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Comorbid psychological disorder in individuals with intellectual disabilities and autism spectrum disorders

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COMORBID PSYCHOLOGICAL DISORDERS IN INDIVIDUALS WITH INTELLECTUAL
DISABILITIES AND AUTISM SPECTRUM DISORDERS

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By
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Abstract

Autism spectrum disorders (ASD) are characterized by deficits in three areas of functioning: communication, socialization, and restricted interests/repetitive behavior. With the rise in diagnoses of ASD in recent years, these disorders have received increasing recognition by researchers and clinicians. These efforts have largely been with young children. However, the study of ASD and comorbid disorders in adults with intellectual disability (ID) has been almost nonexistent. While there are measures available to assess comorbid disorders in people with only ID, the differences in adults with ASD and ID and adults with ID alone may also be a good deal different than in children, and therefore warrants a specialized scale to measure symptoms of ASD in this population. Through research, it is recognized that persons with ASD and ID often evince concomitant psychopathology; yet, the topic has not been systematically studied. The Autism Spectrum Disorders-Comorbidity for Adults (ASD-CA) was designed to screen symptoms of psychopathology that occur more commonly with ASD/ID in adults. The objective of this study was to assess the reliability of the ASD-CA in a first attempt to establish the test's psychometric properties. Three forms of reliability (inter-rater, test-retest, and internal consistency), item analysis, and a factor analysis were conducted.

Introduction

Research on measures of comorbid psychopathology is almost nonexistent for people with Autism Spectrum Disorders (ASD). The rate of ASD diagnosis is increasing rapidly, and the pervasive deficits characteristic of the disorder, along with comorbid psychopathology, makes the development of a measure to assess and diagnose individuals with these conditions imperative (Matson & Nebel-Schwalm, in press). The aim of the present study was to establish a new measure of comorbid psychopathology in adults with both ASD and Intellectual Disability (ID), the Autism Spectrum Disorders-Comorbity for Adults (ASD-CA). An overview of the history, prevalence, and core features of autism, as well as a review of more commonly comorbid psychological disorders diagnosed with ASD and current measures of comorbid psychopathology are presented.

History of Autism

In just over 60 years since Leo Kanner first published an article on a disorder he referred to as 'autistic disturbance of affective contact', there has been an enormous amount of interest and research on the topic. Researchers around the world have dedicated their careers to investigating, defining, and treating individuals with autism. Kanner, in 1943, wrote of 11 children who all appeared to have a syndrome of similar characteristics and deficits. The deficit reported by Kanner to be present in all of the children was "a disability in relating themselves in the ordinary way to people and situations from the beginning of life" (p. 242). He reported that the children all had, since birth, an "extreme autistic aloneness" (i.e., the children disregarded any input from their environment). Historical accounts by their parents indicated that these deficits were present from infancy. The demonstration of symptoms since birth was the essential characteristic in what Kanner considered to differentiate these children from those with

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schizophrenia. Prior to Kanner's original report and for years thereafter, autism and schizophrenia were thought to be overlapping disorders. Kanner emphasized that the children he observed had no regression in development as evidenced by children with childhood schizophrenia.

Communication deficits were also observed in all these children. Of the 11 children, 8 had acquired language, while the other 3 children remained mute. As infants and toddlers, a number of the children were thought to be deaf since they did not respond to sounds or change their facial expression when spoken to. Impairments in language were profound for all, including the children who acquired language, as their language did not show communicative intent. The verbal children were able to name objects and remember long and peculiar strings of words. Reportedly, some children memorized lists of presidents, nursery rhymes, and even French lullabies. Naming, numbering, and reciting constituted much of their vocabulary. During early language development, many of the speaking children also exhibited echolalia and pronoun reversal. When language was used to communicate, it was inflexible in meaning. Kanner, 1943, described a boy that was taught the word "yes" from his father asking him if he wanted to get on his shoulders. The boy was instructed to say "yes" if he wanted to get on his father's shoulders and "no" if he did not. From then on the boy used the word yes to request being placed on his father's shoulders (p. 220).

Along with deficits in communication, socialization was described by Kanner as deficient in the children he studied. They preferred relations with objects over people. The children were aware of the presence of people; however, they displayed behaviors suggesting that they were bothered by, or were being intruded upon by others. The children did not play socially or involve themselves in competitive games with peers, rather they chose to play in solitude. Another

similarity in many of the children, as reported by their mothers, was that the children never assumed an anticipatory posture (i.e., lifting their arms) as infants when preparing to be picked up by a caregiver. Additionally, the children did not adjust their body to the person holding them.

The third deficit reported by Kanner was the children's desire for sameness. Many of the children insisted on a consistent routine, route, or order in which toys were assembled. Other children needed their environment to remain the same; for instance, the order in which furniture was arranged in a bedroom. Additionally, many of the children found broken or incomplete objects quite distressing. Some of the children were so persistent that their parents adhered to the routines or rituals to avoid tantrums.

Kanner also stated that the children he observed were not intellectually disabled (ID). The children were described as having inquisitive facial expressions, an extensive vocabulary, and excellent memory abilities. According to Kanner, these observations discounted the idea that these children were "feebleminded," as believed by many clinicians of the period.

Along with the remarkable "discovery" of autistic disturbances of affective contact, controversial implications arose. Reportedly, all of the children came from intelligent and highly successful parents. Many of the fathers were involved in science, psychiatry, or practiced law. The majority of the mothers were college graduates with careers in psychology, nursing, writing, and medicine. Grandparents of these children were also career people. Kanner suggested that these parents, like their children with autism, were limited in their interest in interacting with people and preferred to spend their time pursuing abstractions, science, and art. The parents were described as cold and it was hypothesized that they could possibly have contributed to their child's aloneness.

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What Kanner failed to recognize, was that at the time of his study, only parents with the financial means could pursue treatment. The study was not population based and the selection suffered from referral bias. Ritvo, et al. (1971) conducted a study on social class of children with autism. When compared to other children with varying disorders, such as behavior problems, neurosis, and other types of disability, no significant difference associated with social class and autism was found.

While Kanner saw a clear distinction between children with schizophrenia and those with autism, many researchers still believed that autism was a form of childhood schizophrenia (Matson & Minshawi, 2006). One such researcher was Creak (1961). He delineated nine criteria for identifying early childhood psychosis. The symptoms included: 1) gross and continuing impairment of emotional relationships, described as aloofness and difficulty playing with peers; 2) age inappropriate lack of awareness of personal identity, including abnormal body posturing, self-injury, and personal pronoun confusion; 3) pathological preoccupation with certain objects or their characteristics, without regard for the function of the item; 4) resistance to environmental change and effort to maintain or restore sameness; 5) abnormal perceptual experience, marked by excessive or unpredictable response to sensory stimuli, such as insensitivity to pain and temperature; 6) acute or excessive anxiety, usually triggered by changes in the environment; 7) loss of speech or failure to acquire or develop language and the occurrence of echolalia or pronoun reversal; 8) distorted pattern of motility, including abnormal gait, unusual body posturing, rocking, or spinning; and, 9) history of serious retardation, although some intellectual functions may be normal or exceptional. These symptoms overlapped greatly with Kanner's description of autism. Some of these criteria are still used today in scales for diagnosing ASD (Matson & Minshawi, 2006).

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Around the same time, another influential researcher, Michael Rutter, suggested that autism was a separate and distinct disorder from schizophrenia, thus agreeing with Kanner (Rutter, 1968). Rutter differentiated the two disorders by emphasizing differences in the ratio of the sexes; 4:1 male to female ratio with autism and less male predominance with schizophrenia. Also, intellectual function was more impaired in children with autism compared to children with schizophrenia. Additionally, a later age of onset was observed with schizophrenia, and the course of symptoms of people with autism was more stable than those diagnosed with schizophrenia (Rutter, 1968, 1978). Another influential contribution by Rutter was his study on the prevalence of ID in people with autism (Rutter & Lockyer, 1967). Contrary to Kanner's observation that all children with autism possessed good cognitive potentials, Rutter and Lockyer (1967) found that half of the children with autism also had IQ's in the subnormal range. Rutter (1978) developed three behavioral categories that were characteristic of individuals with autism: impairment in social relations, delayed/abnormal language development, and insistence on sameness.

Assessment/Diagnosis of ASD

The Diagnostic and Statistical Manual Fourth Edition (DSM-IV-TR; American Psychiatric Association [APA], 2000) is a diagnostic schedule used to classify psychological disorders. Autism, referred to as Autistic Disorder in the DSM-IV-TR, is classified under a broader subset of disorders called Pervasive Developmental Disorders which are also called ASD in the literature. Five disorders encompass the Pervasive Developmental Disorders. The most common are Autistic Disorder, Asperger's Disorder, and Pervasive Developmental Disorder Not Otherwise Specified (PDDNOS). Two rarer disorders, Childhood Disintegrative Disorder and Rett's Disorder, are also classified under the umbrella of Pervasive Developmental Disorders.

Included in the DSM-IV-TR criteria, for a diagnosis of Autistic Disorder were the presentation of qualitative impairments in social interaction, communication, and restricted patterns of interest. The person must possess at least two impairments in social interaction including, 1) impairment in multiple nonverbal behaviors; 2) failure to develop peer relationships (appropriate to developmental level); 3) a lack of spontaneous seeking to share enjoyment; and 4) a lack of social and emotional reciprocity.

The second category for the diagnosis of Autistic Disorder is impairment in communication. In order to meet criteria, the individual must have one of the following impairments, 1) delay in, or total lack of, the development of spoken language; 2) in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others; 3) stereotyped and repetitive or idiosyncratic language; and 4) lack of varied, spontaneous make-believe play or social imitative play appropriate to the developmental level.

Third, the individual must possess at least one of the following behavioral excesses, 1) preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal in either intensity or focus; 2) apparent inflexible adherence to specific, nonfunctional routines or rituals; 3) stereotyped and repetitive motor mannerisms; and 4) persistent preoccupation with parts of objects. Additionally, a total of at least 6 of the above deficits/impairments needs to be displayed and evident prior to the age of 36 months.

Another standard used to classify individuals with ASD is the World Health Organization, International Classification of Diseases, 10th edition (ICD-10; WHO, 1992). The ICD-10 requires the fulfillment of deficits in the following categories: social interaction, communication, and restricted, repetitive behaviors and areas of interest. The social interaction domain includes, 1) failure to adequately use eye-to-eye gaze, facial expression, body posture

and gestures to regulate social interaction; 2) failure to develop peer relationships; 3) rarely seeking and using other people for comfort and affection at times of stress or distress and/or offering comfort and affection to others when they are showing distress or unhappiness; 4) lack of shared enjoyment in terms of vicarious pleasure in other peoples' happiness and/or spontaneous seeking to share their own enjoyment through joint involvement with others; and 5) lack of socio-emotional reciprocity.

Qualitative impairments in the area of communication with the following items evident are necessary to meet criteria for an ASD diagnosis, including, 1) lack of social usage of whatever language skills are present; 2) impairment in make-believe and social imitative play; 3) poor synchrony and lack of reciprocity in conversational interchange; 4) poor flexibility in language expression and a relative lack of creativity and fantasy in thought processes; 5) lack of emotional response to other peoples' verbal and non-verbal overtures; 6) impaired use of variations in cadence or emphasis to reflect communicative modulation; and 7) lack of accompanying gestures to provide emphasis or aid meaning in spoken communication.

Lastly, for an ASD diagnosis, there must be evidence of behavior excesses in the area of restrictive interests and repetitive behaviors, such as, 1) encompassing preoccupation with stereotyped and restricted patterns of interest; 2) specific attachments to unusual objects; 3) apparently compulsive adherence to specific, non-functional routines or rituals; 4) stereotyped and repetitive motor mannerisms; 5) preoccupations with parts of objects or non-functional elements of play material; and 6) distress over changes in small, non-functional details of the environment. In addition to requiring 8 out of the 16 items for a diagnosis of autism, 2 out of the 5 items must be evident in the socialization domain and 2 of the 6 behavior domain items must

be manifested. Importantly, the developmental abnormalities must be present within the first three years of life for a diagnosis to be made.

In the ICD-10, as with the DSM-IV-TR, there are no specific criteria for the diagnosis of PDDNOS. For a diagnosis of PDDNOS, severe impairments in social interaction and either deficits in communication or occurrence of stereotyped behaviors/restricted pattern of interests need to be present. This diagnosis is used as a residual category for disorders that do not fit in any of the other categories. However, the person should still exhibit symptoms consistent with the description of Pervasive Developmental Disorders.

According to the DSM-IV-TR, there are separate criteria for a diagnosis of Rett's Disorder. For a diagnosis of Rett's Disorder the person must meet each of the following criteria, 1) apparently normal prenatal and postnatal development; 2) apparently normal psychomotor development through the first 5 months after birth; and 3) normal head circumference at birth. After the period of normal development, each of the following also must be met: 1) deceleration of head growth between ages 5 and 48 months; 2) loss of previously acquired purposeful hand skills between ages 5 and 30 months with the subsequent development of stereotyped hand movements (e.g., hand-wringing or hand washing); 3) loss of social engagement early in the course (although social interaction often develops later); 4) appearance of poorly coordinated gait or trunk movements; and 5) severely impaired expressive and receptive language development with severe psychomotor retardation.

Childhood Disintegrative Disorder, like Rett's Disorder, has a distinct set of criteria under the Pervasive Developmental Disorder category. Criteria from the DSM-IV-TR includes: 1) apparently normal development for at least the first 2 years after birth as manifested by the presence of age-appropriate verbal and nonverbal communication, social relationships, play, and

adaptive behavior; 2) clinically significant loss of previously acquired skills (before age 10 years) in at least two of the following areas: a) expressive or receptive language, b) social skills or adaptive behavior, c) bowel or bladder control, d) play, or e) motor skills; and 3) abnormalities of functioning in at least two of the following areas: a) qualitative impairment in social interaction (e.g., impairment in nonverbal behaviors, failure to develop peer relationships, lack of social or emotional reciprocity), b) qualitative impairments in communication (e.g., delay or lack of spoken language, inability to initiate or sustain a conversation, stereotyped and repetitive use of language, lack of varied make-believe play), or c) restricted, repetitive, and stereotyped patterns of behavior, interests, and activities, including motor stereotypies and mannerisms.

Since Rimland (1964) developed one of the first scales to measure autism (Rimland's Diagnostic Checklist for Behavior) there have been a number of scales and screeners developed to assess symptoms of the disorder. One of the most commonly used scales to detect ASD in children is the Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Renner, 1988). This test was initially developed to differentiate between children having an ASD or ID diagnosis who were referred to the Treatment and Education of Autistic and related Communication handicapped CHildren (TEACCH; Schlopler, Reichler, & Renner, 1988) in North Carolina. Fifteen independent subscales comprise the CARS. The subscales include: relating to people; imitation; emotional response; body use; object use; adaptation to change; visual response; 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, typically a parent or a caregiver, is instructed to rate the individual on a scale from 1 to 4, with "1" indicating normal for the child's

age and "4" indicating severely abnormal. Psychometrics of the CARS are good, with rater agreement of .71, and test-retest at 12 months yielding non-significant changes in means from the first assessment. Validity studies indicate good criterion-related validity with r = .80 correlation with clinical judgments. Additionally, the scale was able to correctly predict 100% of group membership for children with autism and those with mental retardation. Potential limitations of the CARS are that some expertise and a familiarity of autism are required for accurate administration and that the symptoms represented in the CARS do not directly line up with DSM-IV-TR criteria. This situation is due to the CARS development prior to the DSM-IV-TR. Using the CARS, one is able to differentiate between people who have a more severe form of this disorder from those who may have a milder form; however, it does not provide diagnoses along the spectrum of autism related disorders.

Another popular tool used to assess autism is the Autism Diagnostic Interview-Revised (ADI-R; Lord, Rutter, & Le Couteur, 1994). The ADI-R was designed as a revision to the original Autism Diagnostic Interview (ADI). The ADI-R addresses some of the shortcomings of the ADI, such as only diagnosing children over the age of 5 years and the length of the original assessment (Lord et al., 1994). This measure is in an interview format with parents/caretakers serving as informants. The ADI-R has proved to have good psychometrics with inter-rater reliability ranging from .62 to .89. The ADI-R diagnoses along DSM-IV criteria. However, some drawbacks are that the ADI-R relies solely on parent report, it is lengthy and time consuming to administer, and it requires a clinician that is experienced with autism.

In 1989, Lord and colleagues developed a scale to focus on discriminating between groups of children with ASD, ID, and typically developing children based on social and communicative behaviors. The Autism Diagnostic Observation Schedule (ADOS) is observation-

based rather than informant-based. The child is placed in situations requiring them to request help, engage in symbolic play, take turns, perform simple tasks, tell a story, discuss tasks that occurred earlier in the assessment, and discuss social and emotional situations. The child is rated on each task by the examiner as within normal limits, infrequent or possible abnormality, or definite abnormality. The criteria for an ASD using the ADOS are based on the ICD-10 criteria. Reliability of the scale is reportedly good, with individual items between .61 and .92 (Lord et al., 1989). Validity was also reportedly good as the tool is successful in differentiating between children with and without autism. Weaknesses of the scale are that separately, the communication and social subscales were not able to classify groups, and the scale does not measure behavioral deficits and excesses.

Different from the previously discussed assessments of autism, the Checklist for Autism in Toddlers (CHAT) was designed to be used by pediatricians as a screener at toddlers' 18-month check up. The screener assesses three areas: pretend play, joint attention by pointing, and monitoring of gaze. The parent answers yes/no to nine questions and the pediatrician answers five questions based on observation. For use as a population screen, the scale has been shown to have low sensitivity when only including the high-risk group, but improves when including children with medium risk. Sensitivity improved and specificity was excellent when both groups were considered (Baren-Cohen, Cox, Baird, Swettenham, & Nighingale 1996). Other studies using the CHAT with children who were older showed good levels of sensitivity and specificity (Scambler, Rogers, & Wehner, 2001). Another weakness of the CHAT is that data is not available on the effectiveness of the CHAT in differentiating children with ASD and those with other forms of psychopathology (Matson & Minshawi, 2006).

Many of the measures of ASD already discussed have been developed for and focused primarily on diagnosing and assessing children. The Autism Spectrum Disorders-Diagnosis for Adults (ASD-DA) is a scale designed to measure symptoms of ASD as well as differentiate between disorders along the spectrum, Autism, PDDNOS, and Asperger's Disorder. There are two rating scales, one form used with adults, the ASD-DA, and a second form used with children, the ASD-CA. The adult version consists of 31 items rated as "0"= not different; no impairment, or "1"= different, some impairment. The raters are asked to compare the target individual to a typically developing person his/her age residing in the community. Sample items include: limited number of interests, abnormal repetitive hand or arm movements, becomes upset with change of routine, reads nonverbal cues of other people, and reaction to normal, everyday lights. Reliability for the ASD-DA was found to be acceptable with item reliability averaging .40. Test-retest was also adequate with kappa coefficients ranging from .31 to .61 (Matson, Wilkins, & Gonzalez, 2006).

Core Features of ASD

Since the earliest research in the field of ASD, a common theme has been the triad of impairments. These impairments surround the areas of socialization, communication, and repetitive behavior or insistence on sameness. Discussed thus far have been deficits characteristic to ASD in relation to assessment and diagnosis. An overview of the core features of ASD will now be discussed.

Socialization. A key feature in people with ASD is their inability to relate to other people. Typically developing babies learn throughout the first months of life to socialize with those in their environment. Babies look at the face of a caregiver, make eye contact, and vocalize. Historical accounts from parents indicate that infants with ASD fail to socially smile, make eye

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contact, or engage in other social behaviors appropriate for their developmental level (Volkmar, 1987). Typically developing children, by about 6 to 9 months begin to share attention with other people. This is referred to as joint attention and entails looking at a person and then either looking at or pointing to an object of interest in order to coordinate attention. Many children with ASD fail to master the use of eye gaze and gestures to share attention with another person. Because joint attention is a social skill that is typically acquired at such a young age, impairment in joint attention is one of the first symptoms noticed in infants with ASD (Osterling & Dawson, 1994).

Once thought to be nonexistent in children with ASD, attachment has been evident in this population, particularly toward parents. Although, responses to caregivers may be qualitatively different than typically developing children (Sturmey & Sevin, 1994), children with ASD do display behaviors towards parents/caregivers that are different from strangers (Sigman & Mundy, 1989; Dissanayake & Crossley, 1996). Children with ASD will seek to be in the proximity of their caregivers as opposed to an unfamiliar person and after being separated from their parents for a length of time.

Research on social skills and ASD has focused primarily on children. Consequently, less is known about social skills of adults with ASD (Njardvik, Matson, & Cherry, 1999). Deficits in social skills in people with ASD and comorbid ID persist into adulthood with little improvement overtime (Beadle-Brown, Murphy, Wing, Gould, Shah, Holmes, 2002). Although some social functioning may improve as children develop (Rutter & Garmezy, 1983), deficits in social skills in adults are present (Matson, Baglio, Smirolodo, Hamilton, & Packlowskyj, 1996). The vast majority of research on social skills and people with ASD has focused on children, and as a result there is a dearth of studies involving adults, particularly those with ID. People with the

more severe forms of ID typically have greater deficits in social skills, and coupled with symptomatology of ASD, results in much larger deficits in this domain (Njardvik et al., 1999). Njardvik and colleagues studied the differences in social skills between participants with autism, PDDNOS, and ID only. Social skills deficits were most severe in people with autism, followed by those with PDDNOS, and then ID. Additionally, significant differences were found between the skills of people with autism and those with ID alone. Fewer differences were found between participants with PDDNOS and those with autism and those with ID only. These results are consistent with current literature, characterizing ASD as a disorder of social skills distinct from just ID, with more severe deficits in social skills in people with autism and less severe deficits in individuals with PDDNOS.

Language and Communication. Early researchers on ASD suggested that about half of the people with a diagnosis would never acquire speech (Rutter, 1978). However, this estimate may be decreasing due to more accurate methods of diagnosis, earlier diagnosis, and early intervention (Klinger, Dawson, & Renner, 2003). Some people with autism never develop speech and for those who do, many never acquire functional speech. For many individuals with ASD who have language, their speech is usually abnormal involving echolalia and pronominal reversal (Rutter & Bartak, 1971). For example, the person may say "You want more milk," when actually requesting more milk for themselves. Further, for the children who develop language, their speech may be of unusual rhythm, stress, intonation, or volume when compared to children with just ID (Lord, et al., 2000).

In addition to the deficits in verbal communication, people with ASD also have marked difficulties with nonverbal communication. Eye contact and nodding in response to a request or to gain attention from a person are often impaired. Deficits in non-verbal communication also

encompass their awareness of other people's non-verbal communication, such as facial expression and body language. For example, a person with ASD may engage in monologues about a particular area of interest without noticing that listener's obvious lack of interest displayed through body language.

For people with ASD, deficits in communication overlap with the deficits in socialization. The social context of language is referred to as pragmatics. Some people with ASD develop language. However, their use of language in conversations and in a social context is lacking. Deficiencies in social interactions such as maintaining, joining, and ending conversations, are noted. Due to language difficulties found in people with ID, there may be fewer differences in this area when compared to people with ASD and ID. Again, little research has been generated on communication of adults with ASD and more severe forms of ID.

Behavior. The third hallmark characteristic of individuals with ASD encompasses behavioral excesses. Restricted areas of interests, repetitive behaviors, and insistence on sameness are observed in people with ASD. They have circumscribed interests that are more intense than normal. These interests may consume the person, not allowing time for much else. Some common examples of interests are studying maps of the solar system or talking about vacuums or other mechanical devices. Another characteristic of people with ASD are repetitive behaviors such as stereotypies. Stereotypies are motor movements such as whole body rocking, hand flapping or other unusual, repetitive hand movements. These behaviors are rhythmic in motion and appear purposive. Lastly, an insistence on sameness is often observed in this population. People with ASD may demand that the arrangement of furniture in a room remains unchanged or the same route always taken to the store, or may engage in rituals. Insistences that

the environment, interactions with people, and routines remain the same are characteristic of people with ASD and can be a source of distress (Kanner, 1951).

Differential Diagnosis of ASD

As discussed throughout this review, ASD occur along a continuum of severity. The most severe form is what many people refer to as "classic autism" or Autistic Disorder according to the DSM-IV-TR (APA, 2000) and the least severe being PDDNOS. In order to differentiate between the disorders of the spectrum, severity of symptoms and age of onset are considered.

Autistic Disorder was once termed early infantile autism, but as the children aged, the term seemed less appropriate as the deficits persisted into adulthood. People with Autistic Disorder show symptoms prior to the age of 3 years and have more severe deficits in the triad of impairments: communication, socialization, and behavioral excesses. Additionally, there is a higher prevalence of ID in people with Autistic Disorder.

The first reference to a disorder characterized by regression after seemingly normal development was by Theodore Heller in 1908. The disorder referred to as Heller's Syndrome or dementia infantalis is now termed Childhood Disintegrative Disorder (CDD). These children regress around the age of 3 to 4 years, losing previously gained skills and behaviors. The regression begins with mood problems, speech loss, incontinence, and regression of other skills without recovery. When compared to the amount of research on autism, research involving CDD is quite scarce. One study conducted in India reported a prevalence rate of CDD at .45% in a clinic population, a mean age of onset of 3.76, and 83% of the sample was male (Malhorta & Gupta, 2002). However, the sample size of participants presenting with CDD was low (n=12), therefore limiting the generalizability of results.

Similar to the defining feature of CDD (i.e., age of onset after normal development), Rett's Disorder is another Pervasive Developmental Disorder along the continuum that evinces regression in development. The difference, however, is that this disorder is primarily observed in females and the time of normal development is shorter: months as opposed to years. Rett's Disorder has traceable genetic causes on an X-linked gene. The girls have typical development until the 6th to 18th month of life when regression in social skills, head growth deceleration, and loss of functional use of the hands and stereotypic "hand wringing" presents. Rett's disorder is quite rare and believed to occur in between 1 of 10,000 to 15,000 births.

For people who do not meet the full criteria for a diagnosis of Autistic Disorder, while still evincing qualitative impairments in the core features of autism, a diagnosis of Pervasive Developmental Disorder Not Otherwise Specified (PDDNOS) is appropriate. However, there is yet to be reliable criteria for the diagnosis of PDDNOS (Towbin, 1997). Instead, the diagnosis of PDDNOS is made when criteria for other categories of ASD are not met (Tidmarsh & Volkmar, 2003). PDDNOS is the most commonly diagnosed disorder along the autism spectrum; yet it remains one of the least studied (Matson & Boisjoli, 2007).

Although many people with ASD have an ID, many do not. One diagnosis on the autism spectrum not associated with ID is Asperger's Disorder. Asperger's Disorder is characterized by average or above average intelligence, impairments in socialization and communication, and restricted interests and repetitive behaviors. The one criterion differentiating Asperger's Disorder from a high functioning autism according to the DSM-IV-TR is language development. In the more classic autism, a marked delay in language is observed in both those with low and high intellectual functioning. In people with Asperger's Disorder this delay is not displayed. Language is acquired at a developmentally normal rate or possibly even earlier, with some

children showing hyperlexia (Nation, Clarke, Wright, Williams, & Patterns, 2006). Although there has been research on differentiating between the disorders along the ASD continuum, there it still much empirical research needed.

Prevalence

Once described by Kanner as a rare disorder, more recent estimates have suggested that ASD are one of the most common disorders of childhood. Early estimates placed autism at a rate of about 4 in 10,000 (Lotter, 1966; Wing & Gould, 1979). As of late, there has been much publicity on the increasing prevalence of autism, with some reports indicating ASD as high 6.7 per 1000 (Chakrabarti & Fombonne, 2001). However, ASD has been expanded to include Autistic Disorder, Asperger's Disorder, PDDNOS, Rett's Syndrome, and Childhood Disintegrative Disorder. Also, the criteria that constitute Autistic Disorder and PDDNOS, the most common ASD, have also been expanded in recent years. Thus, increased prevalence may be caused primarily by a broadening definition.

An important distinction exists in the rising number of people affected with this disorder. Although on the surface it appears that ASD are increasing at an exceptional rate, what some in the media have even termed an epidemic, an expanding definition may be the primary cause. When the disorder was initially identified, criteria were much more specific and included only those individuals with what many people today term "classic autism" (Wing & Potter, 2002). In addition to changes in diagnostic criteria, Wing and Potter (2002) also propose that the increase is due to increasing awareness among parents, professionals, and the public of ASD, and the recognition that this disorder can also co-occur with intellectual disability, physical disability, other forms of psychopathology, as well as average to above average intelligence. With updates to the Diagnostic and Statistical Manual and broadening of the criteria, many people who were

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once diagnosed with ID alone, are now classified as having Autistic Disorder, PDD-NOS, or Asperger's Disorder. The increasing prevalence can also be attributed to the increase in awareness of the disorder as well as earlier diagnosis. Additionally, because of the awareness of the disorder, services are becoming available to people with ASD, where the same service may not be available to a person with only a diagnosis of ID (Wing & Potter, 2002). These are all important points when considering the rising prevalence of ASD. While many of these factors appear to be contributing to the rise in diagnoses, further examination of the prevalence of ASD is warranted.

Dual Diagnosis/Comorbidity

Researchers have shown that symptoms of ASD persist into adulthood (Matson et al., 1996). Further, people with ASD present with a higher rater of co-occurring diagnoses, such as ID, epilepsy, vision and hearing deficits, and speech and language impairments (Gillberg & Billstedt, 2000). Additional diagnoses frequently reported to co-occur with ASD are, 2.75% having cerebral palsy, 1.1% tuberous sclerosis, 1.1% Down's Syndrome, .9% congenital rubella, and .3% neurofibromatosis (Fombonne, 1998).

The most common dual diagnoses for people with ASD is ID. Reportedly as many as 75% of individuals with ASD also have some form of ID; however, such a large incidence is debatable (Edelson, 2006). Previous reports on the percentage of people displaying ASD and ID are questionable as many of the statistics reported were without citations, and for those with citations, the numbers were based on non-empirical claims (Edelson, 2006). With that said, a study done by Chakrabarti and Fombonne (2001) reported on a sample of 97 children, all diagnosed with an ASD, where 25.8% were diagnosed with some form of ID. Dosen and Day (2001) also suggesting the incidence of ID co-occurring with ASD to be between 20% and 74%.

Differentiating between the two groups, ASD and ID, is difficult due to similarities in behaviors such as limitations in communication and socialization, as well as the presence of stereotypies. However, researchers have been successful in differentiating these two groups. Such studies have found differences in IQ score (i.e., larger spread between verbal and performance indices in the ASD group; DeMyer, et al., 1974), comparatively larger deficits in expressive language and socialization, a higher occurrence of challenging behaviors, and significantly lower adaptive behavior and academic levels in the ASD group compared to the ID group (Ando & Yoshimuro, 1979; Ando & Yoshimuro, & Wakabayashi, 1989).

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With such a large incidence of people with ASD having comorbid ID, whether it is 20% or 75%, imposes complications with the diagnosis of other conditions. People with ID typically have limited verbal abilities, and therefore diagnosing other forms of psychopathology using more traditional, self-report methods has obvious limitations. Thus, there is a lack of research on comorbid disorders and people with ASD and ID as well as specific assessment measures for people with ID and co-occurring psychopathology.

People with ID have a greater than average risk for comorbid psychopathology (Borthwick-Duffy & Eymenn, 1990), and this is also suggested for people with ID and ASD. In recent years, researchers have begun to explore the existence of psychological disorders that co-occur with ASD. Tsakanikos, et al. (2006) conducted a study looking at psychopathology in people with ASD and ID with limited results. The researchers were unable to find any significant differences in people with ASD compared to those without ASD, when looking at Schizophrenia, Adjustment reaction, Anxiety and Depressive disorders, and Dementia using the Psychopathology Assessment Schedule for Adults with Developmental Disabilities (PAS-ADD). However, other research, albeit limited, has focused on the more common disorders, such as anxiety and depression, finding a higher incidence in people with ASD (Howlin, 1997). With the inadequate and conflicting evidence, there is need for better measures and comprehensive research on comorbid disorders that appear to occur with ASD, such as anxiety, depression, conduct disorders, attention deficit hyperactivity disorder, and feeding difficulties.

Research on comorbid disorders of ASD are mainly limited to research on children. However, a number of studies have used the Diagnostic Assessment of the Severely Handicapped-II (DASH-II; Matson, 1995) to investigate other symptoms of psychopathology and ASD in adults. Such studies have found elevations on subscales including, stereotypies,

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mania, mood, anxiety, schizophrenia, and organicity (Bradley, Summers, Wood, & Bryson, 2004; Matson et al., 1999). Additionally, due to the limited amount of research in this area, prevalence studies of psychopathology and ASD show great variability. Furthermore, the paucity of research on rating scales and the actual lack of rating scales to assess people with ASD and comorbid psychopathology has contributed to the gap in the assessment and treatment of this population. There is need for scales to measure symptoms of psychopathology commonly seen in people with ASD and with adequate specificity to accurately diagnose certain characteristics of ASD as psychopathology. A brief review of the forms of psychopathology that appear to most commonly occur with ASD will be briefly reviewed next.

Attention Deficit Hyperactivity Disorder (ADHD)

Attention Deficit Hyperactivity Disorder is characterized, according to the DSM-IV-TR, as a pattern of inattention and hyperactivity-impulsivity that is more severe and occurs more frequently than in a typically developing individual of the same developmental level (APA, 2000). The presentation of the impairing symptoms needs to be present prior to 7 years of age. However, the diagnosis of a Pervasive Developmental Disorder, or ASD, is exclusionary for a diagnosis of ADHD according to the DSM-IV-TR. Little research has been published regarding the relationship between ADHD and ASD (Loveland & Tunali-Kotoski, 1997). This lack of attention may be due in part to the exclusion criteria for an ADHD diagnosis and also because symptoms of ADHD may be characteristic of ASD (Volkmar, Klin, & Cohen, 1997). People with ASD often exhibit either hyper- or hypo-active behavior (i.e., behavior rarely within normal limits; Gillberg & Billstedt, 2000). However, a study by Goldstein and Schwebach (2004), using a retrospective chart review, compared children with ASD meeting diagnostic criteria for ADHD, to children with a diagnosis of just ADHD with no ASD diagnosis, and to a third group

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of children diagnosed with ASD alone. The authors found a clinically distinct group of children diagnosed with ASD who met criteria for ADHD compared to children with just a diagnosis of ASD. The children with ASD displayed symptoms of ADHD similar in symptoms to those with ADHD only (Goldstein & Schwebach, 2004). Therefore, ASD may co-occur with ADHD. Research on adults with ASD and ADHD has been almost nonexistent. One study by Galli Carmanti, Deriaz, and Bertschy (2006) reported on ADHD-like symptoms that were responsive to low doses of venlafaxine, an antidepressant, in adolescents and adults with ID and ASD. However, further research is not available at present.

Conduct Disorder

Just as with people with ASD, individuals with Conduct Disorder also display social impairments. Conduct Disorder is identified as, according to the DSM-IV-TR, behavior that violates the basic rights of others or some societal norms (APA, 2000). These can include aggression towards others, destruction of property, deceitfulness or theft, and serious violations of rules. Some researchers have found evidence that there are children identified as having a Conduct Disorder, who also have difficulties in understanding pragmatics and with a subset of these children meeting criteria for an ASD (Gilmour, Hill, Place, Skuse, 2004). Although these two groups share some features, Gilchrist, Cox, Rutter, Green, Burton, and Le Couteur (2001) successfully differentiated between adolescents with Asperger's Disorder or high-functioning autism and those with Conduct Disorder based on measures of ASD (i.e., ADOS and ADIR) and IQ. The participants with Conduct Disorder had a different IQ profile compared to both of the ASD groups and displayed reciprocal communication and less social impairments (Gilchrist, et al., 2001). Besides research investigating differences between individuals with Conduct Disorder

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and ASD, research on comorbidity in children or adults has not been conducted with this population to date.

Anxiety

Anxiety is characterized by worry and is reported to be common to people with ASD (Atwood, 1998). According to the DSM-IV-TR, Anxiety Disorders are broken down into numerous other disorders, such as Panic Disorder, Agoraphobia, Specific Phobia, Social Phobia, Obsessive-Compulsive Disorder, Post Traumatic Stress Disorder, and Generalized Anxiety Disorder, among others (APA, 2000). Tantum (2000) reported that panic, social anxiety, and obsessive-compulsive characteristics appear to be the most commonly expressed symptoms of anxiety in people with ASD. Obsessive Compulsive Disorder and Phobia in relation to ASD will be reviewed below.

Obsessive Compulsive Disorder. Characteristics of Obsessive Compulsive Disorder (OCD), such as repetitive actions or words, may present or resemble the behavioral excesses of people with ASD. Defined by the DSM-IV-TR, obsessions or compulsions recur and are time consuming and distressing to the individual affected (APA, 2000). People with ASD may discuss a particular topic exhaustively, require the physical environment remain exact, or become quite upset when a caretaker chooses to take an alternate route to the store. OCD can be confused with the preoccupations or rituals characteristic of people with ASD. However, the difference is that people with OCD are typically distressed by the behavior, whereas the person with ASD is not (Wing & Atwood, 1987). While this distinction is made in adults, with children it is more complicated. The DSM-IV-TR states that with children, distress does not need to be evident for a diagnosis of OCD, due to a lack of cognitive awareness, therefore making diagnosis of symptoms more complicated and often difficult to tease apart. However, a limited number of

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studies addressing compulsions in people with ASD did find a large percentage of adult participants with diagnoses of severe/profound ID displayed compulsive behaviors (McDougal, et,al., 1995; Bodfish, Symons, Parker, & Lewis, 2000). Better scales to measure the traits of OCD are needed along with more research, particularly in adults with ASD and ID, as knowledge in this area is lacking.

Limited research exists on OCD and people with ASD. Although, some recent studies regarding incidence of obsessive-compulsive behaviors in the family members of people with ASD have appeared (Hollander, King, Delaney, Smith, & Silverman, 2003). A study by Hollander and colleagues (2003), examined OCD traits of parents of children with high and low rates of repetitive behaviors. Children with a high rate of repetitive behaviors were significantly more likely to have parents with obsessive compulsive traits compared to children with low rates of repetitive behavior. The researchers also found that children with narrower interests and compulsive rituals were more likely to have a parent with obsessive compulsive traits. Children who had high rates in both repetitive behavior and compulsive traits were nine times as likely to have a parent with OCD.

Phobia. While there is some literature on phobias in children with ASD, research regarding phobias of adults with ASD is quite sparse. Matson and Love (1990) conducted a study on children with ASD and found a higher incidence of phobias compared to typically developing, age-matched peers. Children with ASD had more phobias related to animals and medical and particular situations. Additionally, Evans, Canavera, Kleinpeter, Maccubbin, and Taga (2005) were able to replicate these findings while including a group of children with Down's syndrome and control children matched on both mental and chronological age. These researchers looked to see if fears common to children with ASD are just characteristic of the

disorder, a separate comorbid condition, or a natural progression of fears developmentally. The authors found that the children with ASD had a different pattern of fears and anxiety compared to mental and chronologically age matched peers. Studies involving adults with ID and ASD are lacking and greatly needed.

Tic Disorder

Tic disorders, like OCD, share some commonalities with symptoms of ASD. As defined by the DSM-IV-TR, a tic is sudden vocalization or motor movement that is recurrent and stereotyped (APA, 2000). Repetitive and stereotyped behaviors, being diagnostic criteria for ASD, can vary in topography and may be difficult to differentiate from a tic. In some cases the distinction can be made, as tics tend to be involuntary where stereotypies appear to be more intentional. Tics are also sudden and disrupt the flow of speech and are not as rhythmic in nature as stereotypies (Baron-Cohen, Mortimore, Moriarty, Izaguirre, & Robertson, 1999). Additionally, people who display tics may appear distressed while a person exhibiting a stereotypy appears amused (Lainhart, 1999). However, tics also appear to occur on a continuum making differentiation more difficult (Golden, 1978). Researchers have reported that tic disorders are common to children with ASD (Gadow & DeVincent, 2005; Gadow, DeVincent, Pomeroy, Azizian, 2004). Furthermore, Gadow and DeVincent (2005) reported that children with ASD, who also exhibited signs of tics and ADHD, were also more likely to have other psychiatric symptoms and more severe forms of ASD. These children experienced more environmental problems and were prescribed medication more often (Gadow & DeVincent, 2005). In addition, these researchers found no differences in the co-occurring tic symptoms in the children with and without ASD. These results suggest that a tic disorder is distinguishable from the stereotypic characteristics of ASD and present similarly to "typically" developing children

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with tics. Again, little research has been reported on the prevalence or treatment of adults with an ASD and comorbid tic disorder.

Affective Disorders

Depression is a common comorbid disorder in people with autism (Loveland & Tunlai-Kotoski, 1994). Researchers have also reported that people with ID have a higher incidence and prevalence of depression (Kazdin, Matson, & Senatore, 1983). However, depression is difficult to diagnose in people with ID as the topography of the symptoms may change with the severity of ID. A review was conducted by Smiley and Cooper (2003) investigating possible behavioral equivalents in people with severe and profound ID. The authors found that in individuals with depression, there were increases in agitation, self-injury, skill loss, increased social withdrawal or isolation, and an increase in somatic complaints (Smiley & Cooper, 2003). With ASD being comprised of deficits in communication, diagnosing people with ASD and ID with depression often poses a challenge. More recently, researchers have attempted to investigate the co-occurrence of these two forms of psychopathology. Ghaziuddin, Tsai, and Ghaziuddin, (1992) for example, reported an occurrence rate of comorbid depression in children with autism at 2%, and those with Asperger's Disorder as high as 30%. A recent study looking at adults with ID and autism found a higher prevalence of depressive disorders when compared to people with ID and no ASD (Morgan, Roy, & Chance, 2003).

Eating/feeding Disorders

Even in Kanner's first account of children with autistic disturbance of affective contact, eating problems were noted. The DSM-IV-TR recognizes three feeding disorders: Pica, Rumination, and Feeding Disorder of infancy or early childhood (APA, 2000). Pica is the ingestion of non-food items such as string, paint chips, cigarette butts, leaves, and feces. The

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prevalence of pica in people with ASD has been shown by researchers to be higher than in people with Down's syndrome, 60% compared to 4% respectively (Kinnell, 1985). Rumination is another feeding disorder recognized by the DSM-IV-TR and characterized by the repeated regurgitation and chewing of food, without evidence of gastrointestinal illness or medical condition. Additionally, for people with ID and/or ASD, the rumination needs to be severe enough to warrant attention. The last feeding disorder defined by the DSM-IV-TR, is feeding disorder of infancy or childhood. Individuals with this disorder have gone for 1 month or more without eating adequately resulting in no weight gain or weight loss. Again, this behavior can not be the result of a gastrointestinal illness or medical condition.

In addition to the disorders of eating classified in the DSM-IV-TR, people with ASD often exhibit other disorders that interfere with mealtime. Such behaviors are food selectivity (type and texture) and food refusal (Ahearn, Castine, Nault, & Green, 2001). Ahearn et al. (2001) conducted a study investigating the feeding difficulties of children with ASD. The authors found that more than half of the participants (n= 30) displayed low levels of food acceptance including selectivity and refusal. Some research is available regarding adults with ID and feeding/eating difficulties/disorders (see Grevestock, 2003, for a review); however, research in this area is not available specifically investigating adults with ID and ASD.

Assessment/Diagnosis of Comorbid Psychopathology

Researchers have shown some evidence of comorbid psychopathology in people with ASD and ID (Evans, Canavera, Kleinpeter, Maccubbin, & Taga, 2005; Ghaziuddin et al., 1992; Kinnell, 1985; Matson & Love, 1990; Morgan, Roy, & Chance, 2003). As mentioned previously, identifying symptoms and characteristics of psychopathology in people with ID exhibiting deficits in language, poses an obvious difficulty in regards to diagnosis. Additionally, in people

with multiple disabilities, symptoms of comorbid disorders may be displayed topographically different from the typical population. Due to the complexity of the target population, few measures are available to screen and/or assess additional Axis I disorders in the ID population, and more specifically in individuals with ASD. The best available instruments are reviewed below.

PAS-ADD. The Psychiatric Assessment Schedule for Adults with Developmental Disabilities (PAS-ADD) Checklist is a measure used to detect psychopathology in individuals with ID. The scale was adapted from the PAS-ADD Interview, which is semi-structured and requires trained administrators to conduct the interviews. Using the items that were predictive of ICD-10 diagnosis of psychopathology from the PAS-ADD Interview, the authors designed the PAS-ADD Checklist. The PAS-ADD Checklist is a 29-item informant-based screener. It was designed to be used with caretakers and family members to determine if further evaluation of psychopathology is warranted. Informants rate each item using a four point scale on the following broad areas: appetite and sleep, tension and worry, phobias and panic, depression and hypomania, obsessions and compulsions, psychosis, and autism. Inter-rater reliability is good with an overall total mean correlation of 0.79 and all subscale correlations above 0.55 (Moss et al., 1998).

PIMRA. The Psychopathology Instrument for Mentally Retarded Adults (PIMRA) is a 56-item scale. The items correspond to eight subscales: Schizophrenia, Affective Disorder, Psychosexual Disorder, Anxiety Disorder, Adjustment Disorder, Somatoform Disorder, Personality Disorder, and Inappropriate Adjustment. The scale has two versions, a self-report and informant version. The items are in true/false format. The internal consistency, test-retest,

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and inter-rater reliability are all reportedly good (Balboni, Battagliese & Pedrabissi, 2000; Matson, Kazdin, Senatore, 1984)

DASH-II. The Diagnostic Assessment of the Severely Handicapped II (DASH II; Matson, 1995) is a commonly used, well researched tool for identifying psychopathology in people with the more severe forms of ID. This 84-item, informant based measure is administered in an interview-type format to a person who has known the individual for at least the past six months. The scale consists of 84 items that load on 13 subscales. The subscales consist of symptoms characteristic of 13 common psychiatric disorders. The subscales are: Anxiety, Depression, Mania, PDD/Autism, Schizophrenia, Stereotypies, Self-injury, Elimination, Eating, Sleep, Sexual, Impulse, and Organic. The informant is asked to report how often the behavior has occurred over the previous two weeks, as well as the duration of the problem and its severity. Items are scored on a three-point likert-type scale with, "0" = not a problem; "1" = 1 to 10 occurrences in the past two weeks; and "2" = more than 10 occurrences in the past two weeks. Reliability on the scale is reportedly good (Matson, Gardner, Coe, & Sovner, 1991) with test-retest reliability at 0.84 and inter-rater reliability at 0.86 (Matson, 1995). In addition, many of the subscales of the DASH-II have been validated, including the PDD/Autism, Depression, and Mania subscales (Matson & Smiroldo, 1997; Matson, Smiroldo, & Hastings, 1998; Matson, et al. 1999). However, this scale and the two noted above are for persons with ID. No specialized comorbidity measure of adults with ASD exists.

Purpose

A paucity of research and measures for people with ASD and comorbid psychopathology exists. High rates of ASD and the very serious, debilitating nature of the condition, particularly when comorbid psychopathology is present, make scale development for differential diagnosis essential. Thus, while a compelling argument for such an assessment method exists, no measure of comorbid psychopathology for adults with ASD has been developed to date. The purpose of this study then was to establish a new measure of comorbid psychopathology in adults with ASD by assessing the reliability and conducting an exploratory factor analysis of the Autism Spectrum Disorders-Comorbidity for Adults (ASD-CA). Numerous measures are available to diagnose comorbidity for people without ASD or ID; however, these measures are typically self report, which is unworkable for most people with severe/profound ID and ASD. The ASD-CA is similar to other informant based measures of psychopathology used in populations with severe forms of ID; however, there are important differences. While the more commonly used tools, such as the DASH-II, encompass many forms of psychopathology, it does not screen for disorders that are suggested to be more common in people with ASD. Disorders such as ADHD, phobias, and tics are all screened with the ASD-CA. A more restricted number of Axis I psychopathologies, specific to high probability comorbidity with ASD were selected so that a greater number of symptoms could be evaluated. Thus, the scale is designed to aid in diagnosis, versus to serve solely as a screening tool, as is the case with the DASH II. Additionally it is important to have a scale available for use with people with ID and ASD that is normed for this particular population. As already discussed in this paper, some characteristics of ASD resemble symptoms of Axis I psychopathology, making the establishment of norms for this population more difficult, but at the same time imperative. Reliability and related psychometric constructs of the ASD-CA

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were determined using common tests of reliability, including, inter-rater, test-retest, internal

consistency, item analysis, and factor analysis.

Method

Participants

Participants for this study were selected from two large, developmental centers located in the Southeastern region of the United States. The state-run developmental centers range in size from 300 to 500 residents and primarily serve people with severe and profound ID. The 169 participants ranged in age from 16 to 78 years with a mean age of 48.59 years and a median age of 48 years. The breakdown for level of ID was as follows: Profound ID (n =150), Severe (n = 7), Moderate (n = 4), Mild (n = 0), and unspecified (n = 8). Ethnicity of the participants was predominately Caucasian (n =133) and African American (n = 35), and 1 participant was identified as Hispanic. Ninety-seven of the participants were males and 72 were females. Selection criteria for participation in this study was based on DSM-IV-TR and ICD-10 diagnostic criteria. Two raters were required to be in agreement on diagnostic criteria in order for a classification of ASD to be made. The participants were classified as meeting criteria for Autistic Disorder or Pervasive Developmental Disorder Not Otherwise Specified (PDDNOS). In addition to the classification of ASD, 65 of the participants had at least one additional Axis I diagnosis and 4 of these participants had 2 additional diagnoses. These diagnoses were made previous to the current study by a licensed psychologist in consensus with the habilitation team. This method is considered the gold standard in ASD diagnostic research at this time (Matson, Nebel-Schwalm, & Matson, 2007). The most frequent comorbid Axis I diagnosis was Stereotypic Movement Disorder, with or without SIB (n = 19), Pica (n = 15), Bipolar Disorder (n = 11), Mood Disorder NOS (n = 5), Post Traumatic Stress Disorder (n = 3), Major Depressive Disorder (n = 4), Tic Disorder (n = 2), Rumination Disorder (n = 1), Psychotic Disorder (n = 2),

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Anxiety Disorder NOS (n = 1), Attention Deficit Hyperactivity Disorder (n = 1), Phobia (n = 1), and OCD (n = 1). Also worth mentioning, although not classified as an Axis I diagnosis, 12 participants had a diagnosis of Tardive Dyskinesia. Table 1 lists demographics according to group.

Table 1
Demographic Characteristics of Participants (N=169)

Characteristic	n (%)
Age	
0-21	4 (2.4 %)
22-45	58 (34.3 %)
46-65	96 (56.8%)
66+	11 (6.5%)
Gender	
Female	72 (42.6 %)
Male	96 (57.4%)
Race	
African American	35 (20.7 %)
Caucasian	133 (78.7%)
Hispanic	1 (.6%)
Level of ID	
Profound	150 (88.8 %)
Severe	7 (4.1 %)
Moderate	4 (2.4%)
Mild	0 (0%)
Unspecified	8 (4.7%)
Verbal Ability	
Verbal	50 (29.6 %)
Non-Verbal	119 (70.4 %)
Additional Axis I diagnoses	65 (38.9%)

Test Development

When constructing a new measure there are numerous methods detailed in the literature on how to best establish reliability (Anastasi & Urbina, 1996). Crocker and Algina (1986) delineated essential steps in the systematic approach to test construction. The first step in

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developing an assessment measure is to evaluate the purpose of the test scores. With this in mind, items are developed to assess the construct or constructs to be investigated. The initial pool of items for the ASD-CA were derived from criteria of the ICD-10, DSM-IV-TR, and a review of the literature pertaining to psychopathology in people with ID, ASD, and people with limited verbal skills. The items were then reviewed by three doctoral level clinicians with expertise in developmental disabilities and psychopathology and an independent psychologist experienced with ASD and ID populations. Before the administration of the scale, the items were pilot tested to direct-care staff through clinical interviews to assess and enhance item clarity. Lastly, the measure was field tested in the present study with a large representative sample (Crocker & Algina, 1986).

Measures

     Autism Spectrum Disorders- Comorbidity for Adults (ASD-CA). The ASD-CA is a new, informant-based measure that assesses persons with a current diagnosis of ASD for psychopathologies that are more commonly found to co-occur with ASD based on available literature (Evans et al., 2005; Ghaziuddin et al., 1992; Kinnell, 1985; Matson & Love, 1990; Morgan et al., 2003). Each of the 84 items represent criteria used in the diagnosis of different forms of psychopathology, including, Depression, Conduct Disorder, Attention Deficit Hyperactivity Disorder, Tic Disorder, Obsessive Compulsive Disorder, Phobia, and Eating Disorder. Sample items include: appearance of physical stress; easily becomes angry; is always on the go; and engages in repetitive behaviors to reduce stress. Assessments were administered by doctoral level graduate students trained by the authors of the ASD-CA and prior to administration. Informants were direct-care staff of the state-run centers who were familiar with the participant and had known them for at least the previous 6 months. The ASD-CA was read to

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the informant by the interviewer in a private area of the participant's home, free from distraction. Informants were instructed to rate each item to the extent that it had been a recent problem: '0 = not a problem or impairment, not at all' or '1= some problem or impairment.'

Power

In order to determine the sample size required for the study, an a priori power analysis was conducted. GPower 3 (Faul & Erdfelder, 2007), a statistical computer program, was used with a large effect size of r = 0.5, alpha (α) set at a significance level of .05, and power set at .80, (Cohen, 1965). Through power analysis, a sample of at least 26 was determined to be optimal for reliability analyses. For appropriate power to conduct a factor analysis, the literature reports varied criteria for the number subjects needed to conduct the analysis. Goroush (1983) suggests 5 participants per item or 200 participants, where MacCallum and collegues (2001) propose a ratio of participants to items as 4:1. However, the latter authors state that when communalities are good sample size does not affect the recovery of the factors and smaller sample sizes may be utilized (MacCallum, Widaman, Preacher, & Hong, 2001).

Reliability

Reliability of the ASD-CA was assessed through inter-rater reliability and test-retest reliability. Cohen's kappa was used for both inter-rater and test-retest reliability. Additionally, an item analysis was conducted to determine the appropriateness of the items for this measure and an exploratory factor analysis (EFA) conducted to identify underlying factors of the ASD-CA. Lastly, internal consistency was evaluated by correlating each item with its respective factor established through EFA, and correlating each item against all other items of the measure. Kuder-Richardson-20 was used to evaluate internal consistency.

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Inter-rater reliability. Inter-rater reliability was calculated using Cohen's kappa correlation coefficient. This technique was chosen for this study due to the binary, dichotomous scoring used for the scale, 'not a problem or impairment, not at all' or 'some problem or impairment,' to evaluate agreement between raters while removing chance agreement (Hinkle, Wiersma, & Jurs, 1998). Two direct-care staff familiar with the participant were interviewed to determine inter-rater reliability for the ASD-CA. Correlations greater than .30, fair strength of agreement, were considered acceptable and retained (Landis & Koch, 1977).

Test-retest reliability. Test-retest reliability of the ASD-CA was assessed using Cohen's kappa correlation coefficient. Cohen's kappa measures the agreement between dichotomous variables while removing chance agreement (Hinkle, Wiersma, & Jurs, 1998). Test-retest was administered at two week intervals. This short time interval should reveal adequate reliability of the symptoms of psychopathology.

Item analysis. Items of the ASD-CA were examined to determine appropriateness for the measure. Variance of each item was examined and those items with zero or near zero variance were removed (DeVellis, 1991).

Factor analysis. The ASD-CA consists of items that characterize psychopathology commonly seen in people with ASD: Depression, Phobia, Obsessive Compulsive Disorder, Eating Disorders, Conduct Disorder, Tic Disorder, and Attention Deficit Hyperactivity Disorder. An EFA was conducted to evaluate the underlying factors of this measure. An oblique rotation using the Promax procedure was used. In order to determine the optimal number of factors to retain, the scree plot and Kaiser Criterion were examined. However, on the scree plot, the number of items above the bend and above an eigenvalue of 1 (Kaiser Criterion), resulting in poor factor structure. At a five-factor rotation, the factors were more comprehensible and had

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strong factors (i.e., three or more items per factor with high loadings). A four-factor solution was also attempted however, the factors were less comprehensible some variance was lost due to the rotation. In order to retain enough variance without losing parsimony, a five-factor rotaion was employed. Factor loadings above .32 were considered meaningful and retained for that factor (Tabachnick & Fidell, 2007).

Internal consistency

To evaluate internal consistency, each item was correlated against all items within the respective psychopathology category established with the EFA. The Kuder-Richardson-20 (KR-20) was used to determine internal consistency. For example, one item that represents depression was correlated against all other items that measure depression. This procedure was conducted for the remaining categories that are measured with this scale. KR-20 coefficients of .80 and greater are suggested for adequate internal consistency of a new scale. Additionally, inter-item correlations across each item to all items in the scale were calculated. Higher correlations within versus across factors (diagnostic categories) were expected.

Results

Cohen's kappa was used to assess inter-rater reliability of the original 84 items. These items were identified as possible criteria for diagnosing more common forms of comorbid psychopathology in people with ASD. Seventy-seven pairs of raters were evaluated. Cohen's kappa values for individual items ranged from .07 to .77 with the average reliability for items being .34. The results of this analysis are presented in Table 2.

Table 2
Inter-rater reliability for the ASD-CA using Cohen's kappa (n = 77)

Item	Kappa	Item	Kappa	Item	Kappa	Item	Kappa
1	.31**	22	.41**	43	.10	64	.44**
2	.30**	23	.49**	44	.52**	65	.41**
3	.22	24	.12	45	.41**	66	.22*
4	.32**	25	.42**	46	.17	67	.55**
5	.35**	26	.36**	47	.20	68	.20
6	.31**	27	.53**	48	.45**	69	.17
7	.56**	28	.20	49	.21	70	.44**
8	.32**	29	.07	50	.12	71	.25*
9	.20	30	.34**	51	.27*	72	.66**
10	.40**	31	.26*	52	.38**	73	.37**
11	.46**	32	.29**	53	.33**	74	.34**
12	.31**	33	.40**	54	.23*	75	.12
13	.29**	34	.13	55	.40**	76	.32**
14	.21	35	.63**	56	.28**	77	.40**
15	.29**	36	.35**	57	.37**	78	.49**
16	.64**	37	.27*	58	.26*	79	.38**
17	.54**	38	.42**	59	.54**	80	.19
18	.41**	39	.48**	60	.25*	81	.43**
19	.30**	40	.08	61	.13	82	.50**
20	.26*	41	.37**	62	.31**	83	.67**
21	.26*	42	.50**	63	.37**	84	.77**

*p< .05
**p< .01

Although symptoms of psychopathology can be transient, test-retest at 2 weeks is expected to be relatively stable. In order to assess test-retest reliability, Cohen's kappa was computed for the 52 items, identified through inter-rater reliability analysis as reliable (above the .30 cut-off). Thirty-eight raters were evaluated, and the results are presented in Table 3. Kappa values for individual items ranged from -.07 to .92 with the average reliability for items being .54. Forty-seven items with acceptable inter-rater and test-retest kappa coefficients were retained. Through item analysis of all items of the scale, only two items were identified as having near-zero variance. See Table 4 for a listing of items having near-zero variance.

Table 3
Test-retest reliability for the ASD-CA using Cohen's kappa (n = 38)

Item	Kappa	Item	Kappa
1	.78**	42	.77**
2	.44**	44	.59**
4	.26	45	.77**
5	.43**	48	.71**
6	.56**	52	.47**
7	.63**	53	.92**
8	.58**	55	.58**
10	.63**	57	.15
11	.56**	59	.68**
12	.41**	62	.36*
16	.62**	63	.59**
17	-.07	64	.77**
18	-.07	65	.63**
19	.49**	67	.55**
22	.47**	70	.38**
23	.57**	72	.53**
25	.79**	73	.46**
26	.51**	74	.54**
27	.35*	76	.83**
30	.77**	77	.67**
33	.44**	78	.54**
35	.51**	79	.58**
36	.65**	81	.60**
38	.48**	82	.48**
39	.62**	83	.28
41	.69**	84	.66**

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Table 4
Items excluded after item analysis due to near-zero variance

Item

45 Feelings of worthlessness or excessive guilt.

62 Experiences feelings of hopelessness.

An exploratory factor analysis (EFA) was conducted to empirically establish factors of the ASD-CA. The extraction method used was principal axis factoring and the rotation method was Promax with Kaiser Normalization. Correlations between the factors ranged from .08 to .49. Communalities of items ranged from 0.38 to 0.75. By using an oblique rotation, as the factors were expected to be correlated, there was overlapping variance between the factors resulting in non-exact percentages of variance accounted for by each factor. With that said, five factors were identified accounting for 37.57 % of the variance. Factor 1 accounted for 22.04%, Factor 2 accounted for 6.13%, Factor 3 accounted for 3.40%, Factor 4 accounted for 3.14%, and Factor 5 accounted for 2.86% of the total variance. Factor 1 had eight items loading at .32 or above, Factor 2 had 13 items, Factor 3 had eight items, Factor 4 had 9 items, and Factor 5 had five items. One item loaded on both Factors 1 and 5, one item loaded on both Factors 2 and 3, and one item loaded on factors 4 and 5. The three items with cross-loadings were not retained as these factors already had items that loaded strongly on the respective factors (.50 or greater) (Costello & Osborne, 2005). All items with factor loadings of at least .32 and did not cross load were retained in the scale. Table 5 shows the retained items and the factors on which they load.

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Table 5
Factor Structure of the ASD-CA

Item	Factor 1-Anxiety/ Repetitive Behaviors	Factor2-Conduct Problems	Factor 3-Irritability / Behavioral Excesses	Factor 4-Attention/ Hyperactivity/Impulsivity	Factor 5-Depressive Symptoms
42 Will eat only around specific people.	.81				
64 Will eat only in designated places.	.76				
41 Ordering of objects for no apparent reason or to reduce stress.	.68				
74 Low self-esteem (e.g., no self-confidence, makes negative statements about self).	.57				
65 Engages in repetitive mental Acts (e.g., praying, counting) for no apparent reason.	.57				
78 Experiences excessive worry or concern.	.56				
52 Trembles or shakes in the presence of specific objects or situations.	.54				
35 Damages property.		.78			
16 Destroys other's property.		.70			
38 Loses belongings (e.g., books, toys).		.55			
72 Bullies, threatens, or intimidates others.		.49			

(Table continued)

23 Intrudes upon the activities of others.	.49		
53 Deliberately annoys others.	.45		
36 Steals.	.40		
30 Spiteful, vindictive, revengeful, or wants to get back at others.	.40		
7 Interrupts the activities of others.	.39		
84 Talks excessively.	.39		
77 Waits for his/her turn.	.38		
76 Noisy while playing.	.36		
1 Easily becomes upset.		.68	
73 Irritable mood.		.64	
55 Easily becomes angry.		.63	
59 Tantrums.		.57	
39 Avoids specific objects, persons, or situations causing interference with normal routine.		.45	
63 Persistent or recurring impulses that interfere with activities (e.g. impulse to shout).		.44	
5 Repetition of actions or words to reduce stress.		.32	
2 Concentration problems.			.60
25 Chokes on food or drink.			.55
10 Sudden, rapid, repetitive			.45

(Table continued)

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movements or vocalizations that is not associated with a physical disability				
6 Restless.				.41
22 Always "on-the-go."				.38
12 Runs and climbs more than others his/her age.				.36
8 Has difficulty making decisions.				.36
81 Eats too quickly.				.36
11 Crying.					.63
62 Tearful or weepy.					.60
33 Low energy or fatigue.					.36

Internal consistency of the remaining 37 items was calculated for each factor established through EFA and for each item and the entire scale. Factor 1 had a KR-20 coefficient of .84, Factor 2 had a coefficient of .85, Factor 3 had a coefficient of .82, Factor 4 had a coefficient of .72, and Factor 5 had a coefficient of .44. KR-20 coefficients for each item and its respective factor were calculated and are presented in Table 6. The coefficient value for the overall scale was .91 with individual item-scale coefficients ranging from .27 to .59. These values are presented in Table 7. These indicate good internal consistency for four of the five factors and excellent internal consistency for the ASD-CA, as a value of at least .80 has been suggested for a new scale (Clark & Watson, 1995).

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Table 6
KR-20 for item-subscale coefficients

Factor 1 Items	Alpha	Factor 2 Items	Alpha	Factor 3 Items	Alpha	Factor 4 Items	Alpha	Factor 5 Items	Alpha
42	.68	35	.65	1	.61	2	.52	11	.28
64	.61	16	.59	73	.59	25	.41	62	.32
41	.63	38	.57	55	.68	10	.45	33	.22
74	.61	72	.52	59	.58	6	.37		
65	.63	23	.60	39	.52	22	.43		
78	.59	53	.47	63	.48	12	.37		
52	.51	36	.45	5	.45	8	.39		
		30	.56			81	.34		
		7	.55						
		84	.43						
		77	.46						
		76	.36						

Table 7
KR-20 coefficients for item-scale

Item	Alpha	Item	Alpha	Item	Alpha
1	.49	30	.57	62	.34
2	.46	33	.27	63	.48
5	.54	35	.51	64	.35
6	.42	36	.47	65	.51
7	.57	38	.51	72	.47
8	.37	39	.52	73	.54

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(Table continued)

10	.44	41	.48	74	.47
11	.31	42	.44	76	.36
12	.32	52	.35	77	.45
16	.51	53	.42	78	.43
22	.49	55	.59	81	.31
23	.59	59	.52	84	.38
25	.38				

Total alpha .91

Using the 37 items retained, the inter-rater and test-retest reliabilities were re-evaluated. Kappa coefficients for inter-rater reliability ranged from .30 to .77 with an average kappa for all the items of .43. Kappa values were in the range of .35 and .92 for test-retest reliability with an overall average kappa of .59.

Discussion

Adults diagnosed with ASD and comorbid Axis I diagnoses have been neglected in the literature (Matson & Nebel-Schwalm, 2007), particularly in the areas of scale development and diagnosis. Due to the complexity of symptoms expressed by individuals with ASD, parceling out those symptoms that are characteristic of an additional Axis I diagnosis can be a daunting task, especially without the availability of reliable measures. The aim of this study was to establish the psychometric properties of the ASD-CA through reliability analyses and exploratory factor analysis. This first effort to develop a scale to assess comorbid psychopathology in adults with ASD and severe forms of ID has shown the ASD-CA to be acceptable for use with the target population.

Inter-rater agreement was calculated first for conducting the reliability analysis. Although kappa values were not as large as would be desired, many items were found to be above the acceptable cutoff of .30, indicating fair agreement (Landis & Koch, 1977) with some items found to be as high as .77. However, some items had kappa values as low as .07. While these kappa values may appear low, they are comparable to kappa values from studies assessing the reliability of measures of behavior in similar populations using direct-care staff as informants (Rojahn, Matson, Lott, Esbensen, & Smalls, 2001; Matson, 1995; Moss, et al. 1998). Numerous explanations exist as to why inter-rater agreement using direct care staff does not always result in high reliability for informant based measures. Such explanations include subjectivity of the item content, variability of staff responses due to different levels of exposure to the participant, individual differences in terms of education/reading level between staff members, as well as scale format.

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Items found to be unreliable (a kappa value below .30) included many items requiring the individual being assessed to express his/her thoughts to allow the respondent to endorse (or not endorse) the item with some certainty. In this study, many of the participants were nonverbal or did not have a sophisticated enough communication system in place for adequate expression of mental states. Staff may have inferred such subjective states of the participant, therefore affecting the reliability of the item. Items that may have been unreliable due to this type of subjectivity were, has persistent or recurring thoughts that cause distress and engages in repetitive behaviors for no apparent reason or to reduce stress.

The literature supports variability in staff responses (McGill et al., 2001). For this study, efforts were made so that the majority of informants were direct-care staff, as opposed to home mangers or other professionals who work directly with the individuals but have less contact than direct care staff. However, there are still varying lengths of time that staff spend during the shift working with the individual. The requirements for informants of this study were that they needed to be familiar with the participant and had to have worked with the participant for at least the past 6 months. Some staff may work with the individual for more hours out of the shift, thus allowing for more opportunities to observe the behavior or symptom. At the particular residential facilities where the data were drawn, one staff member is typically assigned to a group of individuals as their primary care attendant. The primary attendant generally engages in more interaction with the resident while assisting in the completion of activities of daily living, such as bathing, feeding, and the delivery of habilitation services. Therefore, these staff are more likely to observe some of the behaviors in question. In several cases, staff interviewed had daily contact with the individual and had known the participant for more than 6 months; however, they may not have been the primary care attendant for the individual. The discrepancy in length of time

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spent with an individual per day may have contributed to the low reliability of some items. Items that may have been affected by the length of time spent with the participant include, sustaining attention in task or play activities; presentation of specific object or situation results in loss of control or fainting; eats too little; weight gain; weight loss; finishes assigned tasks; lacks interest in previously pleasurable activities; indecisive, and avoids activities that require sustained mental effort.

Some disagreement in responses between informants may have also been due to differing educational levels and readability of the measure. Direct care staff education levels at this developmental center range from no high school diploma to college educated. Education level and reading level affects the comprehension of the item and therefore the construct being measured. The Flesch-Kincaid Grade Level score (Flesch, 1948) was calculated to assess the readability of the ASD-CA. The score provided is based on the United States grade system. For example, a score of 10 would indicate that the average person in 10th grade could read the text. The formula used for this score is $(.39 \times ASL) + (11.8 \times ASW) - 15.59$, where ASL is the average sentence length and ASW is the average number of syllables per word. For the ASD-CA, the Flesh-Kincaid Grade Level score was calculated to be 8.3. This reading level for the ASD-CA could pose problems with comprehension for those informants functioning at a lower reading level. While the average reading level of the informants involved in this study is not known, previous research has suggested that with similar samples of informants from developmental facilities, direct-care staff should be provided with materials printed at a 5th grade reading level to optimize comprehension (McKeegan et al., 2002).

Lastly, a potential limitation of the scale, which could result in poor inter-rater reliability, is the binary nature of the responses. While higher response options can cause difficulties with

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discrimination, (e.g., asking an informant to rate a behavior on a 10 point scale) and therefore not reflect true differences, there are also problems with the forced choice of two opposite responses (DeVellis, 1991). The informants in this study were asked to choose from '0 = not a problem or impairment, not at all' or '1= some problem or impairment.' The forced choice left the informant to commit to either extreme, without an option for an intermediate choice (DeVellis, 1991). Informants may have differed in their threshold of what constitutes a problematic symptom.

While results of the inter-rater agreement were fair, results of test-retest agreement were more promising. Some variance was found between the two administration times, yet the results were fairly robust. Kappa values for individual items ranged from .07 to .92 with the average reliability for items being .54. This supports the consistency and reliability of direct-care staff when reporting on symptoms of psychopathology over a 2 week period. Five additional items were found to be unreliable through test-retest reliability analysis. The items with inadequate test-retest reliability included, eats too much; blames others for his/her misdeeds; lies to obtain goods or favors; checking on play objects excessively; and initiates fights. Many of the same explanations for the poor reliability of items for inter-rater reliability can be applied to the items with poor test-retest reliability. Such explanations as readability of the test item, respondent's ability to understand the construct being assessed, and the difficulties in using binary scoring methods are all applicable to the limitations in the test-retest reliability analysis.

Item analysis was also conducted to determine the appropriateness of the items for the scale. Items which had near-zero variance were removed from the item pool, as they would not add to the variance of the scale or be as effective in discriminating between groups- those with psychopathology and those without. Only 2 items were shown to have near-zero variance due to no endorsement for the large majority of participants, with percentages not endorsed ranging

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from 96% to 97%. It is possible that both of these items were not endorsed due to the subjective nature of the item as they both asked about mental states or thoughts of the individual. With many of the participants having limited verbal abilities, the informants would not have access to this information (e.g., feelings of worthless or excessive guilt, experiences feelings of hopelessness).

Results of the EFA were promising. A five-factor solution yielded optimal results consistent with symptom clusters of known psychopathology. Items that were correlated at or above .32 were retained for the factors. Items with cross loadings were removed from the item pool. The number of participants in this study was just shy of the 4:1 participant to item ratio (19 less) suggested by McCraken et al. (2001). However, the communalities values were good, justifying a lower number of subjects. Factor 1 had items consisting mainly of symptoms of anxiety and repetitive behaviors, such as those associated with OCD, tics, and stereotypies. Factor 2 was comprised of items reflecting conduct problems. Factor 3 encompassed items involving behavioral excesses and irritability. Factor 4 contained items that represented symptoms of inattention, hyperactivity, and impulsivity. Lastly, Factor 5 had items which reflected depressive symptoms.

The first factor mainly included items reflecting anxiety and repetitive behaviors often reported in people with OCD, tics, and/or stereotypies. It is also important to note that a number of participants had previous diagnoses of Tardive Dyskinesia (TD). The symptoms of TD may also be represented in this factor as they are also repetitive movements. These different forms of psychopathology involving repetitive behaviors can be difficult to differentiate from one another. For example, as discussed previously, OCD behaviors need to be stressful to the individual; however, this need not be the case for children as they do not have the insight to be distressed.

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This notion may be extrapolated to individuals with ID, particularly the more severe forms. Tics are abrupt movements that interrupt the flow of speech and are difficult for the affected individual to suppress. However, people with OCD and people with ASD with stereotypies can generally suppress the movements even for just a short length of time. Further, there is evidence of a high incidence of people with tics also having OCD and visa versa (Ridley, 1994) and possibly an overlap of symptoms of tic disorders (e.g., Tourette's) and OCD (Gabbay & Coffey, 2003). Many people with ASD already display repetitive movements, and reportedly, there is an increased incidence of people on the ASD continuum having a comorbid condition of OCD or tics (Bodfish, Symons, Parker, & Lewis, 2000). Due to the complexity of discriminating between the different movements, it is not surprising that direct care staff with minimal training in the area of psychopathology were unable to make the distinction, resulting in criteria of seemingly different forms of psychopathology loading on to one factor.

According to staff endorsements, these items are all highly correlated on Factor 1. Some items on this factor do not describe repetitive behaviors, although they are symptoms that may be associated with anxiety disorders. Such items as low self-esteem; trembles or shakes in the presence of specific objects or situations; and experiences excessive worry or concern. This factor will be named Anxiety/Repetitive behaviors.

Factor 2 encompassed symptoms related to disorders of behavior and conduct. Many of the items that loaded on this factor are characteristic of conduct disorder, such as damages property; bullies, threatens, or intimidates others; spiteful, revengeful, vindictive, or wants to get back at others; and steals. While disorders of conduct have been studied in the children with ID and ASD literature, such information is absent in regards to adults. This lack of information can be the result of people with severe and profound ID not having the opportunity to engage in the

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behaviors used to diagnose this disorder, such as truancy from school, staying out all night, or breaking into another person's house. While behavioral problems observed in this population can involve elopement, school/work refusal, stealing, and property destruction, it is unclear if these symptoms are an identifiable form of psychopathology or learned maladaptive behaviors. Perhaps due to this uncertainty, an inadequate amount of research on adults with ID, ASD, and Conduct Disorder exists. This factor will be named Conduct Problems.

At first glance, the third factor does not appear to fit a pattern or symptom cluster of psychopathology. For example, this factor includes items that reflect behavior problems such as irritability, impulsivity, and repetitive behavior. However, further investigation of the items reflect symptoms mainly of irritability and behavioral excesses. Items such as, avoids specific situations, repetition of actions or words to reduce stress, and impulses that interfere with activities may all be characteristic of the behavioral symptoms expressed by individuals with ASD. As discussed previously in this paper, individuals with ASD are often insistent about routines and may engage in seemingly meaningless rituals which may interfere with daily activities. Additionally the other items tend to address more irritability symptoms. Such items include, easily upset, irritable, tantrums, and easily becomes angry. Irritability is often observed in this population and has more recently been treated with the antipsychotic medications, such as risperidone (Masi, Cosenza, Mucci, & Brovendani, 2001; McCraken, et al., 2002). Such irritability may be associated with changes in the environment or routine (Lainhart, 1999). This factor will be named Irritability/Behavioral Excesses.

The fourth factor consists of items addressing inattention, hyperactivity, and impulsivity. Each of these three symptoms are consistent with a symptoms of Attention Deficit Hyperactivity Disorder (ADHD). Inattention and impulsive behavior above and beyond what is typical for

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individuals with ASD, is observed and documented in the research literature for this population (Yoshida, & Uchiyama, 2004). Interestingly, three of the items on the fourth factor are not symptoms of ADHD expressed in the general population. The three items are, sudden, rapid, repetitive, movements not associated with a physical disability, chokes on food or drink, and eats too quickly. The items addressing eating behavior may not be representative of an actual eating disorder, rather an expression of impulsivity. Again, the item addressing rapid, repetitive movements may also be endorsed for those individuals making quick, impulsive movements. This factor will be named Attention/Hyperactivity/Impulsivity.

Depression is one form of psychopathology that has been researched in the ID and ASD population; however, the research is scarce when these two disorders are diagnosed in the same individual. Researchers put forward that people with ID, having limitations in communication, (i.e., ASD) express symptoms of depression that may not look like the depressive symptoms in those individuals without ASD/ID diagnoses (Matson et. al, 1999). This population often lacks the ability to self report on 'interest in activities' or 'feelings of hopelessness'. Clinicians must rely more on behavioral observations to assess depression in these individuals. The fourth factor was comprised of items that are consistent with the literature for a diagnosis of depression in people with ID. Crying, tearful or weepy, and trouble sleeping (Matson et. al, 1999) all make up what will be named the Depressive Symptoms factor.

Internal consistency was poor to good with coefficients for the factors ranging from .44 to .85 and an overall scale coefficient of .91. As expected, the coefficients for the factor scales were lower, particularly for the factors with few items, and higher for the overall scale. The internal consistency for the scale was good and well above the acceptable cut-off of .80 (Clark & Watson, 1995).

While behavioral observation by licenced psychologists may be ideal, it is often time consuming and inefficient for these professionals to conduct lengthy evaluations as a screen for psychopathology. Therefore, direct-care staff, having daily interaction with the individual in question, is the best option for reporting on symptoms of psychpathology. Indirect assessments in the form of rating scales are often the chosen method for assessing this population. While fair to good reliability was observed, inconsistent results were also evident. Becasue of some inconsistency in reporting between raters, and to a lesser degree within raters, multiple assessment methods are therefore necessary to make an accurate diagnosis of psychopathology in this population.

Due to the limited number of measures available to assess comorbid disorders in this population, it is fair to assume that there are individuals with co-occurring Axis I diagnoses being under diagnosed and others without an actual Axis I diagnosis being over diagnosed. Having inadequate measures resulting in misdiagnoses can have obvious consequences, some severe, such as being prescribed psychotropic medications unnecessarily (Matson, Kazdin, Sentaore, 1984). Thus the development of the ASD-CA may add to the knowledge in the field with regards to accurate diagnosis and positive treatment implications by affording the investigation of symptoms of psychopathology specific to adults with ASD and severe forms of ID. This measure would be beneficial as a screener, that is to assess large numbers of individuals for co-occurring psychopathology in an efficient manner. In the case elevations are noted, more extensive evaluations by experienced psychologists would be warranted. Further, the measure could prove useful in the monitoring of symptoms of psychopathology that wax and wane over time (i.e., symptoms of depression) as well as a tool to monitor treatment effects. Future research in the area of comorbid disorders in individuals with ID, particularly adults with a diagnosis of

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ASD, is warranted. Such studies should involve validity studies of the ASD-CA, developing

norms for the measure, replication of the factor structure presented in the current study, as well

as prevalence studies of the different psychopathologies more commonly found in this

population.

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