

2009

# Comparing social skills in children with Autistic disorder and Pervasive Developmental Disorder Not Otherwise Specified

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COMPARING SOCIAL SKILLS IN CHILDREN WITH AUTISTIC DISORDER AND  
PERVASIVE DEVELOPMENTAL DISORDER NOT OTHERWISE SPECIFIED

A Thesis

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Master of Arts

in

The Department of Psychology

By  
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B.S., University of Central Arkansas, 2007  
December 2009

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## Abstract

Although in recent years there has been a large amount of research on Autism Spectrum Disorders (ASD) in general, relatively few studies have focused on Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) as a distinct category. As a deficit in social skills is said to be the primary defining feature of ASD, continued research on assessment and treatment of social skills deficits in ASD is warranted. The present study aims to examine the differences in social skills between children diagnosed with Autistic disorder and PDD-NOS using the Matson Evaluation of Social Skills for Youngsters (MESSY). This study extends a previous investigation conducted by Matson and colleagues that used the MESSY to examine social skills differences between children with Autistic disorder and typical children, by adding a third group, children with PDD-NOS. Results of the analyses indicated that there were statistically significant differences between all three groups in appropriate social skills. Despite a non-statistically significant result for inappropriate social skills, clinical significance was found between Autistic disorder and PDD-NOS. The implications of these results as well as future directions for research are discussed.

## Introduction

The diagnosis of Autism Spectrum Disorders (ASD) has become relatively more common in recent years. According to the Center for Disease Control, between 2 and 6 per 1,000 children have an ASD (2004). ASDs are diagnosed based on a triad of impairments—social interaction impairments, communication impairments, and impairments in behavior (American Psychiatric Association [APA], 2000). A deficit in social skills is said to be the primary deficit in ASD (APA, 2000; Kanner, 1955; Schopler & Mesibov, 1986). This difficulty typically begins with a child's lack of eye contact with caregivers as an infant and develops into a lack of peer relationships, among other things, as the child gets older (APA, 2000; Howlin, 1986). This study will focus on social skills because impairment in this area is said to be the primary deficit in ASD and is the only impairment that is specifically outlined as part of the criteria for a diagnosis of Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) (APA, 2000). Social skills are also necessary for healthy emotional functioning and later psychological adjustment in children (Stone & La Greca, 1986). Although research in ASD in general or Autistic disorder is relatively common, few studies have looked at PDD-NOS as a distinct category (Matson & Boisjoli, 2007). The present study will examine differences in social skills between children diagnosed with Autistic disorder and PDD-NOS using the *Matson Evaluation of Social Skills for Youngsters* (MESSY). An overview of the history, current definition, differential diagnosis, and diagnostic assessment of ASD, as well as a review of current research on PDD-NOS, social skills, and assessment of social skills will be presented.

### History of Autism

In 1943 Kanner published an article describing 11 children who displayed a particular set of symptoms that we now call autism. In this article, Kanner explained that in the past these

children might have been labeled as ‘feebleminded’ or ‘schizophrenic’, but that those labels do not fit the symptomatology that he describes. Some of the features he mentions that link the 11 children include an “inability to relate themselves in the ordinary way to people and situations from the beginning of life” (p. 242), an “extreme autistic aloneness” (p. 242), a “failure to assume at any time an anticipatory posture preparatory to being picked up” (p. 242), and acquisition of speech that is either delayed or not developed at all. When speech has developed, it is not used to convey meaning to others (Kanner, 1943). Other features that Kanner mentions are a superior rote memory, a ‘delayed echolalia’ or repetition of previously heard phrases, a tendency to take things literally, the use of personal pronouns that are repeated just as they were heard, a difficulty with feeding from an early age, and an intolerance for loud noises and moving objects (1943). The children also displayed an “anxiously obsessive desire for the maintenance of sameness” (p. 245), a “limitation in the variety of spontaneous activity” (p. 246), and a good relation to objects, but an unusual relation to people. Physically, the children had basically normal development, and they all came from highly intelligent families (Kanner, 1943).

Kanner’s 1943 work also contrasted autism with schizophrenia. Kanner explained that with schizophrenia, all reports indicated that the first manifestations of the disorder were preceded by at least two years of normal development. Children with autism, however, displayed many of the behaviors from the beginning of life. Kanner also reported that children with autism are able to develop a purposeful relation to objects that does not threaten their ‘aloneness’, but from the beginning they are “impervious to people” (p. 249). He summarized the differences by explaining that those with schizophrenia withdraw from a world they were once a part. This is in contrast to those with autism that slowly step into a world that they were never part of from the beginning of life (Kanner, 1943).

In 1944, just one year after Kanner's original article was published, Hans Asperger published a paper on what he called 'autistic psychopathy'. Asperger understood this to be a type of personality disorder (1944). First, Asperger differentiated autism from schizophrenia. He explained that one of the differences is that children with autism lack contact from the beginning of life, rather than showing a progressive loss of contact, such as people with schizophrenia experience. Essential to the disorder described by Asperger is a "disturbance of the lively relationship with the whole environment" (Asperger, 1944, p. 74). He stated that the qualities that make up this personality type are persistent over time and that they can be found from the second year of life on. Some of the characteristics of the disorder that Asperger outlined include abnormal eye gaze patterns (lack of eye contact), poverty of facial expression and gestures, language that is idiosyncratic, problems with mechanical learning, a lack of empathy, problems with eating, stereotyped behavior (e.g., rocking, unconventional play, lining up toys in patterns), oversensitivity to sensory input as well as under-sensitivity to pain, abnormal relationships to objects, and a lack of affection towards others. Some children also displayed special skills that involved an excellent rote memory. Asperger believed that the majority of children with autism were of normal or above-average intelligence. Despite the great similarities between Kanner's and Asperger's works, it is interesting to note that Asperger would not have known of Kanner's work when he published his study, due to war time and the inability to communicate findings in Germany to the rest of the world (Frith, 1991).

Much confusion existed in the 1950s and 1960s about classifying childhood disorders, specifically those that would at that time been included under the terms psychotic or schizophrenia in childhood (Rutter, 1968). Kanner (1943) was the first to distinguish what he termed infantile autism from childhood schizophrenia. However, this distinction was not



generally accepted until later, and terms such as ‘childhood schizophrenia’, ‘psychotic’, and ‘atypical child’ continued to be used to describe children with autism (Rutter, 1968).

A working party was created in 1961 to develop a set of criteria for a group of children diagnosed as psychotic. These children had been classified with many labels, such as ‘autistic’, ‘schizophrenic’, ‘atypical’, often with an additional label such as ‘brain-damaged’, ‘epileptic’, ‘mentally defective’, and so forth (Creak, 1961). The working party decided upon the term ‘schizophrenic syndrome in childhood’ and listed nine criteria for diagnosis. Although the term used pointed more toward childhood schizophrenia, these criteria are quite similar to criteria used today to diagnosis children with autism. The nine points are as follows: (1) “Gross and sustained impairment of emotional relationships with people”; (2) “Apparent unawareness of his own personal identity to a degree inappropriate for his age” (this can be seen in such behaviors as self-injurious behaviors and misuse of personal pronouns); (3) “Pathological preoccupation with particular objects or certain characteristics of them, without regard to their accepted functions”; (4) “Sustained resistance to change in the environment and a striving to maintain or restore sameness”; (5) “Abnormal perceptual experience (in the absence of discernible organic abnormality), implied by excessive, diminished, or unpredictable response to sensory stimuli”; (6) “Acute, excessive and seemingly illogical anxiety”; (7) “Speech may have been lost, or never acquired, or may have failed to develop beyond a level appropriate to an earlier stage”; (8) “Distortion in motility patterns—e.g., (a) excess as in hyperkinesis; (b) immobility as in catatonia; (c) bizarre postures, or ritualistic mannerisms, such as rocking and spinning (themselves or objects)”; (9) “A background of serious retardation in which islets of normal, near normal or exceptional intellectual function or skill may appear” (Creak, 1961, p.502).

In 1978, when there was much confusion about what set of criteria should constitute the disorder termed ‘autism’, Rutter laid out criteria based on research findings. The four criteria are “(1) an onset before the age of 30 months, (2) impaired social development that has a number of special characteristics and is out of keeping with the child’s intellectual level, (3) delayed and deviant language development that also has certain defined features and is out of keeping with the child’s intellectual level, and (4) insistence on sameness, as shown by stereotyped play patterns, abnormal preoccupations, or resistance to change” (Rutter, 1978, p. 156). This development was significant because Rutter was the first to use research to develop valid and specific diagnostic criteria that differentiated autism from other childhood disorders. Rutter strongly urged other researchers to use the four criteria to define their samples as well, so as to ensure comparability across studies. He also insisted that Intelligence Quotient (IQ) level and neurological or medical status be taken into account when describing cases of autism (Rutter, 1978).

It is clear that the definition of autism has changed and evolved over the years. In 1952, the first edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM) was published, and since then there have been five revisions. Many of these revisions have included changes to the definition of autism, along with the inclusion of Asperger’s disorder and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) as disorders within the autism spectrum. The current definition of ASD, including the diagnostic criteria in the current version of the DSM is outlined below.

## Current Definition of Autism

According to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition – Text Revision* (DSM-IV-TR; American Psychiatric Association [APA], 2000), Pervasive Developmental Disorder (PDD) is characterized by severe and pervasive impairment in several areas of development, including reciprocal social interaction skills, communication skills, and the presence of stereotyped behavior, interests, and activities. Disorders that fall into this category include Autistic Disorder, Rett’s Disorder, Childhood Disintegrative Disorder, Asperger’s Disorder, and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS). PDDs are often referred to as autism spectrum disorders (ASDs) in current literature. For purposes of this paper, the term ASD will be used to refer to the group of disorders along the autism spectrum. ASD is known for deficits in a triad of impairments—social interaction impairments, communication and language impairments, and behavior abnormalities. These impairments will be summarized in this section, followed by current DSM-IV-TR criteria for the three most common disorders in the autism spectrum (Autistic disorder, Asperger’s disorder, and PDD-NOS).

Social Interaction. Abnormal socialization is said to be the primary deficit in ASD (Schopler & Mesibov, 1986). Impairments in social interaction typically begin with a lack of eye contact with caregivers as an infant (Rutter, 1978). There is also often a lack of attachment behavior especially seen in the first five years. For example, children with ASD may fail to seek their parents for physical comfort, and do not often enjoy spending time with their parents (Mauk, Reber, & Batshaw, 1997; Rutter, 1978; Volkmar, Carter, Grossman, & Klin, 1997). Children with ASD do not often form friendships with others (APA; 2000; Mauk et al., 1997; Volkmar et al., 1997). Typically younger children seem ‘aloof’ and lack a desire for friendship,

but often as children get older, they may want friends but may lack knowledge of social conventions (APA, 2000; Howlin, 1986; Volkmar et al., 1997). Children with ASD often fail to engage in spontaneous seeking to share enjoyment with others (APA, 2000; Mauk et al., 1997). Normal children are excited about showing achievements and pointing out things to others, but this is not seen in children with ASD. Also, a lack of social or emotional reciprocity is typically present (APA, 2000). Children with ASD often fail to perceive other people's feelings (Rutter, 1978). They also prefer solitary activities and do not engage in social games with others (APA, 2000; Rutter, 1978).

Communication and Language. Communication impairments in ASD involve both verbal and nonverbal language. The ability to use nonverbal language such as eye contact, gestures, and body posture is severely impaired (Mauk et al., 1997; Rutter, 1978). Children with ASD often fail to engage in imitation behaviors that typically precede language as well (APA, 2000). There is often a delay in language development or sometimes language may never develop at all (Mauk et al., 1997; APA, 2000; Rutter, 1978). Pronoun reversal is quite common in ASD (Howlin, 1986; Mauk et al., 1997). That is, a child with ASD may use the word 'you' when he is referring to himself. Speech may be idiosyncratic or repetitive, and often an inability to sustain a conversation with others is present (APA, 2000; Kanner, 1943). That is, the language that children do acquire is often nonfunctional and is simply repeating what they have heard previously (Mauk et al., 1997; Rutter, 1978).

Behavior. Stereotyped patterns of behavior may include a strict adherence to rituals and routines, as well as stereotyped movements, and an abnormal attachment to certain objects (APA, 2000; Mauk et al., 1997). Children with ASD often focus on parts of objects, such as spinning the wheels on a toy truck. Another common behavior is lining up objects or toys in

organized rows (Mauk et al., 1997). Behaviors such as hand-flapping, clapping, rocking, and spinning are often seen in these children (APA, 2000). These behaviors are especially common in children who also have an intellectual disability (Mauk et al., 1997). Nonfunctional routines are often observed, such as having to sit in the same place at dinner or use a special fork to eat. Small changes in these routines are not tolerated well by children with ASD (Rutter, 1978; Kanner, 1943). Also common is abnormal attachment to objects such as a particular belt that has to be worn all the time or carrying around a piece of string (Mauk et al., 1997; Rutter, 1978).

Co-occurring Conditions. Children with ASD have an increased risk for having other developmental disabilities (Fein, Robins, Liss & Waterhouse, 2001; Mauk et al., 1997). Intellectual disability (ID) is common in children with ASD; sources estimate between 50%-75% of children with ASD are also intellectually disabled (Fein et al., 2001; Mauk et al., 1997). When ASD is comorbid with ID or other developmental disabilities, there is a greater risk for more severe social skills deficits (Matson, Dempsey, Lovullo, & Wilkins, 2008). In order to meet criteria for ID, an individual must display significant limitations in both intellectual ability and in adaptive behavior (American Association on Mental Retardation, (AAMR) 2002). Adaptive behavior limitations are expressed in three areas—conceptual, practical, and social adaptive skills (AAMR, 2002). Because social functioning is impaired in both ID and ASD, it is clear that children with comorbid ASD and ID will have severe social skills deficits. Seizures are also common in children with ASD; an estimated 25% of children with ASD also have seizures (APA, 2000; Fein et al., 2001). Sometimes, though not as often as is commonly believed, special skills or restricted areas of higher functioning are present in children with ASD. For example, a four-year-old girl with autism may be able to “decode” written materials with little

understanding of the meaning of what is read, or a ten-year-old boy may have a prodigious ability to calculate dates (APA, 2000). Probably the most famous example of having unusual skills is exemplified in the mathematical abilities of people like Raymond Babbitt, the main character in the movie *Rainman*. Little is known about the biological origin of these skills (Mauk et al., 1997).

Numerous behavioral abnormalities are associated with ASD. Hyperactivity, short attention span, impulsivity, aggressiveness, self-injurious behaviors, and temper tantrums are examples of behaviors that commonly occur alongside ASD (APA, 2000; Mauk et al., 1997, WHO, 2007). Children with ASD also have unusual responses to sensory input. For example, children with ASD may display a high threshold for pain, oversensitivity to sounds or being touched, exaggerated reactions to light or smells, or fascination with certain stimuli (APA, 2000). Problems with sleeping and eating are also common to this particular population (APA, 2000; Kanner, 1943; WHO, 2007).

Autistic Disorder. For a DSM-IV-TR diagnosis of Autistic disorder to be given, two impairments in the area of social interaction must be present and at least one impairment each in the areas of communication and restricted repetitive and stereotyped patterns of behavior must be present. A total of six impairments from the three areas of impairment are also required. Included in the criteria for social interaction impairment are 1) impairment in multiple nonverbal behaviors; 2) failure to develop peer relationships (appropriate to developmental level); 3) lack of spontaneous seeking to share enjoyment, interests, or achievements; and 4) lack of social and/or emotional reciprocity. Included in the criteria for communication impairments are 1) delay in or lack of development of spoken language; 2) a marked impairment in ability to initiate or sustain a conversation with others; 3) idiosyncratic or stereotyped and repetitive language; and

4) a lack of spontaneous make-believe play or social imitative play. Included in the criteria for restricted repetitive and stereotyped patterns of behavior are 1) preoccupation with at least one stereotyped and restricted patterns of interest that is abnormal in either intensity or focus; 2) inflexible adherence to nonfunctional routines or rituals; 3) stereotyped and repetitive motor mannerisms; and 4) preoccupation with parts of objects. Delays or abnormal functioning in these areas must be present before 36 months of age. The age requirement for Autistic disorder has been supported by research (Buitelaar, Van der Gaag, Klin, & Volkmar, 1999). Further, when the age requirement is not met for Autistic disorder, clinicians will often give a PDD-NOS diagnosis instead (Towbin, 1997).

Asperger's Disorder. In order for a DSM-IV-TR diagnosis of Asperger's disorder to be given the following criteria must be met: 1) impairment in social interaction, shown by at least two of the following: a) impairment in nonverbal behaviors; b) failure to develop developmentally appropriate peer relationships; c) lack of spontaneous seeking to share enjoyment, interests, or achievements with other people; or d) lack of social and/or emotional reciprocity; 2) restricted repetitive and stereotyped patterns of behavior as manifested by at least one of the following: a) preoccupation with one or more stereotyped and restricted patterns of interest with abnormality in either intensity or focus; b) inflexible adherence to nonfunctional routines or rituals; c) stereotyped and repetitive motor mannerisms; or e) persistent preoccupation with parts of objects. A disturbance causing clinically significant impairment in social, occupational, or other important areas of functioning is also required for an Asperger's disorder diagnosis. In addition, no significant delay in language, cognitive development, or in the development of age-appropriate self-help skills, adaptive behavior, and curiosity about his/her environment may be present.

PDD-NOS. Unlike the other ASDs, the DSM-IV-TR is less clear about the diagnostic criteria that must be met for PDD-NOS. This diagnosis should be given when a severe and pervasive impairment is present in the development of reciprocal social interaction associated with impairment in either verbal or nonverbal communication skills or the presence of stereotyped behavior, interests, and activities. Criteria for a specific PDD must not be met or other disorder such as Schizophrenia, Schizotypal Personality Disorder, or Avoidant Personality Disorder. PDD-NOS may be given when criteria for Autistic disorder are not met due to late age of onset, atypical symptomatology, or subthreshold symptomatology (APA, 2000).

Since there is a lot of overlap between the disorders in the autism spectrum, it can often be difficult for a clinician or researcher to differentiate between these disorders. However, research of the disorders within the spectrum has found some criteria that allows for differential diagnosis to be performed. This criterion is outlined in the section below.

#### Differential Diagnosis of Autism Spectrum Disorder

As previously stated, Autistic disorder is part of a category of disorders called Pervasive Developmental Disorders (APA, 2000). This group of disorders is often thought of as part of a spectrum of disorders, which vary according to the degree of disability. The three most common disorders on this spectrum are Autistic disorder, Asperger's disorder, and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS). Therefore, for the purposes of this study, this section will focus on these three disorders.

Asperger's disorder is characterized by qualitative impairment in social interaction and restricted repetitive and stereotyped patterns of behavior, interests, and activities (APA, 2000).

In differentiating Asperger's disorder from Autistic disorder, the focus is mostly on what is *not*



present rather than what is present. Two criteria that must be met for a diagnosis of Asperger's disorder underscore this point. First, no clinically significant general delay in language should be noted. Second, no clinically significant delay in cognitive development or in the development of age-appropriate self-help skills, adaptive behavior (other than in social interaction), and curiosity about the environment in childhood (APA, 2000). Also, the restricted repetitive and stereotyped patterns of behavior, interests, and activities in Autistic disorder are often manifested as a preoccupation with parts of objects, the presence of motor mannerisms, a significant distress in change, and an obsession with rituals. Conversely, with Asperger's disorder this criterion is seen in the all-encompassing pursuit of a circumscribed interest. This pursuit often involves a topic to which the person devotes excessive amounts of time gathering information and facts. As for the difference in social interaction, individuals with Autistic disorder have patterns of social interaction that are marked by self-isolation or markedly rigid social approaches. However in Asperger's disorder, there is often motivation to approach others, although this may be done in a highly eccentric, one-sided, verbose, and seemingly insensitive manner. In contrast to Autistic disorder, mental retardation is typically not observed in Asperger's disorder, although occasionally mild mental retardation is seen (APA, 2000). There is also no age of onset criteria for Asperger's disorder, whereas in Autistic disorder delays or abnormal functioning in either social interaction, language as used in social communication, or symbolic or imaginative play must be present prior to 3 years of age (APA, 2000; WHO, 2007). Prior to the release of *The Diagnostic and Statistical Manual of Mental Disorders-IV* (DSM-IV), Asperger's disorder was not viewed as a distinct disorder, but instead these individuals would have likely been included in diagnoses of Childhood Onset Pervasive Developmental Disorder (COPDD) or Atypical PDD in *The Diagnostic and Statistical Manual of Mental Disorders-III* (DSM-III) or PDD-NOS in

*The Diagnostic and Statistical Manual of Mental Disorders-III-Revised* (DSM-III-R) (Towbin, 1997; Volkmar, Klin, & Cohen, 1997).

PDD-NOS, even more so than Asperger's disorder, is typically characterized for what it *is not* rather than what it is (Matson & Boisjoli, 2007). A diagnosis of PDD-NOS is often given when the age of onset criteria for Autistic disorder is not met (APA, 2000; Towbin, 1997; WHO, 2007). Children diagnosed with PDD-NOS may or may not be intellectually disabled and may or may not have language deficits (Towbin, 1997). As previously stated, PDD-NOS became a distinct category with the introduction of DSM-III-R (Volkmar et al., 1997). Prior to DSM-III-R, individuals currently diagnosed with PDD-NOS would have been included in the diagnosis of Atypical PDD or possibly COPDD (Volkmar et al., 1997). PDD-NOS is often viewed as a "catch all" for children who meet some but not all of the criteria for Autistic disorder (or another PDD) (Tidmarsh & Volkmar, 2003; Towbin, 1997; Volkmar et al., 1997). As can be seen by the aforementioned description of PDD-NOS, the boundaries are not clearly defined (Towbin, 1997; Matson & Boisjoli, 2007).

Assessment is important for differentiated disorders within the autism spectrum from other disorders. Many diagnostic measures have been created for this very purpose. Typically the instruments that have been the most researched are regarded as the best for diagnostic purposes. A review of many of these instruments is included in the following section.

#### Diagnostic Assessment for Autism Spectrum Disorders

In 1964, Rimland created the first diagnostic instrument for autism, *Rimland's Diagnostic Checklist for Behavior*. The measure consisted of 76 questions as well as supplementary information on the mother's pregnancies. Each question had a number of answer choices of

which the caregiver would indicate which one best answered the question for the child. The checklist gathered information about the pregnancy and delivery, problems in infancy, developmental milestones, use of language, social skills, and background information on the parents (as it was previously believed that the parents of children with autism had common characteristics such as being very orderly and very well-educated) (Rimland, 1964). The measure had set answers that were said to be indicative of autism and those that were said to be indicative of schizophrenia. Since this instrument was introduced, the qualifications of ASD have also changed, and thus the assessment measures have changed and developed as well. Currently, there are a number of scales and screeners developed to assess for ASD in children. Some of these ASD diagnostic measures are outlined below.

The *Childhood Autism Rating Scale (CARS)* is one of the most used measures for diagnosing autism in children (Schopler, Reichler, DeVellis, & Daly, 1980; Schopler, Reichler, & Renner, 1988). This measure consists of 15 subscales, including relating to people; imitation; emotional response; body use; object use; adaptation to change; listening response; taste, smell, and touch response and use; fear or nervousness; verbal communication; nonverbal communication; activity level; level and consistency of intellectual response; and general impressions. The rater is instructed to rate the child on a scale from 1 to 4, with '1' being normal or age-appropriate behavior and '4' being severely abnormal. The total score on this measure ranges from 15 to 60. Individuals in the 15-29 range are considered non-autistic; those in the 30-36 range are considered mildly to moderately autistic; and those in the 37-60 range are considered severely autistic. The CARS is a reliable instrument, with a .94 coefficient alpha for internal consistency and an average interrater reliability of .71. The validity of this instrument is also good, with a correlation of .80 between the CARS and independent clinical assessments by a

psychiatrist or psychologist (Schopler et al., 1980). Important to note is that due to the CARS development prior to the release of DSM-IV-TR, this instrument does not exactly match up with DSM-IV-TR criteria.

The *Autism Diagnostic Interview-Revised* (ADI-R) is another widely used instrument for diagnosing autism (Lord, Rutter, & Couteur, 1994). The revised version was shortened to increase ease of clinical use, and was also changed to include children under the age of 5 years. The ADI-R consists of five sections, including opening questions; questions on communication (both early and current); social development and play (both early and current); repetitive and restricted behaviors (scored for both current and ever judgments); and a smaller number of questions concerning general behavior problems. According to the authors, the ADI-R can be completed in approximately 1.5 hours for a 3 or 4-year-old suspected of having autism and slightly longer for an older child (Lord et al., 1994). This instrument is in the form of an interview that a clinician experienced in diagnosing autism administers to a parent or caregiver. The revision also has items that are in line with DSM-IV/ICD-10 criteria. Inter-rater reliability is good, with a range from .63 to .89 (Lord et al., 1994). While this instrument has good psychometrics, one of its biggest downfalls is the length of time it takes to administer.

The *Autism Spectrum Disorder-Diagnostic for Children* (ASD-DC) was created by Matson and Gonzalez (2007) as a scale designed to measure Autistic Disorder, PDD-NOS, and Asperger's Disorder. It is part of a battery that also assesses for comorbid disorders and challenging behavior in children with Autism Spectrum Disorders (ASD). A parent/caregiver completes the assessment measure by comparing the child of interest to children his/her age for each item. The scale consists of 40 items, which are rated on a scale of 0, 'not different; no impairment', to 2 'very different; severe impairment', with 1 being 'somewhat different; mild

impairment' (Matson & Gonzalez, 2007). This scale has excellent internal consistency (.99), good inter-rater reliability (.67), and excellent test-retest reliability (.77) (Matson, Gonzalez, Wilkins & Rivet, 2008). Endorsements on the ASD-DC are highly correlated with DSM-IV-TR/ICD-10 checklist based endorsements. These findings support the ASD-DC as a valuable diagnostic tool for differential diagnosis and classification of ASD. Further research will be conducted to create empirically derived cut offs to differentiate between ASDs (Matson et al., 2008).

Another instrument used to aid in diagnosis of ASD is the *Autism Diagnostic Observation Schedule-Generic* (ADOS-G; Lord et al., 2000). The ADOS-G is a semistructured assessment of social interaction, communication, play, and imaginative use of materials (Lord et al., 2000). The observational schedule consists of four 30-minute modules, based upon the individual's level of expressive language. The domains assessed in this measure include Social, Communication, Stereotyped Behaviors and Restricted Interests, and a total for Social and Communication. Each module has a set of activities (ranging from 10-15 activities) and accompanying ratings. The assessment is scored on a 3-point scale from 0 'no evidence of abnormality related to autism' to 2 'definite evidence'. Some items can be scored 3 to indicate that abnormalities are at a level of severity that interfere with the observation (Lord et al., 2000). This instrument has good psychometric qualities (Lord et al., 2000). Internal consistency estimates are high for the Social-Communication totals, with Cronbach's alpha ranging from .91-.94. Interrater agreement for autism versus nonspectrum comparisons ranges from 90% to 100% across modules. Test-retest reliability is excellent with a .82 correlation for the Social-Communication total (Lord et al., 2000). Lord and colleagues (2000) note that results from this instrument should be combined with history and parent report information to give an accurate

clinical diagnosis, as the measure itself gives either a diagnosis of autism or ASD (indicating that a disorder falls in the autism spectrum but is not severe enough to meet the criteria for autism; i.e. PDD-NOS, Asperger's disorder).

Diagnostic instruments all have their strengths and weaknesses. However, as can be seen from the summary above, few if any measures truly differentiate disorders within the autism spectrum. Specifically, few instruments support PDD-NOS as a separate disorder. Despite this, there is some research that shows that PDD-NOS can be differentiated from other disorders.

#### Pervasive Developmental Disorder Not Otherwise Specified

As previously stated, treating PDD-NOS as a separate category within ASD has been largely neglected in the literature (Matson & Boisjoli, 2007; Mayes et al., 1993). The distinction of PDD-NOS as a separate category came about with the DSM-III-R in 1987. Also of note is that prior to the DSM-IV (1994) Asperger's disorder was not a separate category, therefore some children now classified as having Asperger's disorder would have been classified as PDD-NOS before the introduction of the DSM-IV (Towbin, 1997). Based on diagnostic instruments, it is obvious that differentiation within ASD is not clear. Few diagnostic instruments have set criteria for a diagnosis of PDD-NOS, but rather have distinctions such as 'possible ASD' or 'moderately autistic' (Matson & Gonzalez, 2007; Schopler et al., 1980). Also, due to the lack of clear criteria for a PDD-NOS diagnosis, some have argued that the label could be liberally applied to a number of children, most of which might be better classified as having a language disorder, Attention Deficit Hyperactivity Disorder (ADHD), or other childhood disorder (Buitelaar, Van der Gaag, Klin, & Volkmar, 1999; Towbin, 1997). Despite these difficulties, a limited amount

of studies have attempted to differentiate PDD-NOS from other ASD or other childhood disorders. Some of these studies will be discussed in this section.

In order to understand the difference between diagnoses of autism versus those of PDD-NOS, an exploration of the boundaries of PDD-NOS was performed, analyzing data from the DSM-IV autistic disorder field trial (Buitelaar et al., 1999). This study focused on individuals with an IQ greater than 50 and was comprised of 205 subjects with a diagnosis of autism, 80 with a diagnosis of PDD-NOS, and 174 with non-PDD conditions. Of the non-PDD group, 43 had an intellectual disability and 80 had language disorders. Investigators also compared diagnoses of autism and PDD-NOS across the DSM-III-R, ICD-10, and the DSM-IV. The authors differentiated autism and PDD-NOS by looking at which symptoms from the DSM-IV were endorsed for each group. It was found that in “true” autism, the social interaction symptoms were present in 90% or more cases, communication symptoms in 70% or more cases and activities and interests domain symptoms in at least 60% of cases. However, in the PDD-NOS group, only three symptoms were indicated in 60% or more cases. These included lack of reciprocity, failure to develop peer relationships, and impairment in conversation. Symptoms in the restricted interest and activities domain were rarely present in children with PDD-NOS. The most common symptom within the restricted interests and activities domain was stereotyped motor mannerisms, accounting for 24% of the participants. Also of interest was that 80% of the PDD-NOS cases had an onset of symptomatology prior to age 3, whereas 100% of autism cases had onset prior to 3 years of age (because it is part of the defining criteria for true autism). Buitelaar (1999) and colleagues noted that based on the results of this study, PDD-NOS appears to be a more heterogeneous category than true autism.

The results of this study seem to render some support to the idea that PDD-NOS is simply a lesser variant of autism, however the authors note that more research needs to be done in this area. In an effort to help further differentiate PDD-NOS from autism and from other non-PDD disorders, the authors developed a scoring rule to diagnose PDD-NOS based on the information gathered in their research (see Buitelaar et al., 1999).

In 2006, a study was conducted to investigate the differences between children and adolescents with autism and PDD-NOS in terms of behavioral and emotional functioning (Pearson, Loveland, Lachar, Lane, Reddoch, Mansour & Cleveland). In this study, investigators predicted that children and adolescents with more severe autism would have a greater risk for adverse psychological and developmental effects resulting from stressors and negative life events (Pearson et al., 2006). This is due to the likelihood that children and adolescents with more severe autism might be less able to cope effectively with these stressors. More specifically they predicted that children with autism would have higher levels of depression, social withdrawal, and atypical behaviors than their peers with PDD-NOS. Measures used in this study include the Personality Inventory for Children-Revised (PIC-R), intelligence tests, including the *Stanford-Binet, 4<sup>th</sup> Edition* as well as different versions of Wechsler intelligence tests, and the CARS.

Initial findings from this study indicate that the children with autism had significantly more difficulties with overall behavioral adjustment (as assessed by the PIC-R) than the children with PDD-NOS (Pearson et al., 2006). More specifically, it was found that in comparison to children with PDD-NOS, children with autism had significantly more severe symptoms of social withdrawal, social skills deficits, atypical behaviors, and social withdrawal. However, children with autism had fewer family problems than those children with PDD-NOS (twice as many families in the PDD-NOS group indicated this). There were no significant differences between



autism and PDD-NOS with regards to somatization, delinquency, anxiety, or hyperactivity, as measured by the PIC-R. It is interesting to note, however that more than 50% of the children in each group showed clinically significant levels of depression. Also, more than a half of the children in the PDD-NOS group and more than a third of the children in the autism group displayed clinically significant levels of anxiety. It was found that in both groups, severity of autistic symptomatology, as measured by the CARS, was not correlated with an increased risk for behavioral or emotional problems. The overall findings in this study indicate that even though both children with autism and those with PDD-NOS have a high risk for a variety of psychiatric and social problems, children with autism had a greater risk for depression, social withdrawal, atypical behaviors, and social skills problems (immature social development), as well as a lower risk for family problems. This result was found even when differences in intellectual abilities were taken into account. The authors state that this finding suggests that the diagnostic groups (autism vs. PDD-NOS), as opposed to severity of developmental delay, may predict different risk patterns for psychopathology (Pearson et al., 2006).

In 1993, an investigation was conducted in an effort to differentiate PDD-NOS from autism and language disorders (Mayes, Volkmar, Hooks, & Cicchetti). The researchers put together a list of 80 potential items from DSM-III-R criteria for autistic disorder, ICD-10 Draft Research Criteria for childhood autism, the Autism Behavior Checklist (ABC), and the Vineland Adaptive Behavior Scales (VABS). These items were selected based on their clinical relevance to one of six broad areas: (a) Social Problems; (b) Communication Problems; (c) Deviant Responses to the Environment; (d) Affective Symptoms; (e) Movement Problems; and (f) Thought Problems. The items could each be rated as never exhibited, currently present, present in the past only, or not applicable (Mayes et al., 1993). Out of the 80 potential items, 24 were

chosen that had both good interrater reliability and also discriminated between the three diagnostic groups. Twenty-one of these items were found to significantly distinguish children with PDD-NOS from those with a language disorder and 7 items significantly distinguished children with PDD-NOS from those with autism. It was noted that none of the items from the thought problems category were significantly discriminative (Mayes et al., 1993).

After narrowing down the 24 items that had good interrater reliability and discriminated the three diagnostic groups, these items were used in a replication sample. Results from this study found that the average scores for the PDD-NOS cases fell between those of the autism and language disorder groups on all comparisons. In trying to determine if there were specific items that discriminated the groups, it was found that for comparing PDD-NOS vs. autism, the item related to abnormal comfort seeking was the most robust single predictor. For comparing PDD-NOS vs. language disorders, the most robust single predictor was the item related to inability to make friendships. Overall, the authors reported that the items related to degree of socialization and relatedness best differentiated children with PDD-NOS from those with autism. More specifically, children with PDD-NOS displayed less severe disturbances in relatedness. Compared to children with language disorders, children with PDD-NOS displayed more difficulties with social relatedness and the need for routines and order. The investigators also found that when signal detection procedures were used to create cut-off scores for the different disorders, the scale for differentiating cases of PDD-NOS from language disorder was more robust than the scale for discriminating cases of PDD-NOS from autism (Mayes et al., 1993). As noted, this result is not surprising because one would expect children with PDD-NOS to be more closely related to those with autism than to those with language disorders.

In 1999, Njardvik, Matson, and Cherry compared social skills in adults with autism, PDD-NOS, and mental retardation. The investigators used the CARS to differentiate autism and PDD-NOS. They also used the DSM-IV to classify intellectual disability (ID), Autism, and PDD-NOS. In order to assess social skills, the Socialization domain of the *Vineland Adaptive Behavior Scales (VABS)* and *Matson Evaluation of Social Skills in the Severely Retarded (MESSIER)* were administered. This investigation produced three main findings: 1) The autism group displayed greater deficits in adaptive social skills based on scores from the Socialization domain of the VABS and two subscales of the MESSIER; 2) The PDD-NOS group displayed more adaptive social skills than the autism group on the Positive Nonverbal subscale of the MESSIER; and 3) The PDD-NOS group could not be differentiated from the ID-only group on any of the measures administered (VABS or MESSIER) (Njardvik et al., 1999).

In this study significant results were found between the autism group and the intellectual disability group on the Social Domain of the VABS (Njardvik et al., 1999). Also, on the General Positive subscale of the MESSIER, the only significant difference found was between the autism group and the ID group, with the autism group displaying greater deficits in positive social skills. On the Positive Nonverbal subscale of the MESSIER, differences were significant between the autism group and the ID group as well as between the autism group and the PDD-NOS group. The overall results from this study indicate that adults with [ID] displayed significantly more adaptive social skills than adults with Autistic disorder and adults with PDD-NOS were not significantly different from adults with [ID] on any measure used (Njardvik et al., 1999).

Roeyers, Keymeulen, and Buysse (1998) conducted a study to differentiate attention-deficit/hyperactivity disorder (ADHD) from PDD-NOS. This study focused on the first four years of life in distinguishing the two disorders, and it also examined pre-, peri-, and neonatal

complications. For the purposes of this experiment, the researchers developed a questionnaire based on various instruments and criteria. The questionnaire had two parts—the first part contained 11 questions on pregnancy complications and 13 questions on birth complications. The second part of the questionnaire consisted of 111 items that fell under one of 12 broad categories. These categories were feeding, sleeping, toilet training, activity level, communication, motor development, social behavior information processing, behavior problems, play, stereotypic behaviors, and anxiety. These behaviors were assessed at 6 different age ranges—0 to 3 months; 4 to 6 months; 7 to 12 months; 13 to 24 months; 25 to 36 months; and 37 to 48 months.

Results of this investigation found no differences between children with PDD-NOS and ADHD with regard to complications during pregnancy or birth. The one exception to this finding was the extremely loud crying of children with ADHD immediately after birth. In the 7-12 month age range, children were best diagnostically classified. That is, children who were thought to be ADHD rather than PDD-NOS at age 7-12 months were later confirmed to have an ADHD diagnosis and children who were thought to be PDD-NOS rather than ADHD at 7-12 months of age were later confirmed to have a PDD-NOS diagnosis. During the 7-12 months age range, children with ADHD were distinguished from those with PDD-NOS in that the children with ADHD had a higher activity level. However, as they got older the PDD-NOS children became increasingly more active, and this difference largely disappeared. The differences in overall symptom presentation found between the two groups became more pronounced as the children got older. Overall, children with PDD-NOS had more problems (i.e., behavior problems, unresponsive to social stimulation, motor tics, anxiety, lacking symbolic play) than their matched peers with ADHD. Parents also noticed symptoms earlier in the PDD-NOS group.

Social impairments were found to be evident in most of the children with PDD-NOS even before 12 months of age (Roeyers et al., 1998).

As outlined above, some research has been conducted to differentiate PDD-NOS from other disorders, including those within the spectrum of PDDs. Based on the results from some of the above-mentioned studies, there seems to be some evidence to suggest that PDD-NOS is in fact a separate disorder within ASD/PDD and can be distinguished from other childhood disorders (e.g., autism, language disorders, ADHD). However, more research is indeed needed in this area.

### Social Skills

It has been noted that social skills deficits are a primary feature of ASD (Schopler & Mesibov, 1986; Kanner & Eisenberg, 1956; Wing & Gould, 1979). Social skills can be defined as behaviors that allow a child to interact with others successfully (Gresham & Elliot, 1984). Howlin (1986) suggests that social behavior is “the ability to relate to others in a mutually reinforcing and reciprocal fashion and to adapt social skills to the varying demands of interpersonal contexts” (p. 103). It is basically understood that social skills are an important part of healthy psychological functioning. Just as in Piaget’s stages of cognitive development, social development can be thought of in terms of stages that build upon each other and occur in a sequence in which earlier social competencies are necessary for the development of later social competencies (Dawson & Galpert, 1986; Sroufe, 1979). Thus, the social skills deficits seen in children with ASD likely involve those basic social competencies that are necessary for the normal patterns of social interaction to be established. In the following section a brief overview of typical social skills in normal children and social skills deficits in ASD will be presented.

Typical Children. Normal children come into the world with the motivation and ability to begin immediately establishing a social relationship with their caregivers (Volkmar et al., 1997). Some of the key social skills that aid in normal development involve imitation, nonverbal behaviors, and play (Dawson & Galpert; Sutton-Smith, 1976).

Imitation is important in social development and is one of the most studied patterns of parent-infant interaction. It serves the function of shared mutuality (Dawson & Galpert, 1986). Imitation is considered an important basis for speech development (Schopler, Reichler, & Renner, 1988). Imitation is also a skill that is necessary for education of younger children (Schopler, Reichler, & Renner, 1988).

Nonverbal behaviors, such as eye contact, are important in early development as well (Santrock, 2004). Eye contact is crucial because it is the first mode of communication between an infant and his caregiver (Volkmar, Carter, et al., 1997). Smiling is another mode of communication between an infant and his caregiver. Smiling in response to specific stimuli (typically faces) begins around 2-3 months of age (Santrock, 2004).

A substantial amount of peer interaction in childhood involves play (Santrock, 2004). Play skills typically develop in the first two years of life (Volkmar, Carter, et al., 1997). Infants as young as 6-10 months demonstrate behaviors that include offering and exchanging toys, physical imitation using toys, and mutual object manipulation (Stone & La Greca, 1986). Play increases the chance that children will interact with each other, which serves to advance basic social skills. Also, play is a means by which children can safely explore and seek out new information (Santrock, 2004).

Children with ASD. Abnormal social patterns are seen from the beginning of life in children with ASD (Rutter, 1978; Kanner, 1943; Volkmar, Carter et al., 1997). Kanner (1943) describes children with ASD as having “an extreme autistic aloneness” from very early in life (p. 242). Some deficits in social functioning in ASD involve nonverbal behaviors, imitation, and play.

A lack of nonverbal behaviors in children with ASD is evidenced as early as the first months of life, as they may fail to develop the social smile and reciprocal eye contact (Volkmar, Carter, et al., 1997). Abnormal eye gaze patterns in children with autism are said to be the social deficit that receives the most attention by researchers (Dawson & Galpert, 1986). Children with autism often fail to make eye contact (APA, 2000; Rutter, 1978). Joint attention behaviors tend to be absent, in that children with ASD do not point out things that interest them as normal children do (Volkmar, Carter, et al., 1997). This behavior typically displayed around 6-9 months in normally developing children, but is often absent in children with ASD. Often they do not engage in this behavior or respond to others engaging in this behavior (Mundy, Sigman, Ungerer, & Sherman, 1986). The absence of joint attention is often seen as a precursor to other more pronounced social deficits in ASD (Matson, J., Matson, M., & Rivet, 2007).

Imitation skills in children with autism are often deficient in comparison to normally developing peers. In one study, children with autism showed significantly less nonverbal and verbal imitation than intellectually disabled or normal children (Ungerer & Sigman, 1981). Another study found that children who did not develop language by age 5 often had more impaired vocal and motor imitation skills (Thurm, Lord, Lee, & Newschaffer, 2007). Stone and colleagues (1990) found that children with autism showed significantly lower imitation skills than any control group. They also found that imitation was the best measure for discriminating

children with autism from those without autism (Stone, Lemanek, Fishel, Fernandez, and Altemeier, 1990). Children with autism are also less likely to engage in spontaneous imitation of their parents' actions and show little ability for reciprocal social play (Volkmar, Carter et al., 1997).

Children with autism often do not engage in cooperative play, display very little reciprocity in their relationships with other children, and spend a lot of time unoccupied or involved in stereotyped activities (APA, 2000). Play behavior may involve spinning the wheels on a toy truck or lining up toys in organized rows (APA, 2000). Also, children with autism typically do not engage in pretend play and often fail to display interest in forming friendships (Mauk et al., 1997). Sometimes higher-functioning children on the autism spectrum may develop an interest in forming friendships, but they may lack the social conventions to do so (Howlin, 1986; APA, 2000). One study found that even within children with ASD, those who had a secure attachment with caregivers had better play outcomes, such as development of 'social play' behavior (Naber et al., 2008). A study by Williams and colleagues (2001) found that children with autism spent most of their play time involved in simple acts (moving a car along the ground, bringing a cup to their mouths), rather than the more elaborate functional play that was displayed by typically-developing children and children with Down's Syndrome.

Some of the specific social skills targeted for children with ASD in treatment include behaviors such as eye contact, appropriate speech content (e.g., saying please and thank you, etc.), adequate number of spoken words, appropriate motor movements, appropriate intonation of speech, fewer verbal disruptions, adequate number of interactions with others, and appropriate facial affect (Matson, Kazdin, & Esveldt-Dawson, 1980). Many of these behaviors involve the use of speech, so there appears to be overlap between communication and social deficits in ASD



(White, Koenig & Scahill, 2007). This overlap is typically reflected in rating scales that measure social skills in children (Matson, 1990).

## Assessment

In order to be able to treat some of the social deficits that are associated with autism, it is important to assess the social skills to be targeted. Matson, Matson, and Rivet (2007) note that often when social skills behaviors are targeted for treatment, no rationale exists for the behaviors chosen. They suggest that targeted skills be identified more systematically and then ranked based on ease of training the specific skill and its importance to the child's improved adaptive ability (Matson et al., 2007). The most common methods used to assess social skills in children include checklists and rating scales and role-play tests (Matson & Wilkins, 2007). However, a study by Van Hasselt, Hersen and Bellack (1981) found low correlations between role-play tests compared to sociometric ratings, teacher ratings, and observations of behavior in naturalistic settings. Other researchers have also found that role-play tests were not consistently correlated with teacher or child evaluations of social skills (Matson, Esveltd-Dawson, & Kazdin, 1983). Therefore, this section will focus on ratings scales used to assess social skills. The two rating scales outlined in this paper are *The Social Skills Rating System (SSRS)* and *The Matson Evaluation of Social Skills with Youngsters (MESSY)*.

The *Social Skills Rating System (SSRS)* was developed by Frank Gresham and Stephen Elliot in 1990. This scale has three forms - a teacher form, a parent form, and a student form. The SSRS has three domains: social skills problem behaviors, and academic competence. For the teacher scale, the social skills domain has three subscales: cooperation, assertion, and self-control. The problem behaviors domain consists of three subdomains: externalizing problems,

internalizing problems, and hyperactivity (only at the elementary school level). The academic competence domain consists of nine questions that compare the academic and learning behaviors of the target child to other children in his or her classroom (this domain is only on the teacher rating scale).

The *Matson Evaluation of Social Skills for Youngsters* (MESSY) was developed by Johnny L. Matson, Ph.D, in 1981. The scale originally consisted of 92 items, which included both verbal and nonverbal behavior. However, the final version of the MESSY has 62 items on the self-rating scale and 64 items on the teacher rating scale (Matson, 1990). One of the characteristics unique to the MESSY includes providing both a teacher rating and self-rating version so as to get both perspectives. Furthermore, all items on this scale refer to observable behavior, assess social behaviors along scales for appropriate and inappropriate skills, and refer to social skills (Matson, 1990). The teacher report form produces two factors—Factor 1 is the Inappropriate Assertiveness/Impulsiveness scale, and Factor 2 is the Appropriate Social Skills scale. The MESSY can be used for the following purposes: identifying children with deficient social skills, assessing social skills for Individualized Education Plans (IEPs), evaluating the effects of intervention programs, evaluating social skills in children with handicaps, and evaluating educational programs, as well as scientific research. Norms for the MESSY include samples of children with visual or auditory handicaps as well as children who meet DSM-III criteria for an anxiety disorder (Matson, 1990).

## Purpose

In 1991, Matson, Compton, and Sevin conducted a study using the MESSY comparing children with autism and typical children. This study compared percentages of appropriate and inappropriate social skills between the two groups (typical vs. autism). An item-by-item analysis was used to evaluate which items were endorsed more or less by each group. Results of this study indicate a significant difference between the two factors for the autistic group as well as significant differences between the two groups (typical vs. autism). Investigators found that on the Appropriate Social Skills scale (factor 2), the normal group fell in the average-to-above range, whereas the autism group fell in the problematic to very problematic range (Matson et al., 1991).

The current study replicates and extends the study by Matson and colleagues (1991) by adding a third related group, children with PDD-NOS. This experiment is important for a number of reasons. One reason is that PDD-NOS as a separate category has received little attention in the literature to date (Matson & Boisjoli, 2007; Mayes et al., 1993). Because PDD-NOS is the most diagnosed ASD and the least studied, further research is warranted (Towbin, 1997). Social skills impairment is said to be the primary defining feature in ASD and therefore is an area that should receive a considerable amount of attention in the literature (Kanner & Eisenberg, 1956; Schopler & Meisbov, 1986). The results of this study are important in that they are expected to further differentiate PDD-NOS as a separate category within ASD, which in turn should help to strengthen diagnostic instruments. In order to aid in treatment planning, adequate diagnostic instruments are necessary. Social interaction impairment is the only area of impairment that is required for a diagnosis of PDD-NOS based on DSM-IV-TR criteria (impairment is also required in *either* communication *or* in the area of repetitive, restricted

interests, but not necessarily both) (APA, 2000). Because social interaction impairments are required for a diagnosis of PDD-NOS, this should be an area worthy of further investigation.

The overall prediction for this study is that there will be a significant difference between groups on overall social skills endorsed. Since the appropriate social skills are reversed scored and therefore higher overall scores are reflective of more maladaptive social skills patterns (higher inappropriate and lower appropriate), it is expected that the Autistic disorder group will display the highest overall score, followed by the PDD-NOS group, and then the normal control group. More specifically, it is expected that for appropriate social skills, the Autistic disorder group will have the lowest score and the control group will have the highest score, with the PDD-NOS group falling in between these groups. For inappropriate social skills, the Autistic disorder group is predicted to have the highest score, followed by the PDD-NOS group, while the control group is expected to display the lowest score on this factor. These hypotheses are based on previous research that has attempted to differentiate ASD, suggesting that PDD-NOS is a milder form of ASD compared to Autistic disorder (e.g., Buitelaar et al., 1999; Pearson et al., 2006; Mayes et al., 1993). Research and diagnostic criteria indicate that social skills impairments are a defining feature of ASD, therefore one would expect children with ASD (either Autistic disorder or PDD-NOS) to have greater social deficits than a control group. Results from this study are expected to help further differentiate PDD-NOS from Autistic disorder. This differentiation is important because it will help to strengthen diagnostic measures to differentiate disorders on the autism spectrum. Stronger diagnostic assessments and a greater understanding of differences between disorders on the autism spectrum may also lead to better treatment planning, which in turn would lead to a better prognosis in overall functioning for individuals with ASD.

## Method

### Participants

The children for this study were selected from multiple sources, including community organizations (daycare centers, dance studios, churches, etc.), schools, and outpatient clinics. The children were divided into three groups—those diagnosed with Autistic Disorder, those diagnosed with PDD-NOS, and those without an ASD diagnosis (the control group). The total number of participants chosen for this study was 48 (N=16 for each of the three groups specified above). The average age for the Autistic Disorder, PDD-NOS, and control groups reported in years was 6.50, 7.00, and 7.06, respectively. The differences in age were found to be not significant ( $F=.152$ ;  $p>.05$ ). Participants in this study had an IQ greater than 70, thus anyone with an intellectual disability was excluded.

For purposes of this study, diagnoses for the Autistic disorder and PDD-NOS groups were given based on meeting cut-off criteria on the DSM-IV/ICD-10 checklist (described below). For a PDD-NOS diagnosis, at least two criteria must be met in the social interaction impairment section and one in either the communication impairment section or restricted, repetitive interests section. For an Autistic disorder diagnosis, at least two criteria from the social interaction impairment section must be met and at least one from each of the other two areas (communication impairment and restricted, repetitive interests). A total of six criteria must be met for a diagnosis of Autistic disorder. Also, a delay in one of the three areas of impairment must be present before the age of three.

## Measures

*DSM-IV-TR/ICD-10 Checklist.* This measure is a composite checklist based on criteria for ASD from the DSM-IV-TR (APA, 2000), as well as criteria from the ICD-10 (WHO, 2007) that are not included in the DSM-IV-TR. The three areas of impairment in ASD are included on the checklist—social interaction impairment, communication impairment, and restricted, repetitive interests. The checklist contains 19 items total—5 items for social interaction impairment, 7 items for communication impairment, 6 items for restrictive, repetitive interests, and a final item that involves onset before the age of 3 years. Social interaction impairments include items such as “impairment in the use of multiple nonverbal behavior, such as eye-to-eye gaze” and “failure to develop peer relationships appropriate to developmental level.” Items such as “delay in development or lack of spoken language” and “lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level” are included in the communication impairment section. The restricted, repetitive behavior section contains items such as “inflexible adherence to specific, nonfunctional routines or rituals” and “stereotyped and repetitive motor mannerisms.” Some of the items on the checklist from the ICD-10 that are not in the DSM-IV-TR are “rarely seeking or using others for comfort in times of stress or comforting others when they are stressed,” “lack of variation in speech,” and “specific attachments to unusual objects.” The checklist also has an item inquiring about delays before the age of 3 in at least one of the three areas of impairment. For each item, the caregiver is instructed to indicate ‘yes’ if the item applies to his/her child and ‘no’ if it does not.

For this study, the DSM-IV-TR/ICD-10 checklist was used to diagnose children and assign them to the appropriate group, either Autistic disorder, PDD-NOS, or no ASD (normal control). This measure was utilized because it is based on criteria from the DSM-IV-TR (APA,

2000) and ICD-10 (WHO, 2007), which are broadly accepted international guidelines for diagnosis. This checklist has strong psychometric properties, with inter-rater reliability at .89, internal consistency at .99, and test-retest reliability at .96 (Matson, et al., 2008).

Matson Evaluation of Social Skills in Youngsters (MESSY). This measure is used to assess social skills in children. The parent/teacher form, consisting of 64 items, was used for this study. Each item is rated on a Likert scale from 1 to 5, with 1 being “not at all” and 5 being “very much.” This measure consists of two factors—Factor 1 is the Inappropriate Assertiveness/Impulsiveness scale, and Factor 2 is the Appropriate Social Skills scale. A factor is considered “problematic” if it falls one standard deviation below the normative mean and “very problematic” if it falls two or more standard deviations below the normative mean (Matson, 1990; Matson et al, 1991).

The MESSY has good test-retest reliability with estimates at least .6 and as high as .9 (Wierzbicki & McCabe, 1988). An inter-item coefficient alpha was computed for internal reliability and was found to be .93, which is evident of high degree of internal reliability (Matson, 1990). The MESSY also has good validity and has been found to correlate with a number of other measures such as a popularity and social skills ranking made by classroom teachers, the *School Behavior Checklist*, direct observations, a self-efficacy scale, and some *Child Behavior Checklist* (CBCL) subscales (Kazdin, Matson, & Esveldt-Dawson, 1984; Matson, 1990). It should also be noted that the MESSY has also been translated into nine other languages, such as Turkish, Chinese, Japanese, and Dutch (Bacanli & Erdogan, 2003; Chou, 1997; Matson & Ollendick, 1988; Prins, 1997).

The MESSY, as opposed to other measures, was used in this study for multiple reasons. First, it has been used with the ASD population and proved to differentiate ASD from controls (Matson et al., 1991). Second, unlike some social skills measures that focus on a specific age group (pre-school or adolescent), the MESSY encompasses a broad age range (ages 4-18). Third, the MESSY is one of the most used social skills assessments in research (Matson & Wilkins, 2009). Fourth, as outlined above, the MESSY has strong psychometric properties (Kazdin, Matson, & Esveldt-Dawson, 1984; Matson, 1990; Wierzbicki & McCabe, 1988). Finally, the MESSY will be used in this study because it has also been used to differentiate a variety of different groups of children from controls (e.g., psychiatric populations—depression, bipolar disorder, as well as chronically ill and visually impaired children) (Goldstein, Miklowitz, & Mullen, 2006; Meijer, Sinnema, Bijlstra, Mellenbergh, & Wolters, 2000; Sharma, Sigfoos, & Carroll, 2000; Spirito & Hartford, 1990).

## Procedure

The parents and caregivers of children included in this study completed the MESSY as part of a battery of tests after consent from a parent or guardian to participate in research. Along with the MESSY, the battery included the ASD-DC (described above), the *Autism Spectrum Disorders-Comorbid for Children (ASD-CC)*, the *Autism Spectrum Disorders-Problem Behaviors (ASD-PB)*, and the DSM-IV/ICD-10 checklist (described above). Information regarding age, race, gender, and disabilities was also collected. Data collected on the ASD-DC, ASD-CC, and ASD-PB, however, was not used in the present study. As outlined above, the DSM-IV/ICD-10 checklist was used to diagnose Autistic disorder and PDD-NOS and assign participants to the appropriate groups. The packet is put together so that a demographic form is first, followed by the ASD-DC, ASD-CC, ASD-PB, DSM-IV/ICD-10 checklist, and the MESSY



(in that order). However, caregivers were not instructed to fill out the measures in any specific order. Caregivers of the children in the study were presented with the MESSY (as part of the battery of tests) either in person at the outpatient clinic, through the mail, or via an Internet link. For caregivers that did not fill out the form in person at the outpatient clinic, phone numbers and an email address were provided so that a doctoral-level clinical psychology student with extensive knowledge of all measures could answer any questions. The battery packet takes approximately 30 minutes to 1 hour to complete (sometimes more if the child has ASD). The MESSY alone takes approximately 10-25 minutes to complete, depending on the reading ability of the caregiver (Matson, 1990).

## Research Design

A 3 x 2 mixed model ANOVA was conducted to assess whether there were differences in social skills (both Inappropriate and Appropriate) between three groups—Autistic disorder, PDD-NOS, and a normal control group. In order to better interpret any main effects, the appropriate social skills factor was reverse scored (Matson, 1990). The ANOVA for split plot data (it is also referred to as a mixed-model ANOVA) was used in this study because the two factors (Appropriate Social Skills and Inappropriate Assertiveness/Impulsiveness) are considered conceptually distinct. The mixed-model ANOVA is also appropriate because there are at two independent variables, with one within-subjects variable and one between-subjects variable (Field, 2005). The experimental design for this study was also based on a previous study by Matson and colleagues (1991) that used the MESSY to compare groups (Autism vs. normal control). Significant ANOVA was followed up with Tukey post-hoc tests to determine differences between groups, as this test has good power and protects against possible inflation of family-wise error (Field, 2005). Following a significant interaction between diagnostic group

and social skills type, simple effects tests were computed. A stepwise discriminant analysis (DA) was conducted to identify which items distinguished between the three diagnostic groups. The 64 items on the MESSY were entered as variables. A second stepwise discriminant analysis was also conducted to further look at the differentiating power of the MESSY in regards to social skills for the Autistic disorder and PDD-NOS groups.

An *a priori* power analysis was conducted using GPOWER (Faul, Erdfelder, Lang, & Buchner, 2007) to determine the necessary sample size for a split-plot ANOVA with an effect size of 0.25, alpha of .05, and a power of 0.80. An alpha of .05 is generally accepted in behavioral sciences as the standard for research. Sources recommend that a power of .80 is most appropriate with an alpha of .05 (Hinkle, Wiersma, & Jurs, 2003). It was found that the appropriate sample size is 42 total participants for a split-plot ANOVA with a within-subjects independent variable (social skill type) with two levels and a between-subjects independent variable with three groups (Autistic disorder, PDD-NOS, control). However, this should be considered a minimum sample size and for the purposes of this study, 48 participants (N=16 for each of the three groups) will be used. Significant results are more likely to be found with a larger sample size (Field, 2005).

## Results

Results of the 3 x 2 mixed model ANOVA indicated that there was a significant main effect for social skills type,  $F(1, 45) = 14.93, p < .001$ , partial  $\eta^2 = .25$ , and also diagnostic group,  $F(2, 45) = 10.54, p < .001$ , partial  $\eta^2 = .32$ . Results of the Tukey post-hoc test indicated that there was a significant difference in total social skills between Autistic disorder ( $M = 77.59$ ) and control ( $M = 60.69$ ),  $p < .05$ , as well as between PDD-NOS ( $M=80.00$ ) and control ( $M = 60.69$ ),  $p < .001$ . Conversely, no significant difference was found between Autistic disorder and PDD-NOS,  $p > .05$ . Table 1 shows the total averages as well as averages of both social skills types for each diagnostic group. The means displayed for appropriate social skills in parentheses are the un-reversed mean scores.

Table 1. Group Means for Appropriate and Inappropriate Social Skills

	Autistic Disorder	PDD-NOS	Control
Inappropriate	72.69	91.50	78.06
Appropriate	82.50 (37.50)	68.50 (51.50)	43.31 (76.69)
Overall	77.59	80.00	60.69

In addition to main effects, results of the mixed model ANOVA indicated that there was also a significant interaction between social skills type and diagnostic group,  $F(2, 45) = 10.40, p < .001$ , partial  $\eta^2 = .32$ . To further examine this interaction, tests of simple effects were conducted, first, to determine the relationships of social skills within the diagnostic groups. Tests of the simple effects of social skills type within the typically developing control group was significant,  $F(1, 45) = 23.54, p < .001$ , partial  $\eta^2 = .34$ . For social skills type within the PDD-NOS group, the test of simple effects was also significant,  $F(1, 45) = 10.31, p < .05$ , partial  $\eta^2 = .19$ . Finally, the simple effects test for social skills type within Autistic disorder was not

significant,  $F(1, 45) = 1.88, p > .05$ , partial  $\eta^2 = .04$ . Simple effects of diagnostic group within appropriate social skills was significant,  $F(2, 45) = 32.82, p < .001$ , partial  $\eta^2 = .59$ . Simple effects of diagnostic group within inappropriate social skills, however, was not statistically significant,  $F(2, 45) = 2.71, p > .05$ , partial  $\eta^2 = .11$ . However, the simple effects of diagnostic group within inappropriate social skills were near the statistical cutoff, and therefore deemed clinically significant ( $p = .077$ ).

Since the simple effects were found to be significant (either statistically or clinically), pairwise comparisons were also conducted to examine specific differences in groups between both inappropriate and appropriate social skills. For appropriate social skills, all three groups significantly differed from each other, all  $p < .05$ . A general trend emerged where typically developing children displayed the greatest number of appropriate social skills, followed by the PDD-NOS group, and then the Autistic disorder group. For inappropriate social skills, there were no statistically significant differences between groups, however a clinically significant difference was found between the Autistic disorder group and the PDD-NOS group,  $p = .086$ . It should be noted, however that this difference was not in the expected direction, but rather the PDD-NOS group displayed more inappropriate social skills than the Autistic disorder group. The significance of all of these results will be discussed further below.

Results of the stepwise DA for the three diagnostic groups indicated that there were significant mean differences observed for 30 items of the MESSY (see Table 2). However, the stepwise analysis found only 5 items that added some predictive power to the functions. The five items included: “Does nice things for others who are nice to him/her,”  $F(2, 45) = 29.60, p < .001, \Lambda = .432$ ; “Shows feelings,”  $F(4, 88) = 15.19, p < .001, \Lambda = .350$ ; “Gets upset when he/she has to wait for things,”  $F(6, 86) = 13.34, p < .001, \Lambda = .268$ ; “Gripes or complains often,”  $F(8,$

84) = 11.57,  $p < .001$ ,  $\Lambda = .226$ ; and “Makes sounds that bother others (e.g., burping, sniffing),”  $F(10,82) = 10.93$ ,  $p < .001$ ,  $\Lambda = .184$ . In addition, two discriminant functions emerged in this analysis. The first function revealed a significant association between groups and the five items, accounting for 76.4% of between groups variability. The second function also revealed a significant association between groups and the five items, accounting for 21.9% of between groups variability. The original classification showed that overall 83.3% were correctly classified, while the cross-validated classification showed that overall 77.1% were correctly classified. This suggests that the two identified functions correctly classified the three groups at a percentage that is significantly greater than chance.

When a second DA was conducted to determine those items that significantly differentiated between Autistic disorder and PDD-NOS, significant mean differences were found for 16 of the items (these items are listed in Table 2). However, there were only 10 items found that added some predictive power to the function. The 10 items which were noted to best classify participants as either having Autistic disorder or PDD-NOS were as follows: “Helps a friend who is hurt,”  $F(1,30) = 9.62$ ,  $p < .005$ ,  $\Lambda = .751$ ; “Gripes or complains often,”  $F(2,29) = 8.58$ ,  $p < .005$ ,  $\Lambda = .628$ ; “Gives other children dirty looks,”  $F(3, 28) = 11.87$ ,  $p < .001$ ,  $\Lambda = .440$ ; “Is friendly to new people he/she meets,”  $F(4, 27) = 15.02$ ,  $p < .001$ ,  $\Lambda = .310$ ; “Is a sore loser,”  $F(5, 26) = 15.40$ ,  $p < .001$ ,  $\Lambda = .252$ ; “Threatens people or acts like a bully,”  $F(6, 25) = 16.08$ ,  $p < .001$ ,  $\Lambda = .206$ ; “Sticks up for friends,”  $F(7, 24) = 17.97$ ,  $p < .001$ ,  $\Lambda = .160$ ; “Does nice things for others who are nice to him/her,”  $F(8, 23) = 18.90$ ,  $p < .001$ ,  $\Lambda = .132$ ; “Is stubborn,”  $F(9, 22) = 20.22$ ,  $p < .001$ ,  $\Lambda = .108$ ; and “Takes or uses things that are not his/hers without permission,”  $F(10,21) = 23.98$ ,  $p < .001$ ,  $\Lambda = .081$ . The function revealed a significant association between groups and the 10 items, accounting for 92% of between groups variability.

The original and cross-validated classifications showed that overall 100% were correctly classified. This suggests that the function correctly classified the two groups perfectly.

Table 2. Items Found to Discriminate Between Groups

Item Number	Item	Means for Autistic Disorder	Means for PDD-NOS	Means for Control
1	Makes other people laugh (tells jokes, funny stories, etc.).	1.94	2.50	3.69
3	Becomes angry easily.	2.31	2.88	1.81
4	Is bossy (tells people what to do instead of asking).	1.50	2.63	1.94
5	Gripes or complains often.	1.38	2.31	2.00
7	Takes or uses things that are not his/hers without permission.	3.25	2.25	1.75
*10	Helps a friend who is hurt.	1.50	2.75	3.81
19	Says "thank you" and is happy when someone does something for him/her.	3.00	3.00	4.38
22	Is a sore loser.	1.69	2.69	1.44
24	Blames others for own problems.	1.44	2.25	1.38
25	Sticks up for friends.	1.19	1.81	3.63
26	Looks at people when they are speaking.	2.38	2.94	4.19
28	Smiles at people he/she knows.	3.06	3.44	4.38
31	Shows feelings.	2.94	3.19	4.50
32	Thinks people are picking on him/her when they are not.	1.31	2.38	1.69
33	Thinks good things are going to happen.	1.75	2.88	3.31
34	Works well on a team.	1.38	2.19	3.50
37	Takes care of others' property as if it were his/her own.	1.63	2.44	3.44
39	Calls people by their names.	2.31	3.19	4.56
40	Asks if he/she can be of help.	1.38	2.06	3.81
*41	Feels good if he/she helps others.	1.81	3.00	4.38
42	Defends self.	2.13	2.75	4.00
45	Asks questions when talking with others.	1.94	2.56	3.81
47	Feels sorry when he/she hurts others.	1.94	3.06	3.94
48	Gets upset when he/she has to wait for things.	3.50	3.81	2.13
50	Joins in games with other children.	1.88	2.50	4.13
*51	Plays by the rules of a game.	1.56	2.44	3.63
*54	Does nice things for others who are nice to him/her.	1.63	2.75	4.38
56	Asks others how they are, what they have been doing, etc.	1.31	1.63	3.38
57	Stays with others too long (wears out welcome).	1.38	2.13	1.31
59	Is friendly to new people he/she meets.	2.25	2.38	3.69

\* All groups significantly different from each other

Table 3. Items Found to Differentiate Between Autistic Disorder and PDD-NOS

Item Number	Item	Means for Autistic Disorder	Means for PDD-NOS
4	Is bossy (tells people what to do instead of asking).	1.50	2.63
5	Gripes or complains often.	1.38	2.31
7	Speaks (breaks in) when someone else is speaking.	3.25	2.25
10	Helps a friend who is hurt.	1.50	2.75
25	Sticks up for friends.	1.19	1.81
27	Thinks he/she knows it all.	1.25	2.19
32	Thinks people are picking on him/her when they are not.	1.31	2.38
33	Thinks good things are going to happen.	1.75	2.88
34	Works well on a team.	1.38	2.19
40	Asks if he/she can be of help.	1.38	2.06
41	Feels good if he/she helps others.	1.81	3.00
43	Always thinks something bad is going to happen.	1.19	1.81
47	Feels sorry when he/she hurts others.	1.94	3.06
50	Joins in games with other children.	1.88	2.50
51	Plays by the rules of a game.	1.56	2.44
54	Does nice things for others who are nice to him/her.	1.63	2.75



## Discussion

To date, there is little empirical research that has been conducted to look at the phenomenological differences in core symptoms of ASD between children with Autistic disorder and PDD-NOS (Matson & Boisjoli, 2007). One area that has been noted to be a particularly significant feature of those with ASD is deficits in social skills (APA, 2000; Kanner, 1955; Schopler & Mesibov, 1986; Wing & Gould, 1979). Therefore, the purpose of this paper was to first look at the differences in social behaviors (both appropriate and inappropriate) of children with high incident ASDs (i.e., Autistic disorder or PDD-NOS) compared to typically developing children. Another aim of this research was to offer a more fine-grained analysis of those with Autistic disorder versus PDD-NOS to determine if there were specific social skills that were unique to either of these diagnostic groups. An examination of the results revealed that there was an overall pattern of children with ASD showing greater impairment in social abilities than typically developing children. There was a general trend in inappropriate social skills for the PDD-NOS group to display the most excesses, followed by the typically developing control group, and then the Autistic disorder group. This trend, however was not statistically significant, and was also not reflective of the predictions made for this study. For appropriate social skills, the Autistic disorder group displayed the most deficits, followed by the PDD-NOS group, and then the typically developing control group. This pattern is consistent with predictions for the current study and was found to be significant. Although not all trends found in this study are consistent with the hypotheses made, the outcomes help to extend previous research (e.g., Matson et al., 1991) and add to the current body of literature by identifying differentiating patterns of behavior in ASD. This research also gives way to implications about assessment tools and guided treatment.

In comparing these results to those by Matson and colleagues (1991), the overall outcome is similar. That is, in the previous study, there were no statistically significant differences between diagnostic groups (normal control vs. Autism) in inappropriate social skills using the MESSY. Upon further examination, the findings of Matson and colleagues (1991) indicated that the normal control group displayed a higher number of inappropriate social skills than the Autism group. This finding is similar to that found in the present investigation. There was also a trend in the previous study for the normal control group to display more appropriate social skills than the Autism group, and this is also true of the current study. This pattern for the Autistic disorder group to display fewer inappropriate social behaviors than other groups (e.g., typically developing children, children with PDD-NOS) has been confirmed in the present study. Although this result was not predicted in either study, the implications of this outcome are explained below.

Of the 16 items found to differentiate PDD-NOS from Autistic disorder (see Table 3), only one item had a higher mean for the Autistic disorder group over the PDD-NOS group. Therefore, of the items found to differentiate between the ASD groups, the PDD-NOS group displayed most behaviors (whether appropriate or inappropriate) more frequently than the Autistic disorder group. There are two proposed explanations for this finding. First, there was a trend for the Autistic disorder group to display social skills that are basic in nature, while lacking in skills that require more complex abilities. This was true for both appropriate and inappropriate social skills. Social skills are like building blocks in which basic social behaviors are necessary in order for more complex skills to develop (Dawson & Galpert, 1986; Sroufe, 1979). For example in this study, a greater percentage of the PDD-NOS group endorsed the item “Is a sore loser” than the Autistic disorder group. Other related items endorsed more for the

PDD-NOS group than the Autistic disorder group included: “Works well on a team,” “Joins in games with other children,” and “Plays by the rules of a game.” These items all involve playing/interacting with other children. For the item, “Joins in games with other children,” 50% of the Autistic disorder group endorsed this item as occurring “not at all.” Therefore, children with Autistic disorder are less likely than other children (PDD-NOS or control) to play games with others, and are therefore less likely to display maladaptive behaviors related to playing games (being a sore loser) as well as appropriate behaviors related to playing games (playing by the rules, working well with others, etc). The item “Helps a friend who is hurt” was frequently endorsed by both the PDD-NOS and control groups, but not by the Autistic disorder group. (Tables 4, 5, and 6 show the frequently endorsed items for each group.) Another similar item that was found to be endorsed more by the PDD-NOS group than the Autistic disorder group is “Sticks up for friends.” These are also social skills that involve more complex abilities involving relationships with peers. Children with Autistic disorder are less likely than higher functioning children on the autism spectrum (i.e., PDD-NOS) to seek friendship, thus helping or sticking up for a friend is not a behavior that a child with Autistic disorder is likely to engage in (Hartup & Sancilio, 1986; Howlin, 1986). Some of the other behaviors displayed to a greater degree by the PDD-NOS group over the Autistic disorder group involve emotional reciprocity. One of the criterion for Autistic disorder in the DSM-IV-TR is “lack of social or emotional reciprocity” (APA, 2000). In the present study children with Autistic disorder were less likely to display the following behaviors than children with PDD-NOS or normal developing children: “Feels good if he/she helps others,” “Feels sorry when he/she hurts others,” and “Does nice things for others who are nice to him/her.” Since children with Autistic disorder are more likely to lack social or emotional reciprocity, this affects many of the social skills that they are likely to display, and in

turn reduces the chances that they will interact with others in an appropriate manner (Hartup & Sancilio, 1986). The above-mentioned items involve social skills displayed in friendships, more complex interactions with others, and reciprocity in interactions, and therefore involve more complex patterns of behavior that children with Autistic disorder are less likely to develop than other children (including those with PDD-NOS).

Table 4. Most Frequently Rated Items for Autistic Disorder Group

Item Number	Item	Percent Endorsement
7	Takes or uses things that are not his/hers without permission.	56%
29	Is stubborn.	50%
48	Gets upset when he/she has to wait for things.	50%
19	Says “thank you” and is happy when someone does something for him/her.	44%
28	Smiles at people he/she knows.	38%
6	Speaks (breaks in) when someone else is speaking.	38%
31	Shows feelings.	38%
55	Tries to get others to do what he/she wants.	38%
35	Makes sounds that bother others (e.g., burping, sniffing).	31%
9	Slaps or hits when angry.	25%
39	Calls people by their names.	25%
49	Likes to be the leader	25%
59	Is friendly to new people he/she meets.	25%

A second reason that the Autistic disorder may have scored lower than predicted in inappropriate social skills involves communication deficits. A deficit or delay in language ability is another primary feature of ASD, and is typically impaired to a greater extent in children diagnosed with Autistic disorder than those diagnosed with PDD-NOS (Buitelaar, et al., 1999; Njardvik et al., 1999). An example from the current study involves a greater endorsement of the items “Gripes or complains often,” and “Is bossy,” for the PDD-NOS group over the Autistic disorder group. Also, an appropriate social skill item “Asks if he/she can be of help,” was

endorsed more for the PDD-NOS and control groups than the Autistic disorder group. These behaviors require a basic level of verbal communication that is often lacking in children with Autistic disorder (APA, 2000; Matson & Minshawi, 2006; Rutter, 1978). As many social skills involve the use of communication, any deficits in the area of communication would in turn have an adverse effect on the development of social skills (Garfin & Lord, 1986; White, Koenig, & Scahill, 1990; Wing & Gould, 1979).

Table 5. Most Frequently Rated Items for PDD-NOS Group

Item Number	Item	Percent Endorsement
48	Gets upset when he/she has to wait for things.	69%
39	Calls people by their names.	56%
6	Speaks (breaks in) when someone else is speaking.	50%
9	Slaps or hits when angry.	44%
14	Always wants to be first.	44%
28	Smiles at people he/she knows.	44%
29	Is stubborn.	44%
47	Feels sorry when he/she hurts others.	44%
55	Tries to get others to do what he/she wants.	44%
4	Is bossy (tells people what to do instead of asking).	38%
22	Is a sore loser.	38%
31	Shows feelings.	38%
41	Feels good if he/she helps others.	38%
10	Helps a friend who is hurt.	31%
19	Says "thank you" and is happy when someone does something for him/her.	31%
26	Looks at people when they are speaking.	31%
42	Defends self.	31%
3	Becomes angry easily.	25%
5	Gripes or complains often.	25%
24	Blames others for own problems.	25%
33	Thinks good things are going to happen.	25%
35	Makes sounds that bother others (e.g., burping, sniffing).	25%
37	Takes care of others' property as if it were his/her own.	25%
49	Likes to be the leader.	25%

Table 6. Most Frequently Rated Items for Control Group

Item Number	Item	Percent Endorsement
39	Calls people by their names.	94%
31	Shows feelings.	94%
26	Looks at people when they are speaking.	88%
28	Smiles at people he/she knows.	88%
41	Feels good if he/she helps others.	88%
19	Says "thank you" and is happy when someone does something for him/her.	81%
54	Does nice things for others who are nice to him/her.	81%
47	Feels sorry when he/she hurts others.	75%
51	Plays by the rules of a game.	75%
10	Helps a friend who is hurt.	69%
40	Asks if he/she can be of help.	69%
50	Joins in games with other children.	69%
59	Is friendly to new people he/she meets.	69%
1	Makes other people laugh (tells jokes, funny stories, etc.).	63%
25	Sticks up for friends.	63%
42	Defends self.	63%
33	Thinks good things are going to happen.	56%
34	Works well on a team.	56%
45	Asks questions when talking with others.	50%
56	Asks others how they are, what they have been doing, etc.	50%
37	Takes care of others' property as if it were his/her own.	44%
18	Walks up to people and starts a conversation.	31%
49	Likes to be the leader.	31%
6	Speaks (breaks in) when someone else is speaking.	25%
29	Is stubborn.	25%

While there were some significant results, various limitations could have had some influence on the outcome of this study. One of the main limitations for this study involves the number of participants. There were 48 total participants (N=16 per group), only slightly more than the number required for the appropriate power, alpha level, and effect size (see the proposed analyses section). Significant results are more likely to be found with a larger sample size due to less variability within groups (Field, 2005). Therefore, if additional participants had been included in this investigation it would have bolstered the findings by providing additional

information. For example, researchers suggest that PDD-NOS tends to be more of a heterogeneous group, therefore a larger sample size may have engendered a slightly different outcome than the current study (APA, 2000; Buitelaar et al., 1999; Field, 2005; Walker et al., 2004). The second limitation of this study is that none of the participants were diagnosed as having an intellectual disability. Since it has been estimated that upwards of 70% of children with ASD typically have comorbid ID, the current sample may not be representative of the general population (Fein et al., 2001; Mauk et al., 1997). Due to convenience sampling (many of the children in this study were selected from an outpatient clinic) having a group that was reflective of the population in terms of ID rates would have been difficult. Future research should attempt to find a sample that is more representative of the general population by balancing percentage of participants with ID in each group to what is observed in the population. Another possibility for future research involves comparing social skills with another disorder in the autism spectrum, Asperger's syndrome. Including this group in an analysis would help to further differentiate disorders along the autism spectrum. The present study has helped to further differentiate Autistic disorder and PDD-NOS, specifically in terms of social skills. As replication is important in empirical research, future research should be conducted to further confirm or disconfirm the results of this study. Also, more research should be conducted to differentiate PDD-NOS from other disorders, and in so doing help to strengthen differential diagnosis in assessment measures, as well as guide treatments.

An important implication of this study is the emergence of ten items that provided some predictive power for distinguishing Autistic disorder and PDD-NOS. This is important because these ten items could be used to create a potential screener assessment for differentiating between Autistic disorder and PDD-NOS. There are currently few diagnostic instruments that

distinguish disorders on the autism spectrum, especially PDD-NOS (Matson & Boisjoli, 2007). Therefore a screener to help distinguish between the two most common ASDs (Autistic disorder and PDD-NOS) would greatly add to the field. Often clinicians have a limited amount of time to conduct assessment, therefore screener instruments are important for assisting in ruling out disorders, and recognizing when to conduct further assessment. A screener instrument would also be helpful in identifying specific behaviors to target in treatment. Often diagnostic measures have very little treatment validity, however an instrument such as the proposed ASD screener allows for identification of behavior excesses or deficits to target in intervention (Kratochwill, Thomas, & McGivern, 1996).

In terms of guiding treatment, some specific patterns of behavior were found in this study for children with ASD. These patterns can help clinicians to target interventions for children with Autistic disorder and PDD-NOS. Some specific behaviors to target in intervention for children with Autistic disorder include increasing verbalizations with others. Another area involves increasing interactions with peers, where learning to play games with others would be a good place to start. For children with PDD-NOS, interventions could target increasing positive verbalizations (as opposed to being bossy or complaining). For both children with Autistic disorder and those with PDD-NOS, targeting maladaptive behaviors such as being impatient when waiting for things, being stubborn, and being aggressive when angry is necessary. More appropriate adaptive behaviors should be taught in order to decrease the frequency of these inappropriate behaviors (Jensen & Sinclair, 2002; Koegel, Koegel, & McNERney, 2001; Matson & Minshawi, 2006; Mueser & Bellack, 1989). These are just a few examples, and interventions should always be specific to the individual and their needs (Harris & Weiss, 2007; Lovaas,



1981). More research should be conducted to help further differentiate these patterns of behavior and therefore help to guide more specific interventions for children with ASD.

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## Vita

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