AUTISM SPECTRUM DISORDERS SCREENING & DIAGNOSTIC PRACTICES:
A SURVEY OF PHYSICIANS

A Dissertation by

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AUTISM SPECTRUM DISORDERS SCREENING & DIAGNOSTIC PRACTICES: A SURVEY OF PHYSICIANS

The following faculty members have examined the final copy of this dissertation for form and content, and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy with a major in Communication Sciences and Disorders.

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To my late father K. Rajagopalan
ACKNOWLEDGEMENTS

I am deeply indebted to many people who have helped me finish my dissertation. Writing a dissertation is a long journey and one encounters a myriad of challenges. The support and encouragement of the people around me motivated me to overcome all these challenges and achieve this milestone. I would like to thank everyone who played a part in this achievement.

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ABSTRACT

In 2007, the American Academy of Pediatrics (AAP) released a policy statement which urged physicians to conduct surveillance at every well-child visit and screen for Autism Spectrum Disorders (ASD) at 18 and 24 months, and at any other time when parents raised a concern about a possible ASD. The purpose of this study was to identify the screening practices of pediatricians and primary care physicians (PCPs) in following the AAP guidelines specifically related to ASD in Kansas, Oklahoma and Iowa. A survey was mailed to 1,500 pediatricians and PCPs registered to practice in Kansas, Oklahoma, and Iowa. The survey was designed to obtain the following information: demographic information, ASD screening, diagnostic and referral practices, physician’s knowledge of AAP guidelines, and their pre-professional training.

A total of 481 participants returned the surveys, rendering an overall response rate of 32%. 396 surveys were included for the analysis. The analysis of the data indicated that 66 (17%) respondents routinely screened for ASD according to AAP guidelines. An additional 162 (41%) respondents routinely screened for ASD, but did not follow AAP guidelines. It was also found that the respondents’ pre-professional education in the area of ASD correlated with their confidence levels for identifying the early warning signs of ASD and their ASD screening and diagnostic practices.

The data indicated that pediatricians were more likely to screen for ASD and PCPs were more likely not to screen for ASD. Also, only 19% of physicians were aware of the current AAP guidelines for ASD screening. The data also highlighted the important role of parents and multidisciplinary team in the ASD screening and diagnostic process. These results highlighted the fact that efforts should be made to address ASD screening, diagnostic, and treatment practices in the pre-professional education of these physicians.
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td></td>
</tr>
<tr>
<td>Chapter I</td>
<td>1</td>
</tr>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>Statement of the problem</td>
<td>7</td>
</tr>
<tr>
<td>Purpose of the study</td>
<td>7</td>
</tr>
<tr>
<td>II.</td>
<td></td>
</tr>
<tr>
<td>Review of the Literature</td>
<td>8</td>
</tr>
<tr>
<td>Autism Spectrum Disorders</td>
<td>8</td>
</tr>
<tr>
<td>Characteristics of autistic disorder</td>
<td>9</td>
</tr>
<tr>
<td>Social interaction</td>
<td>10</td>
</tr>
<tr>
<td>Communication</td>
<td>11</td>
</tr>
<tr>
<td>Behavior</td>
<td>12</td>
</tr>
<tr>
<td>Characteristics of Asperger’s syndrome</td>
<td>13</td>
</tr>
<tr>
<td>Characteristics of pervasive developmental disorder not otherwise specified</td>
<td>13</td>
</tr>
<tr>
<td>Characteristics of Rett syndrome</td>
<td>14</td>
</tr>
<tr>
<td>Characteristics of childhood disintegrative disorder</td>
<td>15</td>
</tr>
<tr>
<td>Professional guidelines for ASD-specific screenings</td>
<td>16</td>
</tr>
<tr>
<td>ASD surveillance and screening algorithm</td>
<td>19</td>
</tr>
<tr>
<td>Screening tools</td>
<td>21</td>
</tr>
<tr>
<td>Screening tools for children less than 18 months of age</td>
<td>21</td>
</tr>
<tr>
<td>Screening tools for children 18 months of age and older</td>
<td>23</td>
</tr>
<tr>
<td>Level 1 screening tools</td>
<td>24</td>
</tr>
<tr>
<td>Level 2 screening tools</td>
<td>25</td>
</tr>
<tr>
<td>Advantages of early identification</td>
<td>26</td>
</tr>
<tr>
<td>Current screening practices for ASD</td>
<td>29</td>
</tr>
<tr>
<td>Current diagnostic practices for ASD</td>
<td>31</td>
</tr>
<tr>
<td>Barriers to early screening and diagnosis</td>
<td>32</td>
</tr>
<tr>
<td>Potential challenges for physicians in conducting routine screening for ASD</td>
<td>34</td>
</tr>
<tr>
<td>Effects of physician education/training on screening practices</td>
<td>35</td>
</tr>
<tr>
<td>Multidisciplinary approach to screening children for ASD</td>
<td>35</td>
</tr>
<tr>
<td>Parents’ role in the screening and diagnostic process</td>
<td>36</td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS (continued)

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot study</td>
<td>37</td>
</tr>
<tr>
<td>Statement of purpose</td>
<td>39</td>
</tr>
<tr>
<td>Research questions</td>
<td>39</td>
</tr>
<tr>
<td>Primary research questions</td>
<td>40</td>
</tr>
<tr>
<td>Additional research questions</td>
<td>40</td>
</tr>
<tr>
<td>III. Method</td>
<td>42</td>
</tr>
<tr>
<td>Procedure</td>
<td>42</td>
</tr>
<tr>
<td>Study instrument</td>
<td>42</td>
</tr>
<tr>
<td>Participants</td>
<td>43</td>
</tr>
<tr>
<td>Survey administration</td>
<td>45</td>
</tr>
<tr>
<td>Data analysis</td>
<td>45</td>
</tr>
<tr>
<td>IV. Results</td>
<td>48</td>
</tr>
<tr>
<td>General demographic characteristics of respondents</td>
<td>49</td>
</tr>
<tr>
<td>Results for question 1</td>
<td>51</td>
</tr>
<tr>
<td>Results for question 2</td>
<td>54</td>
</tr>
<tr>
<td>ASD screening practices that do or do not follow AAP guidelines</td>
<td>54</td>
</tr>
<tr>
<td>ASD screening practices that follow guidelines, other ASD screening practices, or not screening</td>
<td>55</td>
</tr>
<tr>
<td>ASD screening practices or no screening</td>
<td>57</td>
</tr>
<tr>
<td>Respondents’ awareness of the current AAP guidelines for ASD screenings</td>
<td>58</td>
</tr>
<tr>
<td>Results for question 3</td>
<td>59</td>
</tr>
<tr>
<td>ASD screening practices that do or do not follow AAP guidelines</td>
<td>59</td>
</tr>
<tr>
<td>ASD screening practices that follow AAP guidelines, other ASD screening practices, or not screening</td>
<td>60</td>
</tr>
<tr>
<td>ASD screening practices according to professional role and demographic characteristics</td>
<td>61</td>
</tr>
<tr>
<td>Differences in the respondents’ awareness of the current AAP guidelines based upon demographic characteristics</td>
<td>68</td>
</tr>
<tr>
<td>Results for question 4</td>
<td>68</td>
</tr>
<tr>
<td>Results for question 5</td>
<td>69</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS (continued)

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results for question 6</td>
<td>70</td>
</tr>
<tr>
<td>Results for question 7</td>
<td>72</td>
</tr>
<tr>
<td>Results for question 8</td>
<td>72</td>
</tr>
<tr>
<td>Results for question 9</td>
<td>75</td>
</tr>
<tr>
<td>Results for question 10</td>
<td>76</td>
</tr>
<tr>
<td>Results for question 11</td>
<td>76</td>
</tr>
<tr>
<td><strong>V. Discussion</strong></td>
<td></td>
</tr>
<tr>
<td>Interpretation of question 1</td>
<td>78</td>
</tr>
<tr>
<td>Interpretation of question 2</td>
<td>80</td>
</tr>
<tr>
<td>Interpretation of question 3</td>
<td>83</td>
</tr>
<tr>
<td>Interpretation of question 4</td>
<td>86</td>
</tr>
<tr>
<td>Interpretation of question 5</td>
<td>87</td>
</tr>
<tr>
<td>Interpretation of question 6</td>
<td>88</td>
</tr>
<tr>
<td>Interpretation of question 7</td>
<td>89</td>
</tr>
<tr>
<td>Interpretation of question 8</td>
<td>89</td>
</tr>
<tr>
<td>Interpretation of question 9</td>
<td>90</td>
</tr>
<tr>
<td>Interpretation of question 10</td>
<td>91</td>
</tr>
<tr>
<td>Conclusion</td>
<td>92</td>
</tr>
<tr>
<td>Limitations of the study</td>
<td>93</td>
</tr>
<tr>
<td>Future directions</td>
<td>95</td>
</tr>
<tr>
<td>References</td>
<td>97</td>
</tr>
<tr>
<td>Appendices</td>
<td></td>
</tr>
<tr>
<td>A. Surveillance and screening algorithm</td>
<td>107</td>
</tr>
<tr>
<td>B. Chi-squares that were not significant</td>
<td>109</td>
</tr>
<tr>
<td>C. Survey</td>
<td>116</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ASD-Specific Screening Tools Suitable to be Used with Children Under 2 Years of Age</td>
<td>22</td>
</tr>
<tr>
<td>2.</td>
<td>Number of Responses by Professional Role and State for Each Mailing</td>
<td>48</td>
</tr>
<tr>
<td>3.</td>
<td>Demographic Characteristics of Respondents by State</td>
<td>50</td>
</tr>
<tr>
<td>4.</td>
<td>Descriptive Characteristics of the Respondents by Professional Role and Gender</td>
<td>52</td>
</tr>
<tr>
<td>5.</td>
<td>Screening Practices for ASD in Accordance with AAP Guidelines by State and Professional Role</td>
<td>55</td>
</tr>
<tr>
<td>6.</td>
<td>Screening Practices for ASD of Respondents by Professional Role and State</td>
<td>56</td>
</tr>
<tr>
<td>7.</td>
<td>Screening Practices of Respondents for ASD by Professional Role for Each State Respondents’ Awareness of the AAP Guidelines for ASD Screening by Professional Role and Screening Practices</td>
<td>57</td>
</tr>
<tr>
<td>8.</td>
<td>Demographic Characteristics of Respondents by State</td>
<td>50</td>
</tr>
<tr>
<td>9.</td>
<td>Screening Practices of Respondents by Gender</td>
<td>59</td>
</tr>
<tr>
<td>10.</td>
<td>ASD Screening Practices of Respondents by Practice Community</td>
<td>60</td>
</tr>
<tr>
<td>11.</td>
<td>ASD Screening Practices of Respondents by Professional Role and Demographic Characteristics</td>
<td>61</td>
</tr>
<tr>
<td>12.</td>
<td>Logistic Regression Predicting Likelihood of Routine Screening for ASD</td>
<td>63</td>
</tr>
<tr>
<td>13.</td>
<td>Screening Tools used by the Respondents for ASD Screening</td>
<td>66</td>
</tr>
<tr>
<td>14.</td>
<td>Frequency of the Follow-up Procedures Respondents Reported for a Positive ASD Screen</td>
<td>67</td>
</tr>
<tr>
<td>15.</td>
<td>Frequency of Barriers Reported by Respondents to Conduct ASD Screenings</td>
<td>69</td>
</tr>
<tr>
<td>16.</td>
<td>ASD Diagnostic Practices of Respondents by Professional Role</td>
<td>70</td>
</tr>
<tr>
<td>17.</td>
<td>ASD Diagnostic Practices and Screening Practices of Respondents by Screening Practices and Professional Role</td>
<td>72</td>
</tr>
<tr>
<td>18.</td>
<td>Frequency of Reasons for Diagnosing ASD without Having Administered a Screening for that Child Reported by Respondent</td>
<td>73</td>
</tr>
<tr>
<td>19.</td>
<td>Correlations among Pre-professional Education and Screening Practices of the Respondents</td>
<td>74</td>
</tr>
<tr>
<td>20.</td>
<td>Mean and Standard Deviations of the Knowledge Variables by Screening Practices</td>
<td>75</td>
</tr>
</tbody>
</table>
CHAPTER I

The words of a parent who has two children diagnosed with autism:

First it was just the suspicion that there was something wrong with my kids. They were both verbal, neither of them flapped their hands, rocked or anything overtly autistic that you hear about. My kid was biting other kids and banging his head. We had a psychologist at our church go to a mom’s group that I was attending where we could ask questions. I was asking about the biting as we were kicked out of the school because of his biting. The psychologist ended up coming over for dinner and watched the kids play and said we needed to have them evaluated. We didn’t feel comfortable going to a psychologist as we heard rumors of people going to a psychologist and getting an autism label and having it not actually be applicable. So we thought that if we are going after something we need to get a medical diagnosis of autism.

There was only one doctor in town who was an autism specialist and so there was long waiting list. We called their office and got on the waiting list which was 18 months at that time. But somebody cancelled within 8 months and so we got to see the doctor early. So at that point we went in and we took in a video of the kids playing normally which was what was normal playing for them. Anyway, we took in the video and filled out mountains of paperwork. During the appointment the doctor got down on the floor and played with the kids and interacted with them for half an hour and said, “Yeah, they have autism” and “Here’s a book and a pamphlet, bye, bye.” And pretty much that’s how we got our diagnosis.
We got a little piece of paper which said they had autism. But where on the spectrum are they? I mean, again, they do not rock or flap hands, they spoke, but it was almost exclusively as we learned, in echoes, so they are echolalic. They were talking all the time but they were quoting computer games and they were using it appropriately. They used it to communicate, but often times you wouldn’t know the meaning of that communication unless you had seen the DVD and knew the situation from the DVD that the echo was from. So anyway that’s how we got our diagnosis and we had already started going to speech therapy by then. Since we had already been going to speech therapy, the doctor didn’t have anything more to recommend us to do.

It was like right after they were 3, about 3 years and 4 months that they had their diagnosis officially. The regular doctors did not have any suspicion during the well-baby health check-ups. The pediatricians did not do any formal screening during the check-ups. The thing I don’t understand is that the doctors are scheduled 5 minutes in the room with the kid. How in the world can they check their ears, nose, throat, tummy and genitals in 5 minutes, let alone do a screening that takes 20 minutes? I know it would be nice to do the screening and other things during regular check-ups but I don’t see how you keep the cost of the physician visit down enough that your insurance will pay for it and still allow the care to be given to the kid.

The other thing that I don’t understand is how if, like, I’m a stay at home mom, I’m college educated, and by all accounts pushy as anything - and if I can be frustrated and thwarted through the process of getting my children diagnosed, what about moms who work and moms who don’t have the time, energy, or whatever to pursue this stuff with their kids. Kids are falling through the cracks and it is going to fall on the society
because we are going to be giving a lot more treatments 10 years down the road than you would if you had intervened at the age of 3. And that’s what Autism Speaks and Autism Now and all those things are talking about, that it has to be diagnosed early, early, early. Because, even if you treat kids that end up falling off of the spectrum or whatever, what’s the harm there? I mean the cost for speech therapy is nothing compared to institutionalization from 20 until 90. I mean what is our net cost here? The whole thing is, it is difficult to get the information if you don’t know the right questions to ask, and if you don’t have a supportive family who can search the internet and talk to people in the community, there is nothing jumping at you in the community (June 18, 2010).

This is the type of story told by parents who have children diagnosed with Autism Spectrum Disorders (ASD). There is a common pattern emerging from such parents’ stories; their children were not diagnosed with ASD until they were 4 + years of age. Many accounts from the parents suggested that either their doctors had not noticed any signs of ASD, or they did not do regular ASD screenings during their children’s well-baby visits. Some parents reported that even when their doctor noticed signs of ASD or suspected ASD, they did not give a formal diagnosis until the child was approximately 3 years of age. Making a diagnosis of ASD is a complicated process, as there are no objective tests to confirm the diagnosis. Physicians have to rely on the clinical signs and symptoms presented by the child and the family to make a diagnosis (Johnson, Myers, & Council on Children with Disabilities, 2007). Consequently, many physicians take a cautionary approach when making a medical diagnosis of ASD. It is well documented, however, that early identification affords the child the opportunity to receive early intervention services which will increase the likelihood of a positive developmental outcome (Baron-Cohen et al., 2000; Johnson et al., 2007; Ošlejšková, Kontrová, Foralová, Dušek,
&Némethová, 2007). Therefore, it is crucial that children who are suspected of having ASD receive their diagnosis as early as possible so that the appropriate intervention services can be initiated. Pediatricians and primary care physicians (PCPs) are the often first point of contact for children who are suspected to present with ASD and their families. In order for the child to receive an early diagnosis and to benefit from early intervention, it is imperative that pediatricians and PCPs become familiar with the early warning signs of ASD and conduct routine screenings using appropriate ASD-specific screening tools during the well-baby health check-ups.

**Introduction**

ASD, also known as pervasive developmental disorder (PDD), is a qualitative disorder that includes a range of behavioral symptoms that fall along a continuum of severity. According to DSM-IV-TR diagnostic criteria, ASD/PDD is known as a ‘spectrum disorder’ because it includes disorders other than autism (APA, 2000). There is no single defining characteristic that all children with ASD exhibit. Rather, each child is unique with a blend of deficits that vary in terms of occurrence and intensity (Lord & Bishop, 2010; Sigman, Spence, & Wang, 2006). Although ASD has been widely recognized as a neurological disorder with strong genetic links, the etiology remains unclear (Baird, Cass, & Slonims, 2003; Johnson et al., 2007; Lord & Bishop, 2010). While there is no empirically available prevention or cure for ASD, early intensive intervention has been documented to provide better outcomes for the children who present with this disorder (Filipek et al., 2000; Gillberg et al., 1990; Johnson et al., 2007; King & Bearman, 2009; Lord & Bishop, 2010; Rutter, 2005).
The number of children diagnosed with ASD is rising steadily worldwide. The Autism and Developmental Disabilities Monitoring Network (ADDM) report prepared by the Centers for Disease Control and Prevention (CDC) showed that there was an increase of 78% in the overall prevalence rate of ASD from 2002 to 2008 (CDC, 2012). According to the ADDM report, the current prevalence rate of ASD is estimated to be 1 in 88 or 11.3 per 1000 8-year-old children, with it being four times more common in boys than girls (CDC, 2012).

Although the reasons for the increase in prevalence of ASD are not clearly understood and are still under investigation, there is consensus that the number of children with this disorder is increasing (King & Bearman, 2009; Lord & Bishop, 2010). Diagnostic and legislative changes over the past several years have expanded the diagnostic criteria for ASD as well as the availability of services (Johnson et al., 2007). Some studies have reported that changes in the diagnostic criteria and practices, such as improved screening practices and broadened diagnostic criteria, which led to the inclusion of milder cases, may have led to the increased prevalence in recent years (Hertz-Picciotto, & Delwiche, 2009; King & Bearman, 2009; Rutter, 2005). A study conducted in California in 2009 reported that broader diagnostic criteria led to the inclusion of milder cases and was, therefore, responsible for 56% of the increase in prevalence rate in that state. It should be noted that approximately 12% of this increase was attributed to children being diagnosed at an earlier age (Hertz-Picciotto, & Delwiche, 2009). Generally, reports of increased prevalence have led to heightened media coverage, increasing awareness of the general public, as well as health care professionals throughout the world (Johnson et al., 2007; Lord & Bishop, 2010).

While signs and symptoms of ASD appear early in life, ASD develops into a life-long handicap that affects every day social functioning, social integration, and the ability to lead an
independent life. In fact, few high-functioning individuals with ASD, without associated intellectual defects, enter adulthood with the ability to lead a minimally supported, independent life (Ošlejšková et al., 2007). Still, there is evidence that early education and behavioral intervention can alleviate some of the “core” deficits of children with ASD and improve their overall quality of life (Charman & Baird, 2002; Dietz, Swinkels, van Daalen, van Engeland, & Buitelaar, 2006; Landa, Holman, & Garrett-Mayer, 2007; Ošlejšková et al., 2007).

Families typically consult with their primary care physician and/or pediatrician first if they are concerned about their child’s development (Heidgerken, Geffken, Modi, & Frakey, 2005). These physicians, therefore, play a critical role in recognizing the early signs of ASD (Committee on Children with Disabilities, 2001; Johnson et al., 2007). Consequently, it is important for PCPs and pediatricians to perform routine screenings to ensure children suspected to present with ASD and for their families receive timely referrals for appropriate services (Filipek et al., 2000; Johnson et al., 2007; Robins & Dumont-Mathieu, 2006).

Over the years a number of practice guidelines have been published by the American Academy of Pediatricians (AAP) urging pediatricians and PCPs to conduct routine screenings for ASD on all children during well-child visits. The first set of guidelines was published by AAP in 2001 recommending that pediatricians monitor and screen for developmental delays using appropriate screening tools, including screening and diagnostic tools specific to ASD at every well-child visit (Committee on Children with Disabilities, 2001). Despite the publication of practice guidelines, studies have shown that only few pediatricians perform routine screenings for ASD during well-child visits as recommended by AAP (Dosreis, Weiner, Johnson, & Newschaffer, 2006; Sand et al., 2005; Zeiger, 2008).
In 2007, AAP published a revised set of guidelines by incorporating the new developments in the field of ASD (Johnson et al., 2007). These guidelines urged PCPs and pediatricians to conduct ASD surveillance during every well-child visit and to screen for ASD at 18 and 24 months using ASD-specific screening tools (Johnson et al., 2007). These guidelines also stated that PCPs and pediatricians needed to develop a better understanding of children with ASD to identify the critical early warning signs for this disorder (Johnson et al., 2007). The publication of these practice guidelines by the pediatricians’ governing body indicated the need for the pediatricians to take a leadership role in the screening and diagnosis of children with ASD. It also urged the PCPs to implement these revised guidelines in their clinical practice.

**Statement of the Problem**

Sand et al. (2005) and Dosreis et al. (2006) indicated that the screening and diagnostic practices of pediatricians had not changed since the practice guidelines were published in 2001. Therefore, it is necessary to evaluate if there has been a change in the screening and diagnostic practices of pediatricians and PCPs since AAP published the revised guidelines in 2007. A thorough review of the literature was conducted and no published studies were found that addressed this issue. It is important, therefore, to identify the current screening and diagnostic practices of pediatricians and PCPs to assess if they have responded appropriately to the recommended practice guidelines.

**Purpose of the Study**

The purpose of this study was to identify the screening practices of pediatricians and PCPs in following AAP guidelines specifically related to ASD in Kansas, Oklahoma, and Iowa.
CHAPTER II

Review of the Literature

Autism Spectrum Disorders (ASD)

ASD is a complex neurodevelopmental disorder. Its exact etiology remains unclear; however, mounting research suggests that genetic and environmental factors are involved (Johnson et al., 2007). While the genetic contribution of ASD continues to unfold, investigators have concluded that this disorder demonstrates great genetic complexity involving multiple genes (Anney et al., 2010; Liu et al., 2011). In addition, evidence suggests that exposure to environmental toxins may act as a teratogen to the central nervous system and trigger or modulate the phenotypic expression of individuals with ASD (Abrahams & Geschwind, 2008; Grether, Anderson, Croen, Smith, & Windham, 2009; Lord & Bishop, 2010).

Studies also have suggested that individuals with ASD present with anatomical abnormalities in multiple areas of the brain, yet the exact neuroanatomical involvement of these disruptions are not clear (Uddin et al., 2011). This uncertainty may be due to the etiologic heterogeneity of ASD and the multifaceted effects this disorder has on the development of brain systems and cognitive processes (Uddin et al., 2011).

There is, however, clear evidence to support that children with autism have increased total brain volume, with increases in the cerebellar hemispheres and the caudate nucleus, with a reduction in the corpus callosum (Pina-Camacho et al., 2011; Verhoeven, De Cock, Lagae, & Sunaert, 2010). There also appears to be multifocal disorganization of both the white and gray matter; thus, the pervasive nature of the disorder (Fidler, Bailey, & Smalley, 2000; Wegiel et al., 2010). Evidence also has been provided to support abnormal structural and/or functional
connectivity of the cortical and subcortical regions in individuals with ASD (Pickett & London, 2005; Pina-Camacho et al., 2011). Additionally, there appears to be a reduced number of Purkinje neurons, which are important communication catalysts with other parts of the brain (Bailey et al., 1998). Abnormal neural networks in the inferior frontal gyrus, temporal and cingulate cortex (areas related to social functioning), and the amygdala-fusiform system, (related to face-processing, social cognition, and emotional awareness) also have been reported (DiCicco-Bloom et al., 2006; Dziobeck, Bahnemann, Convit, Heekeren, 2010; Pina-Camacho et al., 2011; Verhoeven et al., 2010).

Although ASD is known to be a neurodevelopmental disorder, researchers have struggled to distinguish the brain-based biomarkers of children with ASD from typically developing children. As previously stated, this may be due in part to the diverse and complex nature in which this disorder presents among individuals diagnosed on the autism spectrum (Uddin et al., 2011).

ASD/PDD is an umbrella term that encompasses the following disorders within the spectrum: autistic disorder (AD), Asperger’s syndrome (AS), pervasive developmental disorder-not otherwise specified (PDD-NOS), Rett Syndrome (RS), and childhood disintegrative disorder (CDD). Although similarities exist among the different disorders included on the spectrum, there are unique characteristics specific to each disorder category (APA, 2000).

**Characteristics of autistic disorder.**

The DSM-IV-TR (APA, 2000) indicates that autism disorder (AD) affects three domains of functioning including: social interaction, communication, and interests that are restricted in range and/or repetitive or stereotyped behaviors. Children diagnosed with autism should exhibit
signs and symptoms in all three domains (APA, 2000). According to the DSM-IV-TR, the
deficits in these domains must have an onset prior to the age of three and the deficits cannot be
explained by other developmental disorders (APA, 2000; Ozonoff, Goodlin-Jones, & Solomon,
2005). It is important to recognize, however, that the patterns of deficit manifestation vary
tremendously. Some children with AD exhibit deviations from typical childhood development
from birth; though, these deviations may not be evident until they are about one year old. Other
children appear to develop fairly typically during the first year of life, but fail to develop
language and other skills during the second year, or lose previously developed skills (Goin &
Myers, 2004; Sigman et al., 2006). Irrespective of when the deficits begin to manifest, several
investigators have reported that most children exhibit deficits before two years of age, making it
possible to provide a reliable diagnosis of AD prior to the second birthday (Charman & Baird,
2002; Cox et al., 1999; Lord et al., 2006).

**Social interaction.** The DSM-IV-TR diagnostic criteria (APA, 2000) for autism include
qualitative impairment in social interaction, as manifested by at least two of the following:

i. Marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye
gaze, facial expression, body postures, and gestures to regulate social interaction;

ii. Failure to develop peer relationships appropriate to developmental level;

iii. A lack of spontaneous seeking to share enjoyment, interests, or achievements with
other people (e.g., by a lack of showing, bringing, or pointing out objects of
interest); and

iv. Lack of social or emotional reciprocity.
Children with autism often avoid making appropriate eye contact while interacting with others. These children are often described as being in their own world, preferring to play in isolation rather than interacting with others (Prelock, 2006; Sigman et al., 2006). In addition, children with autism tend to show more interest in objects or toys rather than people.

Children with autism often show deficits in theory of mind; thus lacking empathy or the ability to take another person’s perspective (Baron-Cohen, Leslie, & Frith, 1985; Frith, 1996). Theory of mind enables typically developing children to recognize that others have beliefs, thoughts, and feelings that are different from their own. As a result of these deficits, children with autism have difficulties interpreting social situations or cues and understanding humor, deceit, or other emotions. Consequently, their use and interpretation of language is very literal, affecting their ability to interact socially (Baron-Cohen, Leslie, & Frith, 1985; Frith, 1996; Sigman et al., 2006).

**Communication.** The DSM-IV-TR diagnostic criteria (APA, 2000) for autism include qualitative impairments in communication as manifested by at least one of the following:

i. Delay in or total lack of the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime);

ii. In individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others;

iii. Stereotyped and repetitive use of language or idiosyncratic language; and

iv. Lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level.
Children with autism show various levels of expressive language ability ranging from nonverbal to highly verbal. They often demonstrate receptive language delays. Children who are verbal often show abnormal prosody and a tendency to perseverate on certain words or phrases. Their communication often is limited to expressing basic wants and needs, and is rarely used for the purpose of social interaction. Additionally, these children often have difficulty initiating a conversation or maintaining a topic during social interactions (Prelock, 2006).

Echolalia, which is a repetition of vocalizations made by another person, is a common characteristic observed in children with autism. Echolalia may be immediate, when the child repeats the word or a phrase immediately after someone says it; and/or delayed, when the child repeats the phrase after a period of time has passed (Prelock, 2006). In addition, children with autism show an apparent inability to engage in joint attention which is a process of sharing one’s experience. The lack of joint attention affects their language and cognitive development and also limits their ability to engage in social interactions, as they tend to miss nonverbal social cues (Charman, 2003; Prelock, 2006).

**Behavior.** The DSM-IV-TR diagnostic criteria (APA, 2000) for autism include restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following:

i. Encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus;

ii. Apparently inflexible adherence to specific, nonfunctional routines or rituals;

iii. Stereotyped and repetitive motor manners (e.g., hand or finger flapping or twisting, or complex whole-body movements); and
iv. Persistent preoccupation with parts of objects.

Children with autism often engage in repetitive or stereotypical behaviors. They also demonstrate a desire for routines or rituals (e.g., a fixed daily routine, lining up toys in a particular order) (Johnson et al., 2007; Prelock, 2006). These stereotypical behaviors often take the form of persistent, intense preoccupations that are unusual for typically developing children. They tend to affect the child’s ability to engage in meaningful social interactions.

**Characteristics of Asperger’s syndrome.**

The DSM-IV-TR (APA, 2000) indicates that Asperger’s syndrome (AS) affects mainly two domains of functioning which include social interaction, and interests that are restricted in range and/or repetitive or stereotyped behaviors. The signs and symptoms of the social impairment and repetitive or stereotyped behaviors are similar to AD (APA, 2000; Johnson et al., 2007; Prelock, 2006). For a child to be diagnosed with AS, qualitative impairment in social interaction and restricted repetitive and stereotyped patterns of behavior, interests and activities should cause clinically significant impairment in social, occupational, or other important areas of functioning. Additionally, children with AS should not demonstrate clinically significant delays in language, cognitive development, self-help skills, and/or adaptive behavior (APA, 2000).

**Characteristics of pervasive developmental disorder not otherwise specified.**

Children diagnosed with PDD-NOS exhibit severe and pervasive impairment in the development of reciprocal social interaction, along with impaired communication skills, either verbal or nonverbal, and stereotyped behavior, interests, and activities. While children with PDD-NOS present with impairment in each of three domains necessary to be diagnosed with autism, they do not meet the necessary criteria within each of these areas, nor do they meet the
criteria for any of the other disorder categories under the PDD umbrella. Consequently, the child may be diagnosed with PDD-NOS (APA, 2000).

**Characteristics of Rett syndrome.**

Rett syndrome (RS) is a pervasive developmental disorder that almost exclusively affects females (Ellaway & Christodoulou, 2001). For a child to be diagnosed with RS, she should have normal prenatal and perinatal development, normal psychomotor development through the first 5 months after birth, normal head circumference at birth, with a loss of acquired skills and/or regression in the development between ages 5 months and 3 years (APA, 2000; Ellaway & Christodoulou, 2001). Typically, children with RS experience progressive loss of intellectual functioning, fine and gross motor skills, and develop stereotypic hand movements after a period of normal development (Ellaway & Christodoulou, 2001; Prelock, 2006).

The DSM-IV-TR diagnostic criteria (APA, 2000) for RS include onset of all of the following after the period of normal development:

i. deceleration of head growth between ages 5 and 48 months

ii. loss of previously acquired purposeful hand skills between 5 and 30 months with the subsequent development of stereotyped hand movements (e.g., hand-wringing or hand washing)

iii. loss of social engagement early in the course (although often social interaction develops later)

iv. appearance of poorly coordinated gait or trunk movements

v. severely impaired expressive and receptive language development with severe psychomotor retardation
Children with RS have been found to have a mutation in the MECP2 gene found on the X chromosome that codes for a protein needed for brain development. As a result of this protein loss, there is an inappropriate over expression of other genes that are detrimental to central nervous system maturation accounting for the signs and symptoms used to diagnose RS (Ellaway & Christodoulou, 2001).

**Characteristics of childhood disintegrative disorder.**

Childhood disintegrative disorder (CDD) is different from other PDDs in that children with CDD have apparently normal development for at least the first 2 years of life and develops age-appropriate verbal and nonverbal communication, social relationships, play, and adaptive behavior (APA, 2000, Hendry, 2000). The DSM-IV-TR diagnostic criteria (APA, 2000) for CDD include the clinically significant loss of previously acquired skills in at least two of the following areas: expressive or receptive language, social skills or adaptive behavior, bowel or bladder control, play, and motor skills. The diagnostic criteria also indicate that children with CDD exhibit qualitative impairment in two of these three domains: social interaction, communication, and interests that are restricted in range and/or repetitive or stereotyped behaviors.

Though, RS and CDD are included under the umbrella of ASD/PDD, the developmental profiles of these two disorders differ distinctly from the other three disorders. As a result, RS and CDD have a diagnosis of their own, but should be included in the differential diagnosis of the child during the process of comprehensive evaluation for ASD (Hendry, 2000; Johnson et al., 2007).
The above characteristics are used to screen and/or diagnose children on the autism spectrum. Guidelines for screenings have been established by the American Academy of Neurology (AAN) and the American Academy of Pediatrics (AAP).

**Professional Guidelines for ASD-Specific Screenings**

The first set of professional guidelines for screening and diagnosing autism was developed by a panel of multidisciplinary professionals and published by AAN in 2000 (Filipek et al., 2000). The guidelines proposed two levels of evaluation for screening and diagnosing children with autism. The first level of evaluation called the “Routine Developmental Surveillance and Screening Specifically for Autism” recommended that pediatricians and PCPs perform routine developmental screenings for all children at every well-child visit from infancy through school-age. The guidelines also recommended that pediatricians and PCPs look for early warning signs of autism or “red flags” during every well-child visit. The “red flags” that signaled the need for an immediate evaluation included: no babbling, pointing or other gesture by 12 months; no single words by 16 months; no 2-word spontaneous (not echolalic) phrases by 24 months; and/or the loss of language or social skills at any age. If a child exhibited any of the above red flags, the guidelines recommended that physicians screen specifically for autism using an ASD-specific screening tool. If the child receives a positive screening result (i.e., the child presents with signs and symptoms of ASD); then, the child should be referred for a level two evaluation. The guidelines also recommended that when a child receives a negative screening result (i.e., the child does not present with signs and symptoms of ASD) but demonstrates developmental concerns, the child should be referred for early intervention.
A level two evaluation, labeled the “Diagnosis and Evaluation of Autism,” signaled pediatricians and PCPs to perform an in-depth investigation for children who received a positive screening for autism. The purpose of a level two evaluation was to differentiate children with autism from children with other developmental disorders. The guidelines provided evidence that parents were generally reliable in giving information about their child’s development. Pediatricians and PCPs were urged, therefore, to listen carefully to parents’ concerns, give them serious consideration, and perform an immediate evaluation.

Recognizing the vital role pediatricians play in the early identification of children with ASD, the AAP released a policy statement in 2001. This statement recommended pediatricians monitor and screen for developmental delays using appropriate screening tools including tools specific to ASD, at every well-child visit. Similar to the AAN recommendations, the AAP urged physicians to value, recognize, and respond to parental and caregiver concerns regarding their child’s development. It was also recommended that pediatricians refer to a multidisciplinary team with expertise in the area of ASD if they did not feel confident using the appropriate ASD-screening and/or diagnostic tools (Committee on Children with Disabilities, 2001). Despite the 2001 AAP policy statement, very few pediatricians were found to be using standardized screening tools during regular well-child visits (Dosreis et al., 2006; Sand et al., 2005; Zeiger, 2008). In addition, the diagnostic impressions and referral patterns of physicians who relied on clinical impressions and did not use any standardized screening tools were inconsistent. These physicians also tended to miss important risk factors among children who presented with developmental problems (Sices, Feudtner, McLaughlin, Drotar, & Williams, 2003).

In response to the published studies reporting physicians not using standardized screening tools to screen for developmental delays including ASD, AAP developed a developmental
screening algorithm in 2006 (Council on Children with Disabilities, Section on Developmental Behavioral Pediatrics, Bright Futures Steering Committee, & Medical Home Initiatives for Children with Special Needs Project Advisory Committee, 2006). This algorithm was to assist health care professionals in designing a surveillance pattern that would identify developmental concerns in children from birth to three years of age. In this algorithm, AAP recommended that PCPs and pediatricians perform a developmental surveillance at every well-child visit. In addition, AAP again recommended that physicians pay close attention to parents’ concerns, obtain a complete developmental history, and observe children for the presence of any vital risk factors that could be identified and documented. The AAP also urged PCPs and pediatricians to use standardized developmental screening tools routinely at the 9, 18, and 24 or 30-month visits and whenever a concern about the child’s development was raised during the developmental surveillance. In addition, it was recommended that along with a general developmental screening, an ASD-specific screening be administered during the 18 month well-child visit (Council on Children with Disabilities et al., 2006).

In response to the 2006 policy statement on developmental screenings, an AAP Autism Expert Panel recommended that PCPs and pediatricians administer an ASD-specific screening at the 24 month visit in addition to the 18 month visit. The expert panel recommended the additional screening at 24 months so that children who might be at risk for regression after 18 months of age would not be overlooked (Gupta et al., 2007). Acting on this recommendation, and acknowledging the increased prevalence of ASD and the need for early screening and diagnosis of children with ASD, AAP made the appropriate changes to its 2006 policy statement and released a revised policy statement in 2007. In the new policy statement titled, “Identification and Evaluation of Children with Autism Spectrum Disorders,” AAP
recommended that PCPs and pediatricians conduct an ASD surveillance during every well-child visit and screen for ASD at 18 and 24 months, and at any other time when parents and caregivers raised a concern about a possible ASD. Additionally, AAP recommended that physicians use general developmental screening tools, as well as standardized ASD-specific screening tools to perform routine screenings (Johnson et al., 2007).

**ASD surveillance and screening algorithm.**

The first step in the ASD surveillance and screening algorithm is to perform surveillance at every well-child preventive visit through the first five years of life (Johnson et al., 2007) (See Appendix A). During these well-child visits physicians should address any developmental concerns, including those about social skill deficits and early subtle red flags of ASD. AAP also recommended that in addition to performing these routine screening the child should be scheduled for a “problem-targeted” visit, either when a concern regarding the child’s development was identified during previous visits, or when the parents raise a concern about their child’s development based on observed behaviors, social or language deficits, or issues raised by other caregivers. AAP recommended that surveillance at the first well-child visit should begin with a family history to determine if there are any family members, especially a sibling, who has been diagnosed with ASD.

Developmental surveillance involves five important components as described by the AAP. These steps include: 1) eliciting and attending to the parents’ concerns about their child’s development, 2) documenting and maintaining a complete developmental history of the child, 3) making accurate observations of the child development and behaviors, 4) identifying the risk factors, and 5) maintaining an accurate record and documenting the surveillance process and
findings. The developmental surveillance also includes addressing and scoring for risk factors. The four risk factors are if: 1) the child has a sibling who has been diagnosed with ASD, 2) the parents have raised any concerns about ASD, 3) other caregivers have expressed concerns, and 4) the physician has identified concerns about the child. Each risk factor is given a score of one. It was also recommended that physicians pay attention to the early subtle red flags of ASD during each well-child visit through the first 5 years of life. The risk factor score and the age of the child determine the next steps the physician should implement.

In the algorithm, AAP recommended that when a child receives a positive screen for ASD, the physician should conduct a comprehensive ASD evaluation, if familiar and confident with the characteristics of ASD; or, immediately refer the child for a comprehensive evaluation and possible early intervention services. If the child receives a negative screening result (i.e., the child does not present with signs and symptoms of ASD), the physician should schedule a follow-up visit with the child and the family, if the physician, parent, or any caregiver has any concerns about the child’s development. The presence of any red flags or any risk factors identified during the surveillance should necessitate the physicians to immediately screen for ASD using an ASD-specific screening tool in addition to the regular 18 and 24 month screening. Even when a child receives a negative ASD screening result, the child should be referred for early intervention or early childhood education services, when there are other developmental concerns. In the policy statement AAP also stated that physicians should recognize that a diagnosis of ASD is not necessary for children and families to access intervention services. The report urged physicians to be familiar with appropriate referral resources for children with ASD and their families.
Screening Tools

There are several general developmental surveillance and screening tools that can be used for routine screening of developmental delays. Some of these tools may assist in identifying ASD because of the associated language and cognitive issues included in the screening protocol. Typically, however, these general developmental screening tools are not sensitive enough to differentiate children with ASD from children with other developmental delays and also their sensitivity in identifying children with ASD is not clearly known (Johnson et al., 2007). There are several ASD-specific screening tools that may be used based on the age of the child. Though no single screening tool can be used with all children, the AAP recommends that physicians choose one tool for each age group, become familiar and comfortable with it, and use it regularly during preventive well-child visits (Johnson et al., 2007). AAP lists several age-specific screening tools in their policy statement that can be used with children who are at risk for ASD (Johnson et al., 2007). The ASD-specific screening tools appropriate for screening children below 2 years of age are listed in Table 1.

**Screening tools for children less than 18 months of age.** According to the report (Johnson et al., 2007) the screening tools that can be used with children below 18 months of age are the *Infant/Toddler Checklist from the Communication and Symbolic Behavior Scales Developmental Profile (CSBS DP)* (Wetherby & Prizant, 2002), and the *Early Screening of Autistic Traits Questionnaire (ESAT)* (Swinkels et al., 2006).
Table 1

ASD-Specific Screening Tools Suitable to be Used with Children Under 2 Years of Age

<table>
<thead>
<tr>
<th>Screening Tool</th>
<th>Age Group</th>
<th>Format</th>
<th>Reported Sensitivity</th>
<th>Reported Specificity</th>
<th>Other Relevant Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSBS DP Infant-Toddler Checklist</td>
<td>6 to 24 months</td>
<td>Parent completed questionnaire (24 items)</td>
<td>94%</td>
<td></td>
<td>Focuses on social and communication skills</td>
</tr>
<tr>
<td>ESAT</td>
<td>&lt;18 Months</td>
<td>Parent completed questionnaire (14 items)</td>
<td></td>
<td></td>
<td>Sensitivity was lower than CHAT. Reported PPV was 25%</td>
</tr>
<tr>
<td><strong>Level I Tools:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHAT</td>
<td>≥ 18 Months</td>
<td>Parent completed questionnaire (9 items) + Physician direct observation (5 items)</td>
<td>38%</td>
<td>98%</td>
<td>Easy to use, Takes 5 – 10 minutes to administer and score, Differentiates ASD from other developmental delays</td>
</tr>
<tr>
<td>CHAT (Denver Modifications)</td>
<td>≥ 18 Months</td>
<td>Parent completed questionnaire (9 items) + Physician direct observation (5 items)</td>
<td>85%</td>
<td>99%</td>
<td>Minor modifications to the medium risk criteria in the original CHAT</td>
</tr>
<tr>
<td>M-CHAT</td>
<td>≥ 16 Months</td>
<td>Parent completed questionnaire (23 items)</td>
<td>85%</td>
<td>93%</td>
<td>Simple, reliable and easy to use</td>
</tr>
<tr>
<td>PDDST-II</td>
<td>≥ 18 Months</td>
<td>Parent completed questionnaire (22 items)</td>
<td>92%</td>
<td>91%</td>
<td>Reliable to use with ≥ 18 months old children</td>
</tr>
<tr>
<td><strong>Level II Tools:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABC</td>
<td>≥ 18 Months</td>
<td>Behavior checklist completed by teacher or parent (57 items)</td>
<td>75%</td>
<td>81%</td>
<td></td>
</tr>
</tbody>
</table>

22
The CSBS DP Infant-Toddler Checklist (Wetherby & Prizant, 2002) is a 24-item questionnaire completed by parents or caregivers. It was designed to conduct routine screenings for children 6 to 24 months presenting with communication delays, developmental delays, red flags for ASD, or for a routine screening where no concerns exist (Wetherby, Goldstein, Cleary, Allen, & Kublin, 2003). Wetherby et al. (2004) demonstrated that the Infant-Toddler Checklist was an effective tool for identifying children with ASD as it focused on social and communication skills with a sensitivity of 94% in identifying children with ASD from typically developing children.

The ESAT (Swinkels et al., 2006) is a 14-item questionnaire completed by parents or caregivers. The tool screens for the following: pretend play, joint attention, interest in others, eye contact, verbal and nonverbal communication, stereotypical behavior, preoccupations, reaction to sensory stimuli, emotional reaction, and social interaction. Dietz et al. (2006) examined the effectiveness of the ESAT with 14 – 15 month old children and reported that it was possible to identify children with ASD at an early age. However, the sensitivity of the ESAT was low compared to the sensitivity of the Checklist for Autism in Toddlers (CHAT).

**Screening tools for children 18 months of age and older.** The ASD-specific screening tools that can be used with children 18 months and older are classified as level 1 and level 2 screening tools. Level 1 screening tools can be used with all children and are specifically designed to differentiate children who are at risk of ASD from those children with typical
development. Level 2 screening tools are used more often in early intervention programs or developmental clinics and are helpful in differentiating children who are at risk of ASD from those children who are at risk of other developmental disorders. There is considerable conceptual overlap between level 2 screening tools and other diagnostic tools for ASD. Level 2 screening tools require more time and training to administer and interpret than level 1 screening tools. Therefore, level 2 screening tools can be used as part of diagnostic evaluation in addition to being used for screening, but only in conjunction with clinical judgment and other diagnostic measures (Johnson et al., 2007).

**Level 1 screening tools.** The level 1 screening tools recommended by AAP include the following: Checklist for Autism in Toddlers (CHAT) (Baron-Cohen et al., 1992), Modified Checklist for Autism in Toddlers (M-CHAT) (Robins, Fein, Barton, & Green, 2001), Pervasive Developmental Disorders Screening Test – II (PDDST-II) (Siegel, 2004) and Childhood Autism Spectrum Test (CAST) (Scott, Baron-Cohen, Bolton, & Brayne, 2002). Among them the CHAT, M-CHAT and PDDST-II were specifically designed for routine screening of children 18 months or older who are at risk for ASD (Johnson et al., 2007).

The CHAT (Baron-Cohen et al., 1992) is a 14-item questionnaire that includes nine questions for the parent interview and five items for health care providers’ direct observation. It takes approximately 5 – 10 minutes to administer and score (Baron-Cohen et al., 2000). One study reported that CHAT had a sensitivity of 38% and a specificity of 98% with 18 month old children, and thus, it is appropriate to use in routine screening for ASD during regular well-child visits (Baird et al., 2000). Scambler, Rogers, & Wehner, (2001) also showed that the CHAT could be used effectively to identify children with ASD at 18 months or older and is effective in differentiating children with ASD from children with other developmental delays.
By making minor modifications to the original CHAT referred to as the Denver Modifications, Scambler et al. (2001) were able to increase the sensitivity to 85% and keep the specificity close to 100%. The CHAT, in its original form, or with the Denver Modifications, are effective screening tools that can be used for routine screening of children for ASD during the regular 18 and 24 month preventive visits.

The M-CHAT (Robins et al., 2001) is a 23-item questionnaire that is completed by a parent or caregiver. It is considered reliable in identifying children at risk for ASD and has a reported sensitivity of 85% and specificity of 93% (Dumont-Mathieu & Fein, 2005).

The PDDST-II (Siegel, 2004) is a 22-item questionnaire that should be completed by a parent or caregiver. This tool has a sensitivity of 92% and specificity of 91% in identifying children who are at risk for ASD/PDD. Therefore, the PDDST-II is considered a reliable screening tool that can be used with children who are 18 months or older (Johnson et al., 2007).

**Level 2 screening tools.** The Level 2 screening tools include the Asperger Syndrome Diagnostic Scale (ASDS) (Myles, Bock, & Simpson, 2001), Autism Behavior Checklist (ABC) (Krug, Arick, & Almond, 1980), Autism Spectrum Screening Questionnaire (ASSQ) (Ehlers, Gillberg, & Wing, 1999), Childhood Autism Rating Scale (CARS) (Schopler, Reichler, & Renner, 1988), Gilliam Asperger’s Disorder Scale (GADS) (Gilliam, 2001), Krug Asperger’s Disorder Index (KADI) (Krug & Arick, 2003), Pervasive Developmental Disorders Screening Test-II (PDDST-II) (Siegel, 2004), Screening Tool for Autism in Two-Year-Olds (STAT) (Stone, Coonrod, & Ousley, 2000), and Social Communication Questionnaire (SCQ) (Rutter, Bailey, & Lord, 2003). Among these, the ABC, CARS, and PDDST-II can be used with younger children and would be appropriate for routine screening of children during the well-child visits.
The *ABC* (Krug et al., 1980) is a 57-item behavioral checklist that is completed by teachers or parents. Questions are grouped in five areas: sensory, relating, body/object use, language, and social and self-help. Test administration is straightforward and efficient, making it one of the tools that can be used to routinely screen children for ASD (Volkmar et al., 1988).

The *CARS* (Schopler et al., 1988) is a behavioral observation checklist that is to be completed by a trained observer. The child’s behavior is rated on 15 dimensions. *CARS* has a sensitivity of 92% and specificity of 85% in identifying children 2 years or older who are at risk for ASD (Sevin, Matson, Coe, Fee, & Sevin, 1991). A multi site study assessing the effectiveness of the *CARS* indicated that there were significant differences in the mean scores among children in different diagnostic categories (i.e., Autistic Disorder, PDD-NOS, MR, and developmental delay) with high sensitivity and specificity between the *CARS* scores and the clinical diagnosis (Perry, Condillac, Freeman, Dunn-Geier, & Belair, 2005).

The instruments described above do not represent an exhaustive list of all the available screening tools; rather, it is a summary of widely-used, validated, age-appropriate tools that can be used to screen young children for ASD. The AAP has recommended that physicians choose one tool for each age group, become familiar with it, and use it consistently during the routine well-child visits.

**Advantages of Early Identification**

It is essential that physicians screen children for developmental delays, including ASD, on a regular basis so that an appropriate identification of any disorder can be made as early as possible in a child’s life. The advantages of an early diagnosis of an ASD include: early planning for intensive behavioral intervention and education, provisions for family supports and
education, reduction of stress and anguish of family members, and improvement of access to, and delivery of, appropriate and needed medical care (Cox et al., 1999; Filipek et al., 2000). It is also widely accepted that children with ASD have specific needs different from children with other developmental delays (Charman & Baird, 2002). Therefore, when children with ASD begin early intervention tailored to their special needs, their long term prognosis is optimized. There is also evidence to suggest that initiating intervention after these children get older yields diminishing returns (Mandell, Novak, & Zubritsky, 2005).

Several investigators have documented positive outcomes of children with ASD who have had the benefit of appropriate, intensive early intervention (Dawson, 2008; Dietz et al., 2006; Johnson et al., 2007; Landa et al., 2007; Mandell et al., 2005; Robins & Dumont-Mathieu, 2006). Children who have received early intervention have demonstrated improvements in their communication and social behavior, gains in IQ, reduced symptom severity, and reduced development of secondary behaviors. When the intervention has been delayed as a result of late identification, children lose the benefits of early intervention and the outcomes tend to be less successful (Dietz et al., 2006; Landa et al., 2007).

Children with ASD may have a critical period in their development, usually before 2 years of age, when the plasticity of their brain is optimal to respond to targeted intervention. During this period in their development they may not be far behind their typically developing peers and their behavioral and neural plasticity can be taken advantage of in providing maximal benefits (Eikeseth, Smith, Jahr, & Eldevik, 2002). Therefore, initiating early intervention will enable children with ASD to close the developmental gap between themselves and their typically developing peers (Eikeseth et al., 2002; Rogers, 1996). Also, intensive early interventions can increase the learning rates for children with ASD. Such higher learning rates may improve the
children’s developmental trajectory, providing them with the opportunity to match the
development of their typically developing peers (Howard, Sparkman, Cohen, Green, &
Stanislaw, 2005).

Early behavioral intervention programs also will help to reduce the negative secondary
behaviors caused by the underlying impairments in communication and social interaction that are
characteristic features of ASD (Charman & Baird, 2002). Studies have shown that when
appropriate interventions were initiated before the child experienced a loss or reduction in
language and/or social skills, it impacted the child’s development such that these losses were
often prevented or reduced (Charman & Baird, 2002; Dawson, 2008).

It has been reported that when a child has ASD, there is a 3 – 7% increased risk of
subsequent siblings developing ASD (Dietz et al., 2006). This is approximately 50 times higher
than the baseline risk for a child to have ASD (Committee on Children with Disabilities, 2001).
Early identification, then, provides an opportunity for appropriate and timely genetic counseling
for the parents. Early screening and diagnosis also can provide considerable financial savings to
both the families and the health care system when the appropriate services are used efficiently
and effectively (Mandell et al., 2005).

Delays in the diagnostic process not only affect the child’s development and long term
outcome, they can also have long term effects on the family. Parents feel frustrated and worried
as they struggle to obtain a confirmed diagnosis of ASD. They express greater satisfaction and
reduced distress when they receive the diagnosis for their child at an earlier age, as the earlier
diagnosis resulted in fewer visits to various clinicians (Goin-Kochel, Mackintosh, & Myers,
2006).
When a child is diagnosed with ASD, families often have a difficult time accepting the diagnosis and coping with the effects this disorder will have on their future family life. Early identification and intervention often helps families cope with the stress and emotional anguish of having a child with this disorder. It also helps parents understand the difficulties faced by children with ASD and find ways to provide them with much needed support (Dietz et al., 2006).

**Current Screening Practices for ASD**

With the increasing prevalence rate of children with ASD and the evidence for positive long term benefits associated with early intervention, early screening, diagnosis, and treatment is a health care priority (Bryson, Rogers, & Fombonne, 2003). Investigators have shown that ASD can be diagnosed reliably in children by or before the age of three years (Charman & Baird, 2002; Cox et al., 1999; Filipek et al., 1999; Moore & Goodson, 2003). An ASD diagnosis given to children who are two to three years of age tends to be very stable, with most of the children continuing to remain on the spectrum through the preschool years and even later in life (Charman & Baird, 2002; Filipek et al., 1999; Lord et al., 2006; Moore & Goodson, 2003). Cox et al. (1999) reported that all children who were diagnosed with ASD at 20 months remained on the spectrum and continued to receive a diagnosis of autism or a related pervasive developmental disorder in a follow-up evaluation at 42 months. Despite such published reports supporting the reliability of an early diagnosis and the development and advocacy of a number of screening and diagnostic instruments that can be used with very young children, the early identification of young children with ASD is still lagging (Dosreis et al., 2006; Ošlejšková et al., 2007; Sand et al., 2005; Wiggins, Baio, & Rice, 2006).
In its policy statement the AAP recommended that pediatricians and PCPs conduct regular screenings using an ASD-specific standardized screening instrument during the child’s first two years of life. This recommendation was prompted by a study which published the results of a survey conducted with Maryland and Delaware pediatricians (Dosreis et al., 2006). The findings of this study revealed that while 82% of the participants responded that they screened regularly for developmental problems using some type of screening tool, only 8% routinely screened for ASD using ASD-specific screening tools during well-child visits (Dosreis et al., 2006). In addition, this study highlighted that female physicians were more likely than male physicians to screen for developmental delays using standardized tools (Dosreis et al., 2006).

In 2008, Zeiger investigated the ASD screening practices of AAP member pediatricians and reported that 42% of these physicians routinely screened for autism using ASD-specific screening tools. While 70% of the pediatricians reported that they screened for general developmental delays using standardized screening tools, only 28% of the pediatricians were familiar with the current AAP guidelines for ASD screening.

Another survey of pediatricians revealed that only 23% of the respondents consistently used standardized screening tools consistently when screening for developmental delays during regular well-child visits; though, 71% of them indicated that they used clinical assessments or some form of non-standardized methods (Sand et al., 2005). The report further documented that without the use of standardized screening tools pediatricians tended not to consider important risk factors for developmental delays which affected their decisions regarding referrals.
Current Diagnostic Practices for ASD

Despite the emphasis being placed on the importance of an early diagnosis, children are not being diagnosed early enough. Howlin & Moore, (1997) examined the perspectives of parents of 1300 children with autism in the United Kingdom regarding the ASD diagnostic process and documented that the average age of ASD diagnosis was around 6 years. Wiggins et al. (2006) in metropolitan Atlanta, looked at the identification and diagnosing patterns of children with ASD and showed that the mean age of initial evaluation was 4 years and the average age of diagnosis was 5 years. In a study of 204 children in the Czech Republic, Ošlejšková et al. (2007) indicated that the average age of diagnosis was 6.8 years.

Though evidence suggests that the symptoms of ASD appear before 2 years of age, there has been a considerable delay from the time parents first raise concerns about their child’s development and when they receive a diagnosis of ASD. The final diagnosis rarely is made before the child reaches 3 years of age (Dietz et al., 2006) and the delay between the initial evaluation and getting a diagnosis is on average, 13 months (Wiggins et al., 2006). Further, Wiggins et al. (2006) indicated that while parents were concerned about their child’s development between the ages of 12 to 23 months, the children were not evaluated by a qualified professional until an average age of 4 years. Another study in the Czech Republic reported that the average delay from the parents first noticing symptoms to final diagnosis was 54 months (Ošlejšková et al., 2007).

Studies have reported that children are being diagnosed at an earlier age. A survey of the parents and caregivers of children with ASD in Pennsylvania indicated that the average age of diagnosis was 3.1 years for children with autistic disorder, 3.9 years for PDD-NOS, and 7.2 years
for AS (Mandell et al., 2005). In another study of 494 parents of children with autism, Goin-Kochel et al. (2006) showed an average age of diagnosis for autism at 3.4 years and 7.5 years for Asperger’s syndrome.

Rhoades, Scarpa & Salley (2007) conducted a survey of parents and caregivers of children with ASD in Virginia and showed that the average age of diagnosis was 4 years, 10 months. However, more than half the sample reported receiving their initial diagnosis after the age of 3 years and 9 months. The most frequent age at which the diagnosis was received, as reported by the survey participants, was 3 years. Another study examining parental satisfaction relative to the diagnostic process for ASD conducted by Goin-Kochel et al. (2006) revealed that children who were 11 years or younger at the time of the survey received their diagnosis of ASD at an younger age compared to those children who were older than 11 years at the time of survey, suggesting a trend of earlier diagnosis by physicians. Though these studies may suggest a welcome trend that children are being diagnosed earlier, there is still need for improved screening practices by physicians and other health care professionals to identify children with ASD as early as possible.

**Barriers to Early Screening and Diagnosis**

Despite the evidence documenting the need to screen children for ASD during preventive well-child visits, physicians have continued to identify challenges and barriers that have prevented them from engaging in this type of assessment. In a survey of Maryland and Delaware pediatricians, Dosreis et al. (2006) documented that frequent barriers to the routine screening for ASD were a lack of time and not being familiar and confident with the screening tools specific to ASD. While only 22% of pediatricians reported that they were not familiar with the screening
tools used for general developmental screening, 62% indicated that they were not familiar with ASD-specific screening tools. Additionally, 47% of pediatricians reported not being confident with identifying the signs and symptoms of ASD and indicated they routinely referred the child to a specialist when they suspected ASD (Dosreis et al., 2006). Pediatricians also indicated that screening tools were expensive and they were unaware of their effectiveness. These pediatricians thus preferred to rely on their clinical judgment rather than use ASD screening tools.

Zeiger, (2008) reported that most common barriers for AAP member pediatricians to conduct routine ASD screenings were as follows: relied primarily on clinical observations, not being familiar with the ASD-specific screening tools, referral to a specialist, lack of time to conduct ASD screenings, inadequate reimbursement to use the ASD-specific screening tools, and ASD-specific screening tools were expensive and not effective.

A survey of AAP member pediatricians indicated that the most common barriers to conducting routine screenings for developmental delays were as follows: time limitations in the current practice setting, lack of adequate office staff to conduct formal screening, and inadequate reimbursement for the services when they performed a formal screening using standardized screening tools (Sand et al., 2005). Other barriers reported by the pediatricians participating in this study were as follows: they or other office staff were not familiar with the language of the family, they lacked confidence in their ability to screen, a lack of available medical treatment options for children who had positive screening results, lack of knowledge about the available resources for the children who had positive screening results, lack of confidence for the validity and reliability of the screening tools, and a belief that routine standardized screenings were not their responsibility (Sand et al., 2005).
potential challenges for physicians in conducting routine screening for ASD

Asd is a complex disorder that includes a heterogeneous phenotype with a varied spectrum of presentation (Committee on Children with Disabilities, 2001). There is no single characteristic pathognomonic feature that can assist physicians in making a diagnosis of ASD. Additionally, there are no definitive objective laboratory tests to assist with the diagnosis of ASD. Therefore, physicians have to rely on clinical judgments and accounts from parents and caregivers (Johnson et al., 2007). Studies have shown that it was not uncommon for physicians to dismiss the initial concerns raised by parents and caregivers about the delay in their child’s development. The lack of objective, valid screening and diagnostic tools has been reported as a major reason some physicians have adopted a wait and watch approach to diagnosing ASD (Howlin & Asgharian, 1999; Howlin & Moore, 1997).

Still, our understanding of ASD has changed over the years (Johnson et al., 2007; Lord & Bishop 2010). The diagnostic criterion of ASD also has changed as our knowledge of the disorder has improved (APA, 2000; Johnson et al., 2007). A survey of health care providers’ knowledge of ASD indicated that PCPs were aware of the diagnostic criteria outlined in the DSM-IV-TR. Yet, it appeared, PCPs continued to hold knowledge and beliefs that were outdated in the area of ASD (Heidgerken et al., 2005). The differing opinions among physicians have led to confusion and delays in the screening and diagnostic processes. Therefore, it is imperative that physicians remain current relative to the resources available to them so they can provide evidence based screening and diagnostic services to their patients presenting with characteristics of ASD (Johnson et al., 2007).
Effects of Physician Education/Training on Screening Practices

Specialty areas differ in the level and methods used to educate/train physicians about developmental and behavioral diagnoses. Physicians are generally trained in organic diseases and to look for any kind of objective, identifiable, anatomical, or physiological abnormality that may suggest the possibility of an underlying organic disease. The training physicians receive on diagnosing disorders that are behavioral in nature may be somewhat limited (Skellern, McDowell, & Schluter, 2005). For example, a survey of medical students indicated that fourth year medical students had improved knowledge about the diagnostic criteria of ASD, but their knowledge about available empirical interventions was limited (Shah, 2001). Further, this study reported that the medical students’ knowledge regarding possible etiology and cognitive profiles was limited.

Studies have reported that limited education translates to practice; therefore, physicians lack confidence in their ability to screen for developmental disorders such as ASD. Rhoades et al. (2007) reported that some physicians believe their training is limited and less than adequate in the area of ASD; thus, reducing their confidence when screening and diagnosing children with ASD. This was consistent with the earlier reports from Dosreis et al. (2006) and Sand et al. (2005) regarding physicians’ knowledge and confidence with screening tools and their ability to recognize and identify the clinical characteristics of ASD.

Multidisciplinary Approach to Screening Children for ASD

Organizations such as the AAP, Child Neurology Society, and AAN recommended and acknowledged the importance of a multidisciplinary team working collaboratively during the screening and diagnostic process. The agencies stated that multidisciplinary teams should
include: parents, other care givers, health-care professionals from other disciplines including, but not limited to, psychologists, physician assistants, nurse practitioners, speech-language pathologists, occupational therapists, physical therapists, special educators, and any other health care professionals who were involved in the care of the child with ASD (Filipek et al., 1999; Johnson et al., 2007). Such a multidisciplinary team approach would make the screening and diagnostic process more efficient and effective for the child with ASD (Johnson et al., 2007). The American Speech-Language Hearing Association (ASHA) developed guidelines in an attempt to provide support and also document the importance of the role played by other health professionals in the diagnosis and evaluation of children with ASD. This guideline outlined the screening protocols and procedures to be followed by these professionals. The various screening tools and screening procedures recommended by these guidelines were consistent with and complemented the AAP policy statement (ASHA, 2006).

**Parents’ Role in the Screening and Diagnostic Process**

Heightened media attention, coupled with rising prevalence rates, has increased the public’s awareness of ASD (CDC 2012). It is anticipated, therefore, that parents will begin to raise concerns to their physicians about their child’s development much earlier in the child’s life. Dosreis et al. (2006) indicated that among the physicians who screened routinely for ASD, parental concern about their child’s development was an important reason to conduct the screenings. This report underscored the important role parents play in the screening and diagnostic process of their children.

Studies have shown that parents have valid concerns about their children’s development between 15 and 18 months of age. Those concerns may not be addressed, however, if physicians
fail to ask parents about his/her child; or if parents do not feel comfortable discussing their concerns with the physician (Glascoe, 2000; Glascoe & Dworkin, 1995; Johnson et al., 2007). Also, the diagnosis of ASD may be delayed when the parents fail to recognize the developmental concerns due to a lack of adequate knowledge regarding typical development in young children (De Giacomo & Fombonne, 1998; Johnson et al., 2007). Lack of confidence in physicians, combined with parents’ lack of knowledge about typical child development, perpetuates a delay in the diagnostic process (De Giacomo & Fombonne, 1998; Johnson et al., 2007).

Having stable, regular health care can assist in receiving a more timely diagnosis as well. Mandell et al. (2005) reported that for families who had changed or consulted four or more primary care physicians, there was a delay of approximately six months in receiving a diagnosis of ASD. There may be a multitude of reasons for having several physicians providing care for a child, such as: poor access, family instability, professional instability, not realizing the importance of consistent and continuous care, or most importantly, not having concerns properly addressed by the physician (Mandell et al., 2005). Whatever the reason, it is necessary parents recognize the importance of maintaining stable healthcare providers for their child. Not only will this practice provide better overall care for the child, it will also afford the physician the opportunity to observe potential developmental delays, including those related to ASD (Johnson et al., 2007; Mandell et al., 2005).

Pilot Study

As a pilot study to the current study, the investigator surveyed pediatricians and PCPs in the state of Kansas to identify their screening and diagnostic practices specifically related to ASD. The survey was mailed to 301 randomly selected pediatricians and PCPs from the Kansas
Medical Society public mailing list. A total of 103 surveys were returned, rendering an overall return rate of 34%. Of the 103 surveys returned, two were incomplete and excluded from the analysis. Thus, of the 101 completed surveys, 13 (13%) respondents reported that they routinely screened for ASD at least twice before 24 months using ASD-specific screening tools in accordance with AAP guidelines. Twenty additional respondents (19%) reported conducting some ASD screenings but not following the AAP guidelines. Thus, 33 (32%) of the 101 respondents reported that they routinely screened children for ASD using ASD-specific screening tools.

A series of chi-squares were conducted to determine whether there were any association between the ASD screening practices of the respondents and their demographic characteristics. There was a significant association between the ASD screening practices of the respondents and their professional role, $\chi^2(1, n = 101) = 16.54, p < .001$. Among the 24 pediatricians, 67% reported that they routinely screened for ASD using ASD-specific screening tools and among the 77 PCPs, 78% reported that they did not screen for ASD. There was a significant association between the ASD screening practices of the respondents and their gender, $\chi^2(1, n = 101) = 5.98, p = .014$. Of the total 38 female respondents, 18 (47%) reported that they routinely screened for ASD using ASD-specific screening tools and of the total 63 male respondents, 48 (76%) reported that they did not screen for ASD.

For female physicians, there was a significant association between ASD screening practices and professional role, $\chi^2(1, n = 38) = 8.66, p = .003$. Among female pediatricians, 79% of them reported that they screened for ASD using ASD-specific screening tools and among female PCPs, 71% of them reported that they did not screen for ASD. For the respondents who held MD credential, there was significant association between ASD screening practices and
Among the pediatricians who held MD credential, 73% reported that they screened for ASD using ASD-specific screening tools and among the PCPs who held MD credential, 81% reported that they did not screen for ASD. There were no significant differences between the ASD screening practices of the respondents and other demographic characteristics.

Of the 33 respondents who reported that they screen for ASD, 17 (52%) reported that they used the M-CHAT and 5 (15%) used the CHAT to conduct ASD screenings. The four most commonly reported barriers to conducting routine ASD screenings were as follows: (1) physicians were not familiar with ASD-specific screening tools, (2) were not adequately trained to conduct ASD screenings, (3) lack of sufficient time to conduct ASD screenings, and (4) referred the child to a specialist. Among the pediatricians, 79% reported that they had diagnosed children with ASD. Among the PCPs, 65% reported that they had not diagnosed children with ASD. Of the total 67 respondents who reported that they did not screen for ASD, 24 (36%) reported that they had diagnosed children with ASD. In conclusion, female pediatricians who held MD credential were more likely to routinely screen children for ASD using ASD-specific screening tools.

**Statement of Purpose**

The purpose of this study was to identify the screening practices of pediatricians and PCPs in following AAP guidelines specifically related to ASD in Kansas, Oklahoma, and Iowa.

**Research Questions**

The research questions that were addressed in this study are:
Primary research questions.

1) What were the differences among survey respondents according to the demographic characteristics (i.e., gender, age, professional role, professional designation, practice setting, years in practice post residency, and practice community)?

2) Do pediatricians and PCPs in Kansas, Oklahoma, and Iowa follow the AAP guidelines to screen for ASD/PDD?

3) Do the ASD/PDD screening practices of pediatricians and PCPs differ based on demographic characteristics (i.e., gender, age, professional role, professional designation, practice setting, years in practice post residency, and practice community)?

Additional research questions: questions related to screening tools, follow-up procedures, barriers, educational preparation.

4) What screening tools do pediatricians and PCPs use to screen for ASD/PDD?

5) What follow-up procedures do pediatricians and PCPs use with children who receive a positive screening result?

6) What do pediatricians and PCPs identify as barriers to screening for ASD/PDD?

7) Do pediatricians and PCPs diagnose ASD/PDD?

8) Do pediatricians and PCPs diagnose ASD/PDD without administering a screening test?

9) Do the ASD/PDD screening practices of pediatricians and PCPs differ based on their pre-professional education?
10) Do pediatricians and PCPs feel confident to identify the early warning signs of ASD/PDD?

11) What do PCPs and pediatricians report would help them be better prepared to screen, diagnose and treat children with ASD/PDD?
CHAPTER III

Method

Procedure

Study instrument. The study instrument was a paper survey that included questions related to the screening, diagnosis and referral practices of the participants specifically related to ASD. The survey included questions from four areas: demographics of the participants; screening, diagnosis and referral practices specifically related to ASD; information about AAP guidelines on screening for ASD; and participants training specifically related to ASD. The questions for this survey were developed based on the information and feedback received from the survey conducted as a part of the pilot project to this study. The pilot project was conducted by the principal investigator of this study (Coufal, Self, & Rajagopalan, 2010). In addition, surveys from other studies published in refereed journals were reviewed to assist in the development of the framework and the content of the survey instrument (Dosreis et al., 2006; Sand et al., 2005; Self, Coufal, & Parham, 2010; Sices et al., 2003). Once the survey had been constructed, feedback on the content and the format of the instrument was obtained from Drs. Valarie Kerschen and Steven Allen, Assistant Professors and developmental pediatricians at the Kansas University School of Medicine in Wichita, KS. The final survey was modified based on the input from these professionals.

The survey instrument included a total of 21 questions with multiple choice answers and likert scales of agreement. The participants were asked to respond to the following: 8 questions on demographics; 8 questions concerning ASD/PDD screening, diagnostic and referral practices;
and 5 questions based on the physician’s knowledge of AAP guidelines and training information. The survey took approximately five to ten minutes to complete.

Questions related to demographics included gender, age, professional role, professional designation, practice setting, years in post-residency practice, and community in which they practiced. The demographic data also included the zip code of the participants to determine if the screening practices followed by participants were potentially influenced by the geographical location of their practice. The screening and referral information section included questions specifically related to ASD, such as: the participant’s screening practice, screening schedule, tools used for screening, referral practices, barriers to screening, and resources available to the patients. The last question was an open-ended question that asked about the changes that could be made in education and training which, in their opinion, would help them feel more confident and better prepared to screen, diagnose and treat children with ASD/PDD.

**Participants.** The study sample was selected from a comprehensive mailing list of pediatricians and primary care physicians (PCPs) registered in Kansas, Oklahoma, and Iowa. The comprehensive mailing list was developed by combining the public mailing list of all the pediatricians and PCPs who were registered in these three mid-western states. The public mailing list for the physicians was acquired by contacting the state medical boards in each of these three states via telephone and email. The investigator explained the purpose of the study to the state medical boards and requested that they send the mailing lists of the pediatricians and PCPs for their respective states. While making the request, the investigator also indicated that the study had been approved by the Institutional Review Board at Wichita State University (WSU). The state medical boards sent the investigator an electronic data file that contained the physicians’
mailing addresses and other demographic information such as professional title, practice specialty and subspecialty, and licensure status.

The investigator removed physicians whose specialty and subspecialty information indicated that they would not provide routine clinical care to young children from the list. The investigator then created separate mailing lists for PCPs and pediatricians from each of the three states resulting in a total of six different mailing lists. The mailing list for each state was as follows:

1) Kansas: PCP list = 892; Pediatricians list = 303; Total physicians = 1195

2) Oklahoma: PCP list = 920; Pediatricians list = 339; Total physicians = 1259

3) Iowa: PCP list = 1549; Pediatricians list = 303; Total physicians = 1852

The physicians in each of the six lists were numbered from first to last treating each list as an independent group. The investigator then used a stratified random sampling technique to select the study participants. The random number generator on the website randomizer.org (Urbaniak & Plous, 2011) was used to generate 250 random numbers for each list independent of one another. The random numbers were then matched with the corresponding numbers on the mailing lists to select the study participants. The mailing addresses of the selected participants were verified with the WSU postal service to ensure that the mailing addresses were current and valid. Unverified mailing addresses were removed from the lists of participants and replaced with the next verified address. The final study sample consisted of 1500 participants representing 250 PCPs and 250 pediatricians from each of the three states.
**Survey administration.** Each study sample, survey, mailing envelope, and return envelope was coded for anonymity to monitor those participants who had completed the survey and to allow for a follow-up survey to be mailed to non-responders. The purpose of the study, method of participant selection, anonymity and confidentiality of the participants, approval of Internal Review Board at WSU, and voluntariness of the participation in the study was explained within the header of the survey. The survey also included contact information for the Office of Research Administration at WSU, the investigator, and the faculty member directing the research project. This was included to encourage the participants to contact the investigator and/or faculty member if there were any questions regarding the study.

The survey was mailed to selected participants. Each mailing included the survey, a postage paid return envelope, and a postcard thanking the physician for taking the time to complete the survey. A follow-up mailing was sent to the non-responders in four weeks. A second follow-up mailing was sent to the non-responders four weeks after the first follow-up. To protect the confidentiality of the participants the survey did not include any personal identifying information. Only the investigator had access to such identifying information and it was used only for the purposes of monitoring survey completion and mailing follow-up surveys. The completed surveys have been placed in a secured, locked cabinet in the WSU Department of Communication Sciences and Disorders. Only the investigator and the faculty member have access to this file cabinet.

**Data Analysis**

Data from the returned surveys was aggregated and analyzed as group data. Data were entered into SPSS 17.0 by the principal investigator. To check for reliability of the data entry, a
research assistant independently re-entered data from 30 randomly selected returned surveys. Those data entries were completed without any knowledge of the original entries performed by the principal investigator. The data entries were compared between the principal investigator and the research assistant to check for any discrepancies. The discrepancies identified between the principal investigator and the research assistant’s entries were compared to the original survey. Data entry errors occurred less than 1% of the time.

A frequency distribution was run to identify pediatricians and PCPs who routinely screened for ASD following AAP guidelines and those who did not. This information was calculated for the whole group and also for individual states. Chi-squares were computed to analyze the differences among the respondents based upon demographic characteristics. Chi-squares were computed among demographic variables for the respondents who routinely screened for ASD in accordance with AAP guidelines, those who routinely screened for ASD but did not follow AAP guidelines, and those who did not to identify if any demographic variables contributed to the differences in their screening and diagnostic practices. A logistic regression was run to predict a model that would explore the impact of the demographic characteristics of the respondents on the ASD screening practices of the respondents.

Frequency distribution analyses was run to determine commonly used ASD-specific screening tools reported by the respondents, commonly reported follow-up procedures that the respondents used when following up with children who received a positive ASD screening result, commonly reported barriers to conduct routine ASD screenings, reasons reported by the respondents to diagnose a child with ASD without having administered a screening for that particular child, and commonly reported actions that would help the physicians be better prepared to screen, diagnose and treat children with ASD/PDD.
A Spearman correlation analysis was run to determine effects of the pre-professional training received by the respondents in the area of ASD on their ASD screening practices. Mean and standard deviations were computed for the knowledge and confidence variables in the area of ASD among the respondents who reported that they screened for ASD and those who did not screen for ASD.
CHAPTER IV

Results

A total of 1,500 surveys were mailed to PCPs and Pediatricians in Kansas, Oklahoma, and Iowa. A series of three mailings were conducted to achieve the best possible return rate. A total of 481 participants returned the surveys, rendering an overall response rate of 32%. The response rate for each professional group was as follows: pediatricians, 35% (n = 263) and PCPs, 29% (n = 218). Table 2 shows the number of responses received by professional role and state for each mailing.

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<td>16 (27%)</td>
<td>25 (27%)</td>
<td>16 (26%)</td>
</tr>
<tr>
<td>follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>23 (23%)</td>
<td>20 (21%)</td>
<td>16 (23%)</td>
<td>17 (28%)</td>
<td>25 (27%)</td>
<td>17 (28%)</td>
</tr>
<tr>
<td>follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100 (100%)</td>
<td>97 (100%)</td>
<td>70 (100%)</td>
<td>60 (100%)</td>
<td>93 (100%)</td>
<td>61 (100%)</td>
</tr>
</tbody>
</table>

*Note.* Percentages by professional role are in parentheses (Pediatricians n = 263; PCPs n = 218).

Of the 481 surveys received, 38 surveys were considered incomplete and were removed from the analysis. Of the 38 incomplete surveys, 21 respondents reported that they had retired from active clinical practice, 14 reported that the survey did not pertain to them, as they did not provide routine clinical care to young children, and 3 declined to complete the survey. Among
the 443 completed surveys, 47 respondents reported that they did not provide routine clinical care to young children and were, therefore, excluded from the analysis. A total of 396 surveys were included in the final analysis.

**General Demographic Characteristics of Respondents**

The demographic information of the survey respondents by state are summarized in Table 3. Of the 396 respondents, 56% \((n = 223)\) were pediatricians and 44% \((n = 173)\) were PCPs. Of the total respondents, there was an equal number of female and male respondents \((n = 198)\). There were 301 (76%) respondents who were between the ages of 35 and 64 years. There were 346 (87%) respondents that held the medical doctor (MD) credential and 50 (13%) that held the doctor of osteopathy (DO) credential. All of the respondents from Oklahoma held the MD credential. A total of 290 (73%) respondents reported that they worked in either a large or small group practice. Of the 393 respondents who responded to the years in practice post residency question, 179 (46%) were in the two extreme categories. There were 97 (25%) respondents who reported that they were in clinical practice for more than 26 years post residency and 82 (21%) who reported that they were in clinical practice for less than 5 years post residency. Among the total respondents, 39% reported that they practice in a suburban community.
Table 3

Demographic Characteristics of Respondents by State

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Kansas (n = 161)</th>
<th>Oklahoma (n = 110)</th>
<th>Iowa (n = 125)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional role</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pediatrician</td>
<td>79 (49%)</td>
<td>66 (60%)</td>
<td>78 (62%)</td>
</tr>
<tr>
<td>PCP</td>
<td>82 (51%)</td>
<td>44 (40%)</td>
<td>47 (38%)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>84 (52%)</td>
<td>54 (49%)</td>
<td>60 (48%)</td>
</tr>
<tr>
<td>Male</td>
<td>77 (48%)</td>
<td>56 (51%)</td>
<td>65 (52%)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 – 34</td>
<td>28 (17%)</td>
<td>14 (13%)</td>
<td>24 (19%)</td>
</tr>
<tr>
<td>35 – 44</td>
<td>46 (29%)</td>
<td>26 (24%)</td>
<td>39 (31%)</td>
</tr>
<tr>
<td>45 – 54</td>
<td>33 (21%)</td>
<td>29 (26%)</td>
<td>26 (21%)</td>
</tr>
<tr>
<td>55 – 64</td>
<td>46 (29%)</td>
<td>29 (26%)</td>
<td>27 (22%)</td>
</tr>
<tr>
<td>≥ 65</td>
<td>8 (5%)</td>
<td>12 (11%)</td>
<td>9 (7%)</td>
</tr>
<tr>
<td>Professional designation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD</td>
<td>133 (83%)</td>
<td>110 (100%)</td>
<td>103 (82%)</td>
</tr>
<tr>
<td>DO</td>
<td>28 (17%)</td>
<td>0 (0%)</td>
<td>22 (18%)</td>
</tr>
<tr>
<td>Practice setting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>16 (10%)</td>
<td>4 (4%)</td>
<td>13 (10%)</td>
</tr>
<tr>
<td>Large group practice</td>
<td>41 (26%)</td>
<td>37 (34%)</td>
<td>41 (33%)</td>
</tr>
<tr>
<td>Small group practice</td>
<td>74 (46%)</td>
<td>41 (37%)</td>
<td>56 (45%)</td>
</tr>
<tr>
<td>Independent / private practice</td>
<td>18 (11%)</td>
<td>17 (16%)</td>
<td>6 (5%)</td>
</tr>
<tr>
<td>Other</td>
<td>12 (8%)</td>
<td>11 (10%)</td>
<td>9 (7%)</td>
</tr>
<tr>
<td>Years in practice post residency&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5</td>
<td>33 (21%)</td>
<td>17 (16%)</td>
<td>32 (26%)</td>
</tr>
<tr>
<td>6 – 10</td>
<td>22 (14%)</td>
<td>10 (9%)</td>
<td>24 (19%)</td>
</tr>
<tr>
<td>11 – 15</td>
<td>28 (18%)</td>
<td>16 (15%)</td>
<td>10 (8%)</td>
</tr>
<tr>
<td>16 – 20</td>
<td>17 (11%)</td>
<td>12 (11%)</td>
<td>13 (10%)</td>
</tr>
<tr>
<td>21 – 25</td>
<td>24 (15%)</td>
<td>18 (17%)</td>
<td>20 (16%)</td>
</tr>
</tbody>
</table>
Results of Question 1: What were the differences among survey respondents according to
the demographic characteristics (i.e., gender, age, professional role, professional
designation, practice setting, years in practice post residency, and practice community)?

A chi-square was computed to determine whether there were any differences among the
respondents among the three states based on demographic variables. Table 4 summarizes the
demographic characteristics of the respondents by their professional role and gender. There was
a significant difference between the professional designation among the respondents when all
three states were considered, $\chi^2(2, n = 396) = 22.01, p < .001$. Among the respondents from
Kansas and Iowa, 83% and 82% of them respectively, held a MD credential. All of the
respondents from Oklahoma held the MD credential. No other significant differences were found
among the respondents on the other demographic variables: professional role, $\chi^2(2, n = 396) =
5.93, p = .052$, gender, $\chi^2(2, n = 396) = 0.54, p = .763$, age of the respondents, $\chi^2(8, n = 396) =
8.46, p = .390$, practice setting, $\chi^2(8, n = 396) = 14.51, p = .069$, years in practice post residency,
$\chi^2(10, n = 393) = 15.34, p = .120$, and practice community, $\chi^2(4, n = 396) = 1.95, p = .744$. 

---

Table 3 (continued)

<table>
<thead>
<tr>
<th>Practice community</th>
<th>≥ 26</th>
<th>36 (23%)</th>
<th>35 (32%)</th>
<th>26 (21%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>44 (27%)</td>
<td>28 (26%)</td>
<td>32 (26%)</td>
<td></td>
</tr>
<tr>
<td>Suburban</td>
<td>62 (39%)</td>
<td>47 (43%)</td>
<td>44 (35%)</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>55 (34%)</td>
<td>35 (32%)</td>
<td>49 (39%)</td>
<td></td>
</tr>
</tbody>
</table>

Note. Percentages by state are in parentheses.

*a* 1 respondent from Kansas and 2 from Oklahoma did not respond to the years in practice post
residency as they were still doing their residency program.
Table 4

*Descriptive Characteristics of the Respondents by Professional Role and Gender*

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Pediatrician</th>
<th></th>
<th>PCP</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female (n = 126)</td>
<td>Male (n = 97)</td>
<td>Female (n = 72)</td>
<td>Male (n = 101)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 – 34</td>
<td>23 (18%)</td>
<td>7 (7%)</td>
<td>21 (29%)</td>
<td>15 (15%)</td>
</tr>
<tr>
<td>35 – 44</td>
<td>41 (33%)</td>
<td>25 (26%)</td>
<td>28 (39%)</td>
<td>17 (17%)</td>
</tr>
<tr>
<td>45 – 54</td>
<td>36 (29%)</td>
<td>13 (13%)</td>
<td>12 (17%)</td>
<td>27 (27%)</td>
</tr>
<tr>
<td>55 – 64</td>
<td>23 (18%)</td>
<td>32 (33%)</td>
<td>11 (15%)</td>
<td>36 (36%)</td>
</tr>
<tr>
<td>≥ 65</td>
<td>3 (2%)</td>
<td>20 (21%)</td>
<td>0 (0%)</td>
<td>6 (6%)</td>
</tr>
<tr>
<td>Professional designation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD</td>
<td>118 (94%)</td>
<td>88 (91%)</td>
<td>58 (81%)</td>
<td>82 (81%)</td>
</tr>
<tr>
<td>DO</td>
<td>8 (6%)</td>
<td>9 (9%)</td>
<td>14 (19%)</td>
<td>19 (19%)</td>
</tr>
<tr>
<td>Years in practice post residency(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5</td>
<td>33 (26%)</td>
<td>14 (14%)</td>
<td>23 (32%)</td>
<td>12 (12%)</td>
</tr>
<tr>
<td>6 – 10</td>
<td>16 (13%)</td>
<td>15 (16%)</td>
<td>15 (21%)</td>
<td>10 (10%)</td>
</tr>
<tr>
<td>11 – 15</td>
<td>20 (16%)</td>
<td>7 (7%)</td>
<td>11 (15%)</td>
<td>16 (16%)</td>
</tr>
<tr>
<td>16 – 20</td>
<td>16 (13%)</td>
<td>8 (8%)</td>
<td>8 (11%)</td>
<td>10 (10%)</td>
</tr>
<tr>
<td>21 – 25</td>
<td>25 (20%)</td>
<td>11 (11%)</td>
<td>7 (10%)</td>
<td>19 (19%)</td>
</tr>
<tr>
<td>≥ 26</td>
<td>16 (13%)</td>
<td>42 (43%)</td>
<td>8 (11%)</td>
<td>31 (32%)</td>
</tr>
<tr>
<td>Practice community</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>35 (28%)</td>
<td>33 (34%)</td>
<td>15 (21%)</td>
<td>21 (21%)</td>
</tr>
<tr>
<td>Suburban</td>
<td>57 (45%)</td>
<td>41 (42%)</td>
<td>26 (36%)</td>
<td>29 (29%)</td>
</tr>
<tr>
<td>Rural</td>
<td>34 (27%)</td>
<td>23 (24%)</td>
<td>31 (43%)</td>
<td>51 (51%)</td>
</tr>
</tbody>
</table>

*Note.* Percentages by gender are in parentheses.

\(^a\)3 male PCPs did not respond to the years in practice post residency as they were still doing their residency program.
There was a significant association between professional role of the respondents and their
gender, $\chi^2(1, n = 396) = 8.63, p = .003$; professional role and designation, $\chi^2(1, n = 396) = 11.58,$
$p = .001$; and professional role and the community where they practiced, $\chi^2(2, n = 396) = 20.44,$
$p < .001$. Table 4 summarizes the demographic characteristics of the respondents by professional
role and gender. Among the pediatricians ($n = 223$), 57% were female physicians. Among the
PCPs ($n = 173$), 58% were male physicians. A total of 206 (92%) pediatricians and 140 (81%) PCPs held the MD credential. Among the pediatricians, 44% reported that they practiced in a
suburban community. Among the PCPs, 48% reported that they practiced in a rural community.
There was no significant association between the professional role of the respondents and their age,
$\chi^2(4, n = 396) = 10.10, p = .039$, professional role and practice setting, $\chi^2(4, n = 396) = 1.68,$
$p = .794$, and professional role and years in practice post residency, $\chi^2(5, n = 393) = 1.47, p =
.917$.

There was a significant association between the gender of the respondents and their age,
$\chi^2(4, n = 396) = 44.20, p < .001$. There was also a significant association between the gender of
the respondents and their years in practice post residency, $\chi^2(5, n = 393) = 38.46, p < .001$.
Among the respondents who were 44 years or younger, 64% were female physicians and among
the respondents who were 55 years or older, 72% were male physicians (see Table 4). Of the 393
respondents who responded to the years in practice post residency question, 60% of the female
participants reported that they had been in practice for 15 years or less post residency and 62% of
the male participants reported that they had been in practice for more than 15 years post
residency.

Among the pediatricians, there was a significant association between gender and age,
$\chi^2(4, n = 223) = 34.05, p < .001$, and a significant association between gender and years in
practice post residency, $\chi^2(5, n = 223) = 30.48, p < .001$. Among the pediatricians who were younger than 54 years of age, 69% of them were female physicians; and among the pediatricians who were 55 years or older, 67% of them were male physicians. Of the 105 pediatricians who were in clinical practice for 15 years or less post residency, 66% of them were female physicians.

Among the PCPs, there was a significant association between gender and age, $\chi^2(4, n = 173) = 24.59, p < .001$, and a significant association between gender and years in practice post residency, $\chi^2(5, n = 170) = 21.23, p = .001$. Among the PCPs who were 45 years or older, 75% were male physicians. Among the PCPs who were in clinical practice for 16 years or more post residency, 72% were male physicians.

Results of Question 2: Do pediatricians and PCPs in Kansas, Oklahoma, and Iowa follow the AAP guidelines to screen for ASD/PDD?

**ASD screening practices that do or do not follow AAP guidelines.** When physicians in Kansas, Oklahoma, and Iowa were asked if they followed the AAP guidelines to routinely screen for ASD/PDD, 66 (17%) of respondents reported that they screened routinely for ASD at the 18 and 24 month well-child visits in accordance with AAP guidelines using ASD-specific screening tools. The screening practices of these 66 respondents are summarized in Table 5. To determine whether there was an association between the screening practices of the respondents in accordance to AAP guidelines and their professional role, a chi-square was computed. A significant association between the professional role and the screening practices was found, $\chi^2(1, n = 396) = 38.53, p < .001$. Of the 66 respondents who screened for ASD according to AAP guidelines, 60 (91%) were pediatricians. Among all the pediatricians ($n = 223$), 27% screened according to the AAP guidelines and among all the PCPs ($n = 173$), only 3% followed the
guidelines. The screening practices of the respondents did not differ significantly among the three states, \( \chi^2(2, n = 396) = 0.49, p = .781 \). Among the pediatricians from each state, 32% from Kansas, 24% from Oklahoma, and 24% from Iowa screened for ASD following the AAP guidelines.

Table 5

<table>
<thead>
<tr>
<th>Professional Role</th>
<th>Screen for ASD by AAP Guidelines</th>
<th>Do not screen for ASD by AAP guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kansas (89%)</td>
<td>Oklahoma (100%)</td>
</tr>
<tr>
<td>Pediatrician</td>
<td>25 (89%)</td>
<td>16 (100%)</td>
</tr>
<tr>
<td>PCP</td>
<td>3 (11%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Total</td>
<td>28 (100%)</td>
<td>16 (100%)</td>
</tr>
</tbody>
</table>

*Note.* Percentages by the state are in parentheses.

**ASD screening practices that follow guidelines, other ASD screening practices, or not screening.** Although only 66 reported that they screened for ASD according to AAP guidelines, there were 162 (41%) respondents who reported that they routinely screened for ASD using ASD-specific screening tools, but not in accordance with AAP guidelines. Thus, a total of 228 (58%) respondents reported that they, or other staff members in their office, routinely screened children for ASD using ASD-specific screening tools. Table 6 summarizes the screening practices of the respondents by the professional role and state. Of the 162 respondents who routinely screened for ASD, but only followed some portion of the AAP guidelines, 92 reported that they conducted routine ASD screenings for children at the 18 month well-child visit, but not at the 24 month well-child visit. A total of 37 respondents reported that they screened routinely for ASD, but further indicated that they conducted ASD screenings only when
a concern was raised by the parent, when the child was referred for an ASD screening, and/or when they suspected ASD. In addition, 3 respondents, who reported that they screened routinely for ASD, did not report their screening schedule.

Table 6

<table>
<thead>
<tr>
<th>State</th>
<th>Screen and follow AAP guidelines</th>
<th>Screen but do not follow AAP guidelines</th>
<th>Do not screen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pediatricist</td>
<td>PCP</td>
<td>Pediatricist</td>
</tr>
<tr>
<td>Kansas</td>
<td>25 (42%)</td>
<td>3 (50%)</td>
<td>37 (32%)</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>16 (27%)</td>
<td>0 (0%)</td>
<td>36 (31%)</td>
</tr>
<tr>
<td>Iowa</td>
<td>19 (32%)</td>
<td>3 (50%)</td>
<td>44 (38%)</td>
</tr>
<tr>
<td>Total</td>
<td>60 (100%)</td>
<td>6 (100%)</td>
<td>117 (100%)</td>
</tr>
</tbody>
</table>

Note. Percentages by professional role are in parentheses.

To analyze whether the ASD screening practices of the respondents differed by their professional role and state, the respondents were divided into three groups: (1) respondents who reported that they screened for ASD in accordance with AAP guidelines, (2) respondents who reported some form of ASD screening, and (3) respondents who did not screen for ASD. A chi-square was computed to determine the association between the screening practices of the respondents by their professional role. There was a significant association between the screening practices and professional role of the respondents, $\chi^2(2, n = 396) = 105.94, p < .001$. Of the total 223 pediatricians, 60 (27%) pediatricians reported that they routinely screened for ASD in accordance with AAP guidelines and 117 (53%) pediatricians reported that they routinely screened for ASD, but did not follow the AAP guidelines. Of the total 173 PCPs, 6 (4%) PCPs reported that they routinely screened for ASD in accordance with AAP guidelines and 45 (26%)
reported that they routinely screened for ASD, but did not follow the AAP guidelines. There was no significant difference in the screening practices of the respondents across the three states, $\chi^2(4, n = 396) = 7.07, p = .132$.

**ASD screening practices or no screening.** Respondents who screened for ASD according to AAP guidelines and respondents who screened for ASD, but not according to guidelines, were combined into one group to represent respondents who reported that they routinely screened for ASD using ASD-specific screening tools (see Table 7).

Table 7

<table>
<thead>
<tr>
<th>Professional Role</th>
<th>Routinely screen for ASD</th>
<th>Do not routinely screen for ASD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kansas</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pediatrician</td>
<td>63 (80%)</td>
<td>16 (20%)</td>
</tr>
<tr>
<td>PCP</td>
<td>19 (23%)</td>
<td>63 (77%)</td>
</tr>
<tr>
<td><strong>Oklahoma</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pediatrician</td>
<td>52 (79%)</td>
<td>14 (21%)</td>
</tr>
<tr>
<td>PCP</td>
<td>14 (32%)</td>
<td>30 (68%)</td>
</tr>
<tr>
<td><strong>Iowa</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pediatrician</td>
<td>63 (81%)</td>
<td>15 (19%)</td>
</tr>
<tr>
<td>PCP</td>
<td>17 (36%)</td>
<td>30 (64%)</td>
</tr>
</tbody>
</table>

*Note.* Percentages by professional role are in parentheses.

A chi-square was computed to determine whether there was any association between the ASD screening practices of the participants and their professional role. The screening practice of the respondents was significantly different between the professional role, $\chi^2(1, n = 396) = 103.41, p < .001$. There was no significant difference in ASD screening practices of the
respondents among the three states, $\chi^2(2, n = 396) = 5.29$, $p = .071$. However, the screening practices of the professionals (i.e., pediatricians and the PCPs) within each state differed significantly: Kansas $\chi^2(1, n = 161) = 51.53$, $p < .001$; Oklahoma, $\chi^2(1, n = 110) = 24.27$, $p < .001$; and Iowa, $\chi^2(1, n = 125) = 25.32$, $p < .001$. For each state the percent of pediatricians who reported they routinely screened children for ASD using ASD-specific screening tools were as follows: Kansas (80%), Oklahoma (79%), and Iowa (81%). For each state the percent of PCPs who reported they did not screen children for ASD were as follows: Kansas (77%), Oklahoma (68%), and Iowa (64%).

**Respondents’ awareness of the current AAP guidelines for ASD screenings.** Of the total 396 respondents, only 77 (19%) were aware of the AAP guidelines that been developed for screening children for ASD at the 18 and 24 month well-child visits using ASD-specific screening tools. There were 53 (13%) respondents who did not respond to this question. A chi-square was computed to determine whether there was an association between the respondents’ awareness of the AAP guidelines and their professional role. There was a significant difference between pediatricians and PCPs relative to their awareness of the AAP guidelines for ASD screening, $\chi^2(1, n = 343) = 29.55$, $p< .001$. Among the 212 pediatricians who reported their knowledge of AAP guidelines, 68 (32%) respondents were aware of the guidelines. Among the 131 PCPs who reported their knowledge of AAP guidelines, 9 (7%) respondents were aware of the guidelines (Table 8). There was a significant association between the ASD screening practices of the respondents and their awareness of the AAP guidelines for ASD screening $\chi^2(2, n = 343) = 56.10$, $p< .001$. Table 8 displays the respondents’ awareness of the current AAP guidelines for ASD screening by their professional role and their screening practices. Among the 66 respondents who reported that they screened in accordance with AAP guidelines, 37 (56%) of
them were aware of the current AAP guidelines. Among the 152 respondents who reported that they routinely screened for ASD but did not follow AAP guidelines, 28 (18%) indicated they were aware of the current AAP guidelines. Among the 125 respondents who reported that they did not screen for ASD, 12 (10%) were aware of the current AAP guidelines. There were no significant association between the respondents’ awareness of the AAP guidelines for ASD screenings across the three states, $\chi^2(2, n = 343) = 0.13, p = .939$.

Table 8

Respondents’ Awareness of the AAP Guidelines for ASD Screening by Professional Role and Screening Practices

<table>
<thead>
<tr>
<th>Awareness of AAP guidelines</th>
<th>Screen and follow AAP guidelines</th>
<th>Screen but do not follow AAP guidelines</th>
<th>Do not screen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pediatricist PCP</td>
<td>Pediatricist PCP</td>
<td>Pediatricist PCP</td>
</tr>
<tr>
<td>Aware (n = 77)</td>
<td>35 (46%)</td>
<td>25 (33%)</td>
<td>8 (10%)</td>
</tr>
<tr>
<td>Not aware (n = 266)</td>
<td>25 (10%)</td>
<td>87 (33%)</td>
<td>32 (12%)</td>
</tr>
</tbody>
</table>

Note. Percentages by the respondents’ awareness of AAP guidelines are in parentheses.

Results of Question 3: Do the ASD/PDD screening practices of pediatricians and PCPs differ based on demographic characteristics?

ASD screening practices that do or do not follow AAP guidelines. A chi-square was computed to determine whether there was an association between the screening practices of the respondents and the demographic characteristics (i.e., gender, age, professional designation, practice setting, years in practice post residency, and practice community). When only the respondents who screened for ASD in accordance with the AAP guidelines were considered, there was no significant difference between the ASD screening practices of the respondents and
the demographic characteristics: gender, $\chi^2(1, \ n = 396) = 2.62, p = .106$, age, $\chi^2(4, \ n = 396) = 2.00, p = .737$, professional designation, $\chi^2(1, \ n = 396) = 0.90, p = .344$, practice setting, $\chi^2(4, \ n = 396) = 1.57, p = .814$, years in practice post residency, $\chi^2(5, \ n = 393) = 5.38, p = .371$, and practice community, $\chi^2(2, \ n = 396) = 3.58, p = .167$.

**ASD screening practices that follow AAP guidelines, other ASD screening practices, or not screening.** To analyze whether the ASD screening practices of the respondents differed by their demographic characteristics, the respondents were divided into three groups: (1) respondents who reported that they screen for ASD in accordance with AAP guidelines, (2) respondents who reported some form of ASD screening, and (3) respondents who did not screen for ASD. A series of chi-squares were computed to determine whether there was an association between screening practices of the respondents and the demographic characteristics. It was found that there was a significant difference in the screening practices of female and male respondents, $\chi^2(2, \ n = 396) = 10.75, p = .005$. Table 9 displays the screening practices of the respondents by professional role and gender.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Routinely screen and follow AAP guidelines</th>
<th>Routinely screen but do not follow AAP guideline</th>
<th>Do not routinely screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>39 (20%)</td>
<td>91 (46%)</td>
<td>68 (34%)</td>
</tr>
<tr>
<td>Male</td>
<td>27 (14%)</td>
<td>71 (36%)</td>
<td>100 (51%)</td>
</tr>
</tbody>
</table>

*Note.* Percentages by screening practices are in parentheses.

Among the female physicians, 39 (20%) reported that they routinely screened children for ASD following AAP guidelines, and 91 (46%) reported that they routinely screened for ASD but did not follow the AAP guidelines. Among the male physicians, 27 (14%) reported that they
routinely screened children for ASD following AAP guidelines, and 71 (36%) reported that they routinely screened for ASD but did not follow the AAP guidelines.

The screening practices of the respondents differed significantly based on the community setting where they practiced, $\chi^2(4, n = 396) = 16.22, p = .003$. Among the 104 respondents who worked in an urban community, 22 (21%) reported that they screened for ASD following AAP guidelines. From the 153 respondents who reportedly worked in a suburban community, 74 (48%) reported that they screened for ASD but did not follow the AAP guidelines. Among the 139 respondents who worked in a rural community, 77 (55%) reported that they did not screen for ASD (Table 10).

Table 10

<table>
<thead>
<tr>
<th>Practice Community</th>
<th>Routinely screen and follow AAP guidelines</th>
<th>Routinely screen but do not follow AAP guidelines</th>
<th>Do not routinely screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>22 (21%)</td>
<td>43 (41%)</td>
<td>39 (38%)</td>
</tr>
<tr>
<td>Suburban</td>
<td>27 (18%)</td>
<td>74 (48%)</td>
<td>52 (34%)</td>
</tr>
<tr>
<td>Rural</td>
<td>12 (32%)</td>
<td>45 (32%)</td>
<td>77 (55%)</td>
</tr>
</tbody>
</table>

Note. Percentages by professional role are in parentheses.

There were no significant associations found between the screening practices of the respondents and the following demographic variables: age and screening practices, $\chi^2(8, n = 396) = 4.39, p = .820$, professional role and screening practices, $\chi^2(2, n = 396) = 5.69, p = .058$, practice community and screening practices, $\chi^2(8, n = 396) = 8.43, p = .393$, and years in practice post residency and screening practices, $\chi^2(10, n = 393) = 16.86, p = .077$.

**ASD screening practices according to professional role and demographic characteristics.** The ASD screening practices of the respondents by their professional role and
demographic characteristics are summarized in Table 11. For the female respondents, the association between the screening practices and professional role of the physicians was found to be significant, $\chi^2(2, n = 198) = 51.22, p < .001$. Among the female respondents, 83% of the pediatricians reported that they routinely screened for ASD using ASD-specific screening tools and 65% of the PCPs reported that they did not routinely screen for ASD. For the male respondents, the association between the screening practices and professional role of the physicians was significant, $\chi^2(2, n = 198) = 50.08, p < .001$. Among the male respondents, 74% of the pediatricians reported that they routinely screened for ASD using ASD-specific screening tools and 75% of the PCPs reported that they did not routinely screen for ASD.

Among the respondents who represented different age groups, the associations between the screening practices and professional role were found to be significant: 25 to 34 years old, $\chi^2(2, n = 66) = 13.31, p = .001$, 35 to 44 years old, $\chi^2(2, n = 111) = 31.92, p < .001$, 45 to 54 years old, $\chi^2(2, n = 88) = 18.08, p < .001$, and 55 to 64 years old, $\chi^2(2, n = 102) = 49.52, p < .001$. The percent of pediatricians, representing different age groups, who reported they routinely screened children for ASD using ASD-specific screening tools were as follows: 25 to 34 years of age (87%), 35 to 44 years (82%), 45 to 54 years (74%), and 55 to 64 years (86%). The percent of PCPs representing different age groups, who reported that they did not screen children for ASD were as follows: 25 to 34 years of age (56%), 35 to 44 years (71%), 45 to 54 years (64%), and 55 to 64 years (83%).
<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>ASD screening practices of the respondents</th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Routinely screen and follow AAP guidelines</td>
<td>Routinely screen but do not follow AAP guideline</td>
<td>Do not routinely screen</td>
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</tr>
<tr>
<td></td>
<td>Pediatrician</td>
<td>PCP</td>
<td>Pediatrician</td>
<td>PCP</td>
<td>Pediatrician</td>
</tr>
<tr>
<td>Gender</td>
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<td></td>
</tr>
<tr>
<td>Female</td>
<td>36</td>
<td>3</td>
<td>69</td>
<td>22</td>
<td>21</td>
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<tr>
<td>Male</td>
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<td>25</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 – 34</td>
<td>8</td>
<td>3</td>
<td>18</td>
<td>13</td>
<td>4</td>
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<tr>
<td>35 – 44</td>
<td>20</td>
<td>3</td>
<td>34</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>45 – 54</td>
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<td>0</td>
<td>23</td>
<td>14</td>
<td>13</td>
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<tr>
<td>55 – 64</td>
<td>15</td>
<td>0</td>
<td>32</td>
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</tr>
<tr>
<td>≥ 65</td>
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<td>10</td>
<td>0</td>
<td>9</td>
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<td>110</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td>DO</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Practice setting</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Large group practice</td>
<td>21</td>
<td>0</td>
<td>36</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>Small group practice</td>
<td>27</td>
<td>3</td>
<td>50</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>Independent / private practice</td>
<td>6</td>
<td>1</td>
<td>10</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
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<td>9</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Years in practice post residencya</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5</td>
<td>12</td>
<td>4</td>
<td>26</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>6 – 10</td>
<td>8</td>
<td>0</td>
<td>19</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>11 – 15</td>
<td>12</td>
<td>2</td>
<td>9</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
Among the respondents who held the MD credential, the screening practices of the pediatricians and PCPs differed significantly, $\chi^2(2, n = 346) = 97.31, p < .001$. For the respondents with the MD credential, 81% of the pediatricians reported that they routinely screened for ASD using ASD-specific screening tools and 71% of the PCPs reported that they did not screen for ASD.

When the respondents, who practiced in a large group setting were examined, the association between the screening practices and professional role was found to be significant, $\chi^2(2, n = 119) = 39.43, p < .001$. Among the respondents who practiced in a large group setting, 79% of the pediatricians reported that they routinely screened for ASD using ASD-specific screening tools and 77% of the PCPs reported that they did not screen for ASD. For the respondents who practiced in a small group setting, the association between the screening practices and professional role was significant, $\chi^2(2, n = 171) = 48.91, p < .001$. Of the respondents who were employed in small group practices, 85% of the pediatricians reported that they routinely screened for ASD using ASD-specific screening tools and 65% of the PCPs reported that they did not screen for ASD.
Upon examining the respondents who had been in clinical practice post residency for a
specified number of years, the associations between the ASD screening practices and
professional role were found to be significant: 5 years or less, $\chi^2(2, n = 82) = 14.47, p = .001$; 6
to 10 years, $\chi^2(2, n = 56) = 18.34, p < .001$; 11 to 15 years, $\chi^2(2, n = 54) = 21.56, p < .001$; 21 to
25 years, $\chi^2(2, n = 62) = 23.70, p < .001$; and 26 or more years, $\chi^2(2, n = 97) = 33.31, p < .001$.
The percent of pediatricians who reported that they routinely screened children for ASD using
ASD-specific screening tools were as follows: 5 years or less (81%), 6 to 10 years (87%), 11 to
15 years old (78%), 21 to 25 years, (86%), and 26 years or more (74%). The percent of PCPs
who reported they did not screen children for ASD were as follows: 5 years or less (60%), 6 to
10 years (64%), 11 to 15 years old (85%), 21 to 25 years, (73%), and 26 years or more (85%).

When the respondents, who represented different practice community settings were
considered, the associations between the ASD screening practices and professional role of the
respondents were found to be significant: urban, $\chi^2(2, n = 104) = 24.87, p < .001$; suburban $\chi^2(2,
n = 153) = 44.14, p < .001$; and rural $\chi^2(2, n = 139) = 31.02, p < .001$. Among the respondents
whose practice was located in urban communities, 79% of the pediatricians reported that they
routinely screened children for ASD using ASD-specific screening tools and 69% of the PCPs
reported that they did not screen for ASD. For those respondents who had their practice in
suburban communities, 85% of the pediatricians reported that they routinely screened children
for ASD using ASD-specific screening tools and 67% of the PCPs reported that they did not
screen for ASD. Among the respondents who had their practice in rural communities, 70% of the
pediatricians reported that they routinely screened children for ASD using ASD-specific
screening tools and 73% of the PCPs reported that they did not screen for ASD. There were no
other significant differences found among the screening practices of the respondents and the remaining demographic characteristics (See Appendix B).

Direct logistic regression was conducted to determine the effect of the demographic characteristics of the respondents given the likelihood that the respondents would report that they routinely screened for ASD using ASD-specific screening tools. The model contained seven independent, or predictor, variables (i.e., gender, age, professional role, professional designation, practice setting, years in practice post residency, and practice community). The full model containing all predictors was statistically significant, $\chi^2(18, n = 393) = 145.20, p < .001$, indicating that the overall model was able to distinguish between respondents who reported that they routinely screened for ASD using ASD-specific screening tools and those who did not screen for ASD. The model, as a whole, explained between 30.9% and 41.5% of the variance in the screening practices of the respondents, and correctly classified 76.3% of the respondents. As shown in Table 12, only one of the demographic characteristics (professional role) made a statistically significant contribution to the model. The only predictor of the ASD screening practices of the respondents was professional role, recording an odds ratio of 0.08. The odds ratio was less than 1 and so can be inverted ($1/0.08 = 12.5$). This indicated that the PCPs were 12.5 times less likely to screen for ASD using ASD-specific screening tools than pediatricians, controlling for other factors in the model.
<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>p</th>
<th>Odds Ratio</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td>0.28</td>
<td>0.55</td>
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<td>.46</td>
<td>0.82</td>
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<tr>
<td>25 – 34</td>
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<td>4</td>
<td>.41</td>
<td>0.50</td>
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<td>35 – 44</td>
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<td>.04</td>
<td>2.47</td>
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<td>2.03</td>
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<td>6.50</td>
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<td>16 – 20</td>
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<td>≥ 26</td>
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<td>0.93</td>
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<td>0.19</td>
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Table 12 (continued)

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<th>df</th>
<th>p</th>
<th>χ²</th>
<th>df</th>
<th>p</th>
<th>χ²</th>
<th>df</th>
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<td>2.07</td>
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<td>Suburban</td>
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<td>0.31</td>
<td>5.45</td>
<td>1.02</td>
<td>2.07</td>
<td>1.12</td>
<td>3.82</td>
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<td>0.41</td>
<td>0.35</td>
<td>1.43</td>
<td>1.23</td>
<td>1.51</td>
<td>0.77</td>
<td>2.98</td>
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</tr>
</tbody>
</table>

**Differences in the respondents’ awareness of the current AAP guidelines based upon demographic characteristics.** A chi-square was computed to determine whether there was an association between the respondents’ awareness of the current AAP guidelines for ASD screening and the demographic characteristics (i.e., gender, age, professional designation, practice setting, years in practice post residency, and practice community). There were no significant differences between the respondents’ awareness of the current AAP guidelines for ASD screening and the following demographic characteristics: gender, $\chi^2(1, n = 343) = 0.02, p = 0.878$, age of the respondents, $\chi^2(4, n = 343) = 4.66, p = .324$, professional designation, $\chi^2(1, n = 343) = 0.32, p = .573$, practice setting, $\chi^2(4, n = 343) = 12.27, p = .015$, years in practice post residency, $\chi^2(5, n = 341) = 4.25, p = .514$, and community setting of their practice, $\chi^2(2, n = 343) = 1.70, p = .427$.

**Results of Question 4: What screening tools do pediatricians and PCPs use to screen for ASD/PDD?**

The screening tools the respondents indicated they used to conduct ASD screenings have been provided in Table 13. Of the 226 physicians who reported which ASD-specific screening tools they used, 173 (77%) reported that they used *M-CHAT* as a screening tool and 25 (11%) reported that they used the *CHAT*. Other less commonly used screening tools reported by the
physicians in the order of frequency were: \textit{CARS, ABC, STAT, ESAT, CAST, ASQ, CSBS DP, Gilliam Autism Rating Scale (GARS), SCQ, Developmental Behavior Checklist – Autism Screening Algorithm (DBC-ASA), and PDDST-II.}

Table 13

\textit{Screening Tools used by the Respondents for ASD Screening}

<table>
<thead>
<tr>
<th>Screening tool</th>
<th>Frequency of use reported</th>
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</thead>
<tbody>
<tr>
<td>Modified – Checklist for Autism in Toddlers (M-CHAT)</td>
<td>173</td>
</tr>
<tr>
<td>Checklist for Autism in Toddlers (CHAT)</td>
<td>25</td>
</tr>
<tr>
<td>Childhood Autism Rating Scale (CARS)</td>
<td>7</td>
</tr>
<tr>
<td>Autism Behavior Checklist (ABC)</td>
<td>6</td>
</tr>
<tr>
<td>Screening Tool for Autism in Two-Year-Olds (STAT)</td>
<td>6</td>
</tr>
<tr>
<td>Early Screening of Autistic Traits Questionnaire (ESAT)</td>
<td>5</td>
</tr>
<tr>
<td>Childhood Autism Spectrum Test (CAST)</td>
<td>5</td>
</tr>
<tr>
<td>Ages &amp; Stages Questionnaire (ASQ)</td>
<td>4</td>
</tr>
<tr>
<td>Communication and Symbolic Behavior Scales Developmental Profile – Infant/Toddler Checklist (CSBS DP)</td>
<td>3</td>
</tr>
<tr>
<td>Gilliam Autism Rating Scale (GARS)</td>
<td>3</td>
</tr>
<tr>
<td>Social Communication Questionnaire (SCQ)</td>
<td>3</td>
</tr>
<tr>
<td>Developmental Behavior Checklist–Autism Screening Algorithm (DBC-ASA)</td>
<td>2</td>
</tr>
<tr>
<td>Pervasive Developmental Disorders Screening Test – II (PDDST-II)</td>
<td>1</td>
</tr>
</tbody>
</table>

\textbf{Results of Question 5: What follow-up procedures do pediatricians and PCPs use with children who receive a positive screening result?}

The procedures that the respondents reported they used when following up with children who received a positive ASD screening result (i.e., presented with signs and symptoms of ASD)
are summarized in Table 14. A total of 232 respondents reported their follow-up actions. Within this total, four respondents indicated that they did not screen, but responded to the questions related to follow-up procedures. The follow-up procedures that were reported most frequently included: (1) refer the child to a specialist (74%); (2) refer the child for an early intervention program (78%); (3) refer the child for speech-language services (55%); and (4) monitor the symptoms and set up a follow up appointment (40%).

Table 14
Frequency of the Follow-up Procedures Respondents Reported for a Positive ASD Screen

<table>
<thead>
<tr>
<th>Follow-up procedures</th>
<th>Frequency reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer the child for an early intervention program</td>
<td>183 (79%)</td>
</tr>
<tr>
<td>Refer the child to a specialist</td>
<td>175 (75%)</td>
</tr>
<tr>
<td>Refer the child for speech-language services</td>
<td>129 (55%)</td>
</tr>
<tr>
<td>Monitor symptoms and follow-up</td>
<td>94 (41%)</td>
</tr>
<tr>
<td>Do a comprehensive ASD evaluation</td>
<td>42 (18%)</td>
</tr>
<tr>
<td>Administer ASD specific diagnostic tools</td>
<td>18 (8%)</td>
</tr>
<tr>
<td>Refer for genetic testing</td>
<td>16 (7%)</td>
</tr>
<tr>
<td>Other</td>
<td>8 (3%)</td>
</tr>
</tbody>
</table>

Note. Percentages of total respondents who responded to this item (n = 232) are in parentheses.

Results of Question 6: What do pediatricians and PCPs identify as barriers to screening for ASD/PDD?

To identify the common barriers to screening for ASD/PDD as reported by the respondents, a frequency distribution of the barriers was computed (Table 15). The five most commonly reported barriers to conducting routine ASD screenings were as follows: (1) physicians were not familiar with ASD-specific screening tools (58%); (2) lack of sufficient time
to conduct ASD screenings (46%); (3) referred the child to a specialist (46%); (4) were not adequately trained to conduct ASD screenings (44%); and (5) relied only on clinical observations and did not conduct formal screenings (34%).

Table 15
*Frequency of Barriers Reported by Respondents to Conduct ASD Screenings*

<table>
<thead>
<tr>
<th>Barriers to conduct ASD screenings</th>
<th>Frequency reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not familiar with screening tools</td>
<td>112 (58%)</td>
</tr>
<tr>
<td>Refer to specialists</td>
<td>91 (47%)</td>
</tr>
<tr>
<td>Lack of sufficient time</td>
<td>89 (46%)</td>
</tr>
<tr>
<td>Lack of sufficient training</td>
<td>84 (44%)</td>
</tr>
<tr>
<td>Rely only on clinical observations</td>
<td>67 (35%)</td>
</tr>
<tr>
<td>Lack of adequate knowledge about resources and referral sources for ASD</td>
<td>42 (22%)</td>
</tr>
<tr>
<td>Not confident to identify characteristics related to ASD</td>
<td>33 (17%)</td>
</tr>
<tr>
<td>Inadequate reimbursement</td>
<td>22 (11%)</td>
</tr>
<tr>
<td>Screening tools being too expensive</td>
<td>6 (3%)</td>
</tr>
<tr>
<td>Screening tools not being effective</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Other</td>
<td>7 (4%)</td>
</tr>
</tbody>
</table>

*Note.* Percentages of total respondents who responded to this item (n = 192) are in parentheses.

Additional barriers that were identified included the following: the physicians did not have adequate knowledge regarding possible referral resources for ASD, physicians did not feel confident identifying characteristics of ASD, lack of adequate reimbursement, physicians’ beliefs that ASD screening tools were expensive and not effective, they relied on general developmental screening tools and not ASD-specific screening tools, and a lack of awareness regarding available treatment options for a child diagnosed with ASD.
**Results of Question 7: Do pediatricians and PCPs diagnose ASD/PDD?**

Of the total 396 respondents, 253 (64%) reported they had diagnosed a child with ASD. To determine if there was a difference in the diagnostic practices of the respondents based on their professional role, a chi-square was computed. Pediatricians and PCPs differed significantly in their diagnostic practices for ASD, $\chi^2(1, n = 395) = 42.02, p < .001$. Of the 253 respondents who had diagnosed a child with ASD, 174 (69%) of the respondents were pediatricians (Table 16). Among the 141 respondents who reported that they had not diagnosed a child with ASD, 92 (65%) of the respondents were PCPs.

<table>
<thead>
<tr>
<th>Professional Role</th>
<th>ASD diagnostic practices of the respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatrician</td>
<td>Diagnosed ASD: 174 (78%) Not diagnosed ASD: 49 (22%)</td>
</tr>
<tr>
<td>PCP</td>
<td>Diagnosed ASD: 79 (46%) Not diagnosed ASD: 93 (54%)</td>
</tr>
</tbody>
</table>

*Note.* Percentages by professional role are in parentheses (pediatricians $n = 223$; PCPs $n = 172$).

**Results of Question 8: Do pediatricians and PCPs diagnose ASD/PDD without administering a screening test?**

A total of 165 (42%) respondents reported that they had diagnosed a child with ASD without having previously administered an ASD screening for that particular child. To determine whether there was an association between the ASD screening practices and diagnostic practices of the respondents, a chi-square was computed. The ASD screening and diagnostic practices of pediatricians and PCPs are summarized in Table 17. For the pediatricians, there was a significant association between whether the respondents had diagnosed ASD or not and whether...
they had diagnosed a child with ASD without having previously administered an ASD screening for that particular child, \( \chi^2(1, n = 223) = 66.87, p < .001 \). Among the 223 pediatricians, 115 (52%) reported that they had diagnosed children with ASD and had also diagnosed a child with ASD without having previously administering an ASD screening for that particular child. For the PCPs, the association between whether the respondents had diagnosed ASD or not and whether they had diagnosed a child with ASD without having previously administered an ASD screening for that particular child was significant, \( \chi^2(1, n = 171) = 82.29, p < .001 \). Among the 171 PCPs, 50 (29%) reported that they had not diagnosed children with ASD.

### Table 17

*ASD Diagnostic Practices and Screening Practices of Respondents by Screening Practices and Professional Role*

<table>
<thead>
<tr>
<th>Screening practices</th>
<th>ASD diagnostic practices of the respondents</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diagnosed ASD</td>
<td>Not diagnosed ASD</td>
</tr>
<tr>
<td></td>
<td>Diagnosed without screening</td>
<td>Not diagnosed without screening</td>
</tr>
<tr>
<td>Pediatrician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen for ASD</td>
<td>89 (40%)</td>
<td>52 (23%)</td>
</tr>
<tr>
<td>Do not screen for ASD</td>
<td>26 (12%)</td>
<td>7 (3%)</td>
</tr>
<tr>
<td>PCP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen for ASD</td>
<td>18 (11%)</td>
<td>14 (8%)</td>
</tr>
<tr>
<td>Do not screen for ASD</td>
<td>32 (19%)</td>
<td>15 (9%)</td>
</tr>
</tbody>
</table>

*Note.* Percentages by professional role are in parentheses (pediatricians \( n = 223 \); PCPs \( n = 171 \)).

For those respondents who routinely screened for ASD, there was a significant association between whether the respondents had diagnosed ASD or not and whether they had diagnosed a child with ASD without having previously administered an ASD screening for that
particular child, $\chi^2(1, n = 227) = 63.18, p < .001$. Among the respondents who routinely screened for ASD, 47% of them had diagnosed a child with ASD without having previously administered an ASD screening for that particular child. For those respondents who did not screen for ASD, there was a significant association between whether the respondents had diagnosed ASD or not and whether they had diagnosed a child with ASD without having previously administered an ASD screening for that particular child, $\chi^2(1, n = 167) = 96.64, p < .001$. Among the respondents who did not screen for ASD, 52% of them had not diagnosed a child with ASD.

Table 18

*Frequency of Reasons for Diagnosing ASD without Having Administered a Screening for that Child Reported by Respondent*

<table>
<thead>
<tr>
<th>Reasons for diagnosing without screening</th>
<th>Frequency reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents/caretakers expressed concern</td>
<td>143 (83%)</td>
</tr>
<tr>
<td>Referred by school teacher</td>
<td>52 (30%)</td>
</tr>
<tr>
<td>Referred by early intervention program</td>
<td>38 (22%)</td>
</tr>
<tr>
<td>Referred by speech-language pathologist</td>
<td>34 (20%)</td>
</tr>
<tr>
<td>Referred by day care</td>
<td>27 (16%)</td>
</tr>
<tr>
<td>Referred by their doctor</td>
<td>21 (12%)</td>
</tr>
<tr>
<td>Referred by school psychologist</td>
<td>21 (12%)</td>
</tr>
<tr>
<td>Referred by other allied health professionals</td>
<td>17 (10%)</td>
</tr>
</tbody>
</table>

*Note.* Percentages of total respondents who responded to this item ($n = 173$) are in parentheses.

When examining all 223 pediatricians, 89 (40%) reported that they had engaged in the practice of routinely screening for ASD, diagnosing children with ASD, and diagnosing a child with ASD without administering an ASD screening for that particular child. Among the 171 PCPs, 75 (44%) reported that they did not routinely screen for ASD, and had not diagnosed
children with ASD. The reasons provided by the respondents for having diagnosed a child with ASD without having administered a screening for that particular child are provided in Table 18.

The five most commonly reported reasons for diagnosing a child with ASD without having administered a screening for that particular child were as follows: (1) concerns expressed by the parents and/or caregivers (83%); (2) referral from the school teacher (30%); (3) referral from an early intervention program (22%); (4) referral from a speech language pathologist (20%); and (5) a referral from a day care (16%).

**Results of Question 9: Do the ASD/PDD screening practices of pediatricians and PCPs differ based on their pre-professional education?**

Spearman correlation coefficients were computed among the pre-professional education variables and the screening practices of the respondents. The results of the correlational analyses are provided in Table 19. The results indicated that all 6 correlations were statistically significant at $p < .01$. These results suggest that if the respondents indicated that they had received pre-professional training in the areas of ASD screening, diagnoses, and treatment in their medical school or residency, they tended to report that they routinely screened children for ASD.

Table 19

| Correlations among Pre-professional Education and Screening Practices of the Respondents |
|-----------------------------------------------|---------------------------------|-----------------|
| Routine screening for ASD | Screening training | Diagnosis training |
| Screening training | .25** | | |
| Diagnosis training | .28** | .84** | |
| Treatment training | .24** | .77** | .83** |

** $p < .01$
Results of Question 10: Do pediatricians and PCPs feel confident to identify the early warning signs of ASD/PDD?

Means and standard deviations of the knowledge variables were calculated for the respondents who reported that they routinely screened for ASD and those respondents who reported that they did not screen for ASD (Table 20). The respondents who reported that they routinely screened for ASD indicated a higher confidence level in their ability to recognize early warning signs of ASD compared to the respondents who reported that they did not routinely screen for ASD.

Table 20
*Mean and Standard Deviations of the Knowledge Variables by Screening Practices*

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Screen (n = 227)</th>
<th>Do not screen (n = 163)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Ability to recognize early warning signs</td>
<td>3.73</td>
<td>.83</td>
</tr>
<tr>
<td>Knowledge of diagnostic criteria</td>
<td>3.45</td>
<td>.86</td>
</tr>
<tr>
<td>Knowledge of empirically supported interventions</td>
<td>3.29</td>
<td>.88</td>
</tr>
<tr>
<td>Knowledge of local referral resources</td>
<td>3.86</td>
<td>.76</td>
</tr>
</tbody>
</table>

Results of Question 11: What do PCPs and pediatricians report would help them be better prepared to screen, diagnose and treat children with ASD/PDD?

In response to this open-ended survey question, the respondents provided recommendations that, in their opinion, would help them feel more confident and better prepared to screen, diagnose, and treat children with ASD. The five most common suggestions focused on
improving the pre-professional education received in the area of ASD. These suggestions were as follows: (1) develop a mandatory developmental or behavioral pediatrics rotation that would provide more exposure and interaction with specialists who provide care to children with ASD, (2) provide more exposure and hands on training with screening tools and scoring, (3) provide more training on all areas of ASD such as diagnosis, treatment, early intervention services, and community resources, (4) provide more training on the ASD screening process, and (5) include ASD training as a part of the curriculum.
Chapter V

Discussion

The purpose of this study was to identify the ASD screening practices of pediatricians and PCPs in following the AAP guidelines in Kansas, Oklahoma, and Iowa. Given the rising prevalence of ASD and the importance of early intervention to address the needs of these children and their families, it was considered necessary to investigate if physicians were conducting ASD-specific screenings in accordance with the AAP guidelines. The results of this study indicated that most pediatricians and PCP within the states of Kansas, Oklahoma, and Iowa have not been screening children for ASD following these guidelines. This chapter will provide an interpretation of the results based upon the answers given by the physicians in response to the survey each of them completed for the purposes this study.

Interpretation of Question 1: What are the differences among the survey respondents according to the demographic characteristics (i.e., gender, age, professional role, professional designation, practice setting, years in practice post residency, and practice community)?

The response rate among the three states was comparable. Overall, Kansas (39%) had a slightly higher response rate when compared to Oklahoma (26%), and Iowa (31%). The major difference in the response rate was the number of responses received for the first mailing. The response rate for each of the states following the first mailing was as follows: Kansas (22%), Oklahoma (14%) and Iowa (14%). The response rates for the first and second follow-up mailing for the three states were similar.
Among the 750 pediatricians surveyed, there was a 35% response rate, and among the 750 PCPs surveyed, there was a 29% response rate. Published studies using survey instruments, have reported that when the surveys targeted participants’ interests, commitments, and values, the response rates tended to be higher (Cook, Dickinson, & Eccles, 2009; Cull, O'Connor, Sharp, & Tang, 2005; Groves, Cialdini, & Couper, 1992; Thorpe et al., 2009). Thus, the higher response rate from the pediatricians in this study, as compared to response rate of the PCPs, may be an indicator that the pediatricians were more interested in issues related to screening young children for ASD that were the PCPs. Although there were equal numbers of female and male respondents, 64% of the female respondents were pediatricians. Because we do not have the demographic characteristics of the non-responders, we can only speculate the reasons for this difference in gender. The difference might be attributed to the fact that more pediatricians in clinical practice are females and/or that female pediatricians are more interested in issues related to screening children for ASD.

Another interesting demographic characteristic was that among the respondents who were 44 years or younger, 64% were female physicians and among the respondents who were 55 years or older, 72% were male physicians. The trend for an increased number of female respondents in the younger age groups and an increased number of male respondents in the older age groups was found within the professional role demographic as well. In 2008, Zeiger documented this type of inverse relationship between age and gender in her study on the ASD screening practices of pediatricians,

This type of relationship (i.e., gender and age) was also found when reviewing the respondents’ years in practice post residency. There were more female physicians who had been in clinical practice a shorter period of time post residency and more male physicians who had
been in clinical practice for a longer period of time post residency. Two reasons may account for
this gender and age relationship. First, this may be indicative of a trend that more females are
becoming pediatricians or PCPs. In addition, it may be that females from the younger age group
chose to respond to this survey. Without the demographic characteristics of the non-responders,
however, there is no data to support either of these assumptions.

Among the total respondents, approximately one-half were in the two extreme categories
of years in practice post residency. There were 21% of the respondents who reported they had
been in clinical practice for less than 5 years post residency and 25% who reported that had been
in clinical practice for more than 26 years post residency. It is interesting to note that only a few
participants who fell within the 5-25 years post residency group chose to respond to this survey.

**Interpretation of Question 2: Do pediatricians and PCPs in Kansas, Oklahoma, and Iowa
follow the AAP guidelines to screen for ASD/PDD?**

Given the physicians’ responses to the survey, it was determined that only 17% of the
respondents routinely screened children for ASD in accordance with the AAP guidelines. This
result was comparable to the pilot study conducted by the principal investigator where 13% of
the physicians from Kansas reported that they routinely screened children for ASD in accordance
with the AAP guidelines (Coufal et al., 2010). The percent of physicians screening children for
ASD according to the guidelines did not differ significantly among the three states; suggesting
that, regardless of where they practiced, most physicians were not following the AAP guidelines
to screen children for ASD.

When the ASD screening practices of the physicians were considered by their
professional role 27% of the pediatricians, compared to 3% of PCPs, screened for ASD in
accordance with the AAP guidelines. When the pediatricians were examined by state, it was determined that 32% from Kansas, 24% from Oklahoma, and 24% from Iowa screened for ASD following the AAP guidelines. While it was encouraging to see that more pediatricians were screening for ASD according to the AAP guidelines, it was disturbing to note that few PCPs were screening children for ASD according to the guidelines. It is logical that more pediatricians are screening since the guidelines were published and promoted by the AAP and much of the literature regarding screening for ASD is in the pediatrics literature. However, as reported by the AAP in its policy statement (Johnson et al., 2007), both pediatricians and PCPs play a critical role in the early identification of children with ASD (Heidgerken et al., 2005). Thus, the finding that only 3% of the PCPs surveyed for this study were screening for ASD in accordance guidelines is concerning.

It was found in this present study that only 19% of the physicians were familiar with the current AAP guidelines for ASD screenings. When familiarity of the physicians with AAP guidelines was considered by their professional role, 32% pediatricians and 7% PCPs were aware of the guidelines. Zeiger (2008) reported similar findings that only 28% of the pediatricians were familiar with the AAP guidelines for ASD screenings. Given that it has been four years since the AAP published the guidelines (Johnson et al., 2007), it is especially concerning that very few physicians, including pediatricians were familiar with the guidelines. Since very few physicians were familiar of the guidelines, it is not surprising that not many physicians were screening children for ASD in accordance with AAP guidelines.

Although only 17% of the respondents reported that they screened in accordance with AAP guidelines, an additional 41% reported that they routinely screened for ASD using ASD-specific screening tools, but not in accordance with AAP guidelines. Therefore, a total of 58% of
the respondents reported that they, or other staff members in their office, routinely screened children for ASD using ASD-specific screening tools. When the ASD screening practices of the physicians were considered by their professional roles, 80% of all the pediatricians reported that they routinely screened for ASD using ASD-specific screening tools. Across the three states the following percent of pediatricians reported that they routinely screened children for ASD using ASD-specific screening tools: Kansas (80%), Oklahoma (79%), and Iowa (81%).

A 2004 survey of Maryland and Delaware pediatricians, reported that only 8% of the physicians routinely screened for ASD using standardized ASD-specific screening tools (Dosreis et al., 2006). Another study of pediatricians from the national sample reported that 42% of them routinely screened for ASD using standardized ASD-specific screening tools (Zeiger, 2008). In the pilot study, 33% of the physicians from Kansas reported that they routinely screened for ASD using standardized ASD-specific screening tools (Coufal et al., 2010). Given the results of the previous studies that investigated the ASD screening practices of the pediatricians, the results of the present study suggested an improvement in the ASD screening practices of pediatricians.

The results of the ASD screening practices of the PCPs, were not as encouraging. Among the total PCPs, only 30% reported that they routinely screened for ASD using ASD-specific screening tools. Among the three states, the PCPs did not differ in their ASD screening practices. The following represents the percent of PCPs that did not screen for ASD in each of the states: Kansas (77%); Oklahoma (68%), and Iowa (64%). Despite reports that PCPs are often one of the first points of contact for many families when they consult a professional regarding their child’s development, as well as the recognition given by AAP that PCPs play a critical role in early identification of children with ASD, PCPs seem reluctant to engage in routine ASD screenings.
Additionally, another concern that resulted when reviewing the data from this study was that among the respondents who indicated that they routinely screened for ASD, 40% of them screened children for ASD at the 18 month well-child visit, but did not screen at the 24 month well-child visit. The AAP clearly stated that they revised the policy statement to include the need for screening at the 24 month well-child visit in addition to the 18 month visit so as not to overlook or miss children who might be at risk for regression after 18 months of age (Gupta et al., 2007; Johnson et al., 2007). Consequently, it is important that physicians are encouraged to conduct an ASD screening at the 24 month visit in addition to the 18 month screening.

**Interpretation of Question 3: Do the ASD/PDD screening practices of pediatricians and PCPs differ based on demographic characteristics?**

In the pilot study (Coufal et al., 2010), it was found that female physicians were more likely to screen for ASD using ASD-specific screening tools and male physicians were more likely not to screen for ASD. Dosreis et al. (2006) reported similar findings in a survey of Maryland and Delaware pediatricians. They found that female pediatricians were more likely to screen for developmental delays using standardized tools compared to male pediatricians. Zeiger (2008) reported slightly different findings. She indicated that although female pediatricians were more likely to use standardized tools for general developmental delays than male pediatricians, they were less likely to use ASD-specific screening tools than male pediatricians. In the present study, 66% of the female respondents and 50% of the male respondents reported that they screened for ASD using ASD-specific screening tools. The results from the present study corroborate the findings from the pilot study, as well as other previous reports on ASD screening (Dosreis et al., 2006; Zeiger, 2008).
Given that more female pediatricians responded to the survey, and more female physicians reported that they screened for ASD, female physicians may consider screening for ASD a topic for which they have interest. It is important to note that across different studies male physicians have consistently reported that they did not conduct routine screenings (Dosreis et al., 2006; Zeiger, 2008). Thus, it would be important to design a future study that focused on identifying the reasons male physicians are not conducting ASD screenings. These results may bring to light factors that would encourage male physicians to being engaging in the practice of conducting routine ASD screenings.

About three-fourths of the respondents to this study reported that they worked in either a large or small group practice. It is reasonable to expect that physicians who work in group practice settings as compared to hospital settings would be allowed more freedom to develop their own set of practice guidelines versus being required to follow the guidelines established by the hospital. These results indicate, however, that the percent of respondents from the group practice settings who reported that they conducted routine ASD screenings were similar to the respondents who worked in a hospital setting. In addition, the respondents who worked in an independent or private practice setting, who potentially would have the ability to establish their own practice guidelines, accounted for the smallest percent of physicians who were conducting ASD screenings.

The results of this study indicated that the differences found in the ASD screening practices of the respondents relative to the demographic characteristics (e.g., gender, practice setting, practice community) come about due to one common factor which was the professional role of the physicians. Among the female respondents who reported that they screened routinely for ASD, 81% of them were pediatricians; and among the male respondents who reported that
they screen routinely for ASD, 74% of them were pediatricians. The percent of pediatricians who reported that they screened routinely for ASD, who represented different age groups, were as follows: 25 to 34 years of age (87%), 35 to 44 years (82%), 45 to 54 years (74%), and 55 to 64 years (86%). Similarly, of the pediatricians with the MD credential, 81% reported that they screened for ASD. For pediatricians, the results were similar across the other demographic characteristics (i.e., practice community, years in practice post residency, and practice community).

Among the female respondents who did not screen for ASD, 69% were PCPs; and among the male respondents who did not screen for ASD, 75% were PCPs. The percent of the PCPs who reported that they did not screen for ASD from the different age groups were as follows: 25 to 34 years of age (56%), 35 to 44 years (71%), 45 to 54 years (64%), and 55 to 64 years (83%). Among the PCPs with the MD credential, 71% of them reported that they did not screen for ASD. For the PCPs, the results were similar across all other demographic characteristics (i.e., practice community, years in practice post residency, and practice community).

Among all of the demographic characteristics examined, professional role was found to be the strongest predictor for whether a physician did or did not screen for ASD. More than two-thirds of all the pediatricians reported that they screened routinely for ASD and more than half of all the PCPs reported that they did not screen for ASD. However, when the ASD screening practices of the respondents were considered according to their professional role, there were no other significant differences found among the pediatricians or the PCPs based upon the other demographic characteristics investigated (i.e., gender, age, professional designation, practice setting, years in practice post residency, and practice community). The differences in the screening practices of the pediatricians and PCPs weighed heavily on all of the other predictors.
The weight of the professional role was so strong, that it became the catalyst that created the significance in the logistic regression model.

**Interpretation of Question 4:** What screening tools do pediatricians and PCPs use to screen for ASD/PDD?

Of the respondents who screened for ASD in accordance with AAP guidelines, 86% of them used *M-CHAT*; and, of the respondents who screened for ASD but did not follow the AAP guidelines, 73% of the used *M-CHAT* to screen children for ASD. The next commonly used screening tool by the respondents to screen children for ASD was the *CHAT* (11%). The *M-CHAT* is an ASD-specific screening tool that is appropriate when screening children between 16 and 48 months old and the *CHAT* is an ASD-specific screening tool that is appropriate when screening children 18 months or older. Thus, it was encouraging to find that more than four-fifths of the physicians choose to use age appropriate ASD-specific screening tools. There were, however, other screening tools such as the *CARS, STAT, CAST, GARS, SCQ*, and *DBC-ASA* that were reportedly being used to screen children for ASD which were not considered to be appropriate for this age group. Still, among the respondents who were using inappropriate screening tools for children under 2 years of age, many of them reported that they were using additional screening tools that would be considered age appropriate. Generally, it was determined that most physicians who responded to the question about what tools they were using to screen for ASD were using age appropriate ASD-specific screening tools.
Interpretation of Question 5: What follow-up procedures do pediatricians and PCPs use with children who receive a positive screening result?

The follow-up procedures reportedly used most frequently with children who received a positive ASD screening result were: referral to a specialist, referral to an early intervention program, referral for speech-language pathology services, and monitoring symptoms and setting up a follow up appointment. It has been determined that it is good practice for a physician to refer a child who has received a positive ASD screening result to a specialist (Johnson et al., 2007). In so doing, the specialist can provide the family with a medical diagnosis and can also provide the child and family with the appropriate, necessary resources (Johnson et al., 2007). The data also revealed that physicians have been referring children who have received a positive ASD screening result for early intervention services. This should be seen as a positive sign, as several studies have documented the positive benefits of early, intensive intervention services for the children with ASD (Dawson, 2008; Dietz et al., 2006; Johnson et al., 2007; Landa et al., 2007; Mandell et al., 2005; Robins & Dumont-Mathieu, 2006). Another positive practice physicians indicated they have used when following up with children who have received a positive ASD screen includes referring them for speech-language services. As defined by DSM-IV-TR, a qualitative impairment in communication is one of the diagnostic criteria for autism; consequently, speech and language development should be a primary concern for children who have been diagnosed with autism (APA, 2000). It is encouraging to find that many physicians who participated in this study acknowledged this concern and were making the appropriate referrals.
Interpretation of Question 6: What do pediatricians and PCPs identify as barriers to screening for ASD/PDD?

The five most common barriers, as reported by the respondents to this survey, to conducting routine ASD screenings were as follows: (1) lack of familiarity with ASD-specific screening tools; (2) lack of sufficient time to conduct ASD screenings; (3) referral to a specialist; (4) lack of sufficient training to conduct ASD screenings; and (5) relying on clinical observations and not conducting formal screenings. Similar barriers were reported by the Maryland and Delaware pediatricians (Dosreis et al., 2006) and the national sample of pediatricians (Zeiger, 2008) for conducting ASD screenings.

As reported by the AAP in the ASD screening guidelines, there are several ASD-specific screening tools that can be completed by parents that are brief, inexpensive, and used practically in an office setting (Johnson et al., 2007). These tools may be appropriate for physicians to consider incorporating into their practice, given that several physicians reported in this study that they were not familiar with the ASD-specific screening tools, that they considered ASD screening to be a time consuming process, and that they would be reluctant to incorporate these tools into their practice. This is relevant, then, when considering the results of the Sand et al. (2005) study. In this study the developmental screening practices of pediatricians were examined; and, it was found that, without the use of standardized screening tools and relying only on clinical observations, pediatricians tended not to consider important risk factors which subsequently affected their referral practice decisions. Despite reports and published guidelines provided by the AAP documenting the rationale for using ASD-specific screening tools (Johnson et al., 2007; Sand et al., 2005), it was concerning to note that many physicians who participated
in this study continued to report a preference for using clinical observations and regarded using an ASD-specific screening tool as a potential barrier.

**Interpretation of Question 7: Do pediatricians and PCPs diagnose ASD/PDD?**

Among the pediatricians, 78% of them reported that they had diagnosed children with ASD; however, only 46% of the PCPs reported that they had diagnosed children with ASD. It is encouraging to discover that over two-thirds of the pediatricians had diagnosed children with ASD; as this potentially indicates that these pediatricians appeared to recognize the signs and symptoms of ASD and were willing to make this particular medical diagnosis. However, given the rising prevalence of ASD (Johnson et al., 2007; Lord & Bishop, 2010), the fact that many families choose PCPs for as their child’s primary physician, and PCPs are often the first point of contact for families to raise their concerns regarding their child’s development (Heidgerken et al., 2005; Johnson et al., 2007), it is concerning to note that more than half of PCPs surveyed had not diagnosed any children with ASD.

**Interpretation of Question 8: Do pediatricians and PCPs diagnose ASD/PDD without administering a screening test?**

The results of this study highlighted the fact that among the total respondents, 42% of the physicians reported that they had diagnosed a child with ASD without having previously administered an ASD screening for that particular child. In addition, it was found that, among the respondents who have diagnosed a child with ASD without having previously administered an ASD screening for that particular child, 65% reported that they did routinely screen for ASD. While these physicians provided sound reasoning for having diagnosed a child with ASD without having previously administered an ASD screening for that particular child (i.e., parents
or caregivers expressed concerns about the child’s development, and/or or the child was referred by a teacher, an early intervention program, or a speech language pathologist); it was interesting to note that these same physicians had considered it necessary to perform the ASD screening procedures for other children.

The reasons provided by the physicians for diagnosing a child with ASD without having previously administered an ASD screening for that particular child reinforces the important role parents and multidisciplinary team members play in the screening and diagnostic process of children with ASD (Johnson et al., 2007). Dosreis et al. (2006) indicated that parental concerns for a child’s development typically prompted physicians to conduct an ASD screening for that child. The importance of the multidisciplinary team (i.e., parent, teacher, speech language pathologist, psychologist, early intervention program professionals) in making the ASD screening and diagnostic process more efficient and effective was highlighted by the AAP and other professional organizations (ASHA, 2006; Filipek et al., 1999; Johnson et al., 2007). Thus, the physicians’ responses in this study provided positive evidence to support such recommended practices.

**Interpretation of Question 9: Do the ASD/PDD screening practices of pediatricians and PCPs differ based on their pre-professional education?**

As expected the pre-professional education physicians received in the areas of ASD screening, diagnosis, and treatment during their medical school or residency correlated with the ASD screening practices reported by the respondents. The respondents who reported that they had been adequately educated in the area of ASD also reported that they routinely screened children for ASD. Studies have reported that limited pre-professional education in screening and
diagnosis of ASD translates into practice (Dosreis et al., 2006; Rhoades et al., 2007; Sand et al., 2005). It is essential, therefore, that higher education programs that are responsible for educating these professionals include information that covers the screening, diagnosis, early intervention, and resources for into the curriculum; as was recommended by the respondents in this study. In addition, the physicians recommended that the medical schools and residency programs provide mandatory developmental pediatrics training for all physicians. They further indicated that this type of training should include increased exposure and hands on training relative to the ASD screening process as well as ASD-specific screening tools. Considering the findings of the present study and other published reports (Dosreis et al., 2006; Sand et al., 2005; Sices et al., 2003; Zeiger, 2008), it is essential that professional organizations take a leadership role to ensure that these educational changes happen for the benefit of the children with ASD and their families, as well as society as a whole.

**Interpretation of Question 10: Do pediatricians and PCPs feel confident to identify the early warning signs of ASD/PDD?**

Accordingly, the respondents who reported that they routinely screened for ASD also indicated that they had a greater level of confidence in their ability to recognize early warning signs of ASD. They also felt knowledgeable relative to the ASD diagnostic criteria, empirically supported interventions for ASD, and the available local resources that they would access for a child presenting with ASD and their family. As previously discussed, limited pre-professional education leads to reduced confidence levels within the physicians; which will be reflected in their screening and diagnostic practices (Dosreis et al., 2006; Rhoades et al., 2007; Sand et al., 2005). Thus, to improve the confidence levels of the physicians and help them be better prepared
to screen, diagnose, and treat children with ASD the recommendations suggested by the respondents should be seriously considered and acted upon by the appropriate institutions.

Conclusion

It is important that children with ASD receive targeted intervention early in their life to maximize the benefits. Therefore, it is vital that pediatricians and PCPs conduct routine ASD surveillance and screening following AAP guidelines for all children to identify children with ASD as early as possible. The results of the current study indicated that even after five years of publication of current AAP guidelines, only 31% pediatricians and 5% PCPs were familiar with it. Since only few physicians were familiar with the screening guidelines, it was not surprising that only 27% pediatricians and 4% PCPs routinely screened children for ASD according to AAP guidelines. The results further indicated that female pediatricians were more likely to conduct routine ASD screenings compared to any other groups. In addition, physicians who did not routinely screen children for ASD also indicated that they lacked appropriate pre-professional education to feel confident in conducting ASD screenings. Therefore, it is important that higher educational programs review their curriculum to incorporate training on all aspects of ASD such as recognizing early warning signs of ASD, screening, diagnosis, available evidence based intervention and local referral resources as part of the curriculum to encourage all physicians who provide routine clinical care for young children to conduct routine ASD screenings.

Given the high prevalence rate of 1 in 88 children aged 8 years being affected with ASD, it is concerning to note that only few physicians were familiar with the ASD screening guidelines and routinely screened children for ASD. However, the results of the current study and recent ASD prevalence reports indicate that although physicians do not routinely screen children for
ASD, they are diagnosing these children with ASD. While these children do receive the diagnosis of ASD, it is possible that without routine screenings during well-child visits physicians would miss to identify these children at the earliest possible time in order for these children to receive the benefits of early targeted intervention. Therefore, it is essential that appropriate measures are taken to encourage these physicians to routinely screen children for ASD. There should be active lobbying and advocacy to urge the educational system to take initiative in making necessary changes to the pre-professional education of the physicians. Additionally, the results indicated that lack of time and lack of knowledge about the screening tools were common barriers to conducting routine ASD screenings. Therefore, available ASD-specific screening tools should be marketed actively to the physicians who are already in clinical practice to increase awareness of ASD-specific screening tools and the time needed to complete ASD screenings among these physicians.

In addition to pediatricians and PCPs, parents and multidisciplinary team of other healthcare professionals play an important role in the ASD screening and diagnostic process. Therefore, awareness among these professionals should be increased by actively reaching out to them through various methods such as media, advocacy, and education. There should be an active collaboration among physicians, parents and other healthcare professionals in order for the children to be routinely screened and diagnosed early in their development to provide maximal benefits to the children with ASD and their families.

**Limitations of the Study**

As with any study, there are limitations to this investigation. The major limitation was the response rate. Studies on the pediatricians’ developmental and ASD screening practices have
reported response rates of 42% to 55% (Dosreis et al., 2006; Sand et al., 2005; Sices et al., 2003). While efforts were made to ensure the maximum response rate, the response rate for this study was somewhat lower when compared those studies previously reported. The response rate was comparable, however, to the pilot study conducted by the principal investigator.

In addition, it is important to consider the issue of non-respondent bias when interpreting the results of the present study. The purpose of the study was stated explicitly on the first page of the survey that was mailed to all of the physicians. It is possible that the participants who were not interested in this topic may have chosen not to respond to the survey.

Another potential limitation of the study that could have introduced bias into the results was the characteristics of non-respondents. While the results did not present any significant differences among the physicians who responded to the survey, it is possible that the group of physicians who responded was different in some way from the group of physicians who did not respond. With no information on the non-respondents it is not possible to speculate what those differences might have been. Furthermore, because participation in the study was voluntary, only those physicians who had an interest in ASD screenings and the ASD diagnostic process might have responded to this survey.

As with other survey data, the present study also faced the limitation that the results were based on the physicians’ self-reporting of their screening and diagnostic practices. Consequently, the data cannot be confirmed, and thus, may not be as accurate and/or reliable as would direct interviews or observations of physicians.

Finally, the results were based on a sample of physicians from three states (Kansas, Oklahoma, and Iowa). These three states were chosen based on the similarities in the
demographic characteristics of the population among the three states. So, generalizing the results of the present study to other states must be done with caution; as physicians from other states may differ in their approach to screening children for ASD in following the AAP guidelines.

**Future Directions**

1. One major area of concern identified through the present study was that PCPs have not been conducting routine ASD screenings as recommended by the AAP. Future studies may target this group of physicians to explore the rationale for this practice and to identify strategies that would encourage them to begin conducting routine ASD screenings.

2. Another area of concern identified in this study, as well as other previous studies, is that it was found that male physicians were more likely not to conduct routine ASD screenings when compared to female physicians. Future studies should be designed to target male physicians for the purpose of encouraging them to conduct routine ASD screenings.

3. The respondents in this study recommended changes to the pre-professional education curriculum that they felt would be helpful in preparing them to screen, diagnose, and treat children with ASD. Future studies could be developed that would explore opportunities for implementing these pre-professional education changes.

4. Finally, future studies could be designed to identify strategies that would encourage multidisciplinary teams, who provide care to young children, to get more involved in the ASD screening and diagnostic processes so that the evaluation system becomes efficient and effective for the child and the family system.
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APPENDICES
APPENDIX A (continued)

Surveillance and Screening Algorithm: Autism Spectrum Disorders (ASDs)

1a - Developmental concerns, including those about social skill deficits, should be included as one of several health topics addressed at each pediatric preventive care visit through the first 5 years of life. (Go to step 2)

1b - At the parents’ request, or when a concern is identified in a previous visit, a child may be scheduled for a “problem-focused” clinic visit because of concerns about ASD. Parent concern may be based on observations, social or language deficits, issues raised by other caregivers, or heightened anxiety produced by ASD coverage in the media. (Go to step 2)

2 - Developmental surveillance is a flexible, longitudinal, continuous, and cumulative process whereby health care professionals identify children who may have developmental problems. There are 5 components of developmental surveillance: eliciting and attending to the parents’ concerns about their child’s development, documenting and maintaining a developmental history, making accurate observations of the child, identifying the risk and protective factors, and maintaining an accurate record and documenting the process and findings. The concerns of parents, other caregivers, and pediatricians all should be included in determining whether surveillance suggests that the child may be at risk of an ASD. In addition, younger siblings of children with an ASD should also be considered at risk, because they are 16 times more likely to develop symptoms of an ASD than children without a sibling with an ASD. Scoring risk factors will help determine the next steps. (Go to step 3)

3a - If the child is the patient is at least 18 months old, go to step 5a.

3b - If the child is at least 24 months old, go to step 5b.

4 - In the absence of established risk factors and parental/provider concerns (score=0), a level 1 ASD-specific tool should be administered at the 18- and 24-month visits. (Go to step 5c) If this is not an 18- or 24-month visit, (Go to step 7b).

Note: In the AAP policy, “Identifying Infants and Young Children With Developmental Disorders in the Medical Home: An Algorithm for Developmental Surveillance and Screening”, a general developmental screen is recommended at 12, 18, and 24-36 month visits and an ASD screening is recommended at 18-24 month visit. This clinical report also recommends an ASD screening at the 24-month visit to identify children who may regress after 18 months of age.

5a - If the child’s age is <12 months, the pediatrician should use a tool that specifically addresses the clinical characteristics of ASD, such as those that target social-communication skills. (Go to step 6a)

5b - If the child’s age is 12-24 months, the pediatrician should use an ASD-specific screening tool. (Go to step 6b)

5c - For all children ages 12-24 months (regardless of risk factors), the pediatrician should use an ASD-specific screening tool. (Go to step 6b)

6a - When the result of the screening is negative, go to step 7a.

6b - When the result of the ASD screening (at 18- and 24-month visits) is negative, go to step 7b.

7a - If the child demonstrates risk but has a negative screening result, information about ASDs should be provided to parents. The pediatrician should schedule an extra visit within 1 month to address any residual ASD concerns or additional developmental/behavioral concerns after a negative screening result. The child will then re-enter the algorithm at 1b. A “wait-and-see” approach is discouraged. If the only risk factor is a sibling with an ASD, the pediatrician should maintain a higher index of suspicion and address ASD symptoms at each preventive care visit, but an early follow-up within 1 month is not necessary unless a parental concern subsequently arises.

7b - If this is not an 18- or 24-month visit, or when the result of the ASD screening is negative, the pediatrician can inform the parents and schedule the next routine preventive visit. The child will then re-enter the algorithm at 1a.  

8 - If the screening result is positive for possible ASD in step 6a or 6b, the pediatrician should provide a referral for a comprehensive evaluation. Because a positive screening result does not determine a diagnosis of ASD, the child should be referred for a comprehensive ASD evaluation. Early intervention/early childhood education services (depending on child’s age), and an audiological evaluation. A categorical diagnosis is not needed to access intervention services. These programs often provide evaluations and other services even before a medical evaluation is complete. A referral to intervention services or school also is indicated when other developmental/behavioral concerns exist, even though the ASD screening result is negative. The child should be scheduled for a follow-up visit and will then re-enter the algorithm at 1b. All communication between the referral sources and the pediatrician should be coordinated.

AAP information for parents about ASDs includes: “Is Your One-Year-Old Communicating with You?” and “Understanding Autism Spectrum Disorders.”

*Available at www.asp.org
Chi-squares between demographic variables and ASD screening practices that were not significant:

I. For pediatricians:

- screening practices and state, $\chi^2(4, n = 223) = 1.90, p = .754$
- screening practices and gender, $\chi^2(2, n = 223) = 2.79, p = .247$
- screening practices and age, $\chi^2(8, n = 223) = 8.98, p = .344$
- screening practices and professional designation, $\chi^2(2, n = 223) = 2.44, p = .295$
- screening practices and practice setting, $\chi^2(8, n = 223) = 7.81, p = .452$
- screening practices and years in practice post residency, $\chi^2(10, n = 223) = 1.15, p = .346$
- screening practices and practice community, $\chi^2(4, n = 223) = 5.65, p = .227$

II. For PCPs:

- screening practices and state, $\chi^2(4, n = 173) = 5.03, p = .285$
- screening practices and gender, $\chi^2(2, n = 173) = 1.63, p = .442$
- screening practices and age, $\chi^2(8, n = 173) = 16.27, p = .093$
- screening practices and professional designation, $\chi^2(2, n = 173) = 0.84, p = .656$
- screening practices and practice setting, $\chi^2(8, n = 173) = 16.15, p = .060$
- screening practices and years in practice post residency, $\chi^2(10, n = 170) = 23.31, p = .081$
- screening practices and practice community, $\chi^2(4, n = 173) = 1.18, p = .882$

III. For female respondents:

- screening practices and age, $\chi^2(8, n = 198) = 4.08, p = .850$
- screening practices and professional designation, $\chi^2(2, n = 198) = 7.35, p = .025$
- screening practices and practice setting, $\chi^2(8, n = 198) = 5.46, p = .708$
screening practices and years in practice post residency, $\chi^2(10, n = 198) = 6.75, p = .749$

screening practices and practice community, $\chi^2(4, n = 198) = 10.27, p = .036$

IV. For male respondents:

screening practices and age, $\chi^2(8, n = 198) = 4.00, p = .857$

screening practices and professional designation, $\chi^2(2, n = 198) = 1.29, p = .524$

screening practices and practice setting, $\chi^2(8, n = 198) = 4.55, p = .804$

screening practices and years in practice post residency, $\chi^2(10, n = 195) = 17.64, p = .061$

screening practices and practice community, $\chi^2(4, n = 198) = 6.03, p = .197$

V. For respondents who were 25 to 34 years old:

screening practices and gender, $\chi^2(2, n = 66) = 1.39, p = .499$

screening practices and professional designation, $\chi^2(2, n = 66) = 7.62, p = .022$

screening practices and practice setting, $\chi^2(8, n = 66) = 15.88, p = .044$

screening practices and years in practice post residency, $\chi^2(2, n = 63) = 1.31, p = .519$

screening practices and practice community, $\chi^2(4, n = 66) = 1.27, p = .867$

VI. For respondents who were 35 to 44 years old:

screening practices and gender, $\chi^2(2, n = 111) = 1.90, p = .387$

screening practices and professional designation, $\chi^2(2, n = 111) = 2.09, p = .353$

screening practices and practice setting, $\chi^2(8, n = 111) = 12.05, p = .149$

screening practices and years in practice post residency, $\chi^2(6, n = 111) = 7.80, p = .253$

screening practices and practice community, $\chi^2(4, n = 111) = 9.48, p = .050$

VI. For respondents who were 45 to 54 years old:

screening practices and gender, $\chi^2(2, n = 88) = 7.17, p = .028$

screening practices and professional designation, $\chi^2(2, n = 88) = 0.17, p = .919$
screening practices and practice setting, $\chi^2(8, n = 88) = 8.66, p = .371$

screening practices and years in practice post residency, $\chi^2(10, n = 88) = 10.78, p = .375$

screening practices and practice community, $\chi^2(4, n = 88) = 3.51, p = .476$

VI. For respondents who were 55 to 64 years old:

screening practices and gender, $\chi^2(2, n = 102) = 2.39, p = .303$

screening practices and professional designation, $\chi^2(2, n = 102) = 3.22, p = .200$

screening practices and practice setting, $\chi^2(8, n = 102) = 6.62, p = .578$

screening practices and years in practice post residency, $\chi^2(6, n = 102) = 10.77, p = .096$

screening practices and practice community, $\chi^2(4, n = 102) = 5.32, p = .256$

VII. For respondents who were 65 years or older:

screening practices and gender, $\chi^2(2, n = 29) = 21.69, p = .031$

screening practices and professional designation, $\chi^2(2, n = 29) = 0.61, p = .738$

screening practices and practice setting, $\chi^2(8, n = 29) = 6.16, p = .629$

screening practices and years in practice post residency, $\chi^2(4, n = 29) = 2.86, p = .581$

screening practices and practice community, $\chi^2(4, n = 29) = 8.24, p = .083$

VIII. For respondents who held MD credential:

screening practices and gender, $\chi^2(2, n = 346) = 11.87, p = .003$

screening practices and age, $\chi^2(8, n = 346) = 7.16, p = .520$

screening practices and practice setting, $\chi^2(8, n = 346) = 11.56, p = .172$

screening practices and years in practice post residency, $\chi^2(10, n = 343) = 12.58, p = .248$

screening practices and practice community, $\chi^2(4, n = 346) = 15.28, p = .004$

IX. For respondents who held DO credential:

screening practices and gender, $\chi^2(2, n = 50) = 1.95, p = .377$

111
screening practices and age, $\chi^2(8, n = 50) = 7.22, p = .513$

screening practices and practice setting, $\chi^2(8, n = 50) = 2.33, p = .969$

screening practices and years in practice post residency, $\chi^2(10, n = 50) = 22.97, p = .011$

screening practices and practice community, $\chi^2(4, n = 50) = 2.64, p = .620$

X. For respondents who worked in hospital:

screening practices and gender, $\chi^2(2, n = 33) = 0.64, p = .727$

screening practices and age, $\chi^2(8, n = 33) = 13.10, p = .108$

screening practices and professional designation, $\chi^2(2, n = 33) = 2.23, p = .328$

screening practices and years in practice post residency, $\chi^2(10, n = 33) = 12.89, p = .230$

screening practices and practice community, $\chi^2(4, n = 33) = 5.00, p = .287$

XI. For respondents who worked in large group practice:

screening practices and gender, $\chi^2(2, n = 119) = 7.08, p = .029$

screening practices and age, $\chi^2(8, n = 119) = 5.83, p = .666$

screening practices and professional designation, $\chi^2(2, n = 119) = 2.52, p = .284$

screening practices and years in practice post residency, $\chi^2(10, n = 116) = 17.02, p = .074$

screening practices and practice community, $\chi^2(4, n = 119) = 4.64, p = .326$

XII. For respondents who worked in small group practice:

screening practices and gender, $\chi^2(2, n = 171) = 3.67, p = .160$

screening practices and age, $\chi^2(8, n = 171) = 6.04, p = .643$

screening practices and professional designation, $\chi^2(2, n = 171) = 4.98, p = .083$

screening practices and years in practice post residency, $\chi^2(10, n = 171) = 11.88, p = .293$

screening practices and practice community, $\chi^2(4, n = 171) = 20.38, p < .001$

XIII. For respondents who worked in independent / private practice:
screening practices and gender, $\chi^2(2, n = 41) = 0.61, p = .738$

screening practices and age, $\chi^2(8, n = 41) = 10.03, p = .263$

screening practices and professional designation, $\chi^2(2, n = 41) = 0.71, p = .703$

screening practices and years in practice post residency, $\chi^2(10, n = 41) = 21.51, p = .018$

screening practices and practice community, $\chi^2(4, n = 41) = 2.36, p = .670$

XIV. For respondents who were in clinical practice for 5 years or less post residency:

screening practices and gender, $\chi^2(2, n = 82) = 2.22, p = .330$

screening practices and age, $\chi^2(4, n = 82) = 2.06, p = .725$

screening practices and professional designation, $\chi^2(2, n = 82) = 5.12, p = .077$

screening practices and practice setting, $\chi^2(8, n = 82) = 20.70, p = .008$

screening practices and practice community, $\chi^2(4, n = 82) = 1.64, p = .802$

XV. For respondents who were in clinical practice for 6 to 10 years post residency:

screening practices and gender, $\chi^2(2, n = 56) = 1.58, p = .455$

screening practices and age, $\chi^2(4, n = 56) = 2.46, p = .652$

screening practices and professional designation, $\chi^2(2, n = 56) = 3.06, p = .217$

screening practices and practice setting, $\chi^2(8, n = 56) = 18.53, p = .018$

screening practices and practice community, $\chi^2(4, n = 56) = 3.74, p = .442$

XVI. For respondents who were in clinical practice for 11 to 15 years post residency:

screening practices and gender, $\chi^2(2, n = 54) = 6.93, p = .031$

screening practices and age, $\chi^2(4, n = 54) = 5.74, p = .219$

screening practices and professional designation, $\chi^2(2, n = 54) = 2.70, p = .259$

screening practices and practice setting, $\chi^2(8, n = 54) = 9.48, p = .304$

screening practices and practice community, $\chi^2(4, n = 54) = 11.23, p = .024$
XVII. For respondents who were in clinical practice for 16 to 20 years post residency:

- screening practices and gender, $\chi^2(2, n = 42) = 0.04, p = .981$
- screening practices and age, $\chi^2(6, n = 42) = 4.95, p = .550$
- screening practices and professional designation, $\chi^2(2, n = 42) = 0.61, p = .736$
- screening practices and practice setting, $\chi^2(8, n = 42) = 15.53, p = .050$
- screening practices and practice community, $\chi^2(4, n = 42) = 8.61, p = .072$

XVIII. For respondents who were in clinical practice for 21 to 25 years post residency:

- screening practices and gender, $\chi^2(2, n = 62) = 5.24, p = .073$
- screening practices and age, $\chi^2(4, n = 62) = 2.24, p = .692$
- screening practices and professional designation, $\chi^2(2, n = 62) = 3.37, p = .186$
- screening practices and practice setting, $\chi^2(8, n = 62) = 7.71, p = .463$
- screening practices and practice community, $\chi^2(4, n = 62) = 3.61, p = .461$

XIX. For respondents who were in clinical practice for 26 years or more post residency:

- screening practices and gender, $\chi^2(2, n = 97) = 4.20, p = .122$
- screening practices and age, $\chi^2(4, n = 97) = 1.88, p = .757$
- screening practices and professional designation, $\chi^2(2, n = 97) = 6.25, p = .044$
- screening practices and practice setting, $\chi^2(8, n = 97) = 3.70, p = .883$
- screening practices and practice community, $\chi^2(4, n = 97) = 7.29, p = .121$

XX. For respondents who practiced in urban community:

- screening practices and gender, $\chi^2(2, n = 104) = 2.32, p = .314$
- screening practices and age, $\chi^2(8, n = 104) = 5.68, p = .683$
- screening practices and professional designation, $\chi^2(2, n = 104) = 4.01, p = .135$
- screening practices and practice setting, $\chi^2(8, n = 104) = 10.41, p = .238$
screening practices and years in practice post residency, $\chi^2(10, n = 102) = 4.73, p = .909$

XXI. For respondents who practiced in suburban community:

screening practices and gender, $\chi^2(2, n = 153) = 6.51, p = .039$

screening practices and age, $\chi^2(8, n = 153) = 1.83, p = .986$

screening practices and professional designation, $\chi^2(2, n = 153) = 1.43, p = .489$

screening practices and practice setting, $\chi^2(8, n = 153) = 21.74, p = .005$

screening practices and years in practice post residency, $\chi^2(10, n = 153) = 9.70, p = .467$

XXII. For respondents who practiced in rural community:

screening practices and gender, $\chi^2(2, n = 139) = 1.88, p = .391$

screening practices and age, $\chi^2(8, n = 139) = 8.12, p = .422$

screening practices and professional designation, $\chi^2(2, n = 139) = 1.64, p = .440$

screening practices and practice setting, $\chi^2(8, n = 139) = 4.34, p = .825$

screening practices and years in practice post residency, $\chi^2(10, n = 138) = 20.74, p = .023$
APPENDIX C

PURPOSE OF THE SURVEY: This survey is designed to identify the current screening and diagnostic practices and to determine the potential continued medical education needs specifically related to Autism Spectrum Disorders/Pervasive Developmental Disorders (ASD/PDD) for physicians. PARTICIPANT SELECTION: You were selected as a participant because you are listed on the public mailing list as a practicing physician in a target group. The target group consists of physicians who regularly care for young children. EXPLANATION OF PROCEDURES: You will be asked to answer questions about your background information, information regarding screening, diagnosing and referral practices, knowledge of AAP guidelines, training experiences and continuing medical education needs specifically related to ASD/PDD. CONFIDENTIALITY: Final survey data will be analyzed in a de-identified format and presented in aggregate form without any link to you individually. Surveys will be coded to insure anonymity and to allow follow-up. Only the primary investigator will have access to your identity. This study has been approved by the Wichita State University Institutional Review Board (IRB # 1199). REFUSAL/WITHDRAWAL: Participation in this survey is entirely voluntary. There are no anticipated risks or discomforts that will result from this survey. Your decision whether or not to participate will not affect your future relations with Wichita State University. CONTACT: If you have any questions about this survey, you can contact Jagadeesh Rajagopalan, at (316) 978-3331 or at jxrajagopalan@wichita.edu or Dr. Trisha Self at (316) 978-6810 or at trisha.self@wichita.edu. If you have questions pertaining to your rights as a survey participant, you can contact the Office of Research Administration at WSU, Wichita, KS, 67260-0007, telephone, (316) 978-3285. Approximate time to complete this survey is 5 minutes. Thank you for your participation.

Background Information (Please check [✓] your responses)

1. Gender:  □ Female  □ Male
2. Age:  □ 25 – 34  □ 45 – 54  □ ≥ 65
         □ 35 – 44  □ 55 – 64

3. Which best describes your professional role?
   □ Pediatrician  □ Primary Care Physician

4. Professional designation:  □ MD  □ DO

5. How would you describe your current practice setting?
   □ Hospital  □ Independent/Private Practice
   □ Large Group Practice (≥ 8)  □ Other (Please specify) __________________
   □ Small Group Practice (2 to 7)

6. Number of years in practice post residency?
   □ ≤ 5 years  □ 11-15 Years  □ 21-25 Years
   □ 6-10 Years  □ 16-20 Years  □ ≥ 26 Years

7. How would you describe community in which you practice?
   □ Urban  □ Suburban  □ Rural

8. What is the 5-digit zip code for your office? ___________________
**Practice Information (Specifically Related to ASD/PDD)**

9. Do you (or other members of your staff) routinely screen children for Autism Spectrum Disorder (ASD) / Pervasive Developmental Disorder (PDD) using ASD/PDD specific screening tools? (Please check all that apply)

- Yes (I perform ASD screenings)
- Yes (Other staff performs ASD screenings)

(If No, skip to Question # 11)

(Please indicate their professional designation)

i) If yes, indicate when you screen? (Please check all that apply)

- Routinely for all children by 9 months
- Routinely for all children by 18 months
- Routinely for all children by 24 months
- Only when suspected to have ASD/PDD

- Only when referred specifically for ASD/PDD
- When parents/caregivers express concern

ii) Approximately how many ASD screenings do you perform each month? ____________

iii) What screening tool(s) do you routinely use? (Please check all that apply)

- Checklist for Autism in Toddlers (CHAT)
- Modified – Checklist for Autism in Toddlers (M-CHAT)
- Communication and Symbolic Behavior Scales Developmental Profile – Infant/Toddler Checklist (CSBS DP)
- Early Screening of Autistic Traits Questionnaire (ESAT)
- Pervasive Developmental Disorders Screening Test – II (PDDST-II)
- Childhood Autism Spectrum Test (CAST)
- Social Communication Questionnaire (SCQ)
- Screening Tool for Autism in Two-Year-Olds (STAT)
- Developmental Behavior Checklist–Autism Screening Algorithm (DBC-ASA)
- Autism Behavior Checklist (ABC)
- Childhood Autism Rating Scale (CARS)
- Gilliam Autism Rating Scale (GARS)
- Other (Please Specify) ________________________________

10. When a child receives a positive screening, what is your further course of action? (Please check all that apply)

- Monitor symptoms and follow-up
- Administer ASD/PDD specific diagnostic tools
- Do comprehensive evaluation
- Refer for genetic testing

- Refer to specialist for follow-up
- Refer to early intervention program
- Refer to speech language services
- Other (Please specify) ________________________________
11. If you do not routinely screen for ASD/PDD, indicate why? (Please check all that apply)

☐ Lack of sufficient time  ☐ Inadequate reimbursement
☐ Not familiar with screening tools  ☐ Rely only on clinical observations
☐ Lack of sufficient training  ☐ Refer to specialists
☐ Do not feel confident to identify characteristics related to ASD/PDD  ☐ Lack of adequate knowledge about resources and referral sources for ASD/PDD
☐ Screening tools are expensive  ☐ Other (Please specify all)
☐ Screening tools are not effective

12. What abnormalities would prompt you to consider further evaluation? (Please check all that apply)

☐ Abnormal gait  ☐ Communication delays
☐ Poor balance  ☐ Delayed self help skills (e.g., drinking, eating, dressing)
☐ Hyper/hypo tonicity  ☐ Hypersensitivity (e.g., light, sound, texture, touch)
☐ Poor fine motor skills  ☐ Limited food preferences (e.g., texture, color, smell)

13. What resources are available in your office for the parents/caregivers of those children who receive a positive screening for, or are suspected to have signs of ASD/PDD? (Please check all that apply):

☐ Handouts to parents/caregivers
☐ Information packets about ASD/PDD with all local resources
☐ Contact information for specialists in your area
☐ Contact information for early intervention programs in your area
☐ Other (Please specify) ____________________________________________

14. Approximate number of children with ASD/PDD in your current patient load: __________

15. Have you ever diagnosed a child as having ASD/PDD?  ☐ Yes  ☐ No

16. Have you ever diagnosed a child with ASD/PDD without having previously administered a screening test for that child?

☐ Yes  ☐ No (If No, skip to Question # 17)

i) If yes, please indicate the reasons: (Please check all that apply)

☐ Parents/caretakers expressed concern  ☐ Referred by early intervention program
☐ Referred by their doctor  ☐ Referred by speech language pathologist
☐ Referred by school teacher  ☐ Referred by other allied health professionals
☐ Referred by school psychologist (Please specify) ______________________
☐ Referred by day care  ☐ Other (Please specify) ______________________
Knowledge and Training Information (Specifically Related to ASD/PDD)

17. According to your understanding of the current AAP guidelines, at what ages should you routinely administer an ASD specific screening? (Please check all that apply)

- [ ] 9 months
- [ ] 12 months
- [ ] 18 months
- [ ] 24 months
- [ ] 30 months
- [ ] 36 months

18. Rate your level of confidence specifically related to ASD/PDD?

<table>
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<th>Ability to recognize early warning signs</th>
<th>Not confident</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Very confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of diagnostic criteria</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of empirically supported interventions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of local referral sources and resources</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

19. Rate the degree to which your medical school and/or residency training prepared you specifically related to ASD/PDD?

<table>
<thead>
<tr>
<th></th>
<th>Not prepared</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Well prepared</th>
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</thead>
<tbody>
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<td>4</td>
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<td></td>
<td></td>
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<tr>
<td>Diagnosing</td>
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</tr>
<tr>
<td>Treating</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20. Have you attended Continuing Medical Education opportunities in the last 5 years specifically related to characteristics of ASD / PDD?

- [ ] Yes
- [ ] No

  i) If yes, approximately how many hours? ____________

21. Is there anything that would help you with your screening and diagnostic practices for ASD / PDD?

- [ ] Conference
- [ ] Online CME
- [ ] Workshop at your workplace
- [ ] Off site workshop
- [ ] Series of evening meetings
- [ ] Webcast
- [ ] Other (Please specify all) ____________
22. In your opinion, what changes can be made in medical school and/or residency training so that physicians will be confident and better prepared to screen, diagnose, and treat children with ASD/PDD?

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

Additional information regarding continuing medical education opportunities in the area of ASD/PDD will be forth coming. If you are interested in receiving this information, please provide the **appropriate contact information**.

Contact Person: _____________________________   Work Phone: ______________________________
Work Address: _____________________________   Preferred e-mail: ___________________________

**Thank you for taking the time to complete this survey!**