	2
18	0	0	0	0	0	0	1	2
19	0	1	0	0	0	1	0	5
20	1	0	0	0	0	1	0	3
21	0	1	0	1	0	0	1	2
22	1	0	0	0	0	1	1	2
23	1	0	0	0	0	0	1	1
24	1	0	0	0	0	0	1	4
25	0	1	0	0	0	0	1	2
26	0	0	0	0	0	0	1	2
27	0	1	0	0	0	1	1	3
28	0	1	0	1	1	1	1	1
29	1	0	0	0	0	0	1	4
30	0	1	0	0	0	1	1	4
31	0	1	0	0	0	1	1	3
32	0	1	0	0	0	1	1	4
33	1	0	0	0	0	1	1	3
34	1	0	0	0	0	1	1	1
35	0	1	0	0	0	1	1	2
36	0	1	0	0	0	1	1	3
37	0	1	0	0	0	1	1	5
38	0	0	0	0	0	0	1	3
39	1	0	0	0	0	1	1	4
40	0	1	0	0	0	1	1	2
41	0	1	0	0	1	0	1	5
42	1	0	0	0	0	0	1	2
43	0	0	0	0	0	0	1	2
44	0	1	0	0	0	1	1	5
45	0	1	0	0	0	1	1	3
46	1	0	0	0	0	1	1	3
47	0	1	0	1	0	0	1	2

	AM	AN	AO	AP	AQ	AR	AS	AT
48	**Verbal**	**NonverbCom**	**NonverbComA**	**NonverbComB**	**NonverbComC**	**NonverbComD**	**TaskStrip**	**TaskStrip**
49			**mayer johnson**	**sentence board**	**sign language**	**pecs**	**Completed**	**#Visits**
50	0	1	0	0	1	1	1	2
51	1	0	0	0	0	0	1	3
52	0	1	0	0	1	1	1	5
53	1	0	0	0	0	0	1	5
54	1	0	0	0	0	0	1	5
55	0	1	0	0	1	0	1	5
56	0	1	0	0	0	1	1	3
57	1	0	0	0	0	0	1	1
58	1	1	0	0	1	0	1	4
59	0	1	0	0	0	1	1	5
60	1	0	0	0	0	0	1	2
61	0	1	0	0	0	1	1	2
62	0	0	0	0	0	1	1	2
63	0	1	0	0	0	1	1	3
64	1	0	0	0	0	1	1	2
65	1	0	0	1	0	0	1	3
66	0	1	0	1	1	1	1	3
67	1	0	0	0	0	1	1	4
68	1	0	0	0	0	1	1	4
69	0	1	0	0	0	1	1	5
70	0	1	0	0	0	1	1	4
71	1	0	0	0	0	1	1	2
72	0	1	0	0	0	1	1	5
73	0	1	0	0	0	1	1	4
74	0	1	0	0	0	1	1	3
75	0	1	0	0	0	1	1	5
76	1	0	0	0	0	1	1	3
77	0	1	0	0	0	1	1	4
78	1	0	0	0	0	1	1	2
79	1	1	0	0	0	1	1	2
80	0	1	0	0	0	0	1	5
81	0	0	0	0	0	0	1	3
82	0	1	0	0	0	1	1	3
83	1	0	0	1	0	1	1	2

BIBLIOGRAPHY

1. Newacheck, P.W., et al., *The unmet health needs of America's children.* Pediatrics, 2000. **105**(4 Pt 2): p. 989-97.
2. Newacheck, P.W., et al., *Access to health care for children with special health care needs.* Pediatrics, 2000. **105**(4 Pt 1): p. 760-6.
3. Nelson, L.P., et al., *Unmet dental needs and barriers to care for children with significant special health care needs.* Pediatr Dent, 2011. **33**(1): p. 29-36.
4. Lai, B., et al., *Unmet Dental Needs and Barriers to Dental Care Among Children with Autism Spectrum Disorders.* Journal of Autism and Developmental Disorders, 2012. **42**(7): p. 1294-1303.
5. Gandhi, R.P. and U. Klein, *Autism spectrum disorders: an update on oral health management.* J Evid Based Dent Pract, 2014. **14 Suppl**: p. 115-26.
6. Lai, B., et al., *Unmet dental needs and barriers to dental care among children with autism spectrum disorders.* J Autism Dev Disord, 2012. **42**(7): p. 1294-303.
7. Mathu-Muju, K.R., et al., *Visualizing the Comorbidity Burden in Children with Autism Spectrum Disorder Receiving Dental Treatment Under General Anesthesia.* Pediatr Dent, 2016. **38**(2): p. 134-9.
8. Nelson, T.M., et al., *Educational and therapeutic behavioral approaches to providing dental care for patients with Autism Spectrum Disorder.* Spec Care Dentist, 2015. **35**(3): p. 105-13.
9. *American Academy of Pediatrics Ad Hoc Task Force on Definition of the Medical Home. The Medical Home.* Pediatrics, 1992. **90**(5): p. 774.
10. Dentistry, A.A.o.P., *Policy of the dental home.* Pediatric Dentistry, 2015. **37**(6): p. 24-25.
11. Nowak, A.J. and P.S. Casamassimo, *The dental home: a primary care oral health concept.* J Am Dent Assoc, 2002. **133**(1): p. 93-8.
12. *American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. 2013, Arlington, VA: American Psychiatric Association.
13. Mazurek, M.O., et al., *Age at first autism spectrum disorder diagnosis: the role of birth cohort, demographic factors, and clinical features.* J Dev Behav Pediatr, 2014. **35**(9): p. 561-9.
14. Johnson, C.P. and S.M. Myers, *Identification and evaluation of children with autism spectrum disorders.* Pediatrics, 2007. **120**(5): p. 1183-215.
15. Manning-Courtney, P., et al., *Autism spectrum disorders.* Curr Probl Pediatr Adolesc Health Care, 2013. **43**(1): p. 2-11.
16. Valicenti-McDermott, M., et al., *Age at diagnosis of autism spectrum disorders.* J Pediatr, 2012. **161**(3): p. 554-6.
17. *Autism Spectrum Disorder: Data & Statistics*. [cited 2016 August 17, 2016]; Available from: http://www.cdc.gov/ncbddd/autism/data.html.
18. Christensen, D., Baio J, Braun KV, et al., *Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and*

Developmental Disabilities Monitoring Network, 11 Sites, United States, 2012, in *MMWR Surveill Summ*. 2016. p. 1-23.
19. Muhle, R., S.V. Trentacoste, and I. Rapin, *The genetics of autism.* Pediatrics, 2004. **113**(5): p. e472-86.
20. Mandell, D.S., M.M. Novak, and C.D. Zubritsky, *Factors associated with age of diagnosis among children with autism spectrum disorders.* Pediatrics, 2005. **116**(6): p. 1480-6.
21. Daniels, A.M. and D.S. Mandell, *Explaining differences in age at autism spectrum disorder diagnosis: a critical review.* Autism, 2014. **18**(5): p. 583-97.
22. Dawson, G., et al., *Randomized, Controlled Trial of an Intervention for Toddlers With Autism: The Early Start Denver Model.* Pediatrics, 2010. **125**(1): p. e17-e23.
23. Rogers, S.J. and L.A. Vismara, *Evidence-based comprehensive treatments for early autism.* J Clin Child Adolesc Psychol, 2008. **37**(1): p. 8-38.
24. *Educating Children with Autism*, ed. N.R. Council. 2001, Washington, D.C.: National Academies Press. 324.
25. Vismara, L.A. and S.J. Rogers, *Behavioral treatments in autism spectrum disorder: what do we know?* Annu Rev Clin Psychol, 2010. **6**: p. 447-68.
26. Connick, C., et al., *Desensitization: strengths and limitations of its use in dentistry for the patient with severe and profound mental retardation.* ASDC J Dent Child, 2000. **67**(4): p. 250-5.
27. Backman, B. and C. Pilebro, *Visual pedagogy in dentistry for children with autism.* ASDC J Dent Child, 1999. **66**(5): p. 325-31, 294.
28. Zink, A.G., et al., *Use of a Picture Exchange Communication System for preventive procedures in individuals with autism spectrum disorder: pilot study.* Special Care in Dentistry, 2016. **36**(5): p. 254-259.
29. Dentistry, A.A.o.P., *Definition of Special Health Care Needs.* Pediatric Dentistry, 2016. **37**(6): p. 16.
30. Marshall, J., et al., *Cooperation predictors for dental patients with autism.* Pediatr Dent, 2007. **29**(5): p. 369-76.
31. Medicaid, F. *Dental Services Coverage Policy* 2016 [cited 2017 June 4]; Section 4.2.1.1]. Available from: http://ahca.myflorida.com/medicaid/review/specific_policy.shtml.
32. Charlotte, L., Andrea, R & Suzanne P, *Unmet Dental Care Needs Among Children With Special Health Care Needs: Implications for the Medical Home.* Pediatrics, 2005. **116**(3): p. e426-e431.
33. Loo, C.Y., R.M. Graham, and C.V. Hughes, *Behaviour guidance in dental treatment of patients with autism spectrum disorder.* Int J Paediatr Dent, 2009. **19**(6): p. 390-8.
34. Marshall, J., et al., *Parental attitudes regarding behavior guidance of dental patients with autism.* Pediatr Dent, 2008. **30**(5): p. 400-7.
35. Monheit, A.C. and J.P. Vistnes, *Race/ethnicity and health insurance status: 1987 and 1996.* Med Care Res Rev, 2000. **57 Suppl 1**: p. 11-35.
36. Mejia, G.C., et al., *A Conceptual Framework for Hispanic Oral Health Care.* Journal of Public Health Dentistry, 2008. **68**(1): p. 1-6.

37. Berry, J.W., *Immigration, Acculturation, and Adaptation.* Applied Psychology, 1997. **46**(1): p. 5-34.
38. Lara, M., et al., *Acculturation and Latino health in the United States: a review of the literature and its sociopolitical context.* Annu Rev Public Health, 2005. **26**: p. 367-97.
39. Buzhardt, J., et al., *Exploratory Evaluation and Initial Adaptation of a Parent Training Program for Hispanic Families of Children with Autism.* Fam Process, 2016. **55**(1): p. 107-22.