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Madeline Racine

April 2019

IDENTIFYING EARLY CONCERNS OF AUTISM SPECTRUM DISORDER: THE
INFLUENCE OF PATIENT ETHNICITY IN PEDIATRIC PHYSICIAN DECISION-
MAKING

A Dissertation Presented to the
Faculty of the College of Education
University of Houston

In Partial Fulfillment
of the Requirements for the Degree

Doctor of Philosophy

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Abstract

Background: The latency between when symptoms of autism spectrum disorder (ASD) emerge and when children are diagnosed by a health care provider is well-documented. Such delays in ASD diagnosis are even higher for ethnic minority children. This is particularly true for Latino children, though reasons for these disparities are not yet clear. Given the importance of early intervention in improving outcomes in ASD, early and accurate diagnosis for all children is critical. While many children with ASD and their families rely heavily on school-based services, it is often physicians, particularly pediatricians, who have the earliest opportunities to identify symptoms of ASD; however, these important providers may lack sufficient training in and familiarity with ASD. Considering the growing population of Latino families in the United States, increased understanding about potential provider-level factors contributing to ASD diagnostic disparities for Latino children is needed. **Purpose:** The aims of the study were to examine (1) the effect of child ethnicity (Latino or non-Latino White) upon physician identification of ASD symptoms and subsequent diagnostic decision-making and treatment recommendations; (2) the influence of physician self-reported confidence related to recognizing ASD as a diagnostic consideration; and (3) physician characteristics and experiences that may affect their consideration of an ASD diagnosis, particularly for Latino children. **Methods:** Sixty-five pediatric physicians were randomly presented with one of two versions of a clinical vignette (i.e. Latino child, White child) that described a hypothetical child (4 year-old male) presenting with various symptoms of ASD and were asked to answer questions designed to gather information about

physicians' identification of ASD symptoms and subsequent decision-making regarding diagnostic considerations and treatment recommendations; a scale of provider confidence in serving children with ASD was also developed and administered. **Results:** A series of chi-square tests of homogeneity indicated no significant differences in physician recognition of ASD as a differential diagnosis and subsequent diagnostic decision-making and treatment recommendations based on child ethnicity. However, logistic regression indicated physician self-reported confidence in serving children with ASD moderated the effects child ethnicity had on ASD as a first diagnostic consideration; participants who reported higher confidence were more likely to consider ASD as a first diagnostic consideration when the child in the vignette was Latino. Moreover, a measure of confidence was psychometrically assessed as a promising way to measure physician confidence in serving children with ASD that may be used in future studies.

Conclusions: The current study offers initial information about pediatric physicians' decision-making regarding diagnostic considerations and treatment recommendations when presented with a young child with various symptoms of ASD, findings that were not previously available in research. Additionally, findings from this study highlight the role physician self-reported confidence has on the diagnostic consideration of ASD with Latino children. The study also offers unique information regarding physician perceived challenges related to identifying and diagnosing ASD, which represent opportunities for cross-disciplinary collaborations and consultative partnerships between school psychologists and pediatricians. Results are discussed in the context of implications for such cross-disciplinary work with the goal of reducing ASD diagnostic disparities for ethnic minority children.

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Chapter I

Introduction

Autism spectrum disorder (ASD) is an increasingly common neurodevelopmental condition of early childhood, currently affecting 1 in 59 children in the United States (Baio et al., 2018). ASD is characterized by impairments in reciprocal social communication and social interaction (e.g., deficits in social reciprocity, nonverbal communication, understanding relationships) and a presence of restricted and repetitive patterns of behavior (e.g., stereotyped motor movements, ritualized patterns, highly restricted interests; American Psychiatric Association, 2013). Studies that examine early markers of ASD have found strong evidence that symptoms are present within a child's first 2 years of life (Zwaigenbaum et al., 2009), and an accurate and stable diagnosis of ASD can be made by 24 months for most children (Baird et al., 2008; Crais & Watson, 2014). Despite evidence of early symptoms and accuracy and stability of early diagnosis, the average age of diagnosis of ASD in the United States is approximately 4.4 years (Zuckerman, Lindly, & Chavez, 2017), indicating a significant delay between emergence of symptoms and a definitive diagnosis. These delays are concerning given the importance of early intervention in improving outcomes in ASD. Delay in diagnosis is even higher for ethnic minority children, specifically those from Latino families, though reasons for these differences are not yet clear (e.g., Zuckerman et al., 2017). Considering the growing population of Latino families in the United States, increased understanding about factors contributing to ASD diagnostic disparities for Latino children is needed.

Ethnic Disparities in ASD Diagnosis and Treatment

Research consistently supports a delay in diagnosis of ASD for ethnic minority children compared to non-Latino White children. Notably, Latino children are diagnosed

with ASD an average of 1-2.5 years later and have more severe symptoms at the time of the diagnosis than non-Latino White children (Mandell, Listerud, Levy, & Pinto-Martin, 2002; Zuckerman et al., 2017). Because no research has found racial differences in early symptomatology of ASD or the age at which parents first notice concerns about their child's development (Magaña, Lopez, Aguinaga, & Morton, 2013; Ratto, Reznick, & Turner-Brown, 2015), there appear to be other factors that increase the time between first concerns and diagnosis in Latino families. Additionally, Latino children are less likely to *ever* receive early intervention services and on average receive fewer intervention services than non-Latino White children (Magaña et al., 2013), and it is conceivable that this may be related to diagnostic delay. Such a phenomenon is concerning given the benefits of early intervention, with long-term outcomes improved for those who received services during the toddler and preschool years (Turner, Stone, Pozdol, & Coonrod, 2006). Unfortunately, treatment utilization and positive intervention outcomes often rely on early identification and diagnosis (Suma, Adamson, Bakeman, Robins, & Abrams, 2016), which can often be difficult, especially among Latino children.

An early and accurate diagnosis of ASD can be difficult for *all* children due to the heterogeneity in the presentation of symptoms associated with ASD, differences in early childhood development, and co-occurring disorders (e.g., intellectual disability, attention-deficit/hyperactivity disorder, disruptive behavior disorders). Early diagnosis of ASD is even more difficult for children from lower socioeconomic backgrounds (Dickerson et al., 2016; Mandell et al., 2009; Valicenti-Mcdermott, Hottinger, Seijo, & Shulman, 2012) and whose families have a first language other than English (Begeer, Bouk, Boussaid, Terwogt, & Koot, 2009; Valicenti-Mcdermott et al., 2012), such as among Spanish-

speaking families. A handful of studies have identified possible factors contributing to the ASD diagnostic disparities among Latino children including less access to health care and resources (Magaña et al., 2013; Mandell et al., 2002; Zuckerman, Mattox, Donelan, Batbayar, Baghaee, & Bethell, 2013), lack of culturally appropriate services (Zuckerman et al., 2013), families' knowledge and beliefs about developmental disabilities (Zuckerman et al., 2014; Yeh, Hough, McCabe, Lau, & Garland, 2004), and factors at the health care provider level (Begeer et al., 2009). Understanding factors at the provider level (i.e., delaying referrals and diagnosis, knowledge and training in ASD, practical issues) that may contribute to diagnostic delays of ASD among Latino children is important in order to reduce diagnostic delays and, ultimately, increase opportunities for treatment utilization.

Role of Pediatric Physicians

Physicians, particularly pediatricians and primary care providers, play a central role in recognizing and identifying early signs of ASD because these professionals often have regular contact with a child across his or her early years. Parents are likely to express their first concerns to their child's physician at routine wellness checkups, positioning physicians to have a direct impact on early identification, diagnosis, referral, and subsequent treatment. Unfortunately, parents report feeling dissatisfied with the age at which children receive diagnoses compared to when they first express concerns to their physicians (Goin-Kochel, Mackintosh, & Myers, 2006), and numerous factors have been identified in primary care settings that may exacerbate diagnostic delays and parent dissatisfaction.

Physicians often face practical issues including time constraints, insurance barriers, and reimbursement services (Davis et al., 2012; Foy, 2010) that may impact how they assess children for ASD. Furthermore, research consistently shows that physicians feel inadequately trained or lack confidence to identify, diagnose and manage behavioral health problems (Cawthorpe, 2005; Davis et al., 2012; Foy, 2010; Stein et al., 2008), especially for very young children. Some studies have also suggested pediatricians feel significantly less comfortable diagnosing, treating, and caring for children with ASD compared to children with other behavioral health problems or neurodevelopmental conditions (Davis et al., 2012; Golnik, Ireland, & Borowsky, 2009). Physicians report even more difficulty assessing for ASD among Latino children compared to non-Latino White children, especially if the family is Spanish-speaking (Zuckerman et al., 2013). Collectively, these findings suggest that physicians need more experience and training in assessing ASD so they might better understand both familial factors and their own knowledge, experience, and confidence as potentially influencing early identification and diagnosis of ASD in Latino children.

Gaps in the Literature and Present Study

Reducing racial and ethnic disparities in developmental, behavioral, and mental health care is a national priority and more research is needed to identify determinants of these disparities (U.S. Public Health Service, 2000). While research has explored multiple factors (both familial and provider) that may contribute to disparities in diagnosis of ASD, understanding these disparities among Latino children is lacking. Because provider factors such as difficulties in identifying, diagnosing, and treating ASD are among the important considerations for elucidating these issues, it may be that

providers contribute (albeit inadvertently) to diagnostic disparities in diagnosis of ASD among Latino children. Currently, most studies examining provider factors have relied on self-reported practices and opinions, which may not only poorly reflect their everyday practice but also are subject to response biases (i.e., social desirability) related to direct questions about views or practices that may be related to racial or ethnic diagnostic disparities. Additionally, most research has examined disparities within the broader framework of healthcare and mental health care, rather than specifically focusing on ASD. To date there is no published study that has looked at the influence ethnicity has on physician decision-making in regard to ASD diagnosis among Latino children versus non-Latino White children. Additionally, limited attention has been given to potential differences in physician provided ASD-focused treatment recommendations for Latino families. Further research aimed at understanding physician's decision-making in recognizing ASD symptoms and making diagnoses, as well as in making treatment recommendations for Latino children with ASD, is needed. Such work may ultimately help decrease diagnostic delays and increase the likelihood that Latino children receive an accurate and timely diagnosis of ASD, thereby increasing the likelihood of early intervention.

The current study aimed to address gaps in the literature by examining factors related to physicians' decision-making regarding recognizing early ASD symptoms and subsequent diagnosis and treatment recommendations, particularly for young (i.e., preschool age) Latino children. Additionally, the study aimed to explore physician reported confidence related to serving children with ASD and its impact on physician decision-making. Importantly, the study offers a promising way to measure physician

confidence in serving children with ASD, as no such measure was previously available. This is an understudied area with important practice implications: if providers' experiences working with individuals with ASD and minority families and/or confidence about the effectiveness of their work is contributing to ASD diagnostic disparities for Latino children then provider-focused intervention (i.e., training, education) and cross disciplinary collaborations between physicians and ASD specialists, may reduce well-documented delays in ASD diagnosis among Latino children.

The primary aim of this vignette study was to explore differences in physicians' recognition of early ASD concerns and subsequent diagnostic and treatment decisions in Latino children compared with non-Latino White children using a clinical vignette. Specifically, the aims of the proposed study were to examine (1) the effect of child ethnicity (Latino or non-Latino White) upon physician recognition of ASD symptoms and subsequent diagnostic decision-making and treatment recommendations; (2) the influence of physician self-reported confidence related to ASD on recognizing ASD as a diagnostic consideration; and (3) physician characteristics and experiences that may affect their consideration of an ASD diagnosis, particularly for Latino children. Because vignette studies are widely used to examine judgements and decision-making processes made by health professionals when experimental manipulation of certain variables (i.e., patient ethnicity) is not feasible (Evans et al., 2015), the current study offers an important first step in exploring physician decision-making related to ASD, specifically for Latino children. Notably, this is the first study that examines physicians' recognition of early ASD concerns and subsequent diagnostic and treatment recommendations based on a vignette study.

Chapter II

Literature Review

Diagnostic Criteria of ASD

ASD is characterized by impairments in reciprocal social communication and social interaction and the presence of restricted and repetitive patterns of behavior (American Psychiatric Association, 2013). Persistent deficits in social communication and social interaction are present across multiple contexts and manifested by deficits in social reciprocity (e.g., back-and-forth conversation, sharing of interests and emotions), nonverbal communicative behaviors (e.g., use of eye contact, gestures, and facial expressions), and maintaining and understanding relationships (e.g., interest in peers). Restricted and repetitive patterns of behavior, interests or activities include at least two of the following: stereotyped or repetitive motor movements or speech (e.g., echolalia, motor stereotypies), ritualized patterns or inflexible adherence to routines (e.g., rigid thinking patterns, difficulty with transitions), highly restricted interests (e.g., strong attachment to preoccupation or objects), and hyper- or hyporeactivity to sensory input (e.g., adverse response to or interest in specific sounds, smells, textures, and visual stimuli). Symptoms of ASD are present in early childhood and cause significant impairment in everyday functioning. Manifestations of ASD vary greatly between each individual depending on his or her developmental level, chronological age, and severity of symptoms. While there is evidence to suggest a number of different genetic and environmental factors play a role in its development, the exact etiology of ASD is unknown. Research continues to show evidence of a strong genetic component of ASD,

with genetic heritability ranging from 40-90% (Sanchak & Thomas, 2016); however, no single biological marker for ASD exists.

In 2013, the Diagnostic Statistical Manual of Mental Disorders, 5th ed. (DSM-5) created the umbrella diagnosis of ASD to encompass disorders previously referred to as Autistic Disorder, Asperger's Disorder, and Pervasive Developmental Disorder Not Otherwise Specified (American Psychiatric Association, 2013). Diagnoses of ASD may be made in various settings, including community, school, clinical, and/or medical settings; can be designated by a variety of health professionals, including pediatricians, psychiatrists, and psychologists; and must be based on a variety of data sources, such as standardized instruments, parent report of developmental history, and behavioral observations. Persons may receive a clinical diagnosis of ASD per the DSM-5, and children may also be eligible for an educational classification of Autism (AU) in a public school setting, which qualifies a student for early intervention and special education (Individuals with Disabilities in Education Act [IDEA], 2004).

Diagnostic Prevalence of ASD

Once considered rare, ASD currently affects 1 in 59 children in the United States according to most recent estimates from the Centers for Disease Control and Prevention's (CDC) Autism and Developmental Disabilities Monitoring (ADDMM) Network (Baio et al., 2018), representing a 15 percent increase from the most recent report two years ago and the highest prevalence since the CDC began tracking ASD in 2002. Increasing diagnostic prevalence of ASD may be due to a wider and evolving diagnostic criteria; increased public awareness, making individuals more aware of characteristics of the disorder; improvements in identification and diagnosis, including developmental

screening and assessment measures; and increased availability of treatments (Boyd, Odom, Humphreys, & Sam, 2010; Croen, Grether, & Selvin, 2002; Heidgerken, Geffken, Modi, & Frakey, 2005).

ASD is about four times more common among boys (26.6 per 1,000) than girls (6.6 per 1,000) (Baio et al., 2018). While reasons for gender differences in ASD diagnosis are not yet clear, possible explanations include differences in brain structure and genes, misdiagnosis or underdiagnoses of girls, and differences in symptomology between girls and boys. Actual *incidence* (i.e., rate of new cases of a disease) of ASD occurs equally among all racial, ethnic, and socioeconomic groups (Wing & Potter, 2009); however, diagnostic *prevalence* (i.e., number of current cases during a specified period of time) of ASD among White children (17.2 per 1,000) is 7 percent greater than that among Black children (16.0 per 1,000) and 22 percent greater than that among Hispanic children (14.0 per 1,000) (Baio et al., 2018). Given that there is no evidence of increased risk factors for ASD between these groups (Chaidez, Hansen, & Hertz-Picciotto, 2012; Croen et al., 2002; Dyches, Deruelle, Rondan, Gepner, & Tardif, 2004), disparities in prevalence estimates suggest an under-identification of ASD among minority children, most notably Latino children.

Age and Stability of ASD Diagnosis

A large body of research suggests that an accurate and stable diagnosis of ASD can be made by 24 months for most children when diagnosed by a trained professional using appropriate tools and clinical judgement (Baird et al., 2008; Crais & Watson, 2014). Additionally, parents typically report concerns of their child's development to a professional, often times a pediatrician, by 24 months of age (Zwaigenbaum et al., 2015).

Studies that have examined early markers of ASD have found strong evidence that deficits and abnormalities in social communication and attention (e.g., eye contact, orienting to name, pointing, facial expressions, gestures, vocalizations, joint attention) are present between 12 and 24 months (Werner & Dawson, 2005; Young et al., 2003; Zwaigenbaum et al., 2015) and restricted and repetitive behaviors (e.g., atypical sensory and motor behaviors) tend to be present around 18 to 24 months (Brian et al., 2008; Garon et al., 2009; Ozonoff et al., 2008). Additionally, studies that have examined diagnostic stability of ASD in young children have found high diagnostic stability (i.e., retain diagnosis when reassessed across later years) for children diagnosed with ASD at 24 months (Eaves & Ho, 2004; Lord et al., 2006; Turner et al., 2006).

Despite evidence that early identification of ASD can be made reliably and also that ASD diagnoses have stability over the developmental span, most children are not identified and diagnosed with ASD until school age. Most recent data from the CDC reports the average age of ASD diagnosis in the United States is approximately 4.4 years (Zuckerman et al., 2017). Previous studies utilizing large epidemiologic studies have suggested the age of diagnosis to be age 5 years (Fountain et al., 2011) to 5.7 years (Shattuck et al., 2009). Such delays in ASD diagnosis are even greater for ethnic minority children, particularly Latino children; however, reasons for this are not yet clear.

There are many reasons why an accurate diagnosis of ASD at an early age is difficult. First, there is substantial heterogeneity in the presentation of symptoms and history associated with ASD and early manifestations of symptoms and development vary significantly across children (Zwaigenbaum et al., 2015). Given the heterogeneity of symptoms across individuals, professionals may take a “wait and see” attitude when

children show symptoms in the first two years of life (Johnson & Myers, 2007).

Additionally, there is substantial evidence to suggest that the age of diagnosis ultimately depends on symptom severity. Specifically, children with more severe impairments, such as severe speech and language deficits and overt behavior impairments such as hand flapping, are diagnosed earlier (Mandell & Novak, 2005; Shattuck et al., 2009; Wiggins, Baio, & Rice, 2006). Less severe symptoms and symptoms associated with higher functioning ASD are often less observable, making an early diagnosis more difficult. Intellectual ability also varies greatly among children with ASD; 31% of children with ASD are classified in the range of intellectual disability (intelligence quotient [IQ] <70), 25% in the borderline range (IQ 71-85) and 44% in the average to above average range (IQ >85) (Baio et al., 2018). Early diagnosis of ASD is also difficult when symptoms overlap or co-occur with other problems. Conditions associated with ASD include: psychiatric conditions (e.g., anxiety, depression, attention-deficit/hyperactivity disorder), sleep difficulties, intellectual disability, seizures and epilepsy, gastrointestinal problems, and motor impairments (Sanchak & Thomas, 2016). Co-occurring behavioral and/or physical health symptoms can complicate a diagnosis of ASD, often causing children to be undiagnosed, misdiagnosed, or to receive multiple diagnoses. Given the difficulty associated with an early diagnosis of ASD, many families see multiple professionals before receiving a diagnosis (Siklos & Kerns, 2007; Wiggins et al., 2006).

Given the difficulty and complications associated with an early and accurate diagnosis of ASD, there is a clear need for research aimed at understanding factors associated with early identification of ASD. The delay in diagnosis between when accurate ASD diagnosis *can* generally be made and when affected children are actually

identified suggests weaknesses in the overall identification process of ASD, particularly for Latino children who experience the greatest diagnostic delays. Accurate and early diagnosis—or ruling out ASD as the reason for parents’ concerns—is critical in facilitating families’ connection with appropriate intervention services.

Early Intervention for Children with ASD

Children with ASD benefit greatly from early intervention, with long-term outcomes improved for those who have received services during toddler and preschool years (Turner et al., 2006). Addressing parents’ early concerns is important, as a longer delay between family’s first concerns and diagnosis has been associated with lower parental satisfaction in the diagnostic process and higher family distress (Goin-Kochel et al., 2006; McMorris, Cox, Hudson, Liu, & Bebko, 2013). Therefore, an early diagnosis also provides benefits to the family, allowing them to learn more about ASD early on, cope with the diagnosis, seek family support, and most importantly, seek early intervention services for the child, which has consistently been associated with positive long-term outcomes.

The American Academy of Pediatrics (AAP) Committee on Children and Disabilities defined early identification and early intervention as critical aspects in managing and treating children with ASD (AAP, 2001), and treatments chosen by parents vary depending on children’s age (Mire, Raff, Brewton, & Goin-Kochel, 2015). Importantly, research has suggested that children who start early intervention younger have better outcomes, including gains in cognitive skills, communication skills, social interaction, and adaptive functioning (Turner et al., 2006), as well as a decrease in problem behaviors (Vokmar, 2014), than children who start later. There also is evidence

to suggest that intervening with at-risk infants even before full diagnostic criteria are met may provide better outcomes than intervening once a child shows multiple ASD symptoms (Crais & Watson, 2014; Dawson, 2008). Additionally, a later age of diagnosis (older than 3 years) has been associated with different treatment utilization patterns, including a lower likelihood of behavioral interventions and school-based interventions (Zuckerman et al., 2017), indicating that early and prompt diagnosis may be associated with use of evidence-based interventions.

Behavioral intervention. A large body of research on behavioral intervention supports long-term prognosis and positive outcomes for children with ASD and a recent study found 64% of children with ASD received behavioral intervention within the last 12 months (Kogan et al., 2018). Research has suggested the most promising intervention for young children with ASD include early and intensive behavioral intervention that include behavioral intervention strategies adopted from Applied Behavior Analysis (ABA). ABA utilizes operant conditioning to teach children with ASD small units of behavior with repeated trials and focuses on strategies such as prompting, reinforcement, and task analysis (Lovaas, 1987). Several studies have identified evidence of positive outcomes of early and intensive behavioral intervention in toddlers and preschoolers with ASD, including significant improvements in verbal ability, decreased severity of ASD symptoms (Itzhak & Ditz, 2011), and gains in cognitive skills, joint attention, and stereotypic behavior (MacDonald, Parry-Cruwys, Dupere, & Ahearn, 2014). These studies also identified more positive outcomes in children who started intervention at an earlier age, suggesting that the younger a child starts intervention, the better the outcomes he or she will have. Interventions implemented by parents utilizing behavior strategies

have also demonstrated to be effective for young children with ASD. One study found that parent implemented functional communication training, which uses differential reinforcement, increased communication skills and decreased problem behaviors in a sample of 3 year-old children with ASD (Moes & Frea, 2002). Parent training based on behavior principles has also been found to improve communication skills and decrease disruptive behavior in children with ASD as early as 14-18 months (Weiglauf, 2014).

Psychopharmacological treatment. A recent study estimated that 27 percent of children with ASD were taking medication for ASD-related symptoms (Kogan et al., 2018), even though core ASD symptoms are not related to use of psychotropic medication among diagnosed children (Mire, Nowell, Kubiszyn, & Goin-Kochel, 2014). However, medication has been found to be beneficial in treating specific maladaptive behaviors and to target comorbid diagnoses such as attention-deficit/hyperactivity disorder, anxiety, and sleep disorders in children over the age of 5 (Sanchak & Thomas, 2016), increasing the likelihood that children with ASD and comorbid diagnoses are taking medication. Currently there are only two medications approved by the US Food and Drug Administration (FDA) to treat symptoms of ASD such as irritability, aggression, and self-injury. These medications include the atypical antipsychotic medications aripiprazole (Abilify), approved for ages 6-17, and risperidone (Risperdal), approved for ages 5-16. As with any psychopharmacological treatment, the potential benefits must be weighed against the side effects (Kubiszyn, Mire, & Meinert, 2019), which for atypical antipsychotics include sedation, weight gain, tremor, and extrapyramidal symptoms (Sanchak & Thomas, 2016). Even though medication has not been found to be effective in treating core symptoms of ASD, one study found that a

diagnosis of ASD after 3 years was associated with a higher likelihood of using psychotropic medication at age 6-11 years regardless of symptom severity and that this likelihood increased with later age of diagnosis (Zuckerman et al., 2017). Findings such as these indicate that a later diagnosis of ASD may be associated with subsequent medication use that may not be FDA approved or may not be needed based on the child's symptom severity. Therefore, there is an increasing need to identify ASD at an earlier age in order to provide opportunity for early evidence-based interventions, such as behavioral interventions.

Complementary and alternative medicines. It is also important to note the increasing rise in complementary and alternative medicines (CAM) used by families with a child with ASD. Recent evidence suggest that 50% of children and adolescents diagnosed with ASD use CAM as part of treatment (Hofer, Hoffmann, & Bachmann, 2016), and use of these treatments are more likely if the child has GI symptoms, epilepsy, and/or behavioral problems (Perrin et al., 2012). There is limited research in this area to suggest safety and benefits associated with treating symptoms of ASD, with some studies even showing harmful effects (Hofer et al., 2016). Common CAM utilized by families with a child with ASD include: massage therapy, equine assisted therapy, auditory integration training, gluten or casein free diets, hyperbaric oxygen, and secretin (Sanchak & Thomas, 2016). Importantly, a delay of two or more years between a parents' first discussion of concerns with a healthcare provider and actual ASD diagnosis was associated with higher likelihood of later CAM use and this likelihood increased as delay in diagnosis increased (Zuckerman et al., 2017). These findings indicate that families may seek out non-evidence based treatments, such as CAM, when they do not receive an

early and timely diagnosis of ASD. Because of the increasing use of CAM among families with a child with ASD and an even greater use among families whose child receives a late diagnosis of ASD, professionals should take more steps in identifying early symptoms of ASD and encouraging effective and evidence-based interventions with families.

There is convincing evidence that children identified with ASD at a young age benefit from early intervention, specifically behavioral intervention. Because the timeliness of intervention relies upon early identification and diagnosis, it is critical that practitioners recognize and diagnose early symptoms of ASD in order to encourage intervention services. This is particularly true for Latino children who experience the greatest disparities in diagnosis and treatment of ASD (Baio et al., 2018; Magaña et al., 2013). To reduce disparities among Latino children, it is important to understand potential causes for these disparities.

Disparities among Latino Children

Decades of research documents racial and ethnic disparities in healthcare, with individuals from minority racial/ethnic groups having reduced access to healthcare services and treatment (Nelson, 2002). This disparity extends to children's mental health services, despite national attention to reduce these disparities (Alegria, Vallas, & Pumariega, 2010; Lau, Lin, & Flores, 2012; Liang, Matheson, & Douglas, 2016). Numerous studies have found that ethnic minority children are less likely to receive any mental health services, including an accurate diagnosis and treatment services compared to White children (Alegria et al., 2010; Garland et al., 2005; Liang et al., 2016). Several studies have found that Latino children are least likely to receive mental health services,

with estimates suggesting they are one-third as likely to receive services compared to non-Latino White children (Alegria et al., 2010; Kataoaka, Zhang, & Wells, 2002). A number of factors have been identified as likely contributors to these disparities, including issues related to individual and/or family characteristics (e.g., SES, access to resources, language barriers, knowledge, values and beliefs) and system-level factors (e.g., quality of care, providers' beliefs and expectations, communication between provider and patient) (Holm-Hansen, 2006; Magaña et al., 2013).

In regard to ASD, specifically, there is no evidence to suggest that ASD symptom presentation and characteristics vary across race or ethnicity (Chaidez et al., 2012; Croen et al., 2002; Dyches et al., 2004); therefore, one would expect diagnosis prevalence to be aligned across ethnicities. However, research indicates disproportionate differences in ASD diagnoses across various racial and ethnic groups, most notably with Latino children. Specifically, evidence indicates an *under* diagnosis of ASD in Latino children compared to non-Latino White children (Baio, 2018). Recent estimates from the CDC, estimated ASD diagnostic prevalence was 22 percent greater among non-Hispanic White children (17.2 per 1,000) compared with Hispanic children (14.0 per 1,000). Ethnic disparities in estimated ASD diagnostic prevalence suggest that a number of these children are not being evaluated for ASD.

In addition to a lower diagnostic prevalence of ASD for Latino children, a large body of research provides clear evidence that the delay between when a child develops ASD symptoms and when they are actually diagnosed is greatest for Latino children. Specifically, Latino children are diagnosed with ASD an average 1-2.5 years later and have more severe symptoms at the time of diagnosis than non-Latino White children

(Mandell et al., 2002; Zuckerman et al., 2017). One study retrospectively examined 300 children with a diagnosis of ASD and found that Latino children were more likely to be diagnosed later with ASD (i.e., after their 4th birthday) compared to non-Latino White children, and this remained significant after controlling for maternal education, primary language, and insurance status (Valicenti-Mcdermott et al., 2012). Another study examining ethnic differences in age of diagnosis of ASD among Medicaid-eligible children found that Latino children were diagnosed around 8.8 years, while non-Latino White children were diagnosed around 6.3 years (Mandell et al., 2002). Conversely, some work has found no difference in the age that Latino children were diagnosed with ASD compared to other ethnicity groups (Mandell & Novak, 2005; Mandell et al., 2010); however, this may be due to recruitment methods and lack of variability in demographic factors, such as SES, possibly underestimating ethnic disparities that are actually present.

Interestingly, no ethnic differences have been found with regard to the age at which parents reported they first noticed concerns about their child's development and first expressed these concerns to their pediatrician (Colbert et al., 2015; Magaña et al., 2013; Ratto et al., 2015). This suggests determinants other than parent concerns, such as demographic factors, increase the time between first concerns and diagnosis in Latino children (Nowell, Brewton, Allain & Mire, 2015). However, these studies have primarily relied on retrospective parent report which may be subject to error and bias. Overall though, it is clear that Latino children are not being identified with ASD early enough, ultimately delaying initiation of treatment services that have shown to have positive long-term outcomes. Given that Latino children are the largest culturally distinct ethnic group

of children in the United States and the fastest growing minority population (Magaña et al., 2013), this disparity is both a clinical and public health issue.

Disparities also exist in use of treatment services for ASD among Latino children. Latino children are less likely to ever receive early intervention services and, on average, receive fewer services than non-Latino White children (Magaña et al., 2013). Ultimately, non-Latino White families may have access to more resources than Latino families allowing them to receive earlier intervention services (Magaña et al., 2013). In regard to specific treatments, studies have found Latinos and children from poor families are less likely to use prescription medication than non-Latino White children and children from higher SES, despite rating severity of ASD higher (Liptak et al., 2008). These findings are consistent with other studies that have found Latino children less likely to received prescribed medication and have fewer medications than non-Latino White children, even when controlling for socioeconomic factors (Garland, Brookman-Frazee, & Gray, 2013; Hudson, Miller, & Kirby, 2007; Zito, Safer, dosReis, & Riddle, 1998).

Given these disparities, as well as the growing population of Latino families in the United States (Magaña et al., 2013), it is critical that both providers and researchers are aware of these disparities and understand reasons why these may occur in order to reduce disparities and promote early identification of Latino children with ASD. While reasons for ethnic disparities in ASD diagnoses are poorly understood and require more research, a handful of studies have identified possible factors contributing to this disparity.

Access to healthcare. Latino families typically experience less access to health care and resources compared to non-Latino White families (Magaña et al., 2013; Mandell et al., 2002; Zuckerman et al., 2013). For example, data from the CDC/National Center

for Health Statistics (2017) found that Latino children were less likely (87%) to receive well-child checkups, compared to non-Latino White (91%) and non-Latino Black children (92%). Decreased utilization of well-child checkups among Latino families may impact identification and diagnosis of ASD given that pediatricians regularly monitor a child's development and behavior at every well-child checkup in order to identify children who may be at risk for developmental, behavioral, or mental health concerns (Johnson et al., 2007).

Latino children are also more than twice as likely to live in poverty (33%) than non-Latino White children (14%) (U.S. Census Bureau, 2014), and children who live in poverty are diagnosed with ASD later than children from higher SES brackets (Dickerson et al., 2016; Durkin et al., 2017; Jarquin et al., 2011; Mandell et al., 2009; Valicenti-Mcdermott, et al., 2012). Families who live in high-poverty areas often have limited access to healthcare and have fewer resources, including lack of insurance coverage, limited means of transportation, high levels of stress, and lack of childcare, which may decrease the likelihood of seeking healthcare services, such as regular pediatric visits (Magaña et al., 2013; Mandell et al., 2002; Zuckerman, Perrin, Hobrecker, & Donelan, 2013). Even when Latino children are identified with possible ASD at an early age, many families may lack resources to specialty clinics and specialists and experience financial burden in receiving further diagnostic services (Magaña et al., 2013). While poverty and SES play a role in diagnostic disparities, it does not fully explain ethnic disparities in ASD diagnostic prevalence. In fact, a recent study found significant racial and ethnic differences in ASD diagnostic prevalence remained after stratification by SES, specifically among low-SES children (Durkin et al., 2017). These findings suggest

diagnostic disparities among minority children is not fully explained by racial and ethnic disparities in SES.

Language barriers. Language differences for Latino families may also play a role in delayed ASD identification, as children of families whose second language is English are more likely to have a later diagnosis of ASD than families whose first language is English (Begeer et al., 2009; Valicenti-Mcdermott et al., 2012). Differences in language may make completing screening questionnaires difficult for families whose second language is English, and families may have a harder time expressing their concerns about their child to a healthcare provider (Valicenti-Mcdermott et al., 2012). Furthermore, the interactions between clinicians and non-English speaking families may be different than with English speaking families, consequentially hampering communications. Physicians may also have more difficulty assessing a child's development, particularly language development, when the child's second language is English and may attribute language delays to second language rather than early signs of ASD (Begeer et al., 2009; Mandell et al., 2002; Mandell & Novak, 2005).

Parental beliefs and perceptions of child's symptoms. Some research has suggested that parental beliefs and perceptions regarding children's behavior or development vary between Latino families and non-Latino White families. For example, one study found that Latino parents were less likely to consider behavioral and emotional concerns as mental health problems and instead were more likely to attribute them to personality factors compared to non-Latino White parents (Yeh et al., 2004). Similarly, a focus group conducted with 30 Latino mothers of typically developing children found that parents attributed behavior problems to personality or poorer relationships among

family members, rather than a disability (Zuckerman et al., 2014). These findings suggest that expectations and beliefs about a child's behavior vary across cultures and ethnicities and may not be recognized as disorders, which may prevent some Latino families from seeking out behavioral health services, potentially decreasing opportunities for early identification and diagnosis of ASD.

Stigma regarding diagnosis. Latino families may also experience greater perceptions of stigma associated with developmental disabilities (e.g., ASD) or mental health issues compared to non-Latino White families, and some studies have found that Latino families in particular fear family rejection or fear that their child will be “labeled” as having a disability (Alegria et al., 2010; Zuckerman et al., 2014). Additionally, some studies have found that minority families, compared to non-minority White families, are more likely to blame themselves and their own child rearing practices for their child's emotional and/or behavioral issues (Richardson, 2001). These fears surrounding their child's diagnosis may cause families to be reluctant to seek out diagnostic and treatment services for their child.

Lack of culturally-appropriate services. A number of studies have suggested that even when families recognize early symptoms of ASD, many do not seek diagnostic or treatment services because they have less knowledge about available services (Richardson, 2001; Zuckerman et al., 2014). For example, one study found that Latino mothers felt like there was a lack of materials regarding ASD information and services available to them in Spanish (Zuckerman et al., 2014). Regarding ASD screening in pediatric settings, one study found that only 10.3% of physicians offered ASD specific screening in Spanish (Zuckerman et al., 2013), which may ultimately contribute to a later

diagnosis of ASD in children from Spanish-speaking families. Research examining racial/ethnic disparities across a broader range of mental health concerns have suggested that health and behavioral health services available to minority families may not reflect the culture or values of these families. For example, many services often focus on the individual, rather than communities and families, which is an important value in Latino culture (i.e., *familisimo*) (Munoz & Mendelson, 2005).

To reduce diagnostic disparities of ASD, it is important to understand potential causes for these disparities. Unfortunately, most of the research on ethnic disparities have focused on broad mental health services, rather than ASD specifically. Within ASD research, much of the focus has been on barriers at the individual and family level, rather than the provider level. Therefore, there is a clear need for research aimed at understanding *provider-level* factors associated with early identification of ASD particularly for Latino children.

Role of Pediatric Physicians

Pediatricians and pediatric primary care providers play a central role in recognizing and identifying early signs of developmental, behavioral, and emotional health problems because they have regular contact with a child across his or her early years. Parents are likely to express their first concerns to their child's pediatrician, at the child's routine wellness checkups, positioning the pediatrician to have a direct impact on early identification, diagnosis, and referral. The AAP recommends that pediatricians conduct developmental surveillance (i.e., gathering information on family history and child's developmental milestones; eliciting parent concerns about behavior; interacting with patient) at every routine wellness checkup in order to identify children who may be

at risk for mental health conditions (Johnson et al., 2007). Additionally, the AAP recommends that all children receive developmental screening using a formal, validated tool during their wellness checkup at 9 months, 18 months, and 24 or 30 months and screening for ASD specifically using a validated autism-specific instrument at 18 months and 24 months (Johnson & Myers, 2007).

Because early markers of ASD are present within the first two years of life, combined with the propensity of parents to take their first concerns to their child's pediatrician, physicians play an important role in recognizing the signs and the symptoms of ASD and subsequent diagnosis decisions and treatment recommendations. Moreover, an increase in diagnostic prevalence of ASD has led to an increased need for physicians to address difficulties faced by these families; the AAP recognized that primary care physicians will most likely encounter a child with autism as a result of increased diagnostic prevalence (AAP, 2001). Regardless, many families make multiple visits to a variety of health care professionals before receiving a diagnosis of ASD (Wiggins et al., 2006), and parents report feeling dissatisfied with the age in which children receive diagnoses compared to when they first express concerns to their physician (Goin-Kochel et al., 2006). These findings, combined with the well-established delays between when ASD diagnosis can generally be made and when affected children are actually diagnosed, suggests weakness in the overall identification process of ASD. While research in this area is limited, a handful of studies have identified possible provider-level factors contributing to this disparity.

Inconsistent screening practices for ASD. Results from a nationally representative survey on autism screening practice of AAP U.S. members in 2016

indicated that 81% of pediatricians reported “always/almost always” using one or more formal tools to screen for ASD (Coury et al., 2017). This is a significant increase from previous studies that found as low as 8% of pediatricians routinely screened for ASD at the recommended 18 and 24 months (Johnson et al., 2007; Kleinman et al., 2008), suggesting that efforts by multiple organizations to increase routine screening for ASD over the past decade have been effective. Although these findings are promising, 45% of pediatricians who screened for ASD in 2016 reported assessing ASD without the use of a formal screening instrument/checklist, such as the Modified Checklist for Autism in Toddlers (M-CHAT; Robins, Fein, & Barton, 2001). There is also speculation that physicians may screen for ASD less in children from minority families compared to majority groups, although evidence for this is inconsistent (Mandell et al., 2002). Additionally, studies have shown low rates (28.7%) of Spanish-language ASD screening in primary care settings, with only 10.3% of physicians offering both general screening and ASD specific screening in Spanish, despite AAP guidelines (Zuckerman et al., 2013). Physicians were more likely to offer Spanish language screenings if they had a higher number of Latino patients (Zuckerman et al., 2013). Despite an overall increase in screenings for ASD over the past decade, the inconsistent use of formal screening instruments/checklists among pediatricians, as well as a lack of Spanish language screenings available, may ultimately contribute to later diagnoses of ASD in children, particularly in Latino children.

Physician *response* to parent concerns. Research also suggests that the way physicians respond to parents’ concerns influences the age a child is diagnosed with ASD. Physicians often take a “wait and see” approach or may underestimate the

importance of concerns that parents raise, often telling parents not to worry or that the child will grow out of it, when there are early concerns of ASD, such as language delays, in toddlers (Magaña et al., 2013; Zuckerman, Lindly, & Sinche, 2015). A study conducted by Zuckerman and colleagues (2015), found that in a large nationally-representative sample of children with ASD, diagnosis was delayed nearly three years after parents reportedly expressed concerns to their physician to when their child received an ASD diagnosis. Studies have also found that diagnostic delays of ASD were greater when a child's physician had a reassuring or passive response (e.g., says nothing is wrong, child will grow out of it, too early to diagnose) than when a physician had a proactive response (e.g., conduct developmental or screening test, refer to specialist, make a diagnosis) (Magaña et al., 2013; Zuckerman et al., 2015). These findings suggest many physicians may not be responding to families with a proactive response (i.e., further assessing symptoms, making a referral, and/or making a diagnosis) when families first express their concerns; however, no published study has evaluated differences in physician responses to parent concerns, nor taken into account the child's ethnicity. Therefore, research is needed to better understand how physicians report they would respond to parent concerns in order to develop future studies to investigate this phenomenon in actual practice.

How physicians *elicit* developmental concerns. Other studies evaluating health care providers responses to parents' concerns also suggest that physicians may not effectively elicit developmental concerns with minority families (Guerrero, Rodriguez, & Flores, 2011), suggesting that the delay in diagnosis for these families may be due to the interactions with their providers. In a large sample utilizing data from the National

Survey of Children's Health (2007), researchers found that only 50% of US parents reported that their provider elicited a discussion of developmental concerns, with lowest reports from African American (41%) and Latino (49%) parents compared to White parents (55%) (Guerrero et al., 2011). Elicitation of developmental concerns was even lower when English was not the primary language (33%). Additionally, one study found that physicians believe Latino parents are less knowledgeable about ASD than non-Latino White parents (Zuckerman et al., 2013), which may affect the way physicians elicit or respond to Latino parents' concerns about their child's early development. How providers elicit concerns with minority families is especially important when considering the cultural value of *respeto* among Latinos, which refers to respect in interpersonal relationships (Marín & Marín, 1991). Demonstrating appropriate *respeto* may include hesitancy to ask questions because questions could be construed as disrespectful (Flores, 2000). This suggests that how providers elicit concerns are critical in providing a timely and accurate diagnosis of ASD to children and their families and that providers' approaches and responses may vary depending on a families' race, ethnicity, and native language.

Practical issues. Other studies examining barriers to ASD care experienced by pediatric physicians suggest practical issues such as time for wellness checkups and reimbursement as contributing factors in effectively addressing parent concerns (Carbone, 2013; Halfon, Stevens, Larson, & Olson, 2011). Overall, parents report spending little time with their pediatrician during their child's wellness checkup, with one study reporting one-third of parents reported spending less than 10 minutes with their pediatrician during a visit. Longer visits (i.e., more than 20 minutes) have been associated

with higher odds of receiving a developmental assessment and receiving recommendations, as well as allowing more time for parents to ask questions (Halfon et al., 2011).

Physician knowledge about ASD. Additional literature examining barriers to ASD care in primary care settings consistently suggest that primary care physicians and pediatricians may not be equipped to recognize early symptoms of ASD and address concerns with families due to a lack of knowledge, training, and confidence or comfort level in developmental psychology and ASD. Many general practitioners lack specialized training and skills in early ASD which may lead physicians to miss early and subtle symptoms of ASD in the first two years of a child's life. Interestingly, pediatricians and residents reported they did not receive adequate training and felt underprepared to care for children with ASD (Carbone, 2013; Major, Peacock, Ruben, Thomas, & Weitzman, 2013); however, physicians also reported an interest in learning more about ASD (Major et al., 2013). Previous surveys among healthcare providers also indicated gaps in knowledge about ASD. For example, one study assessing knowledge of ASD, found that primary care physicians exhibited some belief patterns about causes and treatments of ASD that was consistent with outdated research compared to specialists and experts in ASD (Heidgerken et al., 2005).

Physician confidence in diagnosing and treating ASD. Not only do physicians report lack of training and knowledge about ASD, but many report a lack in confidence and comfort level in diagnosing, treating, and caring for children with ASD (Davis et al., 2012; Golnik et al., 2009; Major et al., 2013), compared to children with other neurodevelopmental conditions and chronic medical conditions (Golnik et al., 2009).

Data gathered from 70 pediatricians indicated that they felt significantly less comfortable diagnosing and treating ASD compared to other behavioral mental health disorders such as anxiety, attention-deficit/hyperactivity disorder, depression, behavior problems, sleep problems, and somatic complaints (Davis et al., 2012). Interestingly, one study found that physicians reported higher competency in caring for children with ASD if they had a greater number of patients with ASD, had a friend or relative with ASD, or had adequate training about ASD (Golnik et al., 2009). This suggests that more exposure to children with ASD, as well as formal trainings, may increase physician perceived competency in working with children with ASD. Additionally, physicians reported a lack of appropriate referral resources and subspecialists with expertise in ASD (e.g., developmental behavioral pediatricians, child psychologists) (Carbone, 2013; Zuckerman et al., 2013), and they reported difficulties facilitating connections between families and ASD community-based services (Carbone, 2013).

Physician's confidence appears to be even lower when assessing for ASD in minority children, perhaps due to language and cultural barriers. In a study assessing primary care physicians' views on ASD in Latino children, primary care physicians rated more difficulty assessing for ASD in Latino children compared to non-Latino White children and reported a lack of confidence in identifying ASD, especially when the family was Spanish-speaking (Zuckerman et al., 2013). These findings are consistent with previous research suggesting that providers may not be attending to or recognizing the signs of ASD or may attribute language delays to second language rather than early signs of ASD (Begeer et al., 2009; Mandell et al., 2002; Mandell & Novak, 2005). Notably, physicians who were of Latino race, had Spanish proficiency, or saw more than

25% of Latino patients within their practice, were less likely to have difficulty identifying ASD signs and symptoms in Latino children, however, they still reported more difficulty assessing ASD risk in Latino than non-Latino White children (Zuckerman et al., 2013).

While all professionals who work with young children should be aware of the early signs of ASD, pediatric physicians may be the best positioned to identify and discuss concerns with families, ultimately decreasing the diagnostic delay in ASD many families experience. Therefore, it is critical that research further examine factors at the provider-level contributing to the delay in diagnosis of ASD among Latino children. Findings from this research is the first step in determining how to support these providers and help them identify early symptoms of ASD to provide earlier identification and diagnosis, ultimately providing more opportunities for early interventions, particularly among Latino children.

Gaps in the Literature

Reducing disparities in developmental, behavioral, and mental health care is a national priority and more research is needed to identify determinants of these disparities (Alegria, Green, McLaughlin, & Loder, 2015). Because factors contributing to these disparities may include provider factors such as difficulties in recognizing, diagnosing, and treating—all of which may be affected by provider experiences and confidence—it is possible that physicians may contribute to diagnostic disparities (albeit unintentionally) to delays in the age of ASD diagnosis for Latino children. Enhanced understanding of these provider-specific factors, including confidence in ASD, may ultimately contribute to the decrease in the well-documented delays in ASD diagnosis among Latino children. While some common provider-level factors have been suggested across various studies, most of

these studies have relied on provider self-reported practices and opinions, which may not reflect their everyday practice and may be subject to response biases (i.e., social desirability) related to direct questions about racial or ethnic diagnostic disparities. To date there is no published study that examines physicians' recognition of early ASD concerns and subsequent diagnostic and treatment recommendations using a clinical vignette. Because vignette studies are widely used to examine judgements and decision-making processes made by health professionals when experimental manipulation of certain variables (i.e., patient ethnicity) is not feasible (Evans et al., 2015), the current study offers an important first step to additional research in exploring physician decision making related to ASD.

In addition to the aforementioned gaps in the literature, the explicit focus on the potential influence of patient ethnicity upon provider decision-making in ASD is limited. Additionally, limited attention has been given, overall, to understanding disparities of treatment recommendations among ethnic minority children, as well as treatment recommendations in early childhood. Given the importance of early intervention and the best outcomes associated with early intervention for all children with ASD, research is needed to evaluate provider treatment recommendations.

The current study aimed to address gaps in the literature by examining factors related to physicians' decision-making regarding recognizing early ASD symptoms and subsequent diagnosis and treatment recommendations, particularly for young (i.e., preschool age) Latino children. To date, much of the research in this area has focused on individual and family factors that may contribute to disparities, including access to healthcare, language barriers, parent beliefs and perceptions, stigma, and cultural

differences. However, provider factors (i.e., knowledge, experience, and confidence) that may impact ASD diagnostic delays in Latino children are less studied. Understanding these factors has critical practice implications in that provider-level factors such as these may represent points of intervention (i.e., training, education) and/or collaboration with ASD specialists that ultimately may contribute to reductions in disparate identification and services for Latino children.

Current Research Questions

The primary purpose of the current study was to examine differences in physicians' recognition of early ASD concerns and subsequent diagnostic and treatment decisions in Latino children compared with non-Latino White children. Specifically, the aims of the study were to examine (1) the effect of child ethnicity (Latino or non-Latino White) upon physician recognition of ASD symptoms and subsequent diagnostic decision-making and treatment recommendations; (2) the influence of physician self-reported confidence related to ASD on recognizing ASD as a diagnostic consideration; and (3) physician characteristics and experiences that may affect their consideration of an ASD diagnosis, particularly for Latino children. The following research questions were investigated through the use of a clinical vignette and survey questions.

1. Does consideration of an ASD diagnosis (i.e., physician does or does not consider ASD as a potential differential diagnosis) differ depending on a child's ethnicity (Latino or non-Latino White)? Among physicians who considered ASD as a differential diagnosis, did their priority of ASD (i.e., ranking ASD as a first differential diagnostic consideration vs. ranking ASD as a secondary or later consideration) differ depending on the child's ethnicity? Given the well-

documented disparities of ASD diagnosis and age of diagnosis for Latino children (Mandell et al., 2002; Zuckerman et al., 2017; Zuckerman et al., 2014), it was hypothesized that physicians' consideration about an ASD diagnosis would differ depending on child's ethnicity. Specifically, it was hypothesized that physicians would be less likely to consider ASD as one of their differential diagnoses and would be less likely to consider ASD as their priority diagnosis if the child in the vignette was Latino than if the child was non-Latino White.

2. Is there a relationship between physicians' self-reported confidence in serving children with ASD and ranking ASD as a first differential diagnostic consideration? While no study to date has examined physicians' self-reported confidence related to ASD on subsequent ASD identification and diagnosis, literature does suggest that physicians have reported they are less likely to diagnose mental health conditions in children if they feel less confident recognizing and making that diagnosis (Davis et al., 2012). Therefore, it was hypothesized that higher confidence in serving children with ASD would be associated with a higher likelihood of ranking ASD as a first differential diagnostic consideration.
3. Is the relationship between physicians' priority of ASD diagnosis (i.e., ranking ASD as a first differential diagnostic consideration vs. ranking ASD as a secondary or later consideration) and child ethnicity (i.e., Latino or non-Latino White) *moderated by* physician characteristics, including confidence in serving children with ASD and/or demographic characteristics (i.e., provider ethnicity, Spanish proficiency, years in practice, and percentage of ethnic minority

patients)? Research suggests that physicians are less likely to have difficulty identifying ASD in Latino children if they were of Latino ethnicity, had Spanish proficiency, and saw more than 25 percent of Latino patients within their practice (Zuckerman et al., 2013). Therefore, it was hypothesized that the likelihood ranking ASD as a first diagnostic consideration in Latino children would be higher if the physicians identified as Latino, spoke Spanish, and saw more than 25 percent Latino patients. It was also hypothesized that physician confidence in serving children with ASD would moderate the relationship between child ethnicity and priority of ASD as a differential diagnosis. Specifically, it was expected that the likelihood of physicians ranking ASD as a first differential diagnostic consideration would be stronger if they had a higher confidence in serving children with ASD for physicians who read the Latino vignette, but not for physicians who read the non-Latino White vignette.

4. Do physicians' recommended course of action for patients who present with ASD symptoms differ depending on a child's ethnicity? While differences in physicians' recommended courses of action for patients who present with ASD symptoms have not been investigated for Latino vs. non-Latino White children, it is possible that Latino children have a greater delay in diagnosis because they are receiving less active responses from their provider when parents first express concerns regarding development (Magaña et al., 2013; Zuckerman et al., 2015). Therefore, it was hypothesized that physicians would be more likely to recommend 1) conduct a developmental screener, 2) consult with a colleague or specialist, 3) refer to a specialist, and 4) make a diagnosis if the child in the

vignette was non-Latino White than if the child was Latino. It was also hypothesized that physicians would be more likely to recommend 1) reassure parents that behaviors are part of normal development, and 2) wait until child is older to assess concerns if the child in the vignette was Latino than if the child was non-Latino White.

5. Do physicians' recommendations for treatment differ depending on a child's ethnicity? While this area of research is limited, research indicates that Latino children are less likely to ever receive early intervention services than non-Latino White children (Magaña et al., 2013). Therefore, it was hypothesized that there would be differences in treatment recommendations based on the child's ethnicity. Specifically, it was expected that physicians would be more likely to recommend psychosocial (i.e., behavioral) intervention if the child was non-Latino White than if the child was Latino. No specific hypotheses were developed regarding differences in pharmacologic medication and CAM recommendations based on child ethnicity given the limited literature currently available in this area.

Chapter III

Methods

Participants

Participants in this study included sixty-five physicians ($n = 65$) who typically see children for well-child or other routine visits, though demographic information was only collected for sixty-two of these physicians ($n=62$). Participation in the study was voluntary and participants were invited to participate if they reported to be a practicing physician, including residents, with an M.D or D.O. degree, whose patient population includes children of any age for well-child or other routine visits. They did not have to have any specific medical specialty, aside from typically seeing children.

The vast majority of participants were female (72.6%) and identified as White (79%). A minority of participants identified as Hispanic or Latino ethnicity (8.1%), Additionally, few participants reported having Spanish proficiency (19.4%). Over half of participants specialized in pediatrics (66.1%), practiced within a hospital (58.1%), practiced within an urban setting (82.3%), and were residents (54.8%). The average number of years in practice, determined by years since graduating medical school, was 9.65 years ($SD=11.11$), with participants indicating as little as one year since graduation to as many as 40 years. Regarding their reported patient population, 59.7% of participants reported a patient population greater than 50% racial/ethnic minority patients, though 24.2% reported a patient population with more than 50% Latino patients. Geographic location, as reported by Qualtrics, indicated that the majority of participants were from Texas (58.5%), though physicians from 17 other states also participated. Descriptive characteristics for the total sample are reported in Table 1.

Table 1

Demographic Characteristics for Participants who Completed Survey (n=62)

Characteristic		Frequency	Percentage
Gender	Male	17	27.4
	Female	45	72.6
Race	White	49	79.0
	Black/African American	5	8.1
	Asian	8	12.9
Ethnicity	Hispanic/Latino	5	8.1
	Non-Hispanic/Latino	57	91.9
Language Proficiency	Spanish	12	19.4
	English	50	80.6
Medical specialty	Pediatrics	41	66.1
	Family Medicine	5	8.1
	Developmental Pediatrics	10	16.1
	Child/Adolescent Psychiatry	3	4.8
	Other Pediatric sub-specialty	3	4.8
Practice type	Hospital	36	58.1
	Community clinic	11	17.7
	Independent practice	3	4.8
	Partnership or group practice	8	12.9
	Combination of hospital & community	4	6.5
Practice setting	Urban	51	82.3
	Suburban	7	11.3
	Rural	4	6.5
Training	Resident	34	54.8
	Non-Resident	28	45.2
Years in practice	≤5 years	35	56.5
	>5 years	27	43.5
Patient population	>50% ethnic minority	37	59.7
	>50% Latino	15	24.2
	>50% behavioral concerns	19	30.6
	>50% developmental concerns	11	17.7

Procedures

The study utilized a web-based clinical vignette with a corresponding survey, which were developed for the purpose of this study. Vignette studies are widely used for studies examining judgements and decision-making processes made by health professionals when experimental manipulation of certain variables (i.e., patient ethnicity) is not feasible (Evans et al., 2015). These analogue designs offer several advantages in terms of utility, with relatively low requirements (i.e., time, personnel, funding) compared to other methodologies (e.g., interview, focus group, survey) and enables researchers to accurately represent particular scenarios (Evans et al., 2015). Following informed consent, participants were presented with a vignette in which only ethnicity of the child randomly varied (Hispanic or White) and then responded to questions about diagnosis and recommended treatments, as well as questions about themselves. The average amount of time it took participants to read the vignette and complete the survey was approximately 11 minutes. The Institutional Review Board (IRB) at the University of Houston reviewed and approved all study procedures prior to the collection of data. Approval of submission is included in Appendix A.

Vignette development. A vignette describing a hypothetical child patient who may present during a routine visit was deployed in this online study. To develop the vignette for this study, clinical and research descriptions of presenting concerns in young children with ASD were gathered. Additionally, several methodological recommendations regarding the development and implementation of a vignette study examining clinicians' decision-making processes were followed. As described by Evans and colleagues (2015), these considerations included: deriving the vignette content from

the literature and clinical experience; having clear, well-written, and carefully edited vignette that is not longer than 500 words; following a narrative, story-like progression; using present tense; avoiding placing the participant “in the vignette” (e.g., as first- or third-person character); being as neutral as possible with respect to cultural and socio-economic factors; and highlighting the key variables of interest. After initial development of the vignette by the author, 12 current professionals (i.e., practitioners and researchers) and doctoral graduate students who were part of an autism specific research team reviewed the vignette and provided feedback. Reviewers were asked to indicate parts of the vignette that were critical to include in a description of a child with ASD; parts that should be taken out due to inaccuracy or irrelevant information; additional symptoms to add; and rewording to reflect the language a parent would use to express concerns to a physician. Vignette content was refined based on feedback and a second version was sent out again for a final review using same questions. Following the second round of feedback, a final vignette was developed, and two versions of the final vignette were used in this study. There was a single difference between the two versions: in version 1, the child was described as Hispanic whereas in version 2 the child was described as White.

The vignette described the child’s age (4 years), gender (male), and a description of the parent’s presenting concerns, specifically regarding behavioral concerns and symptoms of ASD. Symptoms of ASD were aligned with diagnostic criteria from the DSM-5 (APA, 2013), including social impairment and restricted, repetitive patterns of behavior, as well as developmental delays. Concerns also included symptoms that may be associated with other childhood disorders (e.g., disruptive behavior disorder, attention-deficit/hyperactivity disorder) since comorbid symptoms are common in young children

with ASD (Sanchak & Thomas, 2016). Moreover, externalizing behavior concerns, in particular, may prompt parents to alert their physician to concerns (Sanchak & Thomas, 2016). In addition, the inclusion of such symptoms was intended to decrease the possibility of participants identifying only ASD in their differential diagnosis considerations. The age of 4 years-old for the hypothetical child was selected because the literature supports that an accurate and stable diagnosis of ASD can be made prior to 4 years, with enough symptoms of ASD usually present to support a diagnosis by a child's second birthday (Baird et al., 2008; Crais & Watson, 2014; Zwaigenbaum, 2015). Additionally, this is approximately the average age of diagnosis for the majority of diagnosed children (4.4 years) (Baio et al., 2018). The hypothetical child was male given that significantly more males are diagnosed with ASD (Baio et al., 2018). The vignette is included in Appendix B.

Survey development. Survey questions were developed based on previous surveys used in studies that have examined child ethnicity and physician decision-making (Garland et al., 2015; Zuckerman et al., 2013) and refined based on feedback from doctoral graduate students who were part of an autism specific research team. These students were asked to provide feedback clarity and comprehension of items. The content of the final version of the survey can be characterized by five sections: (1) diagnostic considerations and subsequent decision-making, (2) treatment recommendations, (3) demographic information, (4) confidence in serving children with ASD, and (5) participant reported challenges in assessing and diagnosing ASD. The survey form is included in Appendix C.

A web-based format of the survey was selected for the study to ensure that participants could not change their answers while completing the survey, since questions presented later in the survey (i.e., demographic and ASD specific questions) could influence earlier responses (i.e., diagnostic considerations and subsequent decision-making). Moreover, online data collection was preferable for this study because it permitted access to busy professionals working in a variety of locations in a straightforward format. The secure, online Qualtrics platform was chosen for this study because of its high level of data security, ability to readily export data into statistical software (e.g., SPSS), mobile compatibility, and the wide variety of question types and features (e.g., skip logic, branching, randomization) available. Survey items were built into Qualtrics and tested multiple times using a random response generator. This feature generates random dummy data to aid in the identification of problems within the survey (e.g., faulty skip logic, problems with text fields). Additionally, the web-based survey was piloted with the same group of doctoral graduate students specializing in ASD to test the survey link, functionality of survey on both a computer and a mobile device, and total time to complete the survey. These students were also asked to provide feedback regarding instructions, flow of the survey, and skip logic patterns. Once the survey was finalized, an anonymous link was generated by Qualtrics to distribute the survey to potential participants.

Participant recruitment. Local participants from Houston-area hospitals were recruited by emailing physicians-in-chief, as well as psychology colleagues, of various Houston hospitals and practices and requesting they forward the email containing the study description and survey link to pediatric physicians and residents within their

hospital (i.e., snowball sampling). This email is included in Appendix D. Local participants were also recruited at local hospitals and community practices during daily rounds/meetings or at the beginning of their didactic seminars. These potential participants were also given a brief handout inviting them to participate in the survey and a link directing them to the survey. A Quick Response (QR) barcode was also included in the handout so participants could scan it on their mobile device and be immediately directed to the survey. Handouts were also dropped off to receptionists at local pediatric community practices to be distributed to physicians within the practice. This is included in Appendix E.

Distal participants (i.e., participants outside of the Houston area) were recruited by emailing chapter executive directors of The American Academy of Pediatrics and pediatric residency programs across the country and requesting they forward the study description and survey link to respective members (see Appendix D). Contact information (i.e., name and email address) for each executive director for all chapters and contact person of residency programs were found on each organization's website. In addition to these recruitment methods, the study information and survey link was made available through online professional networking and social media sites, such as Facebook posts and Facebook group pages for the organizations mentioned above, so that study information could be shared with potentially interested physicians. Snowball sampling was used as a recruitment method within the study because physicians often have contacts with other physicians who may be interested in participating in studies such as this one.

Web-based survey administration. After selecting the survey link, potential participants were immediately taken to an inclusion criteria question (i.e., “are you a physician, including residents, with an M.D or D.O. degree who sees children of any ages for well-child or other routine visits?”) to determine whether the individual qualified to participate in the study before being directed to the Informed Consent page. Participants were also instructed to only complete the survey once, in case they received the link to participate from multiple sources due to snowball sampling. This form is included in Appendix F. The informed consent page included a brief description of the study and description of the tasks (i.e., viewing a brief vignette, responding to questions about the vignette, and answering questions about themselves). Neither ethnic disparities nor ASD were discussed in the consent form or study overview to decrease the likelihood of participants guessing specific research questions or hypotheses, which could have influenced their responses. Participants were informed that advancing beyond the informed consent screen would constitute as an electronic signature to participate in the research study. This form is included in Appendix G.

Following informed consent, participants were presented with the vignette, which was randomly distributed to be the vignette of the White child or the Hispanic child using the random assignment generator feature in Qualtrics. Survey questions regarding diagnostic consideration and subsequent decision-making and treatment recommendations followed the vignette and participants were able to refer to the vignette to answer these questions. Next, participants answered demographic questions and questions regarding confidence serving children with ASD. Participants were not able to return to the vignette or prior survey questions once they advanced to this screen to

ensure they did not change their answers after being presented questions related to ASD. Finally, participants were presented three open-ended questions regarding perceived challenges in assessing and diagnosing ASD and resources related to ASD that would be useful. Participants could skip any question they did not wish to answer.

Upon completion of the survey, participants were given the opportunity to enter contact information (name, practice address, email) if they wanted to be entered into a random drawing to receive an autism related book relevant to pediatric physicians. This entry was completely optional and was kept separate from the survey data through the use of a separate survey (i.e., not linked to survey responses). These participants also indicated if they wanted to be considered for potential follow up for this study and/or future research opportunities. This form is included in Appendix H.

Benefits and risks. Overall, the study presented no more than minimal risk of harm to participants and involved no procedures for which written consent is normal required outside of the research context. Research indicates that survey response rates among physicians tends to be lower (54%) than the general public (68%) and that physicians may be reluctant to participate in research due to demanding work schedules and lack of interest in topic (Asch, Jedrzejewski, & Christakis, 1997; Flanigan, McFarlane, & Cook, 2008). In order to optimize the response rate, the current study emphasized the knowledge generation goal of the study as it related to pediatric physicians, minimized the response burden with a quick and efficient survey that could be completed online, and offered an opportunity to receive a small incentive to complete the survey. As noted previously, this study was completed online; therefore, participants' responses were collected electronically via the secure Qualtrics platform and data was stored

electronically on an external USB. The file was password protected and contained no personally identifiable information about participants.

Measures

Diagnostic considerations and subsequent decision-making. Diagnostic consideration items within the survey asked participants whether or not they would consider any diagnosis at this time for the child presented in the vignette (yes/no). If participants select “no”, they were given the opportunity to write why they would not consider a diagnosis for the child. If participants selected “yes”, they were asked to list the differential diagnoses they would consider in rank-order. Previous studies utilizing vignette studies to examine bias in diagnostic assessment across patient ethnicity found no differences in diagnostic decisions when participants were given explicit diagnostic categories to choose from but did find differences when participants provided a spontaneous open-ended response (Begeer et al., 2009; Cuccaro et al., 1996).

Additionally, research has suggested physicians are resistant and reluctant to participate in surveys that impose closed-format questions (Flanigan et al., 2008). Therefore, this question was open-ended (i.e., no diagnostic suggestions were offered) as not to limit or influence the participants’ responses. Participants could provide up to 5 differential diagnoses that they would consider for the child in the vignette.

The survey also included a list of steps that a physician may take after hearing the presented concerns. These items were based on outcomes of previous studies examining management of psychosocial problems and ASD symptoms among child health care professionals (Boyd et al., 2010; Johnson et al., 2007; Velderman, Crone, Wiefferink, & Reijneveld, 2010). Participants selected “yes” or “no” to indicate whether they would

perform each action to manage the concerns presented in the vignette. Options included: (1) conduct a developmental screener, (2) consult with a colleague or specialist, (3) refer child to a specialist for further evaluation, (4) make a diagnosis and discuss with the family, (5) reassure parent that behaviors are part of normal development and provide usual care, and (6) wait until child is older to address concerns. Participants also had the option to select ‘other’ and write in an additional response. They were also asked to select the item that would be their first course of action in order to further examine potential differences in provider recommendations for Latino and non-Latino White children.

Treatment recommendations. Treatment recommendation questions within the survey included a list of treatments that are commonly utilized by families who have a child with ASD. Participants selected “yes” or “no” to indicate whether they would recommend the treatment to the family of the child presented in the vignette. Treatment options included: (1) psychosocial or behavioral intervention, (2) pharmacologic medication, and (3) complementary and alternative medicine (CAM). These three treatments were selected based on common categories of treatments utilized by families of children with ASD (Hofer et al., 2016; Mire, Gealy, Kubiszyn, BurrIDGE, & Goin-Kochel, 2015; Mire, Hughes, Manis, & Goin-Kochel, 2018; Perrin et al., 2012). Participants who selected “yes” for psychosocial intervention and pharmacologic medication were asked to select the specific interventions within that treatment category that they would recommend from a presented list. Participants who selected “no”, were presented with a list of reasons to choose from as to why they would not recommend that specific intervention (see Appendix B). Reasons for non-recommendation were derived from a survey used by Garland and colleagues (2015) that examined physician treatment

decision making for young children with disruptive behaviors. Participants who selected “yes” for CAM were asked to specify their approach through an open-ended response. Participants were also given the option to select “no treatment at this time” and had the opportunity to write in an open-ended response of another treatment recommendation that was not included in the list.

Demographic information. Demographic items were based on previous surveys used in studies that have examined child ethnicity and physician decision-making (Garland et al., 2015; Zuckerman et al., 2013) and assessed gender, race/ethnicity, language proficiencies (e.g., English, Spanish, other), years in practice, medical specialty, practice type (e.g., hospital, community-based clinic), and practice setting (e.g., urban, suburban, rural). Further, participants were also asked about types of patients they see, including the proportion of their patient population who represent ethnic minorities (i.e., non-Caucasian and Hispanic/Latino) and the proportion of their patients with behavioral health and developmental concerns. Demographic questions are included in Appendix B.

ASD Confidence Scale. Nine items regarding domains of patient care for children with ASD or suspected ASD were developed in order to assess participants’ confidence in serving children with ASD. These items were based on previous studies that have examined physician and provider confidence in working with children with ASD (e.g., Major et al., 2013), but were modified to fit the aims of the proposed study. Items queried various responsibilities physicians typically have when seeing a child with ASD or suspected ASD (see Appendix C). For each item, participants rated how confident they feel they can do each of the items listed. Ratings were reported on a 5-point Likert scale ranging from 0 (“Not at all Confident”) to 4 (“Completely Confident”).

A total score was calculated for each participant by calculating the mean of nine items, representing a new construct, which is referred to in this study as ASD Confidence.

Because the psychometric properties of this scale had not been previously investigated, an exploratory factor analysis was conducted. The instrument can be found in Appendix C.

Challenges in assessing and diagnosing ASD. The survey also included open-ended questions to gather information about challenges participants experience in assessing and diagnosing ASD. The first question asked participants to explain challenges they encounter in regard to assessing and diagnosing ASD. The second question was two parts, first asking whether they encounter any additional challenges in regard to assessing and diagnosing ASD when the child and family is Hispanic/Latino; and, if “yes”, they were prompted to explain these challenges. A third question also existed, which asked participants to state resources related to ASD that would be useful in their current practice. These questions are included in Appendix C.

Data Analysis

Data analysis included descriptive statistics regarding participant characteristics and response frequencies to diagnostic and treatment recommendation survey questions. An exploratory factor analysis was conducted to determine the factor structure of the ASD Confidence Scale. Mean scores for each item within this scale were also calculated. Primary hypotheses (effect of patient ethnicity on indicated diagnostic considerations and treatment plans) were examined using inferential statistics, including chi-square tests of homogeneity, independent t-tests, binomial logistic regressions, which are described in

detail below. All analyses were conducted using SPSS version 25. Open-ended responses were grouped by themes, as determined by the author, and analyzed qualitatively.

Power analysis. Statistical power was calculated for all analyses using G*Power (Faul et al., 2009). Based on a priori power analysis, it was indicated that 80 participants were needed to find a significant mean difference between diagnostic decision making (e.g., does or does not consider ASD as a potential differential diagnosis) and treatment recommendations between the two groups (i.e., Latino and non-Latino White), with a moderate effect size ($d=0.50$) and the alpha rate set to .05 (power=0.80). Moderate effect sizes were assumed as there is limited research related to research questions and variables of interest within the current study. In order to examine the predictor variables, or moderators within the study, including provider demographic characteristics and confidence, it was indicated that 114 participants (57 in each group) were needed to find a significant mean difference with a medium effect size ($d=0.50$) and the alpha rate set to .05 (power=0.80). Because the sample size of the current study was smaller than prior power analysis indicated, effect sizes and power for each research question are reported in subsequent Results section. For chi-square tests of homogeneity (research questions 1, 4 and 5), effect sizes were calculated using Cramer's V (Cramer, 1946). For independent samples t -test (research question 2), effect size was calculated using Cohen's d (Cohen, 1992) or Hedge's g (Hedges, 1981) if sample sizes were unequal between groups. Lastly, effect sizes for logistic regressions (research question 3) were calculated using odds ratios. These resulting effect sizes were used to calculate power.

Research question 1. Inferential statistics were conducted to examine the main effect of child ethnicity (as presented in the vignette) on ASD diagnostic consideration. A

dichotomous dependent variable was used to indicate if participants considered ASD *anywhere* within their differential diagnostic considerations (“considered ASD diagnosis”, “did not consider ASD diagnosis”), regardless of the rank order. A chi-square test of homogeneity was conducted to determine whether there was a significant difference in the dependent variable between the two independent variable groups (non-Latino White vignette and Latino vignette). To further examine ASD as a diagnostic consideration, an additional dichotomous variable was used to indicate whether participants who considered an ASD diagnosis ranked (i.e., prioritized) ASD first in their list of diagnostic considerations (“ranked ASD as first diagnostic consideration” or “ranked ASD as second or later diagnostic consideration”). A chi-square test of homogeneity was conducted to determine whether there was a significant difference in this dependent variable for the two independent variable groups (non-Latino White vignette and Latino vignette). Significance tests were based on Pearson χ^2 and statistical significance was evaluated using .05-level two-sided design-based tests. In the case that there was an inadequate samples size for chi-square test of homogeneity, Fisher’s exact test was conducted.

Research question 2. An independent samples *t*-test was conducted to determine the relationship between participants’ ASD Confidence and ranking ASD as a first diagnostic consideration, regardless of child ethnicity. To further explore confidence, additional independent *t*-tests and correlation tests were conducted to examine the relationship between ASD Confidence and participant demographic characteristics, including medical specialty (specializes in neurodevelopment, does not specialize in

neurodevelopment), years in practice, and percentage of patient population with developmental delays.

Research question 3. To investigate whether participant characteristics moderated the relationship between the child's ethnicity in the vignette and ranking ASD as a first diagnostic consideration, binominal logistic regressions were conducted. This allowed examination of the effects of each moderator variable, including ASD Confidence, participant ethnicity, languages spoken, and percentage of Latino patients. While some studies suggest that these characteristics play some role in ASD identification among physicians, there is overall limited research to support hypothesizing a model which includes all of these variables. Additionally, it is not fully understood how these variables relate to one another. Therefore, separate models were used for each presumed moderator. Dichotomous variables were created based on responses in demographic questions for: participant ethnicity (Hispanic/Latino or non-Hispanic/Latino), languages spoken proficiently (speaks Spanish or does not speak Spanish), and percentage of racial/ethnic minority patients (less than 25% or more than 25%). The percentage of racial/ethnic minority patients were dichotomized based on literature that suggests physicians are less likely to have difficulty identifying ASD in Latino children if they saw more than 25% of Latino patients within their practice (Zuckerman et al., 2013). Continuous variables were used for total confidence in serving children with ASD and were mean-centered before creating interaction terms with vignette ethnicity.

Research question 4. Chi-square tests of homogeneity were conducted to determine whether there were differences in the actions (i.e., next steps) participants

reported they would take between participants who read the non-Latino White vignette and the Latino vignette. All participants were included in this analysis, regardless of whether they identified ASD as a differential diagnosis. Significance tests for all analyses were based on Pearson χ^2 and statistical significance was evaluated using .05-level two-sided design-based tests. In the case that there was an inadequate samples size for chi-square test of homogeneity, Fisher's exact test was conducted.

Research question 5. Chi-square test of homogeneity were conducted in order to determine if there were differences in participants' treatment recommendations between participants who read the non-Latino White vignette and the Latino vignette. Dependent variables included yes/no response for the following treatments: (1) psychosocial intervention, (2) pharmacologic medication, and (3) CAM. To further explore treatment recommendations, chi-square tests of homogeneity were conducted to determine if participants' specific type of psychosocial intervention (i.e., individual child, parent management training, school, group) differed among the two groups (non-Latino White or Latino vignette). Significance tests for all analyses were based on Pearson χ^2 and statistical significance was evaluated using .05-level two-sided design-based tests. In the case that there was an inadequate samples size for chi-square test of homogeneity, Fisher's exact test was conducted.

Analysis of open-ended questions. To further explore perceived challenges in early identification of ASD at the provider level, participant responses to three open-ended questions were analyzed qualitatively. In analyzing participants' responses, various themes within each of the three questions were identified by the author, which were organized into categories (see Results). For each question, participants' responses were

coded based on identified themes. If a participant wrote multiple responses within a question, each response was individually coded based on identified themes. Response frequencies of themes for each question were calculated and reported.

Chapter IV

Results

Missing Data

A total of 115 individuals expressed interest in the study (i.e., clicked on the survey link), but 29 of these either did not meet inclusion criteria or did not consent to participate in the study. Therefore, a total of 86 individuals enrolled in the study. Of these individuals, 21 did not move forward in answering subsequent survey questions after being presented with the vignette. Therefore, a total of 65 participants were included in the sample.

Of the 65 participants that were included in this study, 53.8% ($n=35$) read the non-Latino White vignette and 46.2% ($n=30$) read the Latino vignette. There were no significant differences in any of the demographic variables among participants who read the non-Latino White vignette and participants who read the Latino vignette. All of these participants completed the diagnostic considerations and subsequent decision-making questions necessary for research questions 1 and 4. Therefore, 65 participants were included in the analyses for research questions 1 and 4. Less than 5% ($n=3$) of participants did not complete the full survey, including treatment recommendation questions, demographic questions, and the ASD Confidence Scale. Given the minimal drop out, pair-wise deletion was used for analyses. Therefore, a sample size of 62 was used for the remaining research questions (i.e., research questions 2, 3, and 5).

Information on participant drop out and completion of survey is presented in Figure 1.

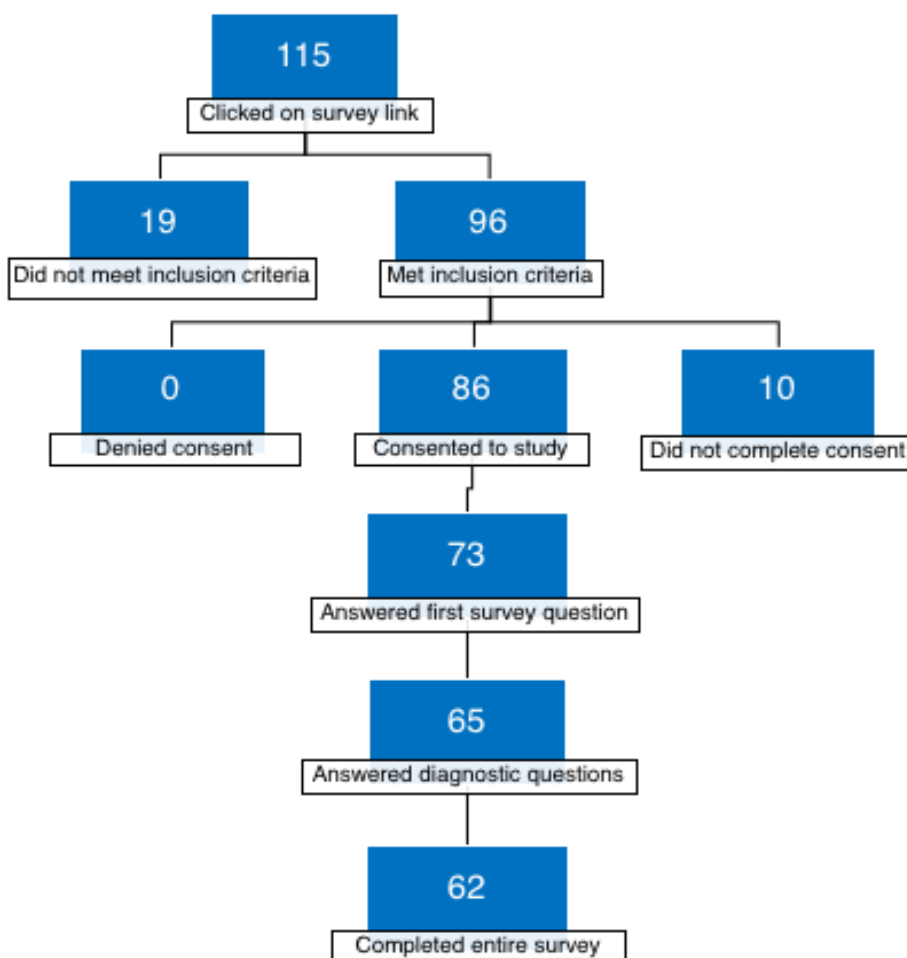


Figure 1. Flow Chart of Participant Drop out and Completion of Survey

Descriptive Statistics

Diagnostic considerations and subsequent decision-making. All participants within the study indicated they would consider further investigating a diagnosis for the child given the information provided in the vignette. Similarly, the vast majority of participants (95.4%) considered ASD within their differential diagnoses, with 72.6% of these participants ranking ASD as their first diagnostic consideration.

To explore the differential diagnoses that participants considered for the child, all responses were categorized based on specific diagnoses. Many diagnoses were grouped into broader diagnostic categories in order to more easily analyze responses and account

for differences in how participants wrote out diagnostic considerations. For example, a broader diagnostic category of *cognitive delay* was created to include diagnoses such as global developmental delay (GDD) and intellectual disability (ID). Similarly, a broader diagnostic category of *disruptive behavior disorder* was created to include diagnoses such as oppositional defiant disorder (ODD), conduct disorder (CD), and disruptive behavior disorder not otherwise specified (DBD-NOS). A broader diagnostic category of *internalizing disorder* was also created to include diagnoses of various anxiety disorders. Clinical judgement was used when determining how to best categorize responses that were symptoms, rather than specific diagnoses. For example, responses including “tantrums” and “aggression” were coded as a *disruptive behavior disorder*, given that these are common symptoms of this diagnostic category. Across all participants, the differential diagnostic considerations were as follows in the order of frequency: ASD (95.4%); attention-deficit/hyperactivity disorder (ADHD) (75.4%); hearing loss or impairment (46.2%); speech and language disorder (35.4%); disruptive behavior disorder (29.2%); cognitive delay (23.1%); internalizing disorder (16.9%); sensory processing disorder (10.8%); genetic conditions (7.7%); and social communication disorder (4.6%). In addition to these diagnostic categories, 20% of participants included a response that described family-related factors, rather than a specific diagnosis or symptom. Specifically, these responses included the following: parenting related, parenting style, lack of discipline/discipline problem, family and/or parent stress, stressful home situation, neglect, abuse, and poor parent child interaction. Therefore, an additional category of *family-related factors* was created to represent these responses (20%).

In regard to differences in diagnostic considerations based on child ethnicity, there were no significant differences in frequencies for ASD, ADHD, hearing loss or impairment, speech and language disorder, disruptive behavior disorder, internalizing disorder, sensory processing disorder, genetic condition and social communication disorder between participants who received the non-Latino White vignette and participants who received the Latino vignette. However, there were significant differences in frequencies for cognitive delay ($p = .021$) and family-related factors ($p = .013$) between participants who received the non-Latino White vignette and participants who received the Latino vignette. Specifically, participants were more likely to consider a cognitive delay if the child was non-Latino White (34.3%) than if the child was Latino (10%). Additionally, participants were more likely to consider *family-factors* if the child was Latino (33.3%) than if the child was non-Latino White (8.6%). Differential diagnosis frequencies within the sample, as well as frequencies within each of the groups by vignette ethnicity, is reported in Table 2.

Table 2

Differential Diagnostic Considerations by Child Ethnicity

Differential Diagnosis	Total N=65		Ethnicity of child in vignette					
			Latino N=30		Non-Latino White N=35		χ^2	p
	n	%	n	%	n	%		
Autism spectrum disorder	62	95.4	29	96.7	33	94.3	0.20	.56
Attention deficit hyperactivity disorder	49	75.4	25	83.3	24	68.6	1.89	.14
Hearing loss or impairment	31	46.2	13	43.4	18	51.4	0.42	.34
Speech and language disorder	23	35.4	10	33.3	13	37.1	0.10	.48
Disruptive behavior disorder	19	29.2	8	26.7	11	31.4	0.18	.43
Cognitive delay	15	23.1	3	10.0	12	34.3	5.36	<.05
Internalizing disorder	11	16.9	3	10.0	8	22.9	1.89	.15
Family-related factors	13	20.0	10	33.3	3	8.6	6.19	<.05
Sensory processing disorder	7	10.8	1	3.3	4	11.4	0.03	.59
Genetic condition	7	7.7	2	6.7	3	8.6	0.08	.57
Social communication disorder	3	4.6	1	3.3	2	5.7	0.21	.56

With regard to subsequent decision-making (i.e., next steps/course of action), the vast majority of participants indicated they would conduct a developmental screener for the child (96.9%), consult with a colleague or specialist about the child (76.6%) and refer the child to a specialist for further evaluation (84.4%). A minority of participants indicated they would make a diagnosis and discuss diagnosis with the child's family (29.7%). Very few participants indicated they would reassure the parent that the child's behaviors are normal (3.1%) and wait until the child is older to address concerns (1.6%). Regarding participants' first course of action, the vast majority of participants indicated they would first conduct a developmental screener for the child (75%). Information regarding subsequent decision-making reported by participants, as well as frequencies within each of the groups by ethnicity of the vignette, is presented in Table 3.

Table 3

Subsequent Decision-Making by Child Ethnicity

Next Steps/Recommended Courses of Action	Ethnicity of child in vignette				Total N=64	
	Non-Latino White N=35		Latino N=29			
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Conduct developmental screener	33	94.3	29	100	62	96.9
Consult with a colleague or specialist	25	71.4	24	82.8	49	76.6
Refer child to a specialist	29	82.9	25	86.2	54	84.4
Make a diagnosis and discuss with family	8	22.9	11	37.9	19	29.7
Reassure parent that behaviors are normal	2	5.7	0	0	2	3.1
Wait until child is older to assess	1	2.9	0	0	1	1.6

Treatment recommendations. The vast majority of participants (87%), indicated they would recommend psychosocial intervention for the child. The most commonly recommended types of psychosocial treatment were parent management training (79.6%), school-based intervention (66.7%), and individual child therapy (55.6%). A minority of participants recommended group treatment (18.5%). These recommendations were not mutually exclusive, and many participants selected more than one psychosocial treatment option.

No participants within the sample reported that they would recommend pharmacologic medication for the child. When presented with reasons as to why they would not recommend pharmacologic medication, 50% of participants endorsed that “medications are not indicated for a child’s concerns/symptoms.” An additional 46% of participants endorsed an additional reason (i.e., “other”) that was not stated in the survey for not recommending pharmacologic medication. Within these participants, 69.2% indicated they need further diagnostic clarification prior to recommending pharmacologic

medication and 30.7% indicated they would prefer to try behavioral interventions prior to starting pharmacologic medication. Other responses endorsed by multiple participants were “the child is too young for pharmacological treatment” (20.6%), “the child’s symptoms are not severe enough” (15.9%), and “risks of medication outweigh the potential benefit of treatment” (15.9%).

Finally, 8.8% of participants recommended CAM treatment. When presented with reasons as to why they would not recommend CAM treatment, a vast majority of participants (68.4%) endorsed that “there are currently no effective/evidence-based CAM treatments available to address behaviors like this”. Many participants also endorsed additional reasons that were not stated in the survey (31.6%), with the majority of these participants (50%) indicating that they are not familiar with or lack knowledge regarding specific CAM approaches. A smaller portion of participants indicated that they would need further diagnostic clarification prior to recommending CAM (33%) and would prefer to try other interventions prior to or in combination with CAM (17%). Information on treatment recommendations is presented in Table 4.

Table 4

Treatment Recommendations by Child Ethnicity

Treatment Recommendation	Ethnicity of child in vignette				Total N=64	
	Non-Latino White N=35		Latino N=29			
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Psychosocial intervention	30	85.7	25	86.2	55	85.9
Individual child therapy	17	58.6	13	52.0	30	55.6
Group therapy	5	17.2	5	20.0	10	18.5
Parent/behavior management training	22	75.9	21	84.0	43	79.6
School-based intervention	18	62.1	18	72.0	36	66.7
Complementary and Alternative Medicine	2	5.9	3	10.3	5	7.9

NOTE: No participants recommended pharmacologic medication

ASD Confidence Scale. An exploratory factor analysis was conducted to determine the factor structure of the nine-items within the ASD Confidence Scale. The minimum amount of data for factor analysis was satisfied (MacCallum et al., 1999), with a final sample size of 62, providing a ratio of over 6 cases per variable, and well-recognized criteria for the factorability of a correlation were used. First, inspection of the correlation matrix showed that all variables had at least one correlation coefficient greater than 0.3, suggesting reasonable factorability. Second, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.92, above the recommended value of 0.7 (Kaiser, 1974), and Bartlett's test of sphericity was significant ($p < .0005$), indicating that the data was likely factorizable. Finally, the communalities were all above 0.4, further confirming that each item shared some common variance with other items. Given these overall indicators, factor analysis was deemed to be suitable for all nine-items. Factor analysis revealed one component that had an eigenvalue greater than one and which explained 65.7% of the total variance, suggesting the scale items are unidimensional. Visual inspection of the scree plot indicated that one component should be retained (Cattell, 1966) and a one-component solution met the interpretability criterion. As such, one component was retained. Component loadings and communalities of the items are presented in Table 5. The alpha coefficient for the nine items, using Cronbach's alpha, was 0.93, suggesting that the items had relatively high internal consistency. Overall, analyses indicated one distinct factor was underlying participants' responses to items assessing ASD confidence, which was called ASD Confidence for the purpose of the current study.

Table 5

Factor Loadings and Communalities Based on Exploratory Factor Analysis for 9 items in ASD Confidence Scale (N=62).

Item	Factor Loading	Communality
Identify early warning signs of ASD	.81	.66
Conduct appropriate screenings to assess developmental level	.65	.42
Make a DSM/ICD diagnosis of ASD	.77	.59
Discuss ASD diagnosis and answer questions	.90	.81
Discuss appropriate treatment options for ASD	.93	.86
Discuss early intervention options for ASD	.91	.82
Discuss educational/school eligibility and services for ASD	.82	.67
Build adequate rapport with patients with ASD	.66	.45
Provide ongoing care and management of symptoms	.79	.62

The average ASD Confidence value of the total sample was 2.15 ($SD=0.93$), representing a value between “moderately confident” and “very confident”, with ASD Confidence ranging from 0.44 to 4. A histogram of the ASD Confidence scores can be seen in Figure 2.

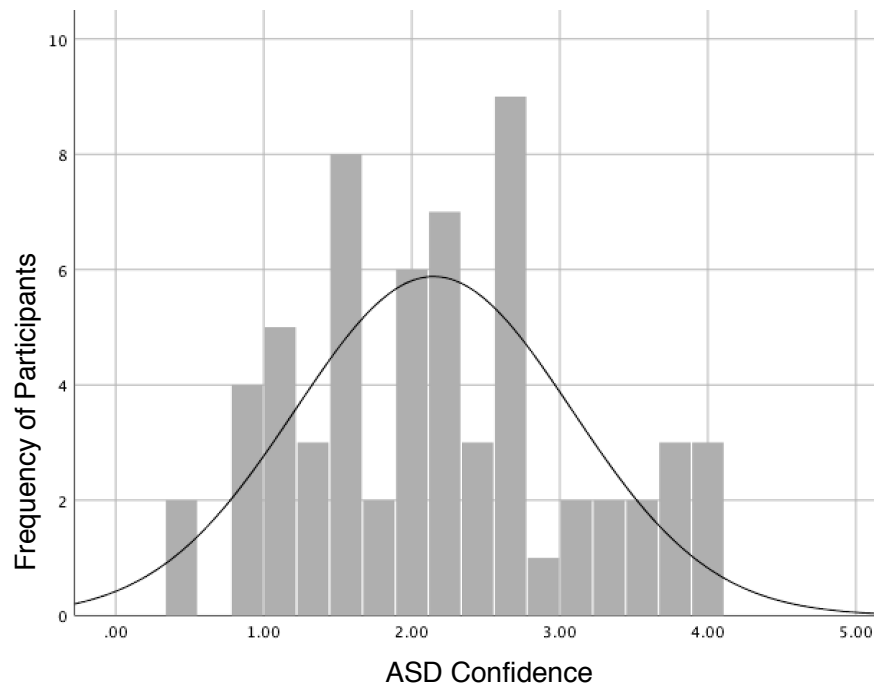


Figure 2. Histogram of ASD Confidence Scores for Participants

As observed by the normal curve overlay, the values for ASD Confidence appear to have a normal distribution (skewness = 0.25, kurtosis = -0.70). The Shapiro-Wilk Test was utilized to assess normality given its appropriateness for smaller sample sizes (Shapiro and Wilk, 1965). Results from the Shapiro-Wilk test support normality of ASD Confidence values, $D(62) = 0.97, p > .05$. Further visual examination using a Box-Plot indicated no outliers for the distribution. The average ASD Confidence value was 2.11 ($SD = 0.17$) for participants who received the non-Latino White vignette and 2.19 ($SD = 0.17$) for participants who received the Latino vignette. There were no significant differences in ASD Confidence between participants who received the non-Latino White vignette and participants who received the Latino vignette. Mean values for each item within the ASD Confidence Scale were also calculated to further examine participant confidence in various domains related to serving children with ASD. Participants were the most confident in identifying early warning signs of ASD within their patients ($M = 2.73, SD = 0.87$). Participants were the least confidence in making a DSM/ICD diagnosis of ASD for their patients ($M = 1.61, SD = 1.29$). There were no significant differences in mean scores for each item between participants who received the non-Latino White vignette and participants who received the Latino vignette. The mean values for all items within the ASD Confidence Scale are located in Table 6.

Table 6

Descriptive Characteristics of ASD Confidence Scale Items and Total ASD Confidence

ASD Confidence Scale Items and Total Confidence	<i>M</i>	<i>SD</i>
Scale Items		
Identify early warning signs of ASD	2.73	0.87
Conduct appropriate screenings to assess developmental level	2.61	1.09
Make a DSM/ICD diagnosis of ASD	1.61	1.29
Discuss ASD diagnosis and answer questions	2.10	1.25
Discuss appropriate treatment options for ASD	1.81	1.35
Discuss early intervention options for ASD	1.94	1.17
Discuss educational/school eligibility and services for ASD	1.65	1.23
Build adequate rapport with patients with ASD	2.71	0.88
Provide ongoing care and management of symptoms	2.18	1.22
ASD Confidence	2.15	0.93

NOTE: Ratings were reported on a 5-point Likert scale ranging from 0 (“Not at all Confident”) to 4 (“Completely Confident”). ASD Confidence value was calculated by mean of nine items.

Inferential Statistics

Research question 1. Research question 1 asked whether consideration of an ASD diagnosis (i.e., participant does or does not consider ASD as a potential differential diagnosis) differed depending on a child’s ethnicity (Latino or non-Latino White). To answer this question, 65 participants were randomly presented with a vignette of a non-Latino White child ($n=35$) or a Latino child ($n=30$) and asked to rank order the diagnoses that they would consider for this child. Due to an inadequate sample size for the chi-square test of homogeneity (i.e., two expected cell count less than five), Fisher’s exact test was conducted to determine if ranking ASD as a diagnostic consideration differed among the two groups (non-Latino White vignette or Latino vignette). Results indicated that 94.3% of participants who read the non-Latino White vignette and 96.7% of participants who read the Latino vignette considered ASD *somewhere* within their differential diagnoses, a difference that was not statistically significant ($p = 1.00$, Fisher’s

exact test). Next, a chi-square test of homogeneity was conducted to determine whether ranking ASD as a *first* diagnostic consideration differed among the two groups (non-Latino White vignette or Latino vignette). Only participants who considered ASD somewhere within their differential diagnoses were included in this analysis ($N = 62$). All expected cell counts were greater than five. Of participants who read the non-Latino White vignette and considered ASD somewhere within their differential diagnoses ($n=33$), 72.7% ranked ASD as their first diagnostic consideration. Of participants who read the Latino vignette and considered ASD somewhere within their differential diagnoses ($n=29$), 72.4% ranked ASD as their first diagnostic consideration. There was no significant difference in the proportions of participants who ranked ASD as their first diagnostic consideration between the two groups, $\chi^2(1) = 0.01$, $p = 0.98$. With a small effect size (Cramer's $V = 0.004$), power equaled 0.05, suggesting limitations for the reproducibility in these results. Overall, this data does not provide strong evidence to conclude that ranking ASD as a first diagnostic consideration differs based on a child's ethnicity.

Research question 2. Research question 2 asked whether there was a relationship between participants' self-reported confidence in serving children with ASD (as represented by the construct ASD Confidence) and ranking ASD as a first differential diagnostic consideration. To answer this question, an independent-samples t -test was conducted. Participants who ranked ASD as their first diagnostic consideration reported a higher ASD Confidence ($M = 2.28$, $SD = 0.94$) than participants who ranked ASD as a secondary or later diagnostic consideration ($M = 1.84$, $SD = 0.88$), though this was not a

statistically significant difference, $t(58) = 0.59$, $p = .113$, Hedge's $g = 0.48$ (power = 0.36).

Additional analyses were conducted to explore differences in ASD Confidence based on participant demographic characteristics, including medical specialty, years in practice, and percentage of patient population with developmental concerns. An independent t -test was conducted to determine whether there was a difference in ASD Confidence between participants who specialized in neurodevelopment (e.g., developmental pediatricians) and those who did not specialize in neurodevelopment (i.e., general pediatrics, family medicine, other pediatric specialty). As expected, ASD Confidence was significantly higher for participants who specialized in neurodevelopment ($M = 3.34$, $SD = 0.60$) than for participants who did not specialize in neurodevelopment ($M = 1.91$, $SD = 0.80$), $t(60) = 5.32$, $p < 0.001$, Hedge's $g = 1.84$ (power = 0.99). Correlation analyses were also conducted to assess the relationship between ASD Confidence and years in practice and percentage of patient population with developmental concerns. There was a statistically significant, moderate positive correlation between years in practice and ASD Confidence, $r(60) = 0.49$, $p < 0.001$. Similarly, there was a statistically significant, moderate positive correlation between percentage of patient population with developmental concerns and ASD Confidence, $r(60) = 0.48$, $p < 0.001$.

Research question 3. Research question 3 asked whether the relationship between participants' priority of ASD diagnosis (i.e., ranking ASD as a first differential diagnostic consideration vs. ranking ASD as a secondary or later consideration) and child ethnicity (i.e., Latino or non-Latino White) was *moderated by* provider characteristics,

including ASD Confidence and/or demographic characteristics (i.e., provider ethnicity, Spanish proficiency, years in practice, and percentage of ethnic minority patients).

A binomial logistic regression was used to investigate whether ASD Confidence moderated the effect that vignette ethnicity had on ranking ASD as a first diagnostic consideration. As it was a continuous variable, ASD Confidence was mean-centered before computing the interaction term (Aiken & West, 1991). A first logistic regression model was estimated without the interaction term and then a subsequent model was tested with the interaction term. The model without the interaction term did not significantly predict ranking ASD as a first diagnostic consideration, $\chi^2(2) = 2.66, p = .26$. However, the second model with the interaction term did significantly predict ranking ASD as a first diagnostic consideration, $\chi^2(1) = 8.95, p = .03$. Moreover, the second model accounted for 20.5% (Nagelkerke R^2) of the variance in ranking ASD as a first diagnostic consideration and correctly classified 75% of cases. Moderator analysis indicated a statistically significant interaction effect of ASD Confidence, shown by the significant interaction term $B = -2.16, SE = 1.03, p = .04$, odds ratio = 0.12. Regression coefficients and significance levels for research question 3 can be found in Table 7.

Table 7

Regression Coefficients and Significance Levels for Research Question 3

Parameter	B	SE B	p	OR	95% CI OR	
					Lower	Upper
Vignette	-0.57	0.79	.48	0.57	0.12	2.7
ASD Confidence	2.08	0.94	.03	8.03	1.27	50.73
Vignette*ASD Confidence	-2.16	1.03	.04	0.12	0.02	0.87
Constant	1.67	0.68	.01	5.29		

To probe the interaction, simple effect coefficients were computed for three values of ASD confidence: 1 *SD* below the mean, at the mean, and 1 *SD* above the mean. Vignette ethnicity was significantly related to ranking ASD as a first diagnostic consideration for participants reporting average levels of confidence in diagnosing ASD ($p = .04$) and who received the Latino vignette. Vignette ethnicity was not significant for participants reporting confidence that was one standard deviation below the mean ($p = .09$) or one standard deviation above ($p = .11$). Overall, the significant moderation suggests that the interaction between vignette ethnicity and confidence in ASD does impact the ranking of ASD as a first diagnostic consideration for participants who received the Latino vignette, but only when participants self-reported average levels of confidence.

Post-hoc power analysis indicated an observed power of .48. With the given parameters, it is estimated that a sample size of 121 would be needed for an observed power of .80. Given that the above moderator analysis was underpowered, data from vignette groups (non-Latino White vignette and Latino vignette) was analyzed separately to explore ASD Confidence as a predictor of ranking ASD as a first diagnostic consideration and better understand the moderation of ASD Confidence. There was one standardized residual with a value of -3.504 standard deviations, which was removed from the analysis. A binomial logistical regression indicated that, for participants who read the Latino vignette, ASD Confidence was a significant predictor of ranking ASD as a first diagnostic consideration, $\chi^2(1) = 8.337, p = .03$. Specifically, increasing confidence was associated with an increased likelihood of ranking ASD as a first diagnostic consideration, $B = 2.08, SE = 0.95, p = .03$, odds ratio = 7.96 [95% CI: 1.25 to

50.89]. For one standard deviation increase in ASD Confidence, the odds of ranking ASD as a first diagnostic consideration increase by 7.96. However, ASD confidence was *not* a significant predictor of ranking ASD as a first diagnostic consideration for participants who read the non-Latino White vignette, $\chi^2(1) = 0.035, p = .85$. Overall, these results suggest that increasing confidence was associated with an increased likelihood of ranking ASD as a first diagnostic consideration for participants who read the vignette with the Latino child while this was not the case for participants who read the vignette for the non-Latino White child.

Additional binomial logistic regressions were used to investigate whether demographic variables moderated the effects that vignette ethnicity has on ranking ASD as a first diagnostic consideration. Years in practice as a moderator was mean-centered before computing the interaction term (Aiken & West, 1991). There was no significant interaction between any of the demographic characteristics—including years in practice, participant ethnicity (Hispanic/Latino or non-Hispanic/Latino), Spanish speaking, and percentage Hispanic/Latino patients (less than 25%, more than 25%)—and the ethnicity of the child. Consistent with analyses exploring ASD Confidence as a predictor of ranking ASD as a first diagnostic consideration, data from vignette groups (non-Latino White vignette and Latino vignette) was also analyzed separately to explore demographic variables as a predictor of ranking ASD as a first diagnostic consideration. Binomial logistical regressions indicated that none of the demographic variables—including years in practice, participant ethnicity (Hispanic/Latino or non-Hispanic/Latino), Spanish speaking, and percentage Hispanic/Latino patients (less than 25%, more than 25%)—

were a significant predictor of ranking ASD as a first diagnostic consideration in either groups (non-Latino White vignette and Latino vignette).

Research question 4. Research question 4 asked whether participants' course of action (i.e., next steps) for patients who present with ASD symptoms differed depending on the child's ethnicity. Chi-square tests of homogeneity were conducted to determine whether physician participants' course of action (i.e., next steps) differed among the two groups (non-Latino White vignette or Latino vignette). Results indicated that 71.4% of participants who read the non-Latino White vignette and 82.8% of participants who read the Latino vignette said they would consult with a colleague or specialist about the child, a difference that was not statistically significant, $\chi^2(1) = 1.14, p = .29$. With a small effect size (Cramer's $V = 0.13$) power equaled 0.19. When asked about making a diagnosis for this child, only 22.9% of participants who read the non-Latino White vignette and 37.9% who read the Latino vignette indicated that they would make a diagnosis for the child. There was no significant difference in the proportion of participants who indicated they would make a diagnosis for the child in the two groups, $\chi^2(1) = 1.73, p = .19$. With a small effect size (Cramer's $V = 0.16$) power equaled 0.26. With at least one expected cell count less than five, Fisher's exact test was conducted between the remaining action items (i.e., conduct a developmental screener for the child, refer the child to a specialist for further evaluation, reassure the parent that behaviors are part of normal development, wait until the child is older to address concerns) and vignette group. There were no significant differences in the proportion of participants who indicated they would conduct a developmental screener for the child ($p = .50$), refer the child to a specialist for further evaluation ($p = .75$), reassure the parent that behaviors are part of normal development (p

= .50), and wait until the child is older to address concerns in the two groups ($p = 1.00$). Overall these results suggest there is no difference in the courses of action participants reported they would take based on the child's ethnicity in the vignette.

Interestingly, less than half of participants in both groups said they would make a diagnosis for the child after reading the vignette. To further explore characteristics of participants who reported they would make a diagnosis, an independent-samples t -test was used to determine if there were differences in ASD Confidence and years in practice between participants who said they would make a diagnosis for the child and participants who said they would not make a diagnosis for the child. ASD Confidence was significantly higher in participants who said they would make a diagnosis ($M = 2.64$, $SD = 0.91$) than among participants who said they would not make a diagnosis ($M = 1.93$, $SD = 0.87$), $t(60) = 2.95$, $p = .005$, Hedge's $g = 0.81$ (power = 0.83). There was no significant differences in years in practice between participants who said they would make a diagnosis ($M = 12.84$, $SD = 13.06$) and participants who said they would not make a diagnosis ($M = 8.23$, $SD = 9.97$), $t(60) = 1.52$, $p = .113$.

Additionally, an independent samples t -test was conducted to determine whether there were differences the participants' percentage of patient population with developmental concerns between participants who said they would and would not make a diagnosis for the child. Percentage of patient population with developmental concerns was significantly higher for participants who said they would make a diagnosis for the child ($M = 40.37$, $SD = 30.22$) than for participants who said they would not make a diagnosis for the child ($M = 24.72$, $SD = 21.34$), $t(60) = 4.873$, $p = .023$, Hedge's $g = 0.642$ (power = 0.63).

Research question 5. Research question 5 asked whether participants' recommendations for treatment differed depending on a child's ethnicity. Fisher's exact tests were conducted to determine whether participants' treatment recommendations (i.e., psychosocial intervention, CAM) differed among the two groups (non-Latino White or Latino vignette). Because no participants within the sample indicated they would recommend pharmacologic medication, an analysis was not conducted for this treatment recommendation. Results indicated that 85.7% of participants who read the non-Latino White vignette and 86.2% of participants who read the Latino vignette said they would recommend psychosocial intervention for the child, a difference that was not statistically significant ($p = 1.00$). Regarding CAM, only 5.9% of participants who read the non-Latino White vignette and 10.3% of participants who read the Latino vignette said they would recommend CAM for the child, a difference that was also not statistically significant ($p = .65$).

To further explore treatment recommendations, chi-square tests of homogeneity were conducted to determine whether participants' recommendations for psychosocial interventions (i.e., individual child, parent management training, school, group) differed among the two groups (non-Latino White or Latino vignette). Overall, there were no significant differences in the types of psychosocial interventions (individual child therapy, $p = .63$; group therapy, $p = .80$; parent management training, $p = .50$; school intervention, $p = .44$) between the two groups. Effect size for individual child therapy, as calculated by Cramer's V , was 0.07, resulting in a power of 0.08; effect size for group therapy was 0.04, resulting in a power of 0.06; effect size for parent management training

was 0.10, resulting in a power of 0.12; and effect size for school intervention was 0.11, resulting in a power of 0.12.

Qualitative analysis. A total of 47 participants (76%) provided a response to the first open-ended question (i.e., challenges assessing and diagnosing ASD). In analyzing these responses, the author identified various themes which were organized into five categories: *training and knowledge in ASD* (e.g., unfamiliarity with diagnostic criteria, difficulty assessing differential diagnoses), *practical issues* (e.g., limited time during appointment, insurance and reimbursement), *lack of timely referral resources* (e.g., long wait lists for developmental pediatricians or psychologists), *limited knowledge of and access to treatment services within community* (e.g., unfamiliarity of community treatment providers, difficulty accessing ABA services), and *parental beliefs and reactions surrounding ASD* (e.g., resistance to accept diagnosis, parents beliefs about normal child development). Within analyzing total responses for this question, 26.2% were related to *training and knowledge in ASD*, 23.1% were related to *parental beliefs and reactions surrounding ASD*, 21.5% were related to *lack of timely referral resources*, 18.5% were related to *limited knowledge of and access to treatment services within the community*, and 10.8% were related to *practical issues*. Responses are presented in Figure 3.

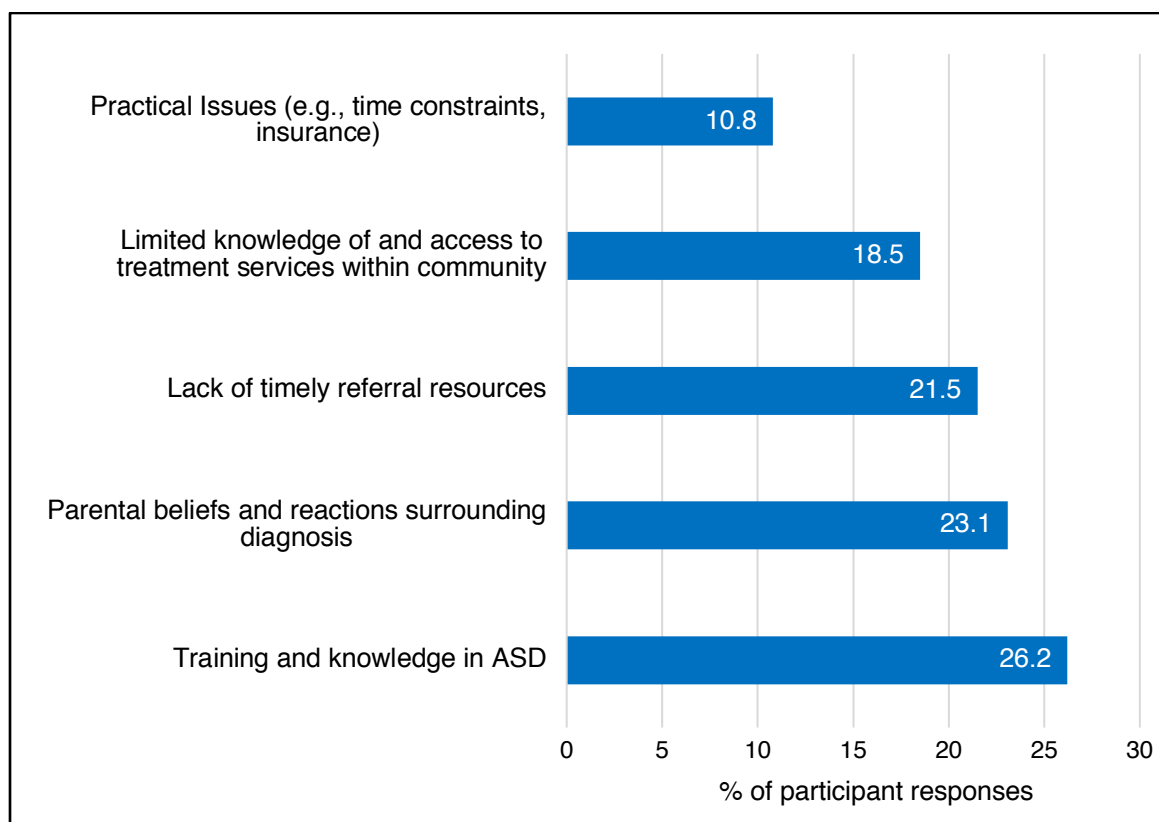


Figure 3. Physician Reported Challenges in Assessing and Diagnosing ASD

All participants provided a response (“yes” or “no”) as to whether they encounter any additional challenges in regard to assessing and diagnosing ASD when the child and family is Hispanic/Latino. A total of 33 participants (53.2%) responded yes and were prompted to explain these challenges. In analyzing their responses, the author identified various themes which were organized into three categories: *language barriers* (e.g., language differences between provider and patients/families, limited availability of interpreter services), *cultural and familial factors* (e.g., cultural differences between provider and patients/families, family expectations and beliefs about normal development, stigma of diagnosis), and *limited resources for families* (e.g., access to evaluation and treatment services). Within analyzing total responses for this question, 46.3% were related to *cultural and familial factors*, 36.5% were related to *language*

barriers, and 17% were related to *limited resources for families*. Responses are presented in Figure 4.

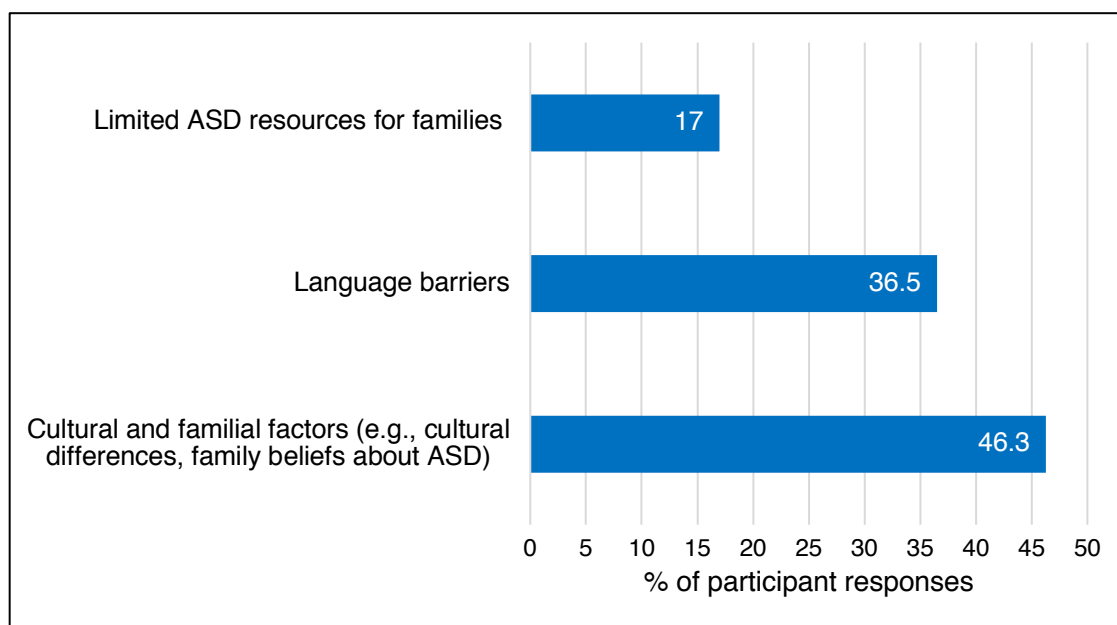


Figure 4. Physician Reported Challenges in Assessing and Diagnosing ASD when Child is Latino

A total of 51 participants (82%) provided a response to the final open-ended question (i.e., resources related to ASD that would be useful in their current practice). In analyzing these responses, the author identified various themes describing which were organized into four categories: *Resources for families* (e.g., psychoeducation on ASD, special education information, community providers), *continued training in ASD* (e.g., training in ASD diagnostic tools, behavior management, treatment options), and *access to resources within practice* (e.g., access to diagnostic tools, access to specialists). In analyzing total responses for this question, 44.5% were related to *resources for families*, 29.8% were related to *continued training in ASD*, and 25.5% were related to *access to resources within practice*. Responses are presented in Figure 5.

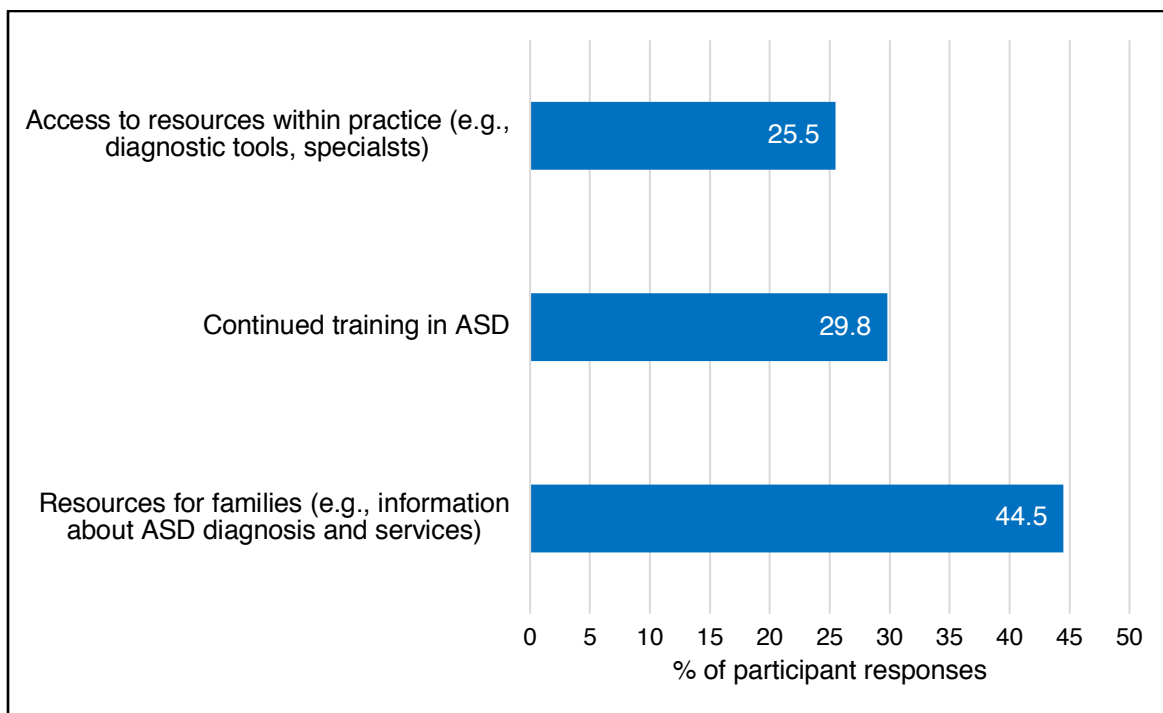


Figure 5. Physician Reported Resources Related to ASD

Chapter V

Discussion

Reducing racial and ethnic disparities in developmental, behavioral, and mental health care is a national priority and more research is needed to identify determinants of these disparities. The current study addresses this need by exploring differences in physicians' recognition of early ASD symptoms and subsequent diagnostic decisions and treatment recommendations in Latino children compared to non-Latino White children. This is an important area of research, as Latino children are less likely to be diagnosed with ASD than non-Latino White children, and they experience the greatest delays in receiving an ASD diagnosis compared to other ethnic groups. Much of the research regarding ASD diagnostic disparities has focused on individual and family factors (e.g., access to healthcare, language barriers, cultural differences, parent beliefs and perceptions), rather than factors at the provider-level (e.g., knowledge, experience, and confidence). The current study adds to the literature by offering initial information about provider factors—including physicians' decision-making regarding diagnostic considerations and treatment recommendations, as well as physicians' experiences and confidence in serving children with ASD—that could influence diagnostic disparities of ASD in Latino children, as well as improve early identification and diagnosis of ASD for *all* children. Given that this is an understudied area, the current study provides a foundation for future work aimed at further understanding diagnostic disparities.

The current study also offers initial information about physicians' differential diagnostic considerations and treatment recommendations when presented with a young child who has ASD symptoms. Moreover, current results yielded information regarding

physician self-reported confidence in various domains of patient care for children with ASD and may offer a promising way to measure physician confidence in serving children with ASD, as no such measure was previously available. The current study also offers unique information about physician perceived challenges in assessing and diagnosing ASD within practice. Overall, these findings represent opportunities for cross-disciplinary collaborations and consultative partnerships between physicians and ASD specialists, such as school psychologists, which could improve early identification of ASD for all children and, ultimately, may reduce diagnostic disparities in Latino children.

Diagnostic Considerations and Subsequent Decision-Making

Child ethnicity and ASD diagnostic consideration. Overall, consideration of an ASD diagnosis did not differ based on child ethnicity. Literature consistently supports a lower diagnostic prevalence of ASD and a greater delay in diagnosis among Latino children than for non-Latino White children (Baio et al., 2018; Mandell et al., 2002; Zuckerman et al., 2017). Given these well-documented ethnic disparities, the author expected participating physicians to be less likely to consider ASD as one of their differential diagnoses and less likely to consider ASD as their priority (i.e., first) diagnosis when the child in the vignette was Latino than when the child was non-Latino White. However, findings in the current study were quite different. The overwhelming majority of physicians (95.4%), regardless of which vignette they had received (i.e., non-Latino White child or Latino child), indicated they would consider ASD as a differential diagnosis based on the child's symptoms. Further, ranking ASD as their first diagnostic consideration did not significantly differ based on the child's ethnicity, and over half of

physicians (76.2%) within both groups ranked ASD as their first diagnostic consideration.

Almost all of the research on ethnic disparities in children with ASD have investigated factors at the family level as possible reasons for diagnostic disparities among Latino children and/or has relied on provider self-reported practices and opinions. However, studies that have tested for racial or ethnic differences related to provider diagnostic decision-making regarding behavioral health concerns (i.e., disruptive behaviors, ADHD) through the use of a clinical vignette have also demonstrated somewhat unexpected findings. For example, in a vignette study examining the influence of ethnicity on physician diagnostic decision-making for childhood disruptive behavior problems, the authors found no significant differences in diagnosis based on ethnicity when controlling for other factors (Garland, et al., 2015). Additionally, most of the literature examining factors related to ethnic disparities in ASD diagnosis has examined prevalence of *actual* ASD diagnoses given by a health care provider, as opposed to provider *consideration* of the diagnosis. Based on the current and other vignette studies, it cannot be concluded that consideration of a diagnosis is representative of a provider actually making a diagnosis in real practice. In fact, only 29.7% of physicians in the current study indicated they would make a diagnosis for the child based on the child's symptoms and physicians reported feeling the least confident in making a DSM/ICD diagnosis of ASD for their patients compared to other responsibilities related to ASD (e.g., identifying early signs of ASD, conducting appropriate screenings). This may suggest that while physicians may *recognize* early symptoms of ASD and *consider* ASD as a possible diagnosis among other differential diagnoses, they may be less likely

to make a diagnosis and discuss it with families, particularly Latino families, potentially contributing to diagnostic delays. Therefore, retrospective studies that examine ethnic differences in physician rates of diagnosing ASD in their patients may be more likely to find results that coincide with the literature supporting diagnostic disparities in Latino children.

Overall, the aforementioned findings could be interpreted as promising evidence that physician decision-making regarding recognition of early ASD symptoms and subsequent diagnostic considerations do not differ by the child's ethnic background (i.e., Latino or non-Latino White). On the other hand, findings may have been impacted by the characteristics of the physicians represented in the current study, hence decreasing generalizability of these findings. Specifically, the majority of physicians were early in their training, with over half of physicians being residents, increasing the possibility that they may have received recent training related to ASD. Additionally, the majority of participating physicians practiced within an urban setting and may have had more experiences with diverse patient populations. Therefore, findings based on this specific sample of physicians may not be representative of physician decision-making in a larger, more diverse sample of physicians.

Indeed, other factors, such as lack of insurance coverage, limited means of transportation, higher levels of stress, and lack of childcare, have been found to undermine regularity in regular pediatric visits, consequentially impacting the physician's ability to identify early signs of ASD (Magaña et al., 2013; Mandell et al., 2002; Zuckerman et al., 2013). In other words, even if physicians are identifying Latino children with ASD at an early age, the decreased utilization of well-child check-ups

among Latino families may impact the age at which physicians identify and diagnose ASD. Given the well-documented ethnic disparities in ASD identification and diagnosis, more research is needed to identify factors at both the family and provider level that may be driving these disparities.

Role of physician characteristics. Overall, physician demographic characteristics did not affect the relationship between child ethnicity and ASD diagnostic consideration, but physician self-reported confidence in serving children with ASD did. It was expected that the relation between physicians' priority of ASD diagnosis (i.e., ranking ASD as a first differential diagnostic consideration) and child ethnicity would vary by specific physician demographic characteristics, including physician ethnicity, Spanish-language proficiency, and ethnicity of patient population. Research has found that physicians are less likely to have difficulty identifying ASD in Latino children if they are of Latino ethnicity, had Spanish proficiency, and saw more than 25 percent of Latino patients within their practice (Zuckerman et al., 2013). However, none of these characteristics were found to influence the effects that child ethnicity had on ranking ASD as a first diagnostic consideration in the current study. There are many possibilities to explain these findings. First, there was a significant lack of diversity within physician demographic characteristics, most notably with physician ethnicity and language proficiency. Specifically, only 8.1% of physicians identified as Hispanic or Latino ethnicity and only 19.4% reported speaking Spanish. Secondly, the sample size of the current study was small, and a majority of physicians identified ASD as a diagnostic consideration. A larger, more diverse sample, with greater variability in diagnostic considerations (i.e., having fewer physicians identify ASD as a differential diagnosis),

may be needed to further explore the effects physician characteristics have on identification of ASD diagnoses in Latino children.

Interestingly, results from the current study indicated that physician confidence in serving children with ASD *did* moderate the relationship between child ethnicity and priority of ASD as a differential diagnosis for participants who read the Latino vignette. Specifically, physicians who reported higher confidence in serving children with ASD were more likely to consider ASD as a first diagnostic consideration when the child in the vignette was Latino while this was not the case for physicians who read the vignette for the non-Latino White child. Previous studies have indicated that physicians report lacking confidence in diagnosing, treating, and caring for children with ASD compared to children with other neurodevelopmental conditions and chronic medical conditions (Davis et al., 2012 Golnik et al., 2009) and report even less confidence when the child is Latino (Zuckerman et al., 2013). However, no studies to date have examined how physician confidence related to ASD influences *actual* rates of identifying and diagnosing ASD among Latino children within practice. Findings from the current study may be viewed as initial information regarding the impact physician confidence in serving children with ASD has on diagnostic consideration of ASD in Latino children. However, more research is needed to further understand this relationship. Nevertheless, these findings represent potential points of provider-focused intervention (i.e., training, education) aimed at increasing physician confidence related to ASD, which may reduce the well-documented delays in ASD diagnosis among Latino children.

Differential diagnostic considerations. Though child ethnicity did not influence physician identification and consideration of an ASD diagnosis in this study, findings

offer potentially important insight regarding physicians' differential diagnostic considerations when presented with a young child who has ASD symptoms. In examining the range of responses to differential diagnostic considerations in addition to ASD, the most frequently reported differential diagnoses generally fell within predicted patterns for the symptoms presented within the clinical vignette. For example, 75.4% of physicians identified ADHD as a differential diagnosis, the second most frequent diagnosis (with ASD being the most frequent). This is consistent with concerns included in the vignette that are typically associated with ADHD (e.g., hyperactivity, impulsivity). Additionally, it was not surprising that physicians also considered hearing loss or impairment (46.2%) as a differential diagnosis, given that pediatricians typically rule-out hearing concerns during wellness check-ups, especially when parents report concerns of their child not responding to their voice. Some physicians (23.1%) also considered a cognitive delay (including GDD and/or ID) among their differential diagnoses, which aligns with some symptoms in the vignette that describe the child's overall delays (e.g., speech and communication delays). Further, children with cognitive impairment are more likely to display symptoms associated in ASD than children with average cognitive abilities, indicating a potential difficulty in differentiating between cognitive and/or developmental delay and ASD (Brereton, Tonge, Mackinnon, & Einfeld, 2002).

It was surprising that more physicians did not consider a disruptive behavior disorder (29.2%) given the concerns related to externalizing behaviors in the vignette (e.g., tantrums, aggression); however, many of these symptoms overlap with diagnostic criteria of other diagnoses that were frequently identified (e.g., ASD, ADHD). Interestingly, some physicians (23.1%) included responses that were related to family

factors, rather than a specific diagnosis or symptom. These responses included factors such as parenting style (e.g., discipline), family and/or parent stress, relationship between parent and child (e.g., poor parent child interaction) and neglect and/or abuse. These findings suggest that physicians may have considered factors related to the whole family rather than child pathology alone, representing a shift from the traditional medical model towards a more ecological or systems perspective framework. This may represent a positive change in thinking given that a child's environment (e.g., family factors) has a direct influence on his or her cognitive, behavioral, and emotional functioning (Bronfenbrenner & Morris, 2006).

Regarding differences in differential diagnostic considerations based on child ethnicity, no significant differences were found based on child ethnicity for the majority of the differential diagnoses. However, there were significant differences in the percentage of physicians who reported family-related factors as a differential diagnosis among physicians who received the non-Latino White vignette and physicians who received the Latino vignette. Specifically, physicians were more likely to attribute the child's symptoms to family-related factors (e.g., parenting style, family and/or parent stress, poor parent child interaction, neglect) if the child was Latino (33.3%) than if the child was non-Latino White (8.6%). These findings suggest that physicians may attribute early symptoms of ASD to family-related factors among their Latino patients, and, if this is the case, it is possible that these attributions may affect the way physicians elicit or respond to Latino parents' concerns about their child's development and behavior (e.g., recommending more discipline strategies rather than further evaluating for ASD), which may ultimately perpetuate ethnic disparities in delayed ASD diagnoses.

Overall, physicians' consideration of multiple differential diagnoses suggest that pediatric-focused physicians recognize co-occurring behavioral health symptoms and consider comorbid disorders when presented with a child with ASD symptoms. However, the current study does not provide information on how physicians make diagnostic decisions based on these differential diagnoses, and it is unclear the extent to which they are knowledgeable about or confident in differentiating ASD symptoms from other overlapping and/or co-occurring symptoms. Such complications in disentangling symptoms may result in under diagnosis or misdiagnosis of ASD.

Physician reported responses to ASD symptoms. Given the well-established documented ethnic disparities in age of diagnosis for ASD, the author expected physicians would be more likely to take a “proactive” response (i.e., conduct a developmental screener, consult with a colleague or specialist, refer to a specialist, make a diagnosis) if the child was non-Latino White than if the child was Latino. Similarly, it was expected that physicians would be more likely to make a “reassuring or passive” response (i.e., reassure parent that behaviors are ‘normal’, wait until the child is older to assess concerns) if the child was Latino than if the child was non-Latino White. However, there were no significant differences in the course of action physicians would take in response to parental concerns based on child ethnicity.

Although no published study has evaluated differences in physician responses to parental concerns of ASD, based on child ethnicity, the overall findings of physicians' reported responses was somewhat surprising based on current literature examining these patterns. Specifically, studies of large nationally representative samples of children with ASD found that diagnosis was delayed nearly three years after parents first expressed

concerns to their physician, and such delays were greater when the child's physician had an initial reassuring or passive response than when a physician had an initial proactive response (Zuckerman et al., 2015). However, in the current study, very few physicians indicated they would reassure the parent that the child's behaviors are normal or wait until the child is older to address concerns. A lack of physicians reporting a passive approach may have been related to the child's age in the vignette. Specifically, physicians may have been more likely to report a passive approach (e.g., "wait and see") had the child in the vignette been younger than 4 years of age. These findings indicate that this specific sample of physicians' reports about their responses to parent concerns *differs* from what has been found in other studies related to physicians' actual responses to parental concerns of ASD. However, questions within the survey were likely subject to some response bias (i.e., social desirability), consequentially limiting conclusions that can be drawn about physician responses to parent concerns. Nevertheless, these findings suggest a potential disconnect between what physicians report they *would* do when presented with a child who displays symptoms of ASD versus what they *actually* do in practice, suggesting a need for further research in this area.

Interestingly, less than one-third of physicians indicated they would make a diagnosis for the child and discuss the diagnosis with the child's family. Physicians who indicated they would make a diagnosis reported higher confidence in serving children with ASD (as determined by ASD Confidence Scale) and a higher percentage of patients with developmental concerns than physicians who indicated they would not make a diagnosis for the child. While these findings are not unexpected, they provide initial information about potential differences among physicians who may make a diagnosis of

ASD within their practice versus physicians who do not. It is likely that physicians who have a higher percentage of patients with developmental concerns also have more experience making diagnoses such as speech and language delays, global developmental delay, and ASD. However, it is important to note that the author cannot assume that physicians who indicated they would make a diagnosis for the child would have made a diagnosis of ASD, given that physicians identified many other differential diagnostic considerations in addition to ASD. Additionally, best practice supports that a diagnosis of ASD should be made based on a variety of data sources, such as standardized instruments, parent report, and behavioral observations. It is possible that the majority of physicians indicated they would not make a diagnosis for this child given that they had not conducted comprehensive diagnostic procedures with the child.

Treatment Recommendations

Current results did not reveal significant differences in physicians' *reported* treatment recommendations based on child ethnicity. While research is limited in this area, studies show that Latino children are less likely to ever receive early intervention services compared with non-Latino White children (Magaña et al., 2013); therefore, it was expected that physicians would be more likely to report a recommendation of psychosocial intervention if the child was non-Latino White than if the child was Latino. Most of the research that has examined ethnic disparities in mental health services has examined actual service use, as opposed to provider-reported *recommendations* for services, like in the present study. Previous studies have attributed disparities in service use to factors including socioeconomic status, access to resources, and family beliefs and attitudes regarding treatment services (Magaña et al., 2013). Additional parents'

treatment choices are often influenced by their beliefs and perceptions about their child's ASD diagnosis (Herbert & Koulouglioti, 2010; Mire et al., 2018), which may play also play a role in treatment use disparities. Interestingly, one study found that Latino parents reported having less knowledge about available treatment services for ASD and felt as though there was a lack of services available to them (Zuckerman et al., 2014). Therefore, it is possible that even if physicians recommend psychosocial intervention to families, Latino families may experience more barriers accessing these services.

The current study also offers initial information regarding physicians' treatment recommendations. Overall, physicians reported treatment recommendations were generally consistent with best practice recommendations for young children presenting with behavioral concerns. Specifically, the majority of physicians recommended psychosocial intervention for the child. The most commonly recommended types of psychosocial treatment were parent management training, school-based intervention, and individual child therapy. Each of these treatment modalities demonstrate efficacy for children with symptoms illustrated in the vignette (Itzhak & Ditz, 2011; Moes & Frea, 2002; Weiglauf et al., 2014).

No physicians within the current sample recommended pharmacologic medication and very few recommended CAM treatment, which also largely aligns with best practice recommendations for young children presenting with behavioral and developmental concerns. Nevertheless, research indicates that approximately half of children with ASD are taking medication (Witwer & Lecavalier, 2005) and/or are using CAM as a part of treatment (Hoffer et al., 2016). These findings suggest that physician reported treatment recommendations in this study may not be representative of actual practice. It is

important to consider that by participating in the current study, these physicians expressed an interest in research. Therefore, it is possible that the current sample of physicians may be familiar with evidence-based treatment recommendations supported through the research compared to physicians who did not express an interest in participating in this research study. Similarly, physicians who did not participate in this study (e.g., physicians who did not express interest in this study or who did not complete the survey following presentation of the vignette) may be less patient and quick to prescribe medication versus the current sample. On the other hand, it may be likely that even if physicians do not recommend pharmacologic medication for children, families may be accessing medication from specialty providers, such as psychiatrists. Similarly, families may be seeking out CAM treatments based on recommendations from other sources, such as other families of children with ASD and/or the internet, rather than from their pediatrician. Therefore, it is important that physicians are aware of treatment approaches commonly utilized by families in order to discuss potential risks and encourage the use of effective and evidence-based interventions.

Physician Confidence in Serving Children with ASD

Importantly, the measure of confidence used in this study, the ASD Confidence Scale, was psychometrically assessed and offers a promising way to measure physician confidence in serving children with ASD (as represented by the construct ASD Confidence), and no such measure was previously available. Findings from this study also offer initial information regarding ASD Confidence among physicians. Specifically, physicians who specialized in neurodevelopment (e.g., developmental pediatricians) reported higher ASD Confidence than physicians of other specialties (i.e., general

pediatrics, family medicine, other pediatric specialty). Additionally, having more years in practice and a higher percentage of patient population with developmental concerns were associated with higher ASD Confidence. While these findings make sense intuitively in that physicians report higher ASD Confidence when they have more practice experience overall and/or have more experience and training in children with developmental delays, these findings contribute to the research by confirming what is intuitively assumed within clinical practice. Further psychometric testing with a larger and more diverse sample across multiple studies will help to further explore this tool as a way to assess physician confidence in serving children with ASD.

Findings from the current study also offer initial information regarding physician self-reported confidence in various domains of patient care for children with ASD (i.e., items within the ASD Confidence Scale), which has not previously been examined in the research. Physicians within the current sample reported most confidence identifying the early warning signs of ASD within their patients, building adequate rapport with patients with ASD, and conducting appropriate screenings to assess patient's developmental level. They reported less confidence discussing early intervention and appropriate treatment options for ASD, including educational/school eligibility and services for ASD. Given the importance of early intervention for children with ASD, and because pediatric physicians are often a family's first point of contact when they have concerns about their child, it is important that physicians feel confident discussing evidence-based treatment options. Because families of a child with ASD very often utilize services delivered in the school setting (Thomas, Morrissey, & McLaurin, 2007; Mire et al., 2018), it is important that physicians also feel confident discussing school related services with families. This

includes having familiarity about legal guidelines and the processes for requesting early childhood or preschool services within the school district (e.g., Preschool Program for Children with Disabilities), as well as the process for requesting a Full and Individual Evaluation (FIE) and attaining an Individualized Education Program (IEP). Collectively, these findings indicate potential training and/or dissemination gap that must be addressed by professionals researching and practicing with ASD populations, such as school psychologists, in order to decrease the burden many families experience in obtaining a diagnosis of ASD and subsequent treatment services for their child.

Within the ASD Confidence Scale, physicians in the current sample reported the *least* confidence in making a DSM/ICD diagnosis of ASD for their patients, despite feeling most confident in identifying early symptoms of ASD. This is consistent with findings from the literature that indicate physicians report a lack in confidence and comfort level in diagnosing children with symptoms of ASD (Davis et al., 2012; Golnik, et al., 2009; Major et al., 2013) and feel significantly less comfortable diagnosing ASD compared to other behavioral health disorders, such as ADHD, depression, sleep problems, and disruptive behaviors (Davis et al., 2012). Given extensive wait-lists for such evaluations from ASD specialists (i.e., developmental pediatricians, psychologists), physicians who have regular and early contact with children play a central role in decreasing diagnostic delays if they identify and diagnose ASD during routine wellness checkups. While more research is needed to understand how physician self-reported confidence in diagnosing ASD translates to actual diagnostic trends in practice, it is possible that having a higher confidence in diagnosing ASD is associated with a higher likelihood of diagnosing patients with ASD in actual practice. If this is the case, these

findings represent potential points of provider-focused intervention aimed at increasing physician diagnostic confidence, which could reduce the well-documented delays in ASD diagnosis.

Physician Reported Challenges in Practice

The majority of physicians within the current study indicated experiencing at least one or more challenges related to assessing and diagnosing ASD within their own practice. These challenges included limited training and knowledge in ASD, parental beliefs and reactions surrounding ASD (e.g., resistance to accept diagnosis), lack of timely referral resources (e.g., psychologists, developmental pediatricians), limited knowledge of and access to treatment services within the community, and practical issues (e.g., time constraints, insurance). These challenges are generally consistent with findings from other studies that have examined barriers of ASD identification within physician type settings (e.g., primary care settings). For example, many studies have indicated that physicians experience barriers related to practical issues such as time for wellness checkups, with one study finding that one-third of parents reported spending less than 10 minutes with their pediatrician during a visit (Carbone, 2013; Halfon et al., 2011). Additionally, studies have found that physicians reported lacking appropriate and timely referral resources for subspecialists with expertise in ASD (e.g., developmental behavioral pediatricians, child psychologists) (Carbone, 2013; Zuckerman et al., 2013), and reported difficulties facilitating connections between families and ASD community-based services (Carbone, 2013). Moreover, multiple studies have indicated that physicians report lacking adequate training and skills in early identification of ASD and feel underprepared to care for children with ASD (Carbone, 2013; Major et al., 2013).

Over half of physician within the current study indicated they encounter additional challenges in regard to assessing and diagnosing ASD when the child and family is Latino. These challenges included cultural and familial factors (e.g., cultural differences, family beliefs and perceptions of diagnosis), language barriers, and limited resources for these families (e.g., access to evaluation and treatment services). These findings are also generally consistent with previous studies that have examined physician reported barriers to ASD care for Latinos. For example, research has found that physicians frequently report barriers including limited access to ASD or developmental specialists, language differences between providers and patients/families, cultural differences between providers and patients/families, parent beliefs about normal child development and their understanding of the early ASD diagnosis and treatment, and limited availability of interpreter services (Zuckerman et al., 2013).

Importantly, the majority of physicians within the current study also expressed interest in resources related to ASD that would be useful in their current practice. Physician reported resources included resources to provide to families (e.g., psychoeducation on ASD, community providers, special education information), continued training in ASD, and access to specialty resources within practice (e.g. diagnostic tools, consultation with developmental specialists). These findings are consistent with studies that have indicated that physicians report an interest in learning more about ASD (Major et al., 2013). Overall, these findings may inform future interventions at the provider-level aimed at increasing training and education in ASD, including symptom identification, diagnostic criteria, differential diagnoses, treatment options, as well as training in diagnostic tools that physicians can use within their own

practice. Additionally, these findings suggest that physicians may be in need of resources that they can disseminate to families regarding information about ASD, community providers, special education, with information available in both English and Spanish.

However, many of these resources already exist and are accessible to physicians, particularly for physicians represented in the current study given their characteristics (e.g., young in training, practicing within urban hospital, interest in research). More research is needed to determine if physicians are actually utilizing the resources available to them (e.g., attending webinars or trainings about ASD, disseminating resources to families) in order to further develop resources that are feasible and accessible to pediatric physicians. Moreover, research is needed to examine whether an increase in using these resources actually decreases diagnostic delays in ASD.

Limitations and Future Directions

Although this study contributes to the relatively limited literature on physician decision-making regarding recognition of early ASD symptoms and subsequent diagnostic considerations and treatment recommendations, particularly for young Latino children, several limitations must be considered. One major limitation of the study is a small sample size. Although 115 individuals followed the survey link, suggesting potential interest to participate in the study following recruitment, data regarding how many individuals were presented with the opportunity to participate in the study were not tracked due to snowball recruitment methods. Based on various recruitment methods used in the current study (e.g., email recruitment, social media, in-person recruitment), it is likely that more than 115 individuals were reached for this study. This is often a challenge in research lacking funding for respondent incentives or compensation.

Additionally, research indicates physicians are a particularly difficult group to recruit and survey response rates among physicians tend to be lower than the general public (Flanigan et al., 2008). Because over half of physicians within the study were pediatric residents, this provides support that residents, or physicians early on in their practice, may be more likely to participate in research opportunities, especially if those opportunities are offered to them by a superior (e.g., chief resident, physician in chief). Unfortunately, data were not collected to determine how physicians in the study were recruited (e.g., in person, email for organization or lead physician, colleague of the author, social media). Future studies involving physician recruitment should provide a question in the beginning of the survey allowing physicians to indicate how they were recruited to better understand effective ways to recruit physicians, consequentially indicating response rates among this population.

Second, the current sample is homogeneous in terms of physician characteristics. This was likely due to snowball sampling methods which was prone to bias (e.g., self-selection). The vast majority of physicians were female and identified as White. A minority of physicians identified as Hispanic or Latino ethnicity. Regarding professional characteristics, a majority of physicians practiced in a hospital, practiced within an urban setting, and reported having a patient population greater than 50% minority patients. These specific characteristics may impact physician experience and competency in working with a diverse patient population, compared to physicians who work in a community-based practice in a rural setting. Therefore, recruiting physicians from more diverse backgrounds may provide better generalizability of the findings and allow researchers to further consider the role that provider characteristics (e.g., ethnicity of

provider, languages spoken, practice setting and population) have on early identification of ASD, specifically within Latino patients. Additionally, the majority of physicians were residents and practiced in Houston. At the time of data collection for this study, a research project aimed at increasing physician knowledge regarding ASD was being conducted with physicians and residents. While it is unclear whether physicians involved in the current study also participated in that study, it is possible that there was some overlap. Therefore, it is possible that some physicians within the current sample may have received psychoeducation regarding early identification and assessment of ASD. If this is the case, these physicians' responses may be skewed to demonstrate a higher knowledge and confidence in serving children with ASD, which may also have impacted findings in the current study.

Additionally, the current study included *any* physicians who saw children for well-child or other routine visits, regardless of specific specialty. Primary care physicians and pediatricians are more likely to identify early concerns of ASD at well-child visits as opposed to general physicians (i.e., physicians who see both adults and children) and pediatric sub-specialties (e.g., developmental pediatrics, psychiatrists), who only see specific populations. Therefore, future studies investigating these same research questions should narrow the inclusion criteria to include primary care physicians and pediatricians to make findings more generalizable to practice.

One of the limitations of any vignette study is external validity or possibility that responses may not generalize to actual physician practice or be sufficiently representative of the "real-world" (Evans et al., 2015). While several steps were taken to mitigate this limitation (e.g., considering recommendations in the literature regarding development and

implementation of a vignette study), physicians' reported decisions regarding diagnostic considerations and treatment recommendations in response to the vignette may differ from their actual behavior in practice. Additionally, it is possible that symptoms within the clinical vignette were overly suggestive of an ASD diagnosis, even though multiple and systematic steps were taken to create a vignette that accurately portrayed a 4 year-old child with ASD. Of strength, the use of a vignette in the current study likely reduced response biases (i.e., social desirability) related to direct questions about views or practices that may be related to racial or ethnic diagnostic disparities. Future studies may wish to consider using a vignette with a more subtle diagnostic picture in order to increase variability in physician responses regarding consideration of ASD diagnosis. Studies should also consider investigating these same research questions with a younger child presented in the vignette, as it is well established in the research that an accurate and stable diagnosis of ASD can be made by 2 years for most children (Baird et al., 2008; Crais & Watson, 2014). Given that most children are not diagnosed at this age, physicians may be less likely to consider an ASD diagnosis when the child in the vignette is 2 years old and may report more variability in their diagnostic decision-making (e.g., may be more likely to take a "wait and see approach" given child's young age).

Another limitation that also exists within the current study is the large number of statistical tests that were performed due to many research questions, as well as additional exploratory analyses. Given this limitation, it is likely that some *p* values were significant purely by chance, representing Type 1 error (i.e., "false positive") within the results of the study. Therefore, significant results within the current study should be interpreted with caution and future studies investigating these same research questions should reduce

the number of statistical tests and/or correct for multiple testing in order to minimize the possibility for alpha-errors and false discovery rates.

As noted previously, the current study did not consider additional factors found in the literature (e.g., SES, language, cultural and family factors) that may affect disparities in ASD diagnoses and treatment services among Latino children. Although the overarching goal of the current study was to examine the isolated effect of child ethnicity on physician decision-making, it is possible that provider factors contributing to diagnostic disparities (e.g., confidence, response to parental concerns, diagnostic considerations and treatment recommendations) are exacerbated when a child presents with multiple risk-factors (e.g., being Latino *and* speaking Spanish; being Latino *and* living in poverty). Therefore, future research investigating potential provider factors contributing to diagnostic disparities may wish to consider other risk-factors, in addition to ethnicity, by manipulating (i.e., systematically vary) these factors directly in the vignette in order to further understand physician decision-making with these children.

Although the current study offers a promising way to measure physician confidence in serving children with ASD (i.e., ASD Confidence Scale), future studies should further investigate the development and utility of this measure in actual practice. Additionally, more research is needed to understand how physician confidence in serving children with ASD impacts physician *competence* and practice implications, such as early identification and diagnosis of ASD. Such findings would have important psychoeducational and practice implications regarding training aimed at improving physician confidence in serving children with ASD. Future studies should also investigate effective methods, such as educational programs, to increase physician confidence in

serving children with ASD. Future work in this area may wish to assess physician confidence pre- and post- intervention using the ASD Confidence Scale in order to assess the effectiveness of the intervention in increasing physician confidence in serving children with ASD. Additionally, future studies should consider expanding the use of this measure to assess physician confidence in other domains of behavioral health disorders (e.g., disruptive behavior disorders, attention-deficit/hyperactivity disorder) that pediatricians often encounter in practice.

Implications for Practice

In previous sections, findings of the study were reviewed and information about practice implications were offered based on each finding. Overall, findings from the current study may inform future intervention efforts at the provider level, that could ultimately improve early identification of ASD for all children and reduce diagnostic disparities in Latino children. Fortunately, many physicians within this study expressed interest in continued training in ASD, suggesting that many physicians may welcome training and educational opportunities aimed at increasing their skills related to serving children with ASD. Pediatric physicians will likely benefit from cross-disciplinary collaborations and consultative partnerships with ASD specialists in order to enhance their capacity to appropriately identify, diagnose, refer, and intervene with ASD. Moreover, children with ASD typically present with many needs that require cross disciplinary care and cross disciplinary work increases the likelihood that these children receive appropriate services.

School psychologists are uniquely qualified to develop consultative relationships and provide training and educational opportunities to pediatric physicians aimed at

increasing their skills in ASD diagnostic and treatment decision-making, potentially reducing the well-documented delays in ASD diagnosis among Latino children and increasing the use of evidence-based treatments in young children with ASD.

Furthermore, school psychologists are well-positioned to initiate, develop and maintain relationships with physicians due to their training and expertise in child development, developmental disabilities, methods of consultation, experience with multidisciplinary teams, and implementation of evidence-based practices. Additionally, school psychologists are ideal professionals to provide training opportunities regarding educational/school eligibility services for ASD, including the process for requesting early childhood or preschool services within the school district (e.g., PPCD), as well as the process for requesting an FIE and attaining an IEP—services that physicians within the current study reported feeling less confident in than other services related to serving children with ASD (e.g., identifying the early warning signs of ASD, conducting appropriate screenings).

It should be noted that many professionals working with children, including psychologists, feel underprepared to serve children with ASD due to lack of specialized training in identifying ASD symptoms and delivering evidence-based interventions (Heidgerken et al., 2005). While this study focused on pediatric physicians in particular, it is important that all professionals working with children in health care or school settings are aware of early symptoms of ASD, since families often seek out multiple professionals (e.g., physicians, psychologists, psychiatrists, school personnel) to express concerns regarding their child's development. Practice implications from this study

regarding opportunities for consultation, education, and training related to ASD will most likely benefit all professionals working with children in health care or school settings.

Summary and Conclusions

Findings from the current study contribute to an understudied area of the literature by offering information about physician decision-making regarding recognition of early ASD symptoms and subsequent diagnostic considerations and treatment recommendations, particularly for young Latino children. Notably, this is the first study to examine the influence of ethnicity on physician decision-making regarding ASD diagnosis involving Latino children versus non-Latino White children. Within the current study, consideration of an ASD diagnosis, including ranking ASD as a first differential diagnostic consideration, and subsequent diagnostic decision making (i.e., next steps) did not differ based on the child's ethnicity. However, physician self-reported confidence in serving children with ASD influenced the relationship between child ethnicity and priority of ASD as a differential diagnosis, suggesting that physician confidence related to ASD plays an important role in ASD diagnostic decision-making when child ethnicity is a consideration. The current findings represent the importance of efforts aimed at increasing physician confidence related to serving children with ASD, which may ultimately reduce the well-documented delays in ASD diagnosis among Latino children.

The current study also offers initial information about physicians' differential diagnostic considerations and treatment recommendations, which were not previously available in the research. Findings from the current study suggest that physicians consider many differential diagnoses for young children that present with behavioral and developmental concerns. Physicians in this study were more likely to report making a

proactive response to parental concerns rather than a passive response and were significantly more likely to recommend psychosocial intervention over pharmacologic medication and CAM treatment. Overall these findings are somewhat inconsistent with previous literature evaluating physician practices, suggesting that physician *reported* responses and treatment recommendations in this study may not be representative of actual practice.

Moreover, the current study yields important information regarding physician self-reported confidence in various domains of patient care for children with ASD and offers a promising way to measure physician confidence in serving children with ASD (i.e. ASD Confidence Scale) that can be used as an educational or developmental tool to evaluate efforts to increase physician confidence in serving children with ASD. Initial findings using this measure suggest that physicians feel most confident identifying the early warning signs of ASD in their patients and feel least confident in making a diagnosis of ASD. These findings are somewhat consistent with the literature and represent potential points of provider focused intervention aimed at increasing physician confidence in serving children with ASD.

Lastly, the current study offers unique information about physician perceived challenges related to identifying and diagnosing ASD in their own practice, including additional challenges they experience when the child and family is Latino. Importantly, physicians within this study also reported a need for resources related to ASD and expressed an interest in continued training in ASD, suggesting that many physicians may welcome intervention opportunities aimed at increasing their skillset in serving children with ASD.

Limitations related to the sample size, physician characteristics, and vignette design are likely to have influenced the current findings and must be considered during interpretation of all results. However, findings have important implications for future studies, as well as important implications for practice. Cross-disciplinary collaborations and consultative partnerships between ASD specialists, such as school psychologists, and physicians may increase the likelihood that children receive an accurate and early diagnosis of ASD, as well as appropriate treatment services.

Researchers and practitioners within the field of psychology, including school psychologists, have an ethical obligation to reduce racial and ethnic disparities in developmental, behavioral, and mental health care. Given the well-documented disparities in diagnosis of ASD for Latino children and the growing population of Latino families in the United States, research aimed at understanding these disparities is critical. The current study offers meaningful contributions to this understudied area of research with the hope that the findings will contribute to future research studies aimed at further understanding these disparities, as well as future intervention efforts to reduce diagnostic disparities and improve care for all children with ASD and their families.

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Appendix A

IRB Approval of Submission



DIVISION OF RESEARCH

Institutional Review Boards

APPROVAL OF SUBMISSION

April 17, 2018
 Madeline Racine
 mdracine@uh.edu

Dear Madeline Racine:
 On April 17, 2018, the IRB reviewed the following submission:

Type of Review:	Modification and Continuing Review
Title of Study:	Understanding Physician Decision Making in Primary Care Settings
Investigator:	Madeline Racine
IRB ID:	MODCR00000308
Funding/ Proposed Funding:	Name: Unfunded
Award ID:	None
Award Title:	
IND, IDE, or HDE:	None
Documents Reviewed:	<ul style="list-style-type: none"> • Informed Consent, Category: Consent Form; • Recruitment Introduction Email.pdf, Category: Recruitment Materials; • Recruitment Email.pdf, Category: Recruitment Materials; • IRB Protocol Revised 4_17_18.pdf, Category: IRB Protocol; • Eligibility Questions, Category: Study tools (ex: surveys, interview/focus group questions, data collection forms, etc.);
Review Category:	Exempt
Committee Name:	Not Applicable
IRB Coordinator:	Sandra Arntz

The IRB has granted continuing approval for this study from April 17, 2018 to April 16, 2023, inclusive, as well as approval for the associated modification.

To ensure continuous approval for studies with a review category of “Committee Review” in the above table, you must submit a continuing review with required explanations by the deadline for the March 2019 meeting. These deadlines may be found



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on the compliance website (<http://www.uh.edu/research/compliance/>). You can submit a continuing review by navigating to the active study and clicking “Create Modification/CR.”

For expedited and exempt studies, a continuing review should be submitted no later than 30 days prior to study closure.

If continuing review approval is not granted on or before April 16, 2023, approval of this study expires and all research (including but not limited to recruitment, consent, study procedures, and analysis of identifiable data) must stop. If the study expires and you believe the welfare of the subjects to be at risk if research procedures are discontinued, please contact the IRB office immediately.

Unless a waiver has been granted by the IRB, use the stamped consent form approved by the IRB to document consent. The approved version may be downloaded from the documents tab.

Summary of approved modification(s):

1. I have expanded the inclusion criteria to include physicians of any specialty (including current residents) with an M.D. or D.O degree who sees children of any ages for well-child or other routine visits, rather than specifying specific medical specialties. Given that collecting survey data from physicians is difficult given their schedule and time constraints, expanding this criteria should allow for more physicians to complete my study. To reflect this change, the eligibility questions presented prior to the start of the survey has been changed from two questions to one question, which asks “Are you a physician (including current residents) with an M.D. or D.O degree who sees children of any ages for well-child or other routine visits? An answer of “yes” to this question will make the participant eligible for participation in the study. This change has been reflected in track changes within my IRB document, informed consent, recruitment emails, the eligibility question document, and within the Qualtrics survey.

2. I have made minor changes to the recruitment email. After receiving feedback from some colleagues who work with physicians, I have shortened the email to increase the likelihood that physicians will read it. This is reflected within my IRB document appendix B.

3. Within my survey, I have changed the gender item (question number 1) to open response rather than multiple choice to allow for participants to indicate their own



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gender, including genders they self-identify with beyond male and female. This is reflected in page 24 of the IRB, within the survey document, and within the Qualtrics survey.

In conducting this study, you are required to follow the requirements listed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system.

Sincerely,

Research Integrity and Oversight (RIO) Office University of Houston, Division of
Research
713 743 9204
cphs@central.uh.edu <http://www.uh.edu/research/compliance/irb-cphs/>

Appendix B

Vignette

VIGNETTE

- A) John is a 4-year-old Caucasian male brought in by his mother for a routine well-child visit. Today, his mother expresses the following concerns to you: “I’m starting to have some concerns about John’s behavior. I have to repeat myself over and over for him to do anything. He usually doesn’t even respond when I call his name. He is constantly running around the house and jumping on furniture. I feel like I can’t take my eyes off him. He is also having meltdowns when his routine changes or when we go into noisy places. The only time I can get him to sit still is when he is playing with his toy trains and animals that he likes to sort and line up. I’ve also noticed that he is not talking as much as other kids. When he wants something he usually just whines or grabs my hand to show me. He’s also had some problems at daycare. His teachers tell me that he doesn’t typically join in during the activities and sometimes hits other children when they take toys from him or when they get in his space. When I pick him up, he is usually playing by himself. I don’t know if that’s because he’s shy or because the other kids don’t want to play with him. It’s not all bad. John can be very sweet at times, but I’m starting to notice that he is different than other kids his age. I’m hoping you can tell me what is wrong with him and what I should do. He has never had any kind of testing or treatments but I am willing to try anything.”
- B) Juan is a 4-year-old Hispanic male brought in by his mother for a routine well-child visit. Today, his mother expresses the following concerns to you: “I’m starting to have some concerns about Juan’s behavior. I have to repeat myself over and over for him to do anything. He usually doesn’t even respond when I call his name. He is constantly running around the house and jumping on furniture. I feel like I can’t take my eyes off him. He is also having meltdowns when his routine changes or when we go into noisy places. The only time I can get him to sit still is when he is playing with his toy trains and animals that he likes to sort and line up. I’ve also noticed that he is not talking as much as other kids. When he wants something he usually just whines or grabs my hand to show me. He’s also had some problems at daycare. His teachers tell me that he doesn’t join in during the activities and sometimes hits other children when they take toys from him or when they get in his space. When I pick him up, he is usually playing by himself. I don’t know if that’s because he’s shy or because the other kids don’t want to play with him. It’s not all bad. Juan can be very sweet at times, but I’m starting to notice that he is different than other kids his age. I’m hoping you can tell me what is wrong with him and what I should do. He has never had any kind of testing or treatments but I am willing to try anything.”

Appendix C

Survey

SURVEY

Please answer the following questions about the vignette presented to you.

1. Would you consider further investigating a diagnosis for this child at this time, given the information provided in the vignette?

a. Yes

- i. *If yes:* What initial differential diagnoses would you consider? Please list all diagnoses that may apply, ranking them in order based on the one you would consider, first, second, etc.

1. _____
2. _____
3. _____
4. _____
5. _____

b. No

- i. *If no:* What is/are the factor(s) why you would you not further investigate a diagnosis for this child at this time?

2. If a child like the one in the vignette presented in your own practice, would you take any of the following actions? Please select *yes* or *no* for each item.

Conduct a developmental screener for the child	Yes	No
Consult with a colleague or specialist about the child	Yes	No
Refer the child to a specialist for further evaluation	Yes	No
Make a diagnosis and discuss diagnosis with the child's family	Yes	No
Reassure the parent that these behaviors are part of normal development for a child this age	Yes	No
Provide usual care and wait until the child is older to address concerns	Yes	No
Other: _____	Yes	No

3. Of the following actions you reported in the previous question, which one would be your first course of action?

For the next few items, you will be asked questions regarding your treatment recommendations (i.e., psychosocial, pharmacologic medication, CAM) for this child and his family.

4. Would you recommend psychosocial intervention for this child at this time?

a. Yes

i. *If yes*, please check which psychosocial intervention(s) you would recommend (check all that apply).

- ☐ Individual Child Therapy
- ☐ Group Therapy
- ☐ Parent/Behavior Management Training
- ☐ School-based intervention
- ☐ Other (please specify)

ii. *If yes*, do you think this family would follow through on your recommendation for psychosocial treatment?

- ☐ Yes
- ☐ No

b. No

i. *If no*, please indicate the factor(s) driving your decision to not recommend psychosocial treatment at this time (check all that apply):

- ☐ Behaviors he is displaying are part of normal development for a child this age
- ☐ The parent, not child, needs treatment
- ☐ Family is not likely to agree/follow through on psychosocial interventions
- ☐ There are no effective/evidence-based psychosocial interventions currently available to address behaviors like this, in a child this age
- ☐ Psychosocial interventions to address behaviors like this are not available in my area
- ☐ The child's symptoms are not severe enough
- ☐ The child is too young for psychosocial treatment
- ☐ Other (specify)

5. Would you recommend pharmacologic medication for this child at this time?

a. Yes

i. *If yes*, please check which pharmacologic medication(s) you would recommend (check all that apply).

- ☐ Antidepressant
- ☐ Antipsychotic

- ☐ Mood Stabilizer
- ☐ Stimulant
- ☐ Other (please specify)

- ii. Do you think this family would follow through on your recommendation for pharmacologic medication?
- ☐ Yes
 - ☐ No

b. No

- i. *If no*, please indicate the factor(s) driving your decision to not recommend pharmacologic medication at this time (check all that apply):
- ☐ Behaviors he is displaying are part of normal development for a child this age
 - ☐ The parent, not child, needs treatment
 - ☐ Family is not likely to agree/follow through on pharmacologic medication
 - ☐ My concern about potential for medication to be abused/misused
 - ☐ Medications are not indicated for this child's concerns/symptoms
 - ☐ Risks of medication outweigh the potential benefit of treatment
 - ☐ The child's symptoms are not severe enough
 - ☐ The child is too young for pharmacological treatment
 - ☐ Other (please specify)

6. Would you recommend Complementary and Alternative Medicine (CAM) for this child at this time?

a. Yes

- i. *If yes*, please specify the specific CAM approach you would recommend: _____
- ii. *If yes*, Do you think this family would follow through on your recommendation for CAM approach?
- ☐ Yes
 - ☐ No

b. No

- i. *If no*, please indicate the factor(s) driving your decision to not recommend CAM approach at this time (check all that apply):
- ☐ Behaviors he is displaying are part of normal development for his age

- ☐ The parent, not child, needs treatment
- ☐ The family is not likely to agree/follow through on CAM approach
- ☐ There are currently no effective/evidence-based CAM treatments available to address behaviors like this, in a child this age
- ☐ CAM approaches to address these behaviors are not available in my area
- ☐ The child's symptoms are not severe enough
- ☐ The child is too young for CAM approaches
- ☐ Other (specify)

7. Would you provide any other recommendations to this child and his family at this time?

- a. Yes
 - i. *If yes, please specify:*
- b. No

Please answer the following questions about yourself.

(new page in Qualtrics where participants cannot return to previous questions)

1. Gender: _____
2. Race *(please select all that apply)*
 - ☐ American Indian or Alaska native
 - ☐ Asian
 - ☐ Black or African American
 - ☐ Native Hawaiian or Other Pacific Islander
 - ☐ White
 - ☐ Other: _____
3. Ethnicity- Are you of Hispanic or Latino ethnicity?
 - ☐ No, not Hispanic or Latino
 - ☐ Yes, Hispanic or Latino (of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race)
4. Languages spoken proficiently *(choose all that apply)*
 - ☐ English
 - ☐ Spanish
 - ☐ Other: _____
5. What is your current medical specialty?
 - ☐ Pediatrics
 - ☐ Family Medicine

- ☐ Internal Medicine
 - ☐ Internal Medicine-Pediatrics
 - ☐ Developmental Pediatrics
 - ☐ Psychiatry
 - ☐ Other Pediatric specialty: _____
6. Practice type
- ☐ Hospital
 - ☐ Community based clinic
 - ☐ Independent practice
 - ☐ Partnership or group practice
 - ☐ Other: _____
7. Practice setting
- ☐ Urban
 - ☐ Suburban
 - ☐ Rural
 - ☐ Other: _____
8. Are you currently a medical resident?
- ☐ Yes
 - ☐ No
9. Years in practice since graduating medical school: _____
10. How would you rate your training on and knowledge of autism and autism spectrum disorders (e.g., Asperger's, High Functioning Autism, PDD-NOS)?
- ☐ Excellent
 - ☐ Good
 - ☐ Average
 - ☐ Poor
 - ☐ Terrible
11. Estimate of current patients who are non-Caucasian: _____%
12. Estimate of current patients who are Hispanic/Latino patients: _____%
13. Estimate of current patients with the following:
- i. Mental health concerns (i.e., depression, anxiety): _____%
 - ii. Behavioral concerns (i.e., ADHD, disruptive behavior): _____%
 - iii. Developmental concerns (i.e., developmental delays, autism, etc.): _____%

Please answer the following questions regarding how confident you feel about doing each of the following activities in your own practice, as it relates to patients with autism spectrum disorders (ASD) or suspected ASD.

- | | | | | | |
|--|----------------------|--------------------|----------------------|----------------|----------------------|
| 1. Identify early warning signs of ASD in my patients | Not at all confident | Slightly confident | Moderately confident | Very confident | Completely confident |
| 2. Conduct appropriate screenings to assess my patients' developmental level | Not at all confident | Slightly confident | Moderately confident | Very confident | Completely confident |
| 3. Make a DSM/ICD diagnosis of ASD for my patients | Not at all confident | Slightly confident | Moderately confident | Very confident | Completely confident |
| 4. Discuss ASD diagnosis with my patient's family and answer questions asked by family | Not at all confident | Slightly confident | Moderately confident | Very confident | Completely confident |
| 5. Discuss appropriate treatment options for ASD with the family | Not at all confident | Slightly confident | Moderately confident | Very confident | Completely confident |
| 6. Discuss early intervention options for ASD with the family | Not at all confident | Slightly confident | Moderately confident | Very confident | Completely confident |
| 7. Discuss educational/school eligibility and services for ASD with the family | Not at all confident | Slightly confident | Moderately confident | Very confident | Completely confident |
| 8. Build adequate rapport with my patients with ASD and their families | Not at all confident | Slightly confident | Moderately confident | Very confident | Completely confident |
| 9. Provide ongoing care and management of symptoms with my patients with ASD | Not at all confident | Slightly confident | Moderately confident | Very confident | Completely confident |

10. In your own experiences, what challenges do you encounter in regard to assessing and diagnosing ASD?

11. In your own experiences, do you encounter any additional challenges in regard to assessing and diagnosing ASD when the child and family is racially or ethnically diverse (e.g. Hispanic/Latino)?

a. Yes

i. *If yes, please explain challenges in regard to assessing and diagnosing ASD when the child and family is racially or ethnically diverse (e.g., Hispanic/Latino)*

b. No

12. What kind of training or resources would be useful in your current practice as it relates to ASD?

Appendix D

Recruitment Email

Hello!

My name is Madeline Racine, and I am a PhD student at the University of Houston in the School Psychology program working under the supervision of Dr. Sarah Mire, as well as Texas Children's Psychologist, Dr. David Curtis. As part of my dissertation, I am surveying physicians who see children for well-child visits in order to examine their decision making for behavioral health needs.

The survey is all online, is anonymous, and takes about 10-15 minutes. The survey includes reading a brief clinical vignette, followed by prompts for you to answer questions about the vignette and provide some basic demographic information. I recognize that 15 minutes is the average length of a well-child visit, so I very much appreciate you taking time out of your day to complete this survey.

Your participation in this study will help *develop projects* to improve behavioral health care for children with developmental and psychosocial needs and *enhance collaboration* between psychologists and physicians.

To participate, click on the link below:

https://coeuh.col.qualtrics.com/jfe/form/SV_5dWINIzHk2JOU97

This project has been reviewed by the University of Houston Committee for the Protection of Human Subjects (713) 743-9204.

Will you also please consider forwarding this email and study information to other physicians you know?

Thank you very much for your consideration of participating in this study! Should you have any questions, please feel free to contact me (mdracine@uh.edu) or my advisor, Sarah Mire, Ph.D. (ssmire@central.uh.edu).

Respectfully,

Madeline Racine, M.Ed.

Madeline Racine, M.Ed.
 Doctoral Candidate in School Psychology
 University of Houston
 Department of Psychological, Health, & Learning Sciences

Appendix E

Recruitment Handout

Physician Opportunity to Participate in Research

Eligibility: Physicians, including residents, who see children for well-child or other routine visits

Purpose: To examine physician decision making as it relates to behavioral health needs

Overview: The survey is online, anonymous, and takes about 10-15 minutes. You will read a brief clinical vignette, answer questions about vignette, and provide demographic information.

*** Your participation in this study will help *develop projects to improve behavioral health care for children with developmental and psychosocial needs and *enhance collaboration* between psychologists and physicians.***

To participate, visit the link below or scan the QR code using your mobile device.

https://coeuh.co1.qualtrics.com/jfe/form/SV_5dWINIzHk2JOU97



This project has been reviewed by the University of Houston Committee for the Protection of Human Subjects (713) 743-9204.

For questions please contact Madeline Racine at mdracine@uh.edu. Thank you very much for your consideration of participating in this study!

Appendix F

Eligibility Question Confirming Inclusion Criteria

ELIGIBILITY QUESTION

Note: If you have received this survey before, please only complete once. Thank you!

1. Are you a physician (including current residents) with an M.D. or D.O. degree who sees children of any ages for well-child or other routine visits?

A) Yes

B) No

- If they answer *Yes* to this question they will be directed to the informed consent document (Appendix D).
- If they answer *No* to this question they will receive the following message:
Thank you for your interest in participating. Though you do not qualify for this study, we hope that you will forward the email you received describing it to your colleagues for their consideration!

Appendix G

Informed Consent Presented to Participants

CONSENT TO PARTICIPATE IN RESEARCH

Title of research study:

Understanding Physician Decision Making in Primary Care Settings

Investigator: Madeline Racine, B.A.

This is a dissertation study being conducted under the supervision of Sarah Mire, Ph.D.

Why am I being invited to take part in a research study?

We invite you to take part in a research study because you are a physician (including current residents) with an M.D. or D.O. degree who currently sees children for well-child or other routine visits. Recognizing that PCPs are a critical and often first point of contact for families, psychologists increasingly seek to collaborate effectively with medical colleagues in providing care for children who are seen across settings (i.e., medical, clinical, school). Your perspective as a physician is vital to furthering research on behavioral medicine and cross-disciplinary collaboration.

What should I know about a research study?

- Whether you take part is up to you.
- You can choose not to take part.
- You can agree to take part and later change your mind.
- Your decision will not be held against you.
- You can ask all the questions you want before you decide, and can ask questions at any time during the study. Contact information is provided below.

Why is this research being done?

The purpose of this study is to gather information on physician decision making in primary care settings. Specifically, the study will examine how physician characteristics (i.e., practice setting, years of practice, race/ethnicity, gender) may be associated with diagnostic and treatment decision-making for children. Psychologists and PCPs often see the same children, in different settings, and learning more about ways that decisions are made in various settings may help inform enhanced cross-disciplinary understanding and collaborations, and ultimately better outcomes for the children we all care for.

How long will the research last?

Taking the online survey should take a maximum of 10-15 minutes– the length of time it takes you to complete the online survey. We will be collecting survey responses from providers for a total of 5 months.

How many people will be studied?

We expect to enroll about 150 physicians in this research study.

What happens if I say yes, I want to be in this research?

If you agree to take part in this study, you will be provided with a link to a secure, online survey platform. You will need a computer or mobile device with internet access to participate in this survey.

What happens if I do not want to be in this research?

You can choose not to take part in the research and it will not be held against you. Choosing not to take part will involve no penalty or loss of benefit to which you are otherwise entitled.

What happens if I say yes, but I change my mind later?

You can leave the research study (i.e., stop taking the survey) at any time, it will not be held against you.

Is there any way being in this study could be bad for me?

There are no foreseeable risks related to the procedures conducted as part of this study.

Will being in this study help me in any way?

We cannot promise benefits to you or other for taking part in this research; however, participation in this research will make a valuable contribution to the field of behavioral medicine, specifically as it relates to primary care physicians.

Will I get anything for being in this study?

For participating in this study, you can choose to enter your contact information (name, email, and practice address) if you would like to be entered into a random drawing to receive a book (valued no more than \$100) relevant to primary care providers. Once you complete the survey, you will be routed to a separate page where you can enter your information if interested in this drawing.

What happens to the information collected for the research?

Efforts will be made to limit the use and disclosure of any information we collect about you (i.e., years of practice, gender, etc.) only to people who have a need to review it. If you indicate that you would like to be entered into the random book drawing, your information will be recorded for that purpose. However, identifying information will be recorded separately and will not be linked to survey responses in any way.

Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, you should talk to the research team at mdracine@uh.edu or the faculty supervisor at ssmire@uh.edu.

This research has been reviewed and approved by the University of Houston Institutional Review Board (IRB). You may also talk to them at (713) 743-9204 or cphs@central.uh.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.

- You want to get information or provide input about this research.

I have read the consent information and agree to take part in the research.

- ☐ *Yes*
- ☐ *No*

Appendix H

End of Survey Question

END OF SURVEY QUESTION

Thank you for completing the survey! Your answers have been recorded.

Would you like to be entered into a random drawing to receive an autism related book relevant to primary care providers?

- ☐ **Yes** (*Routed to separate survey to enter contact information- https://coeuh.co1.qualtrics.com/jfe/form/SV_4MVtn4fxKHiwOtn. Here participants will select if they are interested in researchers using their provided contact information to contact them for potential follow-up research).*)
- ☐ **No** (*Routed to survey complete page*)