

**Validation of the Behavioral Assessment of Social Interaction in Young Children
(BASYC) as a Measure of Early Social Behavior in Children
with Autism Spectrum Disorders**

by

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Abstract

Early social behaviors in children with Autism Spectrum Disorders (ASD) represent an area of core symptom deficits that reflect chronic and pervasive impairment (Gillis & Romanczyk, 2008). Although the specific and heterogeneous pattern of social deficits may be well-documented, available assessment measures for these deficits are limited (Sigafoos, Schlosser, Green, O'Reilly, & Lancioni, 2008). To increase accurate description of symptoms and evaluate sensitivity of the impact of intervention, a new assessment measure, the *Behavioral Assessment of Social Interactions in Young Children* (BASYC; Gillis, Romanczyk, & Callahan, 2007) was developed. The current study aimed to validate the BASYC using the *Early Social Communication Scales* (ESCS; Mundy, Seibert, & Hogan, 1984; Mundy et al., 2003; Seibert, Hogan, & Mundy, 1982) in a sample of 22 children. Cross-validation of the BASYC using the ESCS evaluated convergent validity between the measures using scales related to social responsiveness and social initiations. An additional goal of the study was to examine the relationship between ASD symptomatology in the current sample and scale scores on the BASYC and ESCS.

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Introduction

Autism has been described as the “quintessential neurodevelopmental disorder” (p. 327; Klin, Chawarska, & Volkmar, 2008). As a developmental disorder, Autism is present early in life and influences acquisition, maintenance, and performance of various behaviors throughout an individual’s lifetime. Autism or “Autistic Disorder”, as it is labeled in the Diagnostic and Statistical Manual, 4th edition, Text Revision (American Psychological Association, 2000; DSM-IV TR), is classified under the diagnostic category of Pervasive Developmental Disorders (PDD), which include four other developmental disorders (i.e., Asperger’s Disorder, Rett’s Syndrome, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder-Not Otherwise Specified). Common to each of these disorders is impairment in three symptom domains: communication, social interaction, and restricted and repetitive behaviors (American Psychiatric Association, 2000).

In recent years, researchers and clinicians have responded to sharply increasing prevalence and awareness of pervasive developmental disorders. In terms of classification, researchers and clinicians have begun to use the term “Autism Spectrum Disorders” (ASD) due to the heterogeneity of symptoms that may be present across symptom domains for many of the disorders included in the PDD category within the DSM-IV TR. Following such classification, the term ASD lends itself to description of impairments along a spectrum rather than a single, discrete diagnosis (Matson, 2008). The term ASD incorporates three primary DSM-IV TR diagnoses: Autistic Disorder, Asperger’s Disorder, and Pervasive Developmental Disorder-Not

Otherwise Specified (PDD-NOS). Rett's Disorder and Childhood Disintegrative Disorder are classified separately, as their etiology and clinical presentation has been more specifically defined and understood in a manner that differentiates these conditions from other PDD diagnoses (Gillis & Romanczyk, 2008). In response to increased awareness of ASD, research must strive to answer questions surrounding description, assessment, and interventions for these diagnoses.

Psychological research requires accurate identification and measurement of behavior. Description of symptoms of ASD typically focuses on observable behaviors that may be categorized according to domains of impairment. Given the spectrum of behavioral deficits observed in individuals with ASD, understanding how these domains are distinct and interrelated is important for assessment and intervention planning. In general, differences between the communication and social interaction deficit areas of ASD per the DSM-IV TR include the emphasis on delay and impairment. Communication symptoms are often thought of as being delayed, absent, or atypical (e.g., prosody, content, and repetitive quality or echolalia) in such a way that expression of verbal communication skills may not occur according to typical developmental expectations. Impairment, rather than delay, may be more descriptive of symptoms in the social interaction domain. Social interaction behaviors for children with ASD are atypical in their presentation, noted through restrictive, repetitive interests and inappropriate or unusual play with objects and peers. Behaviors representative of the communication deficit highlight the use of verbal language, whereas behaviors included in the social interaction domain also include nonverbal skills. The defining characteristics of the communication and social interaction deficits are presented below in order to further delineate symptom domains associated with ASD and describe potential symptom differentiation and similarity.

Behaviors in the communication domain focus on delayed development of language, impaired and atypical use of language, and impaired pretend or imitative play (American Psychiatric Association, 2000). Impaired use of language and deficient communication behavior may be seen through in difficulties with maintaining conversations. Atypical communication also may be observed through stereotyped, repetitive, and idiosyncratic language. Play behaviors, notably spontaneous make-believe or social imitative play that is inappropriate for the developmental level of the individual also represents a communication deficit.

Social behaviors denote another domain of behavioral deficits in ASD and may be observable at earlier ages than other symptoms. Diagnostic criteria for social interaction in the DSM-IV TR extend to nonverbal behaviors and complement the verbal and play behavior described in the communication domain (American Psychiatric Association, 2000). The overlap and extension of symptoms between communication and social behaviors describes the related skills necessary for engaging in social-communicative activities. Nonverbal social interaction impairments include deficits in regulatory social cues of eye gaze, facial expressions, body posture, and gestures. Additional deficits in social interaction include difficulty engaging in developmentally appropriate peer relationships, lack of spontaneous, shared enjoyment, and impaired social and emotional reciprocity.

Although differences distinguish core deficits of communication and social interaction, symptoms presented in both domains overlap with each other. Communication and social interaction are interrelated in such a way that both rely on variations of responding to situations and intentional behavior. Engaging in communication with others naturally involves intentional interaction with the other person. Similarity in the two domains also includes play behavior, across imitative play described in the communication and play with toys and others noted in the

social interaction domain. Deficits in communication and social interaction present an overlap in observable impairments based on the connection between language ability and social responses and initiations (Sigafos, Schlosser, Green, O'Reilly, & Lancioni, 2008). Communication occurs within a social environment and may be reinforced by social stimuli, particularly for young children (Kasari Paparella, Freeman, & Jahromi, 2008; Whalen, Schreibman, & Ingersoll, 2006). Observable behavioral deficits across communication and social interaction domains are notable for early identification, assessment, and intervention for ASDs. As impairment in the area of social-communicative behaviors is common to all individuals with ASD, assessment and intervention should reflect the overlapping symptoms present across both communication and social interaction domains.

For the purpose of the current study, discussion of early social behavior across social and communication domains is described within a framework of early social-communicative behaviors. Reference to social behavior seen throughout the current study includes an understanding that these behaviors may be considered social-communicative behaviors, as they reflect both social interaction behaviors as well as communication. To better understand implications for assessment of the interrelated social and communication symptom deficits associated with ASD, a review of typical early social behaviors is necessary.

Early Social Behaviors

Social behaviors observed in young children between 12 and 24 months of age begin with simple declarative and imperative communication between the child and the environment including others and objects. Children begin to explore their environment and engage in social awareness through early behaviors (e.g., pointing and reaching), and these behaviors serve as precursors to later language and social development (Franco & Butterworth, 1996; Hay &

Murray, 1982). Hay and Murray (1982) describe social-communicative behaviors of requesting and offering as foundational skills that may be precursors to prosocial interactions. Offers and requests shown through pointing and preverbal communication methods like gestures and vocalizations serve as responding and initiating behaviors for social interaction. Typically developing children begin to offer and request around 12 months of age (Hay, 1979; Hay & Murray, 1982).

Offering and requesting may begin with gestures, such as pointing, that engage the child in a relationship with objects and people. Pointing is an early social-communicative behavior that demonstrates declarative (i.e., referencing, labeling, or commenting on an object) and imperative (i.e., communicating a need or want for an object in a more instrumental manner) functions for a child. Pointing may be defined as extending the arm and index finger away from the body with other fingers close to the palm (Franco & Butterworth, 1996; Mundy, Seibert, & Hogan, 1984; Mundy et al., 2003; Seibert, Hogan, & Mundy, 1982). When pointing is declarative, the response may be referential for the child and can support language development with naming of referenced objects. Pointing with an imperative, requesting function leads to an offering response in which a desired object is given to the child (Franco & Butterworth, 1996). Pointing behaviors may be indicative of social behaviors involved in sharing, giving, and more developed social interaction related to play (Hay & Murray, 1982; Mundy & Sigman, 1989).

Additional early social behaviors include giving, sharing, showing, and verbalizations. Each of these behaviors may be classified as a response or an initiation. Responding behavior is a foundational skill for the development of social interaction. Initiating social interactions is a more complex social behavior that occurs independently of a prompt, which is when one presents the child with a reminder to engage in a social response (i.e., pointing to a child to

indicate that he/she should share a toy). An example of a response would be when one person states a question such as, “Which toy would you like to play with-ball or bear?” followed by the child’s response of “ball” or “bear.” An initiation would be demonstrated when a child independently states “I want to play with the ball.”

Early social behaviors of responding and initiating serve as developmental predictors of social competence (i.e., information processing of social situation that involves interpretation of interpersonal and affective environmental cues as social and a decision to make a behavioral response appropriate to the situation) and more complex social skills (Crick & Dodge, 1994; Hay & Murray, 1982). To understand the full expression of social behavior, it may be important to consider the progression of behavior from early social actions to more complex social skills. With development of early social behavior, behavioral repertoires allow for more opportunities to engage in complex social skills related to perspective-taking, recognition of the needs, thoughts, and feelings of others, and the ability to maintain a goal-directed exchange with another individual (McEvoy, Rogers, & Pennington, 1993).

Children with ASD have behavior deficits that impact the development and use of early social behaviors. Specifically, children with ASD fail to develop and/or use declarative skills. Additional difficulty with initiating and maintaining goal-directed exchanges is often observed. Consequently, more complex social behaviors, such as empathy and perspective-taking, are also shown to be impaired in children with ASD (Baron-Cohen, 1989; Franco & Butterworth, 1996). Social deficits seen in ASD are chronic and pervasive, providing evidence for the lifelong impairment seen in these disorders (Gillis & Romanczyk, 2008). In order to understand the chronic and pervasive nature of social impairment, assessment methods for social behavior should begin with early, developmentally-based measurement of social behaviors.

Assessment of Early Social Behavior

Early social behavior may be observed through natural and analog experiences, and measurement of social behavior should reflect the use of behaviors in interactions with people and objects. Unfortunately, assessment measures of early social behavior are often limited to paper-and-pencil or caregiver/teacher behavioral ratings and are not sensitive to changes in social behavior that may be seen across time (Sigafos et al., 2008). Third-party reports of social behavior, seen across rating scales, checklists, and caregiver interviews, may not provide a detailed, objective measurement of social behavior (Kazdin, 2003). Caregivers and other adults completing assessment measures may not be accurate reporters of a child's social skills. Third-party, indirect reports of social behavior may also introduce bias into assessment and confound descriptions of social impairment, social skills present in a child's repertoire, and change in social development across time (Sigafos et al., 2008). Research examining third-party reporting assessment methods, including rating scales and behavioral checklists, suggests that these methods are inaccurate in comparison to direct observation methods and produce discrepant results across rater and simultaneous observations (e.g., Achenbach, McConaughy, & Howell, 1987; Hinshaw, Han, Erhardt, & Huber, 1992; Sigafos et al., 2008).

Behavioral assessment provides techniques for more objective measurement of social behavior in either a natural social environment or an analog situation, both of which may present natural consequences and social exchanges comparable to the natural environment. A benefit of analog behavioral assessment is increased control over the type of behaviors targeted for assessment, which may prove helpful for research and clinical applications (Kazdin, 2003). Behavioral assessments that incorporate analogue observations provide more valid description of specific behaviors and functions of the behaviors across scenarios (Haynes, 2003).

Research needs to determine how developmental differences in children with ASD may be objectively described, measured, and interpreted in order to inform diagnostic assessment, intervention planning, and treatment monitoring. Wetherby and Woods (2008) report that development of behavioral skills takes place during activities and routines within a child's natural, social environment. Assessment of these skills should reflect the natural environment to encourage accurate measurement and monitor acquisition and generalization of skills. Behavioral assessment within a series of social tasks may be accomplished with interactive, observation methods. Addressing social behaviors through an observational approach, in which the assessment procedure presents each item as an interactive, behavioral task, may provide more direct measure of behavioral deficits. Klin et al. (2008) indicate that behavioral assessment strategies may reflect inherent variability and mechanisms of socialization that can inform identification of vulnerabilities and causative connection between etiological factors and behavioral manifestations of ASDs. Use of repeated behavioral measures, including periodic assessment of social skills, provides information regarding developmental trajectories for social behaviors, as well as the impact and effectiveness of interventions in demonstrable behavior change (Haynes, 2003; Sigafos et al., 2008).

Analog behavioral assessments for early social behaviors include the *Early Social Communication Scales* (ESCS; Mundy et al., 1984; Mundy et al., 2003; Seibert et al., 1982) and the *Behavioral Assessment of Social Interactions in Young Children* (BASYC; Gillis et al., 2007). These semi-structured, interactive measures present specific scenarios that examine how children respond to and initiate early social behaviors. Although each assessment aims to observe and evaluate early social behavior, the measures have not been directly compared to each other.

Behavioral Assessment of Social Interactions in Young Children (BASYC; Gillis, Callahan, & Romanczyk, 2007). The BASYC is an interactive, behavioral assessment for social behavior. Previous development and research with the *Social Interaction Inventory* (SII; Lockshin, Romanczyk, & Hammond, 2005) informed development of the BASYC. The BASYC presents significant modifications of the SII, signaling the need to validate the BASYC as a new behavioral assessment measure. Social interactions are evaluated across 20 analog, semi-structured social queries. An adult examiner presents a verbal stimulus (i.e., the discriminative stimulus) and records the behavior of the child as a social response, social initiation, or no response. If the child does not make a response, the adult examiner presents the stimulus again and records the behavior as described above. Recorded child behaviors are scored across two scale scores: social responsivity (SR) and social initiation (SI). Scale scores are coded in terms of frequency of specific emitted behaviors. SR behaviors that may be coded include: no response, look away, echo, grab, give, look, approach, gestural response, and verbal response. SI behaviors are coded across the following behaviors: physical contact, request, share, verbal comment, and conversation.

Previous research with the BASYC has established normative data for the typically developing children ages 2 to 5 years old (Callahan & Romanczyk, 2006; Gillis et al., 2007). Research with the measure found that age was not significantly related to scores. A significant, positive relationship between responses and initiations was observed, supporting the theoretical relationship that coordinated responsivity and initiations demonstrate a relationship with early development of early social behaviors (Mundy & Newell, 2007). Comparison of typically developing children and children with ASD revealed that children with ASD received significantly lower scores on the BASYC, demonstrating the presence of early social deficits

across responding and initiating social behaviors. Additionally, preliminary investigations of the BASYC show different patterns of verbal and gestural responses. BASYC items requiring a responding behavior receiving higher ratings of response participation, while items requiring an initiating behavior receive the lowest ratings of participation. Differential significance seen in patterns of responding may support the separation of responding and initiating behaviors as separate social constructs (Clemens et al., 2008). Taken together, the initial research on the BASYC suggests that it may be used for initial assessment of social development and periodic assessment of social skills to evaluate behavioral change across social targets.

Early Social Communication Scales (ESCS; Mundy et al., 1984; Mundy et al., 2003; Seibert et al., 1982). The ESCS is an interactive, behavioral assessment for social behavior in preverbal children that measures development of social behavior across tasks of varying complexity and functionality. Scoring for the ESCS relies on coding of videotaped assessment sessions. Social behaviors are coded for 25 semi-structured situations, and coding produces a social-communicative profile. Profiles describe a child's social behavior according to developmental stage, communicative goal, and the behavior as a social response or social initiation. Social situations presented in the ESCS assess different functions of behavior across joint attention (JA), behavioral requesting (BR), and social interaction (SI). Each behavioral function may be further divided into responding and initiating behaviors, such that six subscales are formed from the three primary behaviors of interest in the measure (RJA, IJA, RBR, IBR, RSI, and ISI).

Behavioral requesting and social interaction are two scales of particular interest based on their similarity with items presented and coded on the BASYC. Behavioral requesting may be defined as the child's communication for a need or want through gestures such as pointing or

reaching. If these behaviors occur in response to an examiner's presentation of a task, the behavioral request is coded as a response (RBR). If reaching or pointing occurs independently from a task or an examiner's direction, the behavioral request is considered to be an initiating behavior (IBR). Similar to the distinction between responding and initiating behaviors with behavioral requesting, social interaction and turn-taking behaviors that follow examiner direction are considered to be responses (RSI), whereas interaction that occurs without examiner instruction is coded as an initiation (ISI).

Use of the ESCS as an assessment of early social behavior is primarily limited to research studies on social development. Coding of social situations provides a detailed analysis of social behaviors across operationally defined targets. As a comprehensive behavioral assessment, the ESCS may be useful for baseline evaluation of social behaviors. However, coding and scoring for the ESCS are time-consuming and may restrict the utility and feasibility of the measure across clinical applications and as a periodic assessment of social skills.

Reliability and validity of the ESCS has been established through a series of studies in typically developing and developmentally delayed children (e.g., Mundy, Sigman, Ungerer, & Sherman, 1986; Mundy, Sigman, & Kasari, 1990; Mundy, Kasari, Sigman, & Ruskin, 1995). Bruinsma, Koegel, & Koegel (2004) state that more uniform, psychometrically sound assessment measures for early social behaviors are needed to investigate social skills and targeted interventions for children with social deficits. Comparison of behavioral assessments, such as the BASYC and the ESCS, may be one potential strategy for demonstrating valid description and measurement of early social behavior across social responses and initiations.

Behaviors Across the BASYC and ESCS

Comparison of the BASYC and the ESCS may be possible based on similarity of behaviors assessed and coded on these two behavioral measures. Early social behaviors of requesting and social interaction are performed during administration of both behavioral assessments. Although scoring procedures for the measures are different, coding and operational definitions of social behaviors such as pointing, reaching, sharing, and giving may be matched. Social behaviors across both measures are classified as responses or initiations, allowing for comparison of types of social behaviors seen in the play interactions presented to participants. See Appendix A for clarification of sample behavioral definitions and Appendix B for comparisons of items from each measure.

Psychometric Properties for Cross-Validation

Cross-validation of behavioral assessments like the BASYC and ESCS may advance the understanding of direct observation and measurement of early social behaviors in children with ASD. To increase utility across clinical and research applications, cross-validation of the BASYC using the ESCS needs to include evaluation of reliability and validity across coding, scoring, and behavioral definitions. Kazdin (2003) and Haynes (2003) each present a thorough description of psychometric properties warranting consideration when using a new, behavioral assessment. In their discussions of qualities of assessment measures, Kazdin and Haynes delineate the importance of test-retest reliability, convergent validity, and construct validity.

Test-retest reliability. Over time, scores on the BASYC and the ESCS should remain consistent such that there should be a significant correlation between scores on one administration of the measure with scores on subsequent testing (Kazdin, 2003; Murphy & Davidshofer, 1998). Recent confirmation of test-retest reliability has been conducted with a

small sample on the BASYC (Clemens et al., 2008). Test-retest reliability has been established for the ESCS in typical and developmentally delayed samples (e.g., Mundy et al., 1995; Mundy et al., 2003; Mundy, Sigman, & Kasari, 1994; Sheinkopf, Mundy, Claussen, & Willoughby, 2004; Smith & Ulvund, 2003).

Convergent validity. The BASYC and the ESCS claim to assess early social behaviors in children (Gillis, et al., 2007; Mundy et al., 2003). Convergent validity describes the relatedness of scores across the BASYC and ESCS. Scores of early social behavior, specifically in the areas of social responding and social initiations, between the two measures should be correlated based on the theoretical similarity of the construct of interest (Haynes, 2003; Kazdin, 2003).

Construct validity. The construct of early social behaviors should be able to be compared between measures. Construct validity describes the overall validity of a measure across content and convergent validity. Specifically, construct validity refers to the ability of the BASYC to measure early social behavior, the construct of interest, based on theoretical similarity and correlation with the ESCS (Haynes, 2003; Kazdin, 2003).

As an element of construct validity, content validity may also be evaluated across the BASYC and the ESCS. Tasks within the BASYC and ESCS demonstrate content validity, specifically that the items and tasks presented within each measure examine the construct of early social behavior (Kazdin, 2003). The BASYC addresses content validity of early social behavior through a series of developmentally-appropriate and developmentally-focused items for social response and social initiations specifically for children with ASD. Research with the ESCS has supported content validity for early social behavior as measured through ESCS tasks and coding of behaviors consistent with the construct of early social behaviors, as seen from a

developmental theory for typically developing children (Mundy et al., 1990; Mundy et al., 1986; Mundy et al., 2003).

Purpose of the Current Study

Given the research and clinical relevance of early social behaviors in children with ASD, empirical assessment techniques should be established specifically for behaviors related to early social interaction. Validity of assessment techniques demonstrated through empirical and psychometric analysis of current measures. In order to establish validity of the BASYC, target items and scores on the BASYC were compared to matched behavioral items and individual scores on the ESCS. The BASYC has been used in clinical interventions as a measure of change in social behaviors to indicate treatment progress. Thus far, the BASYC has received limited attention with regard to potential use for measuring early social behaviors in research. The ESCS has been established as a valid measure of early social behavior and is currently used as a research-based assessment measure for early social-communicative behaviors with typical and developmentally delayed samples.

The current study aimed to validate the BASYC as a behavioral measure of early social interaction in children with ASD, as compared to the ESCS. As an established assessment, measure, the ESCS provides explicit utility in research and assessment of the overall constructs of early social behavior across domains of responsivity and initiation. Despite research utility, the ESCS has not been used across clinical settings, suggesting that another measure may serve as an effective measure of social behavior in clinical settings, as well as possible research opportunities. Validation of the BASYC could provide support for its use across research and clinical programs as a general assessment of social behavior and as a periodic assessment of behavioral change from social skills interventions. A secondary aim was examination of the

relationship between symptomatology of ASD and observed social behaviors. Individuals who show more symptoms of ASD may show specific social and communicative deficits that are related to the number of symptoms or severity of their ASD. Assessment of social behaviors, as measured through the BASYC and the ESCS may be compared with assessment of symptomatology, as measured through the CARS.

Hypotheses

Hypothesis 1. The BASYC is a valid measure of early social interaction behaviors in children with ASD, as evidenced by cross-validation comparison with the scores from ESCS. Specifically, psychometric properties of convergent validity will be established for the BASYC. The social responsivity (SR) scale of the BASYC will be compared to the responding to behavioral requests (RBR) and responding to social interaction (RSI) scales of the ESCS. In addition, the BASYC's social initiation (SI) scale will be compared to the initiating behavioral requests (IBR) and initiating social interaction (ISI) scales of the ESCS.

Hypothesis 2. Based on literature regarding early social behavior and the importance of foundational, prerequisite skills for social interaction, it may be expected that individuals with ASD presenting with more severe symptom profiles would receive low scores on BASYC and ESCS scales. Given the specific and heterogeneous nature of social and communicative impairments associated with ASD it would be expected that presentation of more symptoms of ASD would be related to low scores on BASYC and ESCS scales.

Methods

Participants

Participants included in this study were a subset of a larger study examining sub-types of ASD (See Table 1 for participant characteristics.). The subset of participants evaluated for the current study included 22 children ranging in age from 36 months to 148 months ($M = 77.91$ months, $SD = 34.1$ months). Participants were recruited from educational settings, newspaper advertisements, and autism advocacy groups for children with pervasive developmental disabilities in New York. Assessment measures were completed at the children's schools by two doctoral-level clinical graduate students.

Measures

Cognitive ability. The *Kaufman Brief Intelligence Test-Second Edition* (KBIT-2; Kaufman & Kaufman, 2004) or the *Wechsler Preschool and Primary Scale of Intelligence-Revised* (WPPSI-R; Wechsler, 1989) was administered to each participant to assess cognitive abilities. The KBIT-2 measures verbal and nonverbal cognitive skills across three subtests for individuals 4 to 90 years of age. The WPPSI-R is a measure of cognitive functioning across three primary scales, verbal, performance, and processing speed, and one optional scale, general language. The WPPSI-R assesses cognitive abilities in children 3 years to 7 years 3 months of age. As measures of cognitive ability, the KBIT-2 and the WPPSI-R demonstrate good psychometric properties of reliability and validity (Kaufman & Kaufman, 2004; Wechsler,

1989). The K-BIT 2 was administered to 18 participants ($X= 57.78$, $SD = 25.92$), and the WPPSI-R was administered to 4 participants ($X= 47.25$, $SD = 18.48$).

Autism symptomatology and diagnosis. The *Childhood Autism Rating Scale* (CARS; Schopler, Reichler, & Renner, 1988) was conducted for each participant. The CARS is a brief rating scale that assesses social, communication, and motor behaviors along a scale from typical to atypical development or presentation. Sample items on the CARS include imitation skills, relating to others, and listener behaviors. Ratings on the CARS provide a measure of autism symptomatology and potential severity. Doctoral clinical psychology students trained and familiar with the CARS reviewed participants' records and video recorded observations of participant behavior to gain information necessary for completion of the CARS.

A DSM-IV TR checklist was completed for each participant to provide a research diagnosis for participants in the current study. A completed checklist enabled research confirmation of a participant meeting criteria for an ASD. The diagnostic checklist presents DSM-IV TR diagnostic criteria across the three symptom domains for Autistic Disorder, PDD-NOS, and Asperger's Disorder (American Psychological Association, 2000). Doctoral clinical psychology students trained and familiar with DSM-IV TR criteria and diagnosis of ASD completed the checklists. See Appendix C for the diagnostic checklist.

Social behavior. The *Behavioral Assessment of Social Interactions in Young Children* (BASYC; Gillis, et al., 2007) and the *Early Social Communication Scales* (ESCS; Mundy et al., 1984; Mundy et al., 2003; Seibert et al., 1982) were conducted with each participant in this study. The *Behavioral Assessment of Social Interactions in Young Children* (BASYC; Gillis, et al., 2007). As described previously, the BASYC measures early social behavior across two scales, social responsivity and social initiations. During administration of the BASYC, a series of

twenty items are presented to the child. The examiner presents each item verbally to the child in declarative or interrogative forms. Each item serves as a discriminative stimulus for the child's behavior. If the child does not respond to an item within a 10-second interval, the examiner presents the item again and records the child's behavior. Materials presented during administration include a variety of mechanical and simple toys and random stimuli (e.g., paper, piece of felt, etc) from a large toy chest.

Social responsivity (SR) refers to a verbal or gestural response the child makes within a 10-second interval following the examiner's prompt. Responses that are appropriate for the presented item are counted toward the SR score. SR scores are calculated for each item presented to the child. Social initiations (SI) describe verbal or gestural behaviors the child makes independent of the examiner's prompt. Initiations demonstrate intent to communicate and interact with the examiner through play, objects, or verbalizations. SI scores are calculated for items 2, 3, 4, 5, 6, 10, 14, and 15 (See Appendix B). Following presentation of these specific items, the child is able to play with a toy for a short (1 to 2 minute) interval. Verbalizations or gestures made during this interval that occur when the child is oriented toward the examiner and without examiner prompts (i.e., after a minimum of 4 seconds following the examiner's presentation of a query) are scored as initiations.

The *Early Social Communication Scales* (ESCS; Mundy et al., 1984; Mundy et al., 2003; Seibert et al., 1982). During administration of the ESCS, the child is presented with 17 tasks that assess the target behaviors. Some tasks address one behavior, while others may examine multiple targets. The tasks may include one of the following: 1) the examiner presents specific materials, 2) the examiner asks a question, or 3) the examiner engages in a specific behavior (e.g., examiner's gaze shift, examiner's tickling of the child). Tasks may be presented multiple times

during the administration with different materials to obtain a total of 25 semi-structured scenarios. Materials presented during the tasks include toys, mechanical objects, books, posters, and other simple objects. Similar to the BASYC, the examiner presents the child with a stimulus that should direct the child to perform a specific behavior for each task.

The ESCS measures three categories of social behavior, namely joint attention (JA), behavioral requests (BR), and social interaction (SI). Each behavioral category is further classified according to the observed behavior as a response or an initiation, providing measures of social behavior across six scales. Four scales from the ESCS that match with items and behaviors from the BASYC were coded and scored for the current study (i.e., RBR, IBR, RSI, and ISI).

Behavioral requests are nonverbal behaviors that communicate the child's needs for help or objects. Reaching and pointing in response to an examiner's prompt is coded as responding to behavioral requests (RBR), and independent use of eye contact, reaching, and pointing for needs or wants constitutes initiating behavioral requests (IBR). Social interaction behaviors describe playful exchange between the child and the examiner through turn-taking. Responses to examiner-initiated turn-taking are labeled as responding to social interaction (RSI), and child-initiated turn-taking and play behaviors are categorized as initiating social interaction (ISI).

Scoring and Coding Procedures

BASYC. As described above, items presented during the administration of the BASYC were scored as the occurrence or nonoccurrence of social interaction behaviors. Simultaneous scoring of behavior with the presentation of each discriminative stimulus for the interaction allows for simple coding of the behavior as a response (SR) or an initiation (SI). Social behaviors were coded based on occurrence. Gestural responses are defined as motor behaviors

such as nodding or pointing that communicated intent to comply with or acknowledge the examiner's initiation. Verbal responses are defined as nonimitative verbalizations that communicated intent to comply with or acknowledge the examiner's initiation.

ESCS. Scoring methods for the ESCS follow guidelines established in the ESCS manual. Presentation of each task was coded according to the frequency child's behavior in reference to the targeted behavior of each task. Behaviors of RBR, IBR, RSI, and ISI were coded for each task in which the specific behavior was targeted. Specific examples of coded behaviors include eye contact, pointing, showing, and reaching. Scores for each scale were then calculated based on frequencies of occurrence. Overall responsivity and initiation scores were computed as combinations of BR and SI behaviors to enable comparison of composite scores for both the BASYC and the ESCS. Combining RBR and RSI scores formed ESCS composite responsivity scores, and an IBR and ISI combination formed ESCS composite initiation scores.

Behavioral Coding and Data Analysis

Videotapes of BASYC and ESCS administrations were scored and coded according to above descriptions and established guidelines using a computer program that allowed research assistants to watch ESCS videos and record frequencies of each behavior. Research assistants participated in extensive training prior to coding BASYC and ESCS administrations, and the principal investigator monitored coding progress.

Training for coding procedures involved reading, coding practice, and scheduled sessions with the primary investigator. For the initial step in training, research assistants completed assigned readings of the manual for the ESCS, assessment scoring guidelines, behavioral definitions, and computer program protocol. Once assistants completed the assigned readings, individual and group meetings were scheduled with the primary investigator to test over

behavioral definitions, respond to questions about scoring and computer protocol, practice coding with available assistance. Once research assistants demonstrated coding competency, (i.e., knowledge of behavioral definitions and interrater agreement with primary investigator above .9), the research assistants were able to code assessments independently. Additional training opportunities were provided to coders across the length of the study.

Based on the collaborative nature of the participant dataset, coding was completed at Binghamton University and Auburn University. Completed coding results were shared between research teams, with Binghamton research assistants reporting results for the BASYC administrations and Auburn research assistants reporting results for ESCS administrations. Two undergraduate research assistants were trained in behavioral coding procedures for each assessment. In order to reduce potential bias and distraction during coding sessions, research assistants coded sessions independently. Coding was conducted in a quiet, laboratory setting, and research assistants wore headphones to decrease interference from background noise.

To enable more direct comparison of reported frequencies of social behaviors across the BASYC and ESCS administrations, each assessment session was divided into 10-second intervals. Intervals were used to provide more descriptive, comparable accounts of behavior frequency across sessions of variable lengths. The average frequency for each assessment measure was then calculated to determine the rate of behaviors across participants. The average length of BASYC sessions was 12.33 minutes (71 intervals), and the average length of ESCS sessions was 18.13 minutes (113 intervals). Rates of composite responsivity and initiation behaviors were calculated by dividing obtained frequencies by the average length of each assessment.

Interrater agreement and consistency were calculated for coding of frequency of social behaviors for each participant across all BASYC and ESCS sessions. Intraclass correlation coefficients were used as a measure of reliability based on inclusion of the three factors for comparison, namely rater, participant, and behavior for each coding session. Reported interrater reliability for BASYC sessions was .91, demonstrating a high level of agreement and consistency across coding. Interrater reliability for social behaviors across ESCS coding was .74, indicating an adequate level of agreement and consistency between raters for the multiple response and initiation behaviors. Differences in interrater agreement and consistency reflected challenges in training and coding behaviors across the assessment measures, particularly related to the ESCS. Research assistants reported more difficulty with ESCS coding and required several supplemental training sessions to address coding questions. The number of specific behaviors and decision rules for coding specific behaviors on the ESCS may have resulted in decreased agreement and consistency, presenting the investigator with some notable implications of task organization and structure between the ESCS and the BASYC. With additional training, coding for ESCS demonstrated adequate agreement and consistency across all participant sessions.

Results

Data analyses were conducted to evaluate the BASYC as a measure of early social behavior compared to an established measure, the ESCS. To determine the appropriate course of analysis, data were examined across measures of normality, skewness, and kurtosis. Initial data examination confirmed normality of the dataset and appropriate use of parametric analyses. Gender differences were not significant for the sample. Proposed parametric correlational analyses were conducted to evaluate convergent validity between composite scores of the BASYC and the ESCS.

Comparison of Composite Scores of BASYC and ESCS

Pearson product moment correlations were performed to examine the convergent validity between composite scores of social behaviors on the BASYC and the ESCS. The social responsivity (SR) scale of the BASYC was compared to a composite responsivity score from the ESCS (composed of responding to behavioral requests (RBR) and responding to social interaction (RSI)). Additionally, the BASYC's social initiation (SI) scale was compared to a composite initiation score from the ESCS (composed of initiating behavioral requests (IBR) and initiating social interaction (ISI)). A significant relationship between responsivity behaviors was expected; however, correlational analyses did not support this hypothesis ($r = .180, p = .423$). Initiation behaviors, also expected to demonstrate a significant relationship across assessments, yielded with similar findings of no significant relationship ($r = .144, p = .521$).

Comparison of Symptom Severity and BASYC Composite Scores

Bivariate correlations were performed to examine the influence of ASD symptom severity, as reflected from CARS scores, on response and initiation behaviors measured on the BASYC and ESCS (See Table 2). A significant relationship between higher symptom severity and lower scores on the BASYC and ESCS was expected. However, no significant relationships were observed between total symptom scores on the CARS and BASYC SR ($r = -.417, p = .053$) or SI ($r = -.304, p = .169$) composite scores. Composite scores on the ESCS also demonstrated no significant relationships with total symptom scores on the CARS (ESCS Responding $r = -.111, p = .622$; ESCS Initiation $r = -.116, p = .606$). Further exploration of specific scales of the CARS revealed significant, indirect relationships between behavioral deficits specific to ASD and social response and initiation behaviors on the BASYC and CARS. CARS Imitation ($r = -.424, p = .049$) and Listening Response ($r = -.427, p = .047$) scales demonstrated significant relationships with the BASYC SR.

Discussion

Early social behavior presents a critical set of behaviors that must be evaluated for developmental and diagnostic concerns. As indicators of social and communication development, early social behaviors of responsivity and initiation of social interaction represent deficient skill areas in children with ASD. Assessment of early social behaviors has been limited to third party reporting and few interactive measures (Achenbach, McConaughy, & Howell, 1987; Bruinsma et al., 2004; Hinshaw, Han, Erhardt, & Huber, 1992; Landa, 2005; Sigafos et al., 2008). To address limited assessment methods, the present study compared two observational assessment measures of social responsivity and social initiations in young children. Comparison of the BASYC and ESCS aimed to provide convergent validity supporting the use of the BASYC as a research and clinical assessment measure for early social behavior. Results did not support convergent validation of the BASYC using the ESCS, suggesting that these assessment measures may have differences in development, structure, and utility.

Primary Hypothesis Examining Relationship Between Measures

Overall, the primary hypothesis of the current study was not supported as correlations between responsivity and initiation scales of the BASYC and ESCS were not significant. Examination of reported frequencies of social behaviors for some participants was low, suggesting that the opportunities to code behavior and compare frequencies may be limited. Low frequency ratings of social behavior may be consistent with the clinical sample, as children with ASD demonstrate social deficits that may come across in assessment of social behavior. Although rates of behavior were calculated using coded frequency, floor effects may complicate

examination of the relationship in social behavior. Further explanation of findings, with reference to these suggestions, are discussed below as implications of the obtained results.

Secondary Hypothesis Regarding Symptomatology and Social Scores

With an aim to understand possible relationships between ASD symptom severity and performance on assessment measures, symptomatology scores from the CARS were compared to responsivity and initiation scores on the BASYC and ESCS. Given the heterogeneous and pervasive influence of ASD symptoms on behavior, it was expected that higher ratings on the CARS Total Score (an overall rating of severity) would be related to lower scores on the BASYC and ESCS. Results did not support this hypothesis, as no significant relationships were observed between total symptom scores on the CARS and BASYC SR or SI scales or ESCS Responding and Initiation composite scores. Small sample size and low frequency of coded behaviors may have limited the ability to determine significant relationships between overall scores across assessment measures, a limitation discussed following initial description of results. Inspection of the relationship between the total score of the CARS and BASYC SR composite score ($r = -.417, p = .053$) suggests that a larger sample size and opportunities to code behavior may reveal a stronger relationship between more severe ASD symptom profiles and emitted social response behaviors.

Analyses were performed to examine specific symptom scales of the CARS. Significant relationships obtained between symptoms on the CARS and BASYC SR scale describe the negative influence of severe behavioral deficits specific to ASD on social responsivity. However, relationships between symptom severity and social behaviors measured on the ESCS were not observed. These findings suggest that the BASYC may assess social behavior with greater consideration and specificity to ASD symptomatology than the ESCS and may lead to

recommendations of appropriate use and measurement of social behavior in samples of children with ASD.

Implications of Results

Obtained results suggest that there may be some specific implications of development of measures compared in the study, task organization, and sample characteristics. Overall, results indicated that composite measures were not directly related across the BASYC and ESCS; however, more detailed analysis of specific social behaviors provided support for the use of specific behaviors for social behavior assessment. Although hypotheses were not supported, examination of findings provide greater interest and implications for research and clinical opportunities.

Measure development. Development of the BASYC and ESCS aimed to address assessment needs for interactive, observational approaches to measuring early social behavior in children. The construct of early social behavior was defined across responses to examiner-directed interactions (social responsivity) and child initiations for social interaction (social initiations) in semi-structured play tasks. Operational definitions for responsivity and initiation behaviors were consistent across the BASYC and ESCS; however, a relationship between these behaviors was not observed.

The BASYC was developed for use with children with ASD (Callahan & Romanczyk, 2006; Gillis et al., 2007). Based on diagnostic criteria of social impairment and the influence of social deficits in ASD, older children with ASD present with social deficits across responsivity and initiation behaviors that would be expected for younger children. As a tool specifically developed for children with ASD, the BASYC provides measurement of the general construct of early social behavior in older children with social behavior that may be seen in younger children

with typical development. The sample in the current study reflects use of the BASYC with older children, as the age range of children in the study was large and included school-age children.

Development of the ESCS focused on assessment of behaviors seen in very young, typically developing children (Mundy et al., 1984; Mundy et al., 2003; Seibert et al., 1982). As the ESCS was not developed specifically for children with ASD, the measure may show limited sensitivity to assessment of social behavior in older children with ASD who may display uneven social development across behaviors seen in much younger children.

Research with the ESCS in samples with developmentally delayed children, specifically children with intellectual disability (ID), has shown utility and reliability in assessment of social behavior in children with impaired functioning. Developmental delays seen in ASD, particularly the nature of social impairment specific to ASD, are qualitatively different (e.g., lack of seeking shared experiences, preoccupation with circumscribed interests, increased interest in objects over people, and decreased listener behaviors) that delays seen in more broadly-defined developmentally delayed children and children with ID (Odom, 2002). Significant relationships observed between autism symptomatology and composite scores on the BASYC support findings of differences in social impairment based on diagnosis and behaviors addressed across assessment methods (i.e., task structure and organization) with the BASYC as compared to the ESCS.

Task organization. Task structure and presentation differences in the BASYC and ESCS may also explain differences in scoring. Semi-structured play tasks were utilized across both assessment measures, incorporating developmentally appropriate play and use of engaging toys and play scenarios to elicit social behavior. Despite general guidelines of semi-structured task presentation, the actual tasks and performance demands were different across the two measures.

The BASYC incorporates less structure through more naturalistic play scenarios and defines responsivity and initiation across a fewer number of distinct behaviors.

With an emphasis on more natural social behavior, the BASYC may be able to test more subtle social behaviors that would be observed in typical interactions. In contrast to the highly naturalistic structure of the BASYC, tasks on the ESCS are more contrived and examiner-controlled. The contrived nature of ESCS tasks allows examiners to target a larger number of specific social behaviors rather than provide an opportunity for the child to emit a larger variety of general social behavior. Discrepancy in task structure, with the BASYC being more open-ended and naturalistic and the ESCS more restricted and contrived, may explain the lack of relationship between composite scores for each measure.

Description of behavioral quality may provide further sources of comparison and information about the types of behaviors each task may elicit. Current scoring procedures focus on the occurrence or nonoccurrence of a response or initiation; however, use of post-administration coding for the specific behavioral quality may be warranted. Coding behaviors based on quality of the emitted response or initiation (e.g., response behaviors of look and give and initiation behaviors of physical contact and verbalizations) provides information consistent with the BASYC's focus on a across a variety of typical social interactions.

Sample characteristics. Comparison of the BASYC and ESCS was expected to reveal similarities in obtained scores, supporting validation of the BASYC. Results did not support the primary hypothesis that these two assessments may be used to measure early social behavior across similar samples and for similar purposes; however, lack of support for this hypothesis may be related to limitations of the current sample. The small sample of children in this study displayed a wide range of ages and levels of cognitive functioning. One reason to consider

results based on sample characteristics of this study may be related to a connection between level of functioning and diagnostic severity. The observed relationship between autism severity, specifically deficits of imitation and listening across CARS scores, and social behaviors measured on the BASYC SR suggests that the BASYC demonstrates sensitivity to behaviors in children with autism across functioning.

Limitations of the Current Study

Beyond implications of the results, examination of findings show some limitations in the current study that should be addressed. Limitations of sample characteristics and scoring highlight some potential problems with detection of relationships and confirmation of original hypotheses. As presented earlier, a notable limitation of the study was the small sample size. Results may have been limited by the few number of participants compared across multiple behaviors. Recruitment for a clinical population of children with autism presents a challenge for research; however, challenge to recruitment should be seen as a need for continued efforts in obtaining larger samples for future research. The sample in the current study may have limited findings based on heterogeneity of functioning. Although heterogeneity in functioning is typical for a sample of children with ASD, the variability in behavioral deficits and social skills of this particular sample may have influenced opportunities to code social behaviors.

Coding and scoring methodologies for the BASYC and ESCS utilized frequencies of observed behaviors. For lower functioning children, greater impairment produced fewer instance of social behavior. Decreased opportunities to code social behaviors in sample participant may have produced floor effects in scoring based on the use of frequencies to determining social behavior scores. When combined with the difference in number of distinct behaviors measured with each assessment, significant relationships between the BASYC and ESCS may have been

artificially limited. With a restricted range of possible scoring opportunities, relationships between measures, as well as relationship between responsivity and initiation behaviors, may be difficult to detect.

Strengths of the Current Study

Early social behaviors are crucial for development of more complex social skills and overall functioning of children with ASD. The current study illuminates the need for continued efforts to identify appropriate behavioral assessment measures for social responses and initiations in a sample of children with ASD. Strengths presented in the current study focus on the relationships observed between social responses on the BASYC and ASD symptomatology. Obtained relationships between social responsivity and ASD symptoms of imitation and listening response suggest that the BASYC measures social behaviors specific to ASD, giving credence to its use as a clinical tool in describing social behavior in ASD.

An additional strength the current study presents reflects opportunities for future research using alternative scoring and coding procedures to determine the types of behavior each task may elicit. Also, more detailed coding of specific behaviors could provide information on the frequency of various emitted behaviors in a sample of children with ASD. Coding procedures evaluating the utility of specific responses and initiations should be conducted to determine the influence of behavioral quality on overall scoring and information provided through BASYC assessment information. With defined behavioral quality, represented by more information on emitted behaviors as a specific type of gesture (e.g., a response of grab or an initiation of share) or verbalization (e.g., comment or conversation), further psychometric analyses may be conducted to support use of the BASYC as an assessment of social behavior.

Summary

Limited research and comparison of assessment techniques for early social behavior highlights the need for research to focus on comparison of current assessments and different strategies for measuring the constructs related to social interaction. Study limitations of sample characteristics and use of frequency in coding behaviors with observed low rates of occurrence highlight the need to examine the BASYC in a larger sample of children with ASD. Future research should aim to expand the focus of the current study's construct validation aim with additional assessment techniques that increase the number of observed social behaviors in order to accurately describe relationships between social responsivity and initiation. Coding methods that incorporate description of behavioral quality may also provide further options for measure comparison and more direct information about the types of social behaviors elicited by tasks. Given the significance observed between ASD symptomatology and social behavior from the BASYC, future research should continue to evaluate the use of the BASYC as a valid assessment of specific social interaction for children with ASD. With further research, the BASYC may contribute to the understanding of assessment of early social behavior and patterns of social deficits in children with ASD.

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Appendix 1

Sample Behavioral Coding Definitions

Behavioral definitions were matched across the BASYC and ESCS administrations based on coding definitions provided in the ESCS manual (Mundy, Hogan, & Seibert, 1984; Mundy, Delgado, Block, Venezia, Hogan, & Seibert, 2003; Seibert, Hogan, & Mundy, 1982)

Point: Clear articulation of the index finger (index finger is extended and adjacent fingers are noticeably inclined downward, or away from the index finger and toward the palm) to materials or the examiner's behavior

Show: Child raises a toy upward toward the examiner's face while looking at the examiner; object should be presented relatively still for a second or two; not waving or shaking objects with a hand raised or extended toward examiner

Reach: Child extends his/her arm toward an out of reach object

Give: Child pushes, throws, or hands an object to the examiner in order to request that the examiner repeat an action or to get rid of the object

Appendix 2

BASYC Items with scored target behaviors

Item #	Item	Scored Target Behaviors	
1	Would you like to play with me?	SR	
2	What toy do you want to play with?	SR	SI
3	Can I play with (toy)?	SR	SI
4	Do you want to play with this toy? (<i>Pick out an interesting toy (one that moves/lights up)</i>)	SR	SI
5	Do you want to play with this toy? (<i>Pick out a "boring" toy (e.g., tissue, piece of paper)</i>)	SR	SI
6	Do you want some tea? (<i>Pick out the teapot and cups and prepare two cups of pretend tea.</i>)	SR	SI
7	Do you like the tea?	SR	
8	I'm hungry. <i>Rub stomach</i>	SR	
9	Do you want to play a game?	SR	
10	Do you want to play (game 1) or (game 2)? (<i>Give the child a choice of two games such as catch and Simon says.</i>)	SR	SI
11	Ouch, that hurts! (<i>Pretend to hurt finger.</i>)	SR	
12	How does this toy work? <i>Take a toy that requires manipulation (see 'n say/toy truck with pull string) and show it to the child.</i>	SR	
13	Wow. I'm hot in here! (<i>Wave hand near face</i>)	SR	
14	Look at the (toy far away)! Would you like to see it? (<i>Place a toy out of reach of the child and point to it.</i>)	SR	SI
15	Are there any more toys you want to play with?	SR	SI
16	It's time to clean up. Would you help me please? Let's put all of the toys into the bin.	SR	
17	I had fun playing with you.	SR	
18	What was your favorite toy?	SR	
19	Would you like to play with me again?	SR	

20	Thanks again for playing with me! Bye.	SR
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BASYC Items with possible comparison ESCS target behaviors

Item #	BASYC Item	ESCS Comparison Target Behaviors				BASYC Scored Target Behaviors	
1	Would you like to play with me?	RSI	ISI			SR	
2	What toy do you want to play with?	RBR	IBR			SR	SI
3	Can I play with (toy)?	RBR	IBR	RSI	ISI	SR	SI
4	Do you want to play with this toy? <i>(Pick out an interesting toy (one that moves/lights up))</i>	RBR			IBR	SR	SI
5	Do you want to play with this toy? <i>(Pick out a "boring" toy (e.g., tissue, piece of paper))</i>	RBR			IBR	SR	SI
6	Do you want some tea? <i>(Pick out the teapot and cups and prepare two cups of pretend tea.)</i>	RBR	IBR	RSI	ISI	SR	SI
7	Do you like the tea?	RSI	ISI			SR	
8	I'm hungry. <i>Rub stomach</i>	RSI			ISI	SR	
9	Do you want to play a game?	RSI	ISI			SR	
10	Do you want to play (game 1) or (game 2)? <i>(Give the child a choice of two games such as catch and Simon says.)</i>	RBR	IBR	RSI	ISI	SR	SI
11	Ouch, that hurts! <i>(Pretend to hurt finger.)</i>	RSI		ISI		SR	
12	How does this toy work? <i>Take a toy that requires manipulation (see 'n say/toy truck with pull string) and show it to the child.</i>	RSI	ISI			SR	
13	Wow. I'm hot in here! <i>(Wave hand near face)</i>	RSI		ISI		SR	
14	Look at the (toy far away)! Would you like to see it? <i>(Place a toy out of reach of the child and point to it.)</i>	RBR	IBR	RSI	ISI	SR	SI
15	Are there any more toys you want to play with?	RBR	IBR			SR	SI
16	It's time to clean up. Would you help me please? Let's put all of the toys into the bin.	RSI	ISI			SR	
17	I had fun playing with you.	RSI	ISI			SR	
18	What was your favorite toy?	RSI	ISI			SR	
19	Would you like to play with me again?	RSI	ISI			SR	
20	Thanks again for playing with me! Bye.	RSI	ISI			SR	

ESCS Tasks with target social behaviors and BASYC comparison targets

Task	Target ESCS Social Behaviors		BASYC Comparison Targets		
Turn-taking	RSI	ISI		SR	SI
Object Spectacle #1	(IJA)*	RBR	IBR	SR	SI
Response to Invitation	RSI	ISI		SR	SI
Object Spectacle #2	(IJA)*	RBR	IBR	SR	SI
Social Interaction #1	RSI	ISI		SR	SI
Gaze Following #1	(RJA)*		SR		
Object Spectacle #3	(IJA)*	RBR	IBR	SR	SI
Book Presentation	(RJA)*	(IJA)*		SR	SI
Object Spectacle #4	(IJA)*	RBR	IBR	SR	SI
Turn-taking	RSI	ISI		SR	SI
Response to Invitation	RSI	ISI		SR	SI
Object Spectacle #5	(IJA)*	RBR	IBR	SR	SI
Object Spectacle #6	(IJA)*	RBR	IBR	SR	SI
Response to Invitation	RSI	ISI		SR	SI
Plastic Jar	RBR	IBR		SR	SI
Social Interaction #2	RSI	ISI		SR	SI
Gaze Following #2	(RJA)*		SR		

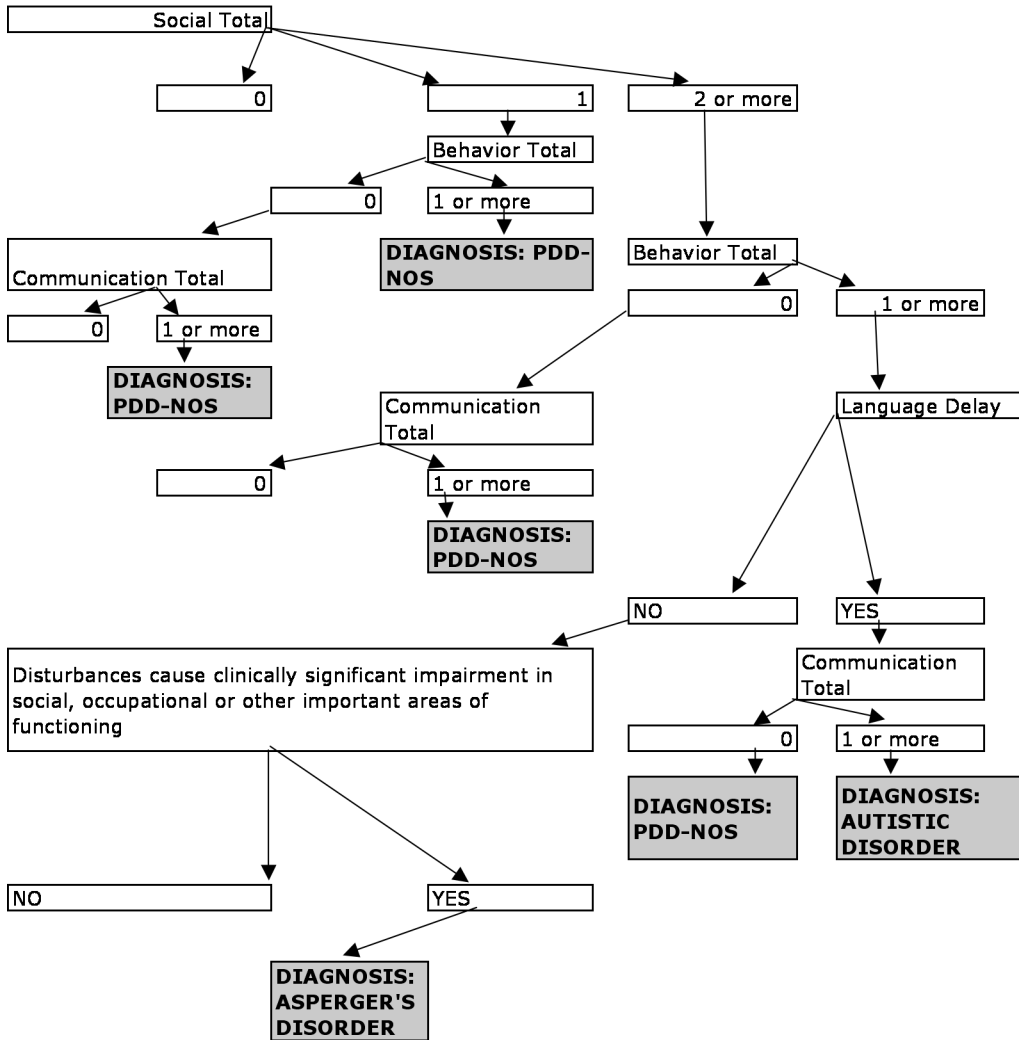
*Note: Joint Attention (JA) behaviors were not coded for the present study. Targets are presented for description of ESCS tasks and comparison with the behaviors scored on the BASYC.

Appendix 3

Diagnostic Checklist

Child/Participant #: _____ Rater: _____ Date: _____

Social Total:	
Communication Total:	
Behavior Total:	



DIAGNOSIS: _____

Table 1

Participant Characteristics (n = 22)

Characteristic	Mean	SD	Range
Age (months)	77.91	34.10	36 – 148
Full Scale IQ			
K-BIT 2 (<i>n</i> = 18)	57.78	25.92	40 – 130
WPPSI-R (<i>n</i> = 4)	47.25	18.48	29 – 73
Verbal IQ			
K-BIT 2	56.39	21.96	40 – 115
WPPSI-R	39.60	30.74	3 – 79

Table 2

Correlations between rates of early social behavior on BASYC and ESCS and autism symptom severity from CARS

Social Behavior	CARS Scales of Symptom Severity			
	Total Score	Relating to People	Imitation	Listening Response
BASYC				
SR	-.417	-.224	-.424*	-.427*
SI	-.304	-.185	-.281	-.222
ESCS				
Responding (RBR + RSI)	-.111	-.015	-.118	.049
Initiation (IBR + ISI)	-.116	-.038	-.136	-.097

Note. * $p < .05$