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Association Between Pediatrician Screening Practices and Age at the Time of Autism Diagnosis Among Latino Children

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Abstract

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MPH, Ponce School of Medicine, 2009

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Autism spectrum disorder (ASD) is a lifelong developmental disability that affects all ethnic groups and is twice as frequent among boys than girls. The Centers for Disease Control and Prevention stated that 1 in 68 children are diagnosed with ASD. Despite guidance from the American Academy of Pediatrics and clinical evidence that suggests that ASD can be diagnosed as early as 24 months of age, most diagnoses occur at age 4 or even later, resulting in fewer opportunities for children to receive early ASD treatment and help them reach the best outcome possible. There is limited information about the appropriate referral practices adopted by pediatricians, the accuracy of ASD testing tools, and ASD studies conducted among the Latino children. The purpose of this study was to examine the associations between age of diagnosis and the screening/referral practices of doctors. Data from the 2011 Pathways Survey ($N = 134$) were analyzed with bivariate and multivariate statistics, including chi-square with cross-tabulation and multinomial logistic regression. No statistically significant associations were found among the dependent variable "age when the parent was told by a doctor that child had ASD," and the independent variables "pediatrician conducted screening" ($p > 0.05$), "pediatrician conducted screening after parent had a developmental concern" ($p > 0.05$), and "doctor referred the child to a specialist after parent had a developmental concern" ($p > 0.05$). The results should be interpreted with caution due to the small sample size of Hispanic children with ASD diagnoses in the dataset. Additional studies are needed that can measure pediatrician screening patterns among the Hispanic/Latino children, thereby producing positive changes that can decrease associated morbidity and mortality among this population.

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Acknowledgments

This doctoral study has been possible thanks to my sweet grandson Nathaniel who for two years have spent many hours sitting next to me while I complete my assignments. Nathan have autism, and this unique condition has inspired me to find more information about the challenges Hispanic/Latino parents encountered when seeking a diagnosis for their children. There's no doubt that this research project will be completed thanks to my inspiration, love, and passion for the Hispanic/Latino children and especially for my grandson. However, I am convinced that the support and kind words of family members and the assistance and guidance received from Dr. Richard Jimenez have made this project possible.

It takes unique human beings to accomplish important things in life, but the support of the people that surround you is essential to keep you motivated and focused. I have been blessed with the company of great people, and I thank God for the opportunity to share with them my accomplishments, my dreams, and my success. These people have shown me how to persevere and continue walking on the right path. To my beloved family, my committee chair Dr. Richard Jimenez, Dr. Jasmine Ward, Dr. Ronald Hudak, Dr. Pete Anderson and Dr. Nancy Rea, I wish the best of the best, happiness, long life, wealth, and health.

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Section 1: Foundation of the Study and Literature Review

Introduction

Autism spectrum disorder (ASD) is a developmental disorder that has been classified by the American Psychological Association (American Psychological Association [APA], 2000) as part of a group of Pervasive Developmental Disorders (PDD) that includes Asperger's Disorder, Rett Disorder, and Childhood Disintegrative Disorders (American Psychological Association [APA], 2000). The disorder is characterized by the lack of communication skills, inability to socially interact, the presence of repetitive behavioral patterns, and other developmental and severe impairments (National Institute for Health and Clinical Excellence, 2011).

Researchers from the Centers for Disease Control and Prevention stated that one in 68 children are diagnosed each year with ASD (Centers for Disease Control and Prevention [CDC], 2015). ASD can affect all ethnic groups and is twice as frequent among boys than girls (Mandell et al., 2009). The American Academy of Pediatrics (AAP) suggests that pediatricians use preliminary observation and developmental screening tools at every well-child visit. Screening tests are recommended at the age of 18 months and again at 24 months old (Valicenti-McDermott, Hottinger, Seijo & Shulman, 2012, as cited by Diaz, 2015). Despite the AAP recommendations, most ASD diagnoses take place at age 4 or even later, limiting the opportunities for children to receive services and initial behavior-based therapies that can improve their social functioning and communication skills (Centers for Disease Control and Prevention [CDC], 2016).

Scientists at the CDC found that the median age of the first evaluation for Hispanic children was 46 months compared to white (43, $p<0.01$) and black children (44, $p<0.05$). The CDC study results indicated a significant difference in mean among the different groups (Centers

for Disease Control and Prevention [CDC], 2014). In another study conducted by Mandell et al. (2009), it was found that ethnic disparities exist in the recognition of Autism Spectrum Disorder (ASD). The delay or missed autism diagnosis may be worse among underserved ethnic minorities and may be caused by inadequate screening practices (Mandell et al., 2009). Therefore, there is a need for evidence-based investigations related to the diagnosis and identification of developmental delays among Hispanic/Latino children.

I conducted a cross-sectional quantitative study in which I explored how pediatricians' (including primary care physicians) screening practices are associated with the delay in ASD diagnosis in the Latino children. Screening practices employed by the physicians such as the use of developmental screening tools (identified as the key independent variable coded as scr_dr), the doctor referred the child to a specialist (dr_refer), and physician's response to parent's concerns by conducting developmental screening (dr_test) were my independent variables. The children's age at the time of diagnosis was my dependent variable and was coded as aut_age. I extracted the archived data from the National Data Resource Center for Child and Adolescent Health (DRC), 2011 Survey of Pathways to Diagnosis and Services.

The main goal of my study was to explore the relationship between pediatrician's screening practices and the age of Hispanic children at the time of diagnosis. The expected outcome of the study was to demonstrate that most pediatricians are not following the American Psychological Association (AAP) established guidelines that recommended testing children at 18 months and 24 months during child-well visits. Early testing and recognition of ASD symptoms are crucial because delays in diagnosis can affect how children receive treatment and referral services.

This study could provide Hispanic families and their children with better access to diagnostic and intervention services which are crucial to the improvement of children's communication, learning, and social skills. Past authors and researchers have focused on language barriers, cultural influences, and the role of healthcare providers, while others have identified barriers to Autism Spectrum Disorder (ASD) screening. Some of the barriers found in past studies are limited information on the accuracy of testing tools, appropriate referral practices adopted by pediatricians, and the lack of studies on the best age to screen for ASD. Examining some of these factors may help increase awareness of the difficulties Hispanic families encounter when seeking early diagnosis of ASD for their children. It could also help clinicians better understand the importance of using cultural-sensitive testing and the need to adapt these tests to the Spanish speaking population.

Problem Statement

Autism Spectrum Disorders (ASD) are a mixed group of disorders characterized by the presence of repetitive behaviors, a marked impairment of a child's receptive language, and the inability to socially interact (Miles, 2011). Children who develop ASD often have difficulties communicating, may not display selective focus, and might not show interest in playing with other children (Zwaigenbaum et al., 2015). Studies conducted by the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention [CDC], 2015) during 2010, show that 1 in 68 children have been diagnosed with Autism Spectrum Disorder (ASD). Also, the CDC studies found that the median age of the first evaluation for Hispanic children was 46 months compared to White (43, $p<0.01$) and Black children (44, $p<0.05$). The CDC study results indicated a significant difference in mean among the different groups (Centers for Disease Control and Prevention [CDC], 2014).

The American Academy of Pediatrics (AAP) recommends the use of diagnostic ASD-specific instruments at 18 and 24 months of age in combination with developmental screening and surveillance (Zwaigenbaum et al., 2016). Despite the AAP recommendations, most ASD diagnosis takes place at age 4 or even later, limiting the opportunities for children with ASD to receive services and early behavior-based therapies that can improve their social functioning and communication skills (Centers for Disease Control and Prevention [CDC], 2016). Early intervention and timely referral to treatment can help improve the children's development and prepare them for school (Centers for Disease Control and Prevention [CDC], 2016).

Jin (2016) stated that ASD diagnosis at a young age ensures that intervention and treatment options are provided earlier and may lead to better health outcomes compared to a late diagnosis. Regardless, there are racial disparities in the diagnosis of ASD that can put Hispanic/Latino children in a disadvantaged position compared to other racial/ethnic groups.

In my study, I mainly focused on the differences in age at the time of diagnosis to determine if physician screening practices may be associated with the delay in the diagnosis of ASD among the Hispanic/Latino population. Past authors and researchers focused on language barriers, cultural influences, and the role of health care providers, but many barriers to ASD screening still exists. Some of the gaps identified through the literature review included limited information about the appropriate referral practices adopted by pediatricians, the accuracy of ASD testing tools, and the lack of studies on the best age to screen for ASD and other developmental disorders.

Purpose of the Study

My study was a cross-sectional quantitative study in which I explored pediatricians' screening practices and how these factors may be associated with the delay in ASD diagnosis observed in the Hispanic/Latino children. Primarily, I tested the possibility of an association between Hispanic/ Latino children's age at the time of diagnosis (diagnosed by primary care physicians or pediatricians as having ASD before 4 years old) and pediatricians' screening practices (independent variable). Screening practices such as the use of developmental screening test (key independent variable coded as scr_dr), the doctor referred the child to a specialist (dr_refer), and physician's response to parent's concerns by conducting developmental screening (coded as dr_test 11) were the independent variables. Children's age at the time of diagnosis was my dependent variable (coded as aut_age).

Research Questions and Hypotheses

RQ1: What is the association between pediatrician' screening practices and age when parent was told by doctor that child had ASD.

$H_0$1. Recommended pediatrician screening practices are not associated with the age when parent was told by doctor that child had ASD.

H_a1Pediatrician's screening practices are associated with the age when parent was told by a doctor that child had ASD.

RQ2: What is the association between pediatrician conducted screening after parent had a developmental concern and age when parent was told by a doctor that child had ASD.

$H_0$1. Pediatrician conducted screening after parent had a developmental concern is not associated with age when parent was told by a doctor that child had ASD.

H_a1. Pediatrician conducted screening after parent had a developmental concern is associated with age when parent was told by a doctor that child had ASD.

RQ3: What is the association between pediatrician referral rates to ASD specialists and age when parent was told by doctor that child had ASD.

H_01. Referral rates to ASD specialists are not associated with the age when parent was told by a doctor that child had ASD.

H_a1. Referral rates to ASD specialists are associated with the age when parent was told by a doctor that child had ASD.

I analyzed quantitative data using descriptive statistics and by inferential statistics. Descriptive statistics included measures of central tendency (mean, median, mode and mode) and were used to describe and understand the population under study and the key variables, within the sample constructed (Nicholas, 2006). I also used inferential statistics such as chi-square (to test the association between two variables) and logistic regression. A chi-square or the *t*-test was used to test the probability that the results of the analysis of the sample are representative of the selected population. Logistic regression was used to predict the relationship in a group, or category in the study, by looking at ethnicity, education, and gender (About Education, 2015).

Theoretical Framework

The advancing health disparities research within the health care system model was designed by Kilbourne et al. in 2006, in response to the need for a comprehensive framework that could guide investigators interested in health disparity research. The advancing health disparities research within the health care system model was designed to shape the research trajectory from the primary detection of health care disparities to the understanding of

inequalities underlying factors. Also, to sequentially produce the developing and implementation of new interventions that are designed to reduce and eliminate those health disparities (Kilbourne et al., 2006).

Kilbourne's model coordinates the process of health disparities research into three different stages: detection, understanding, and the reduction or elimination of health disparities. In my study, I used Kilbourne's Health Disparities framework to define and identify the prevalence of screening practices that may result in delay diagnosis. Based on the three components of the Health Disparities Research model, Mandell et al. (2006) identified some of the factors associated with disparities in the identification of children with ASD. These factors included clinician practices, parents and health care professional beliefs, and the poor interaction between the health care provider and Hispanic parents (Mandell et al., 2006).

Nature of the Study

This study was a cross-sectional quantitative study that involved the analysis of archived data. Data was extracted from the Data Resource Center for Child and Adolescent Health (DRC), 2011 Survey of Pathways to Diagnosis and Services. The 2011 survey was developed as a follow-up to the 2009/10 National Survey of Children with Special Health Care Needs (NS-CSHCN). The datasets are licensed by the Child and Adolescent Health Measurement Initiative (CAHMI). Datasets were requested and obtained by signing a confidentiality agreement. A codebook with a list of all variables was also included in the dataset. Authors Cheng and Phillips (2014) referred to the secondary analysis of existing data as a cost-effective and popular method that can address new research questions. To obtain information about the missing data for each one of the variables, it is important to run frequency tables and the cross tabulation for all

variables of interest. Additionally, recoding the original variables and storing in a new dataset is necessary but the original datasets cannot be changed in any way (Cheng & Phillips, 2014).

In my study, the primary objective was to explore possible associations between physician's practices, and delays in the diagnosis of ASD among Hispanic/Latino children. The study could help in the identification of underlying factors associated with pediatrician's screening practices (independent variable) at the time of testing and diagnosing Hispanic/ Latino children. Pediatrician use of developmental screening test is my key independent variable (coded as scr_dr), physician's response to parent's concerns by conducting developmental screening (coded as dr_test), and the doctor referred the child to a specialist (dr_refer), were the independent variables. Children's age at the time of diagnosis is the dependent variable (coded as aut_age).

My alternative hypothesis for the independent variable states that an association exists between pediatrician's use of screening practices such as the use of developmental screening test (identified as the key independent variable (coded as scr_dr). Other independent variables included are physician's response to parent's concerns by conducting developmental screening (coded as dr_test) and, the doctor referred the child to a specialist (dr_refer) . Children's age at the time of diagnosis is the dependent variable (coded as aut_age). The null hypothesis for the independent variable attempted to show that no correlation exists between pediatrician's screening practices and age of children at the time of ASD diagnosis. Null and alternate hypothesis for the other two independent variables are listed on page six. My outcome variable of interest was Hispanic children's age at the time of diagnosis, and the predictive factor of interest was pediatrician's screening practices (e.g., use of screening tools, referrals, and response to parent's concerns). In my study, I tested the correlation between pediatrician's

screening practices and age of Hispanic children at the time of ASD diagnosis (alternative hypothesis). My null hypothesis attempted to show that children's age at the time of diagnosis is not associated with pediatrician's screening practices.

I analyzed quantitative data using descriptive statistics including, mean, median, and mode. Measures of central tendency were used to describe the values of a predictor, confounding, and the outcome variables within a sample (Research Engineer, 2015). Also, to assess the strength of the relationship between my two variables of interest, I used chi-square and the logistic regression. A chi-square gives the probability that the results of the analysis of the sample are representative of the selected population. The logistic regression is the best method to describe my data and to explain the association between my dependent variable (age of children at the time of diagnosis) and my independent variables (use of screening tools, referrals, and physician's response to parental concerns).

Participants and Source of Information

My cross-sectional study was completed thanks to the datasets provided by the Data Resource Center for Child and Adolescent Health (DRC), 2011 Survey of Pathways to Diagnosis and Services. The website is user-friendly and contains data about diagnosis, access to quality care, functional limitations, and the transition to adulthood. As such, it enables the comparison of the findings on children both at the state and national level. The sample for this survey was obtained from households with children under 18 years old, and the telephone numbers were randomly selected from the previous survey. The website data is maintained by Child and Adolescent Health Measurement Initiative. The validity and rigor of the dataset are reliable due to the specific approaches used in regard to the various ages of the most affected children. The DRC perspectives are on age, health status, income levels, ethnicity and health care use. The

2011 pathway survey also contains data on access to individual healthcare services, children's emotional, physical and behavioral health, and the influence of children's chronic condition(s) on the family. The validity was attested by the authenticity of the sources that were used by the different agencies involved. The national surveys contain data from between 38,000 to 40,000 people in the United States. The state level subgroups data include family structure, age, race/ethnicity, and household income (Child Health Data, 2016).

I reviewed records and data extracted to look at pediatrician's screening practices and Hispanic/Latino children age at diagnosis. The age range of interest was previously determined to be for Hispanic/Latino children under 4 years old, but due to the relatively small sample size found during data extraction, all Hispanic/Latino children between the age of 0-17 were included.

Additionally, pediatricians and primary care physicians screening practices (use of the developmental test, referral to specialists, and response to parent's concern) will be studied to determine if there's a possible association between delays in ASD diagnosis and pediatricians screening practices. My interest was to examine national data because there's a large number of Hispanic/Latino immigrants living in the United States. At the beginning of my study, I had planned to include only the state of Georgia Hispanic children, but after reviewing the codebook, I found that the experts do not recommend using the Pathways survey data for state-level estimates due to the limited sample size (Dara Resource Center [DRC], 2016).

Literature Review

Literature Search Strategy

Literature related to autism spectrum disorders and Hispanic/Latino children is limited. New research could generate additional information and understanding about common issues encountered by Hispanic families at the time of seeking diagnosis and treatment for their children's developmental needs. To obtain peer-reviewed articles related to autism spectrum disorders I searched various Walden University Health Science databases such as CINAHL Plus with Full Text, PubMed, Medline with Full Text, Science Direct, and many others. Due to the limited information found, I searched government agencies such as the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH).

Additionally, data from Autism Speaks (2015) were reviewed since this website contains updated information about autism spectrum disorder. Many of the articles I found were in the references sections of peer-reviewed articles related to autism. Other search terms I used were *Autism, ASD prevalence, delay in Autism Spectrum Disorder, ASD diagnosis, Autism screening tools, ASD diagnosis and Hispanic minorities, Autism diagnosis among Hispanic/Latino children, and disparities in ASD diagnosis.* The publication dates for peer review articles used in the study range from 2011 through 2016. Databases excluded were those related to ASD and economic evaluations of medical treatments, experimental drugs, or ASD genetic studies.

Definition of ASD and related disorders

The term autism spectrum disorders (ASD) was first used to describe self-absorbed adults suffering from schizophrenia who preferred to withdraw from their surroundings (Ennis-Cole, Durodoye, & Harris, 2013). In recent years, experts discovered that autistic people were not able to process information about themselves, had difficulty engaging in social interaction, and could not recognize their feelings and thoughts or those of others (Ennis-Cole, Durodoye, & Harris, 2013). Autism is now called Autism spectrum disorder (ASD) and is classified as a group of

complex developmental disorders characterized by repetitive behavior, limited verbal and nonverbal skills (inability to use and understand gestures, pointing), and difficulties in social interaction. In May of 2013 the American Psychiatric Association announced that autism disorders and other developmental distinct and subtypes childhood, disorders were merged into one diagnosis known as Autism Spectrum Disorders (American Psychological Association [APA], 2013).

The Centers for Disease Control and Prevention (Centers for Disease Control and Prevention [CDC], 2016) found that the incidence of children with ASD is rising, which may be due to the increased awareness of the condition among clinicians and medical professionals. Ennis-Cole, Durodoye, and Harris (2013) attributed the increased in ASD numbers to the new standards specified in the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition, text revision (DSM-IV-TR; American Psychological Association [APA], 2000). The CDC estimates indicates that the prevalence of autism is 1 in 68 births. This estimate means that one percent of the world's population suffers from some form of autism spectrum disorder (Centers for Disease Control and Prevention [CDC], 2014). In the U.S. alone, 3.5 million people are affected by autism. Also, is considered the fastest-growing developmental disability. Experts estimated that the prevalence of ASD had increased by six to 15% each year from the year 2002 to 2010. (Centers for Disease Control and Prevention [CDC], 2016). The cost for ASD services in the U.S. is between $236-262 billion annually. Most of the expenses in the U.S. are in adult services – $175-196 billion, compared to $61-66 billion for children (Autism Society of America, 2016).

Parents' awareness of autism and barriers to health services

Review of research related to disparities among minorities revealed that Hispanic/Latino parents have low levels of information about autism. Zuckerman and colleagues (2014) conducted qualitative interviews with parents of Hispanic/Latino children and found that Hispanic parents have limited information about ASD. In the study, the parents also reported that they did not have adequate knowledge about ASD and said that they still did not understand what it was. Others indicated that the stigma associated with mental health and disability were a limitation to early diagnosis. Also, limited English proficiency made the process of making appointments difficult. Others cited complexities and lack of trust in the health care system and traditional male gender roles as some of the factors that led to a delay in diagnosis.

Studies conducted by Ennis-Cole et al. during 2013, showed that the culture combined with parent's perceptions of autism diagnosis can play a significant role in the diagnosis of autism. The authors emphasized the need for professionals to use multicultural competencies such as appropriate skills, personal awareness, cultural knowledge, and learn to understand autism from the parent's perspective (Ennis-Cole, Durodoye & Harris, 2013).

Williams et al. (2013) observed that there were barriers in access to services for children with language delays and behavioral difficulties. In their survey, they noted that less than half of Spanish-speaking callers received an appointment for a referral to a mental health agency or school. Ennis-Cole et al. (2013) found that parents from minority groups may assume that language delays and lack of social interactivity are a temporary phenomenon or a normal process. Therefore, they may take the time to notice ASD symptoms such as lack of eye contact and lack of pointing or imitation (Ennis-Cole, 2013).

Current ASD Screening tools

Recent studies shows that approximately 70% to 80% of children with developmental delays are undiagnosed by the time they are enrolled in school (Rydz, 2005; Sand et al., 2005). In a study by Zuckerman et al. (2013), it was established that health care providers (e.g., pediatricians and family practitioners) contributed significantly to delays in ASD diagnosis. The researchers observed that only 10% of the practitioners followed the general developmental guidelines and offered ASD screening test in Spanish. In the study, 50%of the surveyed providers agreed that language, limited access to ASD specialists, and cultural differences are some of the barriers found at the time of screening Hispanic children. The American Academy of Pediatrics (AAP) and the American Academy of Neurology (AAN) recommended two screening models for the diagnosis of ASD in young children. The first model is the ongoing developmental surveillance test which includes a questionnaire completed by the parents, or a clinician completed measure. The second model is the routine administration of autism specific screens which should be administered at 18 and 24 months of age regardless of the presence of ASD symptoms. The screening is used in addition to the developmental surveillance or developmental test (Dumont-Matheiu & Fein,2005). Other ASD screening tools that have been commonly used include the Checklist for Autism in Toddlers (CHAT), the Modified Checklist for Autism in Toddlers (MCHAT-R/F-Revision and Follow-up versions), and the Screening Tool for Autism in Two-year-olds (Robins & Dumont-Mathieu, 2006).

Research Gaps

The identification of ASD has improved since the publication of the American Academy of Pediatrics screening guidelines (Huerta & Lord, 2012). However, a significant number of children continue to be undiagnosed, and others are likely to be identified by educational programs (Huerta & Lord, 2012). Past authors and researchers have focused mostly on language

barriers, perceptions, cultural influences, and healthcare providers. Information related to pediatrician's practices, response to parent's concern, referral rates, and how these factors can contribute to the delays in the diagnosis of ASD among Hispanic/Latino children is very limited. Also, few studies have been conducted in the area of identification of early signs of autism spectrum disorder, the recommended age and added value for screening, comparison of instruments, characteristics of the child and family-level factors. Areas with few studies and information also include the analysis of pediatrician's demographics and characteristics such as experience in ASD diagnostic tools and knowledge of ASD guidelines, and how these factors have been implicated in exacerbating this delay.

Definitions

Asperger's Disorder: Asperger syndrome is considered one of several separate subtypes of autism that fell into the single diagnosis of autism spectrum disorder (ASD). Most people that have the disorder are considered high functioning and do not exhibit significant developmental delays (Autism Speaks, 2016).

Autism and Autism spectrum disorder (ASD): Autism or Autism spectrum disorder is a developmental disorder classified by the American Psychological Association [APA], (2000) as part of a group of Pervasive Developmental Disorders (PDD) that includes Asperger's Disorder, Rett's Disorder and Childhood Disintegrative Disorders.

Autism Screening tools: These tools are used in children 18 months of age or older and are designed to detect autism spectrum disorders by focusing on children's social and communication limitations (First Signs, 2014).

Checklist for Autism in Toddlers (CHAT): This screening instrument is used to test the prediction that 18-month-old children who are not paying attention and unable to participate in pretend play could be at risk for receiving a later ASD diagnosis (Baron-Cohen et al. 2000).

*Childhood Disintegrative Disorders: T*he childhood disintegrative disorder is part of the greater developmental disorder category where children normally develop through age 3 or 4 and later lose the ability to communicate, to interact socially, and to use other skills previously learned (Medline Plus, 2016).

Clinical psychologist: specializes in providing behavioral and comprehensive mental health care to individuals or families (American Psychological Association, 2017).

Cross-sectional quantitative study: In a Cross- sectional quantitative study, numerical measurements and data related to the prevalence of an illness is collected at a specific point in time (CSRO, 2016).

*Descriptive statistics: T*hese give the underlying properties of the data that has been collected. They are ideal for providing an overview of the suitability of data gathered for the study (Trochim, 2006).

Dependent variable: Age when parent was told by doctor that child had ASD is the dependent variable (coded as aut_age). Child and Adolescent Health Measurement Initiative (CAHMI, 2015).

Developmental surveillance: This is a flexible technique used by pediatricians to observe children during preventive visits. Developmental surveillance includes making accurate observations of children, responding to parent's concerns, obtaining a developmental history, and

sharing concerns and opinions with other specialists or professionals (American Academy of Pediatrics, 2001).

Independent variables: The screening practices that are employed by the physicians such as the use of developmental screening tools (identified as the main independent variable codes as scr_dr), doctor referred the child to a specialist (dr_refer), and physician's response to parent's concerns by conducting developmental screening (coded as dr_test) will be the independent variables. These do not change, thus, do not bear any influence on the extent of disorders that are observed (Child and Adolescent Health Measurement Initiative (CAHMI, 2015).

Inferential statistics: These establish the relationship between the data collected and the key research question that had been under investigation.

M-CHAT (recently revised) now M-CHAT- R/F: The Modified Checklist for Autism in Toddlers or M-CHAT is a questionnaire specifically designed to identify children with Autism Spectrum Disorder (ASD) either at 18 or 24 months of age. The new M-CHAT follow up, and the Revised version with Follow-up M-CHAT-R/F were created due to the many false positive cases found in the previous M-CHAT (The Children's Hospital of Philadelphia, 2014). Health care professionals can now reduce the unnecessary referrals by incorporating the new versions into the screening process (Robin, n.d.).

Maternal and Child Health Bureau's (MCHB) health-consequences-based special health care needs: is a screener that asks parents about the use of prescriptive interventions, treatments, services, special therapies; the presence of emotional, developmental or behavioral conditions that require treatment, and/or functional limitations (U.S. Department of Health and Human Services, 2000).

Pervasive Developmental Disorders (PDD): The pervasive developmental disorder (PDD) is a group of several different disorders combined under the principal principle of deficit in social interaction and delayed language. This group of disorders is sometimes used in studies to referred as ASD (Chiu, 2013).

STAT (Screening Tool for Autism in Toddlers & Young Children): The STAT is an interactive instrument created for professionals with experience in autism to screen children between the age of 24 and 36 months for autism. The STAT is a Level 2 screener that consists of playful activities that can assess children's important social and communication behaviors (Vanderbilt University, 2016).

Screening practices: In my study screening practices is used to describe the way developmental testing for ASD is carried out, or how pediatricians use ASD testing tools in their office. Some of the ASD screening tools commonly used are the developmental surveillance test, ASD-specific screening questionnaires, the Checklist for Autism in Toddlers (CHAT), the Modified Checklist for Autism in Toddlers (MCHAT) and few others (Robins & Dumont-Mathieu, 2006).

Rett Syndrome: Rett's syndrome is a neurodevelopmental disorder that affects mostly girls and is characterized by early normal development and growth that is followed by seizures, slow brain and head growth, intellectual disability and walking problems (National Institutes of Health, 2013).

Terms that have multiple meaning: The term **health care provider, practitioner or physician**, has been used throughout this paper to refer to pediatricians. A health care

provider/practitioner or physician is a doctor of medicine authorize to practice medicine by the state (UC. Berkeley, 2016).

Assumptions

In my study, I explored the relationship between pediatrician's screening practices and the delay in the diagnosis of ASD among Hispanic/Latino children. I used archived data from the Data Resource Center for Child and Adolescent Health (DRC) database to obtain the variables of interest. These were: the use of developmental screening tools (identified as the key independent variable (coded as scr_dr), physician's response to parent's concerns by conducting developmental screening (dr_test), and the doctor referred the child to a specialist (dr_refer), . My dependent variable, age of children at the time of ASD diagnosis, has been coded as (ast_age.) The dataset contains all variables of interest and I was able to explore the association between physician's screening practices and delays in the diagnosis of ASD among Hispanic/Latino children. At the conclusion of my study, no statistical association was found between pediatrician screening practices and age when parent was told by doctor that child had ASD. Due to the relatively small sample size available, it was uncertain whether or not pediatricians are following the recommended AAP guidelines to screen Hispanic/Latino children for developmental problems in the primary care setting. The randomly selected sample was too small for me to detect an effect or association between my variables. I recommend that future studies be conducted to help determine if an association exist between age when parent was told by dr. that child had ASD and pediatrician use of developmental screening tests.

My assumption was that the information found in the DRC database contains a valid and reliable dataset that was constructed from data that was collected through a valid and rigorous

nationwide telephone survey methodology (CAHMI, 2011). The data collected was supervised and sponsored by different government agencies and children's health records were used only for the purpose of statistical research. I determined that the DRC database complies with all protection and reliability guidelines when it comes to the privacy and validity of the information collected. Also, the children's identity was protected following all research laws and guidelines.

Agencies participating in the data collection process are the U.S. Department of Health and Human Services, (HHS), the Health Resources Services Administration (HRSA), the Maternal and Child Health Bureau (MCHB), and the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention. Also, the agencies used sophisticated State and Local Area Integrated Telephone Survey (SLAITS) technology for the sampling and administration of the survey. The use of State and Local Area Integrated Telephone Survey (SLAITS) technology is a reliable data collection mechanism developed by CDC's National Center for Health Statistics (NCHS) (Centers for Disease Control and Prevention [CDC],2015). The dataset could provide valuable information about processes that take place in the primary care setting that can lead to delays in the diagnosis of ASD among Hispanic/Latino children.

Scope and Delimitations

Aspects of the problem that I investigated in my study were frequency of pediatricians use of screening tools by following the recommendations of the American Academy of Pediatrics (AAP) by conducting developmental screening test on Hispanic/Latino children during child-well visits. Also, the percentage of pediatrician's that can recognize and respond to parents' concerns by carrying out developmental testing, and how frequent Hispanic/Latino children were referred to a developmental specialist. These aspects were explored in my study to

determine if pediatricians were conducting developmental testing in the primary care setting and how these practices contributed to delays in the diagnosis of Hispanic/Latino children.

I focused on the Hispanic/Latino children population due to the lack of research conducted among this minority group. CDC studies have found that the median age of the first evaluation for Hispanic children was 46 months compared to white (43, $p<0.01$) and black children (44, $p<0.05$). The CDC study results indicated a significant difference in mean among the different groups (Centers for Disease Control and Prevention [CDC], 2014). Some of the important aspects of the problem that I decided not to investigate and are beyond the scope of my study are pediatricians' race/ethnicity and the influence of the physicians' culture on ASD screening practices. This information s cannot be found in the dataset codebook for the 2011 pathway survey. However, the influence of culture on developmental screening should be studied in the future.

Mandell & Novak (2005) stated that there's a small body of literature related to cultural influences on the health decisions regarding autism and on the expectations that health care providers have regarding the service needs of different ethnic groups. For this reason, their review focused on guiding future research into the area of cultural differences and the behavioral aspects of autism, recognition of ASD symptoms, family's educational and medical decisions, and their interactions with the healthcare system (Mandell & Novak, 2005). Also, Begeer et al. (2009) specified that a wider cross-cultural study is required to account for factors related to the autism diagnosis processes, and how specific cultural aspects may vary broadly across ethnic groups (Begeer et al. 2009).

Summary and Significance of the Study

The American Academy of Pediatrics (AAP) recommends that pediatricians use preliminary observation and developmental screening tools at the age of 18 and again at 24 months old (Valicenti-McDermott, Hottinger, Seijo & Shulman, 2012, as cited by Diaz, 2015). Despite the AAP recommendations diagnosis continues to take place at the age of 4 or later, limiting children's opportunities to access services and required treatment options. In previous research, authors found that conducting intensive treatment during the early child years can result in increased language and improved social and behavioral skills. Even though children with autism are now diagnosed at younger ages, a gap still exists between the first time parents show concern and the time children are diagnosed. In most cases parent's concerns about the child developmental delay are express to pediatricians before the child reaches the age of two; nevertheless, most doctors are unwilling to make a diagnosis (Moore-Zieger, 2008).

Studies conducted by Ennis-Cole et al. during 2013, shows that the individual perspectives of culture combined with parent's lack of information on autism diagnosis can play a significant role in the diagnosis of autism. The authors emphasized the need for professionals to use multicultural competencies such as appropriate skills, personal awareness, cultural knowledge, and also learn to understand autism from the parent's perspective (Ennis-Cole, Durodoye & Harris, 2013). Zuckerman et al. (2014) stated that Hispanic parents have low levels of information about autism and that they did not understand what it was. The authors also determined that health care providers dismiss parent's concerns about their child's cognitive behavior. While at times Hispanic parents limited English proficiency made the process of making appointments difficult.

Limited research has been conducted related to physician's screening practices and delays in ASD diagnosis among the Hispanic/Latino children. Further investigation of the

specific variables associated with pediatrician's screening practices is needed. Zuckerman et al. (2014) indicated that the stigma associated with mental health and disability were a limitation to early diagnosis (Zuckerman et al. 2014). Other authors cited complexities and lack of trust in the health care system and traditional male gender roles as some of the factors that led to a delay in diagnosis (Zuckerman et al. 2014). Ryn (2007) determined that the role and behavior of medical practitioners and how it contributes to ethnic disparities continue to be largely unexplored (Van Ryn, 2007). In another study conducted by Zuckerman, Lindly and Sinche (2015) The researchers found that parents of children with ASD were more likely to receive reassurances instead of proactive responses. The researchers also observed that active responses from the healthcare provider had the effect of shorter delays in ASD diagnosis (Zuckerman, Lindly & Sinche, 2015).

Due to the limited research conducted among Hispanic/Latino children and ASD diagnosis, my study could contribute to the identification and better understanding of the underlying factors contributing to the late diagnosis of ASD. Additionally, my study can help determine how frequent practitioner’s make use of developmental screening instruments in their practice. My findings could also assist policy experts in the study and development of culture-sensitive screening tools, and in the revision of current guidelines that can help health care providers identify ASD in Hispanic/ Latino children. Furthermore, my study can contribute to identifying inconsistencies in the use of ASD developmental screening tools and determine the frequency of child referral to ASD specialists. Early identification of ASD symptoms will ensure that Hispanic/Latino children benefit from early intervention and treatment.

Conclusion

In conclusion, my study could change the way services are offered and may increase awareness of the importance of revising and individualizing screening tools to meet the needs of the Hispanic/Latino families. Early diagnosis is essential to give Hispanic children the opportunity to receive early ASD treatment and help them reach the best outcome possible (Autism Speaks, 2015, as cited by Diaz, 2015). My study is also important because it may help public health officials, community development experts and social workers develop ASD diagnosis guidelines and practices that are sensitive to the culture and lifestyle of Hispanic/Latino parents.

Past studies have looked mainly at Hispanic/Latino parents' demographics and their association to early diagnosis of developmental problems. My research attempted to extend existing knowledge to uncover critical areas of developmental screening practices that were not explored by previous researchers.

Section 2: Research Design and Data Collection

Introduction

Autism spectrum disorder (ASD) is a developmental disorder that is part of a larger group of Pervasive Developmental Disorders (PDD). These disorders include Asperger's Disorder, Rett Disorder and Childhood Disintegrative Disorders (American Psychiatric Association, 2000). ASD is characterized by the inability to interact socially, lack of communication skills, the presence of repetitive behavioral patterns, and other developmental and severe impairments (National Institute for Health and Clinical Excellence, 2011). ASD affects all ethnic groups and is twice as common among boys than girls (Mandell et al., 2009). Data from the Centers for

Disease Control and Prevention (CDC), shows that 1 in 68 children is diagnosed each year with autism spectrum disorder (Centers for Disease Control and Prevention [CDC], 2015).

The American Academy of Pediatrics (AAP) has recommended the use of preliminary observation and developmental screening tools at every well-child visit and specifically at the age of 18 and 24 months old (Valicenti-McDermott, Hottinger, Seijo & Shulman, 2012, as cited by Diaz, 2015). Despite the AAP recommendations, children are being diagnosed at age 4 or later, which limits the services and early behavior-based therapies that children should receive to improve their social functioning and communication skills (Centers for Disease Control and Prevention [CDC], 2016).

Studies conducted by CDC in 2014 found that the median age of the first evaluation for Hispanic children was 46 months compared to white (43, $p<0.01$) and black children (44, $p<0.05$). The study results indicated a significant difference in mean among the different groups (Centers for Disease Control and Prevention [CDC], 2014). Researchers emphasized the need to promote evidence-based investigations that can assist in the identification of ASD and other developmental disorders among underserved ethnic groups. According to Mandell et al. (2009), ethnic disparities exist in the recognition of ASD caused by inadequate screening practices that may be worse among underserved ethnic minorities (Mandell et al., 2009). Past researchers have focused on language barriers, cultural influences, and the role of healthcare providers, while others have stated that limited information exists on the accuracy of testing tools, referral practices, and the best age to screen for ASD.

To explore the associations between pediatricians screening practices and the delays in the diagnosis of ASD among the Hispanic/Latino children, I conducted a cross-sectional quantitative study. Archived data was extracted from the National Data Resource Center for

Child and Adolescent Health (DRC), 2011 Survey of Pathways to Diagnosis and Services. The expected outcome of my study was a better understanding of the association between pediatrician's use of screening tools and age when parent was told by doctor that child had ASD diagnosis among Hispanic/Latino children. Based on established guidelines by the AAP academy, autism screening should be conducted at every child-well to increase early identification of ASD among underserved ethnic groups (Mandell et al., 2009). To determine the association between physician's practices and the use of ASD developmental tools among Hispanic/Latino children, I used a secondary dataset that contained my variables of interest.

I determined that the appropriate design to help me draw inferences from the current differences between the groups is a cross-sectional design study with a quantitative approach. I examined archived data collected from the years 2009-2010 Pathways survey to find a relationship between the variables at one moment in time as cited by the USC (2016). The 2009-2010 National Survey of CSHCN included validated instruments such as the Children with Special Health Care Needs (CSHCN) Screener, the Difficulties Questionnaire (SDQ) by Goodman (1997) and the Children's Social Behavior Questionnaire (Rothbart et al., 2001). Only children with a clinical diagnosis of ASD intellectual disability or a developmental delay between the ages of 6 and 17 years old and self-identify as Hispanic or Latino origin were analyzed in the 2011 Pathways survey. I extracted and analyzed a total of 354 children who met the aforementioned inclusion criteria.

My key independent variable was "Physician completed screener/assessment," which I defined as a developmental screening or assessment completed by the parent, doctor, or healthcare provider. The second independent variable is "Physician's response to parent's concerns by conducting developmental screening," which I defined as a situation in which, after

a parent expressed concerns, the doctor or healthcare provider conduct a developmental test. The final independent variable was “Doctor referred the child to a specialist.” This variable I described as a situation in which, after parent expressed concerns, a doctor or health care provider referred the child to a specialist The dependent variable description is the age at which child was first told they had Autism spectrum disorder.

Research Design and Rationale

The study was a cross-sectional quantitative study in which the population of Hispanic/Latino children was selected from the dataset to determine possible associations between the designated variables. The selection of a large sample of subjects can result in accurate estimates of the relationship between all variables (Hopkins, 2000). The independent variables in my study are 1) the use of developmental screening tools (key independent variable coded as scr_dr), physician’s response to parent’s concerns by conducting developmental screening (coded as dr_test), and the doctor referred the child to a specialist (coded as dr_refer) . The children’s age at the time of diagnosis is my dependent variable (coded as aut_age).

Researchers using cross-sectional study designs use survey techniques in which data are gathered in a rather inexpensive method that takes little time to conduct. Groups identified for study are intentionally selected based on existing differences rather than seeking random sampling (USC, 2016). The cross-sectional study was a convenient design to use in my autism investigation because I can draw inferences from the actual differences among the groups and can find the relationship between the variables at one moment in time . A cross-sectional study can help establish whether there is an association between my variables. I chose the quantitative approach based on Ackroyd and Hughes, (1992) statement that “qualitative and quantitative studies have advantages, disadvantages, strengths and weaknesses, but neither one is evidently

superior to the other." (Ackroyd & Hughes, 1992). In my study, I I intended to examine the association between pediatrician's ASD diagnostic practices and the number of Hispanic/Latino children that are diagnosed before the age of 4, but due to the relatively sample size decided to use all Hispanic/Latino children with ASD diagnosis found in the dataset (ages 0-17).

Methodology

Study Population

The 2011 Pathways survey is a follow-up survey of CSHCN that was developed as a follow-up to the 2009/10 National Survey of Children with Special Health Care Needs (NS-CSHCN). Values for variables such as race, parental education, ethnicity, the number of the adults in the household and other variables were developed for the 2009-2010 National Survey of CSHCN using multiple imputations (Centers for Disease Control and Prevention [CDC], 2015). The survey was sponsored by the U.S. Department of Health and Human Services and conducted by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). The data were collected using the State and Local Area Integrated Telephone Survey (SLAITS) technology for sampling and administration. The development and validation of the survey were used to identify children who meet the Federal Maternal and Child Health Bureau's (MCHB) health-consequences-based special health care needs. The Pathways survey included validated instruments such as the Children with Special Health Care Needs (CSHCN) Screener, the Difficulties Questionnaire (SDQ) by Goodman (1997) and the Children's Social Behavior Questionnaire (Rothbart et al., 2001). The screeners were used to interview parents about the use of interventions, treatments and the presence of developmental or behavioral conditions (Survey of Pathways to Diagnosis and Services Codebook 2011).

The nationwide telephone survey included a self-administered mail questionnaire used to gather data from a group of people between the ages of 6 to 17 years old at the time of the interview who had autism spectrum disorder (ASD), intellectual disability, and a developmental delay. Respondents were contacted based on the 2009/10 previous survey participation and were able to complete the pathways interview. A total of 6,090 CSHCN participants were sampled for the Pathways survey, and 4,032 completed telephone interviews. 3,997 self-administered questionnaires were mailed but only 2,988 participants completed and returned the questionnaire.

To encourage participations, the DRC offered participants an Incentive to complete the phone interview ($20-$25). These incentives were offered to children's parents and guardians to encourage participation. Additional incentives were given to those completing the self-administered questionnaire ($10 to $15; Survey of Pathways to Diagnosis and Services Codebook 2011). Sampling for the 2011 Pathways Survey was selected based on previous 2009-2010 NS-CSHCN survey participation, and respondents were eligible if they had a child with a confirmed ASD intellectual disability or a developmental delay diagnosis between the ages of 6 and 17 years, and who lived in the same household. The 2011 Pathways included telephone numbers that were randomly selected via an independent digit dial sample of phone numbers of the 2009 and 2010 NS-CSHCN household respondents (Survey of Pathways to Diagnosis and Services Codebook 2011).

In my study, 4,032 children were available for analysis. All children with a clinical diagnosis of ASD between the ages of 0 and 17 years old and who self-identified as Hispanic or Latino were included and analyzed in my study. Based on a population of 4,032 respondents my estimated sample size was previously determined to be 381. After data cleaning and extraction, I found 134 Latino children with ASD diagnosis in the dataset.

The confidence level used was 90%, and the margin of error was 4% using the Survey Monkey 2016 application. Because I was conducting a secondary analysis of archived data with a large sample, no minimum sample size calculation was required. Access to the publicly available datasets was obtained by contacting the Data Resource Center (DRC) and submitting a request for the 2011 Pathways datasets. The DRC send the data agreement form which I signed and returned. DRC granted access to the datasets by providing the links to the telephone interviews and the codebook. The 2011 Survey of Pathways to Diagnosis and Services and codebook is also available to the public at the National Center for Health Statistics website.

Minimum Sample Size

Conducting a secondary analysis of archived data with a large sample, does not require a minimum sample size calculation. However, in my study, a Post Hoc power analysis was conducted after completing my data analysis to determine the power.

Instrumentation and Operationalization of Constructs:

The Child and Adolescent Health Measurement Initiative (CAHMI) worked in partnership with Autism Speaks, the group that sponsored the 2011 Pathways Project to disseminate critical data about children with autism and other related conditions. Also, the survey design and sponsorship was led by the National Institute of Mental Health (NIMH) at the National Institute for Health (NIH). Also, the Maternal and Child Health Bureau (MCHB) at the Health Resources and Services Administration in partnership with National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC). The geographic areas of the United States included in this study were the Midwest, South, Northeast, and West.

The Pathways survey included information obtained from a telephone interview and a self-administered questionnaire (SAQ). The questionnaire and telephone interview were offered to parents and guardians who were able to speak English (Codebook, 2011). Data from the National Survey were collected from 50 states, and the District of Columbia. The population consisted of children living in the different households and who were screened for special health care needs. If multiple children with special health needs lived in the household, one child was randomly chosen to be the subject of the detailed interview. The period of data collection started in July 2009 and continued through March 2011 (NCHS, 2011).

The 2011 Pathways questions were developed especially for the survey and with the purpose to meet various data needs. The data were collected using the State and Local Area Integrated Telephone Survey (SLAITS) technology for sampling and administration. Telephone numbers were randomly selected from respondents to the 2009-2010 NS-CSHCN who were available to be interviewed. The Pathways survey telephone interviewing began on February 10, 2011, and ended on May 15, 2011. The full-length Pathways survey instruments were administered with Computer-Assisted Telephone Interviewing (CATI) technology and via a self-administered questionnaire. The development and validation of the survey were used to identify children who meet the Federal Maternal and Child Health Bureau's (MCHB) health-consequences-based special health care need. NCHS is in the process of confirming the validity of scales based on these adapted questions for this population of school-aged children in the United States (DSR, 2016). The instrument was previously used with noninstitutionalized children with special health care needs and U.S. Census counts of children during the 2009 previous survey.

The Pathways survey includes validated instruments such as the Children with Special Health Care Needs (CSHCN) Screener Difficulties Questionnaire (SDQ) by Goodman (1997) and the Children's Social Behavior Questionnaire (Rothbart et al., 2001). The National Center for Health Statistics normally imputes data when there are approximately 10% missing cases. The imputed variables used in the survey merged dataset will have no missing cases (Survey of Pathways to Diagnosis and Services Codebook 2011). The CSHCN screener is designed to fill a gap in currently available methods by providing an instrument that is efficient and flexible for use across different modes of administration (Bethell, 2002). The CSHCN is a 5-item screening tool designed to identify children with special health needs. The Federal Maternal and Child Health Bureau (MCHB) defines special care needs as "those with an increased risk for a chronic physical, developmental, behavioral, or emotional condition" (CAHMI, 2016). The SDQ is a brief questionnaire that can be offered to the parents and teachers of 4 to 16-year-olds and children between the ages of 11 to 16 years of age (Goodman, 1997). Each version includes 25 items on psychological attributes that are divided between 5 different scales such as emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and prosocial behavior.

The SDQ covers common areas of emotional and behavioral difficulties and examines whether the responder thinks that the child has an issue in any of the different areas. Further information and copies of the questionnaire in 40 different languages can be obtained free from http:\\www. sdqinfo.com (Goodman, 1997). The Children's Social Behavioral Questionnaire by (Hartman et al., 2006) was also used. This questionnaire is a modified, 5-question strength questionnaire for parents of children with Pervasive Developmental Disorders (PPD). The items in the questionnaire describe a broad range of features that are typical of milder forms of PDD.

Based on conceptual assessment and other factor analyses, the number of items in the questionnaire was reduced from 96 to 49. Six subscales were constructed allowing a differentiated description of PDD problems. Estimates for internal reliability, test-retest, convergent, divergent, and inter-rater reliability were all good (Hartman et al., 2006).

Variables Operationalization

Independent variables

My key independent variable was "Pediatrician completed screener/assessment" this is defined as was a developmental screening or assessment completed by the parent, doctor, or health care provider? Response option for my key independent variable was coded as Yes (1) No (2).

Second independent variable "doctor referred the child to a specialist" Described as after parent expressed concerns, did a doctor or healthcare provider refer the child to a specialist? The second independent variable was coded as Yes (1) No (2).

The third independent variable is "Pediatrician's response to parent's concerns by conducting developmental screening" defined as after parent expressed concerns, did the doctor or healthcare provider performed a developmental test? The third variable was coded as Yes (1) No (2).

Dependent Variable

My dependent variable description was Age when the parent was told by the doctor that child had ASD. The survey items are How old was the child when you were first told he/she had autism spectrum disorder (ASD)? The dependent variable was coded as 0-2 years old; 3-5 years old; 6-17 years old.

Diagnosis of ASD

Autism spectrum disorder can be diagnosed as early as 18 months of age, but there's no medical blood test that can diagnose ASD and the disorders that fall with the ASD spectrum (Centers for Disease Control and Prevention [CDC], 2015). According to Kabot et al., 2003 there's no defined medical test for autism but researchers have been able to identify and predict the different etiologies and autistic subtypes of this puzzling disorder (Kabot et al., 2003). Disorders that fall within the Austim Spectrum disorder include Asperger's Disease, Childhood Disintegrative Disorders, and Rett Syndrome. The American Psychiatric Association (APA) in their Diagnostic and Statistical Manual of Mental Disorders (DSM-5, 2013) incorporated childhood disintegrative disorders, Asperger syndrome, childhood disintegrative disorder, and pervasive developmental disorders as part of ASD separate disorders (American Psychological Association [APA], 2013).

To diagnose ASD medical experts rely on observation of children's development and behavior patterns to make a diagnosis but in many cases children will not receive a diagnosis until they are much older. According to CDC, there are two steps in the diagnosis of ASD: developmental screening and comprehensive diagnostic evaluation (Centers for Disease Control and Prevention [CDC], 2015). Developmental screening includes a short test to diagnose children for delays in learning basic skills. The American Pediatric Association (APA) that children be screened during well-child visits since nine months of age and specifically at 18 and 24 months old (Centers for Disease Control and Prevention [CDC], 2015).

Key Terms

Autism Screening tools

Many developmental screening tools have been designed to help medical professionals identify children with developmental delays. Some of these screening instruments can encompass multiple areas of development or be specific to a disorder (e.g. autism). Other testing tools can be specifically used to test for deficiencies in gross motor skills, language or to test for cognitive development problems. The screening instruments do not provide definitive evidence of the presence of developmental delays neither give a diagnosis (Centers for Disease Control and Prevention [CDC], 2016).

The following screening tools are some of the tools used in the diagnosis and identification of ASD. The tools are used in children 18 months of age or older by focusing on the child's social and communication limitations (First Signs, 2014).

Maternal and Child Health Bureau's (MCHB) health-consequences-based special health care needs is a screener that asks parents about the use of prescriptive interventions, treatments, services, special therapies; the presence of emotional, developmental or behavioral conditions that require treatment, and/or functional limitations (U.S. Department of Health and Human Services, 2000).

Checklist for Autism in Toddlers (CHAT)

This screening instrument is used to test the prediction that 18-month-old children who are not paying attention and unable to participate in pretend play could be at risk for receiving a later ASD diagnosis (Baron-Cohen et al. 2000).

M-CHAT (recently revised) now M-CHAT- R/F

The Modified Checklist for Autism in Toddlers M-CHAT is a questionnaire specifically designed to identify children with Autism Spectrum Disorder (ASD) either at 18 or 24 months of age. The new M-CHAT follow up, and the Revised version with Follow-up M-CHAT-R/F were created due to the many false positive cases found in the previous M-CHAT (The Children's Hospital of Philadelphia, 2014). Health care professionals can now reduce the unnecessary referrals by incorporating the new versions into the screening process (Robin, n.d.).

STAT (Screening Tool for Autism in Toddlers & Young Children)

The STAT is an interactive instrument created for professionals with experience in autism to screen children between the age of 24 and 36 months for autism. The STAT is a Level 2 screener that consists of playful activities that can assess children's important social and communication behaviors (Vanderbilt University, 2016).

Autism Spectrum Disorders (ASD)

Autism spectrum disorder (ASD) is a group of developmental disabilities classified by the American Psychological Association [APA], (2000) as part of a group of Pervasive Developmental Disorders (PDD) that includes Asperger's Disorder, Rett Disorder and Childhood Disintegrative Disorders (American Psychiatric Association, 2000). The disorder is characterized by the lack of communication skills, inability to socially interact, the presence of repetitive behavioral patterns, and other developmental and severe impairments (National Institute for Health and Clinical Excellence, 2011).

Pervasive Developmental Disorders (PDD)

Pervasive developmental disorder (PDD) is a group of several different disorders combined under the principal of deficit in social interaction and delayed language. This group of disorders is sometimes used in studies to referred as ASD (Chiu, 2013).

Asperger's Disorder

Asperger syndrome is considered one of several separate subtypes of autism that fell into the single diagnosis of autism spectrum disorder (ASD). Most people that have the disorder are considered high functioning and do not exhibit significant developmental delays (Autism Speaks, 2016).

Rett Syndrome

Rett's syndrome is a neurodevelopmental disorder that affects mostly girls and is characterized by early normal development and growth that is followed by seizures, slow brain and head growth, intellectual disability and walking problems (National Institutes of Health, 2013).

Childhood Disintegrative Disorders

The childhood disintegrative disorder is part of the greater developmental disorder category where children normally develop through age 3 or 4 and later lose the ability to communicate, to interact socially, and to use other skills previously learned (Medline Plus, 2016).

Data Analysis

Data Preparation

I used the IBM SPSS Statistics 23 version provided by Walden University to analyze my data.. The IBM SPSS software can be used to solve research problems by using ad-hoc analysis,

hypothesis testing, and can help us understand data, analyze trends, develop a plan to validate assumptions and drive accurate conclusions. SPSS facilitates the creation of charts, tables, and numerical statistical measures. Files are not only saved in IBM SPSS, other files such as Excel, SAS, and Stata, can be opened without entering data definition information or converting to an intermediate format (IBM, 2012). If there's a significant percentage of cases missing, multiple imputations can be used to handle the missing values. Multiple imputations involve knowledge of complex statistics and the use of sophisticated software. This powerful technique is appropriate for large datasets because it maintains the sample size and the variance of the data. Multiple imputations can also improve the external validity of the study and its statistical power. Missing values were handled by the use of the missing not at random (MNAR) mechanism. In a study by Walani et al., 2015, the MNAR was used for participant's income missing values. If the chance of values missing depends on the outcome or the covariates, the missing not at random (MNAR) is the appropriate mechanism to used (Walani et al.,2015). Other techniques available to deal with missing values also include 'pairwise deletion,' 'listwise deletion,' or 'mean substitution'(Walani et al. 2015, Allison 2002, Saunders et al. 2006, Buhi et al. 2008).

Mock tables are presented in the Appendix section to describe the different concepts and analysis procedure plans for my study. Table one shown in Appendix B and C represent the study concepts such as demographics and pediatrician's clinical characteristics, the data source, the level of measurement, and analysis procedures plan for the ASD study. I described my research question and independent variables in Appendix B, Tables 1 and 2. Table 3 describes the Inferential statistics that explain the relationship between variables such as age and gender. Table 4 shows the linear regression method where we can observe the relationship between

pediatricians use of developmental screening tools and age when parent was told by doctor that child had ASD. Data analysis Matrix for the ASD Study is on page 96 Appendix A.

Descriptive Data Analysis

I analyzed quantitative data by the use of descriptive statistics, mean, median, mode and the standard deviation. Measures of central tendency are commonly used to describe the values of a predictor, confounding, and the outcome variables within a sample (Research Engineer, 2015). Table 1 (below) shows the demographic and clinical characteristics of my sample while and Table 2 includes the number and percent of physician's who performed the ASD assessment. Mock tables depicting descriptive statistics can be found on pages 92-93.

Inferential Data Analysis

Inferential statistics such as chi-square, T-test, and logistic regression were used in the study to explain the relationship between the different variables (see Tables 3 and four below). A Chi-square or the T-test can give us the probability that the results of the analysis of the sample are representative of the selected population. Chi-square tests can also help us look for significant differences between groups of respondents on the main variables. I used inferential statistics to make deductions from the data available and associate my findings to the sample (UWE, 2016). The mock tables in Appendix A through C represent the different statistics that will be used to explain the relationship between variables. A p-value > 0.05 will show if the relationship between the variables is statistically significant.Mock table for analytical statistics can be found in Appendix C, page 98.

Data cleaning is the process of finding, diagnosing, and editing faulty data. Data cleaning can help correct errors and minimize their effect on study results (Van den Broeck et al. 2005).

Cleaning the data will require consistency checks and treatment of missing responses. Consistency checks will serve to identify the data that is out of range, logically inconsistent, or have extreme values were assigned a value (99) or discarded methodically (case wise or pairwise deletion). My screening procedures consisted of visually checking the data using histograms and scatter plots. Also, Bi-and multivariate inferential statistical tests were used to explore differences in groups (e.g., Chi-square, t-test) and to determine the significance of group mean differences. Univariate analysis (the analysis of a single variable for description) include summary statistics for the sample and key variables (California State University, 2010).

I interpreted the bivariate analysis by reporting the N (frequencies) to see if the relationship was significant and explained the Multivariate analysis by reporting p-values, B, and adjusted R-square. Multivariate analysis (a generic term for the analysis that involves more than two variables) included conducting normality checks and linear regression. The rationale for inclusion of potential covariates will be substantiated with references from the literature. Univariate analysis was interpreted reporting N (frequencies) and % (percentages).(Argyrous, 2000).

Post Hoc DataAnalysis

I conducted a Post Hoc analysis to see if my findings were statistically significant, the results are reported in Section 3. A Post Hoc test can help determine if an appropriate sample size was selected and if the power can threaten the internal validity of the findings. A small sample can increase the probability of a Type I error. Type I error can cause that the investigator rejects the null hypothesis when it is true. When the null hypothesis is true, and you fail to reject it, you make a Type I error. The level of significance for Type I error is alpha at a probability of making an error set at 0.05. Type II error denoted by β (Beta) happens when the null hypothesis

is accepted, but the alternative hypothesis is true. 1-Beta is the recommended probability where Beta is .80 (1-.80). (Onwuegbuzie & Leech, 2002).

Internal and external validity

Many of the relevant variables of interest and outcomes in healthcare and the social sciences are abstract concepts known as theoretical constructs. The use of valid and reliable tests or instruments to measure such constructs is an essential component of research quality (Kimberlin and Almut, 2008). Based on the measurement validity evaluation of the CSHCN by Hartman et al., 2006 estimates for internal, test-retest, inter-rater reliability, and for convergent and divergent validity were good (Hartman et al. 2006). On the other hand, one threat to external validity that I found is the measurement instrument used by researchers where they decided only to include children from households that spoke English. Results obtained from the measurement tool cannot be generalized to all Hispanic families. Based on Bethell (2002), differences in rates of identification by the user of an instrument (Screener) by race/ethnicity are not attributable to artifacts of language or translation (Bethell et al. 2002). In my study, the data analyzed was obtained from the survey CSHCN Screener which was administered only in the English language.

Ethical Procedures

Access to the 2011 Pathways dataset was granted by contacting Ms. Kathleen Powers, MSc, and Sr. Research Program Coordinator for the Child & Adolescent Health Measurement Initiative (CAHMI). I requested the 2011 Pathways dataset by contacting CAHMI at http://www.cahmi.org/ by selecting “Access data from the NSCH, NS-CSHCN, and NHIS on the Data Resource Center website and following the link http://www.childhealthdata.org/learn/pathways” I reviewed the survey codebook and found my

variables of interest. I submitted the dataset agreement form, and Ms. Kathleen Powers, MSc, and Senior Research Program Coordinator for Child & Adolescent Health Measurement Initiative approved. Ms. Powers explained the use of citations and other rules regarding the sharing of data, also how to cite when reporting, and publishing, distributing or displaying results from the dataset. I also found citation language for each survey produced by the Data Resource Center and CAHMI which the program coordinator provided. Despite the fact, that the child health data set agreement was signed and access granted, no data was analyzed until I received approval from the Walden IRB committee.

The 2011 pathways dataset is publicly available and is free, cleaned and labeled. I was granted Permission to use the dataset by the Data Resource Center (DRC). Copies of the Data Use Agreement are in the Appendix D. The questionnaire, demographics, and health indicators can be found on the Data Resource Center (DRC) website. Datasets are available as SAS and in SPSS format (DRC, 2016). Because the Pathways datasets are accessible to the public, and there are no patient identifiers, no Institutional Review Board Approval (IRB) will be needed. However, I filled out the IRB board application from Walden University, and it was approved on March 30, 2017. The data set is secured and stored in a password-protected computer where I had access to the data (DRC, 2016).

Summary

A cross-sectional analysis of archived data from the 2011 Pathways, was used for my study. The 2011 Pathways is a follow-up to the 2009/10 National Survey of Children with Special Health Care Needs (NS-CSHCN). The survey questions were developed and collected using the State and Local Area Integrated Telephone Survey (SLAITS) technology used for

sampling and administration. Telephone numbers obtained were randomly selected from respondents to the 2009-2010 NS-CSHCN who were available to be interviewed.

The main purpose of conducting my study was to explore the association between pediatricians screening practices and age when parent was told by doctor that child had ASD. Other independent variables included are the doctor referred the child to a specialist and pediatrician's response to parent's concern by conducting developmental screening. My dependent variable is age when parent was told by doctor that child had ASD.

The theoretical model "The advancing health disparities research within the health care system: a conceptual framework for health disparity research was used for my study. The extracted archived data was collected from the National Data Resource Center for Child and Adolescent Health (DRC), 2011 Survey of Pathways to Diagnosis and Services from the year 2011. The focus of my study was the Hispanic/Latino children population due to the lack of research conducted among this minority group. CDC studies have found that the median age of the first evaluation for Hispanic children was 46 months compared to white (43, $p<0.01$) and black children (44, $p<0.05$). The studies demonstrate a significant difference in mean among the different groups (Centers for Disease Control and Prevention [CDC], 2014).

The computer software that I used for the data analysis was the updated IBM SPSS version 23 provided by Walden University. Data screening and the description of univariate, bi- and multivariate inferential statistical tests and other procedures for variables of interest I previously discussed. Bi-and multivariate inferential statistical tests were used to explore differences in groups (e.g., Chi-square, t-test) and to determine the significance of group mean differences. Univariate analysis (the analysis of a single variable for description) included summary statistics for the sample and key variables (California State University, 2010). Also,

data cleaning and how the identification of errors and data that is out of range was handled and described following examples from other researchers such as Van den Broeck et al. 2005. Screening procedures consisted of visually checking the data and by the use of histograms and scatter screening procedures. I interpreted the bivariate analysis by reporting the N (frequencies) to test if the relationship is significant. Multivariate analysis (to investigate the relationship between two or more independent variables on a single dependent variable) I was able to interpret by reporting the p-values, B (beta), and the adjusted R-square (Argyrous, 2000).

In Section 3, I presented a description of the secondary data set response rates, discrepancies found, and demographic characteristics of the sample, as well as a description of the selected population. Results of basic univariate analyses will be provided to justify the inclusion of covariates in the model. Also, an evaluation of statistical assumptions and a report of analytical findings that includes probability values and confidence intervals will be summarized, and tables and figures presented.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this study was to explore the association between pediatricians screening practices and age at the time of autism diagnosis among the Latino children. I used secondary analysis of quantitative data to determine the association between my dependent variable age at the time of diagnosis and pediatrician screening practices. My independent research variables are "Physician completed screener/assessment" The second independent variable "doctor referred the child to a specialist" Described as after parent expressed concerns, defined as if a

developmental screening or assessment was completed by the parent, doctor, or healthcare provider?did a doctor or healthcare provider refer the child to a specialist? The third independent variable is “Physician’s response to parent’s concerns by conducting developmental screening” defined as after parent expressed concerns, did the doctor or healthcare provider conduct a developmental test? The dependent variable description is the age when parent was told by doctor that child had ASD.

My research questions are:

RQ1: What is the association between pediatrician’ screening practices and age when parent was told by doctor that child had ASD.

$H_0$1. Recommended pediatrician screening practices are not associated with the age when parent was told by doctor that child had ASD.

H_a1. Pediatrician’s screening practices are associated with the age when parent was told by a doctor that child had ASD.

RQ2: What is the association between pediatrician conducted screening after parent had a developmental concern and age when parent was told by a doctor that child had ASD.

$H_0$1. Pediatrician conducted developmental screening after parent had a developmental concern is not associated with age when parent was told by a doctor that child had ASD.

H_a1. Pediatrician conducted developmental screening after parent had a developmental concern is associated with age when parent was told by a doctor that child had ASD.

RQ3: What is the association between pediatrician' referral rates to ASD specialists and age when parent was told by doctor that child had ASD.

$H_0$1. Referral rates to ASD specialists are not associated with the age when parent was told by a doctor that child had ASD.

H_a1. Referral rates to ASD specialists are associated with the age when parent was told by a doctor that child had ASD.

In section 3, I described in detail how I conducted my secondary analysis. The software that I used for my analysis is the IBM SPSS Version 23. I Presented a summary of findings that included the descriptive, univariate, bivariate, and multivariate analysis. I also showed inferential statistics and the conclusion which is all explained with their appropriate tables and figures in the next section.

Description of Secondary Data

DRC Secondary Dataset

The 2011 Survey of Pathways to Diagnosis and Services is a follow-up survey to the previously published 2009/10 National Survey of Children with Special Health Care Needs (CSHCN). The survey was sponsored by the U.S. Department of Health and Human Services, the Health Resources Services Administration, the Maternal and Child Health Bureau (MCHB) and was conducted by the Centers for Disease Control and Prevention National Center for Health Statistics (NCHS). The instrument used to screen the children with special health care needs was the CSHCN Screener. The CSHCN Screener is a tool specifically designed and validated for identifying children with special health care needs (Centers for Disease Control and Prevention [CDC], 2012). The screener included a telephone interview and a self-administered (mail) questionnaire. All telephone numbers were randomly selected from re-contacted respondents who participated in the previous 2009/10 NS-CSHCN survey.

Study Sample

I downloaded the 2011 Pathways Survey data set and carefully examined it to ensure that all the variables of interest were included. Calculations for a minimum sample size were not necessary because all Hispanic/Latino children between the ages of 6 and 17 were included in my study. The 2011 Pathways survey contain data from 4,032 children between the ages of 6 and 17 who were diagnosed with any of the following disorders: autism spectrum disorder, developmental delays, and intellectual disabilities. ASD data for children less than 6 years of age were included in the data set. The data collection time frame was February 2011 through June 2011. A total of 354 Hispanic participants completed the questionnaire but only 134 participants had a child with ASD diagnoses. The dataset is publicly available, and all information related to the surveys is maintained by the Child and Adolescent Health Measurement Initiative.

Minimum Sample

Because I conducted a secondary analysis of archived data with a large sample, no minimum sample size calculation was required. After examining all data, I decided to include all children between the ages of 0 and 17 years of age. All Hispanic/Latino children in the dataset that fell between the ages of 0 to 17 years were included in the study.

Data Analysis

I used IBM SPSS version 23 software for my statistical analysis. Walden University provided the software. I reviewed the codebook multiple times to verify that all the variables were in the dataset. I then proceeded to download the dataset given by the Data Resource Center and began running frequency tables and all cross-tabulations for my variables. The frequency

tables provided information about out of range or missing data as stated by Chen and Phillips (2014).

Missing Data

The 2011 Pathways dataset contain data that was merged by experts with the purpose of eliminating any missing values. All variables that included "non-response," "refused," or don't know" responses and exceeded 5 % or more of the total were imputed. The National Center for Health Statistics (NCHS) generated the imputed version with the purpose of adjusting for observed differences between respondents and no respondents and to allow statistical analysis such as bivariate and multivariate without excluding cases with missing values. Imputed methods can provide a solution to missing data and resolve non-response issues contributing to consistency and comparability of statistical analysis (2011 Survey of Pathways to Diagnosis and Services.

After further examination of some of the variables, I noticed missing cases for Hispanic/Latino age, and for two of my independent variables. I contacted the data set manager who clarified that the data were not missing, but only "skips" cases where the Hispanic/Latino participants did not answer the questions. I decided to remove the "system missing" cases when they were less than 10% because, in the end, I had enough cases to achieve adequate power (.917). I then determined that the chance of making a Type II error was small.

I extracted each one of the independent and dependent variables and saved into a new dataset. I then saved a copy of the new dataset under a different name and proceeded with the univariate descriptive statistical analyses that included ranges, mean, median, minimum, and maximum. To test my null hypothesis, I performed inferential analysis (bivariate) that included cross tables, chi-square, correlations coefficients, simple linear regression, and logistic regression

(multivariate analysis). The purpose of using these methods was to identify any associations and the level of significance between my dependent variable (age at the time of autism diagnosis) and my independent variables (listed below):

1. Physician completed screener/assessment" defined as was a developmental screening or assessment completed by the parent, doctor, or health care provider.

2. The second independent variable "doctor referred the child to a specialist" Described as after parent expressed concerns, did a doctor or health care provider refer the child to a specialist.

3. The third independent variable is "Physician's response to parent's concerns by conducting developmental screening" defined as after parent expressed concerns, did the doctor or health care provider conduct a developmental test.

Univariate Analysis

Descriptive Statistics

A total of 4,032 parents and caregivers of children with special health care needs (CSHCN) between the ages of 6 and 17 years of age responded to the national 2011 Pathways survey in-depth telephone interview. Only 2,988 participants completed a self-administered mail questionnaire (SAQ) and returned it by mail. The total number of Hispanic/Latino participants that I extracted from the national survey sample is 354, mean 2.10 and a standard deviation of .734. Only 134 participants responded to the question: "Age when the parent was first told by a doctor that child had ASD." One participant refused to answer the question. Therefore, 134 is the final number of Hispanic/Latino children that I used for the analysis in my study.

The data manager clarified that the "missing cases" were not random missing data but legitimate skips. The legitimate skips were participants who responded "no" in regard to being

diagnosed with autism. Because I was only interested in Hispanics diagnosed with autism the "Skip" cases were excluded from the study. The secondary data that I present in this section, I analyzed using the following statistical analysis: descriptives, univariate, bivariate, and multivariate statistics.

The variables described in Table 1 below include frequencies and percentages for Hispanic/Latino children's age and sex/gender; parent's and guardian's education.

Descriptive statistics

The sample consisted of 134 participants. Differences in sex shows that 79.9% are males and 19.4% are females. The highest group of Hispanic children with ASD are in age group 3-6 (45.5%) age group 0-2 contain 22.4% and 6-17 years old is 32.1%. A high number of parents (79.1%)completed more than high school education.

Table 1

Demographics and clinical characteristics of study participants (N=134)

Characteristics	Frequencies	(Cumulative Percentages)
Gender		
Male	107	79.9
Female	26	19.4
Age		
0-2 years	30	22.4
3-6 years	61	45.5
6-17 years	43	32.1
Parent's and/or Guardian's Education		
Less than high school	4	3.0

Completed high school	21	15.7
Completed more than high school education	106	79.1

The following table show the descriptive statistics (means, standard deviations, frequencies, and percentages) of all my independent variables. Independent variables are "pediatrician conducted screening", "pediatrician conducted screening after parent had a developmental concern", and "doctor referred the child to a specialist after parent had a developmental concern."

Table 2

Descriptive statistics for independent variables

Independent Variables	Mean	Standard Deviation	Frequencies	Percentages
Physician completed screener/assessment (N=112)	1.38	.486		
Yes			70	62.5
No			42	37.5
Doctor conducted a test after parent had a developmental concern (N=119)	1.52	.501		
Yes			57	47.9
No			62	52.1
Doctor referred child to specialist after parent had a developmental concern (N=119)	1.33	.474		
Yes			79	66.4
No			40	33.6

Demographic and clinical characteristics of the Hispanic/Latino children

The number of Hispanic/Latino parents/caregivers in the 2011 Pathways survey was 354. The total number of participants who answered the question "Age when the parent was first told by a doctor that child had ASD" is 134 (subsample). The mean age of Hispanic children in the subsample is 2.0, and the standard deviation is .734 (Table 4). Age groups ranged from 0-2 years, 3-5 years, and 6-17 years are presented in Table 3, and also depicted in a bar chart (Figure 1). Please note that "missing cases" is not random missing data but legitimate skips. The "missing cases" are participants who responded "no" for being diagnosed with autism. The "skip" cases were excluded from my study as shown in Table 3.

Table 3

Age when parent was first told by physician that child had ASD (N=134 participants).

Age	Frequency	Percent	Cum %
0-2 years	30	8.5	22.4
3-5 years	61	17.2	67.9
6-17 years	43	12.1	100
Total	**134**	37.9	

Age of Hispanic/ Latino children with ASD diagnosis (N=134 participants)

Table 4 presents the total number of Hispanic/Latino parents and caregivers who responded to the question "age when the parent was first told by a doctor that child had ASD." The number in the sample is 134, mean 2.10, and standard deviation of .734 (after excluding 220 legitimate skips).

Table 4

Age when parent was first told by doctor that child had ASD

Age when parent was first told by doctor that child had ASD		
N		**134**
Missing (Skip)		220
Mean	**2.10**	
Median	2.00	
Mode	2	
Std. Deviation	.734	

Note: "Missing data" are legitimate skips and not "missing data"

Figure 1 presents the percentage of responses for each one of the age groups. Age group 0-2 years (22.4 %), 3-5 years (45.5%) and age group 6-17 years (32.0%).

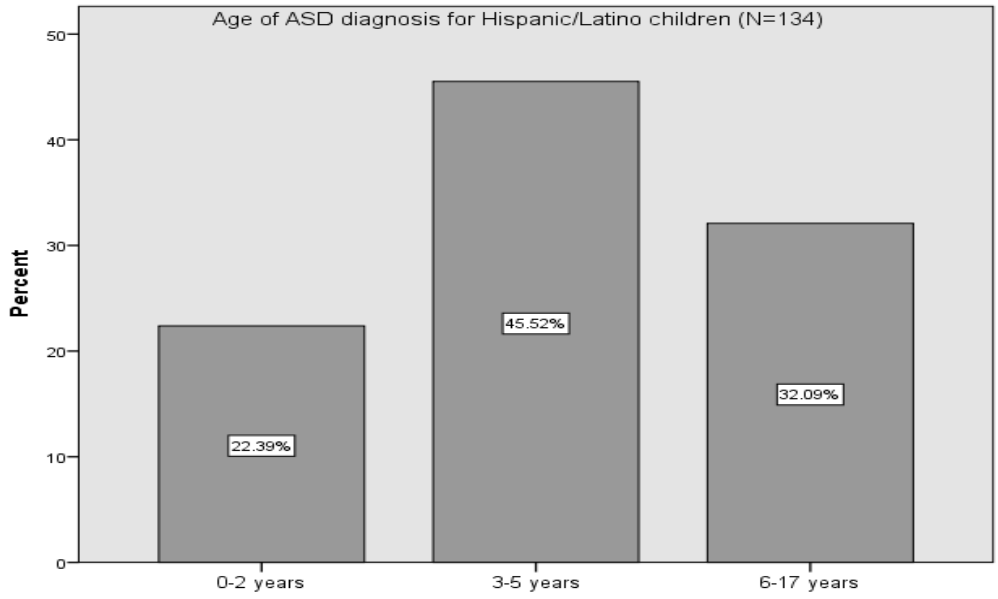

Figure 1. Age of ASD diagnosis for Hispanic/Latino children (N=134)

Table 5 depicts the sex/gender of Hispanic/Latino children. Male Hispanic/Latino children participants is 79.9.4% (N=107) and Female participants is 19.4% (N=26) as shown in figure 2 below.

Table 5

Sex/Gender of Hispanic/Latino Children with ASD

Gender	Frequency	Percent	Cum. %
1 - MALE	107	30.2	79.9
2 - FEMALE	26	7.3	99.3
7 - REFUSED	1	.3	100.0
Total	134	37.9	

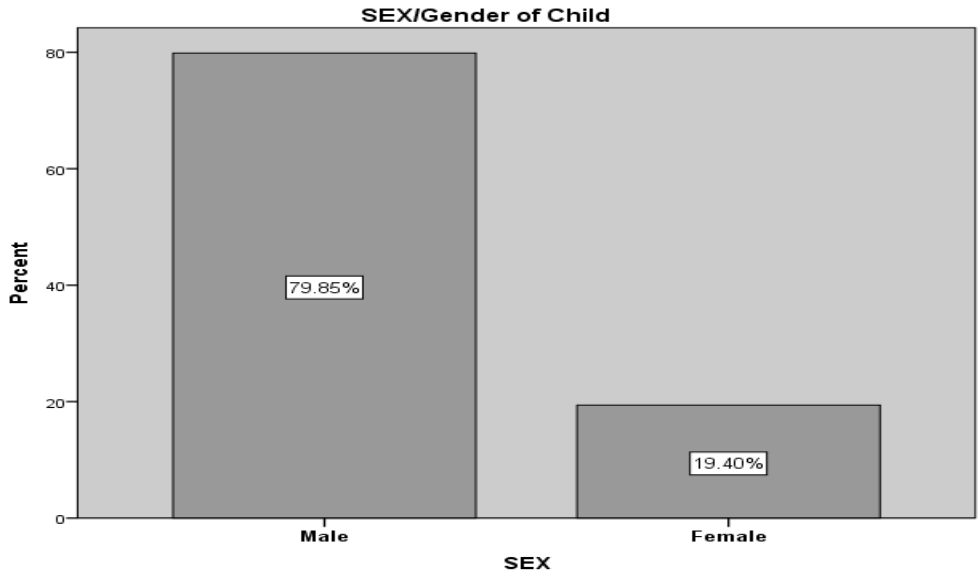

Figure 2. Chart depicting Sex/Gender of Hispanic/Latino children with special health care needs.

In Table 6 presents the percentage of Hispanic parents that don't have a high school education (3.0%, N=4), 15.7% (N=21) finished high school, and 106 Hispanic/Latino parents (79.1%) have more than a high school education. Two participants replied "don't know" and one participant refused to answer the question. The mean statistic for education is 2.86 and Standard deviation .717.

Table 6

Highest education level of parents in household (N=106).

	Frequency	Percent	Valid Percent	Cum. %
1-Less than high School	4	1.1	3.0	3.0
2-Completed high school	21	5.9	15.7	18.7
3-More than high school	**106**	29.9	79.1	97.8
6-Don't know	2	.6	1.5	99.3
7-Refused	1	.3	.7	100.0
Total	134	37.9	100.0	

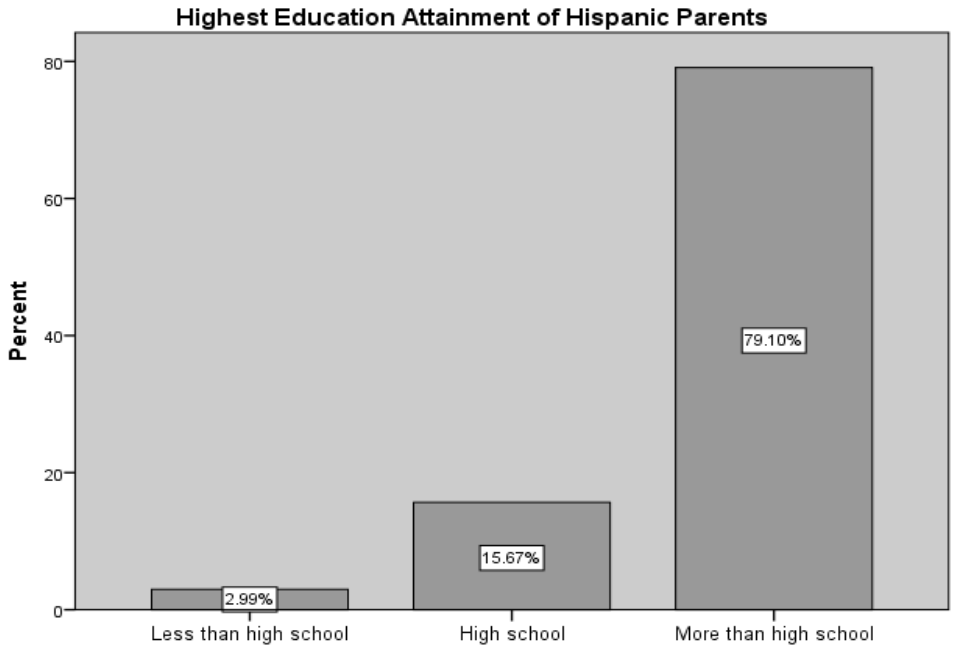

Figure 3. Educational attainment of Hispanic/Latino parents

The percentage of Hispanic parents in the survey that doesn't have a high school education is low 3.0% (N=4). Out of 134 participants (N=21), 15.7% finished high school, and 106 Hispanic/Latino parents (79.1%) stated that they have more than a high school education. Two participants replied “don’t know” and one participant refused to answer the question.

Table 7

Frequencies for Independent variable “Doctor/physician completed screener/assessment”

Doctor completed screener Frequency		Percent	Valid Percent	Cum. %
Yes	70	19.8	62.5	62.5
No	42	11.9	37.5	100.0
Total	**112**	31.6	100.0	
Missing=Skip	22	6.2		
System	220	62.1		
Total	242	68.4		
	354	100.0		

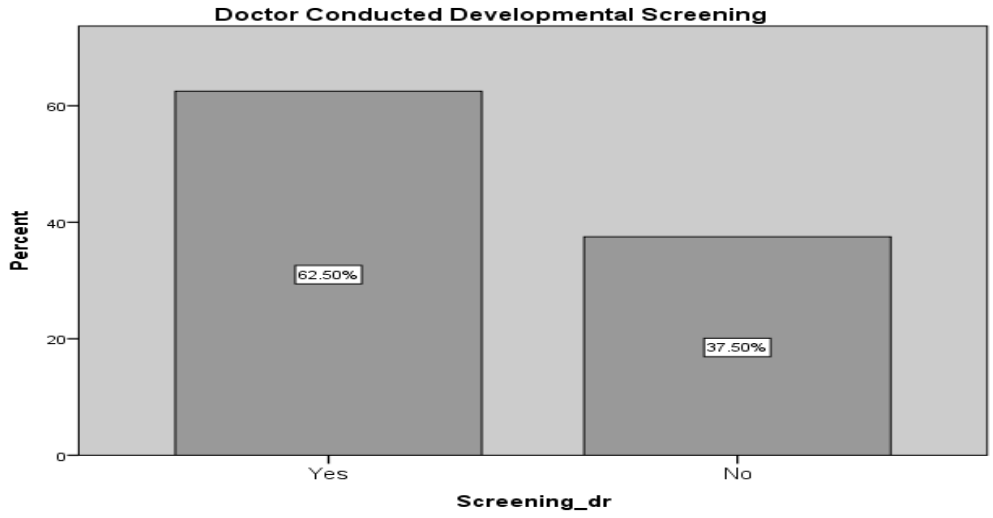

Figure 4. Percent of pediatricians who completed a developmental screening on Latino children.

The majority of pediatricians/health care providers (62.5%) conducted a routine developmental screening on Hispanic/Latino children. A total of, 37.5% did not conduct a developmental test, while 15.7% (not included) did not respond to the question (legitimate skips).

Table 8

Doctor or health care provider conducted a developmental test when parent had a developmental concern

Doctor conducted a developmental test when parent had a developmental concern					
		Frequency	**Percent**	**Valid Percent**	**Cumulative %**
Valid	Yes	57	16.1	47.9	47.9
	No	62	17.5	52.1	100.0
	Total	**119**	33.6	100.0	
Missing	Skip	14	4.0		
	Missing	1	.3		

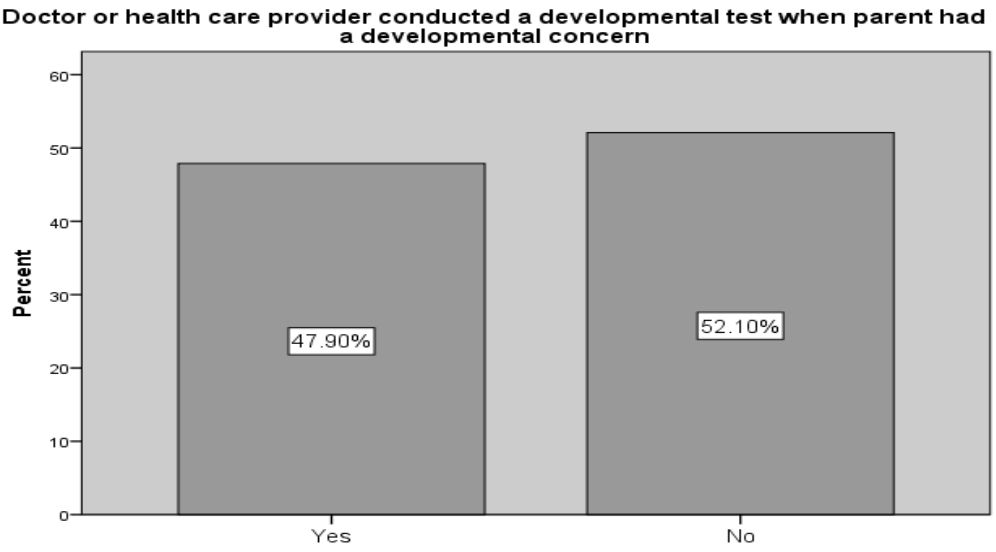

Figure 5. Doctor or health care provider conducted a developmental test when parent had a developmental concern

Depicted above in the chart (Figure 5) we can observe that 47.9% of pediatricians/health care providers conducted a developmental test or ASD assessment on Hispanic/Latino children when the parent had a developmental concern (Table 8). More than half of the health care providers (52.1 %) did not conduct a developmental test when a Hispanic parent had a developmental concern (shown in figure 5 above).

Table 9

Doctor made a referral to a specialist when parent had developmental concerns (N=119)

Doctor made a referral to a specialist when parent had developmental concern

		Frequency	Percent	Valid Percent	Cum. %
Valid	Yes	79	22.3	66.4	66.4
	No	40	11.3	33.6	100.0
	Total	**119**	33.6	100.0	

Missing	Skip	13	3.7
	Missing	1	.3

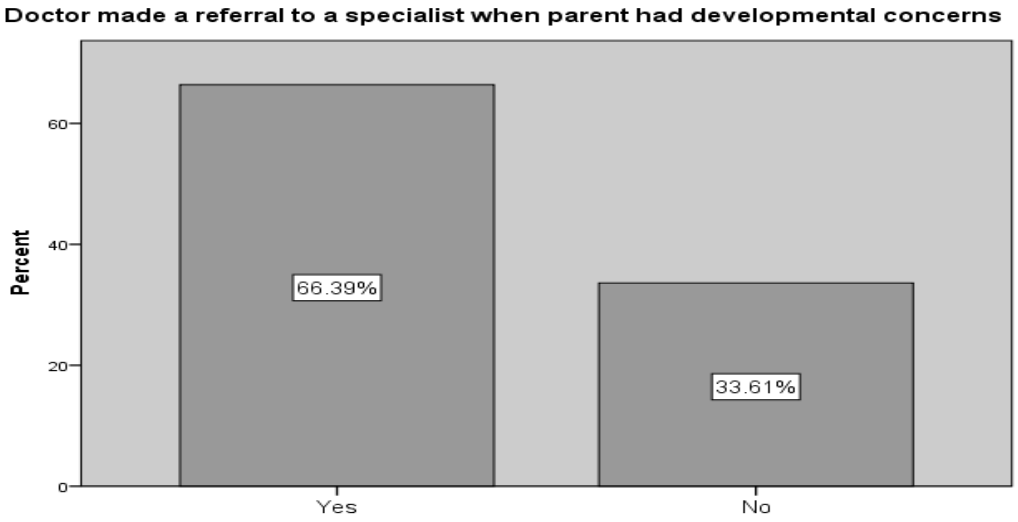

Figure 6. Doctor or health care provider made a referral to a specialist when parent had developmental concerns.

A total of 79 participants (66.4%) stated that a doctor of health care provider referred the child to a specialist when they had a developmental concern, while a total of 33.6% of doctors/physicians (N=40) did not make a referral to a specialist when the parent had a developmental concern. There are 13 “legitimate skips” and one missing participant.

Bivariate Analysis

The next tables and figures present the analysis of relationship between children’s age at the time of autism diagnosis, sex/gender, parental education, and pediatrician’s screening practices (doctor conducted a developmental test, after parent had a developmental concern doctor conducted screening/assessment test, and after parent had a developmental concern doctor made

a referral to a specialist). The number of children with ASD extracted from the main dataset is 134. The error selected was (0.5%), confidence level of 95%, response distribution (set 50%), which resulted in a minimum recommended sample size of 100 (Raosoft, 2004).

Cross-tabulation with Chi-Square Analysis

A cross-tabulation table was used to observe the relationship between the dependent variable (age when the parent was first told child had ASD) participants sex/gender, and parental educational attainment. Also, contingency tables were used to observe the relationship between the dependent variable and independent variables: "age when the parent was first told child had ASD" and "doctor completed developmental screener/assessment", "Dr. conducted developmental screener when the parent had a developmental concern," and "Dr. referred the child to a specialist when parent had a developmental concern".

The results presented in table 9, show that more Hispanic males than females were diagnosed with ASD in the different age groups. The results of the Pearson's r (Chi square) indicates that no statistical significance exists between the two variables. In this case, the significance level of ($\alpha = 0.05$) was used, after examining the results I concluded that the p-value in table 9 is greater than the alpha significance level($p.>0.05$). If the p-values are less than 0.05, one can conclude that there's a strong correlation between the two variables (Ken State University, 2017).

Table 10

Age when parent was told by doctor that child had ASD vs Sex/Gender.

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.997[a]	2	.607
Likelihood Ratio	.993	2	.609
Linear-by-Linear Association	.026	1	.872
N of Valid Cases	133		

significance level (α = 0.05)

No statistical significance was found

Table 11

Age when parent was told by dr. that child had ASD vs Parental education. (no statistical significance observed).

Chi-Square Tests						
	Value	df	Asymptotic Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.080[a]	4	.545	.568		
Likelihood Ratio	3.097	4	.542	.649		
Fisher's Exact Test	3.095			**.521**		

Linear-by-Linear Association	.026[b]	1	.872	.904	.483	.095
N of Valid Cases	131					

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is .92.

significance level (α = 0.05)

Because four cells had expected counts less than five percent and this violates one of the Chi-Square assumptions, the *Fisher's Exact Test* results was used to determine the association between the variables "age when the parent was told by a doctor that child had ASD and parental education." In this case, no statistical significance was observed.

Table 12

Age when parent was told by dr. that child had ASD vs Doctor conducted developmental screening

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.897[a]	2	.639
Likelihood Ratio	.894	2	.639
Linear-by-Linear Association	.865	1	.352
N of Valid Cases	112		

significance level (α = 0.05)

The results presented in table 12, showed that no association exist between age when the parent was told by a doctor that child had ASD and whether or not doctor conducted a developmental test or screening test for ASD.

Table 13

Age when parent was told by dr. that child had ASD vs Doctor conducted developmental screening after parent had a developmental concern

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.443[a]	2	.295
Likelihood Ratio	2.459	2	.292
Linear-by-Linear Association	2.367	1	.124
N of Valid Cases	119		

significance level (α = 0.05)

The results of the Pearson's r (p=.295) showed that no significant relationship exist between "age when the parent was told by a doctor that child had ASD" and "Doctor conducted a developmental test when the the parent had developmental concerns."

Table 14

Age when parent was told by doctor that child had ASD versus Doctor or healthcare provider made a referral to a specialist when parent had a developmental concern

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.365[a]	2	.505
Likelihood Ratio	1.404	2	.496
Linear-by-Linear Association	1.247	1	.264
N of Valid Cases	119		

significance level (α = 0.05)

The results of the Pearson's r (p=.505) showed that no significant relationship exists between age when the parent was told by a doctor that child had ASD and doctor made a referral to a specialist when the parent had developmental concerns. Based on results of the cross tabulation with Chi square test (p values are high >0.05), the null hypothesis is accepted. The calculated effect size using Cohen's d test was d=0.20, (80 % power), and the adequate power (.917), I determined that the chance of making a Type II error are small.

Multinomial Logistic Regression Goodness of Fit Model

I conducted a multinomial logistic regression to determine the association between my dependent and my independent variables. Multinomial logistic regression was used because the dependent variable and independent variables are nominal; the dependent variable is a nominal variable with more than two categories or levels. This model does not assume that the variables

have linearity, are normally distributed or have homoscedasticity (Starkweather, J. & Moske, A, n.d.) Moreover, all assumptions required to perform the multinomial logistic regression test were true, and the data passed the assumptions needed to give a valid result (Laerd Statistics, 2013).

After observing the Pearson's Chi-Square value in Table 15, I concluded that the multinomial logistic regression model fits the data well. Pearson's Chi-Square values that are large and p-values that are less than 0.05 are indicators of a poor fit model. In table 15 below, I observed that the p-value of .823 is not statistically significant (Laerd Statistics, 2013).

The Raosoft software was used to determine the adequate sample size needed to perform the logistic regression statistics. To show that independent variables were normally distributed and that each independent variable was linearly correlated with the dependent variable a scatter plot figure was constructed below (see figure 7).

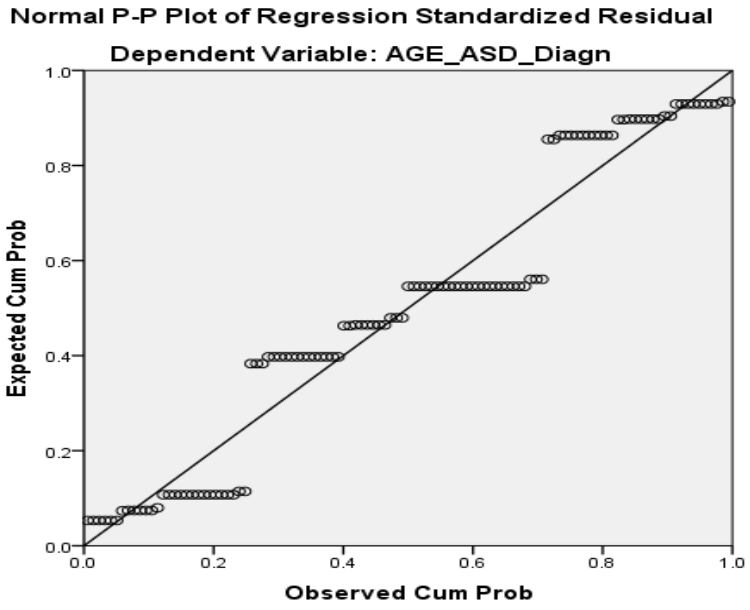

Figure 7. Scatterplot representing linear regression to determine if a relatioship exists bewteen my independent and dependent variables.

Table 15

Multinomial logistic regression goodness of fit model

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	2.885	6	.823
Deviance	3.686	6	.719

significance level (α = 0.05)

Table 16 depicts the likelihood ratio test from the multinomial logistic regression goodness of fit model. The results of the Pearson chi-square statistics were used to indicate the association or statistical significance between my dependent and independent variables. Results in table 16 show that none of my independent variables are statistically significant. The p-values are higher than 0.05.

Table 16

Multinomial logistic model of goddness fit likelihood ration test

Likelihood Ratio Tests				
	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig
Intercept	38.716[a]	.000	0	.
Screening_dr	38.740	.025	2	.988
dr_conducted_test	39.758	1.043	2	.594

dr_refer_child	39.549	.833	2	.659

significance level (α = 0.05)

The p-values in the parameter estimates below showed that the independent variables "doctor conducted screening," "doctor conducted developmental screening after the parent had a developmental concern," and "doctor referred the child to a specialist after the parent had a developmental concern" are not statistically significant. The null hypothesis that pediatrician screening practices are not associated with the age of ASD diagnosis among Hispanic/Latino children is therefore accepted.

Table 17

Parameter estimates for independent variables

Parameter Estimates

AGE_ASD		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
0-2 years	Intercept	-.733	.493	2.214	1	.137			
	[Screening_dr=1]	-.106	.679	.024	1	.876	.900	.238	3.406
	[Screening_dr=2]	0[b]	.	.	0	.	.	.	.
	[dr_conducted_test=1.00]	.554	.637	.758	1	.384	1.741	.500	6.065
	[dr_conducted_test=2.00]	0[b]	.	.	0	.	.	.	.

	[dr_refer_child =1.00]	.611	.714	.733	1	.392	1.842	.455	7.460
	[dr_refer_child =2.00]	0[b]	.	.	0	.	.	.	.
3-5 years	Intercept	.204	.384	.282	1	.595			
	[Screening_dr =1]	-.061	.589	.011	1	.918	.941	.297	2.984
	[Screening_dr =2]	0[b]	.	.	0	.	.	.	.
	[dr_conducted _test=1.00]	.523	.564	.859	1	.354	1.687	.558	5.099
	[dr_conducted _test=2.00]	0[b]	.	.	0	.	.	.	.
	[dr_refer_child =1.00]	.111	.597	.035	1	.852	1.118	.347	3.599
	[dr_refer_child =2.00]	0[b]	.	.	0	.	.	.	.

significance level (α = 0.05)

Post Hoc Analysis

The Independent Samples t-Test is used when comparing the means of two groups if I need to compare the means of more than three groups, the Independent Samples t-test cannot be used (Ken State University, 2017). In my study, the independent sample t-test was conducted (as shown in Table 18) to determine the statistical significance and the direction of the difference between the means of all my independent variables. No statistically significance was observed at the 0.05 alpha level (p values > α) as shown in the "equal variances not assumed" row in Table 18 (Ken State University, 2017). The Cohens d test was manually calculated to determine the

standardized difference among the means and the size of the effect (Statistical lectures, 2012). The size of the effect was obtained by multiplying the statistical significance value by two and then was divided by the square root of the degrees of freedom √ (0.5). The Cohen's effect size (as interpreted by Cohen in 1988) shows that the effect size is small (d=0.20, 80% power). The Cohen's table (figure 8) was taken from the University of Colorado-Colorado Springs (2000).

The post-doc statistical power of 0.310 was obtained based on the results of a Cohen's d effect of 0.2, the probability level of 0.05, and a sample size of 134. The statistical power free online calculator designed by Daniel Soper was used to determine the statistical power of the one-tailed two independent samples t-test (Soper, 2017). The higher the alpha results, the lower the beta values, as alpha increases the beta decreases and the statistical power of the test increases (Sullivan,n.d.). The small observed power of 0.310 in my study could have been caused by a sample size that is modest.

Cohen's Standard	Effect Size	Percentile Standing	Percent of Nonoverlap
	2.0	97.7	81.1%
	1.9	97.1	79.4%
	1.8	96.4	77.4%
	1.7	95.5	75.4%
	1.6	94.5	73.1%
	1.5	93.3	70.7%
	1.4	91.9	68.1%
	1.3	90	65.3%
	1.2	88	62.2%
	1.1	86	58.9%
	1.0	84	55.4%
	0.9	82	51.6%
LARGE	0.8	79	47.4%
	0.7	76	43.0%
	0.6	73	38.2%
MEDIUM	0.5	69	33.0%
	0.4	66	27.4%
	0.3	62	21.3%
SMALL	0.2	58	14.7%
	0.1	54	7.7%
	0.0	50	0%

Figue 8. The Cohen's effect size. University of Colorado-Colorado Springs (2000).

Table 18

Independent Samples t -Test for dependent and independent variables.

Independent Samples Test								
		T-test for Equality of Means						
Age when parent was told by dr. that child had ASD		t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% CI of the Difference	
							Lower	Upper
Doctor conducted developmental screening	Equal variances assumed	-.930	110	.355	-.133	.143	-.418	.151

After parent had develop. concern doctor conducted dev. screening	Equal variances assumed	-1.547	117	.124	-.211	.136	-.481	.059
After parent had develop. concern doctor referred child to a specialist	Equal variances assumed	-1.118	81.851	.259	-.162	.143	-.446	.122

Cohen's d test effect size results using a t-test. $p \leq .05$.

The effect size (using the t-test) was calculated manually for the dependent and independent variables. Hispanic/Latino children who were diagnosed with ASD (N=134), (M= 2.10), standard deviation of .734, statistical value -.930, df=110, confidence interval (CI.95) is -.418 and .151. The Cohen's effect size is (*d*=0.20-80% power). No statistical difference was found. Furthermore, based on Cohen's interpretation of the effect size, I concluded that the effect size is small. The Cohen's d test effect size in my study had little meaning because my null hypothesis was not rejected.

Power and Probability of Type II error (Beta)

The Power and the probability of making a Type II error (Beta) for each independent variable are shown in Table 19. A Type II error can occur when the size of the sample is too small, and the difference can't be detected. The Beta value for the independent variable "physician/pediatrician completed screening' with a sample size of 112, p value of .355 and effect size of .008 equals 0.848 or 84.8% (Power =1-β; 1-.152=0.848). The probability of making a Type II error or having a false negative is 84.8%. 84.8 percent of making a Type II error means

that if my sdy if repeated, it will produce statistically significant results eight times out of ten (Business Dictionary, 2017). "Pediatrician completed screener/assessment" probability of type II error is 84.8%, "Doctor conducted a developmental test when the parent had a developmental concern" probability of Type II error is 0.664 or 66.4% (no difference among groups was detected). The doctor referred the child to a specialist when the parent had a developmental concern" is 0.802 or 80.2% probability of making a Type II error. The interaction and main effects among the variables are not significant. The sample size is adequate, and the difference that was not detected is considered non-meaningful. In my study, a correct decision was made because the difference that was not detected have no applicable meaning (University of Florida Health, 2017).

Table 19

Analysis of variance to determine Power and Probability of type II error (β).

Tests of Between-Subjects Effects

Dependent Variable: AGE_ASD_Diagn.

Source	Type II Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	.467[a]	1	.467	.864	.355	.008	.864	.152
Intercept	464.143	1	464.143	859.662	.000	.887	859.662	1.000
Screening_dr	.467	1	.467	.864	**.355**	**.008**	.864	**.152**
Error	59.390	110	.540					
dr_conducted_test	1.323	1	1.323	2.395	**.124**	**.020**	2.395	**.336**
Error	64.660	117	.553					

dr_refer_child	.697	1	.697	1.249	**.266**	**.011**	1.249	**.198**
Error	65.286	117	.558					

a. R Squared = .008 (Adjusted R Squared = -.001)

b. Computed using alpha = .05

Summary

All statistical analyses for my study was conducted using SPSS 23.0. My sample consisted of 134 participants who were already separated into three age groups (0-2, 3-5, and 6-17 years old). The mean age for Hispanic children is 2.10 and more than 79% are males. A total of 106 out of 134 Latino parents (79%) have more than a high school education. Results of the bivariate and multivariate statistics showed no association between pediatrician's screening practices and age of ASD diagnosis among Latino children. Therefore, I failed to reject my null hypothesis.

In the next section, I described my findings, data validity, reliability, and some of the limitations that were observed with the 2011 Pathways dataset. I analyzed and interpreted my results based on the theoretical model: Advancing Health Disparities Research within the Health Care System: A Conceptual Framework for Health Disparity Research. This model can be used for the detection of health care disparities to the understanding of inequalities underlying factors (Kilbourne et al., 2006).

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

Diagnosis of autism spectrum disorders has increased since the years 2000. Evidence suggests that this developmental disorder affects more males than females. The Centers for Disease Control (CDC) reported in 2000 that 1 out of 150 children were diagnosed with ASD. During the 2012 surveillance, the CDC reported that 1 in 68 children in the U.S. was diagnosed with a developmental disability. Although Autism can be diagnosed at the age of 24 months, most children are diagnosed after 4 years of age (Centers for Disease Control and Prevention [CDC], 2016).

The purpose of my study was to examine the association between pediatricians and other health care providers' screening practices and age when parent was told by doctor that child had ASD. I conducted a secondary analysis of archived data using SPSS 23.0 and included univariate (frequencies), bivariate (Chi-Square), and multivariate analysis (multinomial logistic regression).

Summary of Findings

Child Gender and Parental Educational Attainment

The 2011 Pathways data set included a total of 354 Hispanic/Latino participants. Out of 354, only 134 responded to the question "age when the parent was told by a doctor that child had ASD." The mean age of children was 2.10 and a standard variation of .734. Age groups ranged from 0-2 years, 3-5 years, and 6-17 years. A total of 79.9% (N=107 children) were male Latino children while only 19.4% (N=26) were female participants. The number of male participants observed in my sample cannot support what CDC published in 2016, because my sample is a subgroup of a national survey which contains a moderate sample of Hispanic/Latino participants.

CDC published results that showed that 1 out of 42 boys (4.5 more) are diagnosed with ASD, while only 1 out of 189 girls are diagnosed each year (Centers for Disease Control and Prevention [CDC], 2016). Also, in the extracted sub-sample, most Hispanic/Latino parents have more than a high school education (79.1%), 15.7% completed high school education, and 3.0% said that they have less than a high school education. The fact that the majority of Latino parents have more than a high school education could be related to selection criteria. In the 2011 Pathways survey, the Latino population was not randomly selected. The Latino participants consisted of respondents who had the ability to speak English and were able to complete the interview. The mailed questionnaire was only provided to English-speaking Latino participants. I was not able to compare my results with other studies, because there is limited information and articles related to autism and pediatrician screening practices among the Latino population.

Screening Practices

The cross tabulation for my independent variables ("pediatrician conducted screening", "After parent had developmental concern doctor conducted developmental screening', and "After parent had developmental concern doctor referred the child to a specialist') showed that there's no significant association with my dependent variable "age when the parent was told by a doctor that child had ASD (p>0.05). The findings could not be compared to other studies due to limited literature found about pediatricians' screening practices and age of ASD diagnosis among Hispanic/Latino children. Zuckerman, et al. (2013) for example, conducted a study in California with a sample of 267 pediatricians. Their goal was to identify disparities in the diagnosis of ASD between Latino and White children. The investigation identified some factors that may be related to late ASD diagnoses such as provider's limited use of developmental screening tools, access to

specialists, language and culture barriers, and difficulties recognizing ASD symptoms in Hispanic/Latino children (Zuckerman, et.al. 2013). In my study, no statistical significance was found or indication that pediatricians are not following the American Academy of Pediatrics (AAP) recommendations for ASD screening. The AAP guidelines recommend that screening should be conducted at every well-child visit (conducted at 9, 18, 24, and 30 months old). However, my statistical results should be interpreted with caution due to the small sample size obtained from the dataset.

Sample size adequacy

My sample size was determined using the Raosoft software and showed that the sample size was adequate to perform the logistic regression statistics. My independent variables are normality distributed and each independent variable is linearly correlated with the dependent variable. The distribution was shown in a scatter plot figure (see Figure 7).

Analysis and Interpretation of the Findings in the Context of the Theoretical Conceptual Framework

The advancing health disparities research within the health care system: a conceptual framework designed by Kilbourne et al. in 2006, coordinates the process of health disparities research into three different stages: Detection, understanding, and the reduction or elimination of health disparities (Mandell et al., 2006). Although, my study did not reveal any indication of inequalities or health care disparities factors that could be attributed to lack of screening, using the Kilbourne model in future ASD studies could guide researchers in the understanding of health disparities among the Hispanic/Latino population.

Limitations of the Study

The sample extracted from the secondary data set was small (N=134), and the results may not be generalized to the entire Latino population. The sample size was smaller than anticipated because only educated Hispanic/ Latino parents/caregivers who had the ability to speak English were selected for the survey. Replicating my study with a much larger sample size might help to detect the effect if there is one. Additionally, the small sample was a nonrandom, convenience sample that limited the external validity of the study. Despite the size of the sample, I decided to continue my study because the post hoc power analysis showed that the sample size was adequate and because the difference that was not detected have no applicable meaning. Because the sample size is smaller than anticipated, and no statistical significance was observed during my analyses, I recommend that future studies be conducted with a larger representative sample to detect a meaningful association between the variables.

Recommendations

Findings from my study did not show an association between pediatrician screening practices and age of ASD diagnosis among Hispanic/Latino children. The results of my study suggest that the data collected for the 2011 Pathways Survey is not a representative sample of all Hispanic/Latinos in the US. These results lack external validity and cannot be generalized to the entire Latino population due to the relatively small sample size. No statistical significance was found during the interpretation and analyses of my study. Therefore, I recommend that my finding be interpreted with caution and that future studies be conducted with a larger sample size to detect a possible effect/association between my variables. This lack of association could have been caused not only by the small sample size, but also by the fact that only English speaking Hispanic participants were selected for the survey. Future studies should include a diverse selection of Hispanic participants to provide a clear view of barriers and other factors that could cause delays at the time of ASD diagnosis. The surveys and questionnaires should be specifically

designed to target both the no English and the English speaking Hispanic population. The association among my variables was not statistically significant (at the alpha level of 0.05), but the findings from this investigation should be interpreted with caution.

I recommend that a new national survey be conducted with a larger sample that can be accurately generalized to the Hispanic population. The researchers will need the assistance of interpreters or interviewers who can speak Spanish. Including all Hispanics/Latinos in a future survey will help avoid a selection bias and could produce reliable and statistically significant results. Additional studies are necessary to help raise awareness among healthcare providers and the Hispanic/Latino community about the importance of early autism diagnosis. New studies could contribute to creating programs that can assist healthcare providers, Hispanics, and other minorities increase awareness of the importance of identifying early signs of autism in young children, thereby, decreasing associated morbidity and mortality among this population.

Implications for Professional Practice and Social Change

My research could impact the way services are offered and may increase awareness of the importance of revising and individualizing screening tools to meet the needs of the Hispanic/Latino families. Early diagnosis is essential to give Hispanic children the opportunity to receive early ASD treatment and help them reach the best outcome possible (Autism Speaks, 2015, as cited by Diaz, 2015). My study may help public health officials, community development experts, and social workers develop ASD diagnosis guidelines and practices that are sensitive to the culture and lifestyle of Hispanic/Latino parents. Past studies have looked mainly at Hispanic/Latino parents' demographics and their association to early diagnosis of developmental problems. My research aimed to increase existing knowledge and attempted to uncover critical areas of developmental screening practices that were not explored by previous

researchers. A well-planned study that focuses on the cultural needs of all Hispanic groups should produce positive results and valuable data that could help reduce morbidity and mortality among this population.

Conclusion

Autism Spectrum Disorders continues to affect many Latino children and each year many more are diagnosed. CDC studies have found that 1 out of 68 children in the US have been diagnosed with ASD (CDC, 2014). My study did not yield any statistically significant association between pediatrician screening practices and age at the time of autism diagnosis among Latino children. The number of Hispanic/Latino children diagnosed with ASD could be higher because studies in this area are limited.

The results of my study suggest that the data collected for the 2011 Pathways Survey is not a representative sample of all Hispanic/Latinos in the US. The results of the study lack external validity and cannot be generalize to the entire Latino population due to the relatively small sample size. No statistical significance was found during the interpretation and analyses of my study. A sample size smaller than anticipated resulted by the fact that Hispanic/ Latino parents/caregivers who had the ability to speak English were selected for the survey. Therefore, I recommend that my findings be interpreted with caution and that future studies be conducted with a larger sample size to detect a possible effect/association between my variables.Replicating my study with a much larger sample size might help to detect the effect if there is one.

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Appendix A: Analysis Matrix

Analysis Matrix for the ASD Study

Study Objective	Concept	Data Source	Level of Measurement	Analysis Procedures
I.	Demographics and clinical characteristics of participants diagnosed with Autism Spectrum Disorder (ASD)	Telephone interview and self-administered questionnaire	Nominal	Frequencies, means, percents
II:	Association between pediatricians use of developmental screening tools and children's age at the time of diagnosis	Survey Instrument: Telephone interview and self-administered Questionnaire- Section 2- Diagnostic experiences -Page 4- questions 1-6	Nominal, numerical (age is a continuous variable)	Odds Ratios, Chi Square, P value, Regression
III.1	Characteristics of pediatricians who use the developmental screening tools	Telephone interview and self-administered questionnaire		Frequencies, means, and percents
III.2				

Appendix B: Descriptive Statistics Mock Tables

I. Descriptive Statistics

To Describe the Sample

Demographics and clinical characteristics of study participants (N=X)

Characteristics	Means ± Standard Deviation	Frequencies (Percentages)
Gender		
Male		
Female		
Age		
12 - 18 months		
19 - 25 months		
26 - 31 months		
32 - 37 months		
38 - 43 months		
44 - 48 months		
Parent's and/or Guardian's Education		
Less than high school or highschool graduate		
More than high school education		
Types of ASD		
Asperger's Disorder		
Pervasive Development Disorder (PPD)		
Autistic Disorder		
Multiple Diagnosis		
Never told Asperger's, PPD, or Autistic		

Procedure: Descriptive statistics (means, standard deviations, frequencies, percentages)

To Describe The Data

Table 2: Number and Percent of physician's who performed the ASD assessment (N=x)

Variables	Means ± Standard Deviation	Frequencies (Percentages)
Physician completed screener/assessment		
Yes		

No		
Doctor referred the child to a specialist		
Yes		
No		
Physician's response to parent's concern by conducting the developmental screening		
Yes		
No		

Appendix C: Analytical Statistics

Mock Tables: To Explain Relationships Between Variables

Differences between age and gender groups

Variables	N (%)	X^2	t (df)	P-values
Age				
12 - 18 months				
19 - 25 months				
26 - 31 months				
32 - 37 months				
38 - 43 months				
44 - 48 months				
Gender				
Male				
Female				

*p>.05

Linear regression of pediatricians developmental screening tools predicting age of ASD diagnosis

Variables	*B (SE)*	β	P-values	Adjusted R^2
Gender				
Age				
Parent's and/or Guardian's Education				
Types of ASD				

*p>.05

Appendix D: DRC Data Use Agreement

www.childhealthdata.org

Your Data ... Your Story

Data Resource Center for Child & Adolescent Health

A project of the Child and Adolescent Health Measurement Initiative

Data Use Agreement: Data Resource Center Indicator Data Sets

2012 National Health Interview Survey, Child Complementary and Alternative Medicine Supplement
2011-2012 National Survey of Children's Health
2009-2010 National Survey of Children with Special Health Care Needs
2003 & 2007 National Survey of Children's Health Merged
2007 National Survey of Children's Health
2005-2006 National Survey of Children with Special Health Care Needs
2003 National Survey of Children's Health
2001 National Survey of Children with Special Health Care Needs

Definitions

1. **Licensee:** _____
2. **Licensor:** Child and Adolescent Health Measurement Initiative (CAHMI), The Johns Hopkins Bloomberg School of Public Health, Department of Population, Family & Reproductive Health, 615 North Wolfe Street, Baltimore, MD 21205
3. **Data Set:** DRC Indicator Refined Data Set for: 2011-2012 National Survey of Children's Health, 2009-2010 National Survey of Children with Special Health Care Needs, 2003 & 2007 National Survey of Children's Health Merged, 2007 National Survey of Children's Health, 2005-2006 National Survey of Children with Special Health Care Needs, 2003 National Survey of Children's Health and/or 2001 National Survey of Children with Special Health Care Needs.
4. **Ownership:** CAHMI is the owner of Data Set which was developed in the course of research at CAHMI.
5. **Public Benefit:** CAHMI wants this Data Set to be utilized for the public benefit to the fullest extent possible.
6. **Publications:** Recipient agrees to acknowledge the Provider with appropriate citations in any publications or presentations using results from this Data Set. The suggested citation format is:

   Child and Adolescent Health Measurement Initiative (CAHMI). (*Year and name of survey*) Indicator Data Set. Data Resource Center for Child and Adolescent Health. www.childhealthdata.org

   Please initial here to acknowledge citation request _____
7. **Field of Use (how you intend to use these data):** _____

   The datasets will be used for my dissertation project. Only purpose is for statistical reporting and analysis.

Terms

1. **Grant of License:** Subject to the terms and conditions of this licensee, Licensor grants to Licensee a non-exclusive, non-sub licensable, non-transferable license to use the Data Set provided herein and any associated documentation. Licensor is not obligated to provide upgrades to the Data Set or technical support beyond assistance in installing the Data Set.
2. **Ownership of Data Set:** This License gives the Licensee limited use of the Data Set. This License is not a sale of the Data Set and Licensor retains all title to all rights and interests in the Data Set. The Data Set is protected by U.S. Copyright laws, international treaty provisions and applicable laws of the country in which it is being used.
3. **Permitted Use:** Licensee may use the Data Set in the Field of Use for academic and research purposes only.
4. **Non-permitted Use:** Licensee may not

Send completed DUA by email - info@cahmi.org _____

a. Use the data in the Data Set for any purpose other than statistical reporting and analysis;

b. Make any effort to determine the identity of any reported case in the Data Set;

c. Disclose or make use of the identity of any person or establishment discovered inadvertently, and will advise the Director, National Center for Health Statistics (NCHS), of any such discovery;

d. Link this Data Set with individually identifiable data from any other Data Sets;

e. Use the Data Set at any other location than that specified above;

f. Rent, lease, lend, sell, transmit or otherwise distribute or dispose of the Data Set temporarily or permanently without written consent of Licensor;

g. Create or permit third parties to create derivative works based on the Data Set;

h. Remove, modify, alter or obscure the copyright notices or any other proprietary notices contained in or on the Data Set;

i. Sell derivative works based on the Data Set.

5. **Term and Termination:** This License shall commence on the date of delivery of the Data Set to Licensee and shall terminate automatically upon breach of this License by Licensee.

6. **Confidentiality:** Recipient and Recipient Scientist agree to hold the Data Set in confidence and not disclose to anyone except to such of its employees, consultants and agents as may be necessary to make the determination required under this agreement, providing said employees, consultants and agents are bound by the terms of this Agreement.

7. **Publications:** Recipient agrees to acknowledge the Provider with appropriate citations in any publications or presentations using results from this Data Set.

8. **Warrants:** Licensor warrants that it has the lawful right to grant the license set forth in this Agreement.

9. **NO REPRESENTATIONS OR WARRANTIES:** Except as expressly provided in section 8, the parties acknowledge and agree that licensor, its trustees, directors, officers, employees, and affiliates make no representations and extend no warranties of any kind, either express or implied, including but not limited to warranties of merchantability, fitness for a particular purpose, non-infringement and the absence of latent or other defects, whether or not discoverable. Nothing in the license agreement shall be construed as a representation made or warranty given by licensor that the practice by licensee of the license granted hereunder shall not infringe the patent rights or copyright rights of any third party. In no event shall licensor, its trustees, directors, officers, employees and affiliates be liable for incidental or consequential damages of any kind, including economic damage or injury to property and lost profits, regardless of whether licensor shall be advised, shall have other reason to know, or in fact shall know of the possibility. Licensee assumes the entire risk associated with licensee's use of the Data Set.

10. **Complete Agreement:** This License is a complete and exclusive statement of the terms and conditions of the agreement between Licensee and Licensor.

LICENSEE:

Irma S. Diaz — May 4, 2016

Signature — Date

Name: [redacted]

Title: Walden University student (DrPH)

Email: [redacted]

Address: [redacted]

DRC Data Use Agreement 9.22.14.pdf May 4 , 2016.pdf

Regards,
Irma S. Diaz

On Thu, May 5, 2016 at 9:55 AM, info Box <info@cahmi.org> wrote:

Hi Irma,

Thank you for sending in the DUA.

In order to access these data, please visit:

2011 Pathways FTP 2009-10 CSHCN FTP

Each site has compressed folders containing the DRC Indicator Datasets. In addition to the data files, the folders for the surveys also contain supplemental documents and information. For this reason, the Dataset must be extracted from the compressed folder before it can be opened in SAS, SPSS, or other statistical software.

If your colleagues or students will be working with any data files received from the Data Resource Center, be mindful that you are responsible for assuring that they have first read and consented to abide by the terms of the data use agreement you signed. This can be done by you independently, or by requiring them to make separate applications through the DRC.

Referencing the DRC Indicator Datasets:
Please be sure to use appropriate citation in any materials you publish, distribute or display, which report results from datasets provided by the Data Resource Center and CAHMI. (We never get tired of reminding people to do this!) Citation language for each survey is listed here:

2011 Survey of Pathways to Diagnosis and Services. Maternal and Child Health Bureau in collaboration with the National Center for Health Statistics. 2011 Pathways [Insert SPSS/SAS/Stata] Indicator Data Set prepared by the Data Resource Center for Child and Adolescent Health, Child and Adolescent Health Measurement Initiative. www.childhealthdata.org

2009/10 National Survey of Children with Special Health Care Needs. Maternal and Child Health Bureau in collaboration with the National Center for Health Statistics. 2009/10 NS-CSHCN [Insert SPSS/SAS/Stata] Indicator Data Set prepared by the Data Resource Center for Child and Adolescent Health, Child and Adolescent Health Measurement Initiative. www.childhealthdata.org

We encourage you to keep us informed about your publications and presentations based on these data. To facilitate that, someone from our staff may be contacting you in a few months. Since the main mission of the Data Resource Center is to facilitate dissemination and utilization of the results of the National Surveys, we are always delighted to be able to identify real-life examples of how planners, grant writers, researchers and child health policy advocates are using survey results to promote better health and improve access to and quality of children's health care services.

All of the information you need about the variables can be found on our website under the NS-CSHCN and Pathways Resources for Data Analysis pages. If we can be of further assistance, please don't hesitate to let us know!

Kind regards,
Kathleen Powers