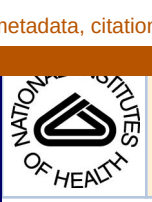

Published in final edited form as:

J Autism Dev Disord. 2012 October ; 42(10): 2152–2161. doi:10.1007/s10803-012-1467-2.

Play and Joint Attention of Children with Autism in the Preschool Special Education Classroom

Connie Wong and

Frank Porter Graham Child Development Institute, CB8040, University of North Carolina at Chapel Hill, Chapel Hill, NC 27510, USA

Psychological Studies in Education, University of California, Los Angeles, CA, USA

Connie Kasari

Semel Institute for Neuroscience and Human Behavior, University of California, Los Angeles, CA, USA

Connie Wong: connie.wong@unc.edu

Abstract

The purpose of this study was to examine play and joint attention in children with autism (n=27) as compared to children with other developmental delays (n=28) in public preschool special education classrooms. The participants were observed in their classroom environment for 2 h over 3 separate days. Results show that children with autism spent more of their time unengaged and less time engaged in symbolic play and joint attention behaviors as compared to children with other developmental delays. Additionally, teachers seldom focused directly on symbolic play and joint attention in their teaching. These findings suggest the importance of educating teachers to target play and joint attention skills in their preschool special education classes, specifically for children with autism.

Keywords

Autism; Play; Joint attention; Engagement; Preschool special education

Introduction

Young children with autism have significant social-communication delays in symbolic play and joint attention. Specific deficits in these areas distinguish children with autism from typically developing children as well as from children with intellectual disabilities (Mundy et al. 1986). Furthermore, both symbolic play and joint attention are significantly associated with later social (Sigman and Ruskin 1999), cognitive (Mundy et al. 2010; Stanley and Konstantareas 2007) and communication development (Charman et al. 2003; Kasari et al. 2008; Loveland and Landry 1986; Mundy and Markus 1997; Mundy et al. 1986, 1990; Sigman and Ruskin 1999).

Correspondence to: Connie Wong, connie.wong@unc.edu.

In symbolic play, children progress developmentally from playing with toys functionally, such as in constructive and manipulative play, to playing with toys symbolically (Lifter et al. 1993). However, in comparison to typically developing children, children with autism at the same mental ages have significant delays in the development of symbolic play (Jarrold et al. 1993; Baron-Cohen 1987). Children with autism tend to manipulate toys or objects in a rigid or stereotyped manner (Atlas 1990) and less often spontaneously initiate creative symbolic play activities (Jarrold et al. 1993; Libby et al. 1998). Beyond these delays in play skills, children with autism are often object focused with less frequent engagement of others into their play activities (Kasari et al. 2010).

Joint attention, the ability to shift attention between another person and an object or event, has a communicative function in that these skills are used for the purpose of sharing attention or interest with another person (Hobson 1989). Compared to MA-matched children with and without intellectual disabilities, children with autism have specific deficits in initiating and responding to joint attention (Mundy et al. 1986). They are more likely to use pointing and attention skills to regulate others' behaviors rather than to share interest (Mundy et al.).

The observed differences in play and joint attention skills for children with autism are well documented, and recent efforts to teach these skills have yielded positive results (Jones et al. 2006; Lang et al. 2009; Martins and Harris 2006; Stahmer 1995; Whalen and Schreibman 2003). There are few randomized controlled trials (RCTs) in which joint attention and play skills have been examined as outcomes of the intervention although the intervention may have focused on these core areas of development (Dawson et al. 2010; Green et al. 2010; Landa et al. 2011). However, Kasari et al. (2006) showed that not only were children with autism able to spontaneously generate symbolic play activities and initiate joint attention with others as a result of their focused RCT intervention, they also had better language outcomes 1 year later (Kasari et al. 2008).

Obtaining change is critical on these areas of core deficit for young children with autism since improvement is linked to better developmental outcomes. However, research studies have most often been conducted in laboratory settings using skilled therapists to teach children. While some recent studies demonstrate that parents can be effective in improving play and joint attention outcomes (Kasari et al. 2010; Rocha et al. 2007; Schertz and Odom 2007), children spend considerable time in preschool settings with teachers.

It is not clear the extent to which teachers focus on these core impairments for children with autism, even in classrooms that are autism-specific. For example, Sigman and Ruskin (1999) reported that children with autism initiated and participated in fewer social interactions with peers than children with Down syndrome and children with other developmental disabilities and tended to play in isolation. Holmes and Willoughby (2005) also observed mostly solitary or parallel functional play behaviors in seventeen 4- to 8-year old children with autism in the classroom. Additionally, Keen et al. (2002) reported that in their study of eight children with autism, the children mostly requested objects or protested; there were few instances of commenting. Further, teachers infrequently acknowledged children's communicative attempts (Keen et al. 2005).

The lack of focus given to symbolic play and joint attention may be due to teachers' lack of knowledge regarding the importance of these skills. Although recent reports identifying evidence-based practices for children with autism include research support for the use of interventions that focus on play and joint attention (National Research Council 2001; National Standards Project 2009; Stansberry-Brusnahan and Collet-Klingenberg 2010), teachers often have limited time and support to access research findings (Closs and Lewin 1998). Furthermore, there is limited research on classroom-based methods (Brunner and Seung 2009). While Stahmer and Aarons (2009) found that autism early intervention providers generally reported favorable attitudes towards using evidence-based practices, little is known regarding their actual use of those strategies in practice. Finally, there is a lack of emphasis on developing symbolic play and joint attention in early childhood curricula. In a content analysis of commonly adopted curricula for young children with autism, few contained symbolic play skills in an appropriate developmental sequence and fewer curriculum guides provided instruction for teaching joint attention skills. When joint attention skills were mentioned, they were often in the context of other goals such as pointing to show receptive understanding rather than for sharing interest (Wong and Kasari 2003).

Given the limited research in classrooms and with teachers, the objective of this study was to build upon the existing research focused on play and joint attention in children with autism by examining those behaviors in the preschool classroom setting as well as focusing on teachers' facilitation of play and joint attention. Specifically, we asked (1) To what extent do children with autism initiate play and joint attention across different types of settings in the natural classroom environment? (2) What opportunities do teachers provide for encouraging and/or developing symbolic play and joint attention behaviors? (3) How do teachers respond to children's initiations of symbolic play and joint attention in the classroom?

Methods

Participants

Recruited from a public early childhood learning center in a suburban school district, participants included 55 pre-schoolers analyzed in two groups: children with autism (n = 27) and a mixed group of children with other disabilities (n = 28). Children with autism all had a clinical diagnosis of autism from a licensed psychologist or neurologist. Though the majority of children in the mixed group of other disabilities had speech/language delays, other diagnoses included Down syndrome, cerebral palsy, ADHD, and emotional/behavioral disorder.

Participating children ranged in age from 3 to 5 years old with mental-age scores between 18.5 and 59 months as calculated from the Mullen Scales of Early Learning (Mullen 1995). The preschoolers were primarily boys, with the proportion of males to females being higher in the autism group, reflective of the gender ratio in autism. Table 1 shows further demographic information. There were no significant differences between the two groups.

The eleven participating classrooms had between six and fourteen children taught by a certificated teacher and two to four instructional assistants. All eleven teachers were female and had between one and 32 years of experience teaching preschool special education. Table 2 provides further detailed background information. Nine of the participating classrooms were self-contained non-categorical classrooms and two were autism-specific; however, not all children in the autism-specific classrooms had a diagnosis of autism. Regardless of class designation and child diagnoses, the teachers all reported that classroom practices were guided primarily by the school-designed curriculum which was based off of state preschool standards and supplemented by the Carolina Curriculum for Preschoolers with Special Needs (Johnson Martin et al. 2004).

Measures

Classroom Observation—Children were observed in their classroom on three separate mornings within a two-week period. Researchers blind to children's diagnosis continuously recorded the presence of specific child behaviors and teacher behaviors towards the target child in 5-min intervals for a total of approximately 2 h (M = 123.57, SD = 13.77 min) observation time per child. Data was collected on a Palm V using Elan 2.0.1 (Sanders 2002), a shareware application designed for behavioral data collection in educational settings. It is a date and time-stamp recording application in which templates can be created to record specific variables of interest as well as anecdotal notes. When observed, all participants had been in their classrooms for at least 3 months.

Table 3 describes the different play and joint attention behaviors that were coded. In order to maintain higher levels of interrater reliability, initiating joint attention required the child to go beyond a coordinated joint look (shifting gaze back and forth between an object/event and another person) to also display a clear gesture of sharing interest such as a show or a point. Thus, only higher level joint attention skills were coded (Van Hecke et al. 2007). Teacher behaviors were coded when they directly provided any instruction in or prompts for play and joint attention as well as if they responded to those behaviors. Researchers recorded anecdotal notes to provide examples of the behaviors. The average intraclass correlation coefficient established between two independent coders was .86, with a range of .81–.92 for the child and teacher play and joint attention behaviors. Researchers also tracked children's engagement states (Adamson et al. 2004; Bakeman and Adamson 1984) to calculate the percentage of time children spent in each state. Intraclass correlation coefficients for percent time in the different engagement states ranged from .86 to .95.

Finally, the child's activities in the classroom were recorded as unstructured (e.g., free play, recess), structured (e.g., circle, centers), or caregiving (e.g., toileting, snack). Overall, children spent 56% of the time in structured activities (M = 68.82, SD = 19.50 min), 32% in unstructured activities (M = 39.45, SD = 11.91 min), and 12% in caregiving activities (M = 14.78, SD = 9.07 min). For ease of interpretation, data was transformed so that the variables of interest were divided by the total time in the activity. There were no significant differences in activity times between the two groups of children.

Structured Play Assessment (SPA; Ungerer and Sigman 1981)—The frequency, type, and level of spontaneous play behaviors were coded from this videotaped 15-min interaction to determine highest play level mastery. While the child and tester sat facing each other at a table, the tester presented four groups of related toys including a tea set, baby bottle, dolls, telephone, brush, mirror, doll furniture, tissue, blocks, dump truck, and a garage.

To master a play level, the child had to spontaneously initiate three play acts at a specific level of three different types. For example, to reach mastery at the substitution level, the child displayed a substitution with three different objects (e.g., block as a cookie, paper as a blanket, and toy bed as an airplane). Thus, for each child, we determined the highest mastered level of play they demonstrated on the assessment (not just the highest level of play shown).

Early Social-Communication Scales (ESCS; Mundy et al. 1986)—The child's nonverbal initiations and responses to joint attention were scored from this videotaped 15-min semi-structured assessment. The child and tester sat across from each other with a set of toys to the side that were visible but beyond reaching distance of the child. The tester, who was trained to elicit different responses, presented the different toys one at a time.

From the assessment, the child's mastery of responding to and initiating joint attention was determined. To reach mastery criteria of a specific skill, the child must have demonstrated an act with at least two different objects on the ESCS. In determining skill mastery for joint attention initiations, only acts associated with eye contact were considered intentional. We used these criteria to determine what the child could demonstrate in joint attention at a minimum "mastered" level across the assessment.

Mullen Scales of Early Learning (MSEL; Mullen 1995)—The MSEL assesses language, motor, and perceptual abilities for children birth to about 5 years old. The visual reception, fine motor, expressive language, and receptive language subscales were used to calculate mental age. Furthermore, the language subscales were used to report receptive and expressive language age scores.

Demographic Information—The parents/guardians completed a demographic form to obtain the child's chronological age, gender, ethnicity, and the parents' highest level of education.

Teacher Survey—Teachers completed a questionnaire to collect teachers' demographic information (age, gender, ethnicity, highest level of education, and years of related teaching experience) as well as general classroom information (number of students in the classroom and the number of adults in the classroom).

Procedure

After obtaining informed parental consent to participate, all assessments and observations were collected within 1 month for each child. Demographic forms and teacher surveys were distributed, completed, and collected within this same time frame.

Results

Primary analyses were conducted using ANCOVAs to compare dependent variables of engagement, play, and joint attention behaviors of children and teachers between the autism and mixed disability groups and to explore if there were differences across activities. Since Wong et al. (2007) found that children with autism who had higher mental age scores had higher rates of learning symbolic play and joint attention skills when taught those skills, the model included mental age as a covariate. Table 4 shows the means and standard deviations of those behaviors in the two groups and across activities.

Multilevel analyses were run using HLM 6.02 (Raudenbush et al. 2005) for dependent variables of play and joint attention. While classroom differences were found, the variance was primarily explained by individual child-level variables rather than by classroom or teacher characteristics; therefore, the following analyses were conducted at the child level.

Engagement States

Children with autism spent more time in an unengaged state than children in the mixed disability group ($F = 23.81$, $p < .001$), with significantly more time spent unengaged during caregiving activities than in any of the other activities ($F = 6.01$, $p < .05$). Children with autism were observed to be mostly eating/drinking or waiting in a passive manner while children in the mixed disability group were more likely to engage themselves by watching, playing with something, or engaging another person.

Compared to children with other disabilities, children with autism spent a higher percentage of time being object-engaged in structured than in unstructured activities ($F = 5.31$, $p < .05$). Regardless of activity, children with autism spent a significantly lower percentage of time in person engagement than children in the mixed disability group ($F = 14.32$, $p < .001$).

The percentage of time spent in each of the engagement states was further examined for its relation to each of the main play and joint attention variables of interest. Table 5 shows a summary of the regression analyses.

Play

Most functional play occurred during unstructured activities ($F = 19.68$, $p < .001$). However, compared to children in the mixed disability group, while children with autism initiated fewer functional play acts in unstructured settings, they displayed more functional play in structured activities ($F = 8.64$, $p < .01$).

For symbolic play, no significant differences were found between children with autism and children with other disabilities. Although symbolic play acts were observed more frequently in unstructured settings ($F = 14.51$, $p < .001$), those behaviors were present at relatively low levels overall. During structured activities, play was not the primary objective. In fact, anecdotal notes reflected that creativity was often stifled in favor of adhering to the goals of the activity. For example, one of the teachers redirected a child to finish completing her puzzle when she started moving the animal puzzle pieces as if they were walking and making corresponding animal sounds.

Overall, children displayed more functional than symbolic play acts in the classroom ($t = 12.80$, $p < .001$). Of the total play acts displayed in the classroom, approximately 94% were at the functional play level while only about 6% were at the symbolic level. Furthermore, while only 28 of the children displayed one or more play initiations at the symbolic or dramatic level during the classroom observations, 45 of the participants demonstrated mastery criteria for playing at those levels during the Structured Play Assessment.

Teachers did target more functional than symbolic play skills with the children ($t = 2.36$, $p < .05$). In examining teachers' teaching of functional play skills, a main effect of activity type was found ($F = 9.62$, $p < .01$) but no main effect was found for the disability group. These results are qualified by a significant interaction of group and activity ($F = 8.08$, $p < .01$). For children in the mixed disability group, teachers targeted functional play more in unstructured activities than in structured activities. The pattern for children with autism was the opposite, with more teacher focus on functional play in structured settings and almost none in unstructured activities. No significant effects were found in teaching symbolic play.

An analysis on teachers' responses to children's play acts, functional and symbolic, revealed that teachers responded at higher proportions during structured activities than in any unstructured and caregiving activities ($F = 5.17$, $p < .05$).

Joint Attention

Although there were no significant differences in the frequency of bids for joint attention between the two groups in the classroom, children with autism responded to fewer bids than children in the mixed disability group ($F = 17.40$, $p < .001$). While children with autism only responded to 58.31% of opportunities, children in the mixed disability group responded 74.94% of the time.

Teachers did initiate more joint attention acts towards children during structured activities than in the other activities ($F = 5.50$, $p < .05$). However, the occurrence of teachers instructing children to respond to their bids for joint attention was very low. When teachers did teach children to respond, they were mostly telling children to "look" when they showed or pointed to something. Moreover, teachers seldom responded to or praised children for attending to their requests for joint attention.

Consistent with results from the ESCS, children with autism initiated fewer joint attention skills than children in the mixed disability group ($F = 10.92$, $p < .01$) across all activity types in the classroom. Furthermore, teachers taught children to initiate joint attention acts at low frequencies. Anecdotal notes suggest that when teachers did teach children to initiate joint attention acts, it was usually in the context of teaching other academic or language skills. For instance, teachers would physically help shape a child's hand into a point for them to identify the correct answer to their question. In such a case, the correct answer would usually be an object or picture and the goal was often to test comprehension (e.g., labeling, color/shape/letter identification). No significant differences were found between the teachers' treatment of children with autism and children in the mixed disability group.

In an examination of teachers' responses to children's initiations of joint attention, no significant effects were found. However, while teachers would respond by looking towards what the child wanted to share, they rarely recognized and reinforced shows and points as joint attention behaviors.

Discussion

The results of this study confirm that children with autism showed fewer play and joint attention behaviors than children with other disabilities in their classrooms as would be predicted by previous assessment studies (e.g., Mundy et al. 1986). Teachers in the classroom provided minimal teaching of play and joint attention and responded to those behaviors at low levels in the classroom setting. Of particular note is that teachers did not adjust their teaching to address these developmental domains and teacher and classroom variables were not associated with teacher performance.

Engagement

Most striking, the results indicated that children with autism spent 37% of the observed time in an unengaged state, where, by definition, they were not purposefully attending to or interacting with objects or other people. Indeed, the results of this study show that the greater percentage of time spent in an unengaged state, the less likely children displayed play and joint attention skills. Children with autism likely have more difficulty sustaining attention to some of the activities in the classroom than children with other developmental delays, and probably require adult facilitation.

Furthermore, children with autism also have increased difficulty in initiating engagement with other people. Although all children spent fairly equivalent amounts of time engaged with objects, children with other disabilities were more likely to initiate engagement with other people, either teachers or other peers in the classroom. Conversely, children with autism were more likely to slip from object-engaged states to states of unengagement. Thus, children with autism need greater environmental arrangements to successfully engage with others in the classroom.

Play

Although capable of playing at symbolic levels, children primarily played at functional levels of play. Developmentally, it may be simpler for children to engage in functional play than putting forth the effort to create more complex, symbolic play. Additionally, some of the functional play toys may be more attractive as battery-powered sound effects and lights increasingly accompany them. Due to the lack of symbolic play displayed during the classroom observations, there was not enough power to detect differences in symbolic play between the two groups of children.

Teachers rarely facilitated the play of children in the classroom. When they did, the focus was on functional play despite the child's mastered play level. However, it was difficult to determine whether teachers' responses to children's play had any effect because they responded at such low levels. During unstructured times, teachers allowed children to engage in play activities independently with minimal feedback. In structured settings, when

teachers did respond, it was often negative because play at that time usually meant that the children were not completing their assigned task. Teachers often discouraged playing creatively for the sake of maintaining classroom order and completing the objectives of the activity. Regardless, in general, teachers did not recognize or support children's play during structured or unstructured periods.

Joint Attention

Consistent with the literature, children with autism responded to and initiated fewer bids for joint attention in both the classroom and assessment setting when compared to children with other disabilities (Mundy et al. 1986). The finding remained significant even when considering the children's developmental levels and their classroom environments.

Teachers presented more opportunities for children, with or without autism, to respond to their joint attention acts in structured rather than unstructured activities. As expected, in circle or at centers, teachers would use more showing and pointing to teach children than in unstructured and caregiving settings. Although teachers provided opportunities for children to respond, they generally did not provide specific instruction about responding and initiating to increase their joint attention abilities.

While teachers did respond naturally to children's initiation of joint attention skills, they rarely responded to them with the intent of reinforcing those behaviors. Nor were teachers attempting to specifically teach nonverbal or verbal joint attention skills.

Implications

The findings from this study highlight several factors that need to be considered in translating research on play and joint attention to practice for children with autism. First, children with autism are spending a significant amount of time unengaged in the classroom. Without decreasing the percentage of unengagement, it would be difficult to intervene on and increase children's symbolic play and joint attention behaviors.

Second, as teachers were not recognizing symbolic play and joint attention acts, it may be that these skills should be treated as separate skill domains to be specifically taught and reinforced, especially for children with autism. One of the issues for teachers is the lack of available resources on play and joint attention (Wong and Kasari 2003). Early childhood curriculum guides need to be more explicit in describing these domain areas.

Another issue for teachers is that in typical preschools, the goal is to foster independence and thus, teachers take the role of a facilitator by setting up stimulating environments and providing functional assistance like obtaining materials and problem solving (Fleming et al. 1991). However, children with autism may need more social assistance, requiring additional guidance and structure to engage with others. While children with other disabilities may naturally engage and interact with other people, children with autism may have too much independence in that they are not seeking out others in the classroom. Therefore, teachers may need greater support in learning about evidence-based practices targeting play and joint attention for young children with autism in the classroom.

These data are among the first to examine play and joint attention skills in a classroom setting for children with autism. However, a limitation of this research was that these data were gathered from one school district in a fairly homogeneous area with respect to ethnicity and socioeconomic status. Data collected in a more diverse area with teachers using different curricular models may be useful in determining if these results can be generalized to other children and classrooms. Regardless, teacher training and future research practice should focus more on symbolic play and joint attention in the school setting because of the importance of these skills on later language and social development.

Acknowledgments

The authors thank the children, families, and teachers who participated in this study and the research assistants who helped gather and code these data: Eric Ishijima, Kimberly Ochs, and Alisha Patel. This article is based on a doctoral dissertation submitted by the first author, under supervision of the second author, at the University of California, Los Angeles. This research was supported in part by a training grant from the National Institutes of Health, NIMH grant MH064927(Connie Kasari), and Autism Speaks grant 2373 (Connie Wong).

References

Adamson LB, Bakeman R, Deckner DF. The development of symbol-infused joint engagement. Child Development. 2004; 75:1171–1187. [PubMed: 15260871]

Atlas JA. Play in assessment and intervention in the childhood psychoses. Child Psychiatry and Human Development. 1990; 21:119–133. [PubMed: 2249494]

Bakeman R, Adamson LB. Coordinating attention to people and objects in mother-infant and peer-infant interaction. Child Development. 1984; 55:1278–1289. [PubMed: 6488956]

Baron-Cohen S. Autism and symbolic play. British Journal of Developmental Psychology. 1987; 5:129–148.

Brunner DL, Seung H. Evaluation of the efficacy of communication-based treatments for autism spectrum disorders: a literature review. Communication Disorders Quarterly. 2009; 31:15–40.

Charman T, Baron-Cohen S, Sweetenham J, Baird G, Drew A, Cox A. Predicting language outcome in infants with autism and pervasive developmental disorder. International Journal of Language & Communication Disorders. 2003; 38:265–285. [PubMed: 12851079]

Closs S, Lewin B. Perceived barriers to research utilization: A survey of four therapies. International Journal of Therapy and Rehabilitation. 1998; 5:151–155.

Dawson G, Rogers SJ, Munson J, Smith M, Winter J, Greenson J, et al. Randomized, controlled trial of an intervention for toddlers with autism: The Early Start Denver Model. Pediatrics. 2010; 125:e17–23. [PubMed: 19948568]

Fleming LA, Wolery M, Weinzierl C, Venn ML, Shroeder C. Model for assessing and adapting teachers' roles in mainstreamed preschool settings. Topics in Early Childhood Special Education. 1991; 11:85–98.

Green J, Charman T, McConachie H, Aldred C, Slonims V, Howlin P, et al. Parent-mediated communication-focused treatment in children with autism (PACT): A randomized controlled trial. The Lancet. 2010; 375:2152–2160.

Hobson, RP. Beyond cognition: A theory of autism. In: Dawson, G., editor. Autism: Nature, diagnosis, and treatment. New York, NY: Guilford Press; 1989. p. 22-48.

Holmes E, Willoughby T. Play behaviour of children with autism spectrum disorders. Journal of Intellectual and Developmental Disability. 2005; 30:156–164.

Jarrold C, Boucher J, Smith P. Symbolic play in autism: A review. Journal of Autism and Developmental Disorders. 1993; 23:281–307. [PubMed: 7687245]

Johnson Martin, NM.; Hacker, B.; Attermeier, SM. Carolina curriculum for preschoolers with special needs. 2. Baltimore, MD: Paul H. Brookes Publishing Co., Inc; 2004.

Jones EA, Carr EG, Feeley KM. Multiple effects of joint attention intervention for children with autism. Behavior Modification. 2006; 30:782–834. [PubMed: 17050765]

Kasari C, Freeman SF, Paparella T. Joint attention and symbolic play in young children with autism: A randomized controlled intervention study. Journal of Child Psychology and Psychiatry. 2006; 47:611–620. [PubMed: 16712638]

Kasari C, Gulsrud A, Wong C, Kwon S, Locke J. Randomized controlled caregiver mediated joint engagement intervention for toddlers with autism. Journal of Autism and Developmental Disorders. 2010; 40:1045–1056. [PubMed: 20145986]

Kasari C, Paparella T, Freeman SF, Jahromi LB. Language outcome in autism: Randomized comparison of joint attention and play interventions. Journal of Consulting and Clinical Psychology. 2008; 76:125–137. [PubMed: 18229990]

Keen D, Sigafoos J, Woodyatt G. Teacher responses to the communicative attempts of children with autism. Journal of Developmental and Physical Disabilities. 2005; 17:19–33.

Keen D, Woodyatt G, Sigafoos J. Verifying teacher perceptions of the potential communicative acts of children with autism. Communication Disorders Quarterly. 2002; 23:133–142.

Landa RJ, Holman KC, O'Neill AH, Stuart EA. Intervention targeting development of socially synchronous engagement in toddlers with autism spectrum disorders: A randomized controlled trial. Journal of Child Psychology and Psychiatry. 2011; 52:13–21. [PubMed: 21126245]

Lang R, O'Reilly M, Rispoli M, Shogren K, Machalicek W, Sigafoos J, et al. Review of interventions to increase functional and symbolic play in children with autism. Education and Training in Developmental Disabilities. 2009; 44:481–492.

Libby S, Powell S, Messer D, Jordan R. Spontaneous play in children with autism: A reappraisal. Journal of Autism and Developmental Disorders. 1998; 28:487–497. [PubMed: 9932235]

Lifter K, Sulzer-Azaroff B, Anderson S, Cowdery GE. Teaching play activities to preschool children with disabilities: The importance of developmental considerations. Journal of Early Intervention. 1993; 17:139–159.

Loveland KA, Landry SH. Joint attention and language in autism and developmental language delay. Journal of Autism and Developmental Disorders. 1986; 16:335–349. [PubMed: 3558291]

Martins MP, Harris SL. Teaching children with autism to respond to joint attention initiations. Child & Family Behavior Therapy. 2006; 28:51–68.

Mullen, EM. Mullen scales of early leaning. Minnesota: American Guidance Service; 1995.

Mundy P, Gwaltney M, Henderson H. Self-referenced processing, neurodevelopment and joint attention in autism. Autism. 2010; 14:408–429. [PubMed: 20926457]

Mundy P, Markus J. On the nature of communication and language impairment in autism. Mental Retardation & Developmental Disabilities Research Reviews. 1997; 3:343–349.

Mundy P, Sigman M, Kasari C. A longitudinal study of joint attention and language development in autistic children. Journal of Autism and Developmental Disorders. 1990; 20:115–128. [PubMed: 2324051]

Mundy P, Sigman MD, Ungerer J, Sherman T. Defining the social deficits of autism: The contribution of non-verbal communication measures. Journal of Child Psychology & Psychiatry & Allied Disciplines. 1986; 27

National Research Council. Educating children with autism. Committee on educational interventions for children with autism. In: Lord, C.; McGee, J., editors. Division of behavioral and social sciences and education. Washington, DC: National Academy Press; 2001.

National Standards Project. Findings and conclusions: Addressing the need for evidence-based practice guidelines for autism spectrum disorders. Randolph, MA: National Autism Center; 2009.

Raudenbush, S.; Bryk, T.; Congdon, R. Hierarchical linear and nonlinear modeling, 6.02. Scientific Software International, Inc; 2005.

Rocha ML, Schreibman L, Stahmer AC. Effectiveness of training parents to teach joint attention in children with autism. Journal of Early Intervention. 2007; 29:154–172.

Sanders, D. Elan v.2.0.1. 2002. http://palmsource.palmgear.com/index.cfm?fuseaction=software.showsoftware&prodid=43494

Schertz HH, Odom S. Promoting joint attention in toddlers with autism: A parent-mediated developmental model. Journal of Autism and Developmental Disorders. 2007; 37:1562–1575. [PubMed: 17096190]

Sigman M, Ruskin E. Continuity and change in the social competence of children with autism, down syndrome, and developmental delays. Monographs of the Society for Research in Child Development. 1999; 64

Stahmer AC. Teaching symbolic play skills to children with autism using pivotal response training. Journal of Autism and Developmental Disorders. 1995; 25:123–141. [PubMed: 7559281]

Stahmer AC, Aarons GA. Attitudes toward adoption of evidence-based practices: A comparison of autism early intervention providers and children's mental health providers. Psychological Services. 2009; 6:223–234. [PubMed: 21796262]

Stanley GC, Konstantareas MM. Symbolic play in children with autism spectrum disorder. Journal of Autism and Developmental Disorders. 2007; 37:1215–1223. [PubMed: 17082977]

Stansberry-Brusnahan LL, Collet-Klingenberg LL. Evidence-based practices for young children with autism spectrum disorders: Guidelines and recommendations from the National Resource Council and National Professional Development Center on Autism Spectrum Disorders. International Journal of Early Childhood Special Education. 2010; 2:45–56.

Ungerer JA, Sigman M. Symbolic play and language comprehension in autistic children. American Academy of Child Psychiatry. 1981; 20:318–337.

Van Hecke AV, Mundy PC, Acra CF, Block JJ, Delgado CED, Parlade MV, et al. Infant joint attention, temperament, and social competence in preschool children. Child Development. 2007; 78:53–69. [PubMed: 17328693]

Whalen C, Schreibman L. Joint attention training for children with autism using behavior modification procedures. Journal of Child Psychology and Psychiatry and Allied Disciplines. 2003; 44:456–468.

Wong, CS.; Kasari, CL. Analysis of early childhood curricula for joint attention and symbolic play skills. Presented at the 19th annual DEC conference on young children with special needs and their families; Washington, DC. 2003.

Wong CS, Kasari C, Freeman S, Paparella T. The acquisition and generalization of joint attention and symbolic play skills in young children with autism. Research & Practice for Persons with Severe Disabilities. 2007; 32:101–109.

Table 1

Child demographics

	Autism (n = 27) M (SD)/frequency (%)	Mixed disability (n = 28) M (SD)/frequency (%)	X^2/F
Chronological age (months)	51.70 (6.74)	49.76 (5.89)	F(1,53) = .06, p = .80
Gender			
Male	22 (82%)	18 (64%)	$X^2(1) = 2.05$, p = .15
Female	5 (18%)	10 (36%)	
Ethnicity			
Caucasian	13 (48%)	13(46%)	$X^2(3) = .33$, p = .95
Hispanic	3 (11%)	4 (14%)	
Asian American	8 (30%)	7 (25%)	
Other	3 (11%)	4 (14%)	
Mullen scales of early learning			
Mental age (months)	42.14 (9.19)	39.24 (9.42)	F(1,52) = .16, p = .70
Receptive language age (months)	41.81 (9.77)	38.20 (10.42)	F(1,52) = .27, p = .61
Expressive language age (months)	37.67 (10.70)	35.09 (9.26)	F(1,52) = .12, p = .74
Mother's highest level of education			
High School	1 (4%)	1 (4%)	$X^2(2) = .67$, p = .72
Some College/Vocational Training	2 (7%)	4 (14%)	
College/Professional/Graduate	24 (89%)	23 (82%)	

Table 2

Teacher/classroom demographics

	Teachers/classrooms (N = 11) M (SD)/frequency (%)
Teacher age (years)	49.89 (6.33)
Teacher ethnicity	
Caucasian	9 (82%)
Hispanic	1 (9%)
Asian American	1 (9%)
Years of teaching	
In current position	8.20 (7.94)
Total in similar position	16.30 (12.13)
Class age designation	
3- to 4-year olds	5 (46%)
4- to 5-year olds	6 (54%)
Class type	
Non-categorical self-contained class	9 (82%)
Autism specific self-contained class	2 (18%)
Class size	
# of child study participants in the class	5.00 (2.45)
Total # of children in the class	10.27 (2.32)
Total # of adults assigned to the class	3.45 (.69)
Ratio of children to instructors	3.06 (.84)

Table 3

Behaviors coded in the classroom observation

Behavior	Definition
Engagement states	(adapted from Adamson et al. 2004)
Unengaged	The child appears uninvolved with any specific person or object
Person-engaged	The child is engaged in an interaction with another person
Object-engaged	The child is solely focused on an object. The child is not communicating with another person in any way
Supported joint	The child and another person are actively involved in the same object or toy, but the joint engagement is actively maintained by the other person.
Coordinated joint	The child initiates or is actively involved with and coordinates attention to both another person and the object to share attention
Play	(adapted from Lifter et al. 1993; Ungerer and Sigman 1981)
Child functional play	The child creates combinations of objects and/or may extend familiar actions with objects in a pretend quality to self, others, or to doll figures
Child symbolic play	The child extends familiar actions to two or more figures or moves the figures as if they are capable of action. The child may use one object to stand in place for another or pretends to use something that is not there. The child may adopt various familiar or fantasy roles in a play theme
Joint attention	(adapted from Mundy et al. 1986)
Child RJA	The child responds (attentional or behavioral) to another's bid (show or point to an object) for joint attention
Child IJA	The child initiates (show or point) a bid for joint attention towards another person for sharing purposes

Table 4

Means and standard deviations of classroom behaviors across activities

	Structured		Unstructured		Caregiving	
	Autism M (SD)	**Mixed disability M (SD)**	**Autism M (SD)**	**Mixed disability M (SD)**	**Autism M (SD)**	**Mixed disability M (SD)**
Engagement states						
% Unengagement	33.13 (13.58)	20.96 (10.92)	37.82 (21.05)	23.66 (13.44)	51.66 (22.52)	33.41 (20.77)
% Person engagement	6.99 (5.42)	11.74 (5.85)	6.93 (5.55)	12.25 (8.92)	2.92 (4.68)	7.01 (10.78)
% Object engagement	20.09 (8.76)	14.44 (7.65)	36.62 (12.79)	40.51 (14.64)	20.34 (17.63)	25.14 (17.72)
% Supported joint engagement	14.67 (5.69)	20.54 (11.96)	6.54 (5.24)	6.88 (4.50)	10.16 (7.88)	12.00 (18.92)
% Coordinated joint engagement	3.29 (3.78)	5.90 (6.25)	5.51 (7.52)	8.48 (10.07)	5.29 (6.53)	9.70 (13.92)
Play						
Frequency of functional play acts	21.27 (17.75)	11.64 (14.84)	47.64 (52.94)	58.24 (44.95)	0	1.29 (5.81)
Frequency of symbolic play acts	.96 (1.98)	.56 (1.79)	3.33 (4.77)	5.47 (8.97)	.22 (1.15)	.27 (1.39)
Frequency of teacher prompts for functional play	1.31 (3.00)	.76 (2.24)	.09 (.36)	2.00 (3.34)	0	0
Frequency of teacher prompts for symbolic play	.29 (.63)	.40 (1.12)	.09 (.36)	1.02 (3.41)	0	0
% of teacher responses to child's play acts	.21 (.56)	.27 (1.00)	.10 (.48)	.25 (1.01)	–	–
Responses to joint attention (RJA)						
Frequency of teacher bids for JA	72.13 (36.61)	71.38 (25.19)	15.53 (13.21)	14.78 (8.84)	22.87 (29.13)	16.84 (12.67)
% of child RJA to bids for JA	62.82 (15.65)	75.22 (12.05)	59.60 (28.52)	69.92 (21.31)	44.55 (34.25)	77.73 (18.92)
Frequency of teacher prompts for RJA	.58 (1.15)	.44 (.81)	.04 (.23)	0	0	0
% of teacher responses to child's RJA	0	.60 (2.13)	0	0	0	0
Initiations of joint attention (IJA)						
Frequency of IJA	17.44 (13.17)	31.02 (20.56)	18.98 (19.34)	31.38 (27.34)	19.40 (22.95)	39.56 (54.90)
Frequency of teacher prompts for IJA	.73 (1.48)	.87 (2.57)	.38 (.94)	0	.11 (.58)	0
% of teacher responses to child's IJA	49.89 (17.39)	43.45 (13.89)	41.38 (24.46)	35.18 (18.94)	41.97 (36.03)	48.71 (26.87)

Frequencies have been calculated as acts per second,

* $p < .05$,

** $p < .01$,

*** $p < .001$

Table 5

Summary of hierarchical regression analyses for unengaged, supported joint, and coordinated joint engagement states (N = 55)

Variable	Unengaged *β*	Object *β*	Person *β*	Supported joint *β*	Coordinated joint *β*
Step 1	$R^2 = .35^{*}$	$R^2 = .03$	$R^2 = .24^{**}$	$R^2 = .14^{*}$	$R^2 = .29^{***}$
Autism diagnosis	$.51^{***}$	.16	$-.48^{***}$	$-.31^{*}$	$-.31^{*}$
Mental age	$-.39^{**}$	−.11	−.08	$.26^{*}$	$.49^{***}$
Step 2	$R^2 = .66^{*}$	$R^2 = .72^{***}$	$R^2 = .61^{**}$	$R^2 = .50^{***}$	$R^2 = .75^{***}$
Autism diagnosis	$.27^{**}$	.02	$-.30^{*}$	−.10	.001
Mental age	−.18	.18	−.25	.03	.17
Functional play	$-.24^{**}$	$.72^{***}$	−.16	.13	−.02
Symbolic play	−.05	−.05	.13	$-.26^{*}$	$.20^{*}$
Response to JA	−.11	−.17	−.16	−.13	.04
Initiations of JA	$-.51^{***}$	$-.29^{*}$	$.32^{*}$	$.68^{***}$	$.69^{***}$

$^{*}p < .05$,

$^{**}p < .01$,

$^{***}p < .001$