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Improving Validity of Referrals for Comprehensive Autism Evaluation : A Tier-2 Direct Autism Observation Checklist

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IMPROVING VALIDITY OF REFERRALS FOR COMPREHENSIVE AUTISM

EVALUATION: A TIER-2 DIRECT AUTISM OBSERVATION CHECKLIST

By Mary Heim Elberson

Submitted in Partial Fulfillment of the Requirements of the Degree of

Doctor of Psychology

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DEPARTMENT OF PSYCHOLOGY

Dissertation Approval

This is to certify that the thesis presented to us by _MARY HEIM ELBERSON_

on the _24th_ day of _May_ , 20_10_, in partial fulfillment of the

requirements for the degree of Doctor of Psychology, has been examined and is

acceptable in both scholarship and literary quality.

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Abstract

Early identification of autism has received national attention and can lead to positive treatment outcomes. Research has demonstrated that qualitative impairments in social and communicative behaviors can be detected within the first two years of life. Unfortunately, many children with autism will not receive an autism diagnosis until they enter preschool. Professionals within school settings have not often received extensive training on assessment of autism spectrum disorders. Expectations, however, are that school-based teams can identify students who demonstrate characteristics associated with autism and refer those students for a comprehensive autism evaluation. Currently, autism screening tools are limited to rating scales completed by parents or teachers. Although rating scales have value in the screening process, they should not be relied upon solely to determine whether or not further assessment is warranted. Instead, rating scales should be used in conjunction with direct observation in determining if an intensive autism evaluation is necessary. Because direct observation can be subjective and reliant on the skills and experience of the observer, a tool is needed to guide and quantify observations.

The current research study provided a retrospective analysis of such an observational screening tool used to observe students enrolled in a preschool program within the Christina School District. The first research question examined the relationship between scores on the observational checklist for students with typical development, developmental delays, and autism. Students with autism scored significantly lower than students with typical development and also lower than those with developmental delays. The second research question examined the effectiveness of individual checklist items at differentiating between the identified groups. Although all items effectively discriminated autism from typical and developmentally delayed peers, removing the two least effective items increased the overall

sensitivity, positive predictive validity and negative predictive validity of the checklist. The third research question investigated the relationship between developmental level and overall checklist score. Developmental level, characterized as "high" (cognitive score of 85 or greater) or "low" (cognitive score of 84 or lower) did not correlate with performance on the checklist. Regardless of developmental level, the checklist correctly identified children within the autism group, based on a cut-score lower than 10 (on the 12-item checklist).

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Introduction

Statement of the Problem

Research has clearly demonstrated the benefits of early identification and subsequent special education services for children with autism. Although the ultimate goal of special education is to provide high quality, early intervention services for children with autism, accurate identification and diagnosis of the disorder is a crucial first step. Diagnostic evaluations considered the "gold standard" for assessing autism include measures that are intensive, time consuming, and costly. Conducting assessments with children who are being referred for special services is an important role for many school psychologists. Although there has been an improved awareness both in the lay and in the professional public about ASDs, many school psychologists have not received the extensive training or gathered the clinical experience required to use a number of diagnostic tools available to determine whether or not a child has an ASD (Bradley-Johnson, 2008). In fact, in many school settings, there is a disconnection between what research has demonstrated as effective methods for the assessment of students with ASD and actual school-based practices (Harris, Bruey, Palmieri, & Handleman, 2009) Although many school psychologists have likely not received extensive training on clinical diagnostic tools used to assess ASDs (such as the Autism Diagnostic Observation Scale – ADOS, or the Autism Diagnostic Interview – ADI), these play a crucial role in screening for autism and making appropriate referrals for diagnostic assessments (Brock, Jimmerson, & Hansen, 2006). Before an expensive and time consuming evaluation is conducted to indicate or to rule out a diagnosis of autism, screening measures should be implemented to determine whether or not more in-depth assessment is warranted.

Most children suspected of having an ASD are assessed prior to entering elementary school. In order for young children to gain access to early intervention services in a timely fashion, it is optimal that risk factors and warning signs for autism be identified by primary care providers at well-baby check-ups (American Academy of Pediatrics, 2006). However, several factors may prompt an initial ASD diagnosis after the age of 3; these include having previously received a non-ASD diagnosis, such as language and developmental delay, mental retardation, or other behavioral disorders (California Department of Developmental Services, 2002). Therefore, some children will enter the preschool system without a diagnosis of autism. As mandated by Child Find regulations, school personnel working in toddler and preschool programs must also be able to identify and evaluate children at- risk for autism. Brock, Jimmerman and Hansen (2006) put forth a model for identifying children at-risk and subsequently evaluating these children within the school system. In this model, consistent with Child Find regulations, school personnel should engage in routine developmental surveillance, or "case finding". This level of assessment is considered "tier 1". After this process has identified children at-risk, a decision should be made about whether or not an autism screening is appropriate by conducting tier 2 assessments. If warranted, a full diagnostic evaluation should be completed to determine whether or not the child has a disability, including the nature and severity of that disability (tier 3). Clearly, in order to best serve children whose development is not following a typical trajectory, professionals working with these children must have an understanding of those behaviors that are suggestive of typical development, of developmental delay and autism, and of the tools to assess children at each tier.

Currently, a review of the literature shows that tier 2 screening measures for the preschool-age population are limited primarily to parent or teacher questionnaires and interviews, and less frequently to direct observation of the child. Although these assessment tools are certainly useful as part of a tier 2 screening, they should not replace or supersede direct observation of the child in a naturalistic setting. In order to form a preliminary understanding of a child's unique strengths and needs, behavioral observations allow professionals working with the student to see how the child responds to situational demands in his or her environment (Bracken, 2007). However, clinical observations of behavior are less objective than standardized scales and tests, causing more debate surrounding their interpretation. There is a need within the field for an observational tool that indicates the probable presence or absence of an autism spectrum disorder in preschool aged children, based on direct observation of a child in a natural setting. In order to decrease the subjectivity of such a tool, it is important to define, operationally, behaviors that may be evident in a preschooler during times when social interaction is emphasized, such as free play or center-based learning. A structured observational tool to be used as part of tier 2 screening for autism will increase the likelihood of making reliable decisions about whether or not a tier 3 diagnostic assessment is warranted.

In order to evaluate young children suspected of autism in the public school setting, it is critical that professionals are well trained and that tools are used that allow differentiation between typical development, developmental disabilities, and autism. As stated, many public school systems do not have professionals who are trained to use tools that have been validated for identifying students with autism. Within research studies, the ADOS and ADI-R are referred to as the "gold standard" in identifying children with autism spectrum

disorders (Filipek et al., 1999). In the clinical setting, the clinical judgment of the evaluator(s) is considered to be the most valid form of diagnosing autism (Filipek et al.; Kleinman et al., 2008). Most professionals working within the public schools have not gained enough clinical experience or practice in assessing this population to evaluate, diagnostically, for the presence of autism. Moreover, specific diagnostic tools to evaluate for autism are expensive and require extensive training of teams for administration of these tools. Additionally, because of the time and resources required to administer these tools, they should be used only when screening measures indicate that autism is likely.

In New Castle County, Delaware, most of the assessment for the educational classification of autism is conducted by the Delaware Autism Program (DAP). Because few professionals working within the early intervention system are trained to administer the ADI-R or ADOS, many have no other option than to refer to teams at DAP where there are professionals who have received this extensive training. This process leads to many children receiving the most intensive evaluation (tier 3) before specific screening measures to assess the likelihood of autism have been completed. Essentially, school personnel are identifying children at-risk for a disability based on their professional opinions, but not using quantitative screening measures to assist in determining whether or not a comprehensive autism evaluation is warranted. For this reason, it is important to create a reliable and valid system of observation within the public school early intervention system for children between the ages of 3 and 5 who are suspected of having autism.

Purpose of the Study

The purpose of this study is to: 1) to review archival data for the purpose of gathering data relative to typically developing children, to children with a developmental

delay (as defined by a developmental quotient or language score equal to or greater than 2 standard deviations below the mean), and to children with a primary educational classification of autism, 2) to determine if children with autism can be differentiated from children with developmental delay and typically developing children, based on observation of free-play and/or center-based instruction within a preschool setting, 3) to determine if any observational items do not effectively distinguish between the three groups and 4) to determine whether or not the developmental level of students with autism affects total checklist scores. In order to determine whether or not these three groups of children can be distinguished from each other based on an observation of their play, an operationally defined observation format will be used, in which the observer will rate behaviors examined as present or not present during the observation.

Research Questions

1. How do children with an educational classification of autism perform on the preschool play observation checklist compared with similar-age peers who demonstrate typical development and with similar-age peers who demonstrate cognitive developmental delays?

2. Are there any items on the preschool play observation checklist that do not effectively differentiate autism from developmentally delayed or from typically developing children?

3. Within the group of students with an educational classification of autism, will the developmental level of these students affect their scores on the preschool observation checklist?

Specific Hypotheses

Hypothesis I: It is predicted there will be a difference in overall rating scores between typically developing children, children with developmental delay, and children with an educational classification of autism during a structured play observation as measured by levels of social interaction, communication, and repetitive behaviors; a structured preschool play observation format will be used.

Hypothesis II: It is predicted that children with autism will perform significantly poorer than typically developing children on the preschool autism observation scale, as evidenced by a score equal to or lower than the "cut-off" score.

Hypothesis III: It is predicted that children with the educational classification of autism will perform significantly poorer than children with a developmental delay and no classification of autism, as evidenced by a score equal to or lower than the "cut-off" score.

Hypothesis IV: It is hypothesized that all of the items on the checklist will differentiate children with autism from those with typical development and developmental delay.

Hypothesis V: It is hypothesized that within the group of students with an educational classification of autism, scores on the preschool play observation checklist will not differ significantly, based on developmental level of the student.

Literature Review

In 1943, Leo Kanner first reported on children who exhibited what Kanner believed to be a congenital lack of interest in other people. Kanner described these children as demonstrating remarkable social failure, profound disturbances in communication, and

unusual responses to the inanimate environment. He used the word autism, meaning "self", to convey the self-contained quality of these children (Volkmar & Klin, 2005). Kanner's original description of the social and communication deficits and behavioral irregularities of children with autism has proven to be enduring. Today, autism is considered a neurodevelopmental disorder characterized by qualitative impairments in reciprocal social interaction and communication, as well as restrictive patterns of interests and behaviors, manifested during the first 36 months of life (Baird, Cass, & Slonims, 2003). Although the precise etiology remains unknown, autism is considered most likely to have a genetic basis involving multiple, interacting genes (Gray & Tonge, 2001). At the present time, autism cannot be diagnosed based on biological markers, and thus remains a behaviorally defined disorder. Although the manifestations of autism vary considerably across children and within individuals over time, it generally has life-long effects and can cause disabilities in all areas of psychological development (National Research Council, 2001). These impairments include deficits in social interaction, as well as potential impairments in cognitive, language, and behavioral functioning (Crane & Winsler, 2008). If autism is correctly identified at an early age, intervention programs are available to address each area of deficit, with promising results (Kleinman et al., 2008).

Because of the large variation in the behaviors related to the diagnosis of autism spectrum disorders, the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (*DSM-IV-TR*), defines the criteria for autism and its subcategories according to the age and type of onset, the associated features, and the severity of the core features. The *DSM-IV-TR* lists five Pervasive Developmental Disorders: Autistic Disorder, Asperger's Disorder, Rett's Disorder, Childhood Disintegrative Disorder, and Pervasive

Developmental Disorder, Not Otherwise Specified (PDD-NOS) (APA, 2000). In clinical practice, the term autism spectrum disorder (ASD) is often used collectively to refer to autism, PDD-NOS, and Asperger's disorder. The majority of research on assessment and identification of ASD in children under the age of 5 focuses on diagnostic characteristics of autism. In fact, atypical autism and Asperger's disorder are usually not identified in children until the school years, when their deficits in social interaction clearly emerge (Klin, McPartland, & Volkmar, 2005). Research on Asperger's Disorder, Rett's Disorder and Childhood Disintegrative Disorder is not considered in this literature review.

Early detection of autism has received much interest in the literature, given its impact on early intervention for children and families. However, the diagnostic picture of autism in young children can be complicated; infants and toddlers often do not evidence many of the abnormal behaviors that must be present for a clinical diagnosis of ASD (such as problems with peer relationships or with conversational skills) because of the typical developmental sequence of onset of these skills (Volkmar, Chawarska, & Klin, 2005). Furthermore, young children with autism form a heterogeneous group; the manifestation of the core impairments and behaviors of autism vary, thereby causing difficulty in defining cut-off scores to signify the presence of the disorder (Baird et al., 2003). Although some researchers have proposed that a distinct diagnostic algorithm is warranted for young children, the *DSM-IV-TR* does not currently differentiate the earliest signs and symptoms from those present during early childhood and beyond (Stone et al., 1999; Crane & Winsler, 2008).

It is recognized that autism is a disorder that is present from birth or very early in development. In fact, current research studies indicate that symptoms of autism can be reliably identified in children between 18 months and 2 years of age, with several

retrospective studies identifying behavioral markers in children as young as 8-12 months of age (Adrien et al., 1993; Baranek, 1999; Werner, Dawson, Osterling, & Dinno, 2000). When a child is not developing typically, parental concern generally emerges by the time the child is approximately 18-months of age; studies suggest that approximately 30% - 54% of parents of children diagnosed with autism have concerns before the child turns one-year (Chawarska & Volkmar, 2005), with 50% reporting features of autism in their children by 2 years of age and 93% indicating recognition of symptoms by age 3 (Matson, Wilkens, & Gonzalez, 2008). However the diagnosis of autism is often not made until 2 to 3 years after symptoms are recognized, primarily because of hesitancy to label or incorrectly diagnose the child (Filipek et al., 2000), because of concerns about causing undo family distress, or with the hope that the symptoms will reverse over time (Filipek et al., 1999).

Matson and colleagues suggest that the most reliable cut-off for accurate diagnosis at the present time is 2 years of age; however, the average age for diagnosis remains 3-4 years of age in the United States (Filipek et al., 1999). Although diagnostic stability increases after about age 2 years, developmental changes in this age group can be marked (Volkmar & Klin, 2005). Given the fact that very young children may not yet demonstrate behaviors that fulfill the DSM-IV criteria for autism, specifically within the areas of social interaction and repetitive behaviors, it is likely that even children who have be diagnosed with autism as toddlers will require reassessment as they enter the preschool years. Additionally, some children will enter preschool without an educational classification of autism; therefore, it is important for school professionals working with pre-kindergarten age students to have access to tools that will enable them to identify students who require further assessment for autism.

Findings suggest that intensive early interventions specialized for children with ASD and their specific learning patterns has been most effective in producing quantifiable gains with this population (Sutera et al., 2007), suggesting that the benefits of early detection and intervention outweigh the risks associated with it. Whereas the data of effectiveness of early intervention continues to mount, the benefits of early intervention are somewhat controversial. Crane and Winsler (2008) caution that more research is needed to evaluate effectiveness, because of wide variability in the types of intervention programs implemented and because of how much information on control variables is collected. Matson et al. (2008) argue that the benefits of early intervention, although conceptually appealing, are largely unsubstantiated by data. Early intervention, although outside the scope of this literature review, is likely to lead to improvements in the functioning of children; however, there is not a direct relationship between any particular intervention and complete alleviation of autistic symptoms to date (National Research Council, 2001).

Screening and assessment of children with suspected Autism Spectrum Disorders

Autism spectrum disorders (ASD) present numerous challenges for early diagnosis and intervention (Crane & Winsler, 2008). Special education law mandates appropriate intervention and education for children with disabilities from the age of three (US Department of Education, 2004); clearly, in order to grant children access to these services, children in need must be identified and subsequently provided with a full diagnostic assessment. Although this is the mandate of the local education authority (LEA), the services of non-LEA specialists are often required for initial identification, diagnosis, and clinical services related to autism (National Research Council, 2001; California Department of Developmental Services, 2002). As professionals working within the school system, we are

charged with the responsibility of understanding typical development and developmental disabilities, identifying children at risk for ASD, and conducting the appropriate screening measures to determine if a full diagnostic evaluation is warranted.

Because early screening and diagnostic techniques have improved within the last decade, the age of first diagnosis of ASD has dropped (with the current age of diagnosis currently being between 2-3 years of age) (Kleinman et al., 2008). However, many children continue to be diagnosed at the age of 4 or 5, perhaps due to a reluctance to "label" the child, to labeling the child incorrectly, or due to a developmental change in symptom presentation. Given that accurate identification of ASDs is reliant on clinical competencies, it is critical that evaluations for ASD be performed only by professionals who have specific expertise in the evaluation and treatment of autism (Filipek et al., 1999; California Department of Developmental Services, 2002; National Research Council, 2002). The level of expertise required for effective diagnosis and assessment of autism may require services of individuals or a team of individuals other than those that are usually available in a school setting (National Research Council, 2002). It is not surprising then that most of the literature base on assessment of ASDs discuss evaluation in a clinical or research setting, often ignoring the role of the school system.

Conceptually, there are three phases in identifying children with an ASD. Although the language often varies within the literature, there is agreement surrounding the importance of each phase. Phase 1 involves routine developmental surveillance, and this is important in identifying children at-risk within the larger population. In schools, this level of identification of needs is considered tier 1, and refers to all initial concerns with a child's learning and/or development. Phase 2 involves screening, or utilizing standardized tools to identify and

refine the recognized risk. In the school system, this level of identification of needs is referred to as tier 2, and consists of observations and use of screening measures to determine whether or not a problem exists. Phase 3 is a formal evaluation often conducted across disciplines, aimed at identifying specific disorders within the child. Within the schools, this phase is referred to as tier 3, and often consists of formal testing of the child's cognitive, speech, language, social, behavioral and motor functioning.

Recent changes in the laws surrounding the identification of learning disabilities have required schools to make use of the three tiered system of assessment, specifically for students suspected of having learning disabilities. Although evidence was not found in the literature, it is suggested from the author's clinical experience that the same three-tiered model is not often used for the assessment of autism spectrum disorders. Instead, based on the report of school personnel, a tier-3 level assessment is often requested to determine whether or not a classification of autism is founded, without evidence from tier-2 assessments that such an evaluation is warranted.

Matson and colleagues (Matson, Nebel-Schwalm, & Matson, 2007) provide an overview of 21 autism scales used for differential diagnosis of autism, each having published psychometric data; the authors argue that any instrument used for diagnosing autism should come from this list. Some of these tools within the list compiled by Matson and colleagues are considered screening instruments elsewhere in the literature; within the literature on tier 2 screening tools utilized to determine whether or not a diagnostic assessment should take place, the following tools are listed by Matson and colleagues as having acceptable psychometric qualities: Autism Behavior Checklist (ABC), Checklist for Autism in Toddlers (CHAT), Modified Checklist for Autism in Toddlers (M-CHAT), Pervasive Developmental

Disorders Behavior Inventory (PDDBI), Pervasive Developmental Disorders Rating Scale (PDDRS) and the Screening Test for Autism in Two-year-olds (STAT). All of the measures on this list, with the exception of the CHAT and the STAT, which utilize a direct observation format in addition to parent report, are in the form of a rating scale. None of the scales is designed to provide a standardized method to observe a child in a naturalistic setting; rather, the examiner is required to interact with the child by manipulating the environment and setting up specific situations.

Within the literature, rating scales are the most widely discussed method of screening for autism. Rating scales are useful for this purpose, especially within the clinical and research arenas, where clinicians have ready access to parents and have the time to conduct an interview based on these rating scales. In the school setting, limitations of rating scales, including confusion over what the items are asking and the tendency for the informant to rate a behavior based on a desired outcome, make their utility less favorable. Additionally, when parents complete rating scales, they tend to be accurate in reporting negative symptoms (e.g. failure to participate in early social games, songs and routines, and preference for solitary activities), but less accurate in reporting the positive symptoms (e.g., deficits in joint attention behaviors and pretend play) (Chawarska & Volkmar, 2005). Given the fact that joint attention skills are a primary deficit in young children with autism and differentiate children with ASD from those with other developmental disabilities (Volmar, Cawarska, & Klin, 2005; Gray & Tonge, 2001), it is important for the rater to be able to adequately identify a deficit in this area. Finally, screening rating scales (such as the M-CHAT) are often designed to maximize sensitivity, or to detect as many cases of autism as possible; therefore, it will identify more children at-risk than will receive a diagnosis of ASD. Adding an

observation of the student by qualified professionals within the school system may enhance the validity of a tier 3 referral.

Naturalistic observation of children suspected of having a disability is considered best practice when completing a diagnostic evaluation (National Research Council, 2001; California Department of Developmental Services, 2002). Observing a child in his or her natural environment does pose some challenges; naturalistic observation can be time consuming, and the child may not display particular behaviors during the observation period (Pasco, Gordon, Howlin, & Charman, 2008). Naturalistic observations also tend to be subjective, especially because standardized tools that would narrow the focus of an observation to salient behaviors and allow comparison of these behaviors across groups are not available. Within the literature, operationally defined naturalistic observational measures were found for use as outcome measures (Pasco et al.), but not for use as a part of a tier 2 screening for autism. Despite the limitations of naturalistic observation, it is a practical and time-efficient way to ascertain information about a child's performance and behaviors without the effects obtained through adult interaction. Because diagnostic evaluations for autism are costly and time intensive, it is in the best interest of school professionals to have access to an observational tool that will assist in making decisions about the need for further evaluation of autism.

Screening Tools

Modified Checklist for Autism in Toddlers

The M-CHAT is a checklist designed to screen for autism at 24 months of age (Brock et al, 2006). It consists of 23 "yes/no" items and can be completed in minutes. The M-CHAT can be used as part of a well-child check-up or by specialists to assess risk for ASDs.

If a child "fails" the screener (fails any three items or any two critical items on the M-CHAT), should receive a more in-depth evaluation. All critical items involve joint attention, pointing, showing, social interest, response to name and imitation. Some data suggest that when a positive autism screen is based upon failure of two of the six critical items, the M-CHAT has a sensitivity of 95%, specificity of 99%, positive predicative power of 79%, and a negative predictive power of 99% (Brock et al.).

Checklist for Autism in Toddlers (CHAT)

The CHAT is a screening instrument that involves a yes/no response to nine questions and a brief observation of the child by the practitioner. Key items assess joint attention and pretend play and have been found to be powerful predictors of autism (Brock et al, 2006).

Social Communication Questionnaire (SCQ)

The Social Communication Questionnaire (SCQ) is a screening instrument designed to evaluate communication skills and social functioning in children who may have autism or autism spectrum disorders (ASD) based on parent report. The SCQ utilizes a 40-item, "yes/no" response format that taps the symptomatology associated with autism spectrum disorder (Rutter, Bailey, & Lord, 2003). The SCQ provides a measure of ASD symptoms, with a cutoff score that can be used to indicate the likelihood that the individual has an ASD. The SCQ may be most useful as a screener for use with parents who already know about autism and autistic spectrum disorders symptoms. It may be less useful as a screening instrument for young children and for families who are less familiar with autism spectrum disorders (Allen, Silove, Williams, & Hutchins, 2007).

Pervasive Developmental Disorders Screening Test – Second Edition (PDDST-2)

The PDDST-2 includes three questionnaires: one for parents, one for developmental disabilities clinics, and one for autism specific clinics. It is the first ASD screening test to contain items specific to development in the first 48 months of life. The PDDST-2 is standardized with large groups of children with other types of neurodevelopmental disorders so that they can be differentiated from non-specific developmental delays, mental retardation, language disorders, infant psychiatric disorders and typical development. Items include positive and negative behaviors associated with autism as well as questions regarding regression. The PDDST-2 is designed for children 12 to 48 months and has a sensitivity of 89% and specificity of 83%. (Siegel, 2004).

Autism in young children

Social dysfunction is one of the essential diagnostic features of autism. In 1943 Leo Kanner originally emphasized the idea that social deviance and delay was a hallmark of autism, an assertion that continues to be represented in the *DSM-IV-TR* (Carter, Davis, Klin, & Volkmar, 2005). The *DSM-IV-TR* defines a qualitative impairment in social interaction as manifested by at least two of the following: marked impairment in the use of multiple nonverbal behaviors to regulate social interaction; failure to develop peer relationships appropriate to developmental level; a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people; or a lack of social or emotional reciprocity (APA, 2000). Although impairments in social interaction are essential to the diagnosis of autism, and may in fact be the most salient early feature of autism (Volkmar et al., 2005), it is not uncommon for parents to fail to express concern about their child's social development prior to the age of 3 years (Charman & Baird, 2002).

In addition to impairments in social interaction, qualitative impairments in communication are part of the diagnostic profile of children with autism. The *DSM-IV-TR* puts forth the idea that qualitative impairments in communication are manifested by at least one of the following: a 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); a marked impairment in the ability to initiate or sustain a conversation with others (in individuals with adequate speech); stereotyped and repetitive use of language or idiosyncratic language; or a lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level (APA, 2000). In fact, language is the earliest disruption reported by most parents of children with autism (Filipek et al., 1999), and speech difficulties are the most often, first-cited concern for referral of children later diagnosed with ASD (Watson, Baranek, & DiLavore, 2003).

Some of the core deficits identified by the *DSM-IV-TR* are not evident in typically developing young children, again making it difficult to follow the currently available diagnostic guidelines strictly for diagnosing young children under the age of 5 years. Therefore, it is an accepted belief that symptoms indeed manifest during the first 2 years of life; however, there is still limited evidence regarding the timing of onset and the nature of severity of the primary symptoms (Chawarska et al., 2007). Indeed, although experts can diagnose autism in two-year-olds, it is important to note that the particular pattern of symptoms in a 2-year-old with autism may differ from that seen at the age of 4-5 years (Charman & Baird, 2002), because autism is a developmental disorder. Again, given the developmental nature and change in symptom presentation throughout the course of the disability, it is essential that school professionals are equipped with a tool that would allow

them to identify those children with the greatest need for further evaluation. In order to effectively discriminate children with autism from those with typical development and cognitive impairments, the scale must reflect what the literature has demonstrated to be differentiating characteristics between the groups. The following sections present a review of the literature on the early characteristics of children with autism.

Autism in the second and third years of life

During this developmental stage, parents most often recognize developmental disturbances and seek advice from health care practitioners. Studies suggest that the abnormalities in the areas of social interaction and communication continue to emerge, and unusual sensory interests and repetitive behaviors often present during this stage (Chawarska & Volkmar, 2005).

Developmentally typical children develop close ties to others in the first two years of life (Carter, Davis, Klin, & Volkmar, 2005). Children with autism often show an unawareness of others and fail to engage in joint attention, evidenced by a lack of pointing things out or using eye contact to share the pleasure of seeing something with another person. Some children with autism show no interest in other children or adults, and tend either to play alone or to engage in parallel play with other children (Filipek et al., 1999). Joint attention emerges throughout infancy and is thought to be critical for incidental learning (Landa, Holman, & Garrett-Mayer, 2007), for building vocabulary and for predicting a later diagnosis of autism (Landa, 2007). It is often defined as directing one's attention toward an object, person, or event for the purpose of sharing one's interest with someone else (Vig & Jedrysek, 1999), and is considered a hallmark of typical development between 8 to 12 months of age (Watson et al., 2003). Joint attention for bids to share experiences and objects of attention

differentiates autism from other developmental disorders from 2 to 5 years of age (Dawson et al, 2004; Landa, 2007; Watson et al., 2003), thereby making it a core deficit of autism (Sigman, Dijamco, Gratier, & Rozga, 2004). Baird and colleagues (2000) used the Checklist for Autism in Toddlers (CHAT) in a large population of 18 month old children to identify childhood autism, and determine the sensitivity and specificity of the instrument. Pertinent to early indicators of autism in toddlers, results from this study indicate that the combination of failing joint attention and pretend play items on the checklist at 18 months of age may indicate risk for autism and related pervasive developmental disorders.

In the second and third years of life, communication development of children with autism is generally characterized by reduced frequency and diversity of communicative forms (Landa, 2007; Stone, Ousley, Yoder, Hogan, & Hepburn, 1997). Landa reviews research which suggests that gestures are less often integrated with vocalizations and that initiation of social-communicative acts are more highly impaired than requesting in 2 to 3 year olds with autism. In fact, children with autism often lead adults to the items they are requesting by pushing the adult's hand toward the object, rather than requesting, by using social-communicative gestures (such as integrating gaze with pointing) (Stone et al.). Similarly, Stone and colleagues found, that compared with children with developmental delay, children with autism demonstrated fewer gestures associated with commenting, fewer acts involving eye contact, and overall less complex communications.

Wetherby, Watt, Morgan, and Shumway (2007) conducted a prospective, longitudinal study to examine the social communication of children with ASD late in their second year of life. Results confirmed social communication deficits evident between 18 and 24 months of age; specifically, children with ASD were distinguished from children with developmental

delay on five measures of social communication including: gaze shifts, gaze/point follow; rate of communicating; acts for joint attention; and inventory of conventional gestures. The authors thereby recommend that these five social communication skills are core deficits of ASD, evident in the second year of life.

Charman et al. (1997) compared 20-month-old children with autism, developmental delay and typical development on some aspects of empathy, joint attention and imitation and found that infants with autism failed to use social gaze in tasks of empathy and joint attention, measured by looking at the experimenter's face and switching the gaze between an interesting object and an adult's face. Infants with autism also produced less imitation than did the infants in the developmental delay group. Play did not differentiate autism from developmental delay, because few infants in either group produced spontaneous pretend play. Similarly, Stone et al. (1999) found that deficits in the use of nonverbal communication, a lack of social or emotional reciprocity, and delayed acquisition of spoken language are the most prevalent diagnostic characteristics of children with autism who are less than 3 years of age.

Wimpory, Hobson, Williams, and Nash (2000) elicited retrospective reports on manifestations of social engagement in the first 2 years of life using the Detection of Autism by Infant Sociability Interview (DAISI), a semi-structured guided interview; they found evidence that infants with autism manifest profound limitations in social engagement that were not simply an expression of developmental delays. Specifically, Wimpory and colleagues identified abnormalities in person-to-person nonverbal communication as well as person-person-object or triadic interactions; this again illuminated the close relationship between communication and social interaction and the deficits in expressing needs and

sharing enjoyment using verbal or nonverbal communication that are found in children with autism.

Landa and colleagues (2007) conducted a prospective study with groups of high risk and low risk infants from 14 months of age in order to determine patterns of developmental trajectories from 14 to 24 months of age in children later diagnosed with autism at 30 or 36 months of age. Similar to other research presented, impairments in joint attention, response to others' bids to share attention to an object (shared positive affect), and initiation of bids for others to share attention with the child (initiations) were noted in children with autism at 14 months of age.

A summary of the research presented on one and two-year-olds indicates that symptoms in each of the core areas of autism have been found to differentiate toddlers with autism from typically developing and developmentally delayed peers. Failure to participate in joint attention emerges as a core deficit in children with autism during these early years, and is shown across many research studies. Stereotypical behaviors and repetitive patterns that emerge in children with autism in the second and third years of life include hand and finger mannerisms, inappropriate use of objects, repetitive interests/play, and unusual sensory behaviors. In general these symptoms intensify and become more pronounced with time (Chawarska & Volkmar, 2005).

Autism in preschool

Communication skills of 3 to 5 year old children with autism are qualitatively different from those of typically developing children or children with developmental delay matched on language abilities (Sigman et al., 2004) and use of the *DSM-IV* diagnostic criteria becomes more useful for children of this age (Kleinman et al., 2008; Volkmar et al., 2005). A

large body of research has identified core deficits in joint attention and symbolic aspects of communication and play in children with ASD from 2 to 5 years of age (Wetherby et al., 2007, Wetherby, 2006). Dawson, Meltzoff, Osterling, Rinaldi, and Brown (1998) found that five year old children with autism exhibit a general impairment in orienting ability, with a more severe impairment found for orienting towards social stimuli, suggesting that children with autism are particularly impaired in their abilities to orient to social stimuli, compared with children with who have Down Syndrome or who have typical development. A cluster of behavioral impairments that characterize preschool children with autism include impairments in paying attention to others (eye contact, orienting), imitating the actions of others, affective responsivity, and joint attention behaviors (Werner et al., 2000). Each of these deficits will be discussed in greater detail later.

Social/Communicative Behaviors

Research on children with autism has identified numerous deficits in social, communicative and related symbolic activities (Wetherby, Prizant, & Hutchinson, 1998). In fact, social and communication impairments associated with autism involve developmental skills that typically emerge during infancy, specifically the behaviors involving communication and interacting socially with a partner. In the first year of life, the developments of sharing attention, sharing affect, and sharing intentions all contribute to a child's capacity for joint attention, and allow him or her to be active social partners (Wetherby, 2006). Within the literature, joint attention often refers to a cluster of behaviors that share the common goal of communicating with another person about an object or event in a nonverbal way, including eye gaze alternation between object/event and communicative partner, and gesturing (pointing, showing). Deficits in the expression of joint attention is a

core or defining feature of autism, because it is not characteristic of children with other developmental disabilities, including cognitive or language impairments (Wetherby et al.; Leekam, & Ramsden, 2006; Sigman et al., 2004). In fact, failure to engage in triadic joint attention by the second year of life is one of the earliest and most robust symptoms of autism (Leekam, & Ramsden). Before reaching his or her first birthday, a child has progressed through major milestones in joint attention. This begins at birth when an infant shares attention with a caregiver in a dyadic fashion and continues as the 9 month old infant begins to engage in social referencing (by shifting gaze between person and object to ensure caregiver is attending to the child's interest). Finally, by the end of the child's first year, he or she has learned to respond to joint attention bids (by following a caregivers gaze or point) (Wetherby). Given that joint attention skills appear to emerge between 9 and 18 months of age in typically developing children, it has been suggested that deficits in these skills reflect disturbances in relatively basic and early emerging developmental processes (Mundy, Sigman, & Kasari, 1994). Another theory posits the idea that the triadic nature of joint attention deficits indicates a cognitive deficit, with joint attention deficits being a precursor to deficits in children's later "theory of mind" (Charman, 1998). Regardless of the theoretical perspectives surrounding impairments in joint attention, recognition of these autism-specific deficits are critical in identification of autism in the school setting.

In typical development, by 9 to 10 months of age, the child begins to use sounds, gestures, and other behaviors to communicate intentionally (Wetherby, 2006). Some gestures observed in typically developing children include pointing in order to request, pushing away to refuse, waving to greet, reaching to be comforted, and pointing, gaze shifts and showing in order to bring someone's attention to an object. The repertoire of sounds and

gestures used to express intentions are the foundation for the emergence of first words; they are presymbolic and reflect the development of shared meaning. As the typical child develops, he or she will develop the capacity to symbolize, which is reflected in the abilities to imitate, pretend, and to use and understand words to refer to objects and events (Wetherby). In a review of the literature on social and communicative deficits in children with autism aged 3 and older, Wetherby et al. (1998) reported on 13 different research studies conducted between 1977 and 1997. Although these studies differed in methodology used, the findings from these studies identified differences in early communication (deficits in protodeclarative pointing and showing, symbolic communication, symbolic gestures), social interactions (deficits initiating and responding to joint attention bids, impairments in affective engagement), and play (play restricted to stereotyped, repetitive movements, deficits in symbolic play). In general, the studies reviewed by Wetherby and colleagues indicate, that compared with typically developing children, children with autism communicate predominately for behavior regulation functions and show a deficit in communication for joint attention. Similarly, more recent research suggests that children with autism communicate predominantly or exclusively to regulate the behavior of others, to request or protest something, and show a deficit in or absence of communication aimed at drawing another's attention to an object or event in order to label it or comment about it (Wetherby). This pattern of deficit in communicating for joint attention purposes is not characteristic of children with specific language impairments or general developmental delays. Although children with autism often demonstrate deficits in communicative and social gestures, they tend to use motoric gestures, such as pulling a person to a desired object

or using another person's hand as a tool, without integrating these acts with a social gesture, such as eye contact (Wetherby et al.).

Research by Wetherby et al. (1998), further supports the pattern of strengths and weaknesses in social communicative domains in children with autism; children with pervasive developmental disorder displayed poorer scores than children with language disability on the Communication and Symbolic Behavior Scales (CSBS) in the following domains: communicative functions (use of gestures, sounds or words for behavior regulation and for joint attention, and the proportion of communication used for social functions), gestural communicative means (measures the variety of conventional gestures, use of distal gestures, and coordination of gestures and vocalizations), reciprocity (use of communication in response to the adult's conventional gestures or speech), social/affective signaling (use of gaze shifts between person and object, expression of positive affect with directed eye gaze, and episodes of negative affect), and symbolic behavior (comprehension of contextual cues, single words and multiword utterances; the number of different action schemes and complexity of actions schemes in symbolic play, and level of constructive play). The autistic children in the study displayed comparable scores in the vocal and verbal communicative means domains (use of vocalizations without gestures and number of word and word combinations produced) with the children who have a language disability.

Research has examined how children initiate and how they respond to joint attention bids. In typical development, joint attention skills emerge with the development of intentional communication, between 6 and 9 months of age (Bruinsma, Koegel, & Koegel, 2004). Indeed, attending to a social partner and sharing attentional focus between an object or event and a partner precede the onset of language and appear to have important implications

with regard to learning to socialize (Bruinsma et al.). Early research into defining the early social deficits associated with autism compared children with autism, with mental retardation and with typical development, and suggested that initiation of joint attention behaviors were most atypical in the autism group (Mundy, 1995). Specifically, children with autism engaged significantly less in eye contact to share enjoyment during toy play.

Although broad conclusions are drawn regarding joint attention deficits in children with autism, Mundy et al. (1994) found that developmental level affects joint attention skills; autistic children with higher IQs displayed deficits on high level, gestural joint attention bids, but did not exhibit clear deficits on lower level eye contact behaviors. These children with higher IQs differed, however, from other developmentally delayed children in the use of joint attention gestures such as pointing and showing. These results indicate that the presentation of joint attention impairments found in autism is related to developmental level, and thus the symptom presentation may be different from child to child.

Within the joint attention literature, many researchers attempt to further differentiate the term by studying the form and function of joint attention behaviors. Bruinsma et al. (2004) reviewed the literature on pointing and its function within joint attention behaviors; the summarized research suggests that children with autism engage in protoimperative pointing to some extent (although not to levels of typical children) and display relatively intact referential pointing, but that they evidence severely impaired protodeclarative pointing. In these cases, children with autism who show the ability to point do not demonstrate this gesture for social reference.

Deficits in social orientation in children with autism are evident in experiments that show these children fail to orient to the sound of social and nonsocial stimuli (Leekam &

Ramsden, 2006; Leekam, Lopez, & Moore, 2000; Dawson et al., 1998). Dawson et al. found that, compared with children who have Down syndrome or who have typical development, children with autism more frequently failed to orient both to social (name called and hands clapping) and to nonsocial stimuli (rattle, music); the failure was more extreme for social stimuli. Leekam and Ramsden attempted to further this research by including prompts other than simply auditory bids, and found that children with autism were less responsive to vocal, visual, and tactile bids for attention than were children with developmental delay. Wimpory, Hobson, and Nash (2007) found that adult behavior influences episodes of social engagement in children with autism. Specifically, when the adult provided active input, continued on the child's activity, and introduced or maintained a repetitive routine, the child with autism was more likely to engage socially. Based on correlational analyses revealing a relationship between shared attention performance and the ability to orient to social stimuli, but not nonsocial stimuli, Dawson et al. suggest that social orienting impairments may contribute to difficulties in shared attention found in autism.

It is theorized that deficits in joint attention have an impact on language development, because language is learned in part through modeling of words that are jointly regarded (Winopry, 2007). Children with autism have difficulty acquiring conventional and symbolic aspects of communication, and demonstrate a limited quantity and quality of gestures (Wetherby, 2006). Although deficits in communication are a defining feature in autism, vocalizations and verbal communication do not necessarily differentiate autism from other disabilities. In fact, approximately 50% of children with autism acquire useful speech (Wetherby et al., 1998); in these cases, the grammatical and lexical aspects of language are found to develop in the same general progression as typically developing children and as

children with mental disabilities. Often times, problems with the pragmatic aspects of language persist, despite intact vocabulary and grammatical skills.

Play

Children learn through play. Intellectual, social and emotional development are all promoted through play, by giving children a context in which to practice language and communication skills, to problem-solve, role-play, and to take the perspective of others (Holmes & Willoughby, 2005; Ziviani, Boyle, & Rodger, 2001). Typically developing children are learning to navigate their environment through play; however, children with autism reportedly display a limited amount of mature play. There is widespread agreement that the play behaviors of children with ASD are both quantitatively and qualitatively different from those of children without ASD. Social interaction, communication and imagination are important elements in the play activities of preschoolers; these elements also reflect the key underlying deficits in children with autism. Studies show that children with autism tend to be limited in their abilities to develop symbolic or pretend play (Wetherby et al., 1998; Holmes & Willoughby). It is reasonable to assume that because children with autism demonstrate qualitative social deficits, their play will be impacted, which in turn further depresses their social abilities by reducing opportunities for practice.

Research into the typical developmental sequence of play in young children is often broken into two categories: object play and social play. Object play focuses on the ways in which children interact with objects from sensorimotor exploration to symbolic forms of play. Social play, on the other hand, consists of the developmental sequence involving how objects are shared and incorporated into social interactions (Jordan, 2003). The development of play demonstrates a strong relationship with cognitive, communication and language

constructs; thus, observation and assessment of play in infants, toddlers, and young children can reveal much about their developmental status.

Research into object play between infancy and age 4 has broken play into the following sequential levels: sensorimotor-exploratory, relational-nonfunctional, functional-conventional, and symbolic (Casby, 2003B). Casby reviewed the seminal works of Piaget along with subsequent research into play and has defined each level in terms of key characteristics and age range in which the level of play is prominent. Each level of play will be reviewed based on Casby's integration of the literature on play. Sensorimotor-exploratory play extends in infants from two to twelve months of age and consists of the physical manipulation and inspection of objects, such as grasping, holding, licking, banging and rubbing objects. Relational-nonfunctional play emerges at approximately six months of age and extends through twelve months and is characterized by relating objects to each other in a nonfunctional manner without social-conventional knowledge (e.g., stacking or pushing objects together). Children engaging in functional-conventional play are seen to use objects in play in a manner consistent with the objects' social-conventional use, with little sense of representation or pretense. This level of play is emerging in infants between ten and twelve months of age. Finally, children begin to evidence symbolic play between the ages of twelve and eighteen months of age. As the child progresses developmentally, his or her level of symbolic play advances, continuing throughout the preoperational period of cognitive development. Casby's review of the literature on play identifies three critical components of symbolic play: the agent, the instrument and the scheme (Casby, 2003A). Each of these aspects undergoes changes that are reflective of the developmental progression of play. The "agent" refers to the animate or pretend-animate being that is involved in the play actions,

and progresses from self-as-agent (emerging 12-18 months; play centered around self),

passive-other-agent (emerging 18-24 months; child acts on substitute agent), and active-

other-agent (emerging 24-30 months; child adds animacy to substitute agent). Change in

agent might be seen initially as a child pretends to talk on a toy phone (self-as-agent),

progresses to putting the phone up to a doll's ear (passive-other-agent) and at its highest level

is evident by holding the phone to doll's ear and pretending the doll is talking (active-other-

agent). The "instrument" component of symbolic play is the object that is used to carry out

play actions. Developmentally, the "instrument" component progresses from using real toys

or objects (emerging 10-12 months), to substitution of a toy or object that has no relationship

to the real instrument (emerging 18-24 months), and finally to imaginary objects that fill in

for an absent instrument (emerging 24-30 months) and finally inventing people and objects

through language and gestures (emerging between 4 and 5 years of age) (Quill, 2000). In

play, one might see a child begin by using a toy fork and plate to pretend he or she is eating

(realistic object), then progress to using a stick as a fork to pretend he or she is eating

(substitute object), and ultimately the child will pretend to hold a fork to eat (imaginary

object). Finally, the "scheme" component of symbolic play entails the complexity of the

symbolic act and progresses from a single scheme (emerging 12-18 months) to combining

multiple schemes (emerging 18-24 months) and finally to complex or planned schemes

(emerging 30 months). For example, a child at first carries out a single play act, then

sequences two or more play acts and finally goes through a complete pretend play sequence.

     In 2 to 5 year old children, social play involves exploring toys, watching and

imitating others, and interacting with peers. Whether or not the child's development is at the

level of exploratory, functional, or pretend play, he or she engages in solitary activity prior to

social activity (Quill, 2000). Social play requires social perspective-taking, reciprocity, and creativity and develops in a three-step sequence; during the lowest level play (nonsocial activity), the child engages in solitary play or in unoccupied, onlooker behavior. Next, between the ages of 18 and 24 months, play shifts to parallel play, in which children display limited social participation, but play near each other. Finally, two forms of social interaction emerge at the highest level: associative play which emerges in the fourth year of life (children engage in separate activities but exchange toys and comment on each other's behavior) and cooperative play which is evident in 4 and 5 year old children (children orient toward a common goal) (Berk, 2008). Original conceptions of these levels of play suggested that as higher levels of play emerged, lower levels were replaced. However, more current research indicates that all types of play coexist during early childhood (Berk). Specifically, rather than following a strict sequence of developmental stages, children tend to cycle back and forth among a range of social play behaviors as they gain experience and skill (Wolfberg & Schuler, 2006). When observing a preschooler's play to determine whether or not he or she should be evaluated for a disability, it is important to note that nonsocial activity is not necessarily indicative of abnormal development; rather, the types of nonsocial activity will indicate concern.

During parallel play, children initially show interest in peers through watching, smiling, and touching while engaged in separate activities (Quill, 2000). It is often a stepping-stone to more socially coordinated forms of play, which require reciprocal communication (Wolfberg & Schuler, 2006). Earlier developmental milestones, which typically occur between 12 and 18 months of age, and include showing interest in peers, pointing to and showing things of interest, combining gestures, eye gaze and words, appear

critical in the development of social play and are typically impaired in children with autism. At two years of age, as the milestone of symbolic activity is emerging, typically developing children begin to share toys, imitate tasks previously observed and participate in supervised small-group games. At three years of age, a typically developing child shows a preference for some friends over other friends, labels feelings in self, assumes different roles in play, begins to take turns in play, and plays group games with supervision. By four years of age, the same child has a preferred friend, plays cooperatively with others, shares and takes turns without reminders, follows rules in simple games, and recognizes another's need for help and gives assistance. Finally, by five years of age, the typical child has a group of friends, follows community rules, engages in complex adult role playing, plays games requiring skill and decision making, and plays cooperative group games (Berk, 2008; Quill, Wolfberg & Schuler).

Play and Autism

By definition, children with autism may demonstrate a lack of varied, spontaneous make-believe play or social imitative play appropriate to the developmental level (APA, 2000). In addition to the impaired development of imaginative play, children with autism evidence clear communication deficits that limit their play interactions. Specifically, communicative techniques naturally embedded into play include both verbal and nonverbal means to initiate and maintain interactions and to respond to others, in gaining the attention of a peer, and in shared attention to an object (Quill, 2000). Children with autism show a qualitative impairment in these social-communicative skills, causing even the most basic peer interactions to be problematic. Hauck & Fein (1995) found striking differences between children with autism and children with mental retardation in the quantity and quality of peer

interactions; specifically, children with autism initiated interactions less often and their interactions were often routinized, whereas the children with mental retardation initiated more and demonstrated more playful interactions. Young children with autism often avoid peer interaction, are nonresponsive to peer overtures, and resist others' attempts to join in their solitary play (Quill).

Within the symbolic dimension of play, children with autism often show high rates of stereotyped sensory exploration play involving fewer novel acts and combinations (Wolfberg & Schuler, 2006), extending long past the typical age range in which children typically engage in such play. As stated, typically developing children engage in functional play acts beginning in the first year of life and extending into the second; children with autism engage in less spontaneous functional play, with less integrated play schemes and fewer novel acts (Wolfberg & Schuler). In a review of research into symbolic/pretend play in children with autism, Jarrold (2003) reviews considerable empirical research, confirming the view that individuals with autism are less likely to engage in pretend play than their peers, both typical and with mental retardation but without autism. Research also demonstrates that when pretend play is seen in samples of individuals with autism, it occurs less frequently and it lasts for less time than when it is seen in other individuals (Jarrold). Children with autism who are at equivalent cognitive levels demonstrate more restrictive play patterns, play less, and spend more time in off-task behaviors than do typically developing children or children with mental retardation or Down Syndrome (Casby, 2003A). Children with mental retardation demonstrate play content and sequence that is similar to that seen in typically developing children, although with a significant delay in onset and in a significantly protracted course of development (Casby, 2003A). Stone, Lemanek, Fishel, Fernandez, &

Altemeier, (1990) found that, taken together, imitation skills, functional play, and appropriate use of toys distinguished four and five year old autistic children from groups with overlapping symptoms (mentally retarded, language impaired, and hearing-impaired children).

Within the area of social play, children with autism are challenged in many of the social dimensions of play, including coordinating play themes, toys and space with peers (Wolfberg & Schuler, 2006). In infancy, social play is characterized by joint attention, spontaneous imitation and emotional responsiveness; all of the skills that are compromised in children with autism (Jordan, 2003). Zivini et al. (2001) reviewed research of play in children with ASD and suggest that differences between play in children with autism and those with typical development or cognitive impairments are seen in the autistic child's inability to initiate and respond to interactions during play, in restrictions in the use of pretence and imagination, and in restricted or stereotyped play. Problems in joint attention, spontaneous imitation, and emotional responsiveness persist in the social play of children with autism (Wolfberg & Schuler). Children with autism engage in higher rates of solitary, onlooker and parallel play but in lower rates of socially coordinated play than typically developing children. Stemming from the original conceptualizations of Wing and Gould, Wolfberg and Schuler describe three qualities of social behavior that may describe the interaction style of children with autism: aloof (withdrawn or avoidant of peers), passive (appear indifferent to peers), and active-odd (show an interest in being with peers, but in a socially awkward way).

Given the dearth of research on the naturalistic play behaviors of children with autism in a school setting, Holmes and Willoughby (2005) assessed the social and cognitive play behaviors of young children within the school setting. The results of the study showed that

children with autism engaged in functional play for the largest percentage of observation time, but rarely engaged in make-believe play. The children with autism in this study engaged in play both alone and in the presence of other people, but did not interact with others. In terms of the social aspects of play, parallel play and solitary play were the most frequently observed play behaviors, but group play among participants was rare.

Conclusion

A broad base of literature indicates that young children with autism demonstrate social, communication and play skills that are qualitatively different from typical children or from those with developmental delays. Prior to referring a young student for a comprehensive evaluation, best practice suggests that data should be collected to indicate the need for such an evaluation. Rating scales and direct observations can be used for this purpose. Currently, there are not observational checklists that provide operationalized definitions of behavior and cut-off scores to assist in making decisions regarding the appropriateness of a more intensive evaluation. Such an observational tool would serve as a guide for professionals working with preschool students within the school setting, providing a more standardized context for viewing the typical and atypical behaviors observed. This tool would provide more information in assisting professionals in determining whether or not a full diagnostic evaluation for autism is warranted.

Chapter 2

Method

The current study involved a retrospective analysis of existing educational data. The archived observational data accessed for this study was collected over a period of 6 months as part of an effort to improve the tier 3 assessments completed at the Delaware Autism Program. A work group was identified to determine how referrals for assessment could be improved. It was determined that an observational checklist could be used by referring teams in order to quantify the behaviors of concern as well as to differentiate between cognitive/language impaired children (those with a global developmental delay) and those with qualitative impairments in language, communication and social interactions (those with autism). Because such a checklist did not exist, specific to the preschool population (which compose the majority of referrals to DAP), the team developed and piloted a checklist. The data collected with this newly developed Autism checklist were accessed and analyzed in the current study.

Data Source

The data obtained from the files of the Christiana School District were collected from a sample comprising 58 preschool children ages 35-65 months, who had been divided into three groups:

(1) 20 children with the educational classification of autism. All of these students had received an evaluation by qualified specialists within the Delaware Autism Program. The evaluation consisted of school and/or home observation, administration of the Autism Diagnostic Interview – Revised (ADI-R) and administration of the Autism Diagnostic

Observation System, Module 1 (ADOS). The cognitive functioning levels of these students ranged from delayed to average;

(2) 17 students with developmental delay as measured by developmental standard scores at or below 75 in the areas of cognition or receptive and expressive language;

(3) 21 typical students without identified psychological or educational problems.

All of the children with autism and cognitive impairment were identified through formal evaluation and were all receiving early intervention services at the time of observation checklist data collection by school staff. All of the typical children were attending a preschool program within the Christina School District at the time of observation checklist data collection.

Demographic information for the three groups is presented in Table 1. The typically developing children ranged in age from 43 to 65 months (M = 56 months; SD = 6.8). Of the typically developing children, 10 were male and 11 were female. The children with developmental delay were 40 to 64 months in age (M = 52.1 months, SD = 7). Of the children with developmental delay, 11 were male and 6 were female. The children with autism ranged in age from 35 to 65 months (M=54 months; SD = 8.4). Of the group of students with autism, 16 were male and 4 were female.

All students with autism and developmental delays had been administered the Bayley Scales of Infant Development, Third Edition (Bayley-III) to assess cognitive and language development. Expressive and receptive language also was measured using the Preschool Language Scale – Fourth Edition (PLS-4). The students in the autism group obtained BSID-III developmental quotients ranging from 55 to 102 (M = 73; SD = 15.5). The students in the developmental delay group obtained BSID-III developmental quotients that ranged from 60

Table 1.

Demographic Data for Children with Typical Development, Developmental Delay, and

Autism

	Typical (n = 21)	Developmental Delay (n = 17)	Autism (n = 20)
Mean age (months)	56	52	54
% male	48	65	80
% female	52	35	20

to 85 (M = 72, SD = 7). Within the developmental delayed group, PLS-4 scores ranged from

58 to 85 in the area of expressive language and from 51 to 85 in the area of receptive

language. Within the autism group, expressive language scores ranged from 50 to 90 and

receptive language scores ranged from 50 to 100. A summary of cognitive and language

scores is provided in Table 2.

Procedure and Measure

The preschool autism observation checklist was developed in order to provide

additional information regarding the appropriateness of a Tier 3 intensive evaluation for

students suspected of being autistic. The checklist was designed to provide cut-off scores that

would help school teams determine whether or not further assessment of autism was

warranted. During the development of the assessment process, numerous observations were

conducted both in regular preschool and in early intervention settings. The research on early

indicators of autism were gathered and used to create a checklist of items describing

behaviors that were found to be exhibited often or almost always by preschool children with

autism, but were rarely or never observed in the behavior of children that were not identified

as autistic, regardless of degree of variability of cognitive and language development.

Because the core deficits of autism include impairments in social interaction and

communication, the children were observed during "free play" times of the day or center-

based instruction. These times allowed for observation of interactions between children and

between the child and the teacher. The observations were naturalistic and the teachers were

asked to interact with the children as they normally would. No harm was posed to the

children through the observation process; the children rarely were aware of being observed.

Table 2.

Average Cognitive and Language Scores for Children in Developmental Delay and Autism Groups

	Developmental Delay (n = 17)	Autism (n = 20)
Mean Cognitive SS	72	73
Mean Expressive SS	72	73
Mean Receptive SS	74	66

In order to develop the checklist, a literature review of social, communication, and play development of young children with autism, cognitive impairment without autism, and typical development was conducted. Behaviors expected to be observed during free play time by children without autism included making requests directed to other children or adults; responding to peers or adults; initiating and/or responding to joint attention bids; showing materials during play; looking at others; and playing with or in close proximity to others. Based on a review of the literature, a list of 12 items describing such behaviors was generated; this list was intended to discriminate between children exhibiting typical development and children diagnosed with Autism. Next, each item was worded in such a way that the behaviors to be observed were operationally defined to ensure generalization across settings and observers. Examples of each operational definition were given to clarify how each target behavior might manifest in the classroom. Figure 1 presents each checklist item with the rationale for its inclusion on the final observational scale.

The final draft version of the observation checklist consisted of 12 operationally defined behaviors and examples concerning how these behaviors may manifest within the classroom observation (Appendix A). The checklist defined and provided examples of behaviors representing the general domains of social interaction, communication and stereotyped/repetitive and sensory behaviors. The checklist was to be completed after a brief observation period. Checklist items were coded as present (occurring during the observation period) or absent (not occurring during the observation period) by the individual conducting the observations. A scoring system was developed in which an observed item was given a score of 1 and an unobserved item was given a score of 0. Interobserver reliability data was

Figure 1.

Items from the Preschool Observation Checklist and Rational for Inclusion

Item:	Rational:
1. When the child's name is called (in a normal tone/volume), does the child look in the direction of the person who called his name?	Children with autism often fail to respond when their names are called. (Leekam & Ramsden, 2006; Leekam, Lopez, & Moore, 2000; Dawson et al., 1998)
2. The child makes at least one clear attempt to direct an adult or peer's attention to an object/item of interest	Children with autism show impairments in initiating joint attention (Mundy, 1995; Bruinsma et al. 2004; Brock et al, 2006; Volmar, Cawarska, & Klin, 2005; Gray & Tonge, 2001)
3. When a teacher or peer attempts to draw the child's attention to an item/object/toy/activity outside of the child's focus, the child turns in the direction of the item/object/toy/activity.	Children with autism show impairments in response to joint attention (Filipek et al., 1999; Mundy, 1995; Brock et al, 2006; Bruinsma et al. 2004; Volmar, Cawarska, & Klin, 2005; Gray & Tonge, 2001)
4. The child exhibits interest in other children	Children with autism often show an unawareness or disinterest in others and may avoid interacting with peers (Filipek et al., 1999, Quill, 2000)
5. The child initiates any interaction with staff or peers by using eye contact (looking at person) paired with vocalizations and/or gestures	Children with autism initiate interactions less frequently than children with cognitive impairments (Landa, 2007; APA, 2000; Hauck & Fein, 1995; Zivini et al. 2001)
6. The child uses gestures as a way to communicate (to describe something, to get something, to provide information, to show emotion)	Children with autism show impairments in use of gestures; when used, gestures are not often integrated with vocalizations and eye contact (Stone et al., 1997; Landa, 2007; APA, 2000)
7. The child pairs eye gaze with words, signs, gestures, or pictures to request items. These requests must be directed to a person (indicated by looking at person)	Children with autism often request by using the adult "as a tool" (Stone et al., 1997)

8. The child plays with a variety of toys in an appropriate manner and/or demonstrates creative/pretend play with objects

Children with autism demonstrate a lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level
Brock et al, 2006; APA, 2000; Filipek et al., 1999; Chawarska & Volkmar, 2005; Wetherby et al., 2007; Quill, 2000)

9. The child directs meaningful (functional) speech to adult or peer to communicate wants/needs/thoughts

Communication patterns of children with autism are characterized by reduced frequency and diversity of communicative forms
(Landa, 2007; Stone, Ousley, Yoder, Hogan, & Hepburn, 1997)

10. The child responds appropriately to social bids from adult or peer

Impairments in social interaction are essential to the diagnosis of autism, and may in fact be the most salient early feature of autism
(APA, 2000; Crane & Winsler, 2008; Volkmar et al., 2005; Chawarska & Volkmar, 2005)

11. The child does not demonstrate unusual sensory behaviors during the observation

Children with autism often show high rates of stereotyped sensory exploration
(Chawarska & Volkmar, 2005; Wolfberg & Schuler, 2006)

12. The child does not evidence any unusual, repetitive, or ritualistic hand or body mannerisms or behaviors

Children with autism demonstrate a restricted, repetitive, and stereotyped patterns of behavior, interest, and activities
(APA, 2000; Chawarska & Volkmar, 2005)

not gathered, because only one person conducted all of the observations that produce the data file used for this study. However, the observer had attended extensive training on the ADOS, an observation-based autism assessment system and "practice" observations had been conducted prior to the use of the checklist to gather the data that were used in this study.

The 12 item checklist was used during classroom observations of students engaged in free play or center-based play time. Each student was observed between 15 and 30 minutes within a free play or center-based play time, and their behavior during the observation period was evaluated using the checklist items. Students with developmental delays, in general, required a longer observation time to complete the observation checklist adequately. Individual item scores were recorded, along with a total score based on the sum of the scores of the 12 items.

Data Analyses

Quantitative descriptive analyses were conducted to determine relationships among variables of interest. Analysis of variance and post hoc Tukey HSD statistics were used to determine the significance of differences in checklist total scores between children with autism, developmental delay, and typical development. Chi-square statistics were calculated to investigate the degree to which the groups differed on total checklist score as well as on each checklist item. An efficiency index was created for each item, based on the percentage of children in each group receiving a positive or negative score on each item. The items were then rank ordered from most to least effective in terms of discriminating between and among student groups (most effective items showed 100% of typical and delayed students receiving a positive score and 0% of autistic students receiving a positive score). Based on removing

some of the less effective items, 10 and 6-item versions of the scale were created and subjected to analyses similar to those conducted with the 12 item version of the checklist.

The 12, 10, and 6 item versions of the checklist were analyzed and compared, to determine the specific cut-off point for each scale that produced the greatest degree of accuracy in assigning children to their respective groups. Scores below the cut-off point were defined as reflecting a score in the Autistic Range. Scores at or above the cut-off score were defined as reflecting a score not in the Autistic range. Figure 2 illustrates the statistical analyses used to address Research Question 2 as well as to obtain the degree to which groups differed on each of the checklist scores (12, 10, and 6-item checklist). The analyses involved the construction of 2 x 2 crosstabulation tables for each item as well as total checklist scores to obtain the following indices: Sensitivity, Specificity, Positive Predicative Power, Negative Predictive Power and Kappa.

The accuracy of checklist cut-off points in predicting group membership was determined by calculating positive predictive power (the percentage of children diagnosed with autism among children with a score in the autistic range), negative predictive power (the percentage of children not diagnosed with autism among children whose scores were not in the autistic range), sensitivity (percentage of children correctly identified as having autism), and specificity (percentage correctly identified as not having autism). A kappa coefficient was calculated from the checklist scores to determine the percentage of improvement above chance that resulted from use of checklist scores to categorize the students into their respective Autistic and Not Autistic groups.

Figure 2.

Indices used in Statistical Analyses of Data

		Variable 2	
		Actual Status (educational classification)	
		Autism	Typical/DD
	Score below cut-score (autism suggested)	A True Positive	B False Positive
Variable 1 Test Outcome	Score above cut-score (autism unlikely)	C False Negative	D True Negative

Sensitivity = (A/(A+C)) x 100

Specificity = (D/(B+D)) x 100

Kappa = ((po – pe)/(1 – e)) x 100 where:

    Po = pA + pD

    Pe = ((pA+pC)(pA+pB)) + ((pB+pD)(pC+pD))

    pA = A/Total N pB = B/Total N pC = C/Total N pD = D/Total N

Positive Predictive Power = (A/(A+B)) * 100

Negative Predictive Power = (D/C+D) * 100

Chapter 3

Results

Research Question #1: How do children with an educational classification of autism perform on the preschool play observation checklist compared with similar-age peers who demonstrate typical development and similar-age peers who demonstrate cognitive developmental delays?

The autism checklist data analyzed in this study were collected during a pilot study conducted with a sample of preschool students attending a program within the Christina School District. The student sample consisted of 21 typically developing children, 17 developmentally delayed children and 20 children identified with autism. The score distribution for the 12-item checklist scores for the three student groups is presented in Table 3. Both typical and developmentally delayed children scored similarly on the total checklist score, whereas children with autism scored significantly lower.

An analysis of variance conducted with the checklist scores indicated that the checklist scores assigned to children classified with autism differed significantly from the scores assigned to children classified with developmental delay and typical development ($F = 96.304$, $p<.0001$). The mean checklist score for children with autism (3.21) was significantly lower than the mean score for children with developmental delay (11.11) and typical development (11.52). Tukey HSD comparisons showed that the differences between mean scores for typical and developmentally delayed children was not significant (.347, $p=.869$). The difference between mean scores for students with autism and typical development was significant (8.23, $p < .0001$). Similarly, the difference between mean scores for students with autism and developmental delay was significant (7.876, $p < .0001$). The significant difference between groups was large, with approximately 78% of the variance accounted for by group

Table 3.

Twelve Item Checklist Scores of Students by Group

Checklist Total Score	Group		
	Typical Development n = 21	Developmental Delay n = 17	Autistic n = 20
12	15	10	0
11	4	3	0
10	1	3	1
9	0	0	2
8	1	0	0
7	0	1	1
6	0	0	1
5	0	0	0
4	0	0	1
3	0	0	4
2	0	0	3
1	0	0	3
0	0	0	4

Highlighted items reflect number of students "missed" by 12-item checklist based on cut-score 9. Scores equal to or less than 9 = autism likely.

affiliation (η=.778).

On the 12-item checklist, the raw score cut-off point yielding the highest accuracy in discriminating between children with and without autism was 9. Total checklist scores of 0 to 9 suggested autism, and scores of 10 to 12 suggested that autism is unlikely. Using this cut-off point, 95% of the children with autism were correctly identified, and 94.8% of the children without autism were correctly identified. Only 4.7% of the typically developing children and 5.8% of the children with developmental delay scored in the "autistic" range (one student from each group was misidentified, based on the cut-score). Negative predictive power was 97%, meaning that 97% of children who scored in the non-autistic range on the checklist were correctly identified as not having autism (i.e., there was one Type II error within the autism group). Positive predictive power was 90%, indicating that 90% of children who scored in the autistic range on the checklist fell within the autism group. The remaining 10% (Type I error) comprised one typical student and one student with developmental delay who were identified within the autistic range, based on checklist scores. Given the measured Type I and II errors, the checklist demonstrated sensitivity and specificity of 95%. The proportion of children with autism correctly identified as such, based on checklist scores was 95% (sensitivity) and the percentage of non-autistic children who were identified by the checklist as not having autism was 95% (specificity). The 12-item checklist demonstrated an 89% improvement over chance in the accuracy of identifying groups ($\varkappa = 89\%$).

Additionally, the sensitivity and specificity was obtained for 10-item and 6-item versions of the checklist. The score distribution for the 10-item and 6-item checklist scores for the three student groups is presented in Tables 4 and 5. Items that did the poorest job

Table 4.

Ten Item Checklist Scores of Students by Group

Checklist Total Score	Group		
	Typical Development n = 21	Developmental Delay n = 17	Autistic n = 20
10	17	13	0
9	3	3	0
8	0	0	3
7	1	0	0
6	0	1	1
5	0	0	0
4	0	0	1
3	0	0	3
2	0	0	2
1	0	0	6
0	0	0	4

Highlighted items reflect number of students "missed" by 10-item checklist based on cut-score 8. Scores equal to or less than 8 = autism likely.

Table 5.

Six Item Checklist Scores of Students by Group

Checklist Total Score	Group		
	Typical Development n = 21	Developmental Delay n = 17	Autistic n = 20
6	19	16	0
5	2	0	2
4	0	1	1
3	0	0	1
2	0	0	1
1	0	0	6
0	0	0	9

Highlighted items reflect number of students "missed" by 6-item checklist based on cut-score

5. Scores equal to or less than 5 = autism likely.

discriminating between groups were removed to create these reduced item scales. Each item was analyzed by actual group performance as it related to expectation, and then rank ordered based on items that most closely aligned with that expectation. These reduced item checklists were composed of the items that showed the most discriminability between groups. The procedure for generation of the reduced item scales is described in the next section.

The cut-score yielding the highest accuracy for the 10-item scale was set at 8 (anything equal to or lower than 8 suggested autism) and the cut-score for the 6-item scale was set at 5 (anything equal to or lower than 5 suggested autism). Given these cut-scores, both the six and ten item checklists increased the negative predictive value and sensitivity of the checklist to 100%, meaning that none of the children who scored above the cut had autism (i.e., there were no false negatives). However, there was a decrease in the positive predictive power and specificity on the reduced item scales, based on identifying more students with developmental delay and typical development as falling within the autism range on the checklist. The 6-item scale yielded a positive predictive value of 87%, with a specificity of 92%. The 10-item checklist yielded a positive predictive value of 91%, with a specificity of 95%. Sensitivity, specificity, positive and negative predictive power and kappa values for each of the scales is reported in Table 6. The 10-item scale demonstrated a 93% improvement in hit-rate over chance ($x = 93\%$), and the 6-item scale demonstrated an 89% improvement in hit-rate over chance ($x = 89\%$).

Table 6.

Accuracy of Preschool Observation Scale 12, 10 and 6-item Checklists in Identifying

Children with and without Autism

	12-item scale	10-item scale	6-item scale
Sensitivity	95%	100%	100%
Specificity	95%	95%	92%
Positive predictive power	90%	91%	87%
Negative predictive power	97%	100%	100%
Kappa	89%	93%	89%

Research Question #2: Are there any items that do not discriminate between the three

groups?

A chi-square item analysis of each question on the checklist showed that each item significantly differentiated the autistic group from the other two groups. The percentage of children exhibiting each of the 12 checklist behaviors is reported in Table 7. Based on these percentages, an item analysis was conducted to rank order the checklist items from most to least effective in terms of describing the behaviors associated with autism. Based on the expectation that students with autism would not exhibit the items on the checklist (i.e., would score 0 on each item), but that students without autism would display each of the checklist behaviors (i.e., would score 1 on each item), it follows that an item that would most efficiently distinguish autism from the other two groups would have a 100% endorsement rate for the typical and developmentally delayed children and a 0% endorsement rate for the students with autism. Because discriminability between the groups is dependent on autistic children being rated in the opposite direction of typical and developmentally delayed children, the percent of autistic children who earned scores similar to these groups represents unwanted positive endorsements. To create a summary statistic for each item, the percentage of typical and developmentally delayed children exhibiting the positive behavior was added together and the percentage of autistic children exhibiting the same behavior was subtracted from that total. The resulting index value reflected the discriminative power of the item with 200 being the ideal score $(100 + 100 - 0)$. As the summary index score decreases, so does the discriminative power of that item. The efficiency index for each item is listed in table 8.

Table 7.

Percentage of Students Exhibiting Checklist Behaviors by Group

Checklist behavior	Typical n= 21	Dev. Delay n=17	Autistic n= 20
1. Responds to name	100.0%	100.0%	50.0%
2. Initiation of joint attention	95.2%	83.3%	25.0%
3. Response to joint attention	95.2%	100.0%	45.0%
4. Interest in other children	100.0%	100.0%	15.0%
5. Initiates interaction	90.5%	100.0%	20.0%
6. Uses gestures to communicate	100.0%	94.4%	30.0%
7. Requests directed to person	81.0%	55.6%	15.0%
8. Plays appropriately	100.0%	94.4%	20.0%
9. Directs functional speech	95.2%	83.3%	30.0%
10. Responds appropriately to social bids	100.0%	100.0%	35.0%
11. No unusual sensory behaviors	95.2%	100.0%	40.0%
12. No repetitive/ritualistic behaviors	100.0%	100.0%	5.0%

Table 8.

Efficiency Index for Checklist Items

Checklist behavior	Efficiency Index
1. Responds to name	150
2. Initiation of joint attention	154
3. Response to joint attention	150
4. Interest in other children	185
5. Initiates interaction	171
6. Uses gestures to communicate	164
7. Requests directed to person	122
8. Plays appropriately	174
9. Directs functional speech	149
10. Responds appropriately to social bids	165
11. No unusual sensory behaviors	155
12. No repetitive/ritualistic behaviors	195

By the procedure described above, a six and ten item checklist was created. Examining the items in this way allowed for analysis of items that did not effectively distinguish between the groups. The 10-item checklist removed two items: "response to name" and" requests directed to a person". These items did not effectively differentiate the three groups, and ranked the lowest among the 12 original items. 'Response to name' (item #1) did not differentiate students with autism from the other groups, because 50% of the students with autism responded correctly to this item. Although the specificity was high (100%), the sensitivity for this item was very low (50%). 'Requests directed to a person' (item #7) was not a discriminating item, because the typical and developmental delayed group demonstrated a higher level of fail rate on this item, compared with the other items on the checklist (Sensitivity = 85%; Specificity =71%). As stated above, the 10-item checklist had very high sensitivity and specificity levels (100% and 95%, respectively).

The 6-item checklist removed the two items listed above as well as the next four lowest ranked items. Item number 9: "child directs functional speech to adult or peer to communicate wants, thoughts, needs" had a low sensitivity (70%) with adequate specificity (92%). Item number 3: "Response to joint attention" had a very low sensitivity (55%) with adequate specificity (92%). Similarly, item number 2: "Initiation of joint attention" had a low sensitivity (75%) with adequate specificity (89%). Finally, item number 11: "Does not demonstrate unusual sensory behaviors", had very high specificity (97%), but low sensitivity (60%). As previously stated, when these items were removed, the remaining six items correctly identified children within the autism group with 100% accuracy (sensitivity) and correctly identified typical and developmentally delayed children with 92% accuracy (specificity).

Research Question #3: Within the group of students with an educational classification of autism, will the developmental level of these students affect their scores *on the preschool observation scale?*

In order to determine whether or not cognitive scores were significantly associated with total checklist scores, the autism sample was categorized into two groups, based on cognitive level. The "high" group was defined as having cognitive standard scores of 85 and higher and the "low" group was defined as having cognitive standard scores of 84 or lower. When cognitive ability was categorized in this way, there was not a relationship above chance between the observation checklist cut-score of ten and the child's ability level (χ = 1.8, p = .179). Cognitive level was not significantly correlated with total observation checklist score in children with autism (r=.275, r^2 = .08, p = .255) or developmental delay (r = .459, r^2 = .21, p = .115). There was approximately 8 % overlap between the cognitive score and total checklist score in students with autism and 21% overlap between the cognitive and total checklist scores in students with developmental delay.

Chapter 4

Discussion

Summary of findings

Research suggests that there is a subset of social interaction and communication skills present very early in life that distinguishes children with autism from children with typical development or developmental delays. Currently, the gold standard for identifying children with autism is a time and training intensive instrument, which is most appropriate for tier 3 assessments, after there is already data to suggest the student demonstrates characteristics associated with autism. An evaluation battery should include standardized measures (such as rating scales and cognitive assessment tools) as well as direct observation of the student in a natural environment. At this time, professionals working within the early education population conduct these observations qualitatively, without having a reference point to compare the student being observed with other populations of students. In this way, the observer's background and experience level become the primary factors in what is seen and reported following a naturalistic observation. Unfortunately, research has suggested that most professionals working in the schools have not gained the professional background necessary to identify students with autism (Bradley-Johnson, 2008). Understandably, professional development opportunities do not focus on identification of autism in the schools, because it is still a relatively rare occurrence and most often it is medically diagnosed. Therefore, professionals do not often seek further training in the area of autism detection or differential diagnosis of autism and developmental delay.

The purpose of this study was to determine if similarities and differences could be identified between typically developing children, children with developmental delay, and

children with autism, based on naturalistic observation in the preschool setting. To address this need, an observation checklist was created, based on a literature review of the social, communication, play and stereotyped behaviors that are specific to children with autism. In order to observe the natural interactions of preschoolers, it was important to observe during times that play and social interaction was expected and encouraged, specifically during free-play and center-based instruction.

Research shows that young children with autism show qualitative impairments in social-communicative, play, and stereotyped behaviors. Based on the review of the literature, operational definitions and examples were created in order to explain how each behavior (or absence of behavior) would appear in a preschool classroom. Preschool students were observed for 15 to 30 minutes within a play or center-based classroom activity. The behaviors on the checklist were rated '1' (presence of positive behaviors and absence of negative behavior) or '0' (absence of positive behaviors and presence of negative behavior) in order to create a consistent framework for observations and allow for statistical analysis of each item.

If the checklist was able to differentiate autism from the other two groups (typical and developmentally delayed), it could potentially become a tool for clinicians to use as part of an assessment battery for making appropriate referrals for a more intensive tier-3 assessment. Additionally, if the checklist proved to effectively discriminate between and among the three groups, it could be used as part of a comprehensive preschool assessment, in order to quantify naturalistic observations in the preschool classroom.

The results of this study revealed significant differences between the children with autism and those with developmental delay and typical development based on overall

checklist scores. Overall checklist scores did not differ significantly between typically developing and developmentally delayed children, suggesting that children with autism demonstrate impairments in social-communicative behaviors, play skills, and stereotyped behaviors that are not evident in the other groups of children included in the study. Although children with developmental delays most often show impaired language functioning, as a group they evidenced nonverbal behaviors (such as gestures, eye gaze, and pointing) which, in part, distinguished them from children with autism.

All items on the checklist proved effective at distinguishing autism from typical and delayed development. However, some items were less effective than others, because several children with autism scored positively on the item or several non-autistic children scored negatively on the item. Based on removing the least effective items, two reduced-item checklists were analyzed (10-item and 6-item). The two lowest rated items were "response to name" and "requests directed to a person". Response to name introduced noise because half of the autistic group responded positively to the item. Although research suggests that failing to respond when one's name is called is a very powerful predictor of autism (Brock et al, 2006), many children in the current study turned around and made eye contact with the teacher after his or her name was called only one time. This discrepancy can likely be accounted for by considering the level of intervention these children have received; most children within the research have not been exposed to formal education, whereas the group included in the study have been enrolled in an education program for at least 6 months, and have received instruction and positive reinforcement for responding to their names. Additionally, "response to name" was the only item that necessitated altering the environment by requiring the teacher to call the student's name, making it less than optimal

in for a naturalistic observation. The second item removed from the 12-item scale involved pairing eye gaze with other means to request items. Although most children with autism did not receive positive ratings on this item, many children in the other two groups also received negative ratings on this item, making it less effective at predicting group affiliation. It was noted throughout observations that typical and developmentally delayed children most often took what they wanted rather than formally asking a peer or adult. Therefore, although requesting is likely not a skill delay for these children, it is not practical to request something formally when they are able to access items independently within the less structured situations.

Four other items were removed to calculate discriminative power of the 6-item checklist. Two items: "initiation of joint attention" and "directs meaningful speech", were removed because a relatively high percentage (17%) of children with developmental delay did not demonstrate these behaviors, potentially reflecting developmental delays in language. Few students within the autism group responded positively on these items; although the difference between positive responses in the autistic and developmentally delayed group did reach statistical significance on these items, these items may be less effective at distinguishing between the groups in future studies. The other two items: "response to joint attention" and "does not demonstrate unusual sensory behaviors" were removed for the 6-item checklist because of the relative high frequency in which students with autism scored positively on these items. It is hypothesized that "response to joint attention" would be more effective at distinguishing between children with autism and other groups of children prior to receiving any intervention services. Although almost all children in the autism group displayed some type of unusual, repetitive, or ritualistic hand or body mannerism during the

observation (95%), significantly fewer unusual sensory behaviors were observed (60%). It is possible that unusual sensory behaviors occur less frequently and therefore were not observed during the 15 to 30-minute observation because teacher reports suggest that several of the students who did not display unusual sensory behaviors during the observation do, in fact, display those behaviors at other times.

Analysis of the 6-item checklist indicates that removing 6 or the original 12 items from the checklist diminishes the specificity and positive predictive power of the scale. Therefore these items, though less effective than others when considered at the individual item level, do contribute to the overall construct validity of the checklist. As stated, the 10-item checklist maximizes the effectiveness of the instrument. However, the other items have clinical utility and therefore could remain on the scale, but scores would not be factored into the overall checklist score.

Finally, it is hypothesized that at the individual item level, some students received a negatively weighted score on items because there was no opportunity to observe the behavior, not necessarily because the student was unable to perform the behavior. Specifically, at times the opportunity to observe response to joint attention was not present. Forcing a score on any item could penalize students based on external factors, therefore increasing false positives on the scale.

By removing two items, the sensitivity of the scale was increased to 100%, meaning that the 10-item checklist accurately captured all of the students with autism. The 10-item checklist showed the same specificity of the full checklist (95%), but specificity on the 6-item checklist fell to 92%. The 10-item checklist was clearly the more effective checklist by maximizing the values for sensitivity, specificity, negative and positive predictive power.

Within the typical development group, there was one student who was identified by her teacher as "selectively mute" and "painfully shy". The teacher noted that this student rarely talks when other children are in the classroom. This student scored in the "autistic" range on the checklist, indicating that it may not be effective in discriminating between autism and selective mutism. Additionally, there was one student within the autism group who is currently being considered for regular education without special education support for kindergarten next year. This student scored within the non-autistic range on the 12-item checklist, but was captured as in the autism range on the 10-item scale.

Developmental level was analyzed as part of the study. As hypothesized, checklist scores did not vary based on cognitive scores either in the autism or in the developmentally delayed group. Consistent with conceptualization of autism as a constellation of social-communicative and atypical behaviors that are qualitatively impaired, rather than globally delayed, children's scores on the checklist were not correlated with IQ. Children with developmental delay (and IQ scores under 75) consistently scored above the cut-off score on the checklist but students with autism (and IQ scores ranging from deficient to average range) consistently scored below the cut-score on the checklist.

Finally, using the 10-item checklist, all students who fell into the autism range based on the Autism Diagnostic Observation Schedule – Module 1, were accurately captured, based on the checklist score. Given this perfect correspondence between measures, the usefulness and practicality of the checklist as part of a tier-2 evaluation to determine whether or not more intensive evaluation is warranted, cannot be overstated.

Implications for practice

The utility of the Autism Preschool Observation Checklist shows promise for decreasing inappropriate tier-3 referrals to the Delaware Autism Program within New Castle County, Delaware. With future replication studies, the checklist could also be used as part of a comprehensive diagnostic battery in order to quantify naturalistic observations. Professionals working within early intervention settings have not often received autism specific training. Therefore, a tool such as this can help practitioners within the preschool setting make determinations about the likelihood that observed behaviors are specific to autism.

Each of the items on the checklist is reflective of prior research into the social-communicative and stereotyped behaviors associated with autism. Because of this, the checklist can provide a framework for observing relative strengths and needs of children scoring poorly on the checklist, and thus provide a roadmap for intervention services within each of the three areas of qualitative impairment. Additionally, the checklist can help practitioners identify areas of strength for students with developmental delay and no autism.

Finally, results from the Autism Preschool Observation Checklist can assist medical and clinical practitioners conducting tier-3 assessments for autism. Often times, children behave and react to environmental stimuli differently based on their comfort level. Furthermore, children with autism often have significant difficulties with transitions and new people. Therefore the checklist can help clinicians conducting autism-specific evaluations by determining whether or not the results obtained during the evaluation are similar to the daily functioning of the child in the preschool setting.

Limitations and future directions

The current study was limited by several factors. Primarily, all observations were conducted by one clinician and therefore interrater reliability was not established. This raises the question of utility for future observers who have less familiarity and experience with the presentation of autism in preschool-aged students. Additionally, although the observer was blind to the typical and developmentally delayed students, the observer was not blind to group affiliation of the autistic students, introducing the potential for bias in coding. During future studies, raters (likely school psychologists and speech/language pathologists) should be blind to each of the three groups to decrease bias in item coding.

Despite the fact that the observer was not involved in the ADOS assessment for any of the autistic students observed, all autistic students are included in the program that employs the observer, again increasing the chances of bias in coding. Future replications of this study are needed; these could include inter-rater reliability, involving observers who work within preschool programs that are not autism-specific. This will ensure that the items are clearly written for the intended audience, which is a group of practitioners working with preschool students who are not likely to have extensive training on the disability of autism. Future directions for utilizing this observation tool should also include the creation of video tapes of observations with accompanying scoring guides and rationale for scores. Standardized video tapes would serve the purpose of providing training on how to use the observation checklist as designed, to those practitioners who might have less clinical experience working with this population of students.

The current sample size is too small to make conclusions about the repeated effectiveness of the current instrument. Increased sample size in each group is needed to

increase statistical power and generalizability of the checklist. A validation study of the checklist should be conducted to determine internal reliability of items and to assess the construct validity of the instrument. Additionally, all students involved in the current study are students enrolled in one of the preschool programs offered through the Christina School District. In order to increase the external validity of the checklist, future studies should observe students in other preschool programs, both in Delaware and in other states.

As stated previously, within the current sample, there was one student described as "selectively mute", although no formal diagnosis has been obtained. This student was described as typically developing within the academic and cognitive domains, but presents as a student who is extremely shy and socially inhibited. It is important to note that the observation checklist did not effectively differentiate between autism and selective mutism, indicating, that despite the small sample of children with selective mutism in the current study (n=1), the checklist might not be useful for this group of children.

The current study utilized a range of observation time (15 to 30 minutes) based on how long it took to observe the positive or expected behaviors in any child. However, it was noted that children with developmental delays, in general, required a longer observation in order to capture many of the items on the checklist. This finding is expected, given the presentation of developmental delays in the classroom. It is recommended that future research studies utilize a 30-minute observation format in order to make individual observations more standardized.

Finally, the current checklist gives only the option to score each item as observed or not observed. At times, a child received a negative rating on an item because the opportunity to display the skill was not present. Future versions of the scale should include a "no

opportunity" score for such items so that the student is not penalized by environmental circumstance.

The use of the Autism Preschool Observation Scale for use in tier-2 evaluations to determine the need for a more intensive and autism-specific evaluation at tier-3 has demonstrated promising potential. Furthermore, areas of need as indicated by the checklist can provide a framework for intervention within the preschool classroom. Specifically within the state of Delaware, the use of the Autism Preschool Observation Scale has excellent promise for reducing unsubstantiated referrals for ADOS assessments through the Delaware Autism Program, thus making it a cost-effective tool for teachers and clinicians working within the preschool early intervention system.

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Appendix

Preschool Autism Observation Checklist

1.	When the child's name is called (in a normal tone/volume), does the child look in the direction of the person who called his or her name? Note: you should call the child's name until s/he responds (until s/he turns in direction from which name was called)	Y N
2.	The child makes at least one clear attempt to direct an adult or peer's attention to an object/item of interest • Examples: ○ Verbal child says "look" or "watch" ○ Nonverbal child looks from object to person, back to object-3 point gaze ○ Child points to object ○ Child shows object to staff or peer ○ Do not include requests	Y N
3.	When a teacher or peer attempts to draw the child's attention to an item/object/toy/activity outside of the child's focus, the child turns in the direction of the item/object/toy/activity. • Examples ○ The child follows point or eye gaze of peer or staff ○ When the teacher/peer says "look" and points to an item, the child turns in the direction of point.	Y N
4.	The child exhibits interest in **other children** • Examples: ○ Child watches other children with interest (e.g., demonstrates a look of curiosity, smiles or changes facial expression, checks in and then returns to individual activity) ○ Does not stare blankly in direction of others ○ Child attempts to join in play with others ○ Child does <u>not</u> move away from others when they approach ○ Child waves ○ Child laughs, smiles, verbalizes/vocalizes in response to another child	Y N
5.	The child initiates any interaction with staff or peers by using eye contact (looking at person) paired with vocalizations and/or gestures • Examples: ○ Child says "hi" or any other phrase while looking at the person ○ Child approaches a child or staff and makes request ○ Any verbal or nonverbal attempt to initiate or join in play ○ Child waves while looking at staff/peer	Y N
6.	The child uses gestures as a way to communicate (to describe something, to get something, to provide information, to show emotion) • Examples:	Y N

	o Waves while looking at a person o Shakes head yes/no o Uses fingers to convey a number (one, two, three fingers) o Extends arm to show you something s/he is holding o Reaches out and gives you something s/he is holding o Hands apart to show "this big" o Gestures "hush" by placing finger to lips o Shrugs to indicate "I don't know"	

7.	The child pairs eye gaze with words, signs, gestures, or pictures to request items. These requests must be directed to a person (indicated by looking at person)
	  • Examples:
	    o Makes eye contact and says "I want…" or uses sign language to request a desired item
	    o Childs points to a desired object or activity
	    o If the child requests by taking the adult's hand and leading it to the object being requested, score as "no"
		Y N

8.	The child plays with a variety of toys in an appropriate manner and/or demonstrates creative/pretend play with objects
	  • Examples:
	    o Plays appropriately with a variety of cause-and-effect toys (play is <u>not</u> perseverative, rote or ritualistic in nature)
	    o Child uses toy(s) for intended purpose (functional play)
	    o Builds with blocks/Leggos
	    o Child uses an object as something else (e.g., uses a crayon as a plane)
	    o Creative or dramatic play
		Y N

9.	The child directs meaningful (functional) speech to adult or peer to communicate wants/needs/thoughts
	  • Examples:
	    o Uses words that are appropriate to the context (e.g., "Drink" to obtain a drink, requests a toy, asks for bathroom
	    o Asks adult or peer a question
	    o Any commenting or social chat
		Y N

10	The child responds appropriately to social bids from adult or peer
	  • Examples
	    o Does <u>not</u> walk away or act as if she or he doesn't hear the adult/peer
	    o Answers a question
	    o Joins in play
	    o Follows a command or direction.
		Y N

11.	The child does not demonstrate unusual sensory behaviors during the observation
	  • Examples:
	    o Unusual sensory behaviors include sniffing or licking objects;
		T F

	holding objects close to eye; repetitive touching or feeling of textures; unusually strong reactions to sounds (covers ears, tantrum behavior following loud sound)	

12	The child does not evidence any unusual, repetitive, or ritualistic hand or body mannerisms or behaviors
	    • Examples:
	        o Unusual hand/body mannerisms include rocking back and forth, flapping hands/arms, flicking fingers, tensing entire body, body posturing, lining up objects, overfocusing on details of object, clear interest in part of an object, intense interest in particular toy or object.
		T F