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An Item Analysis of the Child Behavior Checklist with Preschool Children with Autism

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AN ITEM ANALYSIS OF THE CHILD BEHAVIOR CHECKLIST WITH PRESCHOOL CHILDREN WITH AUTISM

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TABLE OF CONTENTS

LIST OF TABLES

AN ITEM ANALYSIS OF THE CHILD BEHAVIOR CHECKLIST
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The diagnosis of autism is a comprehensive process that requires trained professionals and is often a time consuming process. Behavior rating scales are common components used by practitioners in evaluations to assess various social, emotional, or behavioral problems. With the rise of awareness, the steady increase of autism diagnoses, and the importance of early identification to increase the effectiveness of intervention, there is a need for screeners to identify the characteristics of Autism Spectrum Disorders. The purpose of the present study was to determine if there was a group of items on the Child Behavior Checklist/1.5-5 that reliably distinguished between children with autism and referred, but non-spectrum children. A behavior rating scale was completed by parents and/or guardians of 156 preschool children with autism and without autism. Analyses of the data revealed a grouping of items that were significantly correlated with the diagnosis of autism. Based on predetermined cutoff scores, sensitivity, and specificity; the group of items may be useful in the recommendation of further assessment of autism.

Introduction

In 1943, Leo Kanner was the first to describe our modern conceptualization of autism by describing children with autism as being rigid and withdrawn, and displaying an avoidance of eye contact, lack of social awareness, limited or no language, and stereotyped motor activities (Mash & Wolfe, 2010). However, autism was not formally defined until 1965 when the term, early infantile autism, was included in the 8th edition of the International Classification of Diseases (Goldstein & Ozonoff, 2009). Many more years passed before the psychiatric and psychology professions included autism in the Diagnostic and Statistical Manual of Mental Disorders (DSM-III, American Psychiatric Association [APA], 1980). In the DSM-III, variations of autism were included within a broader category of Pervasive Developmental Disorders (PDD), and were given names of Infantile Autism, Childhood Onset Pervasive Developmental Disorder, and Atypical Pervasive Developmental Disorder (APA, 1980).

The DSM-III system was a major advance in that it included explicit diagnostic criteria and introduced a multiaxial system as a way to organize clinical information, aid in treatment planning and predicting outcomes (APA, 2000). However, Volkmar and Klin (2005) noted shortcomings with this diagnostic system. Specifically, the definition of autism was viewed as deficient because it mainly focused on characteristics exhibited in very young children. Another source of controversy was the placement of autism on Axis I (clinical syndromes), while Axis II is meant for specific developmental disorders. The DSM-III-R (APA, 1987) used the term Autistic Disorder and placed it on Axis II under the umbrella of Pervasive Developmental Disorders. Individuals with impairments in social interactions and communication skills but who do not meet all the criteria for an

Autistic Disorder can be classified as having Pervasive Developmental Disorder-Not Otherwise Specified.

After undergoing another revision, the current Diagnostic and Statistical Manual of Mental Disorders, Text Revision (DSM-IV-TR) provided a definition of autism as the presence of significant impairments in social interactions and in the development of communication, as well as markedly restricted activities and interests (APA, 2000). In the DSM-IV, the umbrella category of Pervasive Developmental Disorder is still used and consists of: Autistic Disorder, Asperger's Disorder, and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS), plus Rett's Disorder and Childhood Disintegrative Disorder. Autism's core deficits - social, communication, and stereotyped/ritualistic behaviors - are directly related to a variety of challenging behaviors exhibited by children with autism. Autism symptoms can vary across children in terms of severity; therefore, the disorder is viewed as existing in a spectrum, which led to the commonly used term Autism Spectrum Disorder (ASD).

Autism has been described as the most devastating developmental disorder (Crane & Winsler, 2008). Many of the children with autism also have cognitive delays (APA, 2000). The broad range of impairments and variations in severity make autism difficult to identify; however, early identification of autism is needed to provide treatment and interventions (Matson & Sipes, 2010). A full comprehensive evaluation is needed to obtain enough information for an accurate diagnosis of autism. There are well-developed autism diagnostic instruments that are useful as part of a comprehensive assessment. However, the instruments are lengthy and require extensive training and experience to administer. Furthermore, someone has to recognize the possibility of autism to initiate an

evaluation. There is a need for easy-to-use instruments to screen for autism. A few autism screeners exist, but again, autism would need to be suspected before such a screening instrument would be administered. An existing broadband behavior rating scale, commonly used by psychologists when conducting evaluations of children, might be helpful to alert professionals as to the possibility of autism.

This thesis project is examining the individual items of the Child Behavior Checklist (CBCL/1.5-5; Achenbach & Rescorla, 2000) to determine if there are specific items that are reliable predictors of ASDs in young children. A grouping of items can then be used to identify the possibility of ASD in children that otherwise might not be identified until they are older. Using a group of items within a common broadband behavior rating scale to alert practitioners of the presence of autistic characteristics would save time and increase the chances children will be identified at an earlier age.

Literature Review

Primary Characteristics of Autism

The three primary diagnostic characteristics of autism are impairments in social interactions, delays or difficulties with communication, and restricted activities and interests (APA, 2000). The characteristics can vary according to the age of the individual and also in severity. In the DSM-IV-TR, there are four specific criteria within each of the three areas (i.e., social, communication, restricted activities) and an individual must meet six of the 12 criteria to be diagnosed with an autistic disorder (APA, 2000). In addition, an individual must also show delays prior to three years of age in one of the following areas: (a) social interaction, (b) language used to communicate socially, or (c) imaginative play. Finally, the symptoms cannot be attributed to Rett's Disorder or Childhood Disintegrative Disorder (APA, 2000). As the assessment of the characteristics of autism is essential to this thesis project, each of those areas will be described in more detail.

Social. One of the hallmarks of autism is impaired social interactions. Those with autism experience profound difficulty in relating to others. Specific characteristics listed in the DSM-IV-TR (APA, 2000) are impairments in nonverbal behaviors such as making eye contact and using facial expressions, difficulty in relating to others, appearance of indifference in regards to the feelings of others, and a lack of emotional reciprocity. Examples of social impairments in the DSM-IV-TR include having difficulties interpreting what others are thinking or feeling and failing to develop meaningful peer relationships. This can vary throughout the developmental period with younger children lacking interest in others and older children wanting to form

friendships, but lacking the skills to interact appropriately with their peers. Impairments when interacting with others, such as participating in social games, may be due to a deficit in the ability to reciprocate emotionally or socially.

Goldstein and Ozonoff (2009) describe social interactions as being awkward and unsuccessful because children with autism have difficulty both initiating interactions and responding to the initiation of interactions from other children. Often, individuals with autism prefer to play alone and some will actively avoid social interactions with others. The social avoidance shown by children with autism has been described as aloofness (Vismara & Lyons, 2007). Children with autism may fail to engage in reciprocal play with others, not respond to others' affective states, or not use pointing or eye contact to engage others (Wimpory, Hobson, & Nash, 2007). This could be due to a lack of awareness or indifference toward others and/or a limited understanding of social rules and social situations.

Communication. Since Kanner's first description of autism, atypical patterns of communication development have continued to be central to the diagnostic criteria of autism spectrum disorders. The DSM-IV-TR states there may be a delay or total lack of development of spoken language, impairments in starting and maintaining conversations, stereotyped or repetitive language, or impairments with make-believe or social imitative play (APA, 2000). Those that speak may lack the ability to start or maintain a social conversation. The repetitive use of language might include repeating meaningless words, phrases, or commercials. They may engage in pronoun reversals or repeat personal pronouns exactly as they are heard. For example, when asked "What's your name?" they may answer "Your name is…" (Mash & Wolfe, 2010). Often times when language is

developed, the tone is monotonous and the use of pitch, intonation, rhythm, rate, or stress may be abnormal (APA, 2000).

One of the most classic symptoms of children with autism is echolalia; although not all children with autism echo. Echolalia refers to a repetition with similar intonation of words or phrases that someone else said (Tager-Flusberg, Paul, & Lord, 2005). Halle and Meadan (2007) noted difficulties children with autism display in their ability to understand pragmatic or social language. They often resort to communicating through nonverbal behaviors (e.g., tantrums) to indicate when they want something or do not want something.

Restricted Behaviors. The third primary diagnostic category of autism is related to unusual behaviors. Individuals with autism may have restricted or repetitive patterns of behavior, interests, and activities (APA, 2000). The DSM-IV-TR provides examples of unusual behaviors, such as demonstrating a preoccupation with specific or narrow interests, demanding a strict schedule or routine, engaging in motor movements to provide sensory stimulation, or forming preoccupations with specific parts of objects. For example, individuals with autism may display an intense focus on a particular object, such as trains or the wheels on a toy truck. Objects may need to be lined up in the same order or have an equal number of each object.

According to the DSM-IV-TR (APA 2000), children with autism tend to be inflexible in regard to their daily schedule and may become obsessed with routines and rituals. Some may engage in stereotyped body movements, such as rocking, dipping, or swaying. Those with autism may display abnormal postures or odd hand movements, and walk on their tiptoes. These types of repetitive body movements may serve as a self-

stimulatory behavior. Carter, Davis, Klin, and Volkmar (2005) stated many children with autism prefer to be left alone to engage in self-stimulatory activities. Mash and Wolfe (2010) reported several theories related to self-stimulatory behaviors by children with autism: (a) they may crave stimulation because it excites the central nervous system, (b) they use it as a way to block out the unwanted overstimulation from the environment, or (c) the behavior results in some type of external reinforcement.

Prevalence of Autism

For decades, autism was considered to be a rare or low incidence disorder affecting only 2 to 5 children per 10,000 (APA, 1980, 1987). Incidence rates have increased drastically in the last couple of decades. In 2007, the number of children diagnosed with autism was 1 in 150, which has changed to 1 in every 110 children in 2011 (National Center on Birth Defects and Developmental Disabilities [NCBDDD], 2011). Recently, the CDC reported the rates to be 1 in 88 (NCBDDD, 2012). The current prevalence rates include children with all disorders on the autism spectrum including Autistic Disorder, Asperger's Disorder, and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). One statistic that has remained fairly stable is that boys are three to four times more likely to be diagnosed with autism than girls (National Research Council, 2001). Autism is recognized worldwide and is found across all social classes; however, when comparing rates of autism across different racial and ethnic groups, Caucasian children and African American children have higher prevalence rates than Hispanic children (Rice, 2009).

The Centers for Disease Control and Prevention (CDC) does not have a definite reason for the increase in autism diagnoses (NCBDDD, 2010). Many reasons have been

proposed, including changes in the criteria used to diagnose autism, a greater awareness among parents and professionals of the disorder, and greater recognition of milder forms of autism, as well as many causes that lack scientific credibility, such as vaccines, mercury, diet, and antibiotics (National Institute of Mental Health, 2009).

Importance of Early Diagnosis

The importance of early identification is supported by evidence that children who receive interventions at younger ages have better outcomes (e.g., higher IQ and adaptive behavior scores) than children diagnosed at older ages (Chawarska & Volkmar, 2005). For many young children with autism, improving imitation and attending skills are often initial goals (Maurice, Green, & Luce, 1996). Imitation and attending skills are foundational skills for learning and the earlier a child has these skills, the more the child will learn.

Many times children do not receive a diagnosis of autism until years after symptoms are first recognized. The average age for a diagnosis ranges from 3.6 years to almost seven years despite evidence that symptoms are recognizable in infancy and children as young as two years can be identified (Gray & Tonge, 2005). The delay in receiving a diagnosis results in lost opportunities for individuals with autism. An early diagnosis can also provide time to modify interventions for children that are not responding to current interventions (Reichow & Wolery, 2008). According to Coonrod and Stone (2005), "Early intervention is critical in preventing a cascade of effects that can result from early deficits and interfere with later functioning" (p. 708). Early identification is not only crucial for the child, it is important in giving parents needed

time to understand the difficulties their children have, which allows their needs to be addressed more effectively (Lord et al., 2005).

One of the first attempts to address the importance of early intervention took place in 1970 when O. Ivar Lovaas started a project at University of California, Los Angeles (UCLA) to address the significant needs of those with autism through an intensive behavioral-intervention program that took place during most of their waking hours (Lovaas, 1987). The UCLA project assumed younger children would better generalize and maintain gains obtained through interventions; therefore, the study focused on children below the age of four (Lovaas, 1987). The sample consisted of two groups: an experimental group that received more than 40 hours per week of one-to-one treatment and a control group that received less than 10 hours of one-to-one treatment. Greater intellectual gains (average 30 IQ points) were noted for the children in the experimental group when compared to the control group (Lovaas, 1987). Lovaas also revealed that early intensive behavioral interventions provided across various settings, such as home and school are more successful when the parents become skilled teachers to maintain treatment gains and that the youngest children made the greatest progress.

In a review of the literature, Eldevik et al. (2009) identified nine controlled design studies reporting the effects of early intensive behavioral interventions with children with autism on two outcomes, change in intelligence and/or adaptive behavior composites. The meta-analysis reported that children with autism made more gains after receiving intensive interventions when compared to children not receiving interventions or receiving only special education interventions. According to Eldevik et al., effective comprehensive interventions have the following common elements: (a) individualization;

(b) reduction of interfering behaviors; (c) experienced staff trained in applied behavior analysis; (d) intervention goals are driven by normal developmental sequences; (e) parents are involved; (f) interventions provided in a one-to-one fashion; (g) interventions are implemented across different settings; (h) intensive, year-round, 20 to 30 hours of interventions per week; (i) duration of more than two years; and (j) interventions are started in the preschool years (three to four years of age).

The National Institute of Mental Health (2009) states there is evidence over the last 15 years of improved outcomes in most young children with autism that received intensive early intervention in optimal educational settings for at least two years during the preschool years. According to Charman (2003), children with autism have specific needs in a preschool setting, such as the structure and organization of their environment that are different from the needs of children with general developmental delays. For children that participated in effective early intervention programs that were intensive, highly structured, had a low student-teacher ratio, and included family members, outcome studies found that many children are able to function in regular education placements with only support services (Mash & Wolfe, 2010).

Assessment of Autism

It was previously noted that the characteristics of autism were recognizable in infancy and that autism could be identified by two years of age (Gray & Tonge, 2005). Thus, it would seem that the diagnosis of autism would be relatively straightforward. However, autism cannot be diagnosed through medical tests. Autism is a behavioral diagnosis that is confounded by the variations in severity of symptoms (i.e., lack of communication, unusual behaviors, and impaired social interactions) from child to child.

In general, there are many types of developmental delays and many preschool children without autism are referred for evaluations. At the preschool level, children are more likely to be referred for a developmental evaluation because of language delays than any other developmental area (U.S. Department of Education, 2005). Delays in language development often impair social interactions and may result in acting out behaviors due to frustration in communication. Preschool children with cognitive delays typically have concurrent delays in language development as well. Thus, preschool children with cognitive and/or language delays can have some of the characteristics of autism, making it hard to distinguish between preschool children with autism and preschool children with other types of developmental delays.

As a result, the diagnostic process for autism is remarkably extensive (Volkmar & Klin, 2005). When evaluating a child for autism, a multidisciplinary approach is preferred, which requires significant time, training, and expertise in the area of autism (Charman & Baird, 2002). An autism diagnosis is based on observations of behavior and educational and psychological testing. According to Lord and Risi (1998), there must be an assessment and documentation of the difficulties in each of the primary diagnostic areas (social reciprocity, communication, and restricted and repetitive behaviors). Those conducting the assessment must have the expertise to know what behaviors to observe and be able to distinguish between characteristics of autism and characteristics of other developmental delays.

Autism diagnostic instruments. Although there are several instruments available to assist in the diagnosis of autism, there are only two that are comprehensive enough to be considered "gold standard" methods of diagnosing autism (Luyster et al.,

2009; Ozonoff, Goodlin-Jones, & Solomon, 2005). The Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore, & Risi, 2003) is one of the most prominent and valid assessments used to help diagnose autism spectrum disorders (Luyster et al., 2009). It is a semi-structured interactive assessment administered by a trained examiner to assess referred individuals because of possible autism or autism spectrum disorders (Lord et al., 2003).

The ADOS provides flexibility in that it can be used with individuals of varying ages, from toddlers to adults, and varying developmental levels. The ADOS is divided into four modules which allows the examiner to select the appropriate module according to the individual's age and level of expressive language, and it yields scores and information in the areas of social behavior, the use of vocalizations/speech and gesture in social situations, and play and interests (Lord et al., 2003). This instrument takes about 30 to 45 minutes to administer and has the examiner interact with the individual in a number of developmentally appropriate, structured tasks designed to assess autism-related behaviors (Naglieri & Chambers, 2009). The scores and information can be used to help determine the presence of autism. The ADOS should only be administered by a trained professional that is experienced in clinical assessment and is also familiar with autism spectrum disorders (Lord et al., 2003).

The Autism Diagnostic Interview-Revised (ADI-R; Rutter, Le Couteur, & Lord, 2003) is another prominent standardized instrument used to assess behaviors related to autism in individuals two years old and older (Matson & Sipes, 2010). It is a semi-structured diagnostic parent interview consisting of 93 questions based on DSM-IV-TR and International Classification of Diseases-10 criteria for autism and pervasive

developmental disorders (Rutter et al., 2003). It is administered by a trained interviewer and can take up to three hours to administer. According to Rutter et al., the ADI-R focuses on three domains of functioning: language and communication, reciprocal social interactions, and patterns of behaviors (i.e., restricted or stereotyped behaviors).

The administration of the interview is highly standardized in order to ensure the informant provides detailed descriptions of the child's behavior. The ADI-R elicits information from the parent regarding the child's current behavior and developmental history. With older children, parents are required to focus on their children's behavior when they were four or five years old because certain features of the disorder are prominent during this time period. The behavioral descriptions given by the parents are coded using predetermined criteria and a diagnostic algorithm differentiates between individuals with and without autism. Rutter et al. (2003) reported that while the diagnostic algorithm can provide a basis for a clinical diagnosis of autism, the diagnostic validity is questionable with individuals with a mental age less than two years old. According to Ozonoff et al. (2005), the ADI-R is a "very helpful tool" (p. 526). However, Ozonoff et al. goes on to note the ADI-R's lack of sensitivity to differences among children with mental ages less than 20 months and the lengthy administration time.

Autism screeners. There are many screening instruments utilized in the diagnosis of autism. However, the intent of this research is not to provide a review of all screeners, but to provide examples of the variations of screeners available. According to Ozonoff et al. (2005) the Social Communication Questionnaire (SCQ; Rutter, Bailey, & Lord, 2003), formerly the Autism Screening Questionnaire, is a brief parental screening

instrument. The SCQ was based on the ADI-R algorithm; however, the items are presented in a much briefer format (Ozonoff et al., 2005). It consists of two different forms, one for current behaviors and one for lifetime behaviors. The lifetime version focuses on the individual's behavior over time, whereas the current version concentrates on behavior during the previous three months. According to Corsello et al. (2007), past research shows that younger children tend to score lower on the SCQ than older children; therefore, the SCQ missed a large number of young children with autism. Allen, Silove, Williams, and Hutchins (2007) analyzed the validity of the SCQ and determined the sensitivity to be acceptable; however, the specificity was low. The authors concluded the SCQ was a valuable screening tool in high-risk children, but it yields many false positives.

The Gilliam Autism Rating Scale-Second Edition (GARS-2; Gilliam, 2006) is a screening checklist that provides information that can be used to help in the screening of autism spectrum disorders in individuals between the ages of 3 and 22 (Montgomery, Newton, & Smith, 2008). The GARS-2 is a behavioral checklist that is often used in schools and diagnostic clinics that offers a link between assessment and intervention (Montgomery et al., 2008). The GARS-2 is comprised of four scales and 56 questions that can be used to estimate the presence of autistic symptoms (Gilliam, 2006). The four scales include Social Interaction, Communication, Stereotyped Behaviors, and Developmental Disturbances. The scores yield an Autism Quotient, which measures the "likelihood that a child has autism" (Ozonoff et al., 2005, p. 527). Unlike other autism assessments, such as the ADOS and the ADI-R, the GARS-2 is relatively simple and offers a short completion time due to the flexibility of the format (Montgomery et al.,

2008). It is considered a useful screening tool for autism; however, it resulted in a high false negative rate when used as a screener for individuals previously diagnosed with autism (Montgomery et al., 2008). In a study evaluating the original GARS, the GARS failed to differentiate among preschool children with autism and preschool children with other developmental delays, suggesting poor diagnostic utility in identifying children with autism (Sikora, Hall, Hartley, Gerrard-Morris, & Cagle, 2008).

Although there are several instruments available to screen and assist in the diagnosis of autism, there is a need for a way of screening for the possibility of autism that is part of psychologists' routine evaluations. In this manner, the possibility of autism could be raised early in the evaluation process. Behavior rating scales are used as part of a psychologist's evaluation of referred children. They provide information regarding a wide range of problem behaviors and could prove to be a useful asset in the early identification of ASDs in young children.

Behavior Rating Scales Utilized as Screeners for Autism?

Health and education professionals are in need of a brief structured instrument to identify specific childhood behavior problems to determine whether a referral for diagnostic services is warranted (Duarte, Bordin, de Oliveira, & Bird, 2003). Broadband behavior rating scales may fulfill such a need. The term, broadband, is used to refer to a behavior rating scale that assesses a broad range of behavioral diagnoses. A narrowband scale would focus on just one disorder (e.g., Attention-Deficit/Hyperactivity Disorder). Broadband behavior rating scales contain dozens of brief statements that describe various specific behaviors. The person completing the scale, usually a parent, teacher, or someone who is very familiar with the child, determines the applicability of the behavior

to the child. The statements are rated based on the frequency of the behavior with Likert-style scales that may range from *never* to *always* or *not true* to *very true.* Behavior rating scales are the most commonly used tool practitioners employ as part of their evaluations involving referred children (Shapiro & Heick, 2004). Because the behavior rating scales are already being used, information gained through the results of behavior rating scales has the potential to raise awareness of the presence of autistic behaviors that might otherwise go undetected.

According to Merrell (2008), behavior rating scales offer several advantages for clinicians and practitioners when conducting assessments with children. They provide practitioners with information about low frequency behaviors that might not occur during a direct observation. Valuable information can be gained about a child's behavior from parents and teachers that are familiar with the child and involved in the child's natural environment. Behavior rating scales are less expensive, only take 10 to 15 minutes to complete, and do not require training or a professional to administer them (Merrell, 2008). Behavior rating scales also provide data on a broad range of behaviors rather than focusing on a specific concern or behavior.

A review of the literature resulted in two studies examining the use of behavior rating scales as possible screeners for autism. Duarte et al. (2003) conducted a study to examine the validity of the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000) in identifying school-age children with autism. In this study, a Brazilian adaptation of an older version of the CBCL (designed for ages 4-18) was used. The sample of participants consisted of 101 children divided into three groups: (a) 36 children with autism and related conditions, (b) 31 children with other psychiatric disorders

(OPD), such as Attention-Deficit/Hyperactivity Disorder, Depressive Disorder, Conduct/Oppositional Defiant Disorder, and separation anxiety/obsessive compulsive disorder, and (c) 34 nonreferred schoolchildren as the control group. Experienced psychologists and child psychiatrists determined the autism and OPD diagnoses using the 10th edition of the International Classification of Diseases criteria based on contact with patients and interviews with parents. The participants ranged in age from 4 to 11 and were predominantly male. The autism and OPD groups were matched based on age and gender and selected from two mental health clinics. The nonreferred schoolchildren were randomly selected from two public schools near the mental health clinics.

When children with autism and nonreferred schoolchildren were compared, the Thought Problems and the Autistic/Bizarre scales yielded the largest effect sizes between the two groups. The Thought Problems scale yielded the largest effect size and provided the best differentiation. The Thought Problems, Autistic/Bizarre, and Aggressive Behavior scales all differentiated between the children with autism and the OPD children. When sensitivity and specificity were calculated, the Autistic/Bizarre scale was best at distinguishing between the autistic and OPD groups.

Duarte et al. (2003) concluded that their study provides beginning support for the validity of the prior version of the CBCL in identifying autism and related conditions in Brazilian children. The information provided by this study would have more usefulness and generalization to U.S. school children if it were replicated in this country. However, the biggest issue that limits generalizability of results is that the version of the CBCL that they used is an outdated version and was adapted to the Portuguese language for this study.

Sikora et al. (2008) conducted a study to determine if the latest preschool version of the CBCL is as clinically useful as an autism specific screener, in this case the Gilliam Autism Rating Scale (GARS; Gilliam, 1995). The study consisted of a sample of 147 participants that were primarily Caucasian (77.6%) with ages ranging from 36-71 months (M = 53.5). The participants took part in an evaluation consisting of the ADOS at an Autism Program at the Child Development and Rehabilitation Center in Oregon. Based on their ADOS classifications, the children were divided into three groups: (a) Autistic, n = 79 (b) Autism Spectrum Disorder, n = 18 and (c) referred, but Non-Spectrum, n = 50. The researchers did not make a distinction among the criteria children needed to meet to be eligible for the Autistic versus the Autism Spectrum Disorder groups.

According to Sikora et al. (2008), primary care physicians were responsible for all of the referrals of the children in this study. Parents were responsible for the completion of the forms; however, occasionally foster parents or caseworkers accompanied the child. Caregivers were given a comprehensive, semi-structured interview and several scales to complete including the GARS and the CBCL. The forms were scored under the supervision of a licensed psychologist and the ADOS was administered and scored immediately. The autism quotient (AQ) from the GARS and the scores from the CBCL were analyzed once all of the data had been collected.

Sikora et al. (2008) examined characteristic differences, such as age, sex, and ethnicity among the three groups. A chi square analysis revealed no significant differences among the three groups of participants with regards to sex and ethnicity; however, a significant difference was detected with age (Autism, M = 50.6; ASD, M = 55.1; Non-Spectrum, M = 57.5) among the groups through a one-way Analysis of

Variance (ANOVA). Further post-hoc analyses revealed that the Autism and ASD group were younger than the Non-Spectrum group.

Pearson correlations resulted in positive correlations between the GARS AQ and the CBCL scale scores. The Withdrawn and Pervasive Developmental Problems scales of the CBCL had the strongest correlation with the GARS AQ. An analysis of the sensitivity revealed both the Withdrawn (64.6%) and Pervasive Developmental Problem (79.8%) scales of the CBCL had better sensitivity than the GARS (53.2%). The specificity of the Withdrawn (62.0%) scale was better than the GARS (54.0%) and the Pervasive Developmental Problems (42.0%) scale. Further analyses of differences between the three groups on the GARS and the CBCL revealed no significant differences among the groups on for the GARS AQ. However, there were significant differences among the groups for the Pervasive Developmental Problems scale (Autistic $M = 75.0$, ASD $M = 73.2$, Non-Spectrum $M = 70.1$) and the Withdrawn scale (Autistic $M = 73.3$, ASD $M = 66.9$, Non-Spectrum $M = 66.0$) of the CBCL.

Sikora et al. (2008) set out to determine the clinical utility of the GARS and the *CBCL*. They concluded that two scales (Withdrawn and Pervasive Developmental Problems) on the CBCL are better at distinguishing children with autism from children without autism than the GARS AQ. The increased sensitivity of the CBCL Withdrawn and Pervasive Developmental Problems scales ensures the early identification of ASDs; therefore, increasing the opportunities for intervention services at an earlier age. An added benefit of the CBCL is the information it provides on various problem behaviors, such as emotional or behavioral problems, which is key in the diagnosis of ASDs.

Overall, "The CBCL has better diagnostic utility than the GARS for boys and girls, and high- and low-functioning children" (Sikora et al., 2008, p. 446).

Further review of the literature revealed two theses that examined the utility of behavior rating scales as screeners for autism. Gross (2009) examined whether rating scales can be useful as screeners for autism in referred preschool aged children, specifically the Behavior Assessment System for Children, 2nd edition (BASC-2; Reynolds & Kamphaus, 2004) and the Child Behavior Checklist (CBCL/1.5-5). The study questioned if there were specific scales on the preschool parent versions of the BASC-2 and the CBCL to distinguish between preschoolers with autism and other clinically referred children without autism. The study consisted of 82 children divided into two groups: 36 children diagnosed with an Autism Spectrum Disorder and 46 children in the referred, but Non-Spectrum group.

Through a series of *t*-tests, significant differences were found on the Aggression (ASD *M* = 50.2, Non-Spectrum *M* = 64.2), Social Skills (ASD *M* = 33.2, Non-Spectrum *M* = 39.4), and Externalizing (ASD *M* = 55.5, Non-Spectrum *M* = 67.9) scales on the *BASC-2* and the Withdrawn (ASD *M* = 75.0, Non-Spectrum *M* = 63.9) and Pervasive Developmental Problems (ASD *M* = 76.2, Non-Spectrum *M* = 68.7) scales on the CBCL. The Non-Spectrum group yielded higher mean scores (indicating more problematic behaviors) on all scales that were found significant on the BASC-2, which is not clinically useful for diagnostic purposes because typically developing children will also have low scores on those scales. Gross (2009) reported children with ASD have fewer problematic behaviors related to Hyperactivity (ASD *M* = 59.8, Non-Spectrum *M* = 68.5), Aggression (ASD *M* = 50.2, Non-Spectrum *M* = 64.2), Anxiety (ASD *M* = 42.9,

Non-Spectrum *M* = 49.2), Depression (ASD *M* = 54.0, Non-Spectrum *M* = 64.1), Externalizing (ASD *M* = 55.5, Non-Spectrum *M* = 67.9), and Internalizing (ASD *M* = 47.6, Non-Spectrum *M* = 56.0) than referred, but non-spectrum children according to the BASC-2. Similar to the findings of the Sikora et al. (2008) study, children with ASD had significantly higher Withdrawn (ASD *M* = 75.0, Non-Spectrum *M* = 63.9) and Pervasive Developmental Problems (ASD *M* = 76.2, Non-Spectrum *M* = 68.7) scores than the Non-Spectrum group on the CBCL.

Using multiple cutoff scores (i.e., 1.0 *SD*, 1.5 *SD*, and 2.0 *SD* above the mean), an analysis was conducted to determine the sensitivity, specificity, positive predictive value (PPV), and negative predictive values (NPV) for the group with autism. The specificity and PPV were poor for most scales; however, the Social Skills scale on the BASC-2 and the Withdrawn scale on the CBCL appear to have the highest sensitivity, specificity, PPV, and NPV percentages at the predetermined cutoff level of 1.5 standard deviations.

McReynolds (2009) also conducted a study examining the scales on the CBCL/1.5-5 and the Clinical Assessment of Behavior-Parent form (CAB-P; Bracken & Keith, 2004) between groups of referred preschool-aged children with and without autism. The participants consisted of two groups: 34 children with an ASD and 40 referred, but Non-Spectrum children. A series of *t*-tests revealed similar findings to the Gross (2009) study. The Withdrawn and Pervasive Developmental Problems scales were found to be significantly different between the two groups on the CBCL/1.5-5, which is consistent with past studies. On the CAB-P, the only significant difference between the two groups was on the Social Maladjustment scale. Non-Spectrum participants were found to have significantly higher scores on the Social Maladjustment (*M* = 61.2) scale

than that of the ASD participants (M = 53.7); however, this information is not clinically useful because the mean score of the ASD group still falls within the average range. Interestingly, the CAB-P has an Autism Spectrum Behaviors scale, but it did not differentiate between the ASD and referred, but Non-Spectrum participants.

Purpose of Present Research

The prevalence of children diagnosed with Autism Spectrum Disorder has been on a steady increase. Autism has a negative impact, not only on the child, but also on the family. Children with autism suffer from significant impairments in their ability to communicate and interact socially with others, which is why early identification is so important. The earlier children are identified with autism, the quicker they can participate in early intervention programs. The earlier intervention is provided, the better the outcomes (Coonrod & Stone, 2005; Lovaas, 1987). Unfortunately, there are often delays of many months and even years before the diagnosis is made (Gray & Tonge, 2005). The screening of autism currently requires someone to recognize that autism is a possibility and administer an autism screening instrument. If a screening method could be developed from a commonly used broadband behavior rating scale that is already part of most psychologists' evaluation repertoires, the diagnosis of autism might occur much sooner.

Only a very few studies have examined the effectiveness of broadband behavior rating scales as screeners for autism. Duarte et al. (2003) provided beginning support for the validity of the CBCL for screening autism; however, by using an outdated version of the CBCL with a Brazilian population, generalization of the results is severely limited, especially in the United States. Sikora et al. (2008) found two scales on the CBCL/1.5-5

to be statistically significantly higher for a group with autism than a referred group without autism; however, the mean scores for both groups of children were in the clinically significant range, limiting the applied usefulness of their results. Similar results were found by Gross (2009) and McReynolds (2009). Their two theses examining the CAB-P, BASC-2, and CBCL determined some statistically significant differences between scales, but their results lack practical or clinical usefulness.

The present study expands on the findings of past research in regards to the CBCL/1.5-5 as a screener for autism. The CBCL/1.5-5 has a Pervasive Developmental Problems (PDP) scale that was derived to distinguish between typically developing preschoolers and preschoolers with autism. While the PDP scale may distinguish between typical children and children with autism, it is not as useful at distinguishing between children with autism and referred children with other developmental delays. Practitioners evaluate referred children with a variety of developmental delays and need a way to distinguish between children with autism and other referred children. The purpose of this research is to determine if a set of items on the CBCL/1.5-5 exists that would reliably distinguish between children with autism and referred, but non-spectrum children. Thus, the research question for this study is: What group of items on the CBCL/1.5-5 reliably distinguishes between children with autism and referred, but non-spectrum children?

Method

Participants

The intent of this research was to expand on the previous findings of McReynolds (2009) and Gross (2009) by re-examining their data sets which were comprised of children who had been referred for an evaluation at a non-profit agency in south central Kentucky. The agency works with children from the ages of birth through eight years, primarily conducting diagnostic evaluations due to behavioral or developmental concerns. A Ph.D. level psychologist with over 20 years of experience in the field of early childhood development and with children with autism conducted all evaluations. The diagnoses of ASD were based on both clinical judgment (based on parent interviews, observations, and interactions with the children) and the assessment results of the ADI-R. According to Goldstein and Ozonoff (2009), "a thorough history is likely to be the best assessment tool" (p. 9) for the diagnosis of ASD, which can be gained through the use of parent interviews. Sikora et al. (2008) view the ADI-R as a gold standard tool for diagnosing autism. While the CBCL/1.5-5 was administered, its results were not used in the diagnostic process as it was scored after the evaluation was completed.

Combining the data sets from McReynolds (2009) and Gross (2009) for the CBCL/1.5-5 resulted in a sample of 70 preschool children diagnosed as having autism and 86 preschool children who had been referred for an evaluation but did not have autism. In order to better understand the sample, basic demographic information was collected for each participant and is displayed in Table 1. Both groups of children were similar on the demographic variables assessed. As typical of children with autism and young children in general that are referred for developmental evaluations, the majority of

Table 1

Characteristics of the Autism Spectrum Disorder (ASD) and Non-Spectrum Groups

	ASD	Non-Spectrum
Gender		
Males	59 (84.3%)	68 (79.1%)
Females	11 (15.7%)	18 (20.9%)
Age		
Mean (months)	40.2	32.8
SD	13.3	6.8
Ethnicity		
Caucasian	61 (87.1%)	74 (86.0%)
African American	5 (7.1%)	8 (9.3%)
Hispanic	3 (4.3%)	3 (3.5%)
Asian	1 (1.4%)	1 (1.2%)
Rater of Child		
Mother	66 (94.3%)	70 (81.4%)
Father	3 (4.3%)	4 (4.7%)
Female Guardian	1 (1.4%)	12 (14.0%)
Parent Education		
$\leq$ High School	40 (57.1%)	51 (59.3%)
$\geq$ Some College	30 (42.9%)	35 (40.7%)

each group were boys (ASD group = 84.3% boys and Non-Spectrum group = 79.1% boys). A chi square test indicated no significant differences between the ASD and Non-Spectrum groups in terms of gender, $\chi^2(1) = .69$, $p = .96$. The majority of the participants in both groups were Caucasian. A chi square test indicated no significant differences between the groups in terms of ethnicity, $\chi^2(3) = .31$, $p = .41$. Mothers or female guardians provided the ratings on the Child Behavior Checklist slightly more than 95% of the time for both groups. If female guardians are grouped with mothers, there was no significant difference between the groups with regard to the gender of the rater, $\chi^2(1) = .01$, $p = .91$. Parent education was very similar between the two groups as well, with both groups having slightly more than 40% with at least some college education. A chi square test indicated no significant differences between the groups in terms of parent education, $\chi^2(1) = .07$, $p = .79$. The ASD group was slightly older with a mean age of 40.2 months when compared to the Non-Spectrum group's mean age of 32.8 months. An independent samples *t*-test indicated this difference was statistically significant, $t(154) = 4.49$, $p = .000$.

Instrument

The Child Behavior Checklist for ages 1.5 to 5 years old (*CBCL/1.5-5*) is a component of the Achenbach System of Empirically Based Assessment (ASEBA). The ASEBA system is comprised of various forms to assess the behavioral, emotional, and social functioning of people ranging from 18 months to over 90 years (Rescorla, 2005). The CBCL/1.5-5 is a revision of the 1992 version of the CBCL/2-3 (Achenbach & Rescorla, 2000). According to the ASEBA manual (Achenbach & Rescorla, 2000), there are two versions of the CBCL/1.5-5, one for a parents and one for the child's teacher,

which provide information on a wide range of behaviors and disorders in young children. Although the CBCL is offered in a variety of forms depending on the age level of the child and the rater (i.e., parents, teachers, or caregivers), the focus of this research was the *CBCL/1.5-5* parent version.

Achenbach and Rescorla (2000) describe the CBCL/1.5-5 as being a user-friendly, standardized instrument that can be used by professionals in diverse settings to assess behavioral and emotional problems in children. The CBCL/1.5-5 does not require training to administer and can be completed in 10 to 15 minutes. Respondents rate each of the 99 items on the CBCL/1.5-5 based on the child's behavior within the past two months on a three-point scale: (a) 0, not true; (b) 1, somewhat or sometimes true; or (c) 2, very true or often true (Rescorla, 2005). In addition to the CBCL/1.5-5, there is a Language Development Survey (LDS) to provide information about possible language delays; however, it was not examined by this research.

The CBCL/1.5-5 yields T scores ($M = 50$, $SD = 10$) for seven "syndrome" scales: Emotionally Reactive, Anxious/Depressed, Somatic Complaints, Withdrawn, Sleep Problems, Attention Problems, and Aggressive Behavior (Achenbach & Rescorla, 2000). The form also provides five "DSM-oriented" scales: Affective Problems, Anxiety Problems, Attention Deficit/Hyperactivity Problems, Pervasive Developmental Problems, and Oppositional Defiant Problems. Each of the syndrome scales are grouped into broader scales (i.e., Internalizing, Externalizing, Total Problems). Achenbach and Rescorla (2000) describe the Internalizing scale as being comprised by the Emotionally Reactive, Anxious/Depressed, Somatic Complaints, and Withdrawn syndrome scales. The Externalizing scale is determined by the scores for the Attention Problems and

Aggressive Behaviors syndrome scales. The Total Problems scale is derived from the sum of all 99 items on the CBCL/1.5-5.

According to Achenbach and Rescorla (2000), the CBCL/1.5-5 was standardized based on the scores from a national sample of 700 non-referred children. In the standardization sample, the forms were completed 88% of the time by the mother, 10% by the father, and 2% by another adult. The sample was obtained from 40 U.S. states, 2 Canadian provinces, 3 Australian states, and Jamaica. The ethnicity was 59% white, 17% African descent, 9% Latino, and 15% mixed or other.

Achenbach and Rescorla (2000) provide information regarding the reliability of the CBCL/1.5-5 based on test-retest, cross-informant agreement, and internal consistency coefficients. Test-retest coefficients were obtained by comparing the ratings of 68 nonreferred children by their mothers on two occasions (mean interval of 8 days). The scales revealed a test-retest reliability ranging from .68 to .92, with a mean of .85 across all scales. The mean reliability of cross-parent agreement was .61. The degree of internal consistency was represented by Cronbach's alpha, which determines how consistent items are within the same test. A comparison of the syndrome scales revealed coefficients ranging from .66 to .95. The DSM-Oriented scales ranged from .63 to .86, with a coefficient of .80 for the Pervasive Developmental Problems scale.

Criterion-related validity and construct validity were reported in the CBCL/1.5-5 manual. The criterion-related validity was determined by comparing the scores of referred children to non-referred children. The samples (n = 563 in each) were matched based on age, gender, parent education, and ethnicity. How the referred sample was obtained is not described in the manual; the referred sample appears to be participants

from the original 1992 version of CBCL. Achenbach and Rescorla (2000) reported that referred children scored higher on all problem scales when compared to nonreferred children. Specifically, referred children had higher mean raw scores on the Pervasive Developmental Problems scale than non-referred children. The manual did not report standard score differences or use a sample of children identified with autism in their comparison of the scale. For support of construct validity, the manual reports data from the previous 1992 version of the CBCL that was designed for children two and three years of age. The older version of the CBCL/2-3 was compared to the Richman Behavior Checklist (BCL) yielding correlations ranging from .56 to .77. Further support was reported when the CBCL/2-3 Total Problem scale correlated with a frequency rating of .70 with The Toddler Behavior Screening Inventory and the Infant-Toddler Social and Emotional Assessment.

Procedure

Data sets from Gross (2009) and McReynolds (2009) were used for this study. Western Kentucky University's Human Subjects Review Board gave approval for the collection of their data; the board was consulted and it was determined permission was not required to further analyze the data given that the participants remained anonymous to the investigator. Archived data from Gross and McReynolds were in two Statistical Package for Social Sciences (SPSS) files and were combined into one SPSS file for this analysis. A summary of the participants' demographic information (i.e., gender, age, ethnicity), diagnosis (Autistic or Non-Spectrum), and level of parental education was determined.

The first step of the procedure was the random selection of 60 participants. Those 60 participants were removed in order to conduct a later validation analysis. The second step was to use the remaining 96 participants' ratings and correlate each rater's response on the 99 individual items of the CBCL/1.5-5 with the diagnosis of autism. The third step was the validation step, where all items with a significant correlation were summed to obtain a total score. That total score was then correlated with the diagnosis of autism for the sample of 60 participants. Finally, additional post-hoc analyses were conducted examining the scores from the Withdrawn and Pervasive Developmental Problems scales on the CBCL/1.5-5 and determining the sensitivity and specificity of various cutoff scores for identifying the children with and without autism.

Results

This research study sought to determine if there was a group of items on the CBCL/1.5-5 that reliably distinguished between children with autism and referred, but non-spectrum children. After removing a randomly selected sample of 60 children (23 with ASD and 37 Non-Spectrum), each item was correlated with the diagnosis of autism. Results of those correlations for all 99 items are presented in Table 2. A total of 20 items had statistically significant correlations with the diagnosis of autism (12 with positive correlations and eight with negative correlations). For validation purposes, all items with a negative correlation were reverse coded (i.e., 0 = 2; 1 = 1; 2 = 0) and a sum of all 20 items was obtained. The summative scores for the 20 items were correlated with the diagnosis of autism, resulting in a statistically significant correlation, $r = .691$, $p = .000$.

Previous research found statistically significant differences between groups of referred children with and without autism on the CBCL/1.5-5 Withdrawn and Pervasive Developmental Problems (PDP) scales (Gross, 2009; McReynolds, 2009; Sikora et al., 2008). The Withdrawn scale is comprised of eight items and the PDP scale consists of 13 items. Five of the eight items on the Withdrawn scale are also included on the PDP scale. Table 3 lists an abbreviated version of those items and the correlations. On the Withdrawn scale, correlations for seven of the eight items were statistically significant with the diagnosis of autism, which provides an explanation why that scale readily distinguishes between ASD and Non-Spectrum groups of referred preschoolers. On the PDP scale, however, only seven of the 13 items had significant correlations. Thus, almost half of the items on the PDP scale were not significantly correlated with the diagnosis of autism. When examining the positive correlations from the original set of 99

Table 2

Correlations Between Individual Items on the CBCL/1.5-5 and Autism Diagnosis

Abbreviated Item	*r*	Abbreviated Item	*r*
1. Aches, pains	-.018	31. Eats nonfood	.028
2. Acts too young	.285**	32. Fears	.106
3. Afraid to try new	.116	33. Feelings easily hurt	.063
4. Avoids eye contact	.335**	34. Accident-prone	-.160
5. Can't concentrate	-.021	35. Gets in fights	-.214*
6. Can't sit still	.004	36. Gets into things	-.181
7. No things out of place	-.058	37. Upset when separated	.025
8. Can't stand waiting	-.050	38. Trouble sleeping	-.186
9. Chews nonfood	-.011	39. Headaches	-.036
10. Too dependent	-.083	40. Hits others	-.214*
11. Seeks help	-.057	41. Holds breath	.065
12. Constipated	.068	42. Hurts unintentionally	-.107
13. Cries a lot	-.131	43. Looks unhappy	-.070
14. Cruel to animals	-.277**	44. Angry moods	-.163
15. Defiant	-.177	45. Nausea	.052
16. Demands must be met	.013	46. Twitches	.176
17. Destroys own things	-.031	47. Nervous	.061
18. Destroys others' things	-.105	48. Nightmares	-.060
19. Diarrhea	.011	49. Overeating	.036
20. Disobedient	-.028	50. Overtired	-.101
21. Disturbed by change	.101	51. Panics	.041
22. Not sleep alone	-.172	52. Painful BM	.180
23. Doesn't answer	.344**	53. Attacks people	-.119
24. Doesn't eat well	.203*	54. Picks skin	-.084
25. Doesn't get along	.095	55. Plays with sex parts	-.016
26. No fun	-.215*	56. Clumsy	-.161
27. Lacks guilt	-.152	57. Eye problems	.007
28. Doesn't leave home	-.061	58. Punishment no effect	-.140
29. Easily frustrated	.001	59. Quickly shifts	-.104
30. Easily jealous	-.284**	60. Skin problems	-.057

(continued)

Abbreviated Item	*r*	Abbreviated Item	*r*
61. Won't eat	.179	81. Stubborn	.051
62. Refuses active games	.267**	82. Sudden mood change	-.068
63. Rocks head or body	.256*	83. Sulks a lot	-.190
64. Resists bed	-.256*	84. Talks/cries in sleep	-.138
65. Resists toilet training	.027	85. Temper	-.053
66. Screams	.014	86. Too concerned neatness	-.102
67. No response to affection	.034	87. Fearful	.033
68. Self-conscious	-.033	88. Uncooperative	.025
69. Selfish	-.041	89. Underactive	-.100
70. Little affection	.228*	90. Unhappy, depressed	-.091
71. Little interest	.252*	91. Loud	.049
72. Little fear	-.009	92. Upset by new situations	.172
73. Shy, timid	.050	93. Vomits	.038
74. Sleeps little	-.093	94. Wakes often	-.291**
75. Smears BM	-.073	95. Wanders away	.192
76. Speech problem	.309**	96. Wants attentions	-.135
77. Stares	.300**	97. Whining	-.150
78. Stomachaches	-.165	98. Withdrawn	.282**
79. Shifts sad/excitement	-.234*	99. Worries	.007
80. Strange behavior	.221*		

*$p < .05$. **$p < .01$.

Table 3

Correlations for Items on the CBCL/1.5-5 Withdrawn and Pervasive Developmental Problems Scales

Scale/Item	*r*
Withdrawn	
2. Acts young	.285**
4. Avoids eye contact	.335**
23. Doesn't answer	.344**
62. Refuses active games	.267**
67. Unresponsive to affection	.034
70. Little affection	.228*
71. Little interest	.252*
98. Withdrawn	.282**
Pervasive Developmental Problems	
3. Afraid to try new	.116
4. Avoids eye contact	.335**
7. Can't stand things out of place	-.058
21. Disturbed by change	.101
23. Doesn't answer	.344**
25. Doesn't get along	-.095
63. Rocks head or body	.256*
67. Unresponsive to affection	.034
70. Little affection	.228*
76. Speech problem	.309**
80. Strange behavior	.221*
92. Upset by new situations	.172
98. Withdrawn	.282**

*$p < .05$; **$p < .01$

items, there were five items (numbers 2, 24, 62, 71, & 77) that were significantly correlated with the diagnosis of autism, yet not included on the PDP scale. Those items, related to such behaviors as being a picky eater and staring off into space, would seem to be useful additions to an ASD scale.

To further analyze the scores from the PDP and Withdrawn scales, the scores for the individual items on each scale were summed and correlated with the diagnosis of autism with the validation sample. Both scales had a statistically significant correlations, but were less than the $r = .691$ for the sum of the 20 items identified in this study. The PDP scale had an r of .378, $p = .004$, and the Withdrawn scale resulted in $r = .447$, $p = .000$.

Of the 20 items with statistically significant correlations with the diagnosis of autism, 12 had positive correlations and eight had negative correlations. It is important to distinguish between those sets of items because the positive correlations mean preschoolers with autism scored high on those items and the negative correlations mean the same group of children was rated low on those items. Table 4 lists the items having the positive and negative correlations. Mean scores for the sums of those items for the ASD and Non-Spectrum groups were also determined and are presented in Table 5. The determination of such scores can help practitioners use the CBCL/1.5-5 in distinguishing between referred preschoolers with and without autism. For example, the mean score of the 12 items with positive correlations was 12.23 and the mean score of the sum of the items with negative correlations was 4.06. Thus, a practitioner who assesses a preschooler that obtains a raw score of 12 on the first set of items and a score of 4 on the second set of items has reason to recommend the child for an evaluation of autism.

Table 4

Items with Positive and Negative Correlations with the Diagnosis of Autism

Positive Correlations	Negative Correlations
2. Acts too young	14. Cruel to animals
4. Avoids eye contact	26. No fun
23. Doesn't answer	30. Easily jealous
24. Doesn't eat well	35. Gets in fights
62. Refuses active games	40. Hits others
63. Rocks head or body	64. Resists bed
70. Little affection	79. Shifts sad/excitement
71. Little interest	94. Wakes often
76. Speech problem	
77. Stares	
80. Strange behavior	
98. Withdrawn	

Table 5

Mean Scores for the Sums of Items with Significant Correlations

	Positive *r* Items		Negative *r* Items	
	M	(*SD*)	*M*	(*SD*)
ASD	12.23	(4.03)	4.06	(2.66)
Non-Spectrum	7.60	(3.81)	6.63	(3.84)

To enhance the usefulness of scores on these items for identifying preschoolers as possibly having autism, specific cutoff scores would be helpful. Subtracting a standard deviation of four points from the mean for the items with positive correlations results in the majority of preschoolers with autism having at least eight raw score points on those items. Conversely, adding a standard deviation of three to the mean sum of scores for the eight items with negative correlations would be a cutoff score of seven. This means that the majority of children identified as having autism scored less than seven raw score points on those items.

Multiple cutoff points close to one standard deviation (*SD*) from the means were tested to determine what percentage of preschoolers met, or failed to meet, the criteria. Table 6 lists the percentage of preschoolers with and without autism that meet both cutoff scores (i.e., above the cutoff for positive correlation items and below the cutoff for negative correlation items), at least one of the cutoff scores, or neither of the cutoff scores. One interesting result is that 100% of the children with autism met at least one of the criteria. That is, not a single child with autism had a score lower than a cutoff for the positive correlation items and, at the same time, had a higher score than the cutoff for the negative correlation items. The cutoff scores that had the fewest Non-Spectrum children (3.6%) meeting both cutoff criteria were ≥ 9 on the positive correlation items and ≤ 5 on the negative correlation items. However, those cutoff scores only resulted in about half (54.5%) of the ASD children meeting both criteria. The cutoff scores that identified the most children with ASD (83.3%) were ≥ 8 on the positive correlation items and ≤ 7 on the negative correlation items. While those cutoff scores were better at identifying

Table 6

Percentages of Participants Meeting Cutoff Scores

Cutoff Scores Pos. *r* / Neg *r*	Meets Both	Meets Positive, Not Negative	Meets Neither	Meets Negative, Not Positive
≥ 8 / ≤ 5				
ASD	59.1	31.8	0.0	9.1
Non-Spectrum	9.6	37.3	25.3	27.7
≥ 8 / ≤ 6				
ASD	72.7	18.2	0.0	9.1
Non-Spectrum	13.3	33.7	18.1	34.9
≥ 8 / ≤ 7				
ASD	83.3	7.6	0.0	9.1
Non-Spectrum	22.9	24.1	13.3	39.8
≥ 9 / ≤ 5				
ASD	54.5	31.8	0.0	13.6
Non-Spectrum	3.6	28.9	33.7	33.7
≥ 9 / ≤ 6				
ASD	68.2	18.2	0.0	13.6
Non-Spectrum	6.0	26.5	25.3	42.2
≥ 9 / ≤ 7				
ASD	78.8	7.6	0.0	13.6
Non-Spectrum	13.3	19.3	18.1	49.4

children with ASD, the use of such cutoff scores greatly increased the number of Non-Spectrum children (22.9%) meeting both criteria.

To determine the best set of cutoff scores, the sensitivity and specificity was determined for each set. Results are presented in Table 7. Sensitivity refers to the number of children with autism who are correctly identified as having autism divided by the total number of children with autism. Specificity refers to the number of children without autism who are correctly identified as not having autism divided by the total number of children without autism. Because the purpose of this analysis is to correctly identify the most children with autism, having a higher sensitivity is deemed more important than having a higher specificity. The cutoff scores with the highest sensitivity (83.3%) are ≥ 8 on the positive correlation items and ≤ 7 on the negative correlation items. Such cutoff scores still maintain a reasonably high specificity (77.1%).

Table 7

Sensitivity and Specificity of Various Cutoff Scores

Cutoff Scores Pos. *r*/Neg. *r*	True Positive	True Negative	False Positive	False Negative	Sensitivity	Specificity
≥ 8 / ≤ 5	39	75	8	27	59.0%	90.3%
≥ 8 / ≤ 6	48	72	11	18	72.7%	86.7%
≥ 8 / ≤ 7	55	64	19	11	83.3%	77.1%
≥ 9 / ≤ 5	36	80	3	30	54.5%	96.3%
≥ 9 / ≤ 6	45	78	5	21	68.1%	93.9%
≥ 9 / ≤ 7	52	72	11	14	78.7%	86.7%

Discussion

The purpose of this research was to examine individual items of the CBCL/1.5-5 to determine if there is a set of items that are good predictors of ASD in preschoolers. The CBCL/1.5-5 was chosen because many practitioners are already using the instrument as part of their psychological evaluations. The CBCL/1.5-5 already includes the DSM-oriented scale of Pervasive Developmental Problems (PDP) based on the diagnostic criteria set forth by the APA (Achenbach & Rescorla, 2000). Past research has established the PDP scale shows a statistically significant difference, but not a practically useful difference, between children with autism and referred children without autism (Gross, 2009; McReynolds, 2009; Sikora et al., 2008).

Interestingly, it does not appear the PDP scale was specifically validated on preschoolers with autism. The CBCL/1.5-5 manual provides technical data on all of the instrument's scales comparing referred and non-referred children. However, the manual never describes what types of disorders the referred sample included. "Our item analyses…compared non-referred children and children referred to many different services for many different problems" (Achenbach & Rescorla, 2000, p. 83). This raises concerns as to whether the original sample of referred children even consisted of children that had a diagnosis of ASD. Thus, normative data on the instrument's ability to distinguish among groups of children with specific disorders are not available. The current research results add important information about the validity of the PDP scale with children with autism.

There are 13 items on the CBCL/1.5-5 that make up the PDP scale. A sum of the scores on those items only resulted in a correlation of .378 with the diagnosis of autism,

much lower than the correlation of the sum of the 20 items identified in this study. The current analysis indicates that only seven of those 13 items on the PDP scale result in statistically significant correlations with the diagnosis of autism. There were five additional items (numbers 2, 24, 62, 71, and 77) on the CBCL/1.5-5 that had significant positive correlations with the diagnosis of autism that were not included on the PDP scale. Eliminating the non-significant items and adding the five items (i.e., acting too young, not eating well, not wanting to participate in active games, uninterested in surroundings, and staring off into space) would be a reasonable step in strengthening the PDP scale on the CBCL/1.5-5.

This analysis revealed 20 of the 99 items that were significantly correlated with a diagnosis of autism. There were 12 items that were positively correlated, which means children with ASD were rated highly, and eight items that were negatively correlated, which means children with ASD received low ratings. Autism screening instruments have summative scores where a score above a certain cutoff indicates the presence of autism is likely. This study provides a unique contribution to the literature as it provides evidence there are certain behaviors that children with autism usually do not demonstrate and, if present, seem to rule out the likelihood of autism being present.

After examining results from various cutoff scores, it was recommended that a score ≥ 8 on the items with positive correlations and a score ≤ 7 on the items with negative correlations be used. The use of those cutoff scores results in a high sensitivity level while maintaining a reasonably high specificity level. These cutoff scores, however, would identify more than one in five children (22.9%) without autism as needing an autism evaluation. Perhaps it would be best if those cutoff scores led to a

more in-depth screening of the possibility of autism, rather than directly to an expensive and time-consuming evaluation of autism. In that manner, a full evaluation might be avoided for the false positives.

Various cutoff scores were presented that indicated what percentages of children with and without autism would meet that criteria. All children with autism met at least one of the criteria (i.e., above cutoff scores for items with positives or below cutoff scores for items with negative correlations). The majority of children with autism met both criteria. There are many variations of autism spectrum disorder, with some children having very severe and debilitating characteristics and other children having very mild characteristics. Perhaps those children with autism that only met one of the criteria were of a certain severity level. Given that the disorder exists on a broad spectrum, it would be difficult for a scale of eight, 12, or even 20 items to adequately capture all the aspects of autism. Interestingly, the Non-Spectrum children were more evenly dispersed in meeting one, both, or neither of the criteria. This result is likely due to the fact that the Non-Spectrum group was a heterogeneous group referred for a wide variety of concerns and disorders (e.g., general developmental delays, speech and language concerns, behavior issues).

Strengths and Limitations

It can be difficult to obtain a large sample of children with a specific disorder, particularly when the age range is restricted. One strength of this study is that it had a relatively large sample of preschool children identified as having an autism spectrum disorder. This study was able to determine a set of items on a commonly used behavior rating scale that could distinguish between preschoolers with autism and other referred

preschoolers without autism. Such results were validated using another sample of 60 preschoolers. The study revealed the shortcomings of the PDP scale on the CBCL/1.5-5 for identifying preschoolers with autism and suggested changes to make it more valid. Another strength of this study was its demonstration of the effectiveness of a two-pronged approach (i.e., above a score on one set of items and below a score on another set of items) to distinguish between children with autism and other referred children.

Several factors should be considered when interpreting the results of this study. The majority of the participants were Caucasian and mothers completed most of the instruments. The sample is not representative of the general population of the United States and fathers' ratings might provide different results. While the two groups used in this study were comparable on most indices measured, the mean age for the ASD group was seven months older than the referred group, which was statistically significant. It is unknown if the few months of age difference would have any impact on the results of this study. Finally, the same individual made all the determinations of whether or not a child had autism. Autism is determined through behavioral judgments (even when using tests) and, thus, other professionals might have made other diagnostic determinations.

Future Research

Replicating this study using groups comprised of older children is recommended. To produce more generalizable results, future research might use a more diverse group of children and evaluate fathers' ratings on a behavior rating scale. Future research could also examine other broadband behavior rating scales other than the one analyzed in the current study to determine if sets of items are able to distinguish between groups of referred children with and without autism. In addition to examining other behavior rating

scales, the teacher versions of the CBCL/1.5-5 and other rating scales could be examined with referred children with and without autism to gain additional information on the instruments' ability to distinguish children with autism from other referred groups of children.

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