Published in final edited form as:

Am J Intellect Dev Disabil. 2019 January ; 124(1): 77–91. doi:10.1352/1944-7558-124.1.77.

Similarities in Functional Play and Differences in Symbolic Play of Children With Autism Spectrum Disorder

Kathy Thiemann-Bourque,

University of Kansas, Juniper Gardens Children's Project

Lynette K. Johnson,

Delta Behavioral Group, PLLC

Nancy C. Brady

University of Kansas, Speech, Language, and Hearing Department.

Abstract

Contradictory reports of play strengths and weaknesses for children with autism spectrum disorders (ASD) persist in the literature. We compared the play of 19 children with ASD to 19 typically developing (TD) children matched on language and cognitive skills. All children were verbal. Results revealed no differences in indiscriminate actions, functional play, and object interest. The children with ASD showed less symbolic play and a significantly fewer number of children met criteria for emerging or mastered symbolic play. A specific deficit was observed for “doll as agent” symbolic play. Outcomes suggest that compared to children without disabilities, children with ASD may have comparable functional play skills and struggle with the transition to some, but not all types of symbolic play.

Keywords

autism spectrum disorder; assessment; functional play; symbolic play

Children with autism spectrum disorder (ASD) have been reported to exhibit deficits in the amount, complexity, and quality of functional and symbolic play (Jarrold, Boucher, & Smith, 1996; Wetherby & Prutting, 1984; Williams, Reddy, & Costall, 2001). Early research on play went as far as proposing a unique play deficit characteristic of children with autism (Sigman & Ruskin, 1999; Ungerer & Sigman, 1981), and recent changes to the DSM-V diagnostic criteria for ASD outlines play differences such as repetitive/stereotyped use of objects, lining up toys, highly restricted interests, and deficits in imaginative play (American Psychiatric Association, 2013). However, some play studies report similarities and no differences in play performance of children with ASD when compared to children without disabilities and children with other developmental disabilities (DD: Dominguez, Ziviani, & Rodger, 2006; Libby, Powell, Messer, & Jordan, 1998; Naber et al., 2008; Thiemann-Bourque, Brady, & Fleming, 2012).

There is consensus of a developmental progression of play in infants and toddlers, moving from basic manipulation of toys for sensory purposes, to functional play or understanding relationships between objects, to symbolic that is more decontextualized. To date, the scope of deficits in functional and symbolic play and across play variables (e.g., object interest or diversity of play) for young children with ASD remains unclear. Researchers have attempted to illuminate discrepant play reports by attending to how play is measured and defined (Barton, 2010; Pierucci, Barber, Gilpin, Crisler, & Klinger, 2015; Thiemann-Bourque et al., 2012). Another challenge in conducting research with children with ASD and comparing skills to typically developing (TD) children is the marked differences in language and cognitive skills. As children's play skills develop, there is reciprocal improvements in other developmental areas, as play is highly correlated with language and cognitive skills (Sigman & Ruskin, 1999; Thiemann-Bourque et al., 2012; Toth, Munson, Meltzoff, & Dawson, 2006). In TD children, the onset of words has been shown to be associated with the emergence of symbolic play (McCune, 1995), and young children with autism with higher language skills have been reported to engage in more symbolic play than those with less developed language (Warreyn, Roeyers, & De Groote, 2005). A lack of language and mental-age matched control groups for comparison has been a common methodological weakness of play research (Jarrold, Boucher, & Smith, 1993). The purpose of this study was to address prior methodological challenges.

Typical Play Development

The first methods to describe the play development of TD children dates back 40 years and focused on a developmental progression and sequence of change from infancy through the preschool years (Belsky & Most, 1981; Lowe, 1975; Nic, 1977). Between the ages of 2 to 12 months, babies engage in *indiscriminate actions* on objects or sensorimotor-exploratory actions, such as mouthing, shaking, or banging toys (Casby, 2003; Lifter, Sulzer-Azaroff, Anderson, & Cow-dery, 1993). This behavior decreases after 10 to 12 months when children begin to explore more than one object at a time and begin to use objects together in *functional play* or object use. Children transition from simple object manipulation to appropriate play with objects based on their function (e.g., stacking blocks; nesting cups; taking objects apart). This type of play then progresses between approximately 12 to 18 months of age when a child begins to demonstrate more conventional uses of objects or associations between objects. For example, she may combine toys together based on their properties (e.g., connect train tracks), direct objects to self (e.g., hold toy phone to ear), then begin to direct actions towards others or to inanimate objects (e.g., brush examiner's hair; feed doll with spoon). These play skills have been described as *functional-combinatorial* (Lifter et al., 1993). Symbolic play typically develops between the ages of 18 to 24 months and occurs when children begin to enact events or actions out of context, with one toy or object representing another (e.g., feeds a doll a piece of sponge; makes an action figure drive a truck). There are different levels of symbolic play skills, such as substituting one object for another, using a doll or inanimate object as an agent of actions, joining sequences of play into multi-scheme actions, or engaging in sociodramatic play and thematic fantasy play. Symbolic play also has been defined based on the objects substituted (e.g., real, substitute, or imaginary objects), the agent involved in the action (e.g., child acts on an object or child

has another agent act as in a doll holding a cup), and single or multiple play schemes (Barton & Pavilanis, 2012; Casby, 2010; Lifter, 2000).

Play Skills of Children With ASD

In one of the earliest play studies, Wing and colleagues (1977) tested their belief of a specific deficit in symbolic play for children with autism between the ages 5 to 14 years. Of the 12 participants with autism, eight showed an absence of symbolic play, and four used repetitive symbolic play acts, and the authors concluded that an absence of symbolic play was related to the presence of autism. It was not clear how symbolic and stereotyped symbolic play skills were defined, and only four of the children with autism were of the mental age when symbolic play would be expected. Further, the groups used for comparison were not matched on mental or chronological age. These methodological issues cast uncertainty of a specific deficit in symbolic play. Research in the 1980s replicated these findings of fewer pretend play acts and weaker symbolic play skills for young children with autism (Wetherby & Prutting, 1984), and extended them by reporting differences in the type of play, such as less pretend play with dolls and shorter play sequences (Ungerer & Sigman, 1981). Interpretation of findings by Ungerer and Sigman are difficult based on inclusion of only 16 children with autism, and comparisons made to observations of *normal children of comparable mental age*, yet no description of this group or how they were assessed was provided and there was no information on expressive language skills of either group.

Later research disputed earlier reports by showing that some children with autism do engage in symbolic play and demonstrate other similarities in play compared to children with other DDs and typically-developing children (Libby et al., 1998; Thiemann-Bourque et al., 2012; Williams et al, 2001). For example, when differences in developmental levels were taken into account, toddlers with autism stayed engaged for a similar amount of time in manipulative, functional, and symbolic play compared to children without autism (Naber et al., 2008). Dominguez et al. (2006) examined the play behaviors of 24 preschoolers with autism relative to 34 TD children matched on chronological age. They stated that the children with autism engaged in significantly more sensorimotor and nonfunctional (relational) play behaviors and demonstrated similar rates of functional and symbolic play acts. However, there were no analyses reported for these latter two play categories and very low rates of symbolic play were observed for both groups (i.e., only in 1% of intervals). In addition, the average communication age for the children with autism was 35 months; no communication age was given for the chronologically age matched comparison group. Jarrold et al. (1993) asserted that little can be inferred regarding specific deficits in symbolic play from studies that only match groups on chronological age, as this fails to take into account marked differences that exist in language and cognitive skills between children with autism and typically developing children.

Williams et al. (2001) attended to the issue of matching and defined subtypes of functional play in an attempt to shed light on previous equivocal play findings. They compared the play of 15 children with autism ($M = 49$ months) to a group of 15 TD infants ($M = 17$ months) matched on general development and to 15 children with Down syndrome ($M = 40$ months). In contrast to earlier research reporting lower rates of functional play (Ungerer & Sigman,

1981), results revealed no significant differences between the groups in total play time engaged in or in the total number of functional play acts. When functional play was separated into simple and elaborated behaviors, they found that the children with autism showed less diverse play (i.e., interest in different objects), spent less time in elaborate play (i.e., with two or more objects), and paired fewer functional acts with vocalizations or gestures. Two strengths of this study were the inclusion of a comparison group of typically developing infants matched on general development and including multiple measures of play that allowed for discovery of both similarities and differences for the children with autism.

Libby and colleagues (1998) were interested in illuminating discrepancies in reports of symbolic play differences for children with autism. They assessed the spontaneous play of nine children with autism ($M = 10$ years), nine TD children ($M = 4$ years) matched on receptive and expressive language skills, and nine children with Down syndrome ($M = 2$ years). Strengths of this study included matching children on language skills, clearer definitions to operationalize symbolic play, and measuring multiple categories of symbolic play. Results revealed that the children with autism displayed a similar number of *object substitutions* (e.g., using a brick as a car), yet significantly fewer acts related to *attribution of false properties* (e.g., pretending a doll is ill) and *reference to absent objects* (e.g., eating imaginary food). Thus the children were able to engage in what would be considered an easier type of symbolic play—substitutions and struggled with what would be considered more advanced levels of symbolic play. Thiemann-Bourque et al. (2012) also reported the presence of symbolic play in 35 preschoolers with ASD compared to 38 children with other DDs. Play was assessed across four play levels and 11 categories adapted from the Developmental Play Assessment (DPA; Lifter, 2000; Lifter et al., 1993). Lifter (2000) stressed the importance of a developmental play assessment, in that it can distinguish between activities that a child knows, may be in the process of learning, or that may be too difficult developmentally at a certain time. Thiemann-Bourque et al. found similarities between the two groups in emergence and mastery of symbolic play and low rates of symbolic play overall. For example, 29% of the children with ASD had skills that were emerging and 9% met criteria for mastery of symbolic play, compared to 26% emerging and 5% mastery for the children with other DDs. The authors stated that the lack of differences may have been due to including participants who were all nonverbal or minimally verbal with a restricted range of language and cognitive abilities. The results did not provide evidence of a specific play deficit for children with autism; however, they need to be interpreted with caution given the lack of a developmentally matched group of TD children (Jarrold et al., 1993).

The main purpose of the present study was to attend to limitations in Thiemann-Bourque et al. (2012) by comparing the play skills of a group of children with ASD to those of a matched group of typically developing children following administration of the same structured play assessment and reporting similar measures. The problem in making such comparisons is that by definition, the delayed social and play skills of children with ASD will likely be confounded with chronological age. The current study sought to address this limitation by matching the children with ASD and TD children based on language and cognitive skills at pretest with a statistical control for chronological age as a possible confound. Nineteen of the original 35 children with ASD participated and had higher

language and cognitive skills; thus were at a developmental level when they would be expected to show symbolic play. With comparable or matched skills, play differences can be interpreted based on what would be expected at specific developmental levels. Such comparisons are important to provide guidance on appropriate targets for intervention. Three research questions were addressed: (1) Do children with ASD demonstrate differences in levels of play and object interest compared to typically developing children with similar language and cognitive skills?, (2) Does social maturity measured by chronological age account for observed differences?, and (3) How do the two groups compare in regard to emerging or mastered functional and symbolic play skills?

Method

Participants

A total of 38 children participated in the study, 19 children with ASD between the ages of 63 and 91 months (mean age = 74 months) and 19 TD children between the ages of 24 and 60 months (mean age = 34 months; see Table 1). These two groups were compared in a design that included multiple dependent measures. The participants with ASD had participated in the original play study by Thiemann-Bourque et al. (2012) and were also part of a larger longitudinal study (Brady, Thiemann-Bourque, Fleming, & Matthews, 2013) and were recruited based on the following: (a) in their final year of preschool or first year of Kindergarten, (b) diagnosis of ASD, (c) vision corrected to 20/80 or better in at least one eye, and (d) hearing levels 25dB HL or better in at least one ear. As part of the larger longitudinal study, all children were administered the Mullen Scales of Early Learning (MSEL; Mullen, 1995) and the Preschool Language Scale-4th Edition (PLS-4; Zimmerman, Steiner, & Pond, 2002) at the first observation point and 2 years later at the last observation period. Children's scores on the MSEL and the PLS-4 from this last observation period were used for the current study (see Table 2). They were selected to participate in the current study if they were still participating in the larger longitudinal study and had standardized test scores that were the closest match to the sample of typically developing participants.

Based on results of the MSEL Expressive Language subtest and the PLS-4 Expressive Communication subtest, all of the children were verbal and 16 (84%) had more than 20 words and were joining words together and 3 (16%) had between 10–20 words. A comparison of group differences in play variables analyzed for the original sample ($n = 35$) and this subsample ($n = 19$) of children with ASD revealed significantly greater object interest (i.e., novel play acts) for the current participants, $M = 30.2$ compared to $M = 19.6$; $F(1, 52) = 14.9, p < .0001$. In addition, there was a higher proportion of children in the current sample who met the criteria for emerging symbolic play ($z = -2.09, p = .045$), and who had mastered functional combinatorial play ($z = -2.75, p = .0009$) and functional play/object use ($z = -6.08; p = .000001$).

As in Thiemann-Bourque et al. (2012), a diagnosis of ASD was confirmed by meeting a minimum of three of the following four criteria: (1) educational or clinical diagnosis of ASD by school district personnel or a credited agency not affiliated with the authors' research lab based on features defined by DSM-IV (APA, 1994), (2) results of the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore, & Risi, 1999) conducted by trained

ADOS staff at a child development clinic affiliated with the host University, (3) results on the Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Rothen Renner, 1993), and (4) a score of 15 or above on the Social Communication Questionnaire (SCQ, Rutter, Bailey, & Lord, 2003).

The 19 TD children were recruited via e-mail, word-of-mouth, and posted fliers. Criteria for participation included (1) minimum chronological age of 2 years, (2) English as primary language, (3) no learning deficits based on parent report, and (4) vision and hearing within normal limits. The second author administered the MSEL and the PLS-4 to all TD children at the time of their enrollment in the home. All parents signed written informed consent, and the 2nd author obtained verbal assent from the TD children.

In the design, children were matched using raw scores on the four subtests of the MSEL and two subtests of the PLS-4 (see Table 2). Raw scores were used as opposed to standard scores due to the limited variability in the sample of children with ASD in standard scores, with most children scoring at or near the bottom of possible standard scores (i.e., 50) for a given age. Paired sample *t* tests were used to test for differences between groups on raw scores across each of these six subtests. Pairs of children were considered matched given no significant difference ($p > .05$) across two to six of MSEL and PLS-4 subtests. Overall, six pairs (32%) matched in all six tests, five pairs (26%) matched in four tests, four pairs (21%) matched in three tests, and four pairs (21%) matched on two tests. Between groups tests indicated no significant differences on any of the six cognitive or language scores at pretest. However, the two groups differed by 40 months in chronological age, $M = 74.3$, $SD = 7.5$ for children with ASD vs. $M = 34.4$, $SD = 10.9$ for TD children, $F(1,36) = 173.45$, $p = .0001$.

Play Assessment

An adapted version of the Developmental Play Assessment (DPA; Lifter, 2000; Lifter et al., 1993) was used to assess children's play for this study. All play procedures mirrored those described in Thiemann-Bourque et al. (2012) and were adapted from Lifter (2000). The full set of procedures included play with toy sets during administrations, video recording of these sessions, coding of child play behaviors, and summarizing codes for dependent play measures.

Toy sets.—Five toy sets were used to assess children's play in unstructured (Set 1) and semistructured (Sets 2–5) activities. We adapted these DPA procedures by including one additional set of toys (5 sets total). Each play set was presented for 3 min before the next set was laid out, for a total of 15 min of observation time. These included: Set 1—Free Play (e.g., nesting cups, puzzle, and pop beads), Set 2—Tea Set (e.g., doll, teapot, spoon, and sponge), Set 3—Grooming (e.g., doll, hairbrush, and phone), Set 4—Sleeping (e.g., bed, plastic figurines, and a piece of paper), and Set 5—Fire Station (e.g., station, fire truck, fireman, and a straw). This play assessment was administered in each participant's home at a table in the living room or kitchen, with a parent close by.

Prior to administration, toys were selected and set out in specific ways to provide opportunities for children to engage in both manipulative and symbolic play behaviors. For example, in Set 1 (free play with manipulatives) the toys allowed the child to put things

together, take things apart, and combine items (e.g., lid off the shape sorter, three pop beads separated and three connected). Each of the next four play sets (2 through 5) were based on a play theme (i.e., tea set, grooming, sleeping, and fire station) and included one object that could be used to represent another object in pretend play (i.e., sponge for food, toy telephone, paper for a blanket, and straw for a fire hose; see Thiemann-Bourque et al. 2012, for list of all toys used). Just prior to starting the 5-min timer for each set, the examiner modeled one symbolic play act; otherwise the examiner was instructed to play with the same toy or imitate the child's actions on toys and not add or expand on any actions or model higher play levels. Child imitation of any examiner modeled act was not coded.

Video recording.—All assessments were videotaped using a Cisco Flip camera set up on a tripod within 5 to 7 feet of the play area. This video was later uploaded to a computer in the lab for coding. The children with ASD were administered the play assessment by the first author or trained graduate research assistants (GRAs) in speech-language pathology as part of the larger study; the second author, also a GRA at the time, administered the play assessment to the 19 TD children.

Play Coding and Measures

Play coding.—Videos of each assessment were coded in the lab using an online play-coding program modeled after a program created by Tapp and Yoder (2001) called the Playcoder. At each instance of a different play act on an object, the trained coder entered the time in minutes and seconds, then selected the appropriate play set (1 through 5) from a drop down menu, followed by the specific toy that was acted on. Each unique or different action on an object was entered into the coding program only once. The online program included an exhaustive list of all toys in each toy set and a list of anticipated (or predicted) play actions that a child may perform with each toy or combination of toys presented. Thus on the screen was a pull-down list of each play set, every toy within each set, and a list of possible or expected actions that could be demonstrated. There were a total of six to 11 possible actions on the pull-down list across the five play sets. Each play set had a unique list of anticipated actions, given the differences in toys and some actions would not be possible for certain sets (e.g., no doll in Set 1 thus there was no opportunity to engage in Doll as Agent acts). A category called “Unexpected Substitutions” was added within each pull-down list to ensure all instances of symbolic play acts were coded, even those that may not have been anticipated. Once the play coding was completed, the online program summed the selected play actions and matched them to the play levels and categories to create a play profile report.

Play measures.—Play skills were measured in four ways based on levels (4), categories (11), object interest, and established criteria for emerging or mastered skills. For the first two measures, children's play behaviors were organized by categories under play levels (see Table 3). Higher play levels in this schema represent greater play proficiency. The four Play Levels were: Level I - Indiscriminate Actions, Level II - Functional Play/ Object Use, Level III - Functional-Combinatorial, and Level IV - Symbolic Play (see Table 3 for descriptions and examples). For this study, we included 11 of the 14 original DPA play categories. Categories not included were: single-scheme sequences, multi-scheme sequences, socio-dramatic/

thematic fantasy play. Earlier work by Lifter and colleagues (2000) reported that preschool children with DDs did not often engage in these higher level skills; thus, the selection of categories was more developmentally appropriate for this group of participants with ASD. Total play composite scores reflected frequency counts within each play level and category; thus there were scores for Play Levels I through IV and for each of the 11 categories.

The third play measure was object interest, defined as unique actions on objects. That is, each novel play act with any toy was counted once. For example, if a child performed the same action with the same toy (e.g., took multiple shapes out of sorter) only one anticipated action (i.e., *Takes shape out of sorter*) was coded. Object interest was the sum of the total number of novel play actions for each child. This play variable did not include any actions from Play Level I, *Indiscriminate Actions* because these acts are considered undifferentiated or sensorimotor behaviors; thus the object interest score included observed acts in Levels II through IV (categories 2 through 11). The fourth play variable was the highest level of play that was considered emerging or mastered based on the type and number of play acts coded within Play Levels II, III and IV demonstrated throughout the assessment (not including indiscriminate actions). Based on criteria by Lifter et al. (1993), a child was emerging at any one level with demonstration of a minimum of two play acts, and a minimum of four or more play acts was the criteria for mastery of any level.

Interrater reliability.—The second author completed all primary play coding and a graduate research assistant (GRA) completing her Master's degree in the Speech and Language Department was trained as the reliability coder. This GRA was trained by viewing videos of play assessments from the larger longitudinal study. A criterion of interrater reliability was set at a minimum of 80% agreement in total play acts for all levels following coding of three child play assessments. Reliability was conducted on five of the 19 videos (26%) from the children with ASD and five from the 19 videos (26%) of the TD children. The RAND function of Microsoft Office Excel was used to randomly select these 10 videos. Reliability between the primary and secondary coder was evaluated using Cohen's Kappa (Cohen, 1960). Kappa was calculated by taking the percentage of actual agreement minus the percentage of agreement by chance, divided by the percentage of potential agreement minus the percentage of agreement by chance. Kappa interrater reliability across all 11 play categories for the children with ASD was 0.68 (range = 0.61 to 0.76; 95% confidence interval) and 0.51 (range = 0.41–0.61; 95% confidence interval) for the children without disabilities. Kappa values for each of the four play levels are included in Table 3. All scores obtained reflected good-to-excellent agreement (Fleiss, Levin, & Paik, 2003).

To better understand the internal relationships between the four Play Levels as measured, we examined the cross-level correlations. Results indicated that Level I play was a consistent weak to moderate negative correlate of all higher levels (II, III, and IV), ranging from $r = -.29$ (with Level II) to $r = -.45$ (with Level IV), whereas relations between Levels II, III, IV were consistently positive, with moderate correlations ranging from $r = .34$ (Levels II to IV) to $r = .49$ (Levels II to III).

We also examined play category relationships within levels with the exception of Level I with only one category. Levels II and IV each had two categories and their correlations were

both positive, $r = .43$ (Level II, categories 1 vs. 2), and $r = .23$ (Level IV, categories 1 vs. 2). Level III had six categories resulting in 15 paired relationships. All but two were positive with the exceptions of category 1 vs. 4 ($r = -.01$) and 2 vs. 3 ($r = -.14$). The largest was $r = .43$ (category 1 vs. 5). Play category relationships across levels were overwhelmingly positive, with weak to moderate correlations. Collectively, these findings indicated a clear divergence between Level 1 play vs. Levels II to IV reflecting greater proficiencies, and considerable positive interrelationships in play categories and levels elsewhere in the measure. The pattern of relationships was not linear suggesting incrementally greater proficiency one level to the next, but rather an expanding, connected play repertoire. The final relationship examined was between Play Levels II through IV and object interest scores. Results revealed positive, significant correlations between each Level and object interest ($r = .726$, $.926$, and $.657$ respectively, $p < .01$).

Statistical Analysis

Comparing the play skills of the children with and without ASD presented several challenges in untangling groups matched on skills at start and the potential for associated differences in age related social maturity. The challenge was how to best form comparable groups at pretest and also control for age related confounds in children's social maturation. Our first step was to match the two groups on language and cognitive skills. Because descriptive analyses indicated a significant group difference in chronological age ($M = 74.3$ months for children with ASD vs. $M = 34.4$ months for TD children) and correlational analyses indicated a positive, significant relationship between Play Level I and CA ($r = .493$, $p < .01$) and a negative, significant relationship between Play Level IV, category 1 and CA ($r = -.563$, $p < .01$), we opted to statistically control age by treating it as a covariate in the analyses of group differences. The relationships between CA and Play Levels II and III were negative, with weak correlations (i.e., $r = -.144$ and $r = -.104$ respectively).

Because of the number of play skill comparisons planned between groups, there was a risk of some comparisons being significant by chance (i.e., experiment-wise error). Analyses of group differences (2, ASD vs. TD) were made using a single factor MANCOVA with two dependent variables of play skills and child age in months as a covariate. The two dependent play skill variables were (1) total number of acts for each child under the Play Levels I through IV, and (2) total number of acts observed under each of the 11 play categories. A Univariate Analysis of Variance (ANOVA) was used to examine differences between groups in object interest. In order to address the third research question and in an effort to compare findings to the same measure used in the first play study (Thiemann-Bourque et al., 2012), we used descriptive statistics to summarize the proportion of children in each group who demonstrated emerging skills (i.e., minimum of two play acts) or mastery (i.e., four or more play acts) across play levels 2, 3, and 4. We then calculated z tests to determine if these proportions were significantly different between the two groups.

Results

Group Differences in Play Levels, Categories, Object Interest, and Emerging/Mastery

Results of the first analysis using MANOVA revealed significant differences between the two groups for Level I, indiscriminate actions on objects, and Level IV, symbolic play. Indiscriminate actions on objects was somewhat higher for the group of children with ASD ($M = 3.6$) compared to the TD children ($M = 0.2$), and this difference was significant, $F(1, 36) = 13.299$, $p = .001$. For Level IV, the children with ASD demonstrated half the number of symbolic play acts on average ($M = 2.2$) compared to the children without disabilities ($M = 4.5$), and the multivariate effect was significant, $F(1, 36) = 9.438$, $p = .004$ (see Table 4). Results also revealed no significant differences in object interest between the children with ASD ($M = 30.2$; $SD = 11.0$) and the group without disabilities ($M = 35.6$; $SD = 7.2$), $F(1, 36) = 3.14$, $p = .085$.

Results from the MANCOVA that considered age a covariate indicated only one significant difference. Level I behaviors between the two groups was no longer significant, $F(1, 35) = 1.387$, $p = .247$, the only group difference was Level IV—symbolic play—after taking chronological age into account, $F(1, 35) = 12.772$, $p = .001$. Within Level I symbolic play, further analysis revealed significant between-group differences for average number of acts in category 11, doll-as-agent, $F(1, 35) = 13.596$, $p = .001$ and no significant differences for category 10, substitutions, $F(1, 35) = 4.09$, $p = .109$. There were no significant differences between the two groups in Play Levels II and III (see Table 4).

Variations in emerging and mastered play skills within Levels II, III, and IV were examined using a z test for differences in two proportions between groups. For Level IV symbolic play, 11 of the 19 children with autism (58%) and 18 of the 19 TD children (95%) met the criteria for emerging symbolic play (at least two acts). These proportions were significantly different from one another ($z = 2.690$, $p = .014$). Three of the 19 children with autism (16%) showed mastery of symbolic play compared to nine of the 19 TD children (47%). These proportions approached significance ($z = 2.057$; $p = .054$). For Level III, 95% of the TD children and 100% of the children with autism met criteria for emerging functional combinatorial play (minimum of two acts). These proportions were not significantly different ($z = -.987$; $p = .34$). Similarly, there were no significant differences between the two groups in mastery of Level II functional play/object use ($z = .987$; $p = .34$). All 19 or 100% of children in both groups had mastered this play level.

Discussion

The findings of this study extend those of Thiemann-Bourque et al. (2012) by measuring and comparing the play development of 19 of the original 35 young children with ASD to a developmentally matched group of TD children. In the original study, the authors failed to find significant differences across broader play levels, object interest, or in emergence or mastery of symbolic play between children with autism and children with other DDs. The authors noted that the lack of differences may have been related to the fact that all children had significant communication deficits, thus there may have been floor effects in more advanced play behaviors due to limited language and cognitive skills. In the current study,

measuring skills of a group of children without DDs using the same developmental approach allowed for determination of specific play deficits for the children with ASD. Results of the first analysis revealed two main findings. First, the children with ASD engaged in significantly more indiscriminate or exploratory actions on toys, and second they demonstrated significantly fewer symbolic play acts. There were no significant differences in object interest between the two groups. Given the difference in the children's ages, we ran a second analysis to address the possibility of age as a measure of social maturity perhaps playing a role in the observed differences. Taking chronological age into account, there was one main finding—the children with autism engaged in significantly less symbolic play and this difference was related to one category, *doll as agent* (e.g., pretending that a doll/figurine is the agent that acts on other toys).

The finding that the older children with autism engaged in higher rates of indiscriminate or nonfunctional play has been reported elsewhere, and atypical object exploration observed in young children has been reported to be related to higher autism severity ratings at 3 and 4 years of age (Ozonoff et al., 2008). In their comparison of children with autism to children with Down syndrome and TD children matched on language skills, Libby et al. (1998) found that older children with autism engaged in significantly more sensorimotor play (e.g., oral exploration, spinning, banging, or repetitive actions); however, they did not find differences in amount of exploratory behaviors (e.g., turning objects over, transferring from one hand to another). Using a similar coding scheme, Dominguez et al. (2006) reported more exploratory and sensorimotor play for 5-year old children with autism compared to children of the same age without autism. In the current study, we grouped both exploratory and sensorimotor behaviors together and coded all as indiscriminate actions. When we controlled for chronological age, engagement in indiscriminate actions was not significantly different for the children with ASD and the younger children without autism. It is possible that coding these behaviors separately may have revealed different outcomes. Furthermore, we presented five sets of toys, with one that supported manipulative play and four with themes that provided opportunities for symbolic play. Dominguez et al. intentionally increased the number of sensorimotor toys available in their assessment based on specific toy preferences of children with autism. Differences in such procedural methods across studies likely contribute to continued discrepancies in play research outcomes. This challenge extends to diagnostic evaluations of ASD that include assessments of children's play skills, in that commonly used standardized measures appear to be assessing different aspects of play with limited correlations found between play composite scores (Pierucci et al., 2015). Pierucci et al. concluded that the context of play observation matters and suggested children need optimal opportunities to demonstrate their play skills.

One challenge in conducting research with children with ASD and comparing skills to typically developing children is ensuring adequately matched control groups given the marked differences in language and cognitive skills (Jarrold et al., 1993). We addressed this challenge, and a limitation of Thiemann-Bourque et al. (2012), by including a developmentally matched group of children without disabilities. All children were of the developmental level when they would be expected to show symbolic play; whereas in the original play study the children were 2 years younger and nonverbal or minimally verbal. The children with ASD in the current study demonstrated less symbolic play compared to

the matched group of children without disabilities, and this difference remained after controlling for chronological age. Although social maturity may be a possible alternative explanation for the observed differences, this outcome suggests that the differences could be attributed to impaired play skills of children with ASD. Further support of a symbolic play deficit was found based on measures of differences in the proportion of children with emerging or mastered levels of symbolic play. That is, just over half of the children with ASD had emerging symbolic play compared to almost all (95%) of the TD children, and only three of 19 children or 16% showed mastery compared to almost half (47%) of the TD children (this latter outcome approached but did not reach significance, $p = .054$). Children with ASD and children with other DDs in the original play study showed similar emerging (29% and 26% respectively) and mastered (9% and 5%) symbolic play skills. In summary, our findings provide some support for the position of Kasari and colleagues (2013) that children with autism may show more competencies in functional play yet have greater difficulty transitioning to symbolic play compared to typically developing children who make a smooth transition to symbolic play.

In the current study, we measured two types of symbolic play: (1) *substitutions* (e.g., pretending a piece of sponge was food), and (2) *doll as agent* (e.g., having a doll or figurine manipulate a toy to pretend). The specificity of a deficit found for one but not both types of symbolic play is of interest and has implications for intervention. The out-comes substantiate research on play differences for young children with autism that include reports of less interest in doll play compared to children without disabilities (Dominguez et al., 2006; Ungerer & Sigman, 1981), and similarities in substitution play acts (Libby et al., 1998). Williams et al. (2001) reported doll-directed play acts as the most common elaborated play behavior demonstrated by both control groups; yet no children with autism showed doll-directed acts in play. In contrast, Naber and colleagues (2008) did not report differences in a preference for dolls between children with and without ASD. Similar to the findings from Thiemann-Bourque et al. (2012), children from both groups in the current study showed the least amount of symbolic play compared to other types of play, and doll as agent had the lowest number of acts. In looking more closely at these differences, 12 children with ASD (63%) did not engage in any doll as agent play acts. These low rates are similar to those reported in Thiemann-Bourque et al., with only one of 35 children with ASD observed playing with a doll in pretend play and as reported by other researchers (Dominguez et al., 2006; Libby et al., 1998). Lifter (2000) suggests we build upon a child's current skill level, as opposed to asking of them something they are not ready to learn. The outcomes of the current study and past research showing children are less skilled or motivated to engage in symbolic doll play (i.e., using dolls/figurines in such a way that the doll is acting on an object such as holding a spoon to the doll's hand and having the doll eat), suggest that this may be an important starting point for some children in intervention. Play interventions that focus on observing a child's developmental level have shown that developmentally appropriate activities were acquired more quickly, occurred spontaneously, and skills were generalized to other toys (Lifter et al., 1993). Although play has become an important component of early interventions for young children with ASD with positive outcomes reported in higher levels of play and later language skills (Kasari, Chang, & Patterson, 2013; Kasari, Gulsrud, Freeman, Paparella, & Hellemann, 2012; Kasari,

Paparella, Freeman, & Jahromi, 2008), few studies have attended to developmental levels or readiness to learn higher level skills (Kasari, Freeman, & Paparella 2006; Lifter, Ellis, Cannon, & Anderson, 2005). Initial identification of emerging skills and descriptions of procedures to teach specific types of symbolic play could improve the effectiveness of comprehensive early play interventions.

The finding of no differences between the two groups in overall object interest deserves mention. Similar to the 6-year olds with ASD, the almost 3-year olds in the present study picked up and appropriately explored or manipulated a similar number of different objects during the 15-min play observation. This could be related to the novelty of the play context and different toys brought into the child's home and the procedure of presenting each set of toys for 5 min then removing them. Thus a situation of novelty was provided on five occasions. Naber et al. (2008) reported a similar lack of differences in how often children with ASD and children without ASD initiated play with a different toy. However, it is unclear from the description of procedures how many different toys were presented at one time. In addition, the assessment was free-play with the mother possibly motivating the children to explore more toys. Using a similar measure of "unique toys touched," Yoder and Stone (2006) were interested in determining how a child's level of initial object exploration would impact response to two different early communication interventions. After assessing the play of 36 preschool children with autism, using a modified version of the DPA at pretreatment and 1-year later, and randomly assigning the children to Responsive Education and Prelinguistic Milieu Teaching (RPMT) and a Picture Exchange Communication (PECS) intervention, results revealed that the children who showed lower rates of initial object exploration benefited most from RPMT. The authors noted that children's daily routines are built around objects, with social interactions and attention to adult's actions a huge part of these routines. These experiences lead to an understanding of how objects can be manipulated and used, and ultimately to development of mental representations or knowledge of how others act on objects and events (Yoder, 2006). Although we did not find differences in object interest in this small sample of children, the work of Yoder and colleagues imply that if children are less skilled in exploring different objects and have limited diversity of play actions, play interventions should focus on this important foundational skill.

Limitations and Future Research

There is agreement that the symbolic play of children with autism may be absent, may emerge slower or at lower rates, may be less complex, and may be qualitatively different than TD peers and children with other DDs (Jarrold et al., 1993; Kasari et al., 2013). However, continued reports of disparities across play studies for children with ASD arise primarily from methodological limitations. Although we attended to some of these methodological limitations by including a language and mental age matched group of TD children and defining play based broad levels and subcategories, some limitations deserve mention. First, we did not measure single-scheme and multischeme sequences of play, or if children combined vocalizations in play, or the quality of play (e.g., positive affect or playfulness). Additional research examining these variables would extend play research for this population, as would the development of consistent taxonomies to define these play

variables (Barton, 2010; Hobson, Lee, & Hobson, 2009). A second limitation is the small sample size. Even though there were no significant differences between the two groups in scores on standardized language and cognitive subtests, a larger population of children would have provided a stronger comparison of play abilities and improve the generalizability of the findings. Further, with a larger sample of children, the mean differences in play skills may have been statistically significant for Level III, functional play. A third weakness of the study is that the examiner who administered the play assessment for the typically developing children also coded the play observations for this group, thus she was not blind to group differences. In addition, the reliability coder was a GRA working on the larger longitudinal study, and therefore, she was aware that the comparison group of children did not have ASD. Coding procedures consisted of selecting toys and actions from a drop-down menu in the Playcoder for observed play behaviors then these behaviors were summed and measures were computed by the program. We believe these procedures limited opportunities for coder bias. Finally, it is important to consider the assessment context in interpreting observed differences in symbolic play. Our assessment included a female doll in two of the five play sets, and this doll may not have been as interesting or motivating for the boys, who made up the majority of participants. The use of a gender neutral agent such as a teddy bear and including an agent or figurine in all toy sets may have led to different results. Casby (2003) recommended presenting an array of blocks, pegs, balls, and sheets of paper with the standard set of thematic play materials (e.g., baby doll with blanket, bed, and bottle; teddy bear with silverware, plate, and bowl) to allow the child many opportunities to transform objects in pretend play.

Conclusion

In summary, results support previous reports of strengths in functional play skills and deficits in higher level abstract symbolic play skills of young children with ASD. Due to the matching procedures used, we were able to compare play differences of children with and without ASD at similar developmental levels (Jarrold et al., 1993). We also found similarities in object interest, or number of different toys played with. Specific differences were noted in one type of symbolic play—fewer doll as agent acts observed for the children with ASD. Given the observation of both similarities and differences in play skills between the two groups, the outcomes demonstrate the importance of assessing children's play using multiple measures, and across both broad and specific play subcategories (Barton, 2010; Casby, 2010). Play instruction that begins at the child's level may lead to a more robust progression through higher play levels and ultimately enhance symbolic understanding. Furthermore, to date, adults are the primary partner participating in play assessments. Given the pervasive social deficits characteristic of children with ASD, it is a logical next step to expand on play research by including peer partners in assessments. In a recent intervention study for young children with ASD, two methods used to measure symbolic and social play included (1) a hierarchy of development similar to the measures used in the current study, and (2) measuring social peer play (e.g., isolate, onlooker, and parallel play; Wolfberg, DeWitt, Young, & Nguyen, 2015). After the social intervention, these measures revealed improved symbolic play and social play of young children with ASD during interactions with typically developing peers. Methods to measure and reliably assess child-peer play within a standardized context would substantially move the field forward.

Acknowledgments

This research was conducted with the support of NIH grants DC007684, HD018955, HD002528, and DC012530 from the National Institutes of Health. We wish to thank all of the children and their families who participated in this study. In addition, we would like to thank Dr. Charles Greenwood for his expertise in data analyses, interpretation, and reviewing the manuscript prior to publication.

References

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Barton E (2010). Development of a taxonomy of pretend play. *Infants & Young Children*, 23, 247–261. doi:10.1097/IYC.0b013e3181f22072
- Barton E, & Pavlanis R (2012). Teaching pretend play to young children with autism. *Young Exceptional Children*, 15, 5–17. doi:10.1177/1096250611424106
- Belsky J, & Most R (1981). From exploration to play: A cross-sectional study of infant free play behavior. *Developmental Psychology*, 17, 630–639. doi:10.1037/0012-1649.17.5.630
- Brady NC, Thiemann-Bourque K, Fleming K, & Matthews K (2013). Predicting language outcomes for children learning augmentative and alternative communication: Child and environmental factors. *Journal of Speech, Language, and Hearing Research*, 56(5), 1595–1612. doi: 10.1044/1092-4388(2013/12-0102)
- Casby MW (2003). The development of play in infants, toddlers, and young children. *Communication Disorders Quarterly*, 24, 163–174. doi:10.1177/15257401030240040201
- Casby MW (2010). Developmental assessment of play: A model for early intervention. *Communication Disorders Quarterly*, 24, 175–183. doi:10.1177/15257401030240040301
- Cohen J (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37–46. doi:10.1177/001316446002000104
- Dominguez A, Ziviani J, & Rodger S (2006). Play behaviors and play object preferences of young children with autistic disorder in a clinical play environment. *Autism*, 10, 53–69. doi: 10.1177/1362361306062010 [PubMed: 16522710]
- Fleiss JL, Levin B, & Paik MC (2003). *Statistical methods for rates and proportions* (3rd ed.). Hoboken, NJ: John Wiley & Sons. doi:10.1002/0471445428
- Hobson RP, Lee A, & Hobson JA (2009). Qualities of symbolic play among children with autism: A social-developmental perspective. *Journal of Autism and Developmental Disorders*, 39, 12–22. doi:10.1007/s10803-008-0589-z [PubMed: 18509752]
- Jarrold C, Boucher J, & Smith PK (1993). Symbolic play in autism: A review. *Journal of Autism and Developmental Disorders*, 23, 281–307. doi:10.1007/BF01046221 [PubMed: 7687245]
- Jarrold C, Boucher J, & Smith PK (1996). Generativity deficits in pretend play in autism. *British Journal of Developmental Psychology*, 14, 275–300. doi: 10.1111/j.2044-835X.1996.tb00706.x
- Kasari C, Chang Y, & Patterson. (2013). Pretending to play or playing to pretend. *American Journal of Play*, 6, 124–135. [PubMed: 26617954]
- Kasari C, Freeman S, & Paparella T (2006). Joint attention and symbolic play in young children with autism: A randomized controlled intervention study. *Journal of Child Psychology and Psychiatry*, 47, 611–620. doi:10.1111/j.1469-7610.2005.01567.x [PubMed: 16712638]
- Kasari C, Gulsrud A, Freeman S, Paparella T, & Hellemann G (2012). Longitudinal follow-up of children with autism receiving targeted interventions on joint attention and play. *Journal of the American Academy of Child & Adolescent Psychiatry*, 51, 487–495. doi:10.1016/j.jaac.2012.02.019 [PubMed: 22525955]
- Kasari C, Paparella T, Freeman S, & Jahromi LB (2008). Language outcome in autism: Randomized comparison of joint attention and play interventions. *Journal of Consulting and Clinical Psychology*, 76, 125. doi:10.1037/0022-006X.76.1.125 [PubMed: 18229990]

- Libby S, Powell S, Messer D, & Jordan R (1998). Spontaneous play in children with autism: A reappraisal. *Journal of Autism and Developmental Disorders*, 28, 487–497. doi:10.1023/A:1026095910558 [PubMed: 9932235]
- Lifter K (2000). Linking assessment to intervention for children with developmental disabilities or at-risk for developmental delay: The developmental play assessment (DPA) instrument In Gitlin-Weinder K, Sandgrund A, & Schafer C (Eds.), *Play diagnosis and assessment* (pp. 228–260). New York, NY: Wiley.
- Lifter K, Ellis J, Cannon B, & Anderson SR (2005). Developmental specificity in targeting and teaching play activities to children with pervasive developmental disorders. *Journal of Early Intervention*, 27, 247–267. doi:10.1177/105381510502700405
- Lifter K, Sulzer-Azaroff B, Anderson S, & Cowdery GE (1993). Teaching play activities to preschool children with disabilities. *Journal of Early Intervention*, 17, 139–159. doi:10.1177/105381519301700206
- Lord C, Rutter M, DiLavore P, & Risi S (1999). *Autism Diagnostic Observation Schedule*. Los Angeles, CA: Western Psychological Services.
- Lowe M (1975). Trends in the development of representational play in infants from one to three years - An observational study. *Journal of Child Psychology and Psychiatry*, 16(1), 33–47. doi:10.1111/j.1469-7610.1975.tb01870.x [PubMed: 1123415]
- McCune L (1995). A normative study of representational play in the transition to language. *Developmental Psychology*, 31, 198–206. doi:10.1037/0012-1649.31.2.198
- Mullen E (1995). *Mullen Scales of Early Learning: AGS edition*. Circle Pines, MN: AGS.
- Naber F, Bakermans-Kranenburg MJ, van IJendoorn MH, Swinkels S, Buitelaar JK, Dietz C, ... van Engeland H (2008). Play behavior and attachment in toddlers with autism. *Journal of Autism and Developmental Disorders*, 38, 857–866. doi: 10.1007/s10803-007-0454-5 [PubMed: 17896172]
- Nicolich LM (1977). Beyond sensorimotor intelligence: Assessment of symbolic maturity through analysis of pretend play. *Merrill-Palmer Quarterly of Behavior and Development*, 23, 89–99.
- Ozonoff S, Macari S, Young GS, Goldring S, Thompson R, & Rogers SJ (2008). Atypical object exploration at 12 months of age is associated with autism in a prospective sample. *Autism: The International Journal of Research and Practice*, 12, 457–472. doi:10.1177/1362361308096402 [PubMed: 18805942]
- Pierucci JM, Barber AB, Gilpin AT, Crisler ME, & Klinger LG (2015). Play assessments and developmental skills in young children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, 30, 35–43. doi:10.1177/1088357614539837
- Rutter M, Bailey A, & Lord C (2003). *Social Communication Questionnaire (SCQ)*. Los Angeles, CA: Western Psychological Services.
- Schopler E, Reichler R, & Rothen Renner B (1993). *Childhood Autism Rating Scale*. Los Angeles, CA: Western Psychological Services.
- Sigman M, & Ruskin E (1999). 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*, 64(1), 1–139. doi:10.1111/1540-5834.00002
- Tapp J, & Yoder PJ (2001). *Playcoder*. Nashville, TN: Vanderbilt University.
- Thiemann-Bourque K, Brady N, & Fleming K (2012). Symbolic play of preschoolers with severe communication impairments with autism and other developmental delays: More similarities than differences. *Journal of Autism and Developmental Disabilities*, 42, 863–873. doi:10.1007/s10803-011-1317-7
- Toth K, Munson J, Meltzoff AN, & Dawson G (2006). Early predictors of communication development in young children with autism spectrum disorder: Joint attention, imitation, and toy play. *Journal of Autism and Developmental Disorders*, 36, 993–1005. doi:10.1007/s10803-006-0137-7 [PubMed: 16845578]
- Ungerer JA, & Sigman M (1981). Symbolic play and language comprehension in autistic children. *Journal of American Academy of Child Psychiatry*, 20, 318–337. doi:10.1016/S0002-7138(09)60992-4

- Warreyn P, Roeyers H, & De Groote I (2005). Early social communicative behaviors of preschoolers with autism spectrum disorder during interaction with their mothers. *Autism*, 9, 342–361. doi: 10.1177/1362361305056076 [PubMed: 16155053]
- Wetherby A, & Prutting C (1984). Profiles of communicative and cognitive-social abilities in autistic children. *Journal of Speech and Hearing Research*, 27, 364–377. doi:10.1044/jshr.2703.364 [PubMed: 6482406]
- Williams E, Reddy V, & Costall A (2001). Taking a closer look at functional play in children with autism. *Journal of Autism and Developmental Disorders*, 31, 67–77. doi:10.1023/A:1005665714197 [PubMed: 11439756]
- Wing L, Gould J, Yeates S, & Brierley L (1977). Symbolic play in severely mentally retarded and in autistic children. *Journal of Child Psychology and Psychiatry*, 18, 167–178. doi:10.1111/j.1469-7610.1977.tb00426.x [PubMed: 141458]
- Wolfberg P, DeWitt M, Young GS, & Nguyen T (2015). Integrated play groups: Promoting symbolic play and social engagement with typical peers in children with ASD across settings. *Journal of Autism and Developmental Disorders*, 45, 830–845. doi:10.1007/s10803-014-2245-0 [PubMed: 25231289]
- Yoder P (2006). Predicting lexical density growth rate in young children with autism spectrum disorders. *American Journal of Speech-Language Pathology*, 15, 378–388. doi: 10.1044/1058-0360(2006/035) [PubMed: 17102148]
- Yoder P, & Stone WL (2006). Randomized comparison of two communication interventions for preschoolers with autism spectrum disorders. *Journal of Consulting and Clinical Psychology*, 74(3), 426. doi:10.1037/0022-006X.74.3.426 [PubMed: 16822100]
- Zimmerman IL, Steiner VG, & Pond RE (2002). *Preschool Language Scale: Fourth Edition*. San Antonio, TX: The Psychological Corporation, a Harcourt Assessment Company.

Table 1

Demographic Information

Participants	ASD (<i>n</i> = 19)	TD (<i>n</i> = 19)
Number of girls	3	10
Number of boys	16	9
Mean age (months)	74	34
Range (months)	63–91	24–60

Note. ASD = Autism Spectrum Disorder; TD = Typically Developing group of children

Table 2

Raw Scores on Cognitive and Language Assessments at Pretest

Subtest Score	<u>ASD (<i>n</i> = 19)</u>		<u>TD (<i>n</i> = 19)</u>		<i>P</i>
	<u>Mean Age in Months (<i>SD</i>)</u>				
	<u>74 (7.5)</u>		<u>34 (10.9)</u>		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
MSEL VR	33.8	8.6	33.4	8.1	0.77
MSEL FM	32.3	7.6	32.2	7.9	0.79
MSEL RL	27.4	8.0	31.2	7.8	0.22
MSEL EL	25.5	7.6	30.5	7.7	0.10
PLS-4 AC	32.4	9.8	38.6	10.2	0.09
PLS-4 EC	33.7	8.8	40.6	9.9	0.06

Note. ASD = Autism Spectrum Disorder; TD = Typically Developing; MSEL = Mullen Scales of Early Learning; VR = Visual Reception; FM = Fine Motor; RL = Receptive Language; EL = Expressive Language; PLS-4 = Preschool Language Scale-4; AC = Auditory Comprehension; EC = Expressive Communication.

p > .05 denotes lack of significant differences in raw scores between the two groups at pretest.

Table 3

Play Levels, Definitions and Subcategories, and Interrater Reliability Across Play Levels

Play Levels and Definitions	Play Categories	Example Play Acts	Kappa: ASD	Kappa: TD
I: Indiscriminate actions – sensorimotor, exploratory actions on toys/objects	1. Mouthing-shaking-banging-inspecting	Puts toy in mouth; bangs toys	0.65	N/O
II: Functional play/object use – play with toys according to their specific function or properties	2. Discriminative actions on single object	Roll a ball; push a track	0.67	0.83
	3. Takes apart combinations	Take pieces out of puzzle or nesting cups apart		
III: Functional combinatorial – actions in play that combine objects or relate one object to another	4. Presentation combinations	Puts pieces in puzzle; puts cup on saucer	0.85	0.74
	5. General combinations	Lines up nesting cups		
	6. Pretend self	Puts phone to ear to talk		
	7. Specific combinations physical	Stacks nesting cups upside down to make a tower		
	8. Child as agent	Throws ball to examiner		
	9. Specific combinations conventional	Stirs with spoon in cup		
IV: Symbolic play – uses an object as a substitute for the standard one; enacts activities out of context; child attributes or gives 'life' to doll as the agent	10. Substitutions	Uses straw as if it were a fire hose	0.49	0.70
	11. Doll as agent Includes Unexpected substitutions	Put's straw in fireman's hand as a fire hose		

Note. ASD = Autism Spectrum Disorder; TD = Typically Developing; Kappa = Cohen's Kappa inter-rater reliability values; N/O = No Level I acts observed by either rater in the 5 videos selected for reliability coding.

Adapted from "Symbolic Play of Preschoolers With Severe Communication Impairments With Autism and Other Developmental Delays: More Similarities Than Differences," by K. Thiemann-Bourque, N. Brady, and K. Fleming, 2012, *Journal of Autism and Developmental Disorders*, 42, p. 866. Copyright 2012 by Springer US. Adapted with permission.

Table 4
Descriptive Multivariate Analysis of the Differences in Play Skills for Children With ASD and Typically Developing Children

Variable	MANOVA			MANCOVA			ASD (<i>n</i> =19)			TD (<i>n</i> =19)		
	Wilks λ	<i>F</i>	<i>df</i>	<i>P</i>	λ	<i>F</i>	<i>df</i>	<i>P</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Play Levels	.614	5.191	1,33	.002	.665	4.030	1,32	.009				
Level I		13.299	1,36	.001		1.387	1,35	.247	3.6	4.0	0.2	0.5
Level II		2.283	1,36	.140		2.870	1,35	.099	11.3	3.2	12.7	2.8
Level III		.574	1,36	.453		.190	1,35	.665	16.8	7.4	18.3	4.7
Level IV		9.438	1,36	.004		12.772	1,35	.001	2.2	2.1	4.5	2.6
Substitutions						2.707	1,35	.109	1.4	1.3	3.2	1.2
Doll as agent						13.596	1,35	.001	0.8	1.5	1.4	2.1

Note. Significant differences between groups with $p < .05$ are in boldface. ASD = Autism Spectrum Disorder; TD = Typically Developing; Diff= difference between means of each group.