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## Use of the revised behavioral summarized evaluation to differentiate Asperger's syndrome from autism

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USE OF THE REVISED BEHAVIORAL SUMMARIZED EVALUATION TO  
DIFFERENTIATE ASPERGER'S SYNDROME FROM AUTISM

Thesis

Submitted to

The College of Arts & Sciences of the

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In Partial Fulfillment of the Requirements for

The Degree

Masters of Arts in Psychology

by

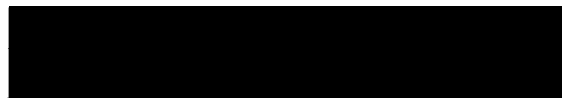
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Dayton, Ohio


April 2006

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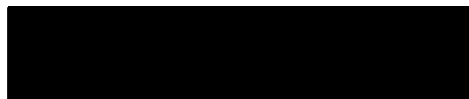
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## ABSTRACT

### USE OF THE REVISED BEHAVIORAL SUMMARIZED EVALUATION TO DIFFERENTIATE ASPERGER'S SYNDROME FROM AUTISM

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The primary purpose of this study was to examine the psychometric properties of the Behavioral Summarized Evaluation-Revised (BSE-R), which is a paper-and-pencil rating scale developed for professionals and paraprofessionals to use in monitoring the severity of symptoms of autistic children. Participants included 23 parents of children diagnosed with autism, 22 parents of children diagnosed with Asperger's syndrome, and 24 parents of *normal* (comparison) children. This study examined three hypotheses. Hypothesis 1 stated that the BSE-R, when completed by parents, will have a high level of internal (inter-item) consistency. Results strongly supported this hypothesis, and these findings replicate and extend research completed on the original version of the BSE. Hypothesis 2 stated that BSE-R items (when completed by parents) would highly correlate with the Childhood Autism Rating Scale (CARS) items (when completed by parents). The CARS is a well-validated and commonly used instrument. This hypothesis was strongly supported, replicating and extending past research on the original BSE and providing evidence of convergent validity for the BSE-R. Hypothesis 3 stated that, when the BSE-R is completed by parents, the global score will have utility in differentiating the

following groups: children with autism, children with Asperger's syndrome, and *normal* (comparison) children. This hypothesis was partially supported. The BSE-R significantly differentiated children with either autism or Asperger's syndrome from *normal* children. Regarding the utility of the BSE-R in differentiating children with autism from children with Asperger's syndrome, only a small set of BSE-R items were successful in doing so. Results are discussed within the context of past research on this psychometric instrument. The practical utility of the BSE-R is also discussed. Finally, limitations of this study are considered, and recommendations for research are presented.

## ACKNOWLEDGEMENTS

This work would not have been possible without the support and encouragement of my chairperson, Dr. Roger N. Reeb, who has been abundantly helpful and has put countless hours into this project. I would also like to thank Dr. Korte and Dr. Katsuyama for useful feedback. I would particularly like to thank Dr. Katsuyama for detailed discussion and encouragement in the area of data analysis. Everyone that has contributed has been invaluable to me, thank you.

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## CHAPTER I

### INTRODUCTION

The purpose of the current study was to further establish the reliability and validity of the Revised Behavioral Summarized Evaluation (BSE-R). The BSE-R was developed to evaluate the severity of behavioral problems in children with autism. This study examined the extent to which the BSE-R (when completed by parents) has utility in differentiating the following groups: children with autism, children with Asperger's disorder and *normal* (comparison) children. Chapter one provides a literature review and rationale for the present project. This chapter is organized into five sections. The first section provides an overview of the diagnostic criteria for Autistic Disorder and highlights ways that it differs from related conditions. In the second section, an overview of research on etiology is presented. The third section summarizes the research on treatment. The fourth section provides an overview of research on the BSE. In the last section, an overview of the present study is provided.

#### Diagnostic Criteria

The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) of the American Psychiatric Association (2000) classifies Autistic Disorder in a category called Pervasive Developmental Disorder (PDD). Recent epidemiological studies are reporting higher prevalence rates of PDD (63%) (Chakrabarti & Fombonne, 2001) than previous studies. This increase may be a reflection of the broadening definition, improved early

identification, and increased public awareness. There are a total of five disorders in the PDD category: Autistic Disorder, Rett's Disorder, Childhood Disintegrative Disorder, Asperger's Disorder, and Pervasive Developmental Disorder Not Otherwise Specified.

As noted in DSM-IV-TR, children diagnosed with Autistic Disorder manifest the following three essential characteristics prior to 3 years of age: impaired reciprocal social interaction; impaired communication skills; and restrictive, repetitive and stereotyped patterns of behavior, interests and activities (American Psychiatric Association, 2000). Individuals with autism may also have abnormal responses to sensory stimuli such as a high threshold for pain and oversensitivity to sound, light, odor or touch. Self-injurious behavior may exist, such as head banging, finger or hand biting, and hair pulling. Eating disturbances are commonly reported by parents, but little research has been conducted to explore this problem. Unusual food preferences can involve texture, color or brand of a food. Frequently, persons with autism require less sleep than other family members. Sleep problems include difficulty falling asleep, staying asleep, and waking up early (Mash and Barkley, 2003). There can be excessive fear or no fear of various objects. Autism follows a continuous course and only small percentages of these children ultimately live and work independently. Even the highest functioning individuals still show difficulty in social interaction and communication and exhibit restricted interests.

In most cases, there is an associated diagnosis of Mental Retardation, which can range from mild to profound. Recent studies estimate that the comorbidity between autism and Mental Retardation is between 40% (Baird, 2000) and 69% (Chakrabarti & Fombonne, 2001). The difficulty in administering a valid intelligence test to this

population can possibly result in lower scores on intelligence tests. The additional diagnosis of Autistic Disorder with Mental Retardation is given in situations where there are qualitative deficits in social and communicative skills and the specific behaviors characteristic of Autistic Disorder are present (American Psychiatric Association, 2000).

All Pervasive Developmental Disorders are characterized by problems in social interaction. However, Autism can be differentiated from other Pervasive Developmental Disorders by various characteristics. Childhood Disintegrative Disorder has a distinct pattern of severe developmental regression after two years of normal development, while autistic symptoms typically occur within the first year of life. Rett's disorder also shows a pattern of head growth deceleration that is not found in individuals with autism. Rett's disorder is only diagnosed in females, whereas Autistic Disorder is predominantly found in males.

An objective of this project is to determine if the BSE-R can differentiate Autism from Asperger's Disorder; therefore, the explanation of differences between these two disorders will be more detailed. For the sake of comparison, Table 1 provides detailed diagnostic criteria for Autistic Disorder and Asperger's Syndrome. In general, researchers have agreed that the diagnosis of Asperger syndrome is similar to Autism in that there are deficits in reciprocal social interaction and repetitive and stereotyped patterns of behavior, interests, and activities, but Asperger's Syndrome includes intact intellectual and language functioning. In Autistic Disorder, social interaction is described as self-isolation or markedly rigid social approaches; Asperger's Disorder, in contrast, may involve a motivation to approach others socially, but typically this is done in a

**Table 1: Diagnostic Criteria for Autism and Asperger's Syndrome**

<p><b>Diagnostic criteria for Autistic Disorder</b></p> <p>A. A total of six or more items from (1), (2), and (3), with at least two from (1), and one each from (2) and (3):</p> <ol style="list-style-type: none"> <li>(1) qualitative impairment in social interactions               <ol style="list-style-type: none"> <li>(a) marked impairment in the use of multiple nonverbal behaviors such eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction</li> <li>(b) failure to develop peer relationships appropriate to developmental level</li> <li>(c) a lack of spontaneous seeking to share enjoyment, interests, or achievements with others</li> <li>(d) lack of social or emotional reciprocity</li> </ol> </li> <li>(2) qualitative impairments in communication               <ol style="list-style-type: none"> <li>(a) delay in, or total lack of, the development of spoken language</li> <li>(b) in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others</li> <li>(c) stereotyped and repetitive use of language or idiosyncratic language</li> <li>(d) lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level</li> </ol> </li> <li>(3) restricted repetitive and stereotyped patterns of behavior, interests, and activities               <ol style="list-style-type: none"> <li>(a) encompassing preoccupation with one or more stereotyped and restricted patterns of interests that is abnormal in intensity or focus</li> <li>(b) apparently inflexible adherence to specific routines or rituals</li> <li>(c) stereotyped and repetitive motor mannerisms</li> <li>(d) persistent preoccupation with parts of objects</li> </ol> </li> </ol> <p>B. Delays or abnormal functioning in at least one of the following areas (1, 2, or 3), with onset prior to age 3 years.</p> <p>C. The disturbance is not better accounted for by Rett's Disorder or Childhood Disintegrative Disorder</p>	<p><b>Diagnostic criteria for Asperger's Disorder</b></p> <p>A. Qualitative impairment in social interaction, as manifested by at least two of the following:</p> <ol style="list-style-type: none"> <li>(1) marked impairment in the use of multiple nonverbal behaviors such as eye-to eye gaze, facial expression, body postures and gestures to regulate social interaction</li> <li>(2) failure to develop peer relationships appropriate to developmental level</li> <li>(3) a lack of spontaneous seeking to share enjoyment, interests, or achievements with others</li> <li>(4) lack of social or emotional reciprocity</li> </ol> <p>B. Restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following:</p> <ol style="list-style-type: none"> <li>(1) encompassing preoccupation with one or more stereotyped and restricted patterns of interests that is abnormal in intensity of focus</li> <li>(2) apparently inflexible adherence to specific routines or rituals</li> <li>(3) stereotyped and repetitive motor mannerisms</li> <li>(4) persistent preoccupation with parts of objects</li> </ol> <p>C. There is no clinically significant general delay in language</p> <p>D. There is no clinically significant delay in cognitive development or in the development of age-appropriate self-help skills, adaptive behavior, and curiosity about the environment in childhood.</p> <p>E. Criteria are not met for another specific Pervasive Developmental Disorder or Schizophrenia.</p>
	<p><b><u>Adapted from:</u></b>            American Psychological Association. (2004).            Diagnostic Manual for Mental Disorders, 4<sup>th</sup> edition, text revision.</p>

highly eccentric, one-sided, verbose, and insensitive manner (American Psychiatric Association, 2000). In contrast to autism, DSM-IV-TR specifies that individuals with Asperger's Disorder do not have clinically significant delays in early language development, cognitive functioning, or adaptive behavior. Furthermore, in Autistic Disorder, restricted, repetitive, and stereotyped interests are often demonstrated by motor mannerisms, preoccupation with parts of objects, rituals, and marked distress in response to change. However, in Asperger's Disorder, the individual spends excessive amounts of time in the pursuit of gathering information and facts about a restricted interest. More research is needed to determine whether these are distinct disorders or whether the difference in diagnoses is a reflection of the degree of impairment.

#### A Brief Overview of Research on Etiology

In 1943, Kanner used the term autism to emphasize the social deficits of the disorder. Kanner's first descriptions included isolated play, unusual language traits, ritualistic behaviors, and resistant to change. Although many of these coincide with today's criteria, Kanner believed that autism was caused by emotionally cold parents, especially mothers. Bettelheim (1974) also reasoned that parents of children with autism were cold, rejecting, and unconsciously hostile toward their children. Furthermore, Ferster (1961) argued that autistic behavior in children was due to their inability to obtain rewards for appropriate social behavior from their parents. Over time, however, researchers could not demonstrate that parenting style had a significant role in the development of autism. In 1962, Rimland wrote a classic book in which he emphasized the biological factors in the etiology of autism. This played an important role in changing

the prevailing view of autism. Then, in 1993, Koegel conducted research with a variety of personality measures that suggested that parents of children with autism do not significantly differ from parents of children without the disorder. More contemporary research has focused on genetic factors, prenatal and perinatal risk factors, biochemical factors, and neuroanatomical factors. However, researchers have not ruled out that psychosocial factors play some role in the development of autism, and most agree that psychosocial factors significantly influence the course and prognosis (Dawson & Osterling, 1997).

### Genetic Factors

The results of several epidemiological studies show the frequency of autism in siblings of autistic children is estimated to be 5% (American Psychiatric Association, 2000). The prevalence in the general population is approximately 5 per 10,000. Epidemiological same-sex twin studies report concordance rates for autism in monozygotic twins ranging from 36% to 91% (Mesibov, 1997), while the concordance rate for dizygotic twins are 0% to 5% (Bailey, LeCouteur, Gottesman, & Bolton, 1995). In a recent large scale study, 7.5% of relatives of individuals with autism fit the description of the broader pheno-type. Broader pheno-type refers to having difficulties in one or more of three areas (i.e., social skills, communication skills, repetitive behaviors) that characterize autism (Pickles et al. 2000). Several genetic linkage studies have been conducted with the linkage signals generally being small. One exception is chromosome 7, which was found to be related to autism by three different research groups (Ashley-Koch et al., 1999; Barrett et al., 1999; International Molecular Genetic Study of Autism

Consortium, 1998). A genetic linkage study refers to finding areas or regions of DNA that are linked to autism (Ashley-Koch, 1999). In summary, one gene does not appear to account for the disorder, but rather it is believed that a polygenic inheritance pattern is present (Folstein, Santangelo, Gilman, Piven, Landa, Lainhart, Hein, & Wzorek, 1999).

#### Prenatal and Perinatal Risk Factors

Five prenatal and perinatal risk factors have been associated with increased risk of autism. They are decreased birth weight, low maternal education, a later start of prenatal care, having a previous termination of pregnancy, and an increase in father's age (Burd, Severud, Kerbeshian, & Klug, 1999). Another study found that maternal bleeding after the first trimester and an extremely long gestational period are also related to an increased risk (Mesibov, 1997). Immune factors, such as maternal viral infections, may play a role as well (Smalley, 1998). Bolton, Murphy, Macdonald, Whitlock, Pickles, & Rutter (1997) found that both individuals with autism and Down syndrome experienced more obstetrical complications than their siblings without a disorder.

#### Biochemical Findings

The most consistent biochemical finding related to autism has been that between 25% and 50% of individuals with autism are hyperserotonemic, which means that they have peripheral blood platelet levels in the upper 5% of levels found in the normal population (Leboyer, Philippe, Bouvard, Guilloud-Bataille, Bondoux, Tabuteau, Feingold, Mouren-Simeoni, & Launay, 1999). Leboyer et al., (1999) found that 51% of mothers, 45% of fathers and 87% of siblings of individuals with autism show elevated levels of serotonin. These studies demonstrate a possible link between serotonin levels and



the behavioral-physiological processes of sleep, pain and sensory perception, motor function, appetite, learning, and memory symptoms of autism (Volkmar, 1989).

The neurotransmitter dopamine is associated with stereotyped and repetitive behaviors. Increased levels of dopamine have been hypothesized to contribute to the stereotyped and repetitive behaviors seen in autism (Garreau, Barthelemy, Domenech, Sauvage, Num, LeLord, & Callaway, 1980). However, studies have not supported this hypothesis (Mash & Barkley, 2003). There has also been interest in the possible link between norepinephrine, which influences attention, anxiety, arousal, memory and movement. However, research examining norepinephrine levels has not found consistent evidence supporting abnormal levels of norepinephrine in individuals with autism (Minderaa, Anderson, Volkmar, Akkerhuis, & Cohen, 1994).

Wakefield, Murch, Anthony, Linnell, Casson, Malik, Berelowitz, Dhillon, Thomson, Harvey, Valentine, Davies, & Walker-Smith, (1998) hypothesized that the increase in the prevalence of autism is related to increase in immunizations for children. Specifically, they hypothesized that autism is related to the measles, mumps, and rubella (MMR) vaccines that are given in a combined injection or right after one another. However, a study with 498 children with PDD indicated that there was no evidence of increased diagnosis in those children who received vaccinations (Taylor, Miller, Farrington, Petropoulos, Favot-Mayoud, Li, & Waight, 1999). In addition, Dales, Hammer and Smith (2001) conducted a retrospective study of MMR vaccination rates by the age of 24 months and autism diagnosis rates among children born between 1980 and 1994 who were enrolled in California kindergarten classes. The results did not support a

link between autism and the MMR vaccine.

### Neuroanatomical Findings

Researchers examining neuroanatomical abnormalities in autism have reported several promising findings. In general, these studies support the notion that autism is linked to a combination of brain enlargements in some areas and brain reduction in other areas (Koenig, Tsatsanis, & Volkmar, 2001). These findings suggest that autism may be caused by abnormal cell growth during the early stages of prenatal and postnatal brain development. Researchers have suggested abnormalities in several areas of the brain: the cerebral cortex, the cerebellum, the limbic system, and the corpus callosum. In general, studies of the cerebral cortex have supported a theory of brain enlargement and studies of the subcortical structures have supported a theory of brain reduction. This suggests that there may be abnormal connections between the cortical and subcortical pathways in individuals with autism (Koenig et al., 2001).

### Psychosocial Factors

One factor that has a major impact on the course of autism is the extent to which behavior modification is implemented at an early age (Lovaas, 1987; Rosenwasser & Axelrod, 2002). Potential factors that predict effectiveness of behavior modification include child's age, degree of cognitive impairment (e.g., mental retardation), verbal ability, forms of disruptive behavior, and neurological status (e.g., presence of seizures). Behavior modification is more effective if implemented early in development. In general, the more severe the cognitive impairment and verbal deficit, disruptive behavior, and neurological deficits, the less effective results are for behavior modification

(Schreibman, 1996). Other variables that relate to family and community consist of parental stress/depression, parental expectations, marital status, support network, culture, and school resources. Overall, stress in the family has a negative effect on the child's progress in behavior modification (Schreibman, 1996). In contrast, a large and consistent support network is an important positive factor influencing the development of children with autism (Lessenberry, 2004). A high level of family support and involvement is important to the course and prognosis of autism. It is believed that the earlier the diagnosis and intervention for children with autism, the better the outcome as far as language development (Robins, Fein, Barton, & Green, 2001). In other words, research suggests that there is a sensitive period in which early intervention has a significant effect on the developing nervous system and results in improved behavioral outcomes for children with autism (Dawson, Ashman, & Carver, 2001).

A proposed theoretical framework explains the relations among the biological abnormalities, cognitive processing impairments, and behavioral symptoms of autism (Gillberg, 1999). It is hypothesized that the behavioral symptoms of autism (social skill impairments, communication impairments, and repetitive behaviors) result from underlying information-processing impairments that are caused by neurofunctional abnormalities related to underlying genetic susceptibility for autism (Gillberg, 1999; Ozonoff, 1997; Rutter, 1999). It is essential that future research strive to understand how the biological, cognitive, social, and behavioral characteristics of autism are related. The ways in which family factors (e.g., stress) and community factors (e.g., resources) influence course and treatment response also needs further study.

### Treatment of Autistic Disorder

No treatment has “cured” autism. However, comprehensive interventions, including parent counseling, individualized education programs, behavior modification and psychopharmacological treatment have demonstrated significant effects.

#### Psychopharmacological Approaches

Medication may help to minimize maladaptive behaviors of individuals with autism (i.e., self-injury, aggressiveness) and neuropsychiatric symptoms (i.e., tics, hyperactivity, compulsive behaviors) that interfere with the individual’s functioning and learning. In addition, medication may promote more “normal” social and communicative developments (Zager, 1999). However, although medication may help to manage or control some symptoms, it does not appear to address or correct the underlying factors causing autism. Neuroleptics or major tranquilizers are commonly used to reduce hyperactivity, tics, and aggressive behavior often exhibited by autistic children. The neuroleptic haloperidol is effective in the treatment of agitation, hyperactivity, aggression, and motor and vocal tics that often occur with autism (Zager, 1999). It does have some risks of causing tardive dyskinesia, which is a serious and irreversible neurological disorder involving uncontrollable movement of various body parts, including the body trunk, legs, arms, fingers, mouth, lips, or tongue. In 1993, Gordon reported that clomipramine, an antidepressant drug, produced a significant reduction in compulsive symptoms, withdrawal and hyperactivity in individuals with autism. One possible side-effect of Clomipramine is seizures. Risperidone (risperdal) is an antipsychotic medication that acts against both positive and perhaps some negative

symptoms of schizophrenia (Huttunen, 1995). Risperdone has also been reported to be effective in treating tic disorder, obsessive-compulsive disorder, and pervasive developmental disorder. Risperdone also seems to reduce frequency of and intensity of temper tantrums and aggression in children with autism.

Some symptoms characteristic of autism are similar to symptoms associated with Attention-Deficit/Hyperactivity Disorder. These have been reduced with the medication clonidine (Tsai, 1992). Individuals with autism who show depressive symptoms usually respond to tricyclic antidepressants. In recent years, serotonin reuptake inhibitors (SRIs), such as Prozac, Zoloft, Paxil, and Luvox help to decrease depressive symptoms for individuals with autism and have been promoted as causing fewer adverse side effects than tricyclic antidepressants (Eastmeade, 2004). Benzodiazepines have shown to be effective for symptoms of autism that are similar to symptoms of generalized anxiety disorder, but use of benzodiazepines needs to be carefully monitored to avoid addiction and dependence (Werry, 1998). Regarding self-injurious behavior, naloxone (an opiate receptor antagonist) had positive results reducing this type of behavior problem in at least one study (Romanczyk, Lockshin, & O'Connor, 1991). While each of these medicines has shown to be effective, each individual is unique and reacts differently, so what works for one person may not work for another. Physicians, parents, and caregivers need to closely monitor any medication and be aware of possible side effects.

#### Behavior Modification Approach

Lovaas and colleagues were the first researchers to develop home-based behavior modification. Lovaas (1987) conducted a study examining the effects of one-to-one

home-based modification on children with autism. Lovaas compared an intensive, one-to-one, home-based behavior modification program that lasted two years to two control conditions (less-intensive treatment or no treatment). To increase desired behaviors, repetitive learning techniques and selective reinforcement were used. Negative behaviors were decreased by withholding reinforcement and prompting the child to display appropriate, desired responses (Lovaas, 1987). Results showed that 47% of the children in the experimental group achieved normal-range I.Q. scores and completed first grade in public schools (Lovaas, 1987). The two control groups did not significantly differ from one another with only 2% of the individuals achieving normal-range I.Q. scores (Lovaas, 1987).

Dawson and Osterling (1997) reviewed eight different university-based intervention programs for children with autism. Approximately 50% of children who received intervention made substantial gains. I.Q. score improvements ranged from 19 to 30 point, with an average gain of 23 I.Q. points. However, the average Full Scale I.Q. of children participating in the programs still fell in the moderately retarded range. In brief, home-based behavior modification, especially early intervention, appears to have a positive effect for children with autism. Nevertheless, conclusions from Lovaas' original research may be somewhat overly optimistic (Dawson and Osterling, 1997).

More recent research shows that, in order for behavioral treatments to optimally work, the stimuli that trigger inappropriate responses in the child with autism need to be understood (Schreibman, 2000). Applied behavioral analysis (ABA) emphasizes this stimulus-response relationship and has been reported by the Surgeon General of the

United States to be the most effective way to treat autism (Rosenwasser & Axelrod, 2002). One assumption of ABA method is that the environment determines the behavior, not the child. The belief is that a behavior is learned and can be changed. The focus is on positive reinforcers. Children with autism have a limited range or atypical interests, making it difficult to find a positive reinforcer. Once a reinforcer is identified, one approach pairs the "normal" reinforcers of attention, praise, affection with the desired tangible reinforcers that the child with autism prefers. Children with autism often do not understand the rules of what behavior is needed to receive a reinforcer. This requires everyone (parents, teachers, and therapist) to be consistent and clearly specify the behavior that is necessary.

Research has shown behavior modification to be effective. However, determining who benefits most from treatment is important. Variables such as the child's age, degree of cognitive impairment, verbal ability, and neurological status can all contribute to the success achieved through treatment (Schreibman, 1996). The younger the child is when treatment starts, the better the prognosis (McEachin, J., Smith, T., & Lovaas, O. I, 1993). Those individuals with verbal ability achieve greater success with treatment (Cash, 1999). The more neurological abnormalities (e.g., hypotonia or hypertonia, abnormal posture or gait, tremors, drooling.) are part of the child's symptomology, the less likely treatment will make a substantial difference (Cash, 1999). The more severe the cognitive impairment, the worse the prognosis (Schreibman, 1996). Green (1996) suggests other variables such as family and environmental factors should be further researched. These include parental stress/depression, availability of a support system, culture, and school

resources (Green, 1996). It would also be beneficial to examine the specific techniques that the individual therapist uses, age at which intervention begins, and how much intervention is received (i.e. hours per week, number of years). Overall, treatment for individuals with autism should intervene on all behaviors, in all environments and with help from everyone involved in the individual's life. Ideally, treatment would incorporate a variety of individualized treatments, start early in life, and continue intensively for a long period of time (Schoen, 2003).

#### A Brief Overview of Research on the Behavioral Summarized Evaluation (BSE)

Given the popularity of the home-based behavior modification programs, there seems to be a need for an instrument for paraprofessionals and parents to use in monitoring therapeutic progress (Maurice, 1996). The Behavioral Summarized Evaluation (BSE) may meet this need (Barthelemy, Adrien, Tanguay, Garreau, Fermanian, Roux, Suavage, & Lelord, 1990). "The BSE was developed to measure changes of behavioral parameters over time and treatments and be easy to handle and accessible to professionals and paraprofessionals" (Barthelemy et al., 1990, p. 195).

The original BSE was a 20 item paper-and-pencil rating scale designed for the measurement of behavioral parameters in children with autism involved in educational programs, neurophysiological studies, and therapeutic programs (Barthelemy et al., 1990). Each of the 20 items was scored on a scale from 0 to 4: 0, if the behavior is never observed; 1, if sometimes; 2, if often; 3, if very often; and 4, if it is always observed. A total score can be obtained by summing the 20 item scores. The Barthelemy (1990) study shows that the BSE is an acceptable tool for the observation of autistic behaviors. The



Expert Severity Score obtained independently and endorsed by the diagnostic assessment team was considered the external criterion. The criterion validity of the BSE was examined for both the global score (GS, 20 items) and the BSE score for Factor 1 (9 items). The nine items of Factor 1 significantly correlated with the scores of the Expert Severity Score. This lends further support for the validity of this factor. Age had no influence on the global score. The global score had excellent reliability (.96), determined by calculating intraclass correlation (Fermanian, 1984). The interrater reliability was .60 or better for 15 items on the scale and for the GS.

Barthelemy, Adrien, Roux, Garreau, Perrot, and Lelord (1992) examined the effectiveness of the BSE to discriminate 58 children with autism from 58 non-autistic mentally retarded children. The BSE clearly discriminated the two samples of children. The results of ANOVA showed that the scores were higher for all 20 items of the BSE in the autistic group. Five items did not show significant difference. Four items clearly had the highest between-group differences, indicating that the behaviors most associated with autism were withdrawal and stereotypic behaviors. When all 20 items of the BSE were entered simultaneously, the discriminant analysis revealed that 90.5% of the autistic and nonautistic (mentally retarded) children were correctly classified (Barthelemy et al., 1992). These findings suggest that the BSE could help in the detection and evaluation of autistic developmental deviance. Barthelemy et al., (1992) suggested extending BSE studies to samples of developmentally disabled children in order to examine whether or not the core BSE behavioral features could help to early differentiate developmental deviance from mental retardation (Barthelemy et al., 1992).

Studies of the validation and application (Barthelemy et al., 1992) of the original BSE revealed that certain dimensions were insufficiently represented (e.g., sensitivity to touch and imitation behavior). Therefore, nine items were added to the initial 20-item scale, resulting in the Revised Behavioral Summarized Scale (BSE-R). The nine items added to the original scale referred to adaptation to environmental situations (items 10, 20, and 25), emotional and instinctive reaction (items 21, 22, and 28), perception (item 29), nonverbal communication (item 26), and motility (item 27). Appendix A provides a complete list of the items on the BSE-R.

Barthelemy, Roux, Adrien, Hameury, Guerin, Garreau, Fermanian, and Lelord (1997) studied a sample of 136 developmentally disabled children (98 boys, 38 girls). Children were diagnosed according to DSM-III-R (APA, 1987). There were 68 children diagnosed with Autistic Disorder, 22 children diagnosed with Pervasive Developmental Disorder Not Otherwise Specified, and 46 children diagnosed with Mental Retardation.

A factor analysis was performed on the data obtained from all 136 children (Barthelemy et al., 1997). Two main factors were found. Thirteen items comprised Factor 1 (items 1, 2, 3, 4, 5, 6, 8, 9, 12, 23, 24, 26, 28). This factor is labeled "Interaction Disorder." Previously in the original BSE, nine items described Factor 1 (items 1, 2, 3, 4, 6, 8, 11, 19, 20). Same item numbers may have content that varies between the BSE-R and the original BSE. The BSE-R had three items correlate with Factor 2 (items 11, 13, 16). This factor is labeled "Modulation Disorder." The BSE only had two items, 10 and 14, correlate with Factor 2.

The global score had excellent interrater reliability (0.97). Three items had

excellent (0.75 – 1.0) interrater reliability (items 1, 10, 29); 10 items had good (0.60 – 0.74) interrater reliability (items 2, 4, 5, 6, 9, 12, 14, 20, 27, 28); 12 had fair (0.40 - 0.59) interrater reliability (items 3, 7, 8, 11, 13, 15, 16, 19, 21, 23, 24, 26). Four items (17, 18, 22, 25) had poor interrater reliability ( $< 0.40$ ) and were not used in subsequent analyses but remain on the published scale.

The criterion validity study was performed on all 136 children. The Expert Severity Score was considered the external criterion. Statistically significant difference on the BSE-R was found between Autistic Disorder and Mental Retardation subgroups and between Autistic Disorder and Pervasive Developmental Disorder Not Otherwise Specified subgroups. Children with Autistic Disorder scored higher than both children with Mental Retardation and Pervasive Developmental Disorder Not Otherwise Specified. Significant partial correlation coefficients were found for each item of Factor 1 and the Expert Severity Score (ranging from .24 to .63). There was no correlation between the Expert Severity Score and the three items of Factor 2.

These results coincide with the previously published findings concerning the validation and application of the first version of the BSE-R. The examination of the interrater reliability showed that most items had excellent, good, or fair reliability. The four items that had poor reliability were most likely a result of inadequate explanations of the items in the glossary (e.g., 25. Variability or VAR: Considerable, even extreme, variations in capacities or problems from one minute to another). These variations may also involve behavior with others in the form of aggressive rejection or possessive attachment. The examination of criterion-related validity provided evidence of a good

relationship between the Expert Severity Score and the BSE-R score for Factor 1 within both the Autistic Disorder and Mental Retardation subgroups. This result indicates the new Factor 1 is fully representative of the autistic syndrome (Barthelemy et al., 1997). Furthermore, the sensitivity and specificity studies showed that the BSE-R scale is capable of discriminating autistic from non-autistic children (Barthelemy et al., 1997). Overall, the BSE-R may be valuable for professionals and paraprofessionals who need to quantify the effectiveness of treatment (Barthelemy et al., 1997).

A study by O Neal, Reeb, Korte, and Butter (2006) showed that the original BSE can be used by parents in meaningful ways. First, this study showed that, when parents use the BSE, the instrument continues to have excellent inter-item consistency. Second, there were similarities between the BSE factor analysis results of the O Neal et al., (2006) study (with parents as evaluators) and the factor analysis results of the original Barthelemy et al., (1990) study (with professionals as raters). That is, two main factors were identified, accounting for a similar level of variance as found in the Barthelemy et al., (1990) study. Further, there was a great deal of similarity between the O Neal et al., (2006) study and the Barthelemy et al., (1990) study regarding the actual factor loadings on Factor 1. Factor 1 appears to be the most important factor, since it is the only factor to correlate with independent (blind) criteria, such as the Expert Severity Scores provided by experienced clinicians (Barthelemy et al., 1990, 1997). However, based on the factor analysis results of the O Neal et al., (2006) study, the Barthelemy et al., (1990), and the Barthelemy et al., (1997) study, there is considerable inconsistency regarding which BSE items load on Factor 2. Barthelemy et al., (1997) have questioned the utility of Factor 2

because it "...is not correlated with independent criteria, and it comprises symptoms not directly involved with autistic syndromes but which may be associated with it." (p. 150). Thus, further research is needed to determine the validity and practical utility of Factor 2. Third, the O Neal et al., (2006) study extended the literature by showing that, when the BSE is completed by parents, it continues to be sensitive to changes in autistic symptoms that take place over the course of a home-based behavior modification program. Fourth, O Neal et al., (2006) extended the literature by showing that the BSE correlates highly with the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 2004). The CARS is a well-validated instrument that is widely used by clinicians in assessing autistic symptoms. Unlike the BSE (and BSE-R), however, the CARS is expensive to obtain for use in clinical work and research, and it is not readily available for paraprofessionals or parents who may be involved in the treatment and monitoring of a child's autistic symptoms.

#### The Present Study: Use of the BSE-R to Differentiate Asperger's Syndrome from Autism

Hypothesis 1 is that the BSE-R, when completed by parents, will have a high level of internal (inter-item) consistency. As indicated above, the O Neal et al., (2006) found this to be the case with the original BSE, but internal consistency for the BSE-R (when completed by parents or other paraprofessionals) is yet to be demonstrated.

Hypothesis 2 is that convergent validity will be demonstrated in that the BSE-R (when completed by parents) will be found to highly correlate with the CARS (when completed by parents). Again, O Neal et al., (2006) found this to be the case with the original BSE, but research has not yet demonstrated convergent validity for the BSE-

R (when completed by parents or other paraprofessionals).

Hypothesis 3 of this study is that the BSE-R global score will have significant utility in differentiating the following groups: children with Autistic Disorder, children with Asperger's syndrome, and normal (comparison) children. In other words, the BSE-R global score will be higher for the group of autistic children relative to the global score for the group of children with Asperger's syndrome, and the global score for the group of children with Asperger's syndrome will be higher relative to the global score for the normal comparison group.

The extent to which the CARS has utility in differentiating autism from Asperger's disorder will also be examined, and this will provide a standard for interpreting BSE-R results. There is one published research study demonstrating that the CARS-Tokio Version has utility in differentiating these disorder groups. Since the CARS is the most widely used and sophisticated psychometric instrument of its kind (Sattler, 2002), judgments regarding the utility of the BSE-R in differentiating the above groups will be partly based on an examination of the relative efficacy of the BSE-R versus the CARS in differentiating the groups. In other words, if the BSE-R is found to be superior to, equal to, or almost as good as the CARS for this purpose, then incremental utility for the BSE-R is demonstrated, since the CARS is expensive and not accessible to paraprofessionals (including parents), whereas the BSE-R is in the "public domain" (i.e., easily accessible and free).

## CHAPTER II

### METHOD

#### Participants

The participants ( $N = 69$ ) included 23 parents of children formally diagnosed with autism, 22 parents of children formally diagnosed with Asperger's syndrome, and 24 parents of normal (comparison) children. Ages across groups ranged from 57 months (almost 5 years old) to 216 months (18 years old), with an average age of 130 months (almost 11 years old) and a standard deviation of 44.51 months. Ages of the children with autism ranged from 64 months (about 5 years old) to 216 months (18 years old), with an average age of 119.78 months (almost 10 years old) and a standard deviation of 47.24 months. Ages of the children with Asperger's syndrome ranged from 57 months (almost 5 years old) to 215 months (18 years old), with an average age of 141.90 months (almost 12 years old) and a standard deviation of 48.86 months. Ages of the normal (comparison) children ranged from 67 months (about 5 ½ years old) to 210 months (about 17 years old), with an average age of 129.17 months (almost 11 years old) and a standard deviation of 36.09 months. The results of ANOVA indicated that the groups did not significantly differ in age,  $F(2, 66) = 1.415, p = .250$ .

Of the 69 children who were the focus of this study, 56 were male and 13 were female. There were 20 males and 3 females with autism, 19 males and 3 females with

Asperger's syndrome and 17 males and 7 females that were normal (comparison) children. A 2 (sex) by 3 (group) chi square analysis indicated that the proportion of males versus females did not differ significantly across the groups,  $\chi^2 = 26.797, p = .000$ .

For socioeconomic status, a four-point scale was used to record income levels of each participant (e.g., 1 is < 20,000; 2 is 20,000 < 40,000; 3 is 40,000 < 60,000; 4 is 60,000 < ). The average family income score was 3.22 (SD = .902) for families of children with autism, 2.95 (SD = .844) for families of children with Asperger's disorder, and 2.79 (SD = .884) for families of normal (comparison) children. The results of ANOVA indicated that the groups did not significantly differ in income levels,  $F(2, 66) = 1.402, p = .253$ .

Participants were recruited by posting a message on the internet site entitled "Me-List." The "Me-List" is a news chatgroup for parents, therapists, and researchers interested in behavior modification. In addition, The Dayton Asperger's Resource Network (DARN) has a local support group that agreed to have a message posted on their internet site entitled "D.A.R.N." Participation selection was based on those caregivers who responded via email.

### Materials

The two instruments that were used in the present study are the Childhood Autism Rating Scale (CARS) and the Revised Behavioral Summarized Evaluation (BSE-R). The primary caregivers were asked to provide ratings on the CARS and the BSE-R based on their child's current behavior.



### Background Information Form

The Background Information Form was used to collect information from parents needed for matching purposes (see Appendix B).

### Childhood Autism Rating Scale (CARS)

The CARS is a 15 item behavioral rating scale with a 4-point severity rating for each item (see Appendix C). The CARS is applicable to children of all ages and involves judgments grounded on quantifiable ratings based on direct observation. The CARS ratings can be fashioned from many different sources such as during psychological testing, classroom participation, or parent reports. The total score of the ratings can be used to make one of three classifications: no autism, mild to moderate autism, or severe autism (Schopler, Reichler, and Renner, 2004). The CARS has been developed and refined based on over a decade of use with more than 1,500 children and has been shown to be an extremely reliable and valid assessment tool (Schopler et al., 2004).

Coefficient alpha (internal consistency), interrater reliability and test-retest reliability on the CARS were demonstrated to be .94, .71, and .88, respectively. In addition, criterion-related validity and validity of the CARS ratings made under alternate conditions (e.g., parents and professional of other disciplines completing the CARS) were shown to be above-average (Schopler et al., 1988).

In addition to the examination of overall functioning, the CARS can also be used to assess each of the following 15 domains: relating to people, imitation, emotional response, body use, object use, adaptation to change, visual response, listening response, taste, smell, and touch response, fear or nervousness, verbal communication, nonverbal

communication, activity level, level and consistency of intellectual response, and general impression. In the present study, overall functioning, as well as functioning in each of the 15 domains, was evaluated. Past research instructing parents to complete the CARS slightly modified the original format by not having the parents rate the general impressions category (Oneal, Reeb, Korte, and Butter, 2006). For the present study, the same guideline was followed.

#### Behavioral Summarized Scale (BSE-R)

The BSE-R is a 29-item paper-and-pencil rating scale designed for the measurement of behavioral parameters in children with autism involved in educational programs, neurophysiological studies, and behavior modification (Barthelemy et al., 1997) (see Appendix D). The BSE-R scale originated from studies of the validation and application of the BSE, which revealed that certain dimensions were insufficiently represented (e.g., sensitivity to touch and imitation behavior) (Barthelemy et al., 1992). Each of the items is scored on a scale from 0 to 4: 0, if the behavior is never observed; 1, if sometimes; 2, if often; 3, if very often; and 4, if always observed. A total score can be obtained by summing 29 item scores. In the present study, the overall score as well as the ratings on each of 29 items was evaluated. Validity and reliability coefficients of the BSE-R have been demonstrated to be within the average to above average range (Barthelemy et al., 1997). For a detailed description of the psychometric properties of the BSE and BSE-R, please refer to an earlier section of this manuscript.

#### Procedure

Participation selection was based on those caregivers who respond via email

(see Appendix E). Individuals were given a general description of the present study and asked to provide a mailing address in order for a questionnaire packet to be sent to them. All primary caregivers were mailed questionnaire packets with specific instructions explaining how to complete the questionnaires (see Appendix F). Primary caregivers were also provided with an informed consent form to sign before completing the CARS and the BSE-R (see Appendix G). Participants were given the researcher's email address and telephone number so they were able to ask questions. They were asked to complete the questionnaires and send the information back to the researcher in the provided envelope. Primary caregivers were e-mailed a reminder notice to please complete the assessment packet after a one-week waiting period. General results of the study were distributed to all participants by posting notices on both internet sites.

## CHAPTER III

### RESULTS

#### Internal Consistency

In support of Hypothesis 1, internal (inter-item) consistency was found for the BSE-R ( $\alpha = .966$ ). Likewise, as expected, internal consistency was also high for the CARS ( $\alpha = .958$ ).

#### Convergent Validity: Relationship Between the BSE-R and CARS

Hypothesis 2 stated that the BSE-R (when completed by parents) would highly correlate with the CARS (when completed by parents), demonstrating convergent validity. This hypothesis was strongly supported. A correlation was computed to examine the relationship between total CARS scores and total BSE-R scores across the three groups (autism vs. Asperger's syndrome vs. normal comparison). The results of the correlational analysis ( $N = 69$ ) were statistically significant ( $r = .916, p = .000$ ). A matrix showing the correlation coefficient between every CARS item and every BSE-R item is provided in Table 2. As illustrated in Table 2, the results were statistically significant for 428 out of the 438 correlation coefficients. As illustrated in Table 3, the correlation between the total CARS scores and the total BSE-R scores was significant within each group (autism, Asperger's syndrome, and normal comparison).

#### Utility of the CARS in Differentiating Autism from Asperger's Disorder

A one-way ANOVA was computed to examine differences in total CARS scores among the three groups (autism vs. Asperger's syndrome vs. normal comparison). The

Table 2: Correlation of CARS and BSE-R Items

	CARS M	CARS I	CARS II	CARS III	CARS IV	CARS V	CARS VI	CARS VII
BSE- R M	.916 .000	.756 .000	.503 .000	.837 .000	.832 .000	.686 .000	.786 .000	.785 .000
BSE- R 1	.668 .000	.586 .000	.280 .020	.655 .000	.588 .000	.494 .000	.648 .000	.474 .000
BSE- R 2	.730 .000	.597 .000	.412 .000	.642 .000	.661 .000	.446 .000	.691 .000	.610 .000
BSE- R 3	.751 .000	.706 .000	.446 .000	.704 .000	.675 .000	.561 .000	.608 .000	.606 .000
BSE- R 4	.765 .000	.668 .000	.504 .000	.688 .000	.685 .000	.557 .000	.602 .000	.746 .000
BSE- R 5	.508 .000	.275 .022	.483 .000	.337 .005	.308 .010	.538 .000	.388 .001	.453 .000
BSE- R 6	.628 .000	.452 .000	.489 .000	.535 .000	.560 .000	.542 .000	.535 .000	.565 .000
BSE- R 7	.609 .000	.535 .000	.362 .002	.487 .000	.557 .000	.492 .000	.383 .000	.659 .000
BSE- R 8	.708 .000	.543 .000	.365 .002	.632 .000	.631 .000	.558 .000	.581 .000	.655 .000
BSE- R 9	.762 .000	.573 .000	.644 .000	.606 .000	.715 .000	.769 .000	.488 .000	.670 .000
BSE- R 10	.761 .000	.613 .000	.451 .000	.676 .000	.694 .000	.632 .000	.608 .000	.715 .000
BSE- R 11	.775 .000	.679 .000	.336 .005	.784 .000	.630 .000	.529 .000	.723 .000	.652 .000
BSE- R 12	.705 .000	.568 .000	.327 .006	.679 .000	.799 .000	.498 .000	.546 .000	.686 .000
BSE- R 13	.634 .000	.520 .000	.330 .006	.556 .000	.558 .000	.451 .000	.536 .000	.587 .000
BSE- R 14	.695 .000	.584 .000	.369 .002	.684 .000	.722 .000	.602 .000	.527 .000	.584 .000
BSE- R 15	.625 .000	.533 .000	.238 .049	.595 .000	.551 .000	.393 .001	.602 .000	.564 .000
BSE- R 16	.564 .000	.522 .000	.329 .006	.465 .000	.508 .000	.396 .001	.596 .000	.447 .000
BSE- R 17	.732 .000	.561 .000	.347 .003	.708 .000	.670 .000	.587 .000	.741 .000	.509 .000
BSE- R 18	.689 .000	.587 .000	.319 .007	.732 .000	.590 .000	.545 .000	.737 .000	.491 .000
BSE- R 19	.532 .000	.452 .000	.203 .095	.471 .000	.530 .000	.223 .065	.625 .000	.408 .000
BSE- R 20	.444 .000	.360 .002	.098 .423	.394 .001	.397 .001	.288 .016	.417 .000	.431 .000
BSE- R 21	.466 .000	.349 .003	.231 .056	.415 .000	.405 .001	.535 .000	.438 .000	.273 .023
BSE- R 22	.593 .000	.446 .000	.220 .070	.574 .000	.614 .000	.319 .007	.521 .000	.553 .000
BSE- R 23	.722 .000	.617 .000	.420 .000	.665 .000	.641 .000	.543 .000	.511 .000	.628 .000
BSE- R 24	.690 .000	.558 .000	.346 .004	.636 .000	.595 .000	.440 .000	.609 .000	.570 .000
BSE- R 25	.732 .000	.621 .000	.393 .001	.683 .000	.633 .000	.529 .000	.668 .000	.538 .000
BSE- R 26	.501 .000	.392 .001	.414 .000	.301 .012	.462 .000	.437 .000	.308 .010	.503 .000
BSE- R 27	.557 .000	.541 .000	.519 .000	.426 .000	.505 .000	.391 .001	.417 .000	.553 .000
BSE- R 28	.700 .000	.600 .000	.345 .004	.727 .000	.668 .000	.491 .000	.584 .000	.633 .000
BSE- R 29	.719 .000	.591 .000	.331 .005	.715 .000	.618 .000	.488 .000	.661 .000	.549 .000

Note: Top number is the correlation coefficient; bottom number is the  $p$  value. Bold items are significant,  $p < .05$

Table 2: Correlation of CARS and BSE-R Items (continued)

	CARSVIII	CARSIX	CARSX	CARSXI	CARSXII	CARSXIII	CARSXIV
BSE-R M	.803 .000	.824 .000	.870 .000	.594 .000	.668 .000	.860 .000	.481 .000
BSE-R1	.715 .000	.579 .000	.708 .000	.404 .000	.443 .000	.660 .000	.241 .046
BSE-R2	.757 .000	.620 .000	.656 .000	.464 .000	.530 .000	.750 .000	.369 .000
BSE-R3	.706 .000	.714 .000	.747 .000	.420 .000	.506 .000	.756 .000	.318 .000
BSE-R4	.776 .000	.550 .000	.714 .000	.616 .000	.611 .000	.617 .000	.348 .003
BSE-R5	.422 .000	.420 .000	.450 .000	.597 .000	.414 .000	.330 .006	.361 .002
BSE-R6	.522 .000	.531 .000	.590 .000	.474 .000	.537 .000	.459 .000	.336 .005
BSE-R7	.534 .000	.428 .000	.548 .000	.612 .000	.549 .000	.426 .000	.359 .002
BSE-R8	.618 .000	.634 .000	.683 .000	.506 .000	.438 .000	.713 .000	.390 .001
BSE-R9	.525 .000	.662 .000	.605 .000	.671 .000	.641 .000	.574 .000	.558 .000
BSE-R10	.673 .000	.695 .000	.711 .000	.509 .000	.580 .000	.698 .000	.348 .003
BSE-R11	.721 .000	.792 .000	.761 .000	.407 .000	.510 .000	.750 .000	.396 .001
BSE-R12	.647 .000	.606 .000	.688 .000	.476 .000	.501 .000	.595 .000	.320 .007
BSE-R13	.592 .000	.653 .000	.617 .000	.421 .000	.408 .000	.626 .000	.260 .031
BSE-R14	.566 .000	.650 .000	.627 .000	.358 .000	.464 .000	.653 .000	.448 .000
BSE-R15	.625 .000	.589 .000	.619 .000	.241 .046	.461 .000	.644 .000	.344 .004
BSE-R16	.472 .000	.471 .000	.474 .000	.272 .024	.453 .000	.573 .000	.381 .001
BSE-R17	.609 .000	.641 .000	.787 .000	.437 .000	.494 .000	.641 .000	.449 .000
BSE-R18	.613 .000	.667 .000	.740 .000	.316 .000	.403 .000	.605 .000	.354 .003
BSE-R19	.556 .000	.494 .000	.516 .000	.216 .075	.427 .000	.661 .000	.147 .228
BSE-R20	.411 .000	.454 .000	.414 .000	.144 .351	.364 .000	.571 .000	.235 .052
BSE-R21	.342 .004	.332 .005	.390 .001	.353 .003	.450 .000	.414 .000	.344 .004
BSE-R22	.610 .000	.564 .000	.660 .000	.289 .016	.385 .001	.671 .000	.178 .143
BSE-R23	.610 .000	.643 .000	.608 .000	.571 .000	.494 .000	.691 .000	.508 .000
BSE-R24	.713 .000	.738 .000	.673 .000	.488 .000	.474 .000	.625 .000	.258 .033
BSE-R25	.679 .000	.758 .000	.739 .000	.372 .002	.472 .000	.792 .000	.325 .006
BSE-R26	.329 .006	.332 .005	.412 .000	.494 .000	.608 .000	.407 .000	.365 .002
BSE-R27	.438 .000	.480 .000	.399 .001	.350 .003	.453 .000	.514 .000	.397 .001
BSE-R28	.631 .000	.589 .000	.759 .000	.343 .004	.434 .000	.744 .000	.313 .009
BSE-R29	.700 .000	.652 .000	.649 .000	.502 .000	.543 .000	.653 .000	.412 .000

Note: Top number is the correlation coefficient; bottom number is the  $p$  value. **Bold** items are significant,  $p < .05$

**Table 3: Correlations Between CARS Total Scores and BSE-R Total Scores  
Within Each Group**

<b>Group</b>	<b>r</b>	<b><i>p value</i></b>	<b>n</b>
Autism	.801	.001	23
Asperger's	.825	.001	22
Normal	.787	.001	24

results of ANOVA were statistically significant,  $F(2, 66) = 65.72, p = .000$ . ANOVA was also employed to examine group differences for each CARS item. Illustrated in Table 4, ANOVA results were statistically significant for 14 out of the 14 CARS items. Pre-planned follow up tests were employed to examine the specific nature of group differences.

Results indicated that the difference between the autism group ( $\underline{M} = 2.32, \underline{SD} = .54$ ) and the normal comparison group ( $\underline{M} = 1.07, \underline{SD} = .16$ ) in CARS mean scores was statistically significant,  $t(45) = 10.913, p = .000$ . As indicated in Table 5, this group difference was also statistically significant for 14 out of the 14 CARS items with a two-tailed test.

Results indicated that the difference between the Asperger's syndrome group ( $\underline{M} = 1.93, \underline{SD} = .42$ ) and the normal comparison group ( $\underline{M} = 1.07, \underline{SD} = .16$ ) in CARS mean scores was statistically significant,  $t(44) = 9.345, p = .000$ . As indicated in Table 6, this group difference was statistically significant for 12 out of the 14 CARS items with a two-tailed test. As also evident in Table 6, this group difference was significant for 13 out of 14 CARS items when the less conservative one-tailed test was employed.

Results indicated that the difference between the autism group ( $\underline{M} = 2.32, \underline{SD} = .54$ ) and Asperger's syndrome group ( $\underline{M} = 1.93, \underline{SD} = .42$ ) in CARS mean scores was statistically significant,  $t(43) = 2.703, p = .010$ . As indicated in Table 7, this group difference was statistically significant for 4 out of the 14 CARS items with a two-tailed test. As also evident in Table 7, this group difference was significant for 5 out of 14 CARS items when the less conservative one-tailed test was employed.



**Table 4: Means and Standard Deviations for CARS Items as a Function of Group**

<i>Items</i>	<i>Diagnosis</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>F*</i>	<i>p value</i>
CARS Total Scores	autism	23	37.78	8.67	65.72	.000
	asperger	22	32.02	6.80		
	no-diagnosis	24	16.69	0.98		
CARSI	autism	23	2.20	.56	42.36	.000
	asperger	22	1.98	.52		
	no-diagnosis	24	1.06	.17		
CARSI	autism	23	1.80	.76	15.47	.000
	asperger	22	1.18	.48		
	no-diagnosis	24	1.00	.00		
CARSI	autism	23	2.65	.70	60.58	.000
	asperger	22	2.43	.60		
	no-diagnosis	24	1.06	.17		
CARSI	autism	23	2.35	.80	37.61	.000
	asperger	22	2.02	.55		
	no-diagnosis	24	1.00	.00		
CARSV	autism	23	2.07	.71	19.63	.000
	asperger	22	1.61	.74		
	no-diagnosis	24	1.00	.00		
CARSV	autism	23	2.61	.85	32.95	.000
	asperger	22	2.23	.91		
	no-diagnosis	24	1.00	.00		
CARSV	autism	23	2.28	.81	26.47	.000
	asperger	22	1.73	.69		
	no-diagnosis	24	1.00	.00		
CARSV	autism	23	2.50	.64	40.82	.000
	asperger's	22	2.20	.65		
	no-diagnosis	24	1.13	.30		

\*Note: *df* between groups = 2, within groups = 66, total = 68

**Table 4: Means and Standard Deviations for CARS Items as a Function of Group  
(continued)**

<i>Items</i>	<i>Diagnosis</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>F*</i>	<i>p value</i>
CARSIX	autism	23	2.43	.92	22.64	.000
	asperger	22	1.98	.93		
	no-diagnosis	24	1.00	.00		
CARSX	autism	23	2.59	.76	53.03	.000
	asperger	22	2.64	.66		
	no-diagnosis	24	1.08	.19		
CAR SXI	autism	23	2.59	.86	4.64	.013
	asperger	22	1.61	.74		
	no-diagnosis	24	1.46	2.04		
CAR SXII	autism	23	1.91	.81	14.54	.000
	asperger	22	1.68	.68		
	no-diagnosis	24	1.00	.00		
CAR SXIII	autism	23	2.43	.80	26.21	.000
	asperger	22	2.14	.86		
	no-diagnosis	24	1.06	.22		
CAR SXIV	autism	23	2.13	.93	10.586	.000
	asperger	22	1.61	.94		
	no-diagnosis	24	1.10	.21		

\*Note: *df* between groups = 2, within groups = 66, total = 68

**Table 5: Results of Analysis Comparing the Autism Group and the Normal Comparison Group on CARS Items**

<i>Items</i>	<i>t*</i>	<i>p value (2-tailed)</i>
CARS Mean Score	10.91	.000
CARSI	9.50	.000
CARSII	5.16	.000
CARSIII	10.84	.000
CARSIV	8.22	.000
CARSV	7.33	.000
CARSVI	9.25	.000
CARSVII	7.77	.000
CARSVIII	9.48	.000
CARSIX	7.64	.000
CARSX	9.35	.000
CARSXI	2.45	.018
CARSXII	5.55	.000
CARSXIII	8.06	.000
CARSXIV	5.26	.000

\*Note: *df* = 45

**Table 6: Results of Analysis Comparing the Asperger's Syndrome Group and Normal Comparison Group on CARS Items**

<i>Items</i>	<i>t*</i>	<i>p value (2-tailed)</i>
CARS Mean Score	9.35	.000
CARSI	8.13	.000
CARSII	1.87	.068
CARSIII	10.68	.000
CARSIV	9.20	.000
CARSV	4.07	.000
CARSVI	6.62	.000
CARSVII	5.20	.000
CARSVIII	7.33	.000
CARSIX	5.14	.000
CARSX	11.08	.000
CARSXI	.34	.737
CARSXII	4.90	.000
CARSXIII	5.90	.000
CARSXIV	2.60	.013

\*Note: *df* = 44

**Table 7: Results of Analysis Comparing the Autism Group and Asperger's Syndrome Group on CARS Items**

<i>Items</i>	<i>t*</i>	<i>p value (2-tailed)</i>
CARS Mean Score	2.70	.010
CARSI	1.35	.183
CARSII	3.26	.002
CARSIII	1.13	.264
CARSIV	1.58	.119
CARSV	2.09	.043
CARSVI	1.45	.154
CARSVII	2.48	.017
CARSVIII	1.54	.131
CARSIX	1.66	.105
CARSX	-.23	.818
CARSXI	4.06	.000
CARSXII	1.04	.306
CARSXIII	1.20	.235
CARSXIV	1.85	.071

\*Note: *df* = 43

### Utility of the BSE-R in Differentiating Autism from Asperger's Disorder

A one-way ANOVA was computed to examine differences in total BSE-R scores among the three groups (autism vs. Asperger's Syndrome vs. normal comparison). The results of ANOVA were statistically significant,  $F(2, 66) = 41.694, p = .000$ . ANOVA was also employed to examine group differences for each BSE-R item. As illustrated in Table 8, these ANOVA results were statistically significant for 29 out of the 29 BSE-R items. Pre-planned follow-up tests were employed to examine the specific nature of group differences.

Results indicated that the difference between the autism group ( $\underline{M} = 1.38, \underline{SD} = .68$ ) and the normal comparison group ( $\underline{M} = .075, \underline{SD} = .08$ ) in BSE-R mean scores was statistically significant,  $t(45) = 9.396, p = .000$ . As indicated in Table 9, this group difference was statistically significant for 29 out of the 29 BSE-R items with a two-tailed test.

Results indicated that the difference between the Asperger's syndrome group ( $\underline{M} = 1.13, \underline{SD} = .61$ ) and the normal comparison group ( $\underline{M} = .075, \underline{SD} = .08$ ) in BSE-R mean scores was statistically significant,  $t(44) = 8.477, p = .000$ . As indicated in Table 10, this group difference was statistically significant for 26 out of the 29 BSE-R items with a two-tailed test, and 27 out of 29 BSE-R items when the less conservative one-tailed test was employed.

Results indicated that the difference between the autism group ( $\underline{M} = 1.38, \underline{SD} = .68$ ) and Asperger's syndrome group ( $\underline{M} = 1.13, \underline{SD} = .61$ ) in BSE-R mean scores was not statistically significant,  $t(43) = 1.284, p = .206$ . As indicated in Table 11, this group

**Table 8: Means and Standard Deviations for BSE-R Items as a Function of Group**

<i>items</i>	<i>diagnosis</i>	<i>M</i>	<i>SD</i>	<i>F*</i>	<i>p value</i>
BSER Total Scores	autism	40.00	19.59	41.69	.000
	asperger	32.82	17.63		
	no-diagnosis	2.17	2.18		
BSER1	autism	2.04	.82	26.73	.000
	asperger	2.14	1.13		
	no-diagnosis	.46	.66		
BSER2	autism	1.52	.99	22.26	.000
	asperger	1.73	1.16		
	no- diagnosis	.13	.34		
BSER3	autism	1.30	.88	18.46	.000
	asperger	1.36	1.09		
	no-diagnosis	.08	.28		
BSER4	autism	1.52	.79	27.95	.000
	asperger	1.18	.66		
	no-diagnosis	.13	.45		
BSER5	autism	.87	1.25	6.31	.003
	asperger	.36	.58		
	no-diagnosis	.04	.20		
BSER6	autism	.65	.78	8.58	.000
	asperger	.77	.92		
	no-diagnosis	.00	.00		
BSER7	autism	1.65	1.19	21.32	.000
	asperger	.68	.95		
	no-diagnosis	.00	.00		
BSER8	autism	1.65	1.15	19.34	.000
	asperger	1.36	1.18		
	no-diagnosis	.04	.20		

\*Note: *df* between groups = 2, within groups = 66, total = 68

Table 8: Means and Standard Deviations for BSE-R Items as a Function of Group

<i>items</i>	<i>diagnosis</i>	<i>M</i>	<i>SD</i>	<i>F*</i>	<i>p value</i>
BSER9	autism	1.70	1.40	14.50	.000
	asperger	.73	1.28		
	no-diagnosis	.00	.00		
BSER10	autism	1.74	1.42	17.02	.000
	asperger	1.32	1.21		
	no-diagnosis	.00	.00		
BSER11	autism	2.17	1.30	26.68	.000
	asperger	2.23	1.19		
	no-diagnosis	.25	.53		
BSER12	autism	1.96	1.26	21.46	.000
	asperger	1.23	1.31		
	no-diagnosis	.00	.00		
BSER13	autism	1.57	1.12	10.22	.000
	asperger	1.32	1.29		
	no-diagnosis	.29	.55		
BSER14	autism	1.39	1.47	10.77	.000
	asperger	1.23	1.31		
	no-diagnosis	.00	.00		
BSER15	autism	1.00	1.04	8.75	.000
	asperger	.73	.94		
	no-diagnosis	.04	.20		
BSER16	autism	1.09	1.16	11.82	.000
	asperger	.45	.51		
	no-diagnosis	.04	.20		
BSER17	autism	1.70	1.02	24.29	.000
	asperger	1.64	1.09		
	no-diagnosis	.13	.34		

\*Note: *df* between groups = 2, within groups = 66, total = 68



**Table 8: Means and Standard Deviations for BSE-R Items as a Function of Group**

<i>Items</i>	<i>diagnosis</i>	<i>M</i>	<i>SD</i>	<i>F*</i>	<i>p value</i>
BSER18	autism	1.48	1.08	24.30	.000
	asperger	1.59	.91		
	no-diagnosis	.08	.28		
BSER19	autism	1.04	1.33	8.15	.001
	asperger	1.14	1.32		
	no-diagnosis	.00	.00		
BSER20	autism	.39	.78	3.17	.049
	asperger	.18	.50		
	no-diagnosis	.00	.00		
BSER21	autism	.48	.73	5.85	.005
	asperger	.64	.90		
	no-diagnosis	.00	.00		
BSER22	autism	1.26	1.05	10.51	.000
	asperger	.95	1.17		
	no-diagnosis	.08	.28		
BSER23	autism	2.22	1.00	26.95	.000
	asperger	1.86	1.17		
	no-diagnosis	.33	.56		
BSER24	autism	1.78	1.17	22.40	.000
	asperger	1.23	1.15		
	no-diagnosis	.00	.00		
BSER25	autism	1.22	1.20	12.48	.000
	asperger	1.09	1.06		
	no-diagnosis	.00	.00		

\*Note: *df* between groups = 2, within groups = 66, total = 68

**Table 8: Means and Standard Deviations for BSE-R Items as a Function of Group**

<i>items</i>	<i>diagnosis</i>	<i>M</i>	<i>SD</i>	<i>F*</i>	<i>p value</i>
BSER26	autism	.61	1.08	4.13	.020
	asperger	.23	.69		
	no-diagnosis	.00	.00		
BSER27	autism	.57	.95	3.67	.031
	asperger	.18	.85		
	no-diagnosis	.00	.00		
BSER28	autism	1.39	1.03	26.96	.000
	asperger	1.64	1.00		
	no-diagnosis	.00	.00		
BSER29	autism	2.04	1.22	25.02	.000
	asperger	1.68	1.32		
	no-diagnosis	.04	.20		

\*Note: *df* between groups = 2, within groups = 66, total = 68

**Table 9: Results of Analysis Comparing the Autism Group and Normal Comparison Group on BSE-R Items**

<i>Items</i>	<i>t*</i>	<i>p value (2-tailed)</i>
BSER Mean Score	9.40	.00
BSER1	7.30	.00
BSER2	6.51	.00
BSER3	6.49	.00
BSER4	7.49	.00
BSER5	3.19	.00
BSER6	4.12	.00
BSER7	6.80	.00
BSER8	6.74	.00
BSER9	5.95	.00
BSER10	5.10	.00
BSER11	6.68	.00
BSER12	7.61	.00
BSER13	4.98	.00
BSER14	4.64	.00
BSER15	4.41	.00
BSER16	4.33	.00
BSER17	7.15	.00
BSER18	6.11	.00
BSER19	3.84	.00
BSER20	2.45	.02
BSER21	3.21	.00
BSER22	5.28	.00
BSER23	8.01	.00
BSER24	7.49	.00
BSER25	4.95	.00
BSER26	2.77	.01
BSER27	2.93	.01
BSER28	6.60	.00
BSER29	7.90	.00

\*Note:  $df = 45$

**Table 10: Results of Analysis Comparing the Asperger's Syndrome Group and Normal Comparison Group on BSE-R Items**

<i>Items</i>	<i>t*</i>	<i>p value (2-tailed)</i>
BSER Mean Score	8.48	.00
BSER1	6.24	.00
BSER2	6.47	.00
BSER3	5.55	.00
BSER4	6.37	.00
BSER5	2.55	.01
BSER6	4.11	.00
BSER7	3.54	.00
BSER8	5.42	.00
BSER9	2.79	.01
BSER10	5.34	.00
BSER11	7.37	.00
BSER12	4.61	.00
BSER13	3.57	.00
BSER14	4.61	.00
BSER15	3.51	.00
BSER16	3.66	.00
BSER17	6.45	.00
BSER18	7.74	.00
BSER19	4.22	.00
BSER20	1.78	.08
BSER21	3.46	.00
BSER22	3.53	.00
BSER23	5.74	.00
BSER24	5.23	.00
BSER25	5.02	.00
BSER26	1.63	.11
BSER27	1.05	.30
BSER28	8.01	.00
BSER29	6.00	.00

\*Note:  $df = 44$

**Table 11: Results of Analysis Comparing the Asperger's Syndrome Group and Autism Group on BSE-R Items**

<i>Items</i>	<i>t*</i>	<i>p value. (2-tailed)</i>
BSER Mean Score	1.28	.21
BSER1	.32	.75
BSER2	.64	.53
BSER3	.20	.84
BSER4	-1.56	.13
BSER5	-1.72	.09
BSER6	.48	.64
BSER7	-3.02	.00
BSER8	-.83	.41
BSER9	-2.42	.02
BSER10	-1.07	.29
BSER11	.143	.89
BSER12	-1.91	.06
BSER13	-.69	.50
BSER14	-.40	.70
BSER15	-.92	.36
BSER16	-2.34	.02
BSER17	-.19	.85
BSER18	.38	.71
BSER19	.24	.82
BSER20	-1.06	.29
BSER21	.65	.52
BSER22	-.92	.36
BSER23	-1.10	.28
BSER24	-1.61	.12
BSER25	-.37	.71
BSER26	-1.41	.17
BSER27	-1.43	.16
BSER28	.81	.42
BSER29	-.95	.35

\*Note:  $df = 43$

difference was statistically significant for 3 out of the 29 BSE-R items with a two-tailed test, and 5 out of 29 BSE-R items when the less conservative one-tailed test was employed.

#### Relative Utility of CARS Versus BSE-R in Differentiating Clinical From Non-Clinical Group

As previously noted, the CARS is the most sophisticated and commonly-used psychometric instrument of its kind (Sattler, 2002), and so it was used as a standard by which the utility of the BSE-R could be judged. On the other hand, the BSE-R has some practical advantages for use by paraprofessionals or parents, as explained earlier. The results presented in the above sections suggest that the CARS has greater utility than the BSE-R in differentiating the closely-related diagnostic groups (autism versus Asperger's syndrome). However, another very clear finding is that both psychometric instruments have utility in differentiating the two clinical groups from the normal comparison group. Therefore, a discriminant function analysis was computed to determine the relative utility of the CARS versus BSE-R in differentiating participants in clinical groups from participants in the non-clinical (normal) group. Using a discriminant function analysis, the total CARS scores were able to correctly classify 89.9% of the children into clinical (autism and Asperger's syndrome) and non-clinical (normal) groups. In comparison, another discriminant function analysis indicated that the total BSE-R scores were able to correctly classify 88.4% of the children into clinical (autism and Asperger's syndrome) and non-clinical (normal) groups.

## CHAPTER IV

### DISCUSSION

This discussion is organized into a number of sections. The first section discusses evidence of internal consistency for the BSE-R. In the second section, evidence of convergent validity for the BSE-R is reviewed. The third section focuses on the discriminant validity of the BSE-R; that is, it considers the utility of the BSE-R in differentiating among clinical groups as well as between clinical versus non-clinical groups. In the fourth section, the practical utility of the BSE-R, in comparison to other available psychometric instruments, is discussed. Throughout the different sections, relevant limitations of the current study are noted and recommendations for research are provided.

#### Internal Consistency

Previous research demonstrated internal consistency for the original BSE (Barthelemy et al., 1990; Barthelemy et al., 1992) as well as the BSE-R (Barthelemy et al., 1997) when completed by professionals. Oneal et al., (2006) found that the original BSE had good internal consistency when completed by parents. In support of Hypothesis 1, the present results indicated that, the BSE-R (when completed by parents) also has a very high level of internal consistency (inter-item) consistency, replicating past research with the revised form. As also expected, this study found that when parents completed the CARS, excellent internal consistency was found. This finding replicates past research

showing excellent internal consistency for the CARS when completed by professionals (Schopler et al., 2004; Hisateru, Hirokazu, and Hiroshi, 2003).

A limitation of the present study is that the smaller sample size precluded a factor analysis of BSE-R items. It is recommended that a similar study be conducted with a larger group in order to determine if the factors obtained among BSE-R items when the instrument is completed by parents are consistent with past research identifying common or similar factors in (a) the original BSE when completed by professionals (Barthelemy et al., 1990; Barthelemy et al., 1992), (b) the BSE-R when completed by professionals (Barthelemy et al., 1997) and (c) the original BSE when completed by parents (Oneal et al., 2006).

#### Convergent Validity

A correlation was computed to examine the relationship between total CARS scores and total BSE-R scores across the three groups (autism vs. Asperger's syndrome vs. normal comparison). Similar to another study (Oneal et al., 2006), a significant correlation between the original BSE and the CARS was found. Participants who scored high on the BSE-R also scored high on the CARS and participants who scored low on the BSE-R also scored low on the CARS (see Table 2). Thus, results supported Hypothesis 2. This close correspondence between BSE-R and CARS scores suggests convergent validity for the BSE-R as a measure of parents' perception of symptom severity. The CARS is a valid, reliable and useful instrument, which has been developed and refined through over a decade of research and clinical use (Schopler et al., 2004).

A limitation of the present study was that the diagnoses of autism and Asperger's



disorder were not confirmed by a professional (i.e., clinical psychologist or psychiatrist). A related limitation was that the relationship between BSE-R scores and Expert Severity Scores was not examined. However, previous research did demonstrate that this psychometric instrument corresponded with Expert Severity Scores (Barthelemy et al., 1990; Barthelemy et al., 1997). Regarding future research, a prospective longitudinal study is recommended in which the relationship between BSE-R scores (when completed by parents) and Expert Severity Scores is examined over time. In such a study, there should be an emphasis on determining the extent to which parents' BSE-R ratings accurately reflect fluctuations in symptomatology as autistic children receive home-based behavior modification.

#### Utility of the BSE-R in Differentiating Diagnostic Groups

In the present study, results indicated that, when the BSE-R and the CARS are completed by parents, both psychometric instruments are very effective in differentiating (a) autism from normal development and (b) Asperger's disorder from normal development. This finding is consistent with Hypothesis 3, and it is also consistent with past research on the BSE-R (Barthelemy et al., 1997) and the CARS (Hisateru, Hirokazu, and Hiroshi, 2003). Further, since past research on the original BSE (and BSE-R) and the CARS utilized professional ratings, the findings of the present study represent a significant extension of the body of research.

Hypothesis 3 also stated that the BSE-R (when completed by parents) would be useful in differentiating autism from Asperger's disorder. Since the CARS is the most commonly used and sophisticated instrument of its kind (Sattler, 2002), the level of

effectiveness of the CARS in differentiating autism from Asperger's disorder was used as a reference point for determining the utility of the BSE-R for that particular purpose. In previous research, the Childhood Autism Rating Scale - Tokio Version (CARS-TV) was used to rate the behaviors of children with a variety of pervasive developmental disorders (e.g., autistic disorder, childhood disintegrative disorder, Asperger's disorder, and pervasive developmental disorder not otherwise specified). The total score differed significantly among the four groups, with autism disorder and childhood disintegrative disorder being significantly higher than both pervasive developmental disorder not otherwise specified and Asperger's disorder (Hisateru, Hirokazu, and Hiroshi, 2003). The CARS-Tokio Version was able to correctly classify 72% of the children into autism and Asperger's syndrome groups.

In general, results provided only partial support for Hypothesis 3 and indicated that the CARS was more successful than the BSE-R in differentiating autism from Asperger's disorder. Depending on whether a one or two-tailed test is employed, 4 or 5 out of 14 CARS items were significantly higher for the autism group relative to the Asperger's disorder group, whereas only 3 or 5 out of 29 BSE-R items showed this statistically significant directional pattern. Table 12 provides a list of CARS and BSE-R items that significantly differentiated autism from Asperger's disorder.

It is important to make the following points regarding the findings of this study as they pertain to the discriminant validity of the BSE-R. First, it should be noted that 3 of the 5 BSE-R items that differentiated the two clinical groups (i.e., items 5, 9, and 12) belong to BSE-R Factor 1, which is believed to be the most important factor because it is

**Table 12: Significant Items that Differentiate the Autism Group  
from Asperger's Syndrome**

BSE-R		CARS	
<i>items</i>	<i>p value (2-tailed)</i>	<i>items</i>	<i>p value (2-tailed)</i>
5) Does not make an effort to communicate using voice and/or words	.09	II) Imitation	.00
7) Stereotyped vocal or verbal utterances, echolalia	.00	V) Object use	.04
9) Inappropriate relating to inanimate objects	.02	VII) Visual response	.02
12) Stereotyped sensorimotor activity	.06	XI) Verbal communication	.00
16) Heteroaggressiveness	.02	XIV) level and consistency of intellectual response	.07

the only one that correlates with Expert Severity scores provided by experienced clinicians (Barthelemy et al., 1990, 1997). Future research should focus on those items of the BSE-R and the CARS that significantly differentiated the diagnostic groups, with the plan of developing and refining a psychometric instrument that paraprofessionals and parents can successfully use in making such differentiations. Second, while the CARS seems superior to the BSE-R in differentiating the clinical groups, a follow-up discriminant function analysis suggested that the CARS and BSE-R have approximately equal utility in differentiating the clinical groups from the normal group. That is, the CARS correctly classified 89.9% of the participants into clinical versus non-clinical groups and the BSE-R correctly classified 88.4% of the cases into clinical versus non-clinical groups. Third, the relative utility of the BSE-R and the CARS in differentiating the diagnostic groups must be viewed in light of the practical advantages of the BSE-R, as discussed below.

#### Practical Utility

In considering the importance of early initiation of remedial treatment for children with autism and the recent epidemiological studies reporting higher prevalence rates of autism and Asperger's syndrome than previous studies, a valid and efficient diagnostic screening scale for Pervasive Developmental Disorders is needed (Hisateru, Hirokazu, and Hiroshi, 2003). The BSE-R has proven to be a highly reliable and valid tool that is efficient in assessing and evaluating symptoms of autism. In addition, given the popularity of the home-based behavior modification programs, there is a need for an instrument to use in monitoring therapeutic progress that is free, easy to handle, and

accessible to paraprofessionals and parents (Barthelemy et al., 1990).

In sum, the BSE-R is free and readily available, does not require a significant level of clinical training to administer and provides many examples of specific behavioral tendencies of autistic symptoms. While further research may be needed to refine the BSE-R in order to make it ideal for parents, the available research suggests that it can be used by parents in a meaningful way as they assist the treatment team in monitoring changes in autistic symptoms in response to treatment.

## APPENDIX A

BSE-R ITEMS

<u>Items</u>	<u>Abbreviations</u>
1. Aloneness	ALO
2. Ignores people	IGN
3. Poor social interaction	SOC
4. Abnormal eye contact	GAZ
5. Does not make an effort to communicate using voice and/or words	VOI
6. Lack of appropriate facial expression and gesture	GES
7. Stereotyped vocal and verbal utterances, echolalia	ECH
8. Lack of initiative, poor activity	ACT
9. Inappropriate relating to inanimate objects or to dolls	OBI
10. Irresistible and/or ritual use of objects	RIT
11. Intolerance of change and to frustration	SAM
12. Stereotyped sensorimotor activity	STE
13. Agitation, restlessness	AGI
14. Bizarre posture and gait	POS
15. Auto-aggressiveness	AGR
16. Hetero-aggressiveness	HGR
17. Mild anxiety signs	ANX
18. Mood difficulties	MOO
19. Disturbance of feeding behavior	EAT
20. Does not try to be clean (stools or urine), plays with stools	CLE
21. Individual bodily activities	BLOD
22. Sleep problems	SLEP
23. Unstable attention	ATT
24. Bizarre responses to auditory stimuli	AUD
25. Variability	VAR
26. Does not imitate the gestures or voices of others	IMI
27. Child too floppy, lifeless	TON
28. Does not share emotion	EMO
29. Paradoxical sensitivity to touching and contact	TOU

## APPENDIX B

## Background Information Form

1. Name of individual completing form: \_\_\_\_\_

2. Your relationship to the child: \_\_\_\_\_  
\_\_\_\_\_

3. Gender of child: \_\_\_\_\_ M \_\_\_\_\_ F

4. Birth date of child: Month: \_\_\_\_\_ Day: \_\_\_\_\_ Year: \_\_\_\_\_

5. Formal Diagnostic and Statistical Manual of Mental Disorders—4<sup>th</sup> edition (DSM-IV) diagnosis (e.g., Autistic Disorder, or Asperger's Syndrome): \_\_\_\_\_  
\_\_\_\_\_

6. What is the highest grade level of school you completed? \_\_\_\_\_

7. Are you currently employed? \_\_\_\_\_ Yes \_\_\_\_\_ No

If yes, where are you employed? \_\_\_\_\_

Please provide a brief job description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. What is your family's average yearly income?

\_\_\_\_\_ Less than \$20,000

\_\_\_\_\_ \$20,000 - \$40,000

\_\_\_\_\_ \$40,000- \$60,000

\_\_\_\_\_ More than \$60,000

## APPENDIX C

## Childhood Autism Rating Scale (CARS)





# CARS Rating Sheet

**Directions:** For each category, use the space provided below each scale for taking notes concerning the behaviors relevant to each scale. After you have finished observing the child, rate the behaviors relevant to each item of the scale. For each item, circle the number which corresponds

to the statement that best describes the child. You may indicate the child is between two descriptions by using ratings of 1.5, 2.5, or 3.5. Abbreviated rating criteria are presented for each scale. See chapter 2 of the Manual for detailed rating criteria.

## I. RELATING TO PEOPLE

- 1** No evidence of difficulty or abnormality in relating to people • The child's behavior is appropriate for his or her age. Some shyness, fussiness, or annoyance at being told what to do may be observed, but not to an atypical degree.
- 1.5**
- 2** Mildly abnormal relationships • The child may avoid looking the adult in the eye, avoid the adult or become fussy if interaction is forced, be excessively shy, not be as responsive to the adult as is typical, or cling to parents somewhat more than most children of the same age.
- 2.5**
- 3** Moderately abnormal relationships • The child shows aloofness (seems unaware of adult) at times. Persistent and forceful attempts are necessary to get the child's attention at times. Minimal contact is initiated by the child.
- 3.5**
- 4** Severely abnormal relationships • The child is consistently aloof or unaware of what the adult is doing. He or she almost never responds or initiates contact with the adult. Only the most persistent attempts to get the child's attention have any effect.

Observations:

## II. IMITATION

- 1** Appropriate imitation • The child can imitate sounds, words, and movements which are appropriate for his or her skill level.
- 1.5**
- 2** Mildly abnormal imitation • The child imitates simple behaviors such as clapping or single verbal sounds most of the time; occasionally, imitates only after prodding or after a delay.
- 2.5**
- 3** Moderately abnormal imitation • The child imitates only part of the time and requires a great deal of persistence and help from the adult; frequently imitates only after a delay.
- 3.5**
- 4** Severely abnormal imitation • The child rarely or never imitates sounds, words, or movements even with prodding and assistance from the adult.

Observations:

## III. EMOTIONAL RESPONSE

- 1** Age-appropriate and situation-appropriate emotional responses • The child shows the appropriate type and degree of emotional response as indicated by a change in facial expression, posture, and manner.
- 1.5**
- 2** Mildly abnormal emotional responses • The child occasionally displays a somewhat inappropriate type or degree of emotional reactions. Reactions are sometimes unrelated to the objects or events surrounding them.
- 2.5**
- 3** Moderately abnormal emotional responses • The child shows definite signs of inappropriate type and/or degree of emotional response. Reactions may be quite inhibited or excessive and unrelated to the situation; may grimace, laugh, or become rigid even though no apparent emotion-producing objects or events are present.
- 3.5**
- 4** Severely abnormal emotional responses • Responses are seldom appropriate to the situation; once the child gets in a certain mood, it is very difficult to change the mood. Conversely, the child may show wildly different emotions when nothing has changed.

Observations:

## IV. BODY USE

- 1** Age appropriate body use • The child moves with the same ease, agility, and coordination of a normal child of the same age.
- 1.5**
- 2** Mildly abnormal body use • Some minor peculiarities may be present, such as clumsiness, repetitive movements, poor coordination, or the rare appearance of unusual movements.
- 2.5**
- 3** Moderately abnormal body use • Behaviors that are clearly strange or unusual for a child of this age may include strange finger movements, peculiar finger or body posturing, staring or picking at the body, self-directed aggression, rocking, spinning, fidgeting, wiggling, or toe-walking.
- 3.5**
- 4** Severely abnormal body use • Intense or frequent movements of the type listed above are signs of severely abnormal body use. These behaviors may persist despite attempts to discourage them or involve the child in other activities.

Observations:

## V. OBJECT USE

**Appropriate use of, and interest in, toys and other objects** • The child shows normal interest in toys and other objects appropriate for his or her skill level and uses these toys in an appropriate manner.

**Mildly inappropriate interest in, or use of, toys and other objects** • The child may show atypical interest in a toy or play with it in an inappropriately childish way (e.g., banging or sucking on the toy).

**Moderately inappropriate interest in, or use of, toys and other objects** • The child may show little interest in toys or other objects, or may be preoccupied with using an object or toy in some strange way. He or she may focus on some insignificant part of a toy, become fascinated with light reflecting off the object, repetitively move some part of the object, or play with one object exclusively.

**Severely inappropriate interest in, or use of, toys or other objects** • The child may engage in the same behaviors as above, with greater frequency and intensity. The child is difficult to distract when engaged in these inappropriate activities.

**Observations:**

## VI. ADAPTATION TO CHANGE

**Age appropriate response to change** • While the child may notice or comment on changes in routine, he or she accepts these changes without undue distress.

**Mildly abnormal adaptation to change** • When an adult tries to change tasks the child may continue the same activity or use the same materials.

**Moderately abnormal adaptation to change** • The child actively resists changes in routine, tries to continue the old activity, and is difficult to distract. He or she may become angry and unhappy when an established routine is altered.

**Severely abnormal adaptation to change** • The child shows severe reactions to change. If a change is forced, he or she may become extremely angry or uncooperative and respond with tantrums.

**Observations:**

## VII. VISUAL RESPONSE

**Age appropriate visual response** • The child's visual behavior is normal and appropriate for that age. Vision is used together with other senses as a way to explore a new object.

**Mildly abnormal visual response** • The child must be occasionally reminded to look at objects. The child may be more interested in looking at mirrors or lighting than peers, may occasionally stare off into space, or may also avoid looking people in the eye.

**Moderately abnormal visual response** • The child must be reminded frequently to look at what he or she is doing. He or she may stare into space, avoid looking people in the eye, look at objects from an unusual angle, or hold objects very close to the eyes.

**Severely abnormal visual response** • The child consistently avoids looking at people or certain objects and may show extreme forms of other visual peculiarities described above.

**Observations:**

## VIII. LISTENING RESPONSE

**1 Age appropriate listening response** • The child's listening behavior is normal and appropriate for age. Listening is used together with other senses.

**1.5 2 Mildly abnormal listening response** • There may be some lack of response, or mild overreaction to certain sounds. Responses to sounds may be delayed, and sounds may need repetition to catch the child's attention. The child may be distracted by extraneous sounds.

**2.5 3 Moderately abnormal listening response** • The child's responses to sounds vary; often ignores a sound the first few times it is made; may be startled or cover ears when hearing some everyday sounds.

**3.5 4 Severely abnormal listening response** • The child overreacts and/or underreacts to sounds to an extremely marked degree, regardless of the type of sound.

**Observations:**

## IX. TASTE, SMELL, AND TOUCH RESPONSE AND USE

**1 Normal use of, and response to, taste, smell, and touch** • The child explores new objects in an age appropriate manner, generally by feeling and looking. Taste or smell may be used when appropriate. When reacting to minor, everyday pain, the child expresses discomfort but does not overreact.

**1.5 2 Mildly abnormal use of, and response to, taste, smell, and touch** • The child may persist in putting objects in his or her mouth; may smell or taste inedible objects; may ignore or overreact to mild pain that a normal child would express as discomfort.

**2.5 3 Moderately abnormal use of, and response to, taste, smell, and touch** • The child may be moderately preoccupied with touching, smelling, or tasting objects or people. The child may either react too much or too little.

**3.5 4 Severely abnormal use of, and response to, taste, smell, and touch** • The child is preoccupied with smelling, tasting, or feeling objects more for the sensation than for normal exploration or use of the objects. The child may completely ignore pain or react very strongly to slight discomfort.

**Observations:**

## X. FEAR OR NERVOUSNESS

**1 Normal fear or nervousness** • The child's behavior is appropriate both to the situation and to his or her age.

**1.5 2 Mildly abnormal fear or nervousness** • The child occasionally shows too much or too little fear or nervousness compared to the reaction of a normal child of the same age in a similar situation.

**2.5 3 Moderately abnormal fear or nervousness** • The child shows either quite a bit more or quite a bit less fear than is typical even for a younger child in a similar situation.

**3.5 4 Severely abnormal fear or nervousness** • Fears persist even after repeated experience with harmless events or objects. It is extremely difficult to calm or comfort the child. The child may, conversely, fail to show appropriate regard for hazards which other children of the same age avoid.

**Observations:**

## XI. VERBAL COMMUNICATION

- 1** Normal verbal communication, age and situation appropriate.
- 1.5**
- 2** Mildly abnormal verbal communication • Speech shows overall retardation. Most speech is meaningful; however, some echolalia or pronoun reversal may occur. Some peculiar words or jargon may be used occasionally.
- 2.5**
- 3** Moderately abnormal verbal communication • Speech may be absent. When present, verbal communication may be a mixture of some meaningful speech and some peculiar speech such as jargon, echolalia, or pronoun reversal. Peculiarities in meaningful speech include excessive questioning or preoccupation with particular topics.
- 3.5**
- 4** Severely abnormal verbal communication • Meaningful speech is not used. The child may make infantile squeals, weird or animal-like sounds, complex noises approximating speech, or may show persistent, bizarre use of some recognizable words or phrases.

Observations:

## XII. NONVERBAL COMMUNICATION

- 1** Normal use of nonverbal communication, age and situation appropriate.
- 1.5**
- 2** Mildly abnormal use of nonverbal communication • Immature use of nonverbal communication; may only point vaguely, or reach for what he or she wants, in situations where same-age child may point or gesture more specifically to indicate what he or she wants.
- 2.5**
- 3** Moderately abnormal use of nonverbal communication • The child is generally unable to express needs or desires nonverbally, and cannot understand the nonverbal communication of others.
- 3.5**
- 4** Severely abnormal use of nonverbal communication • The child only uses bizarre or peculiar gestures which have no apparent meaning, and shows no awareness of the meanings associated with the gestures or facial expressions of others.

Observations:

## XIII. ACTIVITY LEVEL

- 1** Normal activity level for age and circumstances • The child is neither more active nor less active than a normal child of the same age in a similar situation.
- 1.5**
- 2** Mildly abnormal activity level • The child may either be mildly restless or somewhat "lazy" and slow moving at times. The child's activity level interferes only slightly with his or her performance.
- 2.5**
- 3** Moderately abnormal activity level • The child may be quite active and difficult to restrain. He or she may have boundless energy and may not go to sleep readily at night. Conversely, the child may be quite lethargic, and need a great deal of prodding to get him or her to move about.
- 3.5**
- 4** Severely abnormal activity level • The child exhibits extremes of activity or inactivity and may even shift from one extreme to the other.

Observations:

## XIV. LEVEL AND CONSISTENCY OF INTELLECTUAL RESPONSE

- 1** Intelligence is normal and reasonably consistent across various areas • The child is as intelligent as typical children of the same age and does not have any unusual intellectual skills or problems.
- 1.5**
- 2** Mildly abnormal intellectual functioning • The child is not as smart as typical children of the same age; skills appear fairly evenly retarded across all areas.
- 2.5**
- 3** Moderately abnormal intellectual functioning • In general, the child is not as smart as typical children of the same age; however, the child may function nearly normally in one or more intellectual areas.
- 3.5**
- 4** Severely abnormal intellectual functioning • While the child generally is not as smart as the typical child of his age, he or she may function even better than the normal child of the same age in one or more areas.

Observations:

## XV. GENERAL IMPRESSIONS

- 1** No autism • The child shows none of the symptoms characteristic of autism.
- 1.5**
- 2** Mild autism • The child shows only a few symptoms or only a mild degree of autism.
- 2.5**
- 3** Moderate autism • The child shows a number of symptoms or a moderate degree of autism.
- 3.5**
- 4** Severe autism • The child shows many symptoms or an extreme degree of autism.

Observations:

## APPENDIX D

**The Revised Behavioral Summarized Evaluation Scale (BSE-R)**  
**MAKE RESPONSES ON THIS SHEET.**

The BSE-R Scale is designed to provide a quantitative evaluation of autistic behavior in children with developmental disorders. In regard to the following symptom list, please rate your child as she/he is currently functioning in the space provided. Each item is scored from 0 to 4 according to the frequency of the symptom.

Please use the following rating system:

- 0 = Never
- 1 = Sometimes
- 2 = Often
- 3 = Very often
- 4 = Always

**1. Aloneness (ALO)**

- Keeps to the edges of a group or isolates himself/herself from it; cuts off communication.
- Keeps in his/her own world.
- Seeks a familiar space.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**2. Ignores people (IGN)**

- Indifferent to others, pays no attention to them: can walk into them without seeing them; seems not to hear them.
- Does not respond to overtures.
- Too quiet, indifferent (frozen expression).
- In terms of general behavior there is a turning away from others or a delayed reaction to them.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**3. Poor social interaction (SOC)**

- No exchange of toys.
  - No spontaneous approaches; no offering of objects.
  - Does not use objects as a means of mediation.
  - Uses the adult as an object.
  - Does not smile; does not seek company.
  - Is incapable of sustaining social exchanges.
- It should be noted that the child can stare at parts of the examiner's body or follow him around and still remain withdrawn.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**4. Abnormal eye contact (GAZ)**

- Does not look you in the eye; covers eyes; avoids direct looks.
- Looks away; turns face away when called or looked at.
- Empty or lifeless expression; fleeting or piercing look; follows things with eyes only intermittently; fixes things with gaze peripherally rather than centrally.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**5. Does not make an effort to communicate using voice and/or words (VOI)**

Here assessment should be based on the effort towards communication and not on verbal level. A child with speech can make no effort to communicate and score a high mark (noncommunicative echolalic language). A child without speech can try to make himself/herself understood in his/her own way (bubbling, prattling) and score a low mark.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**6. Lack of appropriate facial expression and gestures (GES)**

- Facial immobility.
- Shows no anticipatory postural reaction when about to be picked up.
- Cannot direct the examiner's hand to obtain a desired object: does not wave hands in its direction: cannot indicate precisely what s/he wants by gesture, attitude, or look.
- If s/he can speak, does not use facial, vocal, or gestural expression with normal frequency and liveliness.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**7. Stereotyped vocal or verbal utterances, echolalia (ECH)**

- Immediate or delayed echolalia; repeats randomly or selectively.
- Inversion of the personal pronoun.
- Repeats words or phrases whether or not they have communicative value.
- Links together words and phrases based on certain key words or consonances irrespective of any logical connection between them. Example: lemon, Monday, daylight, etc.
- Utters stereotyped sounds ("ah," "oh") in an abrupt, jerky way at moments of disappointment or delight: at other times for no particular reason.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**8. Lack of initiative, poor activity (ACT)**

- Does not invent any games without prompting (though possibly quite capable of doing so).
- Passivity; lack of interest.
- Slowness.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**9. Inappropriate relating to inanimate objects or to doll (OBJ)**

- Ignores objects or shows only fleeting interest in them (the object is held in a haphazard way without visual fixation on it).
- Sucks or puts objects into mouth.
- Pats, taps or strikes them repeatedly.
- Unusual behavior towards objects; lets them drop from hands passively: strokes them.
- Pulls hand away from a building block as if it were red-hot: minute tactile examination of things; tends to become absorbed by meaningless marks: stains, holes, dots.
- Bizarre and very personal utilization of objects and/or strange, eccentric behavior; will place an object on its side, or turn it round and round. Always carries a piece of string. Picks up anything lying around.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_**10. Irresistible and/or ritual use of objects (RIT)**

- Irresistible, uncontrollable need for an object, always keeps it with him/her, whether or not s/he uses it.
- Always uses objects in the same way and for the same purpose.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_**11. Intolerance of change and frustration (SAM)**

- Insistent demand that everything remains unchanged.
- Has great difficulty in accepting anything unusual: changes of place, time, people, clothes, food. Such changes provoke disproportionate reactions.
- Frustrated, reacts angrily when forbidden something or when activities are interrupted: discontented when desires or expectations remain unsatisfied. Becomes fixated on the frustrating element.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_**12. Stereotyped sensorimotor activity (STE)**

Stereotyped activities can also be noticed in the gait:

- Rocks to and fro on the bed, on the ground or from one foot to the other.
- Looks at hands; plays "hand-games", twists fingers, smells hands, blocks ears, covers eyes.
- Drums feet.
- Plays "eye-games" in sunlight or electric light.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_**13. Agitation, restlessness (AGI)**

Such symptoms occur in periods of rest or directed activity.

- Restlessness: disordered, uncontrolled, aimless excitation. Seems unable to find any peace, is constantly on the move.
- Boisterousness: seems compelled to make a noise and be generally troublesome.

Boisterousness can be considered normal, but pathological when exaggerated. It is therefore taken into account in the assessment.

Example: climbs everywhere, jumps from chair to chair, touches everything, is constantly changing activities, spreads out objects or toys. Can also be very noisy

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**14. Bizarre posture and gait (POS)**

Strangeness is often evident in posture and gait but it can also extend to general behavior and activities.

- Facial expression: grimaces, bizarre facial movements
- Posture: feet crossed in the air, head underneath ; twisted body ; unbalanced posture ; legs folded, head against the feet : hunched up in the corner of a room ; neck bent backwards ; violent extensions of the body ; absence of postural anticipation ; poor postural adaptation (the "soft" or "slippery" child).
- Gait: hops, walks on tiptoe or on the heels; turns round and round or runs round in little circles ; walks dragging one foot ; walks sideways with strange sudden forward movements.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**15. Auto-aggressiveness (AGR)**

- Aggression directed against or mutilation of own body (hits head with hand or some object, lets himself/herself fall heavily to the ground, bites, pinches himself/herself, scratches face, etc.).

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**16. Heteroaggressiveness (HGR)**

- Bites, scratches, hits out at other people.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**17. Mild anxiety signs (ANX)**

Examples of manifestations of anguish and anxiety:

- Sudden fits or crying, whimpering (often without tears)
- Little nervous laughs
- Seems fearful, fretful, uneasy
- Aimless walking up and down
- Trembling

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**18. Mood difficulties (MOO)**

- Difficulty in registering emotion
- Alternation of opposite emotions (anger, laughter, pleasure, sadness)
- Unprovoked fits of temper and laughter.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_



**19. Disturbance of feeding behavior (EAT)**

- Qualitative and/or quantitative difficulties
- Passive indifference: allows himself/herself to be fed without affective participation.
- Active refusal: cries or screams at the sight of food, refuses to be fed, gesticulating and turning the head away.
- Exclusive choice of certain tastes: sweet or salty.
- Eats other things (stones, paper).
- Vomiting.
- Eats dirtily, smears the food or throws it away.
- Rituals.
- Absence of the sense of taste.
- Bulimia, anorexia.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**20. Does not try to be clean (stools or urine), plays with stools (CLE)**

It is necessary to appreciate the efforts to be clean and not autonomy which varies with age. Plays with stools, handles them, puts them in mouth.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**21. Individual bodily activities (BOD)**

- Solitary stimulation of sensitive areas of body, particularly sexual areas (masturbation).
- Seeks or avoids "skin" contact with others: sexual games, problems with bodily contact.
- Disinterested in body, no handling of parts of the body (mouth, anus, sexual organs, skin).
- The child avoids bodily contact during washing, dressing, etc. Avoids being touched.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**22. Sleep problems (SLEP)**

- Hypersomnia (sleepy, difficult to waken).
- Hyposomnia (too awake, active, excitable). The child can remain awake and calm.
- Disturbed sleep (screams, cries, complains, nightmares).
- Sleep rituals (needs a presence, certain positions).

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**23. Unstable attention, easily distracted (ATT)**

- The child is incapable of fixing his attention on any suggested activity.
- Takes no notice of what is said to him/her on any suggested activity.
- Slowness of integration: does not take in instructions or does so only after a delay.
- Delayed responses.
- Unstable attention: modifications of attention are triggered by minute changes in the environment.
- Abnormal attention: pays attention to own non-vocal sound productions (scratching, tapping), which s/he listens to very attentively.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**24. Bizarre responses to auditory stimuli (AUD)**

- Heightened importance of the auditory function in a certain kind of relation with the outside world.
- Excessive, insufficient, or selective sensitivity to noises, sounds, calls.
- Paradoxical responses. Example: the child does not turn head when a door slams or when his/her name is called and interests himself/herself instead in the sound of rustling paper.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**25. Variability (VAR)**

- Considerable, even extreme, variations in capacities or problems from one minute to another.
- These variations may also involve behavior with others in the form of aggressive rejection or possessive attachment.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**26. Does not imitate the gestures or voices of others (IMI)**

Incapable of copying movements of hands, head, mouth or of copying postures and does not imitate sounds (not to be confused with echopraxia or echolalia).

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**27. Child too floppy, lifeless (TON)**

Hypotonic child, limp.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**28. Does not share emotion (EMO)**

Does not seem sensitive to emotion expressed by others. The expression of his/her emotion does not fit with that of others.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

**29. Paradoxical sensitivity to touching and contact (TOU)**

Physical contact with objects or people are sometimes avoided and sometimes accepted, even sought.

**FREQUENCY OF SYMPTOM:** \_\_\_\_\_

## APPENDIX E

**E-mail Message for Recruiting Participants**

My name is Lindsey Williams and I am currently a graduate student in clinical psychology at the University of Dayton. I am presently working with Dr. Roger N. Reeb on a research project that is to further investigate the Revised Behavioral Summarized Evaluation (BSE-R), a scale designed for the measurement of behavioral parameters in children with autism. The primary purpose of the project is to establish reliability and validity of the BSE-R by examining the extent to which the BSE-R helps in differentiating Autistic Disorder from Asperger's Syndrome and normal functioning. I am currently recruiting caregivers of children with Autistic Disorder or Asperger's Syndrome to participate in the study. I am also recruiting caregivers of children without a diagnosis of Autistic Disorder or Asperger's Syndrome. The potential results may support a well-validated instrument that can be used by paraprofessionals and parents to assist in monitoring therapeutic progress of home-based behavior modification programs.

If you elect to participate in this study, you will be mailed a packet of information including directions and an informed consent, and will be asked to complete two behavior rating scales and one questionnaire. The total time to complete the packet of information will be approximately 1 hour. When completed, the packet will be mailed back using an enclosed self-addressed/stamped envelope.

The identity of your child, and all of the information you provide will be treated with the professional standard of confidentiality. Identification numbers will be used rather than names, and all information will be stored in a locked filing cabinet. To participate, please email me your name and address so that I can mail you the questionnaire packet. I will email you when you can be expecting the packet. General results of the study will be distributed to participants individually upon their request. If you have any questions, feel free to contact Lindsey Williams, Dr. Roger N. Reeb, or Charles E. Kimble.

Thank you very much;

Lindsey Williams, Investigator, (937) 286-3595, [lew1011@hotmail.com](mailto:lew1011@hotmail.com)

Roger N. Reeb, Ph.D., Thesis Chair, Department of Psychology (SJ 306),  
University of Dayton, (937) 229-2395, [roger.reeb@notes.udayton.edu](mailto:roger.reeb@notes.udayton.edu)

Charles E. Kimble, Ph.D., Chair of Research Review and Ethics Committee,  
Department of Psychology (SJ 319), University of Dayton, (937) 229-2167;  
[charles.kimble@notes.udayton.edu](mailto:charles.kimble@notes.udayton.edu)

## APPENDIX F

**Caregiver Instructions**

To be completed by primary caregiver:

- 1 Please be sure to read and sign the **Informed Consent to Participate.**
- 2 Please complete the 3 instruments in the following order:
  - The Childhood Autism Rating Scale (CARS)
  - The Revised Behavioral Summarized Evaluation (BSE-R)
  - The Background Information Form
- 3 On the CARS and the BSE-R, please rate the child at their present level of functioning.
- 4 I am hoping to receive the questionnaire packets back within 7 to 10 days. Please mail back the packet using the enclosed self-addressed/stamped envelope.

If you have any questions about any of the scales or information please feel free to contact:

Lindsey Williams, Investigator, (937) 286-3595, **lew1011@hotmail.com**

Roger N. Reeb, Ph.D., Department of Psychology (SJ 306), University of Dayton, (937) 229-2395, **roger.reeb@notes.udayton.edu**

Charles E. Kimble, Ph.D., Chair of Research Review and Ethics Committee, Department of Psychology (SJ 319), University of Dayton, (937) 229-2167; **charles.kimble@notes.udayton.edu**

## APPENDIX G

**Informed Consent To Participate In A Research Project**

<b>Project Title:</b>	Use of the Revised Behavioral Summarized Evaluation to Differentiate Autism from Asperger's Disorder
<b>Investigators</b>	Lindsey Williams and Roger N. Reeb, Ph.D. (faculty sponsor)
<b>Description of Study:</b>	We are conducting a study to determine if the Revised Behavioral Summarized Evaluation (BSE-R) is useful in differentiating Autistic Disorder from both normal functioning as well as a related disorder (Asperger's Disorder). The need for a paper-and-pencil measure that can be used by paraprofessionals and parents in monitoring therapeutic progress is important, given the common use of home-based behavior modification programs for children diagnosed with autism (and related conditions). As a participant in this study, you will be asked to complete two behavior rating scales and one informational questionnaire within 7 to 10 days of receipt.
<b>Adverse Effects and Risks:</b>	Participation in this study is on a voluntary basis. Therefore, you have the right to withdraw from the study at any time. There will be no negative consequences from withdrawing from the study. While significant adverse effects, risks, or discomfort are not anticipated, it is possible that caregivers could experience some discomfort or concern if they are informed of unexpected results. If the results provide evidence that your child has one of the above conditions when you have designated him/her as "normal," or if the results suggest that your child has a more severe condition than you have designated, then you will be informed of this fact, and a referral will be provided if you wish to pursue a multidisciplinary evaluation. Likewise, if the results provide evidence that your child is "normal," and this finding is viewed as unexpected, given the disorder that you have designated him/her as having, then the researchers will inform you of this finding, and a referral will be provided if you wish to pursue a multidisciplinary evaluation.
<b>Duration of Study:</b>	It will take approximately 1 hour to complete the questionnaires.
<b>Confidentiality of Data:</b>	The identity of your child, and all of the information you provide will be treated with the professional standard of confidentiality. Identification numbers will be used rather than names, and all information will be stored in a locked filing cabinet.

**Consent to  
participate:**

I have voluntarily decided to participate in this study. The investigator named above has adequately answered any and all questions I have about this study, the procedures involved, and my participation. I understand that the investigator named above will be available to answer any questions about research procedures throughout this study. I also understand that there will be no negative consequences from withdrawing from the study. I also understand that the investigator named above may terminate my participation in this study if s/he feels this to be in my best interest. In addition, I certify that I am 18 (eighteen) years of age or older.

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Signature of Participant

Date

***Researcher: Return this form to the Psychology Experiments Box in SJ***

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