

Caregiver Responsiveness and Social Interaction Behaviors of Young Children With Autism

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Although it is documented that parent interaction influences children's development, few studies have focused on methods for reliably assessing molar-level caregiver-child interactions that are used regularly in treatment evaluations in community-based settings, and none have targeted children with autism spectrum disorders. Thirty-five children and their caregivers participated in an outpatient evaluation for therapeutic treatment planning for children with autism spectrum disorders. Parent-child interactions (part of the routine evaluation) were coded immediately after a 10-minute free-play activity. Analyses indicated that molar-level caregiver interaction behaviors could be evaluated with good reliability. Correlational analysis of parent and child demographics with the quality of interactions revealed no significant relationships, consistent with previous research. However, an expected and significant concurrent association was observed between parent responsiveness, measured using the observational rating scale, and parents' reports of children's ability to initiate interactions with adults. Research on reliable, ecologically feasible methods of parent-child interaction assessment conducted in community-based settings may help translate evidence-based practices into real-world settings.

Keywords: *autism; parent-child interaction; engagement; social; responsiveness*

More than 35 years ago, Schopler (1971) proposed that parents of children with autism could serve as "cotherapists" for their children (Short, 1984). This concept was revolutionary for two reasons. First, it was in direct opposition to prevailing theories that blamed parents for their children's disorder (Bettelheim, 1967; Ferster, 1961), and second, it anticipated future research demonstrating the valid and important contribution of responsive parent behaviors to cognitive, language, social, and emotional outcomes for typically developing children (Bornstein, Tamis-LeMonda, & Haynes, 1999; Carpenter, Nagell, & Tomasello, 1998; Dunst et al., 2001; Hoff & Naigles, 2002; Masur, Flynn, & Eichhorst, 2005; Tamis-LeMonda, Bornstein, & Baumwell, 2001; Tomasello & Farrar, 1986; Weizman & Snow, 2001) and for children at risk for, or experiencing, developmental delays (Brady, Marquis, Fleming, & McLean, 2004; Hebert, Swank,

Smith, & Landry, 2004; Hoff, 2003; Landry, Smith, & Swank, 2006; Yoder & Warren, 1998, 1999, 2004), including autism (Siller & Sigman, 2002). In fact, numerous studies have indicated that responsive parenting plays a more substantial role in the development of children at biological risk than it does for children who, presumably, have more resilience in achieving optimal developmental outcomes (Landry et al., 2006).

Responsive parent behaviors are characterized in the literature as immediate, contingent, and affectively positive

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reactions to children's acts of communication and play (Bornstein & Tamis-LeMonda, 1989; Landry et al., 2006; Steelman, Assel, Swank, Smith, & Landry, 2002). A hallmark of responsiveness is that such parent behaviors follow into children's current focus of attention, or "plan of the moment" (Girolametto, Weitzman, Wiigs, & Pearce, 1999, p. 365), and maintain children's engagement in the types of activities necessary for learning. On the basis of replicated empirical support for a positive association between parent responsiveness and a variety of child learning outcomes, current intervention programs for children with developmental disabilities frequently incorporate a component that teaches parents to use responsive strategies when interacting with their children (Fey et al., 2006; Girolametto & Weitzman, 2006; Girolametto et al., 1999; Guttentag, Pedrosa-Josic, Landry, Smith, & Swank, 2006; Kaiser, Hancock, & Hester, 1998; Kaiser, Hemmeter, Ostrosky, & Fisher, 1996; Mahoney, Boyce, Fewell, Spiker & Wheeden, 1998; Mahoney, Finger, & Powell, 1985; Spiker, Boyce, & Boyce, 2002; Yoder, McCathren, Warren & Watson, 2002; Yoder & Warren, 2002), including interventions designed to improve social, affective, and language outcomes for children with autism spectrum disorders (Mahoney & Perales, 2003, 2005; Rogers et al., 2006; Wetherby & Woods, 2006). Indeed, several studies now have demonstrated that parents of children with autism can increase their use of responsive interaction strategies (Aldred, Green, & Adams, 2004; Kashinath, Woods, & Goldstein, 2006; Mahoney & Perales, 2005; McConachie, Van Randle, Hammal, & Le Couteur, 2005; Siller, Hutman, & Sigman, 2007; Yoder & Stone, 2006).

Parent responsiveness may be considered a multifaceted construct composed of several distinct, but conceptually related, component skills (Martin, 1989). In addition, different aspects of parent responsiveness may predict different developmental outcomes, such as exploratory play or language skills (Landry et al., 2006; Landry, Smith, Swank, & Miller-Loncar, 2000). The acknowledgement of the direct and indirect contribution of parent behaviors to positive child outcomes, and the desire to enhance these parent behaviors through interventions, has led to much interest in identifying specific aspects of parent responsiveness (Mahoney et al., 1998; Mahoney & Perales, 2003, 2005; Mahoney & Powell, 1988; Prizant, Wetherby, & Rydell, 2000). For example, Landry et al. (2006) selected four aspects of responsiveness to target within the context of an intervention designed for mothers of children at risk for developmental delays: contingent responding, affective support, support for child focus of attention, and supportive language input measured at the micro-level. The authors found

that although contingent responsiveness was important for child cooperation, maintaining child engagement and providing verbal input were important for language development.

Similarly, Mahoney, Powell, and Finger (1986) developed the *Maternal Behavior Rating Scale*, a 12-item scale that assesses four dimensions of parent responsiveness: responsiveness, affect, achievement orientation, and directiveness, measured at a more global level. Mahoney and Perales (2005) used this scale to evaluate the effectiveness of a relationship-focused intervention for improving the social and emotional well-being of 20 young children diagnosed with either autism or pervasive developmental disorder. Following participation in 8 to 14 months of parent-child training sessions, mothers made significant changes in both responsiveness and affect, but not in achievement orientation or directiveness. In addition, changes in maternal responsiveness covaried with changes in child social emotional functioning, even when controlling for initial parent responsiveness. Thus, different approaches have been applied to assessing the construct of responsiveness by different investigators.

Despite the documented associations between the parent and child behaviors, little work has been done to translate such knowledge into community-based treatment programs for children with autism. For community-based service providers, measurement tools must be ecologically feasible. That is, not only must these measurement tools be valid and reliable (Mahoney, Spiker, & Boyce, 1996), but they must be able to be administered, scored, and interpreted with relative ease; require few additional personnel, time, and equipment resources; and add little cost to the assessment process (Ruble, Willis, & Crabtree, 2008). Research tools on parent-child interaction from laboratories produce important findings using essential research techniques. The shortfall for these methods is that they are often time-consuming and labor intensive, requiring videotape recording and coding of micro-level behaviors (e.g., 5-second event coding or frequency counts) as well as the use and maintenance of specialized equipment.

On the other hand, instruments based on ratings of molar-level behaviors administered in real time run the risk of reliability error (Sackett, Gluck, & Ruppenthal, 1978). Therefore, research on measurement systems that can be used by clinicians holds promise not only to elucidate specific aspects of parent behaviors that should be targeted for treatment (Kim & Mahoney, 2004) but also to assist in bridging the gap between efficacy studies and effectiveness or implementation research (Bodfish, 2004). Care must be taken that appropriate tools that have clear operational definitions and that are free of bias are used (Baird, Haas, McCormick, & Carruth, 1992).

This preliminary study is unique for two reasons. First, it occurred within a “practice as usual” context. That is, the measurement tools were able to be administered as part of an intervention assessment that was required prior to treatment delivery. Second, because the measurements were based on practice as usual, the participants represented a clinically referred rather than a research-recruited sample. Therefore, the primary aim of this exploratory study was to determine whether a rating scale of parent behaviors could be administered reliably as part of practice as usual. A secondary aim was to examine the concurrent associations between ratings of molar-level parent behaviors and parent and child variables. Both direct and indirect measures of caregiver and child factors (e.g., demographics characteristics of the parents and social behaviors of the child) were examined. Two directional hypotheses based on prior research were explored. First, it was hypothesized that parent responsiveness would be associated with child cognitive skills (Spiker et al., 2002), but not with parent demographic factors such as level of education, income, or number of children. Second, it was hypothesized that parent contingent responsiveness, as a specific feature of parent interaction style, would relate significantly with parents’ reports of their children’s ability to initiate social interactions (Mahoney & Perales, 2003, 2005).

Methods

Participants

Thirty-five children with autism and their caregivers participated. Caregivers were 30 mothers, 4 fathers, and 1 stepfather. Data were gathered as part of a treatment evaluation prior to receiving services in a community-based outpatient autism intervention program for children; therefore, participants were not recruited but were representative of community referrals. Participants signed release forms to be videotaped and for data to be used for research purposes. Institutional review board approval was also received.

Participating children were originally referred from a regional diagnostic center or their pediatricians for intervention services; all children carried clinical diagnoses of autism prior to entry into the study. Data from children referred to the program were excluded from analysis if they were diagnosed with sensory impairments (hearing or visual) and if they did not receive total scores indicative of autism on the basis of the results of the *Autism Diagnostic Observation Schedule–Generic* (ADOS-G; Lord et al., 1989, 2000) administered as part of the treatment study evaluation. The demographic information of

Table 1
Demographic and Clinical Information

Variable	Value
Parent/caregiver	
Marital status	
Married	28 (80%)
Not married/divorced	7 (20%)
Education	
College degree	14 (40%)
No college degree	17 (49%)
Nonresponse	4 (11%)
Income	
<\$50,000	16 (46%)
>\$50,000	6 (17%)
Nonresponse	13 (37%)
Number of children	2.0 ± 0.9
Child	
Age (months)	55.9 ± 15.0
Sex	
Male	30 (86%)
Female	5 (14%)
Race	
Caucasian	30 (86%)
African American	2 (6%)
Asian	1 (3%)
Other	2 (6%)
ADOS-G	23.7 ± 5.1
Differential Abilities scale	30.0 ± 8.6
VABS	
Socialization	56.5 ± 6.9
Communication	50.6 ± 9.9

Note: Values are counts with percentages or $M \pm SD$. ADOS-G = *Autism Diagnostic Observation Schedule–Generic*; VABS = *Vineland Adaptive Behavior Scales*.

the parents and children is reported in Table 1. The sample was largely male (86%) and Caucasian (86%), so these variables were not considered in statistical analyses. Nonresponse was an issue for two of the caregiver demographic items: income (13 of 35 [37%]) and education (4 of 35 [11%]). To retain these participants in the statistical analyses reported below, nonresponders were included as a separate group for each of these factors. The handling of nonresponders in the statistical analyses is described below.

Measures

All caregivers completed an application before the initiation of clinical services that provided the background information of caregiver demographics (age, income, level of education, number of children, and marital status), child demographics (age, gender, and race), and outcome variables (parents’ ratings of children’s general

social abilities and specific skills in initiating with adults and with children) for the study. Although all children had clinical diagnoses of autistic disorder (American Psychiatric Association, 1994) by clinicians not connected to this study and prior to study entry, diagnoses were confirmed with the ADOS-G (Lord et al., 1989, 2000). The mean ADOS-G score was 23.7 ($SD = 5.1$).

The *Differential Abilities Scale* (DAS; Elliott, 1990) was also used to evaluate cognitive functioning. Subtest t scores were calculated on the basis of chronological age rather than developmental age. Subtest t scores based on chronological age were then used to obtain general conceptual ability scores. Thirty-three children completed the DAS and exhibited a mean general conceptual ability score of 30.0 ($SD = 8.6$), indicating a classification within the "very low" range. Two children did not complete the DAS because attempts to create work-reward routines were not successful, and the children's behavior was not consistent with task engagement (i.e., sitting in a chair, looking at items).

The *Vineland Adaptive Behavior Scales* (VABS; Sparrow & Cicchetti, 1984) was used as a measure of adaptive functioning for socialization and communication. Thirty-one of the caregivers completed the VABS. Children's mean adaptive standard score for socialization was 56.5 ($SD = 6.9$) and for communication was 50.6 ($SD = 9.9$). These standard scores fall in the "low" range. Four parents did not complete the VABS because of time restrictions (i.e., they arrived to the evaluation late, and this assessment was omitted from the evaluation).

Parent interaction was measured using a rating scale developed as part of the treatment evaluation. The *Social Interaction Rating Scale* (SIRS) was composed of items representing six aspects of parent responsiveness: (a) contingency, (b) directiveness, (c) initiation toward the child, (d) movement with the child, (e) affect, and (f) maintenance of interaction with the child. All behaviors measured on the SIRS were evaluated using a 5-point, Likert-type scale ranging from 1 to 3, with 0.5 midpoints (e.g., 1.5, 2.5). Each of the six items was summed to yield an overall score that was used as the dependent variable. Higher item and total scores were assumed to be indicative of better parent interaction. A copy of the instrument and definitions are in the Appendix.

The six aspects of parent responsiveness were selected for examination on the basis of clinical observation and informed by previous research focusing on parent-child interactions and child engagement, as well as behavioral, social-interactionist, and developmental approaches to intervention. The first aspect of parent behavior selected for examination was contingency, representing the construct of quick and temporally contiguous parent responses that relate conceptually to the child's prior

action (Bornstein & Tamis-LeMonda, 1989). As discussed previously, parental consistency in contingent responsiveness may be especially important for children with autism, who may face general challenges in learning response-reinforcer contingencies (Koegel & Koegel, 2006). More specifically, children with autism may not be sensitive to the social cues of others within the context of an interaction, and their own unconventional attempts to communicate may be difficult for others to detect and interpret. Thus, children with autism may be faced with obstacles to learning that their responses can affect the social environment. Having experience with a parent who responds contingently to their actions may result in children who are more likely to initiate in subsequent interactive settings.

The second aspect of responsiveness selected for examination was directiveness. Research suggests that maternal directiveness has a changing influence across development, with facilitative effects on early skill development followed by negative associations at later ages, as children develop competence in various developmental domains (Landry et al., 2000). McCathren, Yoder, and Warren (2005) suggested that directives that maintain child engagement or that introduce a new focus to an unengaged child may enhance development for young children with disabilities, whereas directives that redirect child attention may not. Similarly, research has demonstrated the beneficial effects of adult-directed instruction on learning outcomes for children with autism. Discrete trial training is especially important for the rapid acquisition of new skills in young children with autism (Lovaas, 1981; McEachin, Smith, & Lovaas, 1993; Smith, 2001). A caveat, however, is that behaviors learned through discrete trial training may fail to generalize across new contexts, people, and materials; that is, children who are trained in the respondent role required by discrete trial approaches may not initiate behaviors in new and less highly structured settings in which behaviors are not prompted. Indeed, researchers have identified an indirect association between parent directiveness and child initiations and the display of a range of communicative intentions for children with autism (El Ghoroury & Romanczyk, 1999; Prizant et al., 2000). Therefore, the type of skill targeted for intervention (e.g., social communication vs. matching objects) may be important when assessing the predictive contribution of directiveness to developmental outcomes. Further examples of directiveness are provided in the Appendix.

A third aspect of responsiveness selected for examination in the current study was parent affect. Previous research demonstrates that positive affect, also called warm responsiveness, is directly associated with child social competence (Steelman et al., 2002) and engagement (Kim

& Mahoney, 2004). Steelman et al. (2002) defined their construct of affective responsiveness as parent praise and encouragement, physical affection, attention to child, and enthusiasm during parent-child interactions. Examining a large group of preterm mother-child dyads, these authors found that maternal warm responsiveness at 12 months predicted a variety of child social skills at 54 months, including compliance with maternal requests, eye gaze to the mother, positive affect, and the use of language and communicative gestures directed toward the mother. Additionally, Kim and Mahoney (2004) demonstrated that even when controlling for child developmental status, positive maternal affect (i.e., acceptance, enjoyment, expressiveness, and warmth) made a significant contribution to engagement for a group of children with developmental delays. These authors suggested that the impact of parent responsiveness on development is mediated by the amount of time children spend engaged in activities that support learning outcomes (Kim & Mahoney, 2004). The National Research Council's (2001) summary of effective programs for children with autism also identifies child engagement as a critical feature in effective programming (Dawson, & Osterling, 1997). Therefore, because children's learning is influenced by the quality of their engagement, caregiver affect may provide an influential component of parent responsiveness and one that is worthy of study.

The fourth dimension of caregiver behavior deemed to be important was parent initiations directed toward the child. Caregiver initiations may play an important role in facilitating language and play skills for children with autism, who may experience restricted interest in objects and limited behavioral repertoires as well as challenges in initiating interactions with social partners (Dawson et al., 2004; Leekam & Ramsden, 2006; Martins & Harris, 2006; Warreyn, Roeyers, & De Groote, 2005). Siller and Sigman (2002) demonstrated a positive association between the frequency with which parents of young children with autism initiated interactions (e.g., by pointing to, showing, or offering a toy) and gains in child initiations of joint attention 1 year later. This association remained significant even when controlling for the duration of child engagement and initial child IQ, joint attention, and language status. Thus, parents who model the use of initiations that serve a declarative, as opposed to behavior-regulating, pragmatic function may increase the subsequent production of these types of social initiations in their children with autism.

The fifth category of parent responsiveness selected for examination in the current study was parents' use of movement to establish proximity with their children. Research has shown that despite challenges in responding to the distal attentional directives of social partners (Burack, 1994; Goldstein, Johnson, & Minshew, 2001;

Joseph & Tager Flusberg, 1997; Lewy & Dawson, 1992; Mundy, Sigman, & Kasari, 1994; Sigman & Ruskin, 1999), children with autism can respond to more salient and proximal attention directing cues (Leekam, Hunnisett, & Moore, 1998; Leekam, López, & Moore, 2000; McDuffie, Yoder, & Stone, 2005). Leekam et al. (1998) demonstrated that the response of a child with autism to attentional directives could be facilitated through the addition of language and gestures to adult social cues as well as by moving or otherwise increasing the salience and reward value of the target itself. Research also has revealed that parents of young children with autism exert more effort to obtain and maintain their children's attention (Adamson, McArthur, Markov, Dunbar, & Bakeman, 2001) than parents of typically developing children. However, parental effort may be reflected in the quality rather than the quantity of parents' overtures to their children. Investigators have demonstrated that parents of children with autism use more physical contact when engaging with their children or when attempting to maintain their children's attention to a task (Kasari, Sigman, Mundy, & Yirmiya, 1988). Similarly, Doussard-Roosevelt, Joe, Bazhenova, and Porges (2003) determined that the parents of children with autism used more movement toward and physical contact and fewer verbal approaches to their children than parents of age-matched, typically developing comparison children. Mothers also are likely to use high-intensity, relative to low-intensity, approach behaviors during play interactions with children with autism (Doussard-Roosevelt et al., 2003).

A final dimension of parent responsiveness is the ability to maintain or scaffold joint interaction (Prizant et al., 2000; Schuler & Wolfberg, 2000; Wolfberg & Schuler, 1999), which is different from directiveness (see Appendix). A caregiver plays a fundamental role in guiding the process of learning by supporting a child's object engagement, self-regulation, attention, and cognitive skills, that is, by maintaining the child within his or her zone of proximal development (Vygotsky, 1978). Therefore, caregivers who are more able to establish and maintain interactions with their children (e.g., by providing repeated practice or partial assistance to complete goal-directed actions) create and enhance opportunities for language and social development. When parents of children with autism follow into the children's current activities by imitating or elaborating on the children's toy play or by describing what the children are doing, children with autism show an increase in time spent in both coordinated and supported joint engagement and a decrease in the amount of time they spend simply watching the adult play (Lewy & Dawson, 1992). Recent studies suggest that time spent in supported joint engagement, during which

parents change the way children experience interactions with objects, without the children's explicit acknowledgment of the parents, may actually contribute to language learning to a greater extent than time spent in coordinated joint engagement (Adamson, Bakeman, & Deckner, 2004, 2005). Thus, a parent's ability to follow into and maintain child engagement with the appropriate use of objects may be very important for a child with autism.

Finally, the last part of the treatment evaluation that was included assessment of children's social skills via parental report. Parents completed a 26-item in-house questionnaire asking them to rate the quality of their children's social skills by completing survey questions that evaluated social behaviors representing initiating, maintaining, and responding during interactions. Survey items came from skills targeted in effective intervention programs and recommended by researchers as critical in programs of young children with autism (joint attention, communication, play, and reciprocal social interaction; Dawson & Osterling, 1997). Parents used a Likert-type scale ranging from 1 (*not well*) to 4 (*very well*) to indicate the quality of their children's social behaviors with adults and with children (i.e., "How well does your child initiate social interactions with adults/children?"). These two items from this questionnaire were of particular interest: children's ability to initiate social interaction with adults and also with children. Because children's social initiations have been shown by longitudinal research to result in positive outcomes (Koegel, Koegel, Shoshan, & McNerney, 1999), these two questionnaire items were included in the statistical analysis. In particular, the relationship between the SIRS items and these responses was analyzed to test whether any of the SIRS items had predictive value with respect to the children's social initiation ability.

Procedure

As mentioned, all data were gathered as part of a routine intervention planning protocol that is part of an outpatient clinical setting specialized in autism spectrum disorders. Part of the routine assessment includes videotaping a parent-child play session as part of the treatment evaluation. Parents were asked to play with their children for 10 minutes using a set of predetermined toys that included two dolls, two bottles, two small balls, and two miniature cars. Parents were told that the purpose of this activity was to help the children become accustomed to the new environment as well as observe their children's play skills. Play sessions were videotaped for reliability coding after the evaluation. The first author (a licensed psychologist practitioner-researcher) administered the SIRS during the evaluation, immediately following the

parent-child play session, and her score was used as the criterion rating for subsequent reliability analysis (her experience includes prior research reliability training from the developers of the ADOS-G and the *Autism Diagnostic Interview-Revised* [ADI-R]). The ADOS-G, DAS, and VABS were administered after the parent-child free play session. Coders completed about 10 hours of training on the SIRS using videotapes from subjects not in the present sample. After training, 20% of the videotapes of the parent-child interaction for this study were randomly selected and coded by an independent observer, and codes were compared with the codes obtained during the evaluation. The concordance between the two coders was evaluated with Lin's (1989, 2000) concordance correlation coefficient (CCC). Lin's CCC provides a better measure of agreement between raters than Pearson's correlation coefficient, because it accounts for shifts in location as well as shifts in scale. Informally, Lin's CCC modifies Pearson's correlation coefficient by multiplying it by a bias correction factor that accounts for deviations from the 45° line of perfect agreement. The CCC between our two raters was .85. Pearson's correlation was .85 as well. The internal consistency of the SIRS was also calculated for each observer using Cronbach's α . Rater 1 exhibited an α value of .90, and Rater 2 exhibited an α value of .88.

An analysis of covariance was applied to test the effect of parent or caregiver characteristics on the total SIRS score. The included factors were marital status (married vs. not married), education level (college degree vs. no college degree), income (above or below \$50,000), and number of children in the family (as a continuous covariate). Because of significant nonresponse on education level and income, nonresponders were included as an additional level for these factors to preserve the sample size. The comparisons of interest for these factors were between the levels defined by the responders (i.e., comparison of the nonresponders with the responders was not of interest). Consequently, the comparisons of interest for these factors were contrasts of the levels defined by the responders, excluding the nonresponders. A linear regression was applied to the test the effects of child characteristics (age, DAS score, VABS Socialization and Communication scale scores). As previously mentioned, gender and race were not included in the analysis, because the sample was largely male (86%) and Caucasian (86%). The ADOS-G was not included as a predictor, because it was a criterion for study inclusion. As an exploratory analysis, an ordinal logistic regression of the children's social initiation ability with adults and children onto the items of the SIRS was conducted to determine whether any SIRS items were of any predictive value.

Results

The demographic and clinical characteristics of the sample are presented in Table 1. Table 2 provides the results of the analysis of covariance considering parent or caregiver factors and the regression considering child factors. Among parent or caregiver factors, SIRS total scores were not significantly different among the groups defined by marital status ($p = .77$), the attainment of a college degree ($p = .88$), or income level relative to \$50,000 per year ($p = .94$). In addition, there was no significant relationship between the number of children in the family and SIRS total score ($p = .35$). Among child factors, total SIRS scores were not significantly related to child age ($p = .64$), scores on the DAS ($p = .14$), or scores on the VABS Communication ($p = .98$) and Socialization ($p = .94$) scales.

Table 3 contains the results of the ordinal logistic regression that tested the relationships of the SIRS items with parents' reports of their children's ability to initiate social interactions with adults and children. The contingency item of the SIRS was significantly and positively associated with the child's social initiation ability with adults (odds ratio = 267.1, $p = .01$), indicating that parents and caregivers who were more responsive to children's attempts at initiation were more likely to rate their children's social initiation ability with adults as high. The same relationship with children's social initiation ability with other children was strong (odds ratio = 30.9) but not statistically significant ($p = .08$). No other items of the SIRS were significantly associated with parents' ratings of social initiation ability.

Discussion

Providing effective, empirically based treatments for young children with autism remains an elusive goal in community-based settings (Bodfish, 2004). A recent study by Stahmer, Collings, and Palinkas (2005) suggests

Table 2
Evaluation of Relationship Between Demographic and Clinical Characteristics on SIRS Total Score

Variable	SIRS Score	<i>p</i>
Parent/caregiver		
Marital status		.77
Married	14.9 ± 2.5	
Not married/divorced	14.3 ± 4.6	
Education		.88 ^a
College degree	15.1 ± 2.5	
No college degree	15.0 ± 2.5	
Nonresponse	12.9 ± 5.7	
Income		.94 ^b
<\$50,000	14.8 ± 2.7	
>\$50,000	15.0 ± 2.6	
Nonresponse	14.7 ± 3.6	
Number of children	—	.35
Child		
Age	—	.64
DAS	—	.14
VABS		
Socialization	—	.94
Communication	—	.98

Note: SIRS = *Social Interaction Rating Scale*; DAS = *Differential Abilities Scale*; VABS = *Vineland Adaptive Behavior Scales*.

a. Derived from the contrast of those with college degrees against those without college degrees (nonresponders excluded).

b. Derived from the contrast of those with incomes less than \$50,000 against those with incomes greater than \$50,000 (nonresponders excluded).

that providers often rely on parents in selecting specific treatment methods rather than basing decision making on the evidence supporting treatment approaches. The lack of use of science-based decision making in the selection of interventions in autism is partially the result of a lack of effectiveness and implementation research conducted in community-based treatment settings. For the field to move toward the selection and use of empirically based

Table 3
Ordinal Logistic Regression of Child Social Initiation Skills With Adults and With Children Onto SIRS Subscales

Predictor	Adults			Children		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Affect	0.6	0.0 to 8.8	.73	0.4	0.0 to 7.2	.54
Maintenance	0.1	0.0 to 1.7	.11	0.3	0.0 to 4.1	.35
Directiveness	10.3	0.4 to 17.1	.16	1.4	0.0 to 39.1	.85
Contingency	267.1	5.2 to 13,692.6	.01	30.9	0.7 to 1398.0	.08
Initiation	0.6	0.0 to 19.6	.78	0.2	0.0 to 5.8	.33
Movement	0.0	0.0 to 1.4	.08	2.0	0.1 to 74.5	.70

Note: SIRS = *Social Interaction Rating Scale*; OR = odds ratio; CI = confidence interval.

interventions, recognition of the gap between efficacy and implementation research is needed (Ruble et al., 2008). One way to close the research-to-practice gap is to investigate methods that can be applied directly in clinical settings. This study is unique because it was conducted in an outpatient program for children with autism and based on participants who were community referrals rather than research recruitments.

Another serious issue in the field of early intervention research for children with autism involves debate over the theoretical rationale for various treatment approaches, in particular adult-directed methods (i.e., discrete trial training) versus child-directed approaches (i.e., responsive teaching). Emergent research describes a need for consideration of the pivotal deficits in autism as the emphasis of early intervention (Kasari et al., 2005). Parent-child interaction research, which is limited in the autism literature, suggests the need for a treatment approach targeting the special challenges faced by children with autism (i.e., social development and language acquisition) (Aldred et al., 2004; Baldwin, Markman, Bill, Desjardins, & Irwin, 1996; Yoder & Warren, 1993). The ability to assess and, subsequently, modify parent interaction style is a logical way to increase child engagement, social behaviors, and language development, which have been shown to be associated with positive outcomes in adulthood for children with autism (Mesibov, 1984).

In the current study, parent responsiveness was measured as part of an outpatient community-based program planning treatment evaluation. Analysis of the associations between parent interactions and both parent and child demographics revealed no significant associations. A significant association failed to be detected between parent interaction style and adaptive behavior as measured by the VABS. Contrary to our hypothesis, no significant association was observed between parent interaction style and cognitive level as measured by the DAS, a finding that is inconsistent with previous research (Spiker et al., 2002).

The second hypothesis tested was that parent interaction style would be significantly associated with child social initiation skills. When the specific features of parent engagement (item scores) were evaluated against children's initiation skills, parent responsiveness was significantly associated with children's ability to initiate social interactions with adults but not with children.

These findings support other research on the need for increased recognition of responsive and contingent parent teaching approaches. The increased recognition of children with autism (Chakrabarti & Fombonne, 2001) calls for attention to bridging the gap between research and practice though effectiveness research on parent-child interaction. Effectiveness research includes the development of meaningful, valid, reliable, and feasible measurement tools

designed for use in clinical settings. Few instruments have been generated from evidenced based studies for use in clinical settings in autism, resulting in a lack of knowledge to guide effectiveness and implementation research.

Limitations

To effectively develop clinically useful and friendly tools, more research needs to be done on the number of hours required to train clinicians. The personnel in this study had extensive experience with children with autism; thus, the quantity and type of training that would be required to enable less experienced clinicians to achieve reliability of observational rating scales of molar-level behaviors is a question that must be addressed in future research. A second issue involves missing data. Although provisions were made to include nonresponders to the income and education questions such that relevant comparisons were preserved in the statistical analysis, an analysis of a more complete data set may provide more nuanced information. A third issue is that data analyses from larger samples and from samples that represent the broader autism spectrum (Asperger's disorder and pervasive developmental disorder not otherwise specified) would be beneficial in further demonstrating the utility of the SIRS instrument. Finally, the use of a single item from a questionnaire is insufficient to fully test the utility of the parent-child rating scale. Specifically, the results from the ordinal logistic regression are exploratory and more research on the external validity of the items of the SIRS is required.

Future Directions

This preliminary and exploratory study suggests that parent interaction skills can be evaluated with adequate interrater reliability in a clinical setting. Future research is needed on validating these findings through direct observation, correlation with other established measures of parent-child interaction (e.g., the *Maternal Behavior Rating Scale*; Mahoney et al., 1986), application to larger sample sizes, and comparisons among different diagnostic groups and in different settings, including day care and early childhood preschool programs. Micro-level analysis of parent-child interactions can tell us if parents who are judged to be more responsive according to our global ratings actually more responsive to their children on the basis of direct observation of parent child interaction. Given the observed association between parents' contingent responsiveness and parents' reports of their children's ability to initiate social interaction with adults, an important question to consider is whether these children actually have better social initiation skills according to direct observation. That is, do the children of more responsive parents actually initiate more frequently

during parent-child interactions, or are responsive parents simply more likely to recognize and respond to these initiations relative to less responsive parents? In short, a comparison of molar-level ratings with direct observation of those aspects of parent responsiveness identified in the current study (i.e., contingency, directiveness, affect, initiations, movement, and maintaining interaction) will add to our confidence that we are measuring constructs that we intend to measure. Future

research that examines parent-child interaction and parent responsiveness within the context of such interactions has the potential to inform planning for individualized treatment that promotes optimal parent-child engagement. If parent interaction style can be accurately and reliably assessed, clinicians can use molar-level rating scales as a tool for guiding parents to interact more effectively and appropriately in designated areas that result in optimal and relevant developmental outcomes.

Appendix

Social Interaction Rating Scale

ID# 	<h1 style="margin: 0;">social Interaction Rating Scale</h1> <small>(Ruble, et al., rev. 2005)</small>
Child's Name: _____ Observation Date: _____ Observer: _____ Caregiver's Name: _____ Relationship of Caregiver to Child: : _____	

Level of Affect	Maintenance of Interaction																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">1</td><td>Facial expression shows <i>no</i> emotion during the child's activities, praise/feedback & attention are absent, & attentive body language is absent.</td></tr> <tr><td style="text-align: center;">1.5</td><td>Limited emotion is shown, very little verbal praise/feedback or attention is given, & attentive body language is minimal.</td></tr> <tr><td style="text-align: center;">2</td><td>Attentive and expressive at times, and/or may give some verbal praise/feedback. Exhibits some attentive body language.</td></tr> <tr><td style="text-align: center;">2.5</td><td>Frequently attentive and expressive, giving frequent verbal praise/feedback, & exhibiting positive/attentive body language the majority of the time.</td></tr> <tr><td style="text-align: center;">3</td><td>Positive praise/feedback and/or instruction is given in a calm or enthusiastic tone of voice, there are several instances of observable enjoyment with the child through positive attention & emotional facial expressions, & attentive body language is continually used.</td></tr> </table> Observations/Comments: _____	1	Facial expression shows <i>no</i> emotion during the child's activities, praise/feedback & attention are absent, & attentive body language is absent.	1.5	Limited emotion is shown, very little verbal praise/feedback or attention is given, & attentive body language is minimal.	2	Attentive and expressive at times, and/or may give some verbal praise/feedback. Exhibits some attentive body language.	2.5	Frequently attentive and expressive, giving frequent verbal praise/feedback, & exhibiting positive/attentive body language the majority of the time.	3	Positive praise/feedback and/or instruction is given in a calm or enthusiastic tone of voice, there are several instances of observable enjoyment with the child through positive attention & emotional facial expressions, & attentive body language is continually used.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">1</td><td>Does not attempt to help the child to be productive in child's interactions with objects & does not demonstrate or facilitate an object's proper use.</td></tr> <tr><td style="text-align: center;">1.5</td><td>Makes limited attempt to foster productivity in interactions with objects & makes minimal effort to demonstrate or facilitate an object's proper use.</td></tr> <tr><td style="text-align: center;">2</td><td>Makes some attempts to maintain productivity, to demonstrate an object's proper use, or to help the child use an object appropriately.</td></tr> <tr><td style="text-align: center;">2.5</td><td>Makes frequent attempts to and is successful in maintaining productivity. Parent demonstrates & facilitates an object's proper use.</td></tr> <tr><td style="text-align: center;">3</td><td>Is successful in helping the child to be productive in interactions with objects and/or others throughout the session using a wide variety of different approaches.</td></tr> </table> Observations/Comments: _____	1	Does not attempt to help the child to be productive in child's interactions with objects & does not demonstrate or facilitate an object's proper use.	1.5	Makes limited attempt to foster productivity in interactions with objects & makes minimal effort to demonstrate or facilitate an object's proper use.	2	Makes some attempts to maintain productivity, to demonstrate an object's proper use, or to help the child use an object appropriately.	2.5	Makes frequent attempts to and is successful in maintaining productivity. Parent demonstrates & facilitates an object's proper use.	3	Is successful in helping the child to be productive in interactions with objects and/or others throughout the session using a wide variety of different approaches.
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Directiveness	Contingency																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">1</td><td>Repeatedly & intensely attempts to direct the child's immediate attention and/or behavior.</td></tr> <tr><td style="text-align: center;">1.5</td><td>Frequently attempts to direct the child's immediate attention and/or behavior.</td></tr> <tr><td style="text-align: center;">2</td><td>Makes some attempts to direct the child's attention and/or behavior.</td></tr> <tr><td style="text-align: center;">2.5</td><td>Maintains child's interest by directing the child's attention and/or behavior on a limited basis.</td></tr> <tr><td style="text-align: center;">3</td><td>Tailors directiveness based on the child's behavior throughout by allowing adequate response time and/or independence.</td></tr> </table> Observations/Comments: _____	1	Repeatedly & intensely attempts to direct the child's immediate attention and/or behavior.	1.5	Frequently attempts to direct the child's immediate attention and/or behavior.	2	Makes some attempts to direct the child's attention and/or behavior.	2.5	Maintains child's interest by directing the child's attention and/or behavior on a limited basis.	3	Tailors directiveness based on the child's behavior throughout by allowing adequate response time and/or independence.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">1</td><td>Does not respond to the child's initiations, behavior, body language, & requests.</td></tr> <tr><td style="text-align: center;">1.5</td><td>Shows limited / inconsistent responses to the child's behavior, body language, & requests.</td></tr> <tr><td style="text-align: center;">2</td><td>Is somewhat responsive to the child's initiations, behavior, body language, & requests in several instances. May have neutral response to child.</td></tr> <tr><td style="text-align: center;">2.5</td><td>Frequently & positively responds to the child's initiations, behavior, body language, & requests.</td></tr> <tr><td style="text-align: center;">3</td><td>Responds consistently & positively to the child's initiations, behavior, body language, & requests.</td></tr> </table> Observations/Comments: _____	1	Does not respond to the child's initiations, behavior, body language, & requests.	1.5	Shows limited / inconsistent responses to the child's behavior, body language, & requests.	2	Is somewhat responsive to the child's initiations, behavior, body language, & requests in several instances. May have neutral response to child.	2.5	Frequently & positively responds to the child's initiations, behavior, body language, & requests.	3	Responds consistently & positively to the child's initiations, behavior, body language, & requests.
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Initiation	Level of Movement / Participation																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">1</td><td>Is apathetic & does not attempt to direct the child's attention and/or behavior.</td></tr> <tr><td style="text-align: center;">1.5</td><td>Is passive but makes limited attempt to initiate with the child.</td></tr> <tr><td style="text-align: center;">2</td><td>Initiates some of the time with the child.</td></tr> <tr><td style="text-align: center;">2.5</td><td>Initiates positively with the child frequently.</td></tr> <tr><td style="text-align: center;">3</td><td>Initiates positively with the child throughout.</td></tr> </table> Observations/Comments: _____	1	Is apathetic & does not attempt to direct the child's attention and/or behavior.	1.5	Is passive but makes limited attempt to initiate with the child.	2	Initiates some of the time with the child.	2.5	Initiates positively with the child frequently.	3	Initiates positively with the child throughout.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">1</td><td>Does not move with the child & his/her activities & does not participate with the child.</td></tr> <tr><td style="text-align: center;">1.5</td><td>Makes limited movements with the child & makes few attempts to participate with the child.</td></tr> <tr><td style="text-align: center;">2</td><td>Somewhat moves with the child & participates some of the time.</td></tr> <tr><td style="text-align: center;">2.5</td><td>Frequently moves with the child & frequently participates with the child.</td></tr> <tr><td style="text-align: center;">3</td><td>Moves with the child & his/her activities and encourages participation throughout.</td></tr> </table> Observations/Comments: _____	1	Does not move with the child & his/her activities & does not participate with the child.	1.5	Makes limited movements with the child & makes few attempts to participate with the child.	2	Somewhat moves with the child & participates some of the time.	2.5	Frequently moves with the child & frequently participates with the child.	3	Moves with the child & his/her activities and encourages participation throughout.
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Total Score	Poor Interaction ←————→ Optimum Interaction 6 6.5 7 7.5 8 8.5 9 9.5 10 10.5 11 11.5 12 12.5 13 13.5 14 14.5 15 15.5 16 16.5 17 17.5 18
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(continued)

Appendix (continued)

Social Interaction Rating Scale Hints for Coding

(Ruble, et al., rev. 2005)

Level of Affect: Measures parent's interest in/attention to the child or his/her activity.

- 1 Parent appears disinterested in the child and his/her activities. Parent may appear flat or show negative emotions toward child. Parent does not show interest through his/her body language, like sitting up, leaning forward, etc.
- 1.5 Parent shows limited interest in child and may briefly comment on his/her activity. Occasional praise/feedback may be given. Parent does not interact positively with the child.
- 2 Parent has neutral affect toward child (is not angry w/ child or ignoring them, but does not smile at them, etc.). Some praise/feedback is given and parent attends somewhat to child.
- 2.5 Parent frequently gives praise/feedback to child and is interested in them. Parent shows positive affect.
- 3 Parent is enthusiastic about child/child's activities, or the parent is clearly attending to child/child's activity and interacting with child in a calm, yet pleasant manner. Shared enjoyment between child and parent is observed through facial expression and/or positive body language. Praise and/or feedback are given in a positive manner.

Maintenance of Interaction: Measures degree to which parent builds on child's initiation and/or assists child in using objects functionally.

- 1 Parent does not attempt to use different approaches (physical, verbal, gestural prompts) to build upon interaction. Parent does not ask questions or introduce new elements to keep child engrossed in task. Parent may allow child to use an object inappropriately without attempting to demonstrate its proper use (i.e., allows child to mouth ball w/out teaching him/her to roll it).
- 1.5 Parent makes few attempts to help child be productive. Parent may demonstrate an object's use a few times, but is not persistent in the demonstration. Parent does not monitor the interaction closely or look for ways to build upon it.
- 2 Parent may show child how to roll ball, then watches as he/she mouths it and partially corrects child/shows child how to be more functional with ball. Parent asks a few questions about activity to expand the interaction.
- 2.5 Parent frequently looks for ways to help child expand the interaction and asks questions about play. Or, parent frequently assists the child in using objects correctly.
- 3 Parent expands interaction by introducing new elements into play/ activity (i.e., parent may have doll catch ball, may show child how to stack blocks according to color, etc.) and gives child the support he/she needs to be successful in interactions with objects (physical, verbal, gestural prompts or physical assistance). Parent may consistently ask questions that keep the child engaged and monitors the quality of the interaction.

Directiveness: Measures degree to which parent gives commands and/or directs child's immediate attention.

- 1 Parent does not allow time for child to respond to request before repeating request and makes constant commands (i.e., "Do this," "Look at this," "Come here," etc.). Parent may redirect child's interest or focus. Parent may direct behavior through gestures, repetitive commands, & physical prompting.
- 1.5 Parent frequently gives the child commands and only briefly waits for the child's response.
- 2 Parent somewhat tries to direct child's attention through prompts and offers a little time before demanding that the child comply with request.
- 2.5 Parent uses commands infrequently and may find alternate ways to redirect child's attention. Parent follows child's lead and interest and only occasionally repeats prompts and demand's the child's immediate attention.
- 3 Parent is able to follow child's lead throughout and only refocuses attention when he/she become distracted. Parent directs attention to a different topic only when focus of attention is not productive. Parent allows child adequate time to comply with request.

Contingency: Measures frequency and intensity of the parent's reactions to child's initiation with actions or objects.

- 1 Parent ignores child's requests, behavior, body language, etc. Parent does not follow child's initiation and does not reciprocate interaction with child.
- 1.5 Parent's responses to child are restricted and he/she may often ignore child's behaviors.
- 2 Parent responds appropriately to child's initiations, but is neither enthusiastic nor apathetic about his/her initiations.
- 2.5 Parent is mostly attentive to child and is generally positive toward his/her initiations.
- 3 Parent fully attends to child's body language, requests, and/or behavior. Parent responds to child's initiations with enthusiasm. Parent follows child's lead in initiations.

Initiation: Measures degree to which parent begins interaction with child.

- 1 Parent makes no attempt to interact with child.
- 1.5 Parent is passive but makes a partial attempt to begin an interaction.
- 2 Parent takes some initiative to interact with child, and interactions are neutral.
- 2.5 Parent makes several attempts to begin interactions with child.
- 3 Parent is persistent in attempting to begin interactions with child. Even if child does not respond, parent will continue to initiate. Parent interacts positively with child.

Level of Movement/Participation: Measures degree to which parent stays on the child's physical level.

- 1 Parent does not move with child. Parent may remain standing while child sits and parent does not transition with child. Parent does not take part in child's activities.
- 1.5 Parent may occasionally move with child and get on his/her physical level. Parent may participate somewhat.
- 2 Parent is somewhat interactive with child and sometimes sits beside them or follows them to another activity.
- 2.5 Parent generally sits on child's level and/or follows child to new activity. Participation is frequently observed.
- 3 Parent sits on the floor with the child and constantly readjusts position as the child transitions to a new activity.

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