ENHANCING THE PLAY AND COMMENTING ABILITIES OF TODDLERS WITH AUTISM SPECTRUM DISORDERS THROUGH CAREGIVER-IMPLEMENTED TEACHING OF PLAY

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TABLE OF CONTENTS

I  ABSTRACT ......................................................................................................................... 9

II  ACKNOWLEDGMENTS ........................................................................................................ 11

III  CHAPTER 1: INTRODUCTION ......................................................................................... 14

Public Health Considerations of ASD ............................................................................. 14
Intervention Approaches for Young Children with ASD .................................................. 15
Early Intervention in Massachusetts ................................................................................. 17
Interventions for Toddlers with ASD ................................................................................ 18
Caregiver-Implemented Interventions .............................................................................. 18
Play and Language Development of Children with ASD ................................................... 20
Play Interventions for Children with ASD ...................................................................... 21
Effects of Caregiver Involvement on Play & Language Skills of Children with ASD ....... 23
Caregiver-Implemented Play Interventions for Toddlers with ASD ............................... 25
Rationale and Significance .............................................................................................. 26

IV  CHAPTER 2: REVIEW OF THE LITERATURE .................................................................. 29

A. PLAY AND EARLY CHILDHOOD DEVELOPMENT ......................................................... 29

Importance of Play in Development .............................................................................. 30
Empirical, Descriptive Studies of Children’s Play ........................................................... 31
Connections of Play to Language Development ............................................................... 33
Connections of Play to Social Development .................................................................. 34
Delays in Play .................................................................................................................... 36
Play as a Developmental Domain .................................................................................... 37
Directions for Future Research in Early Childhood Development and Play .................. 37
B. AUTISM SPECTRUM DISORDERS AND EARLY CHILDHOOD DEVELOPMENT ....... 38

Autism Spectrum Disorders ............................................................................................ 38
Biological and Genetic Markers of ASD ........................................................................ 39
Increased Prevalence of ASD ........................................................................................ 42
ASD Prevalence across Male and Female Children ........................................................ 43
Sociodemographic Trends .............................................................................................. 44
Diagnosing ASD ............................................................................................................. 49
Delays in the Social Development of Young Children with ASD ................................. 50
Delays in the Language Development of Young Children with ASD

Delays in the Play Development of Young Children with ASD

Directions for Future Research for Children with ASD

C. INTERVENTION APPROACHES FOR CHILDREN WITH ASD

Intervention Approaches for Children with ASD

Future Directions for Intervention Approaches for Children with ASD

D. INTERVENTIONS IN PLAY FOR CHILDREN WITH ASD

In Vivo Modeling and Play

Video Modeling and Play

Discrete Trial Training and Play

Pivotal Response Training and Play

Incidental Teaching and Play

Strengths of Play Interventions

Weaknesses of Play Interventions

Future Research Directions in Play Interventions for Children with ASD

E. INTERVENTIONS FOR TODDLERS WITH ASD

Directions for Future Research in Interventions for Toddlers with ASD

F. CAREGIVER-IMPLEMENTED INTERVENTIONS

Caregiver-Implemented Methods for Toddlers with ASD

Caregiver-Implemented Play Interventions for Toddlers with ASD

Directions for Future Research in Caregiver-Implemented Interventions

G. RATIONALE AND SIGNIFICANCE OF THE PROPOSED STUDY

Rationale of the Proposed Study

Significance of the Proposed Study

Research Questions and Hypotheses

V CHAPTER 3: METHODOLOGY

Recruitment Procedures

Participants

Measures

Materials and Equipment

Setting
APPENDICES .................................................................................................................237
Appendix A: Recruitment Flyer..........................................................................................237
Appendix B: KDC Email Message .....................................................................................238
Appendix C: Statement of Informed Consent .....................................................................239
Appendix D: Toy Inventory Questionnaire .........................................................................245
Appendix E: Inventory of Toddler and Family Activities and Practices .........................247
Appendix F: Description of DPA Categories ......................................................................252
Appendix G: First DPA Coding Sheet: DPA Play Activity Datasheet ...............................253
Appendix H: Second DPA Coding Sheet: Categorization of DPA Play Activities ............257
Appendix I: Third DPA Coding Sheet: Play Category Levels ............................................260
Appendix J: First Caregiver Handout-Play Intervention Activities and Targets ............262
Appendix K: Second Caregiver Handout-Caregiver-Implemented Play Interventions ....263
Appendix L: Third Caregiver Handout-Single-Subject Designs and Baseline Phases ....265
Appendix M: Fourth Caregiver Handout-Procedures and Teaching Techniques .............268
Appendix N: Fifth Caregiver Handout- Overview of Activities .......................................270
Appendix O: Dates of Completed Sessions .......................................................................271
Appendix P: Coding Target Play Activities ......................................................................272
Appendix Q: Toy Inventory Questionnaire Information ....................................................275
Appendix R: Toy Set Rotations ..........................................................................................277
Appendix S: John’s Play Activities ......................................................................................278
Appendix T: Edward’s Play Activities ................................................................................282
Appendix U: Vincenzo’s Play Activities ..............................................................................286
Appendix V: Brent’s Play Activities .....................................................................................290
Appendix W: Travis’ Play Activities ....................................................................................294
TABLES .............................................................................................................................298
Table 1: Play Assessments in which Play is regarded as a Developmental Domain .........298
Table 2: In Vivo and Video Modeling Approaches in Play Interventions for Children with ASD ........................................................................................................................................299
Table 3: Intervention Studies that Involve Direct Teaching to Support Developments in Play ............................................................................................................................................300
Table 4: Caregiver-Training Intervention Studies Designed for Young Children with ASD ..........................................................302
Table 5: Overview of Participating Children..........................................................304
Table 6: Participants’ Birthing and Medical History ..............................................305
Table 7: Overview of Participating Caregivers .....................................................306
Table 8: Overview of Family Characteristics .......................................................307
Table 9: BDI-2 Scores that Reflect Participants’ Development across Domains at the Time of Study Enrollment ..........................................................308
Table 10: John’s DPA Performance .................................................................309
Table 11: Edward’s DPA Performance ..........................................................310
Table 12: Vincenzo’s DPA Performance .........................................................311
Table 13: Brent’s DPA Performance ............................................................312
Table 14: Travis’ DPA Performance ..............................................................313
Table 15: Interobserver Agreement of the DPA Administration and Observation of Spontaneous Commenting ..........................................................314
Table 16: DPA Play Categories that were targeted for Intervention ..................315
Table 17: Overview of Completed Sessions and Sessions Designated for Coding ......316
Table 18: Interobserver Agreement across Baseline, Intervention, and Maintenance Sessions ........................................................................................................317
Table 19: Number of Recorded Sessions that were Discarded .........................318
Table 20: Treatment Fidelity of Caregivers’ Intervention Delivery ....................319
VIX FIGURES ........................................................................................................320
Figure 1: Frequency of John’s Spontaneously Occurring Target Play Activities ....320
Figure 2: John’s Performance of Previously Demonstrated and New Play Activity Exemplars ........................................................................................................321
Figure 3: John’s Total Commenting .....................................................................322
Figure 4: John’s General and Activity-Specific Commenting ............................323
Figure 5: Frequency of Edward’s Spontaneously Occurring Target Play Activities......324
Figure 6: Edward’s Performance of Previously Demonstrated and New Play Activity Exemplars ........................................................................................................325
Figure 7: Edward’s Total Commenting ..............................................................326
Figure 8: Edward’s General and Activity-Specific Commenting........................................327
Figure 9: Frequency of Vincenzo’s Spontaneously Occurring Target Play Activities........328
Figure 10: Vincenzo’s Performance of Previously Demonstrated and New Play Activity
Exemplars ................................................................................................................................329
Figure 11: Vincenzo’s Total Commenting ..............................................................................330
Figure 12: Vincenzo’s General and Activity-Specific Commenting ....................................331
Figure 13: Frequency of Brent’s Spontaneously Occurring Target Play Activities ..............332
Figure 14: Brent’s Performance of Previously Demonstrated and New Play Activity
Exemplars ................................................................................................................................333
Figure 15: Brent’s Total Commenting ....................................................................................334
Figure 16: Brent’s General and Activity-Specific Commenting ...........................................335
Figure 17: Frequency of Travis’ Spontaneously Occurring Target Play Activities ...............336
Figure 18: Travis’ Performance of Previously Demonstrated and New Play Activity
Exemplars ................................................................................................................................337
Figure 19: Travis’ Total Commenting ....................................................................................338
Figure 20: Travis’ General and Activity-Specific Commenting ...........................................339
Figure 21: Frequency of Spontaneously Occurring Target Play Activities ........................340
Figure 22: Play Activity Exemplars .......................................................................................341
Figure 23: Total Commenting ...............................................................................................342
Figure 24: General and Activity Specific Commenting .......................................................343
Abstract

Children are being diagnosed with autism spectrum disorders (ASD) more frequently and at younger ages, with a growing number of toddlers receiving ASD diagnoses and accessing early intervention (EI) services. Young children with ASD, including toddlers, show marked delays in play and benefit from interventions that move them forward in their play skill development. Evidence-based approaches, including incidental teaching, have been used to teach play skills to preschool-aged children with ASD, and, in some instances, have yielded simultaneous improvements in their commenting skills, although language goals were not targeted directly in the teaching.

Despite these positive empirical outcomes, gaps currently exist in the play intervention literature. Although ASD prevalence and EI eligibility rates are rising, few studies have examined the impact of direct teaching in play on the play and commenting abilities of toddlers with ASD; the majority of studies have involved preschool-aged children who received play instruction in school settings or in home settings from research assistants, but not from their primary caregivers. For most play intervention studies with preschool-aged children, the skills that were targeted for intervention were vague, derived arbitrarily, and disconnected from children’s specific learning needs. A few studies used incidental teaching approaches to teach developmentally specific play activities, yet not to toddlers with ASD.

This study was designed to investigate how caregiver-delivered instruction in play impacted the play and commenting abilities of toddlers with ASD. Five male toddlers (23-32 months old) with ASD were recruited from a local EI agency and received instruction based on least-to-most prompting that targeted play skills that were at the emergent level, evidenced by results from the Developmental Play Assessment (DPA) and baseline session data.
The children’s response to intervention varied. Although limited conclusions can be made about differences in response to intervention because of methodological study constraints, results provide preliminary evidence that the children showed play and commenting skills that were not present during baseline.

The results of this study contribute to the literature base by describing the rationale, methods, and outcomes of a play intervention with empirical and theoretical relevance that was linked to individualized assessment targets based on each child’s developmental level. Directions for future research include refining intervention procedures and conducting studies with more robust research designs and statistical procedures, both of which are important for informing the practice of EI service providers and school psychologists who work with early childhood populations.
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Chapter 1

Enhancing the Play and Commenting Abilities of Toddlers with Autism Spectrum Disorders through Caregiver-Implemented Teaching of Play

This applied research project was developed to inform the practice of scientist-practitioners with clinical and research priorities, and originates from a careful review of developmental theory, special education law, empirical literature, and evidence-based strategies used with young children with ASD. Chapter I summarizes the purpose, rationale, and significance of this dissertation project, first by highlighting the public health considerations of ASD in terms of increasing prevalence and service provision rates. Current intervention approaches are described, highlighting interventions used toddlers with ASD, direct teaching in play, and caregiver-implemented interventions. Based on all of these considerations, a rationale for this study is provided and research questions and hypotheses are proposed.

Public Health Considerations of ASD

According to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR), ASD is a group of neurodevelopmental disorders that include Autistic Disorder (AD), Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS), and Asperger’s syndrome. Each of these disorders have different diagnostic criteria, but, as a collective diagnostic category, indicate that individuals show qualitative impairments with reciprocal social and communication skills, language development, and a restricted repertoire of activities and interests (American Psychiatric Association [APA], 2000; Centers for Disease Control and Prevention [CDC], 2009). Within the United States, ASD is a major public health concern (Newschaffer & Curran, 2003). Children are being identified with ASD at earlier ages, increasingly before three years of age, which has heightened the annual prevalence rate.
appreciably and the number of children who access therapy services across private and public sectors (Rice, 2007). Given these current diagnostic and service provision trends, there is a need within the mental health and education fields to understand strengths and impairments shown by toddlers with ASD and to investigate naturalistic evidence-based treatments.

**Intervention Approaches for Young Children with ASD**

A growing number of treatment approaches are being delivered to young children with ASD across school, community, and home settings to address their language, communication, and social delays; these approaches also are applied to address their delays in play. Commonly delivered approaches that address delays in play include Developmental, Individual Difference, Relationship-based (DIR®)/Floortime (Greenspan & Wieder, 1997, 2006; Wieder, 2003), the More Than Words® program, and applied behavior analysis techniques (ABA: Lovaas, Ackerman, Alexander, Firestone, Perkins, & Young, 1981; Zager, 2005; Stahmer, Ingersoll, & Carter, 2003). These approaches incorporate a variety of ABA techniques, which include: (1) in vivo modeling (e.g., Tryon & Keane, 1986; Jahr, Eldevik, & Eikeseth, 2000; Goldstein & Cisar, 1992), (2) video modeling (e.g., D’Ateno, Mangiapanello, & Taylor, 2003), (3) discrete trial training (e.g., Nuzzolo-Gomez, Leonard, Ortiz, Rivera, & Greer, 2002; Santarcarangelo, Dyer, & Luce, 1987), (4) pivotal response training (e.g., Stahmer & Schreibman, 1992; Koegel, Dyer, & Bell, 1987; Haring & Lovinger, 1989), and (5) incidental training (Stahmer, 1995; Thorp, Stahmer, & Schreibman, 1995; Ingersoll & Schreibman, 2006; Kohler, Anthony Steighner, & Hoyson, 2001; Craig-Unkefer & Kaiser, 2003; Lifter, Sulzer-Azaroff, Anderson, & Cowdery, 1993; Lifter, Ellis, Cannon & Anderson, 2005; Lifter & Foster-Sanda, in progress).
The majority of play intervention studies have used a single-subject, multiple-baseline design to investigate whether preschool- and/or school-aged children furthered their play skill repertoire in response to ABA teaching approaches. Across studies, children generally displayed higher frequencies of spontaneous play skills when they were delivered using one of the teaching approaches; however, a gap in the literature exists because no studies to date have compared the strengths and limitations of these ABA techniques with respect to methodological rigor and relevance for specific populations of children with ASD. Consequently, practitioners do not have a framework to inform their decision-making about which approaches they should use with individual children with ASD. Additionally, with the exception of work by Lifter and her colleagues (e.g., Lifter et al., 1993, 2005, in progress), many of these studies do not have a strong theoretical and empirical foundation underlying the development of intervention goals; intervention targets often were established arbitrarily without reference to child development theories. Thus, results of play intervention studies provide preliminary support regarding effective teaching methods, but provide limited information about which skills to teach based on developmental theory, minimizing the extent to which studies can inform intervention planning for preschool- and school-aged children with ASD.

More research is needed to investigate how behavioral strategies can be integrated with developmental theory when creating interventions for young children with ASD. Focus should be placed on investigating the strengths and limitations of ABA teaching approaches through systematic research to help practitioners determine which techniques are most applicable for various populations of young children with ASD. Another consideration for intervention planning is the conceptual framework and decision-making that underlies decisions to integrate child development theory with a particular teaching approach; that is, what is the stance of the
developmental theories, in what way do the teaching practices coincide with these stances, and how can the two be integrated to create a developmentally-relevant intervention approach for children with ASD? Additionally, as intervention research has focused largely on preschool- and school-aged children with ASD, more focus should be placed on designing interventions for toddlers with ASD and their families.

**Early Intervention in Massachusetts**

In Massachusetts, EI is a statewide service that is coordinated by the Department of Public Health (DPH) within the Office of Health and Human Services, and is available to families of children between birth and three years of age (i.e., infants and toddlers) who have established conditions, developmental delays, and biological and/or environmental. According to DPH criteria (Health and Human Services, 2011), children are eligible for EI in Massachusetts if they: (1) present with four or more DPH-identified birth (e.g., born prematurely, stayed in neonatal intensive care unit for five or more days) or environmental (e.g., substance use in the home) risk factors, (2) have DPH-recognized medical conditions or disabilities, including ASD, and/or (3) show delays on one of two DPH-approved eligibility evaluation measures, the Early Intervention Developmental Profile (EIDP) or the Battelle Developmental Inventory, Second Edition (BDI-2: Newborg, 2005). Approximately 33,500 infants and toddlers receive services annually in Massachusetts, with 4% of the service recipients in the 2010 fiscal year having a diagnosis of ASD (Health and Human Services, 2011). Many toddlers with ASD supplement EI services with ABA therapy, which are services that also are overseen by the Massachusetts Department of Public Health for children three years old or younger, resulting in an overall comprehensive and intensive treatment approach.
EI services can support the learning and development of children with ASD (Halleland & Harris, 2000; National Research Council [NRC], 2001). A growing literature base provides evidence that EI can affect the developing nervous system (see Dawson, Ashman, & Carver, 2001, for a review) and information-processing abilities (Rogers, 1998) of young children with ASD, fostering improved behavioral outcomes. Although different treatment approaches are used in EI, difficulties arise as treatment outcome studies have not compared these approaches directly. Dawson and Osterling (1997) reviewed eight university-based intervention programs for children with ASD in the United States, and identified the following key elements across treatment approaches: (1) a curriculum focused on areas of attention and compliance, motor imitation, communication, appropriate use of toys, and social skills, (2) highly structured teaching environments with a low student-to-staff ration, (3) systematic strategies for generalizing newly acquired skills to a wide range of situations, (4) maintenance of predictability and routine in the daily schedule, (5) a functional approach to problem behaviors, (6) a focus on skills needed for successful transitions from the early intervention program to the regular preschool or kindergarten classroom, and (7) a high level of family involvement.

**Interventions for Toddlers with ASD**

A central concern for EI providers who work with toddlers with ASD is implementing services that are evidence-based and family-centered. The majority of intervention research for children with ASD has focused on preschool- and school-aged children; very few studies have involved toddlers with ASD. Thus, practitioners often apply strategies designed for older children when working with toddlers with ASD, which is problematic both empirically and theoretically. Empirically, intervention techniques that are designed for older children are being delivered to toddlers with ASD without a supporting evidence base. Additionally, preschool-
aged children have different cognitive capacities, developmental levels, and learning abilities than toddlers. Interventions designed for older children may coincide with their skills and developmental levels but may be too advanced developmentally for toddlers.

Another problem arises because the primary learning contexts and teaching agents of preschool-aged children and toddlers differ. Interventions for older children are designed to be implemented in school settings by teachers. Contrastingly, as noted in Part C of IDEA, "to the maximum extent appropriate to the needs of the child, early intervention services must be provided in natural environments, including the home and community settings in which children without disabilities participate" (34 CFR §303.12(b)). Toddlers spend the majority of their time at home with their caregivers, suggesting that home-based, caregiver-directed instruction is a naturalistic learning context for young children. The manner in which caregivers teach their children may differ from teachers’ instructional styles, although similarities and differences of these dynamics have not been evaluated in the empirical literature. Additionally, caregivers may have a broader array of teaching opportunities that are embedded in daily routines whereas teachers provide instruction through direct teaching methods. Because have different cognitive abilities and learning contexts, interventions designed for preschool- and school-aged children with ASD may be ill-suited for toddlers with ASD given differences in their cognitive abilities, developmental levels, and primary learning contexts. Very few studies have investigated the use of intervention approaches for toddlers (i.e., children up to and including 36 months of age) (e.g., Schertz, Baker, Hurwitz, & Benner, 2011); thus, there is a need to develop and examine intervention techniques that coincide with the developmental levels and learning contexts of toddlers with ASD particularly the use of caregiver-implemented interventions.
Caregiver-Implemented Interventions

There are many benefits associated with caregiver-implemented interventions for children with ASD. For one, caregiver-implemented interventions with professional-directed consultation are a cost-effective service delivery approach. According to Solomon (2008), interventions that are delivered by professionals to young children with ASD cost $25,000 to $60,000 annually. Budgetary restrictions coupled with increasing prevalence rates could prevent state departments from meeting the needs of many young children with ASD and their families; however, training caregivers to implement interventions is a cost-effective way for providing necessary services to a wide population of children with ASD (Diggle, McConachie, & Randle, 2005).

Additionally, young children benefit by learning from adults who are salient in their daily routines. Although children with ASD interact with different direct service providers, including EI clinicians, ABA therapists, and speech-language therapists, the duration and pervasiveness of their daily interactions are brief relative to the duration and pervasiveness of interactions between children and their primary caregivers. Thus, caregiver involvement is important as periods of shared attention and interaction support children’s learning and development (Dawson & Osterling, 1997; Adamson & Bakeman, 1991).

Play and Language Development of Children with ASD

Children with ASD often show marked delays in play and language development. Relative to same-age peers without ASD, children with ASD often perform perseverative actions, repeat play themes at the expense of not learning others, and demonstrate play with minimal to no pretense. Additionally, although the nature of language delays can vary, many
children with ASD have limited social pragmatic skills relative to age-similar peers, including their ability to comment about toys, objects, and ongoing actions.

Researchers have identified interdependencies between play and language development (Lifter & Bloom, 1989; McCune, 1995; Bates, Thai, Whitesell, Fenson, & Oakes, 1989; Stahmer, 1995; Thorp, Stahmer, & Schreibman, 1995). Explanations have centered on developments in mental representation underlying the development of both play and language skills. Through developments in mental representation, children gain an understanding that entities such as objects, toys, and words can be used in the service of something else. For example, children can pretend that a block is a car, while using a word (e.g., “car”), which functions as a verbal symbol, to reference this object being used in play.

Studies suggest that play is a significant predictor of later language abilities (e.g., Charman et al., 2003; McCune-Nicolich, 1981; Sigman & Ruskin, 1999; Toth, Munson, Meltzoff, & Dawson, 2006; Sigman & McGovern, 2005; Smith, Mirenda, & Zaidman-Zait, 2007). In particular, play with elements of pretense (i.e., pretend play, symbolic play) may function as a medium through which children gain the representational competence needed to use verbal symbols meaningfully (Thorp, Stahmer, & Schreibman, 1995). Thus, children with ASD may benefit from interventions that facilitate increases in their play skill developmental and commenting (Kasari et al, 2006; Barton & Wolery, 2010; Lifter & Foster-Sanda, in progress).

**Play Interventions for Children with ASD**

Children with ASD show delays in play (e.g., Hobson, Lee, & Hobson, 2009; Libby, Powell, Messer, & Jordan, 1998; McDonough, Stahmer, Schreibman, & Thompson, 1997; Rutherford, Young, Hepburn, & Rogers, 2007). They have difficulty moving forward in the development of their play and acquiring higher-level play skills, particularly actions with
elements of pretense (i.e., pretend play, fantasy play, sociodramatic play, symbolic play). Delays in play are problematic as they complicate how children engage with and acquire information about their environment; they have a limited repertoire of ways to make meaningful connections between toys and objects, which can limit what they learn about their world and how they consolidate information about their experiences. Having less-developed play relative to same-age peers also minimizes the amount of opportunities children with ASD have to interact and speak with other children. Play can be an activity base in which children communicate reciprocally and engage socially around toys, objects, and activities, but having qualitatively different play than peers minimizes the frequency of common points of interests. Children with ASD have marked delays in their language and social development, and having fewer mutual play interests further limits what they can discuss and jointly reference with peers without ASD.

A large literature base supports the use of play interventions with preschool-aged children with ASD to push them forward in the development of their play skills (e.g., Ingersoll & Schreibman, 2006; Stahmer, 1995; MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009; Kassari, Freeman, & Paparella, 2006; Lifter, Sulzer-Azaroff, Anderson, & Cowdery, 1993; Lifter, Ellis, Cannon, & Anderson, 2005; Wong, Kasari, Freeman, & Paparella, 2007). Through direct teaching in play, children with ASD have learned to demonstrate explicitly taught actions. In a few studies, they have been shown to generate new activities spontaneously. As studies have assessed the maintenance of explicitly taught play skills inconsistently, there is inconclusive evidence in the literature about whether children with ASD persist with performing play activities they acquire through direct interventions in play.

ABA teaching techniques (ABA; Lovaas, Ackerman, Alexander, Firestone, Perkins, & Young, 1981; Zager, 2005) have been applied to teach play skills to children with ASD.
Caregiver-Implemented Play (Stahmer, Ingersoll, & Carter, 2003). Children with ASD have demonstrated progress with play skill development when these teaching techniques are integrated with cognitive-developmental theory to target play skills that are at the leading edge of children’s learning (i.e., developmentally specific [DevSp] play activities), as supported by play assessment data (Lifter et al., 1993, 2005, in progress; Kasari et al., 2006).

Although play interventions have been shown to help children acquire higher-level play skills as a result of the intervention, the existing literature has methodological flaws, warranting the cautious interpretation of study findings. Some studies have inconsistent intrasubject treatment effects (Zercher, Hunt, Schuler, & Webster, 2001), overlapping data across conditions (Taylor & Iacono, 2003), or lack graphs that provide a visual demonstration of intervention results (Sherrat, 2002). Another concern is the frequent lack of procedural fidelity, maintenance data, and the generalizability of findings. Although play interventions have been delivered to preschool-aged children with ASD, few studies include participants under the age of 36 months. Thus, studies with enhanced methodological rigor are needed to evaluate the effects of interventions in play on the play skill development of toddlers (i.e., 36 months of age or younger) with ASD.

**Effects of Caregiver Involvement on the Play and Language Skills of Children with ASD**

Although studies, such as work by Lifter et al (2005), examined the use of play interventions implemented in the home setting, the teaching was delivered by a home-based behavior therapist. In her critique of her study, Lifter noted that future studies should involve the most salient teaching figure within a child’s environment. Thus, interventions designed for toddlers should involve their primary caregiver as the primary teaching figure. Very few studies have investigated the effects of caregiver-implemented play interventions on the play skill
development of toddlers with ASD (e.g., Solomon, Necheles, Ferch, & Bruckman, 2007; Solomon, 2008). Because direct instruction in play moves children forward in the development of their play skills, and caregivers are the primary teaching agents for toddlers, the question arises as to whether toddlers with ASD will benefit from caregiver-implemented play interventions to further their play abilities.

A relationship between children’s involvement in a play intervention and increases in commenting has been revealed in the literature (e.g., Kasari et al., 2006; Barton & Wolery, 2010; Lifter & Foster-Sanda, in progress). When preschool-aged children received direct teaching in play from research investigators and/or teachers, they showed increases in the overall frequency of their commenting. Because caregivers are primary teaching agents for toddlers, the question arises about how caregivers affect the language development of young children. Caregivers’ language has identified as a useful mechanism for scaffolding the language development of children with ASD by helping them acquire words and regard them as conventional symbols (e.g., Hutman, Siller, & Sigman, 2009; Aldred, Green, & Adams, 2004). This approach is particularly effective when communication is embedded within the context of children’s play. Through the natural language paradigm (NLP; Koegel, O’Dell, & Koegel, 1987), which is a teaching strategy that builds upon children’s interests and activities, caregivers can label objects to which children are attending to promote word learning (Luce & Callanan, 2010; Bakeeman & Adamson, 1984; Tomasello & Farrar, 1986), can comment on ongoing play actions to facilitate the formation of related words and phrases (Siller & Sigman, 2002, 2008), and can promote an increased frequency of spontaneous vocalizations (Gillette & LeBlanc, 2007). Because preschool-aged children show increases in their commenting while participating in play interventions, and young children with ASD comment more frequently when caregivers attach language to objects
and ongoing actions, future studies can investigate whether toddlers with ASD show increased commenting while participating in a caregiver-implemented play intervention. Currently, there are no studies that examine how caregiver-implemented instruction in play impacts the commenting abilities of toddlers with ASD.

**Caregiver-Implemented Play Intervention for Toddlers with ASD**

Play interventions that have accounted for children’s specific developmental play level (Lifter et al; 1993, 2005; Kasari et al., 2006) have been delivered by research assistants or home-based therapists to preschool-aged children. Results of these studies provide evidence that children with ASD can demonstrate a wider variety of spontaneous play actions more frequently upon receiving direct instruction of play activities at the emergence level. The approach of teaching developmentally specific play activities has not been applied to toddlers with ASD, although caregiver-giver implemented play interventions have been delivered and investigated in the literature. The Play and Language for Autistic Youngsters (PLAY) Project (Solomon et al., 2007; Solomon, 2008) is a play-based intervention model that is designed to teach caregivers how to implement play-based teaching techniques with toddlers and young children with ASD, particularly through the PLAY Project’s Home Consultation (PPHC) program. This approach builds upon the strengths of naturalistic teaching by having caregivers, the most salient teaching figures in toddlers’ lives, teaching play activities in a naturalistic setting. A primary limitation of the PLAY project is the vague manner of teaching play; caregivers are trained to teach play activities without regard to the specific developmental level of the child’s play skill level. Caregivers are trained to generate a list of activities that are likely to be engaging to their children and then deliver teaching techniques to help children execute these activities while increasing their social pragmatic development within the context of play. These play activities do
not have an empirical or theoretical framework supporting their inclusion within the intervention. Additionally, they have no direct relation to children’s levels of developmental readiness; instead, they are a loose compilation of play activities. More research is needed to examine caregiver-implemented play interventions that teach developmentally specific play activities to toddlers with ASD.

**Rationale and Significance of Study**

This dissertation project was designed to examine how a caregiver-implemented play intervention impacts the play and commenting abilities of toddlers with ASD. Building upon the work of Lifter and colleagues (1993, 2005, in progress), the intervention uses naturalistic behavioral instruction to teach children developmentally specific play activities that they show a developmental readiness to learn. A single-subject, multiple-baseline research design (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005) with replication across children was used to examine how five male toddlers with ASD responded to the play teaching. A single-subject design was selected because it privileges the progress of the individual learner and affords a degree of experimental control when investigating treatment outcomes. A multiple baseline approach with staggering intervention phases was used to increase opportunities for demonstrating experimental effects and to examine comparisons of children’s responsiveness to intervention and inter-subject replication (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005).

The proposed investigation is relevant given the earlier age of ASD diagnosis, the increasing prevalence of ASD, and the significant play and communication delays demonstrated by children with ASD. Systematically, it highlights the paucity of systematic EI play teaching approaches for toddlers with ASD and the importance of developing interventions that build upon salient elements of natural learning environments. This study is the first to implement an
empirically-designed and implemented play intervention approach with toddlers with ASD and to use caregiver-implementation as the primary teaching mechanism. It also builds upon a burgeoning literature base that demonstrates how direct teaching in play can yield simultaneous gains in language and play skills for young children with ASD, and how caregiver-implemented interventions can promote the implementation of naturalistic teaching methods. Additionally, treatment integrity was monitored formatively (i.e., the extent to which caregivers delivered intervention procedures as indicated in training materials) to promote adherence to treatment protocols and enhance confidence that outcome data truly reflect the effects of the investigated teaching approach.

**Relevance for early childhood researchers.** Evidence-based teaching is vital to working with early childhood populations, which places the onus on researchers to examine instructional strategies through comprehensive empirical approaches. Researchers have systematically investigated several evidence-based teaching approaches for young children with ASD; however, this dissertation project was developed to address a gap in the play intervention literature-play interventions for toddlers with ASD. For this study, the student researcher examined the impact of applying evidence-based teaching approaches in the novel context of teaching play to toddlers with ASD.

The student researcher developed this project with the intent of gathering preliminary outcome data that could inform the generation of future play intervention studies for toddlers with ASD. A single-subject, multiple-baseline design was used with the hope that future studies would involve more varied statistical procedures and research designs. Procedures, results, and limitations all are discussed in order to depict the entire process of this study, and provide a
foundation for future research endeavors. Accordingly, research priorities underlay the
development of this project, and was designed to contribute to the early childhood play literature.

**Relevance of study for EI clinicians and school psychologists.** This dissertation project
also represents an effort to inform decision-making about clinical practice with early childhood
populations. Informed by the integration child development and behavioral theory, this study
investigated how five toddlers who were assigned to two groups responded to ABA teaching
approaches. Using a single-subject, multiple-baseline design yielded data about individual
outcomes and group responsiveness, which reflects a priority of early childhood practice: to
deliver strategies that have empirical support for large groups of children but can be tailored to
address a child’s individualized needs. To date, few studies have examined play intervention
approaches for toddlers with ASD, which limits clinicians’ ability to glean teaching strategies
from a relevant evidence base. By examining the effects of caregiver-implemented teaching on
the play and commenting skills of toddlers with ASD, the student researcher endeavored to
provide EI clinicians and school psychologists with an intervention approach that is empirically-
supported, theoretically comprehensive, and applicable for individual service recipients. This
information will optimally be used to assess, intervention, and monitor play interventions for
everal childhood populations, and thus has relevance for EI service providers and school
psychologists who work with young children with ASD.
Chapter 2

Review of the Literature

This chapter, which is divided into six sections, lays the foundation for the proposed research study by outlining the theoretical and empirical rationale for a caregiver-implemented intervention in play for toddlers with ASD. The first section, entitled Play and Early Childhood Development, describes the importance of play to young children’s development from a cognitive-developmental perspective and reviews empirical descriptive studies that reveal the presence of qualitatively unique, sequentially developing play categories; these studies support the consideration of play as a developmental domain and its use as a basis for assessment and intervention activities. Given the connections of play to language and social development, children with disabilities and delays often show delays in play, particularly children with ASD.

The next section, Autism Spectrum Disorders and Early Childhood Development, reviews the diagnostic criteria, biologic and genetic markers, diagnostic methodologies, prevalence, and sociodemographic trends of ASD. Social, language, and play delays shown by children with ASD are described. The third section, Intervention Approaches for Children with ASD, evaluates intervention approaches that have been used with young children with ASD while the fourth section, Play Interventions for Children with ASD, examines the wide range of play interventions implemented with this population. The fifth section, Caregiver-Implemented Interventions, evaluates the strengths and limitations of caregiver-implemented interventions for children and toddlers with ASD. The final section, Rationale and Significance of the Proposed Study, explains the theoretical, empirical and practical relevance of this proposed intervention study and describes the primary research questions, hypotheses, and intervention context.
Play and Early Childhood Development

Importance of Play in Development

Play is a pervasive and natural activity of early childhood. It provides a meaningful context for individualized learning and is central to the development of young children (NAECS/SDE, 2001; Johnson, Christie, & Yawkey, 1999; Lifter, Ellis, Cannon, & Anderson, 2005; Jordan & Libby, 1997). Many contemporary studies on children’s play reflect a cognitive-developmental orientation and are based on the perspectives put forth by Piaget (1962), Axline (1947, 1964), Montessori (1967), and Vygotsky (in Rubin, Fein, & Vandenberg 1983). Based on his theory of assimilation, Piaget (1962, p. 93) described play as a “happy display of known actions;” children assimilate new experiences onto existing frameworks of understanding and subsequently display this new knowledge through their play. Similarly, Axline (1947) described play as “the child’s natural medium of self-expression,” which is an opportunity for the child to “play out his feelings and problems” (p. 8) and experience “himself as a capable, responsible person” and comes to develop “self-respect...a sense of dignity...and increasing self-understanding” (Axline, 1964, p. 67). Both of these theorists propose that children express what they know and demonstrate in their play what they are thinking and feeling. Alternatively, Montessori (1967) and Vygotsky (in Rubin et al., 1983) regarded play as a child-directed means for acquiring new information. Montessori described play as “the child’s work” (1967, p. 180), positing that active engagement with objects and toys of interest push children forward in their cognitive, social, and emotional development. Similarly, Vygotsky proposed that play served as “an adaptive mechanism promoting cognitive growth” (in Rubin et al., 1983, p. 709). In this way, children construct knowledge about their environment and experiences by acquiring new information while making novel relationships between objects and toys with prior knowledge.
Contemporary theories of play synthesize these two perspectives. For example, Lifter and Bloom (1998) define play as,

“…the expression of intentional states -- the representations in consciousness constructed from what children know about and are learning from ongoing events --and consists of spontaneous, naturally occurring activities with objects that engage attention and interest. Play may or may not involve caregivers or peers, may or may not involve a display of affect, and may or may not involve pretense (p. 164).

They propose that play is a demonstration of what children know and what they are thinking about, and that children obtain knowledge about objects, people, and events by integrating new experiences with prior knowledge. This definition sets the stage for play as a domain. If play is an expression of what children know, then an evaluation of children’s play behaviors can be used for an assessment of knowledge. If play is an activity for learning, then interventions in play can be used to help children learn.

**Empirical, Descriptive Studies of Children’s Play**

Research reveals the presence of developmental sequences of play activities, which supports the consideration of play as a developmental domain. Piaget (1962) proposed a developmental sequence of play activities that was comprised of three global terms: (a) “practice games,” which also is known as “sensorimotor play” or “manipulative play,” (b) “symbolic play,” which also is known as “pretend play,” and (c) “games with rules.” Children begin with “practice games” while “symbolic play,” develops toward the end of the second year and continues through the preschool period. The final stage, “games with rules,” emerges toward the end of the preschool period and continues through the stage of concrete operations. The terms “manipulative play” and “symbolic play” represent qualitatively unique varieties of play;
however, these general and global concepts do not accurately characterize the broad and diverse range of children’s play activities. Descriptive studies conducted during the 1970s, 1980s, and 1990s provide greater specificity to the broad conceptualizations of play put forth by Piaget (1962) by revealing the presence of qualitatively unique play activities that develop sequentially from infancy through the preschool period (e.g., Belsky & Most, 1981; Bloom, 1993; Bloom & Tinker, 2001; Fenson, Kagan, Kearsley, & Zelazo, 1976; Fenson & Ramsay, 1980; Garvey, 1977; Lowe, 1975; Lifter & Bloom, 1989; McCune, 1995; Nicolich, 1977; Smilansky, 1968; Watson & Fischer, 1977).

Across studies, various terms have been used to describe categories that comprise play sequences, creating discrepancies within the existing literature. For example, in her review of literature on pretend play, Barton (2010) noted that the term “functional play with pretense” may be used to describe elements of pretend play (e.g., Lifter, Ellis, Cannon, & Anderson, 2005), used as the entire definition of pretend play (e.g., DiCarlo & Reid, 2004), or completely excluded from the definition of pretend play (e.g., Sigman & Ungerer, 1984). Current efforts by Lifter, Foster-Sanda, Young, and Anastasio (in preparation) emphasize similarities among play category terms in order to unify the nomenclature for these activities.

Despite the terminological discrepancies, overarching patterns exist across play behavior sequences. Children’s early play with objects begins with indiscriminate actions (e.g., picking up and dropping, banging, and mouthing objects) and taking apart configurations of objects (e.g., dumping blocks from a bowl). In late infancy, children begin to configure objects and transition them between places (e.g., putting blocks into several bowls). As early toddlers, children begin constructing relationships that exploit the unique physical properties of objects (e.g., stacking cups and blocks) while also relating objects to themselves in a pretend manner (e.g., “drinking”
Caregiver-Implemented Play

from a cup). Children then begin to extend pretend activities to dolls and caregivers (e.g., extending spoon to caregiver’s mouth) and to link activities, showing increased levels of planning (e.g., feeding a doll, washing a doll, and then putting it to bed). Finally, as preschoolers, children start attributing animacy to doll figures (e.g., moving figures to load goods into truck) and engaging in sociodramatic and fantasy play.

**Connections of Play to Language Development**

Vygotsky (1966) posited that play is the means through which language develops, and subsequent research has confirmed a systematic relationship between play and language development (Bates, Thai, Whitesell, Fenson, & Oakes, 1989; Stahmer, 1995; Thorp, Stahmer, & Schreibman, 1995). Transitions in play and language occur simultaneously as the development of mental representation underlies both processes (e.g., Lifter & Bloom, 1989; Westby, 1988; McCune-Nicolich, 1981; McCune, 1995; Pizzo & Bruce, 2010; Mundy, Sigman, Ungerer, & Sherman, 1987; Sigman & Ruskin, 1999; Leslie, 1987; Sigman & McGovern, 2005; Smith, Mirenda, & Zaidman-Zait, 2007; Yoder & Stone, 2006). Sociodramatic play may function as a medium through which children gain the representational competence necessary for the correct use of verbal symbols (Thorp, Stahmer, & Schreibman, 1995). Through engagement in “pretend play,” which is when objects are used in a manner involving pretense (e.g., brushing a doll’s hair), children develop “symbolic function,” or the understanding that objects, actions, (e.g., feeding a doll with a spoon) and words (e.g., saying “toys” to refer to tangible objects) have representational value (Piaget, 1962). It also fosters the development of “representational insight” (DeLoache, 1987, 2000), or the understanding that entities such as words, objects, and toys can be used in the service of something else. Relationships between play and language have been demonstrated in studies of children without disabilities (e.g., Lifter & Bloom, 1989;
McCune, 1995) and children with delays and disabilities, including ASD (e.g., Blanc, Adrien, Roux, & Barthélémy, 2005; Ungerer & Sigman, 1981; Wing, Gould, Yeates, & Brierley, 1977).

**Connections of Play to Social Development**

The social development of young children often is described based on how they play with peers. For example, the *Scale of Social Participation* (Parten, 1932) is a developmental sequence of social behavior in the context of play that can be used to investigate and categorize the social capabilities of young children. Parten identified six stages of social interaction within the context of play: (1) *unoccupied behavior*, in which a child does not interact or play with others and instead attends to momentary interests, (2) *onlooker*, in which a child primarily watches nearby children and begins to interact with them, (3) *solitary play*, in which a child plays alone with toys not being used by nearby children, (4) *parallel activity*, in which a child’s activity begins to be social as it brings him or her into contact with other children, although the child only plays beside others and does not interact with them, (5) *associative play*, in which a child engages in a group activity with overt recognition of common activities, interests and personal associations, and (6) *cooperative play*, in which a child engages in play with others that is characterized by a division of labor, group censorship, the centralization of leadership and control, and the subordination of individual desires to that of the group. This scale has great relevance for investigating social development within the context of play; however, it confounds social engagement with play with objects, and thus does not regard play as a domain with explicit developmental sequences and developmental requirements.

Studies support an association between play and social development. Symbolic play has been linked to the development of social pragmatic skills (Casby, 2003), emotional regulation (Lindsey & Cowell, 2003; Matthews, 2008), and the development of social competence (Uren &
Stagnitti, 2009). Children’s attachment with their caregivers also influences their motivation to play and the quality of executed play actions, perhaps because a secure parental attachment enables children to explore their environment under safe and supportive conditions (Ainsworth, 1978; Bowlby, 1982). Children with more secure parental attachment often display higher-level symbolic play relative to children with less secure parental attachments, as indicated by studies of both children without delays and disabilities (Matas, Arend, & Sroufe, 1978; Meins, Fernyhough, Russell, & Clark-Carter, 1998) and children with autism spectrum disorders (ASD). Demonstrating a correlation between attachment style and symbolic play skills, Marcu, Oppenheim, Koren-Karie, Dolev, and Yirmiya (2009) found that preschool-aged boys with ASD who showed stronger attachment to their caregivers demonstrated higher scores on symbolic play measures relative to same-age peers with less-developed attachments. Naber, Bakermans-Kranenburg, van IJzendoorn, Swinkels, Buitelaar, Dietz, et al., (2008) arrived at similar conclusions for toddlers with ASD. The role of parental attachment thus has important connections to children’s play development.

Another consideration is how social interactions occur within the context of play. Research by Pierce-Jordan and Lifter (2005) supported an inverse relationship between play and social interactions. By observing the naturally occurring play and social engagements of preschool-aged children with and without ASD and categorizing the observed play using criteria from the Developmental Play Assessment (DPA: Lifter, 2000), they found that regardless of the diagnosis, when children were engaged in developmentally difficult, or emerging, play activities they were less likely to engage in social interactions than when they engaged in relatively easy, or mastered, play activities. Likewise, when children were engaged in social interactions, they tended to demonstrate less challenging play behaviors than when they were not engaged in social interactions.
interactions. Based on the cognitive load theory (Sweller, 1988), it was hypothesized that children exert mental energy when engaging in play and social interactions, and that concurrent engagement in play and social interactions during intervention activities creates a competition for cognitive resources that decreases children’s ability to acquire new social or play knowledge.

**Delays in Play**

Children with delays, disabilities, and impaired social and language development often show delays in play. Relative to typically developing children, children with Down syndrome display a level of play that correlates more highly with measures of mental age than with chronological age (Hill & McCune-Nicolich, 1981). They also display less exploratory behavior during play and repetitively elaborate on the same play themes (Cunningham, Glenn, Wilkinson, & Sloper, 1985). The children of mothers who have abused substances have been shown to have immature play strategies and slowly developing complex play (Beckwith, Rodning, Norris, Phillipsen, Khandabi, & Howard, 1994). Similarly, children with visual impairments engage in limited exploration, more solitary play, and less symbolic play relative to same-age peers without visual impairments (Tröster & Brambring, 1994).

Compared to children with Down syndrome and children without delays and disabilities, children with ASD show significant delays in play (e.g., Rutherford, Young, Hepburn, & Rogers, 2007). A large number of studies have investigated play delays shown by children with ASD (e.g., Hobson, Lee, & Hobson, 2009; Libby, Powell, Messer, & Jordan, 1998; McDonough, Stahmer, Schreibman, & Thompson, 1997), revealing the presence of impaired pretend/symbolic play, infrequent spontaneous and imitated play, frequent sensorimotor play and repetitive play schemes, and minimal cooperative play and turn-taking. Overall, many children with ASD have difficulty learning how to play.
**Play as a Developmental Domain**

Play can be regarded as a developmental domain in its own right (Lifter, Foster-Sanda, Arzamarski, Briesch, & McClure, 2011) and shows systematic relationships with other domains (e.g., language, social) in children with and without disabilities (see Vig, 2007 for a review). Children with delayed language and social development often do not make developmental progress in play; they have difficulty engaging with objects and cannot move forward in the development of their play knowledge. These difficulties warrant the need for assessments of and interventions in play.

An assessment of developmental progress in play can provide information about which activities are at the leading edge of a child’s development (i.e., emerging), which are extremely familiar and mastered, and which are presently too difficult for a child. From this information, interventions can be developed to move children forward in the development of their play skills. Table 1 provides examples of play assessments that regard play as a developmental domain and can be used to link assessment data to target intervention activities. This assessment and intervention approach has great relevance for children with ASD as they generally have delays in play and benefit from targeted intervention to move them forward in the development of their play skills.

**Directions for Future Research in Early Childhood Development and Play**

The wealth of research investigating the underpinnings of language and social development in young children reveals systematic developments in play and thus supports the consideration of play as a developmental domain in its own right. As play comes to be regarded more consistently in practice and in the empirical literature as a developmental domain,
additional research would be beneficial to investigate interdependencies between the play, language, and social development of young children.

The use of different terms to categorize similar aspects of developmental play sequences generates terminological confusion in the descriptive play literature. Effective delivery of play assessments and intervention to children with delays and disabilities depends on clarity of terminology, so it is crucial to synthesize the descriptive play literature and develop a consistent nomenclature to describe categories within play sequences. Additionally, most empirically based descriptive studies of children’s play were conducted at least a decade ago. Additional research is needed with more populations of children with delays and disabilities to investigate how their play develops relative to developmental sequences put forth in the literature, and how their play skills compare relative to children without delays and disabilities. Such research would have relevance for children with ASD because this population often presents with appreciable delays in their play skills.

Autism Spectrum Disorders and Early Childhood Development

Autism Spectrum Disorders

ASD are a group of neurodevelopmental disorders that include Autistic Disorder (AD), Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS), and Asperger’s syndrome. These disorders are characterized by impairments in the development of reciprocal social and communication skills, delays in language development, and a restricted repertoire of activities and interests, which impacts the development of play skills (American Psychiatric Association [APA], 2000; Centers for Disease Control and Prevention [CDC], 2007). The majority of ASD in children are over the age of three years when diagnosed, with the median age of earliest diagnosis ranging from 4.5 to 5.5 years (Rice, 2007); however, symptom onset
general occurs during infancy and toddlerhood (De Giacomo & Fombonne, 1998), with approximately 51 to 91 percent of children showing symptoms before three years of age (Rice, 2007).

Two profiles of ASD symptom onset have been identified. In some instances, ASD symptoms can be present before 12 months of age with children showing impaired joint attention, intentional communication, and activity engagement (e.g., Baron-Cohen, Cox, Baird, Swettenham, Nightingale, Morgan, et al., 1996; Baranek, 1999; Lord, 1995; Osterling & Dawson, 1994). Other children may present with typical skill acquisition during infancy and early toddlerhood but then experience skill regressions before three years of age (e.g., De Giacomo & Fombonne, 1998; Davidovitch, Glic, Holtzman, Tirosh, & Safir, 2000; Ozonoff, Williams, & Landa, 2005). As symptom presentation can be indicated accurately at 14 months (Landa & Garrett-Meyer, 2006) and can show high stability at as young as 17 months of age (Worley, Matson, Mahan, Kozlowski, & Neal, 2011), toddlers are being diagnosed with ASD with greater frequency (Lord, Risi, DiLavore, Shulman, Thurm, & Pickles, 2006; Stone, Lee, Ashford, Brissie, Hepburn, Coonrod, et al., 1999).

**Biological and Genetic Markers of ASD**

No biological or genetic markers for ASDs are currently known. Because symptom onset occurs during infancy and toddlerhood, a growing body of research is examining infant and maternal risk factors (King & Bearman, 2011); however, studies have provided inconclusive evidence about the effects of prenatal and perinatal risk factors, including advanced maternal and/or paternal age (e.g., King, Fountain, Dakhlallah, & Bearman, 2009; Croen, Grether, & Selvin, 2002), low infant birth weight (e.g., Itzchak, Lahat, & Zachor, 2011), low Apgar scores (e.g., Eaton, Mortensen, Thomsen, & Frydenberg, 2001), fetal distress (e.g., Glasson, Bower,
Petterson, Chaney, & Hallmayer, 2004), multiple births (e.g., Croen, Grether, & Selvin, 2002), small for gestational age (e.g., Hultman & Sparen 2004; Larsson, Eaton, Madsen, Vestergaard, Olesen, Agerbo, et al., 2005), and birth order (e.g., Croen, Grether, & Selvin, 2002; Durkin, Maenner, Newshaffer, Lee, Cuniff, Daniels, et al., 2008; Bolton, Murphy, Macdonald, Whitlock, Pickles, & Rutter, 1997; Lord, Mulloy, Wendelboe, & Schopler, 1991).

An emerging literature base suggests genetic underpinnings of ASD. Evidence from family and twin studies (e.g., Liu, Zerubavel and Bearman, 2010; Steffenburg, Gillberg, Hellgren, Andersson, Gillberg, Jakobsson, et al, 1989; Ritvo, Freeman, Mason-Brothers, Mo, & Ritvo, 1985; Rutter, 2000), studies of the broader autism phenotype (Pickles, Starr, Kazak, Bolton, Papanikolaou, Bailey et al., 2000), and genetic linkage studies (e.g., Alarcon, Canto, Liu, Gilliam, the Autism Genetic Resource Exchange Consortium, & Geschwind, 2002; International Molecular Genetic Study of Autism Consortium, 1998; Liu, 2001; Ashley-Kock, Wolpert, Menold, Zaeem, Basu, Donnelly, et al, 1999) indicate that several genes play a role in ASD etiology; however, the specific genes underlying ASD etiology have not been identified (Abrahams & Geschwin, 2008; Folstein & Rosen-Sheidley, 2001).

Research also has examined the role of biochemical markers, neuroanatomical variability, and abnormal hemispheric laterality. Inconsistent results have been found regarding the role of biochemical markers, including serotonin (Leboyer, Philippe, Bouvard, Guilloud-Bataille, Bondoux, Tabuteau et al, 1999; McBride, Anderson, Hertzig, Snow, Thompson, Khait et al, 1998), dopamine (Garreau, Barthelemy, Domenech, Sauvage, Num, Lelord et al, 1980; Anderson & Hoshino, 1997), norepinephrine (Gillberg, Svennerholm, & Hamilton-Hellberg, 1983; Minderaa, Anderson, Volkmar, Akkerhuis, & Cohen, 1994) and endogenous opioid peptides (Tordjman, Anderson, McBride, Hertzig, Snow, Hall et al., 1997; Leboyer, Bouvard, Recasens,
Philippe, Guilloud-Bataille, Bondoux et al, 1994). Studies on brain volume variability provide a greater level of support that people with ASD show atypical neural enlargement and reduction across regions of the brain (see Koenig, Tsatsanis, & Volkmar, 2001 for a review), specifically the cerebral cortex (Piven, Arndt, Bailey, & Andreasen, 1996; Courchesne, Press, & Yeung-Courchesne, 1993), cerebellum (Courchesne, Yeung-Courchesne, Press, Hesselink, & Jernigan, 1988; Hsu, Yeung-Courchesne, Courchesne, & Press, 1991; Fatemi, Stary, Halt, & Realmuto, 2001), the limbic system (Bachevalier, 1994; Bauman & Kemper, 1988; Piven, Bailey, Ranson, & Arndt, 1998; Saitoh, Courchesne, Egaas, Lincoln, & Schreibman, 1995), and the corpus callosum (Egaas, Courchesne, & Saitoh, 1995, Piven, Bailey, Ranson, & Arndt, 1997). Despite contradictory findings about which regions are over- and/or under-developed, research suggests that individuals with ASD have impaired neural pathways. Results of cortical EEG studies further support this perspective, suggesting that individuals with ASD demonstrate atypical patterns of hemispheric activation relative to same-age peers, including (1) greater right-than left-hemispheric action during language and motor imitation tasks (Dawson, Warrenburg, & Fuller, 1983), (2) reduced inter- and intra-hemispheric asymmetry during an alert resting state (Cantor, Thatcher, Hrybyk, & Kaye, 1986), and (3) reduced activation in the frontal and temporal circuitry, but not in the parietal circuitry, of the left hemisphere (Dawson, Klinger, Panagiotides, Lewy, & Castelloe, 1995).

Examining the biological and genetic underpinnings of ASD can provide information about factors that underlie social, affective, communication, and play deficits. It also can illuminate relations between biological, behavioral, and developmental characteristics of ASD. Additionally, a deeper understanding of biological and genetic factors can inform the development and implementation of interventions designed for children with ASD.
Increased Prevalence of ASD

ASD prevalence has been investigated starting in the mid-sixties in England (Lotter, 1966) and continues to the present time. Researchers from the CDC in collaboration with the Health Resources and Services Administration (HRSA) found that over a twelve-year period, the prevalence of ASD has increased by 289.5% among children aged 3 to 17 years in the United States (Boyle, Boulet, Schieve, Cohen, Blumberg, Yeargin-Allsopp et al., 2011). On average, ASD prevalence has risen from one in every 2,000 children before 1990 to one in every 110 in 2006 (CDC, 2009). According to the Twenty Fifth Annual Report to Congress on the Implementation of the Individuals with Disabilities in Education Act (Office of Special Education Programs, 2005), approximately 17,032 students between the ages of three and five years and 97,847 students between the ages of six and 21 years were on Individualized Education Plans (IEPs) under the disability category of “autism” in the 50 states, Washington, DC, and Puerto Rico as of 2005.

Several intersecting factors may have influenced the dramatic rise in ASD prevalence. From a systemic perspective, commonly cited explanations include (1) the broadening of diagnostic criteria, (2) changes in diagnostic and assessment measures, (3) earlier recognition of ASD symptoms and younger diagnosis ages, (4) greater awareness of ASD symptoms among professionals, caregivers, and the general public, (5) more resources dedicated to ASD research and treatment, and (6) changes in diagnostic and assessment measures (Matson & Kozlowski, 2011; Posserud, Lundervold, Lie, & Gillberg, 2010). Increased prevalence may also reflect a genuine rise in the number of children presenting with ASD (Wing & Potter, 2002). Additional research is needed to investigate factors that exacerbate the increasing prevalence of ASD, which would contribute to the increased effectiveness of interventions for these children.
ASD Prevalence across Male and Female Children

A large literature base suggests that males show higher ASD prevalence than females. In a review commissioned by the Committee on the Effectiveness of Early Education in Autism of the National Research Council (NRC), Fombonne (2003) identified a 4.3:1 male to female rate ratio across epidemiological studies with an overall age range from birth to young adulthood. In conjunction with the CDC and the Agency for Toxic Substances and Disease Registry (ATSDR), Bertrand, Mars, Boyle, Bove, Yeargin-Allsopp, and Decoufle (2001) demonstrated a male to female rate ratio of 2.7:1 for children between the ages of 3 and 10 with ASD who live in Brick Township, New Jersey. Worley, Matson, Sipes, and Kozlowski (2011) displayed a similar trend with a 1.06:1 male to female rate ratio with a sample of toddlers (i.e., 17 to 36 months old) with ASD who receive early intervention services in Louisiana.

Despite the higher prevalence among males, the sexes appear to differ little in symptom presentation. In a study conducted with 390 caregivers of infants and toddlers with ASD from an early intervention program in Louisiana (Sipes, Matson, Worley, & Kozwolski, 2011), differences in ASD symptom endorsement across gender only occurred with restricted and repetitive behaviors; female toddlers with average cognitive abilities had significantly fewer endorsements on items related to restrictive and repetitive behaviors relative to male toddlers with average cognitive abilities. In contrast, male and female toddlers with lower cognitive functioning demonstrated elevated impairments in social, communication, and behavioral presentation relative to male and female toddlers with average cognitive abilities. Thus, notable differences in ASD symptom presentation across gender were not displayed but instead appeared to occur because of underlying cognitive abilities. Information about underlying cognitive
abilities may provide more relevant information as compared to gender about deficit trends of children with ASD.

**Sociodemographic Trends**

Although ASD affects children across racial, ethnic, and socioeconomic groups (Bertrand et al., 2001; Lainhart, Bigler, Bocian, Coon, Dinh, Dawson, et al., 2006), available research has limited multicultural relevance. The majority of epidemiological studies on ASD have been conducted with non-Hispanic white populations in the United States (e.g., Bertrand et al., 2001; Sipes, Matson, Worley, & Kozwolski, 2011), Canada (Bryson et al., 1988), England (Wing & Gould, 1979; Wing, 1980; Chakrabarti & Fombonne, 2001), France (Fombonne, du Mazaubrun, Cans, & Grandjean, 1997; Cialdella & Mamelle, 1989), Sweden (Steffenburg & Gillberg, 1986), Norway (Sponheim & Skjeldal, 1998), and Iceland (Magnusson & Saemundsen, 2001). The existing research provides minimal information about ASD prevalence from a multicultural perspective, although the literature base is growing.

Sun and Allison (2010), epidemiological research has been conducted with Asian populations in Japan (e.g., Honda, Shimizu, Misumi, Nimi, & Ohashi, 1996; Sugiyama & Abe, 1989, Kawamura, Takahashi, & Ishii, 2008), Hong Kong (Chung, Luk, & Lee, 1990), China (e.g., Zhang, Sui, & Wang, 2008; Yang, Hu, & Han, 2007), Taiwan (Chen, Liu, Su, Huang, & Lin, 2007), and Indonesia (Wignyosumarto, Mukhlas, & Shirataki, 1992). A few studies have evaluated ASD prevalence in the Middle East, specifically Israel (Davidovitch, Holtzman, & Tirosh, 2001; Kamer, Zohar, Youngmann, Diamond, Inbar & Senecky, 2004) and Iran (Ghanizadeh, 2008). There is a paucity of epidemiological research in Central and South America, with the exception of Venezuela (Montiel-Nava & Pena, 2008); however, diagnostic studies have been conducted in Brazil (Bandim, Ventura, Miller, Almeida, & Costa, 2003;
Duarte, Bordin, de Olierira, & Bird., 2003; Lowenthal, Paula, Schwartzman, Brunoni, & Mercadante, 2007) and Costa Rica (McInnes et al., 2005). Only a few reports about ASD in Africa have been published (Kahn & Hombarume, 1996; Lotter, 1978; Mankoski, Collins, Ndosi, Mgalla, Sawratt, & Folstein, 2006).

Race and ethnicity. Investigations of race- and ethnicity-specific ASD prevalence are inconclusive. One commonly cited position is that non-Hispanic black children show a higher ASD prevalence rate relative to same-age peers with different racial and ethnic identities. This trend was demonstrated among second-generation Afro-Caribbean children relative to non-Hispanic white children in the United Kingdom (Wing, 1980; Goodman & Richards, 1995) and among non-Hispanic black children relative to non-Hispanic white children living in Missouri (Hillman, Kanafani, Takahashi, & Miles, 2000). In a study of sociodemographic data gleaned from the Metropolitan Atlanta Developmental Disabilities Surveillance Program (MADDSP), Bhasin and Schendel (2007) found that non-Hispanic black children were more likely to be identified as having ASD in the school setting relative to non-Hispanic white peers; ASD risk for non-Hispanic black children was elevated at non-school sources but was not significant.

In contrast, data from the Autism and Developmental Disabilities Monitoring (ADDM) Network displayed appreciable overlap of prevalence rates for non-Hispanic black and non-Hispanic white children in five areas of the United States, although non-Hispanic black males showed higher prevalence then non-Hispanic white males in Georgia. A report by Yeargin-Allsopp, Rice, Karapurkar, Doernberg Boyle, and Murphy (2003) also revealed similar prevalence rates for non-Hispanic black and white children in Georgia. Using multivariate analytic techniques to analyze data from the California Department of Developmental Services (DDS), Croen, Grether and Selvin (2002) found a slightly higher ASD prevalence in non-
Hispanic black children relative to non-Hispanic white children, Hispanic children, and Asian children; however, they hypothesized that results may not reflect a greater prevalence of ASD per se but instead stem from an ascertainment bias as non-Hispanic black families from the study population may have be more likely than non-Hispanic white families to use the service delivery systems that granted them access to diagnoses and treatment. Additional research is needed to examine how patterns of ASD prevalence for non-Hispanic black children are influenced by etiological implications, phenotypic expressions of the disorder, and systemic factors, such as how children are identified by service providers and families’ access to health care (Mandell, Listerud, Levy, & Pinto-Martin, 2002).

Some studies report lower ASD prevalence among Hispanic children than among non-Hispanic white children. Croen et al. (2002a, 2002b) found that Hispanic women (n.b., race was not identified by the authors) who were born in Mexico were less likely to have children diagnosed with ASD relative to non-Hispanic white women and women born in “other countries” (n.b., other countries not specified by author). Palmer, Walker, Mandell, Bayles, and Miller (2010) found significantly lower ASD rates among school districts in southern Texas with a predominance of economically disadvantaged Hispanic children with lower median household incomes; however, they caution against making assumptions about prevalence based on these findings without considering the potential influence of socioeconomic indicators. They propose that relative to non-Hispanic white children, Hispanic children may be less likely to have health insurance, three times as likely to live in households that fall below the poverty line, twice as likely to lack a regular source of medical care, and 1.3 times as likely to experience difficulty accessing specialty care. Given these conditions, ASD may be underdiagnosed in Hispanic children, resulting in a research trend that suggests lower prevalence rates relative to non-
Hispanic white children. Future research is needed to investigate whether lower prevalence is attributable to factors such as parental immigration, socioeconomic indicators, and access to medical care rather than a lower genetic susceptibility.

**Immigrant caregivers.** Research reveals mixed findings about whether ASD prevalence is higher among children with caregivers who immigrated to their current countries of residence. Wing and Gould (1979) found higher ASD prevalence among the children of first-generation immigrant caregivers in England while Tanoue, Oda, Asano and Kawashima (1998) found higher prevalence among children with caregivers who had moved from other parts of Japan. Croen, Grether, and Selvin (2002) found a lower ASD prevalence rate among the children of women who were born in Mexico relative to women who were born in California or were born in “other countries.” Among a sample of children with ASD living in a Swedish city, Gillberg, Steffenburg, Borjesson, and Andersson (1987) found that children with caregivers who immigrated to Sweden were more likely have ASD relative to age-matched peers who had caregivers that were born in Sweden; however, this trend was not found in children who lived in rural areas of Sweden. Building upon the latter finding, Gillberg and Gillberg (1996) later analyzed the cases of 15 children with ASD who had caregivers that immigrated to Sweden and found that ASD risk did not appear to be related to maternal immigrant status but instead to one caregiver having a diagnosis of ASD. Other findings contradict the hypothesis that children of immigrant caregivers have a higher likelihood of being diagnosed with ASD relative to same-age peers who were born in the country in which they reside currently (e.g., Ritvo, Freeman, Pingree, Mason-Brothers, Jorde, Jenson, et al., 1989; Webb, Lobo, Hervas, Scourfield, & Fraser, 1997; Magnusson & Saemundsen, 2000; Powell, Edwards, Edwards, Pandit, Sungum-Paliwal, & Whitehouse, 2000; Bertrand et al., 2001; Croen, Grether, Hoogstrate, & Selvin, 2002).
**Socioeconomic status.** Data are inconclusive regarding the association between ASD prevalence and socioeconomic status (SES). Early clinical studies (e.g., Eisenberg & Kanner, 1956; Cox, Rutter, Newman, & Bartak, 1975; Finnegan & Quarrington, 1979; Hoshino, Kumashiro, Yashima, Tachibana, & Watanabe, 1982; McCarthy, Fitzgerald, & Smith, 1979) and more recent population-based studies (Lotter, 1967; Treffert, 1970; Fombonne, Simmons, Ford, Meltzer, & Goodman, 2001; Croen, Grether, & Selvin, 2002; Bhasin & Schendel, 2007; Williams, Thomas, Sidebotham, & Emond, 2008; Maenner, Arneson, & Durkin, 2009) reveal associations between indicators of socioeconomic advantage, such as household income, parental education, and ASD risk. Croen, Grether, and Selvin (2002) found that women with a postgraduate education were four times as likely to have a child with ASD relative to women with a high school education. Results of a surveillance-based, cross-sectional study by Durkin, Maenner, Meaney, Levy, DiGuiseppi, Nicholas, et al. (2008) displayed a SES gradient in ASD prevalence as 8-year-old children with ASD were less likely to live in census block groups classified as “poverty areas” and more likely to live in census block groups with higher adult educational achievement and median house incomes.

In contrast, other clinical studies (e.g., Cialdella & Mamelle, 1989; Cryan, Byrne, O’Donovan, & O’Callaghan, 1996; Ritvo, Cantwell, Johnson, Clements, Benbrook, Slagle, et al., 1971; Scholper, Andrews, & Strupp, 1970; Tsai, Stewart, Faust, & Shook, 1982; Burd, Severud, Kerbeshian & Klug, 1999) and epidemiological studies (Wing, 1980; Gillberg & Schaumann, 1982; Steffensburg & Gillberg, 1986; Larsson et al., 2005) have not found evidence that associates higher SES with increased risk of ASD. These findings not only reflect an uncertainty about the relationship between ASD and SES but also reveal difficulties with making meaningful comparisons about SES from a multicultural perspective. For example, Ghanizadeh (2008) could
not determine SES using measures like the four-factor Hollingshead Scale (1975) because the Iranian neighborhoods from which he recruited study participants do not conceptualize SES in the manner reflected by this scale nor are there any official city criteria for measuring SES. Thus, he assumed that students attending a specific school belonged to the same SES category. Differences in how communities conceptualize SES affect how findings are interpreted regarding the association between ASD and SES.

Children with ASD do not have homogeneous sociodemographic profiles. The intersection of different characteristics can impact how symptoms of ASD present, and how these symptoms are understood within the context of a child’s family and community. Remaining mindful of these sociodemographic characteristics is essential for providing equitable, ecologically-relevant care to children with ASD and their families.

**Diagnosing ASD**

ASD diagnoses are based on behavioral criteria and developmental history (Klinger, Dawson, & Renner, 2003). Clinicians use different approaches to inform diagnostic decision-making. Some rely solely on clinical judgment while others incorporate results from standardized measures. The latter approach has been shown to enhance the stability and accuracy of ASD diagnoses (Lord et al, 2006).

A broader understanding of ASD diagnostic criteria facilitated the development of several standardized instruments, affording clinicians the flexibility to use whichever tool best fits the needs and profile of the child they are testing. Certain measures are used for children older than three years of age, such as the Childhood Autism Rating Scale (Schopler, Reichler, De Vellis, & Daly, 1980), while others are intended for early detection, including the Checklist for Autism in Toddlers (CHAT: Baron-Cohen et al., 1996), the Modified Checklist for Autism in
Toddlers (M-CHAT, Robins, Fein, Barton, & Green, 2001), the Pervasive Developmental Disorders Screening Test (PDDST Siegel & Hayer, 1999) and the Screening Tool for Autism in Two-Year-Olds (Stone, Coonrod, & Ousley, 2000). The Autism Diagnostic Interview–Revised (ADI-R: Lord, Rutter, & Le Couteur, 1994) is a standardized, semi-structured, hour-long caregiver interview for children with a mental age of 18 months and up that provides information about both current symptoms and prior symptoms. The Autism Diagnostic Observation Schedule-Generic (ADOS-G: Lord et al, 2000) is a 30-minute, standardized, semi-structured play session for children who are 30 months or older that assesses symptoms within the context of a child’s developmental level; results of this measure are used in conjunction with a caregiver interview. Tailoring diagnostic evaluations by selecting the measure that is best suited to the child being assessed has made diagnostic decision-making a more systematic, individualized and accurate process for clinicians.

For older toddlers with ASD, the ADOS-G presents as the most ideal measure because data from semi-structured play sessions can be integrated with caregiver report information to provide a comprehensive depiction of a child’s developmental skills across settings and observers. The ADI-R may be the best option for younger children with ASD (i.e., 18 months and up); however, results are derived solely from caregiver report and are not necessarily supported by direct, systematic observations of children’s behavioral and developmental presentation. Thus, children with ASD are not given the opportunity to display their skills for the purposes of diagnostic decision-making.

**Delays in the Social Development of Young Children with ASD**

The theory of mind hypothesis holds that children develop the ability to perceive the thoughts, feelings, and intentions of others; however, children with ASD have impaired theory of
mind, which impacts their social development (Baron-Cohen, 1995; Mastrangelo, 2009). Social deficits are among the first core symptoms demonstrated by young children with ASD (Zwaigenbaum, Bryson, Lord, Rogers, Carter, Carver, et al, 2009). Research conducted with preschool-aged children revealed that children with ASD engage in social behaviors less frequently and consistently than same-age peers without ASD (Pierce-Jordan & Lifter, 2005). They show minimal eye contact and impaired joint attention (Charman & Baron-Cohen, 1997; Morgan, Mayberry, & Durkin, 2003), and have appreciable difficulties with elements of social interactions, including: (1) the initiation and maintenance of social engagements (Koegel, Koegel, Frea, & Fredeen, 2001; Shabani, Katz, Wilder, Beauchamp, Taylor, & Fischer, 2002), (2) observing, comprehending, and responding to the actions of others (Mastrangelo, 2009), and (3) understanding the expression of emotion (Soucy, 1997). These challenges persist as children with ASD mature and have trouble understanding more complex social information, such as empathy, deception, humor, and teasing (Brown & Whiten, 2000). With delays in their theory of mind development and a limited repertoire of social pragmatic skills, children with ASD engage in solitary play and/or repetitive and self-stimulatory behavior instead of interacting with adults and peers (Schleien, 1990, p. 318). Thus, children with ASD benefit for direct instruction around interacting and engaging with others (McGee, Almeida, Sulzer-Azaroff, & Feldman, 1992).

**Delays in the Language Development of Young Children with ASD**

Impairments in language and communication are a hallmark characteristic of ASD (APA, 2000). There is considerable individual variation in language development for children with ASD (Weismer, Lord, & Elser, 2010). About 40% of children with ASD are non-verbal while 25%–30% of children with ASD acquire words between 12 to 18 months of age but later
experience a regression. Other children do not speak in early childhood but gradually gain and use language throughout childhood (Johnson, 2004).

Relative to peers of the same chronological age and nonverbal cognitive level, children with ASD often show significant language deficits, particularly with vocabulary and grammatical abilities (Thurm, Lord, Lee, Newschaffer, 2007; Eigsti, de Marchena, Schuh, & Kelley, 2011). One area of particular concern is “language play,” which is spontaneous and interactive commenting that occurs in the context of play. To prevent confusion with terminology, the term “language play” will be called “commenting” throughout this investigation. Research conducted by Corbett and Prelock (2006) suggests that children with ASD use “sound play” more frequently during play (i.e., melodic, rhythmic strings of syllables including chanting, humming, singing and conversation-like babble) while peers without ASD use language with more grammatical content and pragmatic relevance. Thus, children with ASD show less developed commenting during play relative to same-age peers without ASD. Commenting is important to the development of young children. It is a sociolinguistic pragmatic skill that affords connections to other’s in the child’s environment. It also moves children with ASD beyond the pragmatic function of requesting.

Infants and toddlers may show symptoms of ASD, particularly delayed communication and language development, that are later attributed to a hearing impairment or hearing loss. Thus, hearing impairments and ASD may be considered possible diagnoses, either singularly or with co-morbidity, when a young child shows communication and language impairments (Jure, Rapin, & Tuchman, 1991). Toddlers with compromised hearing without ASD often show communication impairments, although the extent of these delays is less pronounced relative to toddlers with ASD without compromised hearing (Worley, Matson, & Kozlowski, 2011).
Evaluating how hearing impacts the communication and language presentation of children with ASD or determining whether hearing loss solely underlies communication and language delays is necessary for accurate and relevant treatment planning.

**Delays in Play Development of Children with ASD**

As play skills develop and children demonstrate play with elements of pretense (i.e., pretend play, symbolic play), they are required to enact a play sequence while recognizing that elements of the play are not tangible (e.g., that child is not actually feeding food to a doll when scooping a spoon into an empty cup and extending it to the doll’s mouth) (Mastrangelo, 2009; Morgan, Maybery, & Durkin, 2003). This awareness requires a well-developed theory of mind, which also is integral to social development. Research suggests that children with better-developed theory of mind show higher levels of pretend and fantasy play than peers with less-developed theory of mind (Rutherford & Rogers, 2003); thus, children with ASD may show less developed play relative to peers without ASD because of deficits in their theory of mind development.

According to DSM-IV (APA, 2000) criteria, children with ASD show a “lack of varied, spontaneous make-believe play or social imitative play appropriate to the developmental level.” Research highlights the infrequent presentation of spontaneous pretend/symbolic play (Baron-Cohen, 1987; Stahmer, 1995; Hobson, Lee, & Hobson, 2009; Lewis & Boucher, 1988; Libby, Powell, Messer, & Jordan, 1998; Rutherford & Rogers, 2003; Wulff, 1985), restricted functional play and object exploration (Atlas, 1990; Williams, Reddy, & Costall, 2001; Pierce & Courchesne, 2001), and recurrent patterns of play that are repetitive, ritualistic, and perseverative (e.g., Paterson & Arco, 2007; Wetherby, Woods, Allen, Cleary, Dickinson, & Lord, 2004; Jarrold, Boucher, & Smith, 1996). Children with ASD also have difficulty executing spontaneous
play (Van Berckelaer-Onnes, 2003) imitating play actions demonstrated by others in unstructured settings, exacerbating the pervasiveness of perseverative play (e.g., Sigman & Ungerer, 1984; Lewis & Boucher, 1988; McDonough, Stahmer, Schreibman, & Thompson, 1997; Charman & Baron-Cohen, 1997; Riguet, Taylor, Benaroya, & Klein, 1981). Delays in play are problematic, impacting how children with ASD learn, acquire knowledge, process information, and understand their world.

**Directions for Future Research for Children with ASD**

As ASD prevalence increases and children receive diagnoses at earlier ages, more research is needed to investigate factors that influence prevalence rates, the role of biological genetic markers, the influence of environmental and systemic risk factors, and patterns of symptom presentation that are displayed by young children. From a multicultural and ecological perspective, there should be an increased focus on diagnostic characteristics and sociodemographic trends of various populations of children with ASD. Given this diversity, diagnostic tools and decision-making processes should be evaluated to better understand the effects of potential test biases and performance discrepancies, and to acknowledge factors with important developmental effects, including parental acculturation, bilingualism, and gender role expectations. Ensuring that evaluation results accurately reflect children’s abilities and skills can help improve the likelihood that assumptions and clinical decisions made about children with ASD are generated from relevant and equitable assessment data.

Given the increasing prevalence, there is a great need to further explore the nature of social, language, and play delays shown by children with ASD. Increased emphasis should focus on delays and symptom patterns shown by infants and toddlers as children are receiving
diagnoses at younger ages. A better understanding of the social, language, and play delays also warrants a stronger focus on intervention approaches to use with young children with ASD.

**Intervention Approaches for Children with ASD**

Many interventions designed for children with ASD come from the tradition of behavior theory and applied behavior analysis (ABA; Lovaas, Ackerman, Alexander, Firestone, Perkins, & Young, 1981; Zager, 2005; Stahmer, Ingersoll, & Carter, 2003). The most popular and well-researched approaches include: (1) in vivo modeling, (2) video modeling, (3) discrete trial training (DTT), (4) pivotal response training and (5) incidental learning. Each approach has unique strengths and limitations regarding how their application (1) fosters skill acquisition during treatment, (2) facilitates the generalization of skills across settings and contexts, which is difficult for children with ASD (Paul, 2008), and (3) promotes the maintenance of skills post-intervention.

**Intervention Approaches for Children with ASD**

**In vivo and video modeling.** Bandura’s social learning theory (1977, 1986) posits that people learn new behaviors by watching others and reenacting what they observed. As children with ASD can benefit from observational learning, in vivo modeling and video modeling often are integrated into interventions for this population. In vivo modeling is an evidence-based approach that uses adult and children models to teach various skills to children with ASD. Early research found limited support for using adult models to teach children with ASD (e.g., Barry & Overmann, 1977; Varni, Lovaas, Koegel, & Everett, 1979); however, later studies found that children with ASD acquired new behaviors and skills through this approach, showing improvements in labeling (Charlop, Schreibman, & Tyron, 1983), following one-step commands (Egel, Richman, & Koegel, 1981), and play skill development (Tryon & Keane, 1986; Jahr,
Eldevik, & Eikeseth, 2000; Goldstein & Cisar, 1992). Although adults or children can serve as models, research suggests that children with ASD demonstrate skill acquisition regardless of whether the models are adults or age-similar peers with typical development (Barry & Overmann, 1977; Ihrig & Wolchik, 1988).

Video modeling evolved from the in vivo modeling literature and has gained appreciable popularity with ABA interventionists. With this approach, children are shown recorded samples of a model performing target skills and behaviors and are given the opportunity to practice what they observed. Video recording samples vary in duration, ranging from five seconds (Corbett, 2003) to 20 minutes (Lasater & Brady, 1995) in length. Many video samples feature self-modeling (Buggey, Toombs, Gardener, & Cervetti, 1999; Buggey, 2005; Dowrick, 1999; Bellini, Akullian, & Hopf, 2007), which involves recording the child performing the target skill or behavior, or first-person perspective taking, which involves only showing the model’s hands with voice narration (Shipley-Benamou, Lutzker, & Taubman, 2002). Other video samples feature adult models (e.g., Charlop-Christy, Le, & Freeman, 2000; Charlop-Christy & Daneshvar, 2002; D’Ateno, Mangiapanello, & Taylor, 2003; LeBlanc, Coates, Daneshvar, Charlop-Christy, Morris, & Lancaster, 2003), peer models (e.g., Haring Kennedy, Adams, & Pitts Conway, 1987; Simpson, Langone, & Ayers, 2004), or sibling models (e.g., Reagon, Higbee, & Endicott, 2006; Taylor, Levin, & Jasper, 1999); however, the actual model is not critical to the efficacy of video modeling as children have been shown to respond to video modeling interventions across model types (Sherer, Pierce, Paredes, Kisacky, Ingersoll, & Schreibman, 2001). Used with children with ASD ranging from 3 to 21 years of age, video modeling is an intervention technique that has been used with toddlers with ASD (e.g., Kleeberger & Mirenda, 2010).
There currently are four main types of video modeling intervention approaches: (1) priming, (2) error correction procedures, (3) video prompting, and (4) simultaneous video modeling. With priming, children watch a video sample and then have the opportunity to reenact the observed skill or behavior (e.g., Charlop & Milstein, 1989; Schreibman, Whalen, & Stahmer, 2000). Error correction procedures are teaching techniques that only apply video modeling when target skills are demonstrated incorrectly or are not demonstrated (e.g., Reeve, Reeve, Townsend, & Poulson, 2007). Video prompting involves showing observers the first step of a target skill and allowing them to practice it before proceeding to the next video recorded step. With simultaneous video modeling, observers practice the target skill or behavior while watching the video (Kinney, Vedora, & Stromer, 2003; Taber-Doughty, Patton, & Brennan, 2008).

The focus of video modeling interventions has included: (1) language and communication skills (Buggey, Toombs, Gardener, & Cervetti, 1999; Charlop & Milstein, 1989; Charlop-Christy, Le & Freeman, 2000; Lowy Apple, Billingsley & Schwartz, 2005; Wert & Neisworth, 2003; Sherer et al. 2001), (2) perspective taking (Charlop-Christy & Daneshvar, 2003; LeBlanc et al., 2003), (3) emotion perception (Corbett, 2003), (4) social interaction skills (Apple, Billingsley, & Schwartz, 2005; Buggey, 2005; Maione & Mirenda, 2006; Nikopoulos & Keenan, 2004; LeBlanc et al., 2003; Sherer et al., 2001; Bellini, Akullian, & Hopf, 2007), and (5) play skills, including reciprocal play (Nikopoulos & Keenan, 2004; MacDonald, Clark, Garrigan, & Vangala, 2005), motor and verbal play sequences (D’Ateno, Mangiapanello, & Taylor, 2003), play-related commenting (Taylor, Levin, & Jasper, 1999; Macdonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009), and sociodramatic play (Nikopoulos & Keenan, 2003; Dauphin, Kinney, & Stromer, 2004). Additionally, Haring, Kennedy, Adams, and Pitts-Conway
(1987) used video modeling to promote the generalization of previously learned skills by showing the skill practiced in different settings.

Both in vivo modeling and video modeling have been shown to be effective not only in teaching new behaviors to children with ASD but also in promoting generalization and maintenance (Charlop-Christy, Le, & Freeman, 2000); however, relative to in vivo procedures, video modeling may facilitate a faster acquisition of specific tasks and a broader generalization across people, settings, and stimuli, rendering prompting and reinforcement outside of the video modeling context unnecessary (i.e., unnecessary for experimenters to provide cuing) (Charlop-Christy et al., 2000; D’Ateno, Mangiapanello, & Taylor, 2003; MacDonald, Clark, Garrigan, & Vangala, 2005). Research by Charlop-Christy, Le, and Freeman (2000) suggests that video modeling procedures are time- and cost-effective as they only require one-third of the time and half the cost of in vivo modeling. They also allow a larger range of children to receive treatment as recorded samples can be used with other children (Charlop-Christy, Le, & Freeman, 2000). Using video samples may lend to more specific and targeted intervention approaches as models can be filmed performing target skills and behaviors across settings, models and contexts, which can promote generalizability (Haring et al. 1987; Charlop & Milstein, 1989), and can be filmed until their performance meets the desired intervention standards (Hine & Wolery, 2006). This technique may coincide with the visual preference and strength shown by many individuals with ASD (Shipley-Benamou, Lutzker, & Taubman, 2002; Quill, 1997; Zihni & Zihni, 2005) and build upon the reinforcing appeal that technology, including television, have for many children with ASD (Charlop-Christy, Le & Freeman, 2000). It also provides discrete opportunities to observe skill performance without distractions that can confound children’s attention to the teaching stimuli (MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009; Charlop-Christy &
Daneshar, 2003); that is, video modeling reduces the extent to which social engagements (Hine & Wolery, 2006; Charlop & Milstein, 1989) and competing environmental stimuli (Lovaas, Koegel, & Schreibman, 1979) confound children’s attention to and demonstration of target skills and behaviors.

The video modeling approach is limited as there is no empirical support to indicate which children may benefit from this method or whether children need to have prerequisite skills in order to learn a new skill through video modeling. Although children with stronger visual skills may benefit from this approach, it is unclear which aspects of the visual medium are necessary and sufficient for treatment (Corbett & Abdullah, 2005). Even children with strong visual skills will not benefit from explicit video modeling teaching if they are not attending to the video monitor; in contrast, children can receive prompting to attend to stimuli with in vivo procedures, which are not provided with video modeling. Relative to video modeling, in vivo procedures may help children with ASD generalize learned skills to other same-aged children (Charlop, Schreibman, & Tryon, 1983; Egel, Richman & Koegel, 1981) as teaching occurs with children playing alongside peers; however, the extent to which both modeling procedures can promote generalization is unclear as research has revealed contradictory findings (e.g., Tryon & Keane, 1986; Charlop-Christy, Le, & Freeeman, 2000). Additionally, watching video samples may be insufficient for promoting skill acquisition as children with ASD may require in vivo cueing and verbal prompting to perform what they had observed (Hine & Wolery, 2006); thus, a mixed-approach with integrated video modeling and in vivo prompting, cueing, and reinforcement may optimize the rate of skill acquisition (Charlop & Milstein, 1989, Shipley-Benamou, Lutzker, & Taubman, 2002).
**Discrete trial training.** Discrete trial training (DTT) is an evidence-based approach used frequently with children with ASD (Smith, 2001; Stahmer, Ingersoll, & Carter, 2003; Tarbox & Najdowski, 2008; Quill, 1995). Wolf, Risley and Mees (1964) were some of the first researchers to investigate this approach by using DTT to teach a young boy with ASD to increase his vocalizations, while the seminal work of Lovaas and his colleagues (1977, 1981, 1987) increased the popularity of this approach for children with ASD. DTT generally is used to increase the behavioral repertoires of individuals with ASD by teaching specific skills through highly structured, adult-directed instruction (Stahmer, Ingersoll, & Carter, 2003). Complex skills are segmented into subskills, which are taught through a series of teaching trials. Teaching trials consist of four key elements: (1) the trainer’s presentation, (2) the child’s response, (3) a consequence or reinforcement, and (4) a short pause between the consequence and the next instruction (i.e., between-trials interval) (Maurice, Green, & Luce, 1996). Techniques like shaping, prompt fading, and least-to-most prompting (Sulzer-Azaroff & Mayer, 1991) are applied systematically to facilitate children’s demonstration of target activities, thereby providing opportunities to reinforce their demonstration. Children with ASD can receive anywhere from a few minutes to several hours of DTT daily (Smith, 2001).

DTT has been used to teach a wide variety of skills to children with ASD. Certain studies have examined how interventions that only use DTT effect the acquisition of skills, speech formation and phrase expansion (e.g., Young, Krantz, McClannahan, & Poulson, 1994), sign language (Carr & Dores, 1981), motor movements like coloring and cutting with scissors (Lovaas, Ackerman, Alexander, Firestone, Perkins, & Young., 1981), matching (Lovaas, Koegel, & Schreibman, 1979) communication, self-care, and social interaction (Newsom, 1998), and play (Nuzzolo-Gomez, Leonard, Ortiz, Rivera, & Greer, 2002; Santarcarangelo, Dyer, & Luce, 1987).
Other studies have incorporated DTT with other ABA approaches, such as incidental teaching (Kasari, Freeman, & Paparella, 2006).

The benefits of DTT have been studied extensively and are well established in the literature (Stahmer, Ingerssol, & Carter, 2003; Tarbox & Najdowski, 2008). The high degree of structure and control maintained by the therapist allows for the explicit teaching of goals. Every teaching trial is brief, allowing for the presentation of several teaching trials; this quicker rate allows for more repetitions of target behaviors and learning trials during therapy, affording children the opportunity to practice skills more frequently and achieve mastery more quickly. Working individually with the child allows the interventionists to tailor goals and teaching strategies to best fit the child’s specific needs (Smith, 2001). Having predetermined goals and teaching techniques lends to straightforward data collection, which simplifies the process of monitoring children’s responsiveness to intervention. Another advantage is that training teachers to implement DTT is straightforward as they are given predetermined instructions, scripts, and reinforcers to deliver to children.

The DTT approach also has limitations. The highly structured learning environment is adult-directed and may not build upon children’s interests and motivations. Responsiveness to intervention may be compromised with DTT as children often resist structured instruction. Trials usually are presented as the therapist and child face each other and are presented in rapid succession, which can be an unnatural learning style for many young children (Maurice, Green, & Luce, 1996). Sessions generally are conducted in settings and under conditions apart from children’s daily activities (Pretti-Frontczak & Bricker, 2004), which is problematic as teaching out of the context of children’s daily activities may reduce generalizability. The high degree of structure can lead to rote responding, and children can have difficulty transferring skills obtained
during highly structured sessions to their daily routine when shaping, prompting, and
reinforcement is variable and/or unavailable. Furthermore, providing external reinforcers that
have no inherent relation to the presented learning approach may hinder the extent to which
children can generalize skills to other contexts and settings (Rosenblatt, Bloom, & Koegel,
1995). Given all of the above considerations, DTT can be an important element of programming
for children with ASD but should not be the only methodology implemented; to optimize
learning and promote skill generalization, DTT should be integrated with naturalistic teaching
approaches, which includes pivotal response training and incidental learning.

**Pivotal response training.** Pivotal response training (PRT: Koegel, Koegel, &
McNerney, 2001; Koegel, Koegel, Harrower, & Carter, 1999; Koegel, Koegel, Shoshan, &
McNerney, 1999; Koegel, O’Dell, & Koegel, 1987; Stahmer & Gist, 2001; Thorp, Stahmer, &
Schreibman, 1995) is an approach that integrates systematic teaching with children’s interests to
promote their motivation to respond to learning. Similar to DTT, PRT addresses common
impairments shown by children with ASD, including communication, language, and play delays,
through structured, adult-directed interactions between the therapist and child. PRT differs from
DTT as teaching is less restrictive as sessions (1) incorporate turn taking to allow for modeling
and a more individualized learning pace, (2) build upon children’s interests and preferences by
allowing them to choose stimuli from amongst those provided by the therapist (Koegel, O’Dell,
& Koegel, 1987), (3) intersperse mastered tasks with learning tasks (Dunlap, 1984), (4) reinforce
target response approximations, and (5) involve reinforcers that relate directly and inherently to
children’s responses (Koegel & Williams, 1980).

With PRT, attention is paid to increasing children’s motivation to respond to learning
tasks, which is evaluated based on the frequency of their responding, the duration of response
latency, and affective reactions to the presented learning task (Koegel, Koegel, & McNerney, 2001). As children with ASD often show stimulus over-selectivity (Allen & Fuqua, 1985; Schreibman, Kohlenberg, & Britten, 1986), another focus of PRT is to encourage children to respond to multiple cues in their environment, which can enhance their responsiveness to social cues and increase learning and generalization (Burke & Cerniglia, 1990). Attention to social cues is enhanced when children begin to show improved self-management skills, which is difficult for many children with ASD. As noted in a comprehensive review by Koegel, Koegel, and McNerney (2001), PRT interventions have incorporated self-management techniques to address difficulties shown by people with ASD around personal competence, problem-solving, and independence (Koegel & Koegel, 1995), stereotypy (Koegel & Koegel, 1990), social skills (e.g., Reese, Sherman, & Sheldon, 1984), disruptive behavior (e.g., Newman, Tuntigian, Ryan, & Reinecke, 1997), academic skills (Harris, 1986), language (Laski, Charlop, & Schreibman, 1988), and play (e.g., Stahmer & Schreibman, 1992; Koegel, Dyer, & Bell, 1987; Haring & Lovinger, 1989).

PRT presents as a time and cost-effective intervention approach. Great emphasis is placed on pivotal areas of functioning, including motivation, responsiveness to cues, and self-management; addressing these difficulties directly can foster children’s motivation to learn and enhance their responsiveness to intervention by eliminating obstacles that otherwise could impede the delivery of language, social, behavioral, and play interventions. The less restrictive teaching approach increases the likelihood that children will show higher rates of skill generalization and maintenance relative to skills acquired through DTT (Stokes & Baer, 1977). Contrastingly, PRT requires a great deal of flexibility and mindfulness on behalf of the interventionist to build upon children’s interests while implementing structured teaching.
**Incidental teaching.** Incidental teaching is an approach used with children with ASD that applies systematic teaching to naturally occurring learning opportunities (Hart & Risley, 1968; Cowan & Allen, 2007; McGee, Morrier, & Daly, 1999; McGee, Almedia, Sulzer-Azaroff, & Feldman, 1992; Ingersoll & Schreibman, 2006). The primary distinctions among incidental teaching, DTT, and PRT are: (1) who selects teaching stimuli, (2) who initiates the teaching interaction, (3) the type of reinforcement provided, and (4) the location of the teaching sessions. Sessions begin when the interventionist, including caregivers and teachers, selects a target objective and arranges toys in the environment to facilitate the child’s attention toward them. When a child gestures or verbalizes about a toy, the interventionist begins teaching by encouraging the child to elaborate about the toy in a way that addresses the learning objective. The interventionist will encourage elaboration by asking a question, using a gesture, or performing the desired target. If the child responds, praise and brief access to the toy is provided. If the child does not respond, the interventionist can provide three prompts using least-to-most prompting (Sulzer-Azaroff & Mayer, 1991) to facilitate a response and provide reinforcement. To create another learning opportunity, the interventionist takes a turn with the toy and then waits for the child to indicate interest in the object. Teaching with that toy is brief and ends once the child loses interest, which differs from DTT and PRT as these approaches require a set number of teaching trials using the same materials repeatedly.

Incidental teaching has been used to teach a variety of skills to children with ASD, including reading and grammar (McGee, Krantz, & McClannahan, 1985; Miranda-Linne & Melin, 1992; McGee et al., 1986), early language and communication skills (McGee, Almeida, Sulzer-Azaroff, & Feldman, 1992), reciprocal imitation skills (Ingersoll & Schreibman, 2006), speech and phrase expansion (Charlop-Christy & Carpenter, 2000; Kohler, Anthony Steighner,
Incidental teaching has several advantages, many of which address limitations of approaches like DTT and PRT. Like PRT, incidental teaching focuses on the child’s motivation in a less structured environment relative to DTT; however, teaching does not occur within a one-on-one interaction but instead through opportunities that arise naturally in contexts like home, school, and community settings. While PRT would involve showing the child a preferred doll and requiring that he/she say the word before receiving it, incidental teaching would involve the interventionist following the child’s lead and then implementing structure by commenting on the child’s focus of attention. Thus, if a child walked over to a toy box and looked at a doll, an interventionist who is using incidental teaching would approach the child and require the performance of a target goal (e.g., saying, “please” with a sign) before allowing access to it. This teaching approach minimizes the extent to which children with ASD become dependent on prompts and cues, which can happen with more highly structured approaches like DTT.

Naturalistic approaches like incidental teaching present teaching in a developmentally normative instructional approach, within the context of naturally occurring activities, rather than designating separate work and play times (Charlop-Christy & LeBlanc, 1999). It also allows for teaching to occur within the context of family routines without disrupting them (McGee, Morrier, & Daly, 1999). Another benefit of incidental teaching is that relative to DTT and PRT, skill generalization is increased teaching as teaching occurs through spontaneous opportunities that are embedded in play activities (Charlop-Christy & Carpenter, 2000; Kaiser, Yoder, &
Keetz, 1992; McGee, Morrier, & Daly, 1999). Although children acquire skills through PRT and DTT, they may have difficulty transitioning skills to contexts other than the initial teaching environment whereas teaching with different toys in different settings can foster learning that is not attributed to a single learning environment, thus promoting skill generalization. Additionally, given the flexibility around teaching contexts, incidental teaching can be delivered by a wide range of interventionists, including peers, teachers, and caregivers, across a variety of settings.

A primary limitation of incidental teaching is the potential confound of social interaction; whereas in vivo modeling, video modeling, DTT, and PRT minimize the extent to which children have to interact with interventionists, social engagements demands may potentially be higher with naturalistic teaching approaches. Another disadvantage involves the fact that the rate of instruction is controlled by the child and depends heavily on how he/she interacts with objects. Given that this approach is child-directed, adults must stay hyper-vigilant about creating an environment that is conducive to learning and remain mindful of applying the learning objectives across different play scenarios.

**Future Directions in Intervention Approaches for Children with ASD**

There are many approaches derived from behavioral theory and ABA that have been implemented with children with ASD. Although the APA task force on psychosocial interventions (Lonigan, Elbert, & Johnson, 1998) recommends that treatment approaches be compared systematically through well-designed research, most studies in ASD research have not compared one treatment approaches (Kasari, Freeman, & Paparella, 2006). Future research should investigate the advantages and disadvantages of the primary intervention approaches, while also examining how to integrate elements of the approaches systematically to form a comprehensive treatment plan that can promote skill acquisition, generalization, and
maintenance. Additionally, as the prevalence of ASD increases, emphasis should be placed on creating intervention approaches that optimize treatment outcomes through individualized, specific teaching for the largest possible number of children. Through research and clinical work, efforts can focus on investigating and applying the approach that best optimizes children’s responsiveness to intervention.

**Interventions in Play for Children with ASD**

Direct instruction in play can move children with ASD forward in the development of their play skills (e.g., Ingersoll & Schreibman, 2006; Stahmer, 1995; MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009; Kassari, Freeman, & Paparella, 2006; Lifter, Sulzer-Azaroff, Anderson, & Cowdery, 1993; Lifter, Ellis, Cannon, & Anderson, 2005; Lifter & Foster-Sanda, in progress; Wong, Kasari, Freeman, & Paparella, 2007). In vivo modeling, video modeling, DTT, PRT, and incidental teaching all have been applied to teach play skills to children with ASD. The following section reviews the play intervention literature, examining how direct teaching in play impacted the play development of young children with ASD.

**In Vivo Modeling and Play**

In vivo modeling has been used to teach play to young children with ASD. Tryon and Keane (1986) used peer-implemented modeling to promote imitative, independent play for children with ASD. Goldstein and Cisar (1992) evaluated how adult-implemented sociodramatic play model scripts impacted the play and social communicative intents of children with ASD as they played alongside same-age peers without ASD. Jahr, Eldevik, and Eikeseth (2000) compared two in vivo modeling procedures to teach children with ASD to initiate and sustain cooperative play. The strengths and limitations of each study are reviewed and described below.
Tryon and Keane (1986). Tryon and Keane (1986) investigated the effects of in vivo modeling performed by same-age peers without ASD on the appropriate play skills of three young children with ASD, aged 4 years old. Play was taught to the children in order to reinforce an alternative to self-stimulatory behavior. Pretesting was conducted by the experimenter to identify 10 toys that with which the child did not play correctly. For this study, correct play was defined as actively manipulating a toy. Pretesting involved showing a toy to a child and providing instruction five times during a ten second period; each toy only was presented once to the child. The 10 identified toys were used incorporated into the baseline, intervention, generalization, and maintenance sessions, all of which lasted for 10 minutes.

Across the sessions, the child’s behavior was coded during 10-second intervals for five key behaviors: (1) imitative play (e.g., play with one of the ten toys that matched or approximated play demonstrated by the peer model; (2) nonimitative appropriate play (i.e., demonstration of play that was not modeled, (3) exploratory play (i.e., examining a toy without playing and without self-stimulating), (4) self-stimulatory behavior (i.e., repetitive, stereotyped behavior), and (5) social nonverbal behaviors (i.e., directing nonverbal behavior toward the model). These categories were derived from a work that was unpublished (Schreibman, 1981) when this study was published.

Baseline and intervention sessions occurred in a classroom at a local agency for children with ASD. Peers began intervention by demonstrating simple play activities with toys that were unfamiliar to the children with ASD. The children with ASD watched the peers twice and then were given the opportunity to imitate the modeled play. Praise and edible reinforcers were provided for demonstration of the modeled play. When a child demonstrated a modeled activity,
he was then given four additional trials in order to help promote mastery. Once mastery of an activity was demonstrated, generalization was measured.

A single-subject, multiple-baseline design replicated across subjects was used. Results of the study revealed that children showed increases in modeled and appropriate play and decreases in self-stimulatory behaviors. They also displayed generalization across toys and models and maintained their acquired play skills one and three weeks after the generalization probes were conducted. Results support the use of peer-implemented in vivo modeling with children with ASD to help them demonstrate presented play actions. Further information about the quality of the modeled play actions and the rationale supporting their inclusion in the intervention would be helpful.

Goldstein and Cisar (1992). Goldstein and Cisar (1992) investigated the effects of an intervention package comprised of scripts, verbal prompts, modeling, and reinforcement on the sociodramatic play and social interactions of preschool-aged children with ASD. The intervention was implemented at an integrated preschool program with three triads of children; each triad consisted of two children without ASD and one child with ASD. Nine children participated in total. For a 15-minute period, a triad participated in script training for one of three sociodramatic play activities: pet shop, magic show, and carnival. Children were required to adopt one of three roles (e.g., a salesperson, an animal caretaker, and a customer for the pet shop script) and learn 10 targeted behaviors that facilitated interactions between peers. The script was delivered in a way that was tailored to each child’s language and cognitive abilities. For example, if a child was assigned to be the carnival booth attendant and was prompted to give feedback to the customer, a child without verbal communication might be prompted to clap while a child with moderately-developed verbal communication might be prompted to use a one-
word response (e.g., “Good”) and a child with highly-developed verbal communication might be prompted to use a longer verbal elaboration (e.g., “Nice job with that game.”). Trainers responded to children’s responses by providing feedback, during which they modeled verbal restatements (e.g., "Right, that was a good job with the game"). When necessary, token reinforcement systems were used to reduce off-task behavior.

After participating in the training, all children showed increases in theme-related social behavior during play; however, there was no assessment conducted around the children’s ability to demonstrate novel sociodramatic play activities. The authors also raised a concern that direct teaching in play using highly-structured DTT could potentially exacerbate the development of stereotypic routines and recommended that future interventions incorporate a variety of scripts, sociodramatic activities, and play partners.

**Jahr, Eldevik, and Eikeseth (2000).** Jahr, Eldevik, and Eikeseth (2000) compared how in vivo modeling impacted the sustained cooperative play of children with ASD relative to in vivo modeling plus verbal rehearsal. With the in vivo modeling approach, children observed two models performing scripted episodes of cooperative play and then engaged with one of the models to perform the activity while the modeled episode was repeated. With the in vivo modeling plus verbal rehearsal approach, children observed two models performing the scripted play sequence and then were required to describe the modeled play episode before taking the place of one of the models. During probe and training sessions, the children had access to a minimum of 40 toys, which included blocks, dolls, animals, and cars.

The examiners created a list of scripted play episodes for each participant. Episodes covered a range of play topics. The experimenters and the staff agreed that the final scripts
provided examples of cooperative play; they did not use assessment data to inform the development of the play scripts.

Throughout sessions, the investigators monitored the frequency of play responses. A play response began when a child touched a toy and involved a discrete manipulation of toys in a conventional manner (e.g., driving a car, building a railway, or feeding a doll); it ended when the participant released the toy or stopped the play response. The authors did not make distinctions between the qualitative natures of play activities (e.g., symbolic/pretend play relative to functional/relational play) and instead regarded any activity with toys as a play response.

The authors implemented a nonconcurrent multiple baseline design but noted that a concurrent multiple-baseline design across children may have provided better experimental control. Results showed increases in scripted play episodes, cooperative play, and the generalization of those skills across play partners. Approximately 6 to 16 months after the intervention, the children continued to demonstrate mastered cooperative play activities.

**Video Modeling and Play**

Video modeling has been used by many researchers to teach play skills to children with ASD. This approach has been used to increase children’s toy-related commenting (Taylor, Levin, & Jasper, 1999) pretend play sequences (D’Ateno, Mangiapanello, & Taylor, 2003; MacDonald, Clark, Garrigan, & Vangala, 2005; MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009; Paterson & Arco, 2007; Dauphin, Kinney, & Stromer, 2004), and social initiations during play (Nikopoulos & Keenan, 2003). Strengths and limitations of each study will be examined and discussed below.

**Taylor, Levin, and Jasper (1999).** Using a multiple baseline design across three play activities, Taylor, Levin, and Jasper (1999) used a video modeling intervention to teach two
school-aged children with ASD, aged 6 years old (experiment one) and 9 years old (experiment two), to make play-related statements to their siblings while they played with one of three toy sets in their home setting. For the first experiment, the child’s sibling was provided with a script with play comments or requests (e.g., "Let's play with the trains"), which she read for the recorded video sample. An adult sat next to the sibling on the video sample and read an alternate script, which contained comments that were derived from a normative sample. The adult and sibling played with toys according to the script (e.g., handed the train to the sibling). Three different tapes (i.e., one for each play activity) were created, all of which contained approximately six scripted play comments for the 6-year-old participant to imitate. As the child would be playing with his sibling after viewing the video samples, it was expected that he would repeat comments made by the adult. After the video sample sibling was shown to 6-year-old child three times consecutively, he was given the opportunity to play with the toys that were used in the video sample and to make scripted and unscripted comments. Results from the baseline, intervention, and probe data indicate that he showed progress with making scripted comments while playing with his sister; however, he did not use any unscripted commenting.

For the second experiment, an adult read approximately 10 scripted comments about the play activities (e.g., "This is the bad guy!"), which were intended to be repeated by the participant, while the sibling generated spontaneous comments for the three video recorded samples; the sibling was not given a script in order to examine the effects of video modeling when alternate responses were not presented in a rote fashion. During intervention, the child viewed the first four comments on the video and then was given toys from the video. An adult sat near the child, made unscripted comments about the ongoing play activities, and reinforced scripted or unscripted comments. As the intervention sessions progressed, the child viewed the
video segment for longer periods before starting the practice session with the adult. After viewing the video, the child showed increased frequency with scripted and unscripted commenting. Although both children showed increases in their play-related commenting, generalization and maintenance was not assessed, providing limited information about the pervasiveness of study findings.

**D’Ateno, Mangiapanello, and Taylor (2003).** D’Ateno and colleagues (2003) used video modeling to teach complex pretend-play sequences to a preschool-aged girl with ASD. Using a multiple-baseline procedure across three response categories (tea party, shopping, and baking), the young girl observed recorded play sequences comprised of verbal and motor responses and did not receive reinforcement or error-correction from adults. After only a few interventions sessions, she quickly acquired verbal and motor responses for all play sequences; however, generalization measures were not reported, providing limited information about whether continued video modeling would promote maintenance with the acquired play behaviors. Additionally, the researchers used measures that were not sensitive to perseverative behaviors often shown by children with ASD, meaning that problems such as imitating behavior out of context or in a repetitive manner may have occurred but were not measured.

**MacDonald, Clark, Garrigan, and Vangala (2005).** MacDonald, Clark, Garrigan, and Vangala (2005) used video modeling to teach two male children with ASD, aged 4 years and 7 years old, to engage in reciprocal pretend play with same-age peers without ASD. A play script containing 16 verbalizations and 14 coordinated actions was developed for each of the three play sets (i.e., a town, a ship, and a house). Each play set contained a base structure and seven characters or objects that the children had to animate. The scripts described a pretend event that involved the characters and materials within the play set. Children were required to hold and
speak for each character and to relate the figures to the accompanying toys, such as putting a firefighter into a fire truck. The authors gleansed play activities for the play scripts from the Developmental Play Assessment (DPA), noting that Lifter (2000) describes pretend play actions as: (1) “relating objects to one’s self and acting on those objects in a pretend manner, such as when a child looks through a telescope (i.e., pretend self) and (2) when a child extends familiar actions to dolls, such as putting a telescope to dolls’ eye (i.e., child-as-agent). Please see Table 3 for a description of the DPA play categories.

The video sample featured an adult model performing the script twice and was shown to children two times consecutively. After viewing the video sample and receiving a cue from the examiner to start playing, children were allotted four minutes to play with the materials and were assessed on four dimensions: (1) scripted verbalizations (i.e., vocal statements that matched the statement of the video model), (2) scripted actions (i.e., motor responses that matched the actions of the video model), (3) unscripted play that involved actions demonstrated by the video model with a different, and (4) unscripted play that involved a play action that was not modeled in the video script but was appropriate to the context of the toy. Unscripted verbalizations did not occur and thus were not scored. Each child began playing with the town toy set, transitioned to the ship toy set and concluded with the house set; mastery on scripted verbalizations and scripted play actions had to be established before children could start with the next play set. Probes were conducted sporadically throughout the intervention phase.

The authors found that children showed rapid acquisition of scripted pretend play, reciprocal verbal interaction, and cooperative interactions; unscripted play was not observed throughout the baseline, intervention, and probe conditions. The authors note that some children demonstrated unscripted play but described the actions as repetitive isolated play activities that
were not related to the play script theme, such as making a character ascend and descend the stairs of a ship repeatedly. Although this play action may have been an arbitrary stereotypy, it also may have been coded improperly relative to the classification criteria of the DPA; that is, the child extended a familiar action (i.e., ascending and descending stairs) to a figure (i.e., the sailor), which meets criteria to be coded as a child-as-agent action. Thus, more information is needed to see if other relevant play actions were coded incorrectly and thereby overlooked for the purposes of data analysis because they did not relate directly to the play script. Another concern arises because the authors developed a play script around pretend self and child-as-agent actions but did not have assessment data to support the use of these play category activities as target intervention goals. Additionally, pretend self and child-as-agent activities are two developmentally distinct categories of play that do not necessarily emerge simultaneously; however, the authors blended goals for each category of play within the play scripts.

**MacDonald, Sacramone, Mansfield, Wiltz, and Ahearn (2009).** MacDonald, Sacramone, Mansfield, Wiltz, and Ahearn (2009) examined the effects of video modeling on the reciprocal play of two children with ASD, aged 5 years and 7 years, as they played with same-age peers without ASD. The authors created video samples of adults performing scripted play scenarios that contained different verbalizations and play actions. Each child with ASD was paired with a same-age peer to watch the video and engage in play. Using a multiple-probe design across three play sets, results indicated that both children with ASD and the peers showed quick acquisition of the scripted play sequences and verbalizations and maintained this performance, as evidenced by follow-up probes. In addition, probes indicated an increase in the mean number of unscripted verbalizations, reciprocal verbal interactions, scripted play and cooperative play.
The children showed increases in scripted play, commenting, and reciprocal engagements while playing but did not demonstrate any extended novel play. Given the interdependencies between play, language, and social development, it is understandable that children would not demonstrate new play actions while working on the more challenging tasks of communicating and making social engagements during play; however, no assessment results were used to inform the development of these scripted play actions and to evaluate which play actions were mastered by the children and which were at the leading edge of their learning. Another limitation was the lack of generalization of the acquired play schemes to other play settings, with different play partners, and with different play materials.

**Paterson and Arco (2007).** The authors examined the effects of video modeling on generalization of independent toy play. Two children with ASD, aged 6 years and 7 years old, participated in this study. One child was presented with three toy sets that were comprised of toys that were viewed as unrelated (i.e., a construction site, a helicopter play set, and a jet ski with accessories) while the other child was presented with three toy sets that were comprised of toys with common characteristics (i.e., a crane, a bulldozer, a dump truck, and a background mat with accessories). All of the toys were accessible in the children’s homes. There was no rationale reported in the study about the decision-making used to determine what constituted similar characteristics among toys. Each child viewed a two minute video sample of an adult male playing and commenting about play activities and then had the opportunity to play with the objects featured in the recorded sample. While playing, the children were observed to determine the frequency of their (1) appropriate verbal play behavior (i.e., verbal statements or play sounds that related to the toy and the situation), (2) appropriate motor play behavior (i.e., play action that related to the toy and the situation), (3) repetitive verbal play behavior (i.e., verbal statements or
play sounds that were identical to verbal statements or play sounds previously recorded during any three minutes of play), and (4) repetitive motor play behavior (i.e., play actions that were identical to play actions previously recorded during any three minutes of play). A multiple baseline across play behavior with a withdrawal phase with the first toy set was used to evaluate effects of video modeling for the first child. For the second child, the generalization of play behavior was evaluated with a withdrawal design containing continuous-generalization probes for play with Toys 2 and 3.

Results suggested a functional relationship between video modeling and play behaviors, although the study does not indicate whether the children showed novel play, play demonstrated on the video sample, or a combination of activities. A decrease in repetitive motor play was noted, but there was uncertainty about the effects on repetitive verbal play because of low baseline levels of verbalizations. Findings also revealed generalized motor play with the three related toys and the maintenance of play, albeit slightly decreased, after video modeling was terminated with all the toys. Additionally, the video modeling condition appeared to produce a convergence between verbal and motor play behavior. Similar to the work of MacDonald and colleagues (2005), there were no measures used to inform the development of play actions demonstrated on the video sample and no accounting for whether the activities has developmental relevance for the individual children.

Nikopoulos and Keenan (2003). Nikopoulos and Keenan (2003) evaluated the effects of video modeling on three primary areas: this study examined (1) social initiation in an adapted play setting, (2) increases in appropriate play, and (3) generalization and maintenance of the behavior change at a one and two month follow-up period. Seven children with developmental delays, ages 9–15 years, participated in this study. Children were taken to one room to view a 35
second video, which featured one of three models (i.e., a familiar adult, a peer, or an unfamiliar adult) entering a second room with the examiner and performing a specific action with a particular toy for approximately 15 seconds. After watching this video once, each child entered the second room with the experimenter, who proceeded to engage in the same play behavior performed in the video. The child’s behavior during the experimental session, which lasted up to 5 minutes, was videotaped and coded with respect to (1) the latency to social initiation with the experimenter and (2) the amount of time spent playing with any toy.

A multiple-treatment design was used for six children while an A-B design was used for one child. Out of seven children, four children showed increases in their social initiation skills, play length duration, and appropriate play activities, which were maintained after a 1- and 2-month follow-up period. Results suggest that video modeling can present as a time-efficient teaching tool as well as a means of enhancing appropriate play skills. Nearly all instances of appropriate play were activities that were demonstrated on the videotape. Interpreting factors that could have impacted the lack of unscripted play is difficult as the types of play activities taught to the children were not reported in the study, nor was the rationale for why activities were selected.

**Dauphin, Kinney, and Stromer (2004).** Building upon the work of Goldstein and Cisar (1992), Dauphin, Kinney, and Stromer (2004) used a video-enhanced activity schedule, which consisted of video-based matrix training and notebook activity schedules, to teach sociodramatic play to a three-year-old boy with ASD. Their approach differed from that used by Goldstein and Cisar (1992) as they designed an intervention that (a) could be implemented to a single child during home-based teaching, (b) encouraged independent play, and (c) resulted in generative learning outcomes; thus, they put forth new procedures for teaching sociodramatic play to
children with ASD. During phase one, the child learned three out of nine presented sociodramatic play activities after viewing video models and receiving corrective prompts from his teacher. He also performed six novel actions that were related to the previously taught activities but were distinct. During phase two, the child learned to perform nine new activities using picture cuing from his notebook schedule. During phase three, he learned to perform trios of play activities within three matrices presented on his video-enhanced schedule and showed improvements on performing six new activities within each matrix when he observed picture cues on his computer and notebook schedule.

Results of this study provide supporting evidence that video modeling can be effective for helping children with ASD perform learned play activities and execute a few novel actions based on prior teaching; however, video modeling techniques were not sufficient to promote teaching as the child required frequent prompting and correction from adults to remain on task. Additionally, there are great costs and time demands involved with developing training resources and materials (e.g., workshops, on-line training modules) to help teachers and other interventionists use teaching resources like video modeling schedules.

**Discrete Trial Training and Play**

DTT is another well-researched and popular behavioral technique for the direct instruction of play behaviors (Stahmer, Ingerssol, & Carter, 2003). This approach has been used in two different ways with children with ASD. In certain cases, instruction in play serves not to promote developments in play per se but rather alternative activities to replace more disruptive behaviors. For example, Nuzzolo-Gomez, Leonard, Ortiz, Rivera, and Greer (2002) delivered an intervention to investigate the effects of DTT on toy play and stereotypys. In contrast, Kasari,
Freeman, and Paparella (2006) integrated DTT with incidental teaching to move children with ASD forward in the development of their play skills.

**Nuzzolo-Gomez, Leonard, Ortiz, Rivera, and Greer (2002).** Building upon research by Greer, Becker, Saxe, and Mirabella (1985), Nuzzolo-Gomez and colleagues (2002) used discrete trial play training and conditioned reinforcement of play with three students with ASD, aged 4 through 7 years, to initiate appropriate functional play in their classroom. Appropriate play was defined as touching a toy or using it in the manner for which it was designed. Data were collected during five minute intervals while the children sat at the table with a set of toys (e.g., blocks, balls, puzzles, dolls, a doll house, musical instruments, cars, trucks, a toy garage, and stuffed animals), indicating whether children played with toys independently, upon verbal request, or with physical guidance. Verbal praises and edibles were provided as reinforcement. A multiple baseline design across participants was used and demonstrated that children showed increases in appropriate play and decreases in stereotypy. A notable limitation is the lack of clarification about the children’s play skill level during baseline and how direct instruction in play served to foster maintenance and generalization of these skills across settings and contexts. Another question is how the use of edible reinforcers impacts the process of teaching play relative to the process of children coming to acknowledge toys as reinforcement.

**Kasari, Freeman, and Paparella (2006).** The authors conducted a randomized controlled trial to examine the effects of targeted interventions of joint attention and symbolic play on 58 children with ASD aged 3 and 4 years. Children were randomized to a joint attention intervention, a symbolic play intervention, or control group. To determine target play goals and evaluate progress post-intervention, the authors used an adapted version of the Developmental
Caregiver-Implemented Play 81

Play Assessment (DPA: Lifter, 2000), which involved less stringent criteria for mastered activities. Play categories that were *emerging* were targeted for the play intervention group.

Interventions were delivered by a graduate student in educational psychology for approximately 30 minutes a day for 5 to 6 weeks. To begin each session, each child received 5 to 8 minutes of DTT, which focused on the particular play goal. Least-to-most prompting and positive reinforcement were used to facilitate children’s demonstration of the target. After this highly structured teaching, the child transitioned onto the floor and played with the examiner in a semi-structured session that integrated systematic prompting and reinforcement with naturally occurring opportunities; the examiner followed the child’s lead, commented upon activities performed, imitated actions demonstrated by the child (Lewy & Dawson, 1992; Ninio & Bruner, 1978; Tomasello & Farrar, 1986). The overall objective of the play intervention was to focus on object combinations that were increasingly more symbolic but were not contingent upon shared attention between adult and child.

Results suggest that both intervention conditions showed improved in some aspects of joint engagement and joint attention (i.e., coordinated joint looks), functional play skills, and engagement with their mothers. Only the children in the play intervention group showed more diverse types of symbolic play and obtained higher levels of the DPA post-assessment. Children in the control group did not show any improvements with their joint attention, social interaction, and play skills, despite receiving six hours of one-to-one intervention daily. These results support the notion that the quantity of service provision is not sufficient for promoting treatment outcomes; instead, direct instruction should be provided and interventions should be tailored to children’s individual skill level. This study also provides support for combining the more structured DTT approach, which can provide frequent repetitions of target skill practice, with
Incidental teaching, which can enhance the generalization of play skills acquired through intervention.

**Pivotal Response Training and Play**

Pivotal response training has been shown to be effective in establishing sociodramatic play skills with adults as play partners (Stahmer, 1995; Thorp, Stahmer, & Schreibman, 1995). In these studies, children acquired play skills, and these skills generalized across toys and adults. Pierce and Shreibman (1997) used peer-implemented PRT in play to examine social interactions between children with autism and their typically developing peers. Stahmer and Schreibman (1992) examined the effects of a self-management treatment package on unsupervised play. Stahmer (1995) investigated how PRT impacted the symbolic play skills of children with ASD while Thorp, Stahmer, and Schreibman (1995) implemented similar techniques to teach sociodramatic play.

**Pierce and Shreibman (1997).** The authors examined the effects of peer-implemented PRT on the language use and play of two children with ASD, aged 7 years and 8 years old, and to what extent the children generalized acquired skills to peers who did not deliver the intervention. Eight peers, aged 7 years and 8 years old, learned to deliver PRT strategies using didactic instruction, modeling, role playing, and feedback. The PRT strategies were: (1) paying attention (i.e., ensure that child paying attention before delivering a prompt), (2) giving choices of different play activities to keep motivation high, (3) vary toys according to the child’s interest, (4) model frequent and varied examples of appropriate play and social skills and statements, (5) reinforce child’s attempts to play or interact socially, (6) encourage conversation by having the child use a word before allowing access to a toy, (7) extend conversations about toys and
activities, (8) model turn taking, (9) narrate play actions, and (10) teach responsively to multiple cues.

During baseline and intervention, one peer implemented the PRT strategies to a target child while they played with toys e.g., balls, modeling clay, a castle toy set) either in a classroom or in a "recreation room." The peers alternated the role of the interventionist. For generalization, the peer-child dyads worked in a new classroom with new toys (e.g., miniature laundry set with accessories, board games) when the other students were outside for recess. Results demonstrated that the children with ASD displayed higher levels of social interaction, social initiation, language use, and play, which later were generalized across settings, stimuli, and peers. Although both children played with the same amount of toys per teaching session across baseline, intervention, and generalization (i.e., 3-4 toys on average per session), they played with a wider range of toys post-intervention, with one child using 15 different toys and the other using 20 different toys across post-treatment sessions. Limited information is available about the kinds of activities demonstrated by the children with the toys as the authors sought to teach play in order to replace repetitive behaviors and stereotypys rather than promote developments in play per se.

**Stahmer and Schreibman (1992).** Stahmer and Schreibman (1992) examined the effects of a self-management treatment package delivered to three children with ASD, aged 7, 12, and 13 years, on the acquisition, generalization, and maintenance of unsupervised appropriate play. Four variables were monitored throughout baseline, intervention, and maintenance phases: (1) appropriate play, (2) self-stimulation, (3) inappropriate behavior, and (4) other behavior. Appropriate play was defined as using an object in the manner in which it was intended, meaning that appropriate play was defined by the toys available to the child.
Two of the children were delivered the intervention at home while the other child was
delivered the intervention in her bedroom. During baseline, the children were allowed to play
with five toys; three of those toys were used subsequently during intervention while the other
two toys were used during generalization. One child played with a doll, a rocket ship with
accessories, a puzzle, a puppet, and blocks. The second child played with two board games, a
puzzle, a book, and blocks. The third child played with two puzzles, two books, and markers.
Treatment began by having the child and experimenter collaboratively decide which play
activities were appropriate or inappropriate. The children then were given access to a timer and
were taught to engage in appropriate play for a designated period. The initial time period
duration was determined based on baseline observations but varied from 30 seconds to 10
minutes throughout the intervention based on when the child began performing longer periods of
appropriate play. Reinforcement (e.g., edibles, stickers, soda, or food) was provided if children
performed appropriate play for the entire period. The self-management supports (i.e., timer, adult
in the room) were removed once the child mastered the techniques of using the timer to monitor
the length of appropriate play. The examiner would leave the room, observe the child through a
one-way mirror or television monitor, and return after ten minute to connect with the child about
whether he/she demonstrated appropriate play. Follow-up probes were conducted one-month
post-intervention and were conducted by a stranger.

Results from this single-subject, multiple-baseline design across subjects revealed
increases in self-managed appropriate play for all three children during intervention and
generalization. Two of the children maintained high levels of appropriate play at the one-month
follow-up session. Findings also showed subsequent decreases in self-stimulatory behaviors and
inappropriate play, suggesting that the appropriate play goal was taught more as a compensatory behavior rather than as a means to address the children’s delays in play.

**Stahmer (1995).** Stahmer (1995) investigated the effects of using PRT to teach seven children with ASD, aged 4 to 7 years old, to perform symbolic play behaviors. Each child was recorded in three 14-minute segments before and after intervention and after a 3-month follow-up period, as the child was filmed with the experimenter, a caregiver, and a language-aged matched peer. Toys used in these videotaped sessions also were used during symbolic play training. Each recording consisted of seven minutes of the child playing alone while the examiner or caregiver and 7 minutes of the child interacting with the adult. When children were filmed with their caregivers, caregivers were not directed to elicit play; the examiner attempted to elicit symbolic play while being filmed with the child. The recording with the peer consisted of an 8-minute free-play session in which both the children were allowed to interact freely throughout the session. These observations provided information about the children’s play skills and their ability to speak and interact with others while playing.

Symbolic play training was conducted three times weekly for one hour per session. Sessions began when the examiner presented preferred toys to the child the experimenter and used them to demonstrate modeled symbolic actions. Reinforcement (i.e., access to the toy and praise) was provided when the children performed a modeled action or an approximation of a modeled action; as the child showed progress with the development of their symbolic play skills, they were expected to demonstrate more complex play before receiving reinforcement. Mastered play activities were interspersed with learning tasks.

Instances of symbolic play were monitored and recorded across all treatment phases. Symbolic play was defined as activities which involved a child (1) using an object as if it were another object, and/or (2) attributing pretend properties to an object, and/or (3) referring to
absent objects as if they were present. The examiners also scored play complexity, which involved the performance of at least three actions related to a pretend theme, and the creativity of play, which involved performing symbolic play themes not demonstrated during intervention.

Findings from this single subject multiple baseline design across subjects showed increases in creative symbolic play, play complexity, and peer interactions during play. Results suggest that children with ASD can engage in symbolic play at levels similar to that of language-matched typical children. The authors propose that children who do not have well-developed language capacities would not have developmental readiness to participate in this intervention; this point raises the question about which play levels should be targeted for children with ASD who have minimal to no verbal language.

Thorp, Stahmer, and Schreibman (1995). Thorp, Stahmer, and Schreibman (1995) implemented PRT procedures to teach sociodramatic play to boys with ASD, aged 5, 8, and 9 years old, who showed the potential to learn this level of play; they also monitored how teaching play impacted the participants’ language and social skills. The caregivers and teachers of each child completed the Play History (Rogers, Herbison, Lewis, Pantone, & Reis, 1986) to provide information about the children’s toy preferences, how they played with toys, the children’s play companions, and their play area. Each child also was video recorded for a 12-minute period before treatment, after treatment, and 3 months after treatment to assess for the presence of five sociodramatic play activities adopted from Smilansky (1968): (1) role playing (i.e., the child adopted the role of a real or fictitious character, such as a dad, a fireman, or a Ninja Turtle, and verbalized his adopted role), (2) make-believe transformations (i.e., substitution of ambiguous or nonexistent items for real objects, such as using a block as a telephone), (3) persistence (i.e., performing the entirety of a play theme by linking four consecutive actions), (4) social behavior
(i.e., negative responses by not complying with a question or command from the experiments, positive responses for compliance, and social initiations if the child began a game or interaction with the adult), and (5) verbal communication (i.e., spontaneous speech that related to activities, other speech that was prompted and related to activities, and inappropriate speech, such as echolalia). The authors comprehensively evaluated the children’s sociodramatic play abilities; however, they did not provide a rationale about how they determined whether the children were ready developmentally to participate in the direct teaching of sociodramatic play.

The 5-year-old child received intervention in his home while the 9-year-old child worked in his home and the 8-year-old child worked at school. Each child participated in the intervention two or three times a week until they received 16 total hours of training. Generalization sessions always occurred in a clinic.

All of the children were taught sociodramatic play activities using a particular set of toys (i.e., a Cabbage-Patch boy doll, a toy bottle, and toy baby food; a Sesame Street Cleaning Set; a fireman's dress-up uniform complete with a toy ax, walkie-talkie, and flashlight; a McDonald's Snack Shop, and ambiguous items like a Popsicle stick; a small blue plastic disk; a tissue; and a red wooden stick). During baseline, post-training, and follow-up measures, they also had access to a generalization toy set (i.e., a baby doll with clothes and a bottle; a Fischer Price picnic basket with food and dishes; a doctor's kit, and other ambiguous items not used during training sessions). The experimenter began intervention by presenting a varied assortment of toys to children based on their preferences, and then stated using the toys to model sociodramatic play. It was necessary for the experimenter to maintain a high level of involvement (e.g., adopting a role in the pretend play) to help keep the children engaged in the PRT process. If the child did to respond, the experimenter repeated the demonstrated action. Children were provided with
naturalistic reinforcement (e.g., access to a toy) upon demonstrating a target behavior or an approximation of a target behavior; as sessions progressed, children were expected to be progressively closer to the target behavior in order to receive reinforcement. To foster children’s motivation to play and ensure a high rate of success, mastered play activities were interspersed with novel play activities.

Results showed that all three children spent more time performing each element of sociodramatic play and maintained these abilities three months after the intervention ended. These skills also were generalized to different settings and toys. The authors hypothesized that using a structured but more naturalistic approach like PRT rather than DTT reduced the likelihood of children developing new stereotypies as a function of participating in the intervention. Although the children generalized their play skills to their caregivers to some extent, data revealed that they did not play as well during probe sessions with their caregivers. The authors attribute this finding to two potential factors. First, they proposed that the caregivers did not support sociodramatic play during probes, even when given instructions by the examiner, and more often were observed initiating simpler play forms they were generally used with their child. Additionally, rather than allowing the child to choose a toy, caregivers may have placed high demands on their child to select a particular toy. These hypotheses are relevant for future studies that involve caregiver-training as efforts should be taken to ensure that caregivers fully understand the rationale and procedures involved in intervention efforts, which can enhance treatment fidelity and promote children’s generalization of play to various play partners.

Incidental Teaching and Play

Interventions that incorporate behavioral techniques, such as least-to-most prompting (Sulzer-Azaroff & Mayer, 1991) with naturalistic teaching (i.e., implemented in familiar settings
and by familiar people; implemented by following child’s lead) have served to promote gains in skills of children with ASD (Bernard-Optiz, Ing, & Kong, 2004; Prizant & Wetherby, 1998; Lifter et al., 1993, 2005, 2011). Naturalistic behavioral techniques like incidental teaching can improve the play skills of children with ASD (Kohler et al., 2001; Craig-Unkefer & Kaiser, 2003; McGee, Morrier, & Daly, 1999).

**Craig-Unkefer and Kaiser (2003).** Using a multiple-baseline design across three dyads, the authors implemented a plan-play-report intervention with six children with expressive language delays from a Head Start preschool program and investigated its effects on three outcomes: (1) peer-directed social-communication, (2) the length and complexity of verbalizations, and (3) the complexity of play. After establishing baseline, 20-minute intervention sessions were delivered three to four times per week. Each session began with an *advanced play organizer*, during which the interventionist and children developed a plan for a randomly selected play activity by labeling the toys and planning associated activities. Prompting and suggestions were provided by the interventionists if the children had difficulty generating play activity ideas. After the planning, the children began the *play* component of the intervention; for a 10-minute period, the interventionist sat apart from the children as they engaged in the preplanned play activities. Redirections (i.e., modeling, direct instructions, and indirect instructions) and reflective statements were provided by the interventionist to keep the children focused on the play activity and to help them maintain their play interactions. The redirection and reflective support was not provided when the children were interacting and was faded midway during intervention. The final intervention component, *the review session*, occurred after the play session, lasted five minutes, and involved the interventionist asking general and specific questions to the children about their play and verbal exchanges. In addition
to baseline and intervention sessions, six generalization probes (three during baseline and three after intervention) were conducted for each child to investigate whether the children could execute play and verbal exchanges with a peer with typical language and speech development who was from a different classroom and not involved in the intervention teaching. Fidelity measures were collected and interobserver agreement was established.

Results suggest that the plan-play-report intervention was effective in increasing the frequency of children’s peer-directed verbalizations, increasing the length and complexity of children’s language, and promoting the performance of more complex play, which was generalized during the probe conditions. The authors did not deliver maintenance measures or conduct sessions across contexts, providing little information about how the children implemented the play skills apart from the structured teaching sessions, such as when playing in large groups rather than dyads. Another concern regards the claim that children showed changes in play. The authors used the Peer Play Code (Craig-Unkefer, 1998; adapted from Parten, 1932; Rubin, 1989) to examine and classify children’s play using the following six categories: aggression, solitary, onlooker, parallel play, associative play, and cooperative play. These categories confound social interactions with play and do not reflect developments in play per se. Thus, results should be examined with the understanding that the children showed increases in how frequently they interacted with peers during play, and that little can be posited about how their play developed relative to the developmental sequences revealed in empirical, descriptive studies of children’s play.

O’Connor and Stagnitti (2011). Learn to Play (Stagnitti, 2009) is a program designed to help children develop their play skills, which can enable them to interact with peers on an increasingly competent level. Based on the “Learn to Play” program, O’Connor and Stagnitti
(2011) designed a teacher-implemented play group intervention to increase the play, language, and behavior skills of children between the ages of 5-8 years with intellectual disabilities. Of the 35 participating children, 19 were assigned to the play group and 16 participated in the control condition (i.e., completed traditional classroom activities within a specialist school). Of the 11 boys and eight girls in the intervention group (Mean age = 5.7 years, SD = .52 years), ten children had ASD, six had developmental delays, five had vision and hearing impairments, and two had Down syndrome. Of the eight boys and eight girls in the comparison group (Mean age = 6.78 years, SD = .51 years), seven had ASD, four had developmental delays, and one each had Down syndrome, vision and hearing impairments and attention deficit hyperactive disorder. Seven teachers from the specialty school from which the children were recruited implemented the play group intervention.

Two measures were administered to evaluate children’s play: The Child-Initiated Pretend Play Assessment (ChIPPA; Stagnetti & Unsworth, 2004; Stagnitti, 2007) and the Penn Interactive Peer Play Scale (PIPPS: Fantuzzo, Sutton-Smith, Coolahan, Manz, Canning, & Debnam, 1995). The ChiPPA is a standardized, norm-referenced play assessment that examines the pretend play of children between 3 to 7 years old. Children participated in a 30 minute assessment that was divided into two 15 minute sessions: the conventional-imaginative session and the symbolic session. During the conventional-imaginative session, children were observed using a farm set. During the symbolic sessions, children used unstructured objects such as a tin, cone, tea towel, and a box. Children’s actions were coded and categorized based on the (1) percentage of elaborate pretend play actions’ (PEPA), (2) the number of object substitutions (NOS) and (3) the number of imitated actions (NIA) produced during the 30 minute play period, which revealed the level and quality of children’s pretend play. The PIPPS (Fantuzzo, Sutton-
Smith, Coolahan, Manz, Canning, & Debnam, 1995) is a 32-item Likert rating scale for preschool-aged children, which evaluates three dimensions of social interactions within play: interaction, disruption and disconnection. The interaction scale provides information about social play abilities like cooperativeness and helpfulness. The disruption scale relates to aggression and antisocial behavior while the disconnection scale relates to withdrawal and limited peer interaction. The PIPPS was completed by teachers who had observed children’s play behavior to provide information about the level of social interaction within play.

For one hour twice a week, teachers guided the children in play, based on data from the ChiPPA and the PIPPS, as they played at one of four play stations: (1) doll play, (2) transport, (3) construction and (4) home corner which involved a range of play sequences. Results of this quasi-experimental revealed that children participating in the play intervention for six months showed improved play skills, higher social competence, and more social connectedness with peers. This study provides support for using a play intervention to move children forward in the development of their play, behavioral and social skills; however, it does not address how to proceed when children do not demonstrate any pretend play, nor does the study specify what activities specifically constitute pretend play.

Ingersoll and Schreibman (2006). Ingersoll and Schreibman (2006) examined the effects of naturalistic teaching on the reciprocal imitation skills of five children with ASD, aged two to four years. Baseline and intervention sessions were conducted on the floor of two treatment rooms while generalization sessions occurred in a sitting room or a treatment room at local preschool. Five sets of identical toys were compiled to be used with each child. Toys were selected based on the child’s interest and were varied each session so that over 50 different sets of toys were used throughout the study. Generalization materials were novel toys that were not
used during treatment. During the treatment sessions, which consisted of five phases that lasted for two weeks, the examiners implemented several naturalistic techniques, including (1) contingent imitation (i.e., therapist imitates child’s actions), (2) linguistic mapping (i.e., therapist labeled the actions that they were performing and modeling of actions with toys), and (3) least-to-most prompting (i.e., actions with toys were modeled and prompted if not performed by the child after three opportunities). These techniques were used to encourage the child to demonstrate four kinds of activities modeled by the examiner: (1) familiar actions with the same toy being used by a child, (2) novel actions with a toy being used by a child, (3) familiar actions with novel toys, and (4) novel actions with novel toys. The authors used baseline data to inform which play activities they modeled during sessions, thus tailoring intervention efforts to fit each child’s individual needs; however, the authors did not describe the modeled play activities, providing limited information about how they came to decide which actions to include in treatment.

Using a single-subject, multiple-baseline design across participants, their findings demonstrated that children showed substantial progress in their spontaneous object imitation, which maintained over a month period after treatment ended. Children also generalized novel play activities across settings and therapists. Their ability to demonstrate pretend play was variable, although children showed gains in pretend play demonstrations more markedly when provided with modeled activities then when they engaged in free play.

Lifter, Sulzer-Azaroff, Anderson, and Cowdery (1993). Lifter and colleagues (1993) investigated whether three boys with ASD, aged 4 years old, would learn and generalize pretend play activities that were matched at two different play levels; one level coincided with the child’s chronological age while the other coincided with the child’s developmental readiness. To
determine which activities should be targeted in intervention, the Developmental Play Assessment (DPA: Lifter, 2000) was administered initially to fifteen children. The DPA consists of a 30-minute sample of spontaneous play with four groups of toys in the presence of a familiar adult. It does not require language, but the ability of the child to do things with objects. Children’s play is coded and then classified relative to a hierarchical organization of 15 categories of play that range from indiscriminative actions to socio-dramatic and fantasy play. Categories that were emerging (i.e., child demonstrates at least two different activities on at least four occasions) are considered to be developmentally appropriate for a child, and thus were targeted for intervention, as these activities “have not yet matured but are in the process of maturation,” presenting at the leading edge of learning (Vygotsky, 1978, pg. 86). That is, (1) their appearance provided evidence of the child’s organization of play and (2) they co-occurred with comments about ongoing events.

Based on DPA results, three children were selected to participate as they all showed the emerging ability to perform child-as-agent actions (i.e., extends familiar actions to doll figures with the child as the agent of the action), which presented as their developmentally specific target goals. Doll-as-agent activities (i.e., child moves doll figures as though they were capable of action) were not yet demonstrated by the majority of children, but were targeted as the age-related intervention goals as these play activities often are demonstrated by same-age peers. All sessions were conducted in the students’ classroom and were implemented by the teacher. Teaching and probe sessions were seven minutes long and occurred twice a day approximately three or four times a week for three to five months. The three children alternated learning child-as-agent and doll-as-agent across intervention phases. The first portion of the intervention session involved receiving direct instruction with a few toys; the remaining portion included all
toys from a toy set to assess for generalization of play skills to novel toys. Children’s play was recorded and retrospectively coded to note when play activities were demonstrated spontaneously, prompted verbally and/or gesturally, or physically guided. Reinforcement (i.e., verbal praise, smiles, and hugs) was provided whenever the child demonstrated the target play actions, regardless if they were spontaneous, prompted, or physically guided.

Results of this single-subject multiple baseline study replicated across subjects demonstrated that children acquired and generalized Child-as-Agent play skills, which coincided with their developmental level, but had difficulty acquiring doll-as-agent actions, which coincided with their chronological age, despite the large amount of intervention time devoted to teaching these activities. These findings provide support for assessing the play skills of children with ASD and using assessment results to inform intervention development as targeting emerging play skills allows the focus to be placed on goals that can be achieved through targeted intervention. It also provides evidence that children with ASD can be moved forward in the development of their play skills through direct teaching in play. This study raised questions about who should implement interventions for children. The first author taught child-as-agent and doll-as-agent activities to the children but proposed that future research should incorporate the most salient teaching figure within a setting as the primary interventionist; thus, teachers should implement school-based interventions and caregivers should implement home-based interventions.

Lifter, Ellis, Cannon, and Anderson (2005). Lifter, Ellis, Cannon, and Anderson (2005) designed a play intervention for three children, aged 4, 5, and 6 years old, with ASD. Data from the DPA informed the development of developmentally specific intervention goals for each child. Three adjacent play categories were identified as play targets: pretend self, child-as-agent,
and specific conventional. Three different toy sets, which were compilations of the children’s toys, were used to teach targeted activities within each of the target categories. The sets reflected specific themes, such as caregiving activities (e.g. washing and eating), fixing automobiles, or a train station, and included objects for manipulative and pretend play activities. Two play activities were taught directly within each of the three target play categories, resulting in six targeted play activities overall; this design meets the requirement of a sufficient number of response exemplars in programming for generalization (Stokes & Osnes, 1989).

Home-based therapists who worked with the children four days per week delivered the intervention after participating in a comprehensive training program, which consisted of didactic seminars, guided demonstrations and role playing. Play intervention sessions were ten minutes long and were delivered one to three times a day approximately 3 to 4 times per week. Each session was divided into two separate teaching components. During the first three to five minutes, teachers described the children’s actions, modeled play actions, and verbally reinforced play demonstrated by the child. Least-to-most prompting was used when children focused on target toys and/or attempted to perform the play activity. The interventionists provided direct instruction more directly in the second portion by using least-to-most prompting to teach three target activities. All sessions were recorded and instances of spontaneous and prompted behaviors were coded retrospectively.

The study used a modified multiple-baseline-design across target play activities within each of the target play categories within a toy set. That is, the intervention began by teaching children the first target activity from each target play category while the second target activities were held in baseline; the second target activities from each of the play categories were targeted during the second intervention phase. Findings showed that the children acquired target play
activities that were taught systematically, showing higher acquisition rates with play activities from *emerging* play categories relative to successive, but non-emerging, play categories. Results demonstrate that children with play delays benefit from interventions that target play skills at the leading edge of their learning, which help them acquire skills that they would not develop otherwise without direct, systematic instruction. Results support the value of the developmental sequence presented in the DPA to identify the quality of activities (i.e., the categories) the child is in the process of learning and to provide explicit information in setting goals for intervention.

The authors acknowledge primary limitations to address in future research. Demonstrating how treatment fidelity can be compromised in field-based research, the teachers changed the intervention protocol for reasons that were not based on the child’s performance and continued to teach target one activities during the second intervention phase when target two should have been targeted. Another consideration is having caregivers provide direct teaching in play rather than the home-based therapists, although they also were familiar to the children.

**Lifter, Foster-Sanda et al. (in progress).** This study examined how teacher-implemented instruction in play affected the play and commenting skills of two young children with ASD, aged 4 years old, as they played next to two same-age classmates without ASD. A single-subject, multiple-baseline design with replication across toy sets was used to investigate how children responded when they were taught developmentally specific play activities, which were identified using the DPA, using incidental teaching. Play categories were selected for intervention based on each child’s performance on the DPA. The target play categories for one child were specific conventional and child-as-agent while the target play categories for the other child were single-scheme sequences and simple two-part schemes. A school-based speech language pathologist selected language objectives for each child, which were considered bonus
objectives as they were an addition to objectives identified in each child’s IEP. Single-word commenting was identified as a target language objective for one child while the other child was monitored for increased elaboration.

All sessions were conducted with the target child playing alongside two peers. During 15-minute intervention sessions, teachers used least-to-most prompting to teach the target child to demonstrate target play actions with one of four toy sets while they played alongside peers. During the first phase of intervention, children received direct instruction for the bath and food toy sets while remaining in baseline for the cars/trucks and trains toy sets. During the second phase of intervention, children also received direct instruction with the cars/trucks and trains toy sets. A farm toy set was given to the children on two occasions as a generalization probe. The teachers commented on play actions demonstrated by the children but did not intervene with a direct language intervention. Verbal reinforcement was provided in response to spontaneous actions, prompted actions (i.e., with verbal or gestural support), or actions involving physical guidance. All sessions were recorded, allowing for a retrospective analysis of the child’s play activity and commenting demonstration, as well as interobservation agreement calculations.

Results of this single-subject, multiple-baseline design across students and toy sets demonstrated increases in the frequency and variety of target play activities, as well as overall commenting and commenting related to target play activities. These findings further evidence that children with ASD benefit from direct instruction in play to help them acquire more advanced play skills. Additionally, the children showed increases in commenting as a function of participating in a play intervention. There is limited information about the generalization of findings as the farm set probe condition was delivered infrequently, and no maintenance data were collected. The incorporation of teachers as the primary interventionists addressed concerns
raised by Lifter and colleagues (1993, 2005) that interventions should be delivered by the most familiar and salient teaching figures within a child’s environment. Another similarity to work by Lifter and colleagues is the compromised treatment fidelity, as a retrospective analysis revealed instances of teachers deviating from the intervention protocol.

**Strengths of Play Interventions**

A number of play intervention studies have been implemented with children with ASD using the five intervention approaches used primarily to teach young children with ASD. The majority of play interventions are strong procedurally as they involve evidence-based techniques that are implemented systematically and have well-developed research designs. Many studies monitored the generalization and maintenance of children’s acquired play skills in order to examine the pervasiveness of treatment outcomes.

Although a variety of play assessment and intervention approaches were applied, findings across studies show that even when children with ASD have frequent access to toys, they may not play with them in a way that moves them forward in the development of their play skills. Instead, they acquire new play activities through direct instruction in play. Regardless of how play goals are identified, the reviewed studies provide support that children with delays in play, including children with ASD, benefit from direct instruction in play.

Findings emphasize two integral considerations for the development of play interventions: (1) how information is being taught and (2) what is being taught. Across the five examined intervention approaches, children responded to interventions with behavioral teaching techniques and showed consistent play skill acquisition. Although the delivery of in vivo modeling, video modeling, DTT, and PRT can promote change, incidental teaching is a more flexible and natural approach that fosters pervasive developments in play. To move children
forward in the development of their play skills, behavioral techniques should used to teach play activities that children show a readiness to acquire (e.g., Lifter et al., 1993, 2005; Kasari, 2006; Thorp, Stahmer, & Schreibman, 1995). As children with ASD do not show uniform delays in play, developmentally specific (DevSp) play activities should be identified through assessment data and targeted as primary intervention goals (Lifter et al., 1993, 2005; Kasari, 2006). Overall, integrating naturalistic behavioral approaches to teach developmentally specific play activities has important implications for practitioners as they develop and implement play interventions for young children with ASD.

**Weaknesses of Play Interventions**

Many play intervention studies approach the teaching of play ambiguously. Many purport to teach appropriate play but provide little to no rationale about what these kinds of activities entail. Other studies focused on a particular aspect of play but without a rationale for why it was targeted for intervention. This ambiguity can complicate treatment outcomes and minimize the gains children could otherwise make in response to systematic interventions with specific and relevant targets.

There are various reasons why play interventions have been implemented with children with ASD. Some interventions teach play in order to provide an alternative to disruptive and/or self-stimulating behaviors. These studied regarded outcomes as successful when children showed increases in play activities and decreases in disruptive behavior; however, they did little to move children forward in the development of their play skills. Other studies have taught play to children based on the properties of the toys (e.g., Stahmer & Schreibman, 1992). This perspective of play interventions can promote gains in play categories that involve active manipulations of toys but may fall short in fostering higher levels of play with elements of
pretense. For example, children may be discouraged from placing a dog puzzle piece into the driver’s seat of a toy automobile if the only perceived function of puzzle pieces is to fit into a puzzle board; however, placing a creature into a vehicle could be have an element of pretense and be regarded as a demonstration of pretend play. Although these studies are well-intentioned, they do little to move children forward in the development of their play skills, thereby missing a tremendous opportunity to provide targeted intervention that address delays in play directly and also have an impact on language, communication, and social development.

Certain approaches and techniques, which are characteristic of intervention approaches, are problematic to the teaching of play. More structured approaches, such as DTT, have been shown to promote context-specific skill acquisition that cannot be replicated across settings, players, and toys; they also may exacerbate the presentation of stereotypy and repetitive behaviors (Goldstein & Cisar, 1992). The use of reinforcers that are not related to the ongoing play activities also raises questions about using reinforcement that is connected and natural to the play intervention process and how this application affects skill acquisition, generalization, and maintenance.

Play interventions that involve DTT, PVT, and incidental teaching have been delivered by lead investigators or research assistants. To build upon the natural context of intervention settings, researchers should involve the most salient teaching figure as the primary interventionist. Another limitation involves the fact that studies that have involved home-based therapists and teachers implementing interventions have been delivered to preschool-aged children. There is an overall paucity of research regarding play interventions implemented for toddlers, as well caregiver-implemented interventions.
The existing play intervention literature has methodological flaws, warranting the cautious interpretation of study findings. As noted in their review of play intervention study, Barton and Wolery (2008) reported that many studies have inconsistent intrasubject treatment effects and overlapping data across conditions. Another notable concern is the frequent lack of well-implemented procedural fidelity, maintenance, and generalization data.

**Future Research Directions in Play Interventions for Children with ASD**

Many important considerations can be addressed in future research to further the existing play intervention literature. Studies can investigate how in vivo modeling, video modeling, DTT (with the exception of research by Kasari et al [2006]), and PVT can be used to teach developmentally specific play activities to children with ASD, and how incidental teaching procedures can be further applied for this teaching purpose. Emphasis can be placed on using a broader range of research designs and stronger methodological rigor to evaluate play interventions delivered to diverse populations of children with ASD from different geographic locations. Further examination also is warranted to examine how interventions can be implemented by the most constant and salient teaching figures in a child’s environment, including caregivers in the home environment. Given the higher prevalence rates and earlier ages of ASD diagnosis, there is a particular need to design and deliver play interventions to toddlers with ASD as this age range has been included rarely in the majority of play intervention study samples. Furthermore, results of Lifter, Foster-Sanda et al (in progress) demonstrated that interventions in play can have associated affects on children’s commenting abilities. Taken together, future studies can investigate how interventions in play impact the play and language development of toddlers (i.e., under 36 months old) with ASD by teaching developmentally specific play activities through evidence-based behavioral techniques.
From a procedural perspective, studies can use more rigorous methods of evaluating the generalization and maintenance of play skill acquisition. An additional focus on formative assessment also is warranted given the noted compromising of treatment integrity in certain studies. An optimal approach for monitoring treatment integrity formatively involves an examination of the content (i.e., what intervention steps were implemented), quantity (i.e., how much of the intervention was provided), quality (i.e., how well the intervention was implemented), and process (i.e., how the intervention was implemented) of intervention adherence (Hagermoster et al., 2009).

**Interventions for Toddlers with ASD**

A review conducted by the National Research Council (2001) reveals that the majority of studies conducted with children with ASD have involved children between the ages of 3 to 5 years. Although early intervention has been shown to improve outcomes for children with ASD (e.g., Rapin, 1997; Rogers, 1998; Smith, Groen, & Wynn, 2000; Vismara & Rogers, 2010), few interventions have been implemented and evaluated for toddlers (McGee, Morrier, & Daly, 1999); therefore, there is uncertainty about the most appropriate service models for educating young children with autism (e.g., Heflin & Simpson, 1998). The following section provides reviews studies that have focused on interventions for children with ASD younger than 2 years of age, some of which are case reports (Perry, Cohen, & DeCarlo, 1995; Green, Brennan, & Fein, 2002; McGee, Morrier, & Daly, 1999).

**Perry, Cohen, and DeCarlo (1995).** Perry, Cohen, and DeCarlo (1995) published a case study that described the symptom presentation and treatment approaches used with two siblings who are 21 months apart who met criteria for ASD around 2 years of age. The older sibling was acquiring language but around 15 months of age showed isolated play, frequent tantrums, social
withdrawal, and increases in perseverative behavior. The younger sibling also was acquiring single words and showed similar patterns with respect to minimal interest in others, delays in social and communication development, and frequent tantrums. The older child began ABA therapy when she was 23 months old while the younger child started at 25 months of age. Both children received DTT to address delays in their socialization, verbal and nonverbal communication, play, and cognition. The authors reported that the children showed great progress during approximately two years of intervention, after which they no longer met criteria for ASD; however, results of this case study should be interpreted cautiously as the authors did not report actual data and or provide a description of assessment procedures in their article.

Green, Brennan, and Fein (2002). Green and colleagues (2002) presented a case report of a 14-month-old girl who showed many ASD symptoms, including: diminished levels of babbling, minimal eye contact, infrequent responsiveness to spoken language, inconsistent pointing, limited imitation, impoverished play skills, and a significant delay in social communicative development. To address her delays, she received three years of intensive treatment, which began at 25 to 33 hours of weekly services and increased to 30 to 36 hours per week in her second and third year of the program; the service delivery hours were decreased appreciably when she was 4 years old and were discontinued once she turned four-and-a-half years old because of her developmental progress. The intensive ABA services she received were an integration of DTT, PVT, and incidental teaching. She did not receive any direct instruction in play. The majority of services were provided by agency therapists, although the girl’s mother delivered interventions approximately three to eight hours a week. Her caregivers and au pair also provide additional teaching through incidental teaching in naturally occurring situations. Intervention goals were gleaned from the research literature and curriculum guides for early
intervention ABA. Direct observational data was collected, which revealed significant improvements in her language, social, cognitive, and daily living skills throughout the course of intervention. Near the fourth year of her intervention, the child longer met criteria for a diagnosis of ASD. Information from this case study provides preliminary support for the use of integrated APA approaches with toddlers with ASD, which can be examined further through future research with more rigorous research methodologies and larger samples sizes.

McGee, Morrier, and Daly (1999). The authors conducted a descriptive program evaluation of the Walden Toddler Model, which is a program designed for toddlers (i.e., 15 to 30 months of age) with ASD. For one year, this program provides children with 30 hours of services. Although incidental teaching is the primary intervention mechanism, other approaches can be integrated into the treatment package. Outcome data were presented for 28 children who began programming at around 29 months of age. Results demonstrated increases in meaningful verbalizations, decreases in echolalia, and an expanded vocabulary. Children reportedly interacted with their caregivers more frequently, showed greater social responsiveness to adults, and performed higher levels of play. These findings should be interpreted cautiously as they were generated from a program evaluation with a sample of convenience and were not derived from a controlled study. Additionally, the report includes limited information about measurement methods and does not include precise outcome data.

Directions for future research in intervention for toddlers with ASD

Given the trend toward early diagnosis of ASD, there is a great need for researchers to develop and evaluate interventions for toddlers with ASD. Practitioners also should evaluate currently implemented programs for young children with ASD using comprehensive research methodologies and strong research designs, which would add to the dearth of empirical evidence
about interventions delivered to toddlers with ASD. Once this literature base is increased, efforts can focus on comparing intervention approaches to evaluate their strengths and limitations and establishing which approaches or combinations of approaches best fit the needs of diverse populations of toddlers with ASD.

Caregiver-Implemented Interventions

Caregivers greatly influence their children’s development and play an important role in intervention development, implementation and decision-making. Parental involvement allows caregivers to capitalize on teachable moments as they occur, provide learning opportunities during naturally occurring routines, and facilitate the generalization of learning across contexts. Programming has been developed for the caregivers of children with disruptive behavior disorders (DBD: Eyberg, Nelson, & Boggs, 2008), attention deficit hyperactivity disorder (Pelham & Fabiano, 2008), anxiety (Barrett & Shortt, 2003), and developmental disabilities (Feldmen & Werner, 2002). Research suggests that with training and support, caregivers learn new intervention strategies and implement them accurately (e.g., Dunlap, Ester, Langhans, & Fox, 2006; Kashinath, Woods, & Goldstein, 2006), which improves children’s responsiveness to intervention and optimizes treatment outcomes.

Given the dramatic rise in prevalence and the high cost of providing services, caregiver-implemented interventions are being delivered to young children with ASD more frequently (National Research Council, 2001; Brookman-Frazee, Vismara, Drahota, Stahmer, & Openden, 2009; Oosterling et al., 2010). Research reveals many benefits of caregiver-implemented interventions, such as cost-effectiveness, promoting generalization and maintenance, reducing parental stress, and increasing caregivers’ self-efficacy about influencing their children’s development (e.g., Koegel, Schreibman, Britten, Burke, & O’Neill, 1982; Carter, Messinger,
Stone, Celimli, Nahmias, & Yoder, 2011; Koegel et al., 1996). The caregivers of children with ASD have been taught to implement a variety of interventions to address the caregiver-child relationship (e.g., Koegel, Bimbela, & Schreibman, 1996; Mahoney & Perales, 2003), communication skills (e.g., Harris, 1986; Charlop-Christy & Carpenter, 2000), and disruptive behaviors (e.g., Marcus, Lansing, Andrews, & Schopler, 1978). Three important elements inform the development of caregiver-implemented interventions for children with ASD: (1) the child’s developmental level, (2) targeted goals, and (3) family characteristics.

Meadan, Ostrosky, Zaghlawan, and Yu (2009) comprehensively reviewed 12 caregiver-implemented intervention studies for young children with ASD, which consisted of four comparative studies (Charlop-Christy & Carpenter, 2000; Drew, Baird, Baron-Cohen, Cox, Slonims, Wheelwright, et al., 2002; Moes & Frea, 2002; Rogers et al., 2006), four evaluations of a specific intervention (Elder, Valcante, Yarandi, White, & Elder, 2005; Ingersoll & Gergans, 2007; Mahoney & Perales, 2003; Seung, Ashwell, Elder, & Valcante, 2006), and four studies that evaluated the effectiveness and generalization of an intervention (Jones, Carr, & Feeley, 2006; Kaiser, Hancock, & Nietfeld, 2000; Kashinath et al., 2006; Symon, 2005). Eight of the studies used a single-subject research design while two studies integrated single-subject designs and group analysis methods to compare intervention approaches (Elder, Valcante, Yarandi, White, & Elder, 2005; Rogers et al., 2006). Mahoney and Perales (2003) conducted a statistical analysis of pre- and post-intervention data while Drew and colleagues (2002) compared intervention models through a randomized control trial. Findings across the studies revealed that caregivers acquired sophisticated teaching strategies when they participated in training (e.g., modeling and role playing), and that implementing strategies (e.g., following the child’s lead,
imitating verbal and nonverbal initiations) in natural environments optimizes treatment outcomes.

All studies, excepting research by Drew and colleagues (2002), reported inter-rater reliability, which ranged from 62 to 100 percent; the majority of studies collected reliability data relating to the children’s responsiveness to treatment while only a few collected data about caregiver implementation. Many studies incorporated generalization measures into their procedural methods. Of the generalization measures reported, most focused on generalization across time (i.e., maintenance) and settings (e.g., location and routines). Nine studies included treatment fidelity measures, such as procedural checklists, with two studies (Kashinath et al., 2006; Rogers et al., 2006) assessing both the caregiver education and caregivers-as-trainers components.

In the past, caregiver-focused interventions were very structured and occurred in clinic or home settings (Kashinath et al., 2006); however, naturalistic approaches have been recommended as the most advantageous approach for caregiver-implemented strategies. Requiring caregivers to allot specific times to work with their child increase stress levels whereas working within routines and schedules embeds learning into naturally occurring opportunities, thereby reducing caregiveral stress and promoting frequent opportunities for focused teaching (Koegel, 2000; McWilliam, 2000).

**Caregiver-Implemented Methods for Toddlers with ASD**

According to statistics from the United States Department of Education (2005), one million infants and young children receive early intervention and special education services. Toddlers spend the majority of their time at home with their caregivers (Meadan, Ostrosky, Zaghlawan, & Yu, 2009), and caregivers are most actively engaged with their children during
toddlerhood (Hart & Risley, 1999). Thus, caregivers are an essential component of interventions for infants and toddlers (Meadan, Ostrosky, Zaghlawan, & Yu, 2009; Zwaigenbaum, Bryson, Lord, Rogers, Carter, Carver, et al, 2009). There has been increased focus on designing caregiver-implemented interventions for toddlers in the home environment within the context of early intervention service provision (Dunlap, Ester, Langhans, & Fox, 2006; Dunst, Hamby, Trivette, Raab, & Bruder, 2002; Buchanan & Weiss, 2006; McCollum & Hemmeter, 1997; Sandall, Hemmeter, Smith, & McLean, 2005). Despite this practical focus, few studies have evaluated interventions for toddlers systematically. A few exceptions are investigations of the Early Start Denver Model (ESDM: Vismara & Rogers, 2008) and Hanen’s More than Words® program (Girolametto, Sussman, & Weitzman, 2007; McConachie, Randle, Hammal, & Le Couteur, 2005; Carter, Messinger, Stone, Celimli, Nahmias, & Yoder, 2011).

**Early Start Denver Model.** The ESDM is an innovative intervention approach for toddlers with ASD that integrates the Denver model and PRT. The Denver model is a developmentally and relationally-based intervention approach that addresses core deficits of ASD by promoting a social environment to foster relationships between children and adults and encourage children’s learning. It has promoted positive effects on children’s communicative and social development (e.g., Rogers et al., 2006; Rogers, Herbison, Lewis, Pantone, & Reis, 1986; Rogers & Lewis, 1989). PRT has been incorporated into parent training models to increase the language and play skills of children with ASD (e.g., Koegel, Koegel, & Schreibman, 1991; Schreibman & Koegel, 1996; Stahmer & Gist, 2001). By integrating the Denver model and PRT, the ESDM approach is designed to teach caregivers to embed intervention strategies within daily routines using familiar toys and materials, thereby encouraging children’s engagement, learning, and skill generalization.
In their case study report, Vismara and Rogers (2008) provide preliminary support for using the ESDM model with infants and toddlers with ASD, examining how a caregiver-coaching intervention impacted the development of a nine-month-old infant who showed symptoms of ASD. The intervention consisted of two baseline sessions, 12 interventions sessions, and four follow-up visits, each of which lasted ninety minutes. During the intervention sessions, the child’s caregivers learned to deliver the following strategies within the context of naturalistic play activities: (1) increasing the child’s attention and motivation, (2) using sensory social routines, (3) encouraging dyadic engagement, (4) promoting nonverbal communication and speech development, (5) facilitating increased observation, imitation, and joint attention, (6) using antecedent-behavior-consequence relationships, as well as prompting, shaping, and fading techniques, and (7) conducting functional assessment of behavior. During the first ten minutes of each session, the investigator described and demonstrated the teaching strategy. The caregivers then delivered the strategies while the investigator provided feedback, and additional demonstrations if necessary. The caregivers received coaching until they mastered the strategies, as supported by treatment fidelity data. At the end of each session, caregivers were given training materials to read and were asked to apply the newly acquired techniques with their children in natural play activities and routines at home.

Two 10-minute play samples were collected during each intervention session to evaluate the caregivers’ acquisition of the strategies and to monitor the child’s responsiveness to intervention. The first sample provided treatment fidelity data and was collected at the beginning of each session. During this play sample, the caregivers implemented tactics that were taught during the prior session. The second sample was collected later in each session, and involved the interventionist demonstrating new techniques with the child during a play activity. Data from this
sample were used to assess the investigator’s treatment fidelity and to examine the child’s use of social communicative behaviors. The first two follow-up visits were scheduled with at 2-week intervals while the final two occurred at one-month intervals. The 10-minute play sample was collected with the caregiver and child during the beginning of each follow-up visit. A 10-minute sample with a new interventionist also was conducted to assess generalization of skills.

Data from this case study suggest that the caregivers learned to implement evidence-based intervention techniques within the context of play to promote the social and communication development of an infant/toddler with ASD. The investigators acknowledged the limitations that results are reflective of one family with one toddler with ASD, were generated from an AB design with a short baseline, and that simultaneous early intervention services may have influenced the child’s development in a manner that was not captured by the study design; however, results provide a framework to inform the future implementation of a randomized group-design study that evaluates intervention efficacy and generalization more thoroughly.

More than Words. Hanen’s More Than Words® (HMTW) program is a caregiver training approach that teaches caregivers to increase the communication of young children with ASD through naturalistic teaching strategies (Sussman, 1999). Throughout eight weekly group sessions and three individual family sessions, a speech language pathologist teaches families to increase caregiver-child interactions and facilitate children’s communicative by: (1) embedding learning in naturalistic routines, (2) building upon children’s developmental skills, (3) providing children with opportunities to interact and response to his/her environment, and (4) responding to children’s communicative intents. Results from a clinical case report with caregivers of three preschool-aged children with ASD (Girolametto, Sussman, & Weitzman, 2007) and a quasi-experimental study of 51 preschoolers with language delay and suspected ASD (McConachie,
Randle, Hammal, & Le Couteur, 2005) showed improved caregiver facilitations and positive treatment outcomes for participating children. Contrastingly, results of a randomized clinical trial conducted with 62 toddlers provided conflicting evidence (Carter, Messinger, Stone, Celimli, Nahmias, & Yoder, 2011). Child communication outcomes had differential effects depending on baseline factors. Children with lower play skills, as determined by results from the DPA, during baseline showed more appreciable communication gains as a function of the HMTW intervention whereas children with more developed play showed insignificant treatment effects, suggesting that the caregivers of toddlers with higher-level play may require greater support to facilitate their communication development.

**Caregiver-Implemented Play Interventions for Toddlers with ASD**

There is a notable paucity in the play intervention research of caregiver-implemented play interventions for toddlers with ASD. One exception is the Play and Language for Autistic Youngsters (PLAY) Project (Solomon et al., 2007; Soloman, 2008), which is an evidence-based model with emerging empirical support. Having received a grant from the National Institute for Mental Health (NIH) to evaluate this model through a controlled study, the PLAY Project is a consultation approach that teaches caregivers to deliver play-based teaching techniques to toddlers with ASD. It reflects principles of the Developmental Individual-Differences Relationship-Based (DIR®)/Floortime framework (Greenspan & Wieder, 1997), which posits that children learn best when adults deliver techniques that build upon children’s interests and attention. The PLAY Project Home Consultation (PPHC) program has great relevance for toddlers with ASD and their families as consultation occurs with caregivers in the home setting. With the PPHC model, caregivers receive intensive, year-long training (i.e., modeling, coaching) by a home-based consultant who provides written and verbal feedback about the caregivers’
implementation approach and the children’s treatment responses. Caregivers are expected to implement the PLAY approach for at least 15 hours a week and to teach play based on results from the PLAY Project Skill Sequence. This sequence details the following teaching steps: (1) list principles/strategies based on a child’s comfort zone (CZ), sensory motor profile (SMP), and functional developmental level (FDL), (2) assess a child's CZ activities, SMP and FDL, (3) define/list daily and weekly curriculum/activities, (4) follow a child’s cues, lead and interests, (5) create a menu of specific techniques to enhance teaching, (6) videotape and review interactions and progress, and (7) reassess and adjust curriculum, methods, and techniques. Presenting with emerging empirical support, the PLAY Project is an evidence-based approach for toddlers with ASD that uses naturalistic teaching and attends to children’s developmental readiness to inform play-based teaching techniques. A primary limitation of the PLAY project is the vague manner of teaching play; caregivers are trained to teach play activities without regard to the specific developmental level of the child’s play skill level.

**Directions for Future Research in Caregiver-Implemented Interventions**

Infants and toddlers spend a large amount of time at home with their caregivers, warranting an increased focus on caregiver-implemented strategies for this population, particularly for the caregivers of toddlers with ASD. Caregiver-implemented studies conducted with preschool aged children with ASD should be adapted to fit the needs of toddlers with ASD and their families while new approaches are being developed and investigated. As the existing literature base consists largely of case studies and program reviews, future research should incorporate stronger methodological designs and more robust statistical analyses. Building upon other interventions delivered to children with ASD, caregivers should be taught to apply evidence-based methods systematically through naturalistic teaching and to deliver teaching that
coincides with a child’s developmental level. As interventions in play can support developments in play and developments in language, and children with ASD benefit from direct teaching in play, more research is needed to investigate caregiver-implemented play interventions for toddlers with ASD.

**Rationale of the Proposed Study**

Children with ASD often show marked delays in play and language development. A large literature base supports the use of play interventions with preschool-aged children with ASD to push them forward in the development of their play skills (e.g., Lifter et al., 1993, 2005, 2011; Kasari et al., 2006; Ingersoll & Schreibman, 2006). A few studies have examined the use of play interventions implemented in the home setting (Lifter et al., 2005) and the use of caregiver-implemented play interventions (Solomon, 2008; Solomon et al., 2007) to address play skill development; however, none to date have investigated the effects of caregiver-implemented play interventions on the play skill development of toddlers with ASD. As pretend play is a significant predictor of later language abilities for young children with ASD (e.g., Charman et al., 2003; McCune-Nicolich, 1981; Sigman & Ruskin, 1999; Toth, Munson, Meltzoff, & Dawson, 2006; Sigman & McGovern, 2005; Smith, Mirenda, & Zaidman-Zait, 2007) and participating in play interventions with developmentally specific play targets can facilitate gains in play and language development (Lifter & Foster-Sanda, in preparation), further research is warranted to investigate whether toddlers with ASD will benefit from caregiver-implemented play interventions to further their play and commenting abilities.

This study was designed to evaluate the effects of a caregiver-implemented play intervention on the play and commenting abilities of toddlers with ASD. Caregivers completed a series of training activities and received formative feedback from the student researcher about
delivering instruction that targeted specific play deficits shown by their toddlers with ASD. A single-subject, multiple-baseline design (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005) with replication across children was used to examine how five toddlers with ASD responded to the systematic, incidental teaching that was delivered by their caregivers.

**Significance of the Proposed Study**

This investigation is relevant for clinicians and researchers who work with early childhood populations, and was developed to contribute to the existing play literature base and to inform clinical practice. ASD prevalence continues to increase, while special education autism eligibility rates also rise; thus, an increasing number of young children are being diagnosed with ASD and are receiving specialized instruction through early intervention agencies and special education preschool programs. Toddlers with ASD exhibit pervasive qualitative impairments in their play and commenting abilities, and efforts are made to provide direct instruction that will remediate these deficits; however, despite the well intentions of early childhood teachers and researchers, there currently is a paucity of systematic, naturalistic approaches for teaching play to this population within the context of EI service provision. Thus, this study was developed to contribute to the existing play intervention literature base and to inform clinical practice. This study will be the first to implement a well-documented play intervention approach with toddlers with ASD and to use caregiver-implementation as the primary teaching mechanism. It builds upon a burgeoning literature base that demonstrates how direct teaching in play yields simultaneous gains in both language and play development for young children with ASD, and how caregiver-implemented interventions can promote the implementation of naturalistic teaching methods. Additionally, monitoring treatment integrity formatively will enhance confidence that outcomes truly are a result of the intervention per se. These contributions will
inform the play intervention literature and enable early intervention clinicians to address the play and language development of toddlers with ASD by building upon caregiver-implementation strategies.

**Research Questions and Hypotheses**

Six research questions were developed with respect to the caregiver-implemented intervention in play:

*Research Question One.* Will the caregivers deliver the play intervention to their toddler with ASD at least three times per week?

*Research Question Two.* Will caregivers show high levels of fidelity (i.e., \( \geq 80\% \)) with delivering the play intervention (i.e., as described in the procedures) in response to receiving formative feedback through ongoing caregiver training?

*Research Question Three.* Will the toddlers with ASD show an increase in the frequency of spontaneously demonstrated a) target play activities and b) play activity exemplars in response to the play intervention?

*Research Question Four.* Will the toddlers with ASD show an increase in the frequency of a) general commenting and b) commenting related to target play activities in response to the play intervention?

*Research Question Five.* Will the toddlers with ASD perform a higher frequency of a) target play activities, b) play activity exemplars, c) general comments, and d) comments related to the target play activity while playing with novel toys (i.e., toys not used to teach target play activities) during generalization probes in response to the play intervention?
Research Question Six. Will the toddlers with ASD show an increase in the frequency of a) target play activities, b) play activities exemplars, c) general commenting, and d) commenting related to the target play activities during the maintenance phase?
CHAPTER 3

Methodology

Chapter 3 was developed to describe the study methodology and results of the initial assessment activities. It begins with an explanation of recruitment procedures, an overview of the participants and caregivers, and a description of the primary researcher and research assistants. Study measures are presented, followed by a description of the setting, materials and equipment, and research design. The chapter concludes with an overview of study procedures, initial assessment results, and caregiver training activities.

Recruitment Procedures

When this study was developed and implemented, the researcher was enrolled in the Combined Counseling and School Psychology doctoral program at Northeastern University. She also worked as a developmental specialist at an EI-agency in southeastern Massachusetts that was overseen by the Massachusetts Department of Public Health (DPH). As the researcher planned to recruit study participants from the EI agency at which she worked, all recruitment procedures were submitted to and approved by the Institutional Review Board (IRB) at Northeastern University, DPH, and the EI agency’s board of directors.

Inclusion and Exclusion Criteria. This study was designed for toddlers with ASD who were receiving EI services. Participants had to be between 14 to 36 months of age, have received an ASD diagnosis (i.e., AD, PDD-NOS, or Asperger’s Disorder) from an independent evaluator (e.g., developmental pediatrician, neurologist, developmental psychologist, or neuropsychologist), and be able to vocalize at least five words. Children with comorbid visual and/or hearing impairments were not eligible to participate. To prevent a conflict between clinical and research priorities and the development of a dual relationship, the researcher did not
enroll children with whom she worked as an EI service provider. Caregivers were eligible for inclusion if they spent at least 30 minutes at home with their child at least three days a week and spoke English fluently. Non-English speaking caregivers were not eligible for participation.

**Initial Recruitment Activities.** To protect the autonomy and privacy of EI service recipients with ASD and their families, the researcher informed all families who were receiving services through the southeastern EI branch about the study. In March 2012, the researcher distributed recruitment flyers (see Appendix A) to approximately 350 families through at least one of three distribution methods: 1) sending a message through the agency email listserv (see Appendix B), 2) asking group leaders to distribute flyers during parent-child play groups and/or, 3) asking EI service coordinators to distribute flyers during home visits. The recruitment flyer highlighted inclusion criteria, summarized study procedures, and included the researcher’s contact information. Caregivers were asked to provide written confirmation of their interest in the study by emailing the researcher or submitting their contact information to her on a detachable portion of the recruitment flyer. Upon receiving written confirmation through either notification method, the researcher contacted the caregivers via email or telephone, based on the caregiver’s preference, to briefly describe the study and schedule an appointment in order to review study procedures and participant rights.

**Study Enrollment Process.** Fifteen families contacted the researcher to indicate interest in the study. Three families were ineligible for participation because the researcher was their child’s EI service coordinator. Two families were ineligible because their children did not have an ASD diagnosis. One interested and eligible caregiver felt that family and work obligations would impede her ability to deliver the intervention and opted to not meet with the researcher. After these families were excluded, nine potential participants who met eligibility criteria
remained. Three families were placed on a waiting list, while six families met with the researcher and signed the *Statement of Informed Consent* (see Appendix C) to enroll in the study. By signing the *Statement of Informed Consent*, caregivers confirmed their own participation in the study, granted permission for their children to participate, and allowed the researcher to access the following information from the EI agency’s clinical files: 1) the Individualized Family Service Plan (IFSP) (i.e., a document that details goals, outcomes, and the service delivery plan for children who receive EI services) 2) protocols and EI evaluation reports, 3) DPH-mandated referral, evaluation, and parent report questionnaires, 4) medical records, and 5) documentation of the ASD diagnosis. Throughout the recruitment and enrollment process, caregivers were informed of their right to decline participation at any time, and they were assured that there would not be any negative outcomes if they declined or revoked participation. They also were informed that their study involvement had no impact on their children’s EI service provision.

**Participants**

**Children.** Six toddlers originally enrolled in this study; however, one caregiver withdrew after completing the informed consent and study questionnaires because she and her child were moving out of state. Thus, five male toddlers with ASD participated in this study. To protect their confidentiality, the children were given the aliases of Edward, Vincenzo, John, Brent, and Travis. All of the toddlers were Caucasian, lived with their biological parents in southeastern Massachusetts, came from English-speaking families, and were receiving EI services at the time of study enrollment. Three of the participants were single children while the other two were fraternal twins. Please see Table 5 for an overview of the children’s sociodemographic information and Table 6 for a summarization of their birthing and medical history.

**Caregivers.** One primary caregiver for each child, for a total of five caregivers,
participated in this study. Table 7 provides information about the three caregivers with single children and the two caregivers with twins. It was determined that requiring one parent to deliver the intervention to both sons simultaneously or work with one twin and then another across consecutive sessions was too time- and labor-intensive. Further, for this family, it was not naturalistic for the parents to split into separate rooms and work with only one twin; rather, the twins typically received therapies and played with both of their parents in the same space simultaneously. Accordingly, the twins’ biological mother and father enrolled in the study and delivered play teaching to both of their sons.

**Researchers.** The primary researcher was a fourth-year candidate in the Combined School and Counseling Psychology doctoral program at Northeastern University (NEU). She previously earned a master’s of science degree in educational psychology and a Certificate of Advanced Graduate Study (CAGS) in School Psychology at NEU. While earning her master’s degree, she completed a DPH-approved certificate program in early intervention and later earned full certification as an Early Intervention Specialist after working as a developmental specialist at a Massachusetts EI agency for four years. The researcher has extensive experience working with the families of toddlers with ASD in home-based settings. She is competent with administering and interpreting a wide range of assessment measures for early childhood populations.

Two research assistants also participated and their role was to conduct interobserver agreement coding activities. One research assistant was a fourth-year doctoral student in a different school psychology program. Her primary clinical and research interests focused on autism assessments and conducting research with school-aged children with ASD. The second research assistant had a master’s degree in counseling and art therapy and, at the time of this study, worked as a home-based ABA worker with two toddlers with ASD. Neither of the
research assistants had experience administering or interpreting play-based assessments or delivering direct instruction in play.

Measures

Four assessment measures were used in this study: 1) the Toy Inventory Questionnaire, 2) the Inventory of Toddlers and Family Activities Practices, 3) the Battelle Developmental Inventory-Second Edition (BDI-2; Newborg, 2005), and 4) the Developmental Play Assessment (DPA; Lifter, 2000). Caregivers completed the Toy Inventory Questionnaire (see Appendix D) to indicate which toys their children owned. The Inventory of Toddlers and Families Activities Practices (see Appendix E) was administered to provide information about activities, events, and routines that were common for each family. Results of the BDI-2 were used to describe the toddlers’ developmental profile using a standardized, norm-referenced measure. The DPA was administered to assess for emerging play categories, which informed the generation of target play activities, and to examine spontaneous commenting that occurred during free-play.

Toy Inventory Questionnaire. The Toy Inventory Questionnaire allowed caregivers to indicate toys that their children owned by putting a checkmark next to a series of pre-existing items or recording the name of a toy in a blank space. Questionnaire items were gleaned from three sources. First, the researcher listed toys that were in the equipment closet at the EI site at which she worked. She then supplemented the list by adding: 1) toys that were owned by the 10 children with whom she worked as an EI clinician and 2) toys that were sold on the Fisher-Price, Play-Skool, and Doug and Melissa websites.

Inventory of Toddlers and Family Activities Practices. The Inventory of Toddlers and Families Activities Practices (see Appendix E) was developed to gather information about families’ common activities, events, and routines. The researcher developed this inventory using
two primary sources. The majority of the inventory derived from the Family Activities Inventory used by the Project Play research team (Lifter et al., present). The researcher then supplemented the inventory by adding a list of characters that may interest children, which was gleaned from a review of television programming websites (e.g., Nicktoons; PBS; Sprouts).

**Battelle Developmental Inventory, Second Edition.** The BDI-2 (Newborg, 2005) is a standardized, norm-referenced instrument used with children from birth to seven years old. In Massachusetts, EI agencies use BDI-2 results to determine children’s eligibility for services and assess their developmental profile relative to same-age peers. The BDI-2 standardization sample includes 2,500 children from approximately 30 states and was stratified by age, sex, race/ethnicity, geographic region, and socioeconomic level, but excludes children with delays and disabilities.

**Structure of the BDI-2.** The BDI-2 consists of 450 items that can be completed through caregiver interview, observation and/or structured procedures and assesses the following five areas: Adaptive (e.g., self-care and personal responsibility subdomains), Personal-Social (e.g., adult interaction, peer interaction, self-concept and social role subdomains), Communication (e.g., receptive communication and expressive communication subdomains), Motor (e.g., gross motor, fine motor, and perceptual motor subdomains), and Cognitive (e.g., attention and memory, reasoning and academic skills, perception and concepts subdomains). Children who are 24 months or older are administered all of the subtests. For children 23 months and younger, the personal responsibility, peer interaction, perceptual motor, and reasoning and academic skills subtests are not administered.

The Adaptive domain examines the ability to perform tasks associated with daily routines with increasing autonomy (e.g., eating, dressing, toileting, grooming, and preparing for sleep)
and the ability to assume responsibility for performing tasks (e.g., chores, initiating in play, and avoiding common dangers). The Personal-Social domain measures whether children can engage in meaningful social interactions with adults and peers and develop their own self-concept and social role. The Communication domain measures the ability to receive and express information and ideas through verbal and nonverbal means. The Motor domain assesses the ability to use large and small muscles of the body and to integrate visual-motor skills. The Cognition domain examines the ability to visually and auditorily attend to environmental stimuli for varying periods, to retrieve information when prompted, to use critical thinking skills and scholastic abilities, and to conceptualize and discriminate object features (e.g., size and shape) and respond to them. The BDI-2 Total Composite represents a child’s development across all of the domains and is considered the most reliable of all the score information available.

Subdomain scores are scaled scores that can range from 1 to 19, with 8-12 representing the average range. A developmental quotient (DQ) is calculated for each domain score and the overall BDI-2 total. Like a standard score, each DQ has a mean of 100 and a standard deviation of 15. Scores within the average range for age range from 90-109.

**Psychometric properties of the BDI-2.** The BDI-2 has acceptable internal consistency and test-retest reliability (Newborg, 2005; Salvia & Ysseldyke, 2001). Internal consistency was examined using the split-half method, corrected by the Spearman-Brown formula. The average reliabilities for all subdomains, which were calculated by averaging the Fisher’s $z$ transformed values of each of the age-group coefficients, were at or above 0.85, ranging from 0.85 to 0.95. The reliability coefficients for the BDI-2 domain and total DQ scores were calculated with the formula for a reliability of a sum of multiple tests (Nunnally, 1967). They all were at or above 0.90, ranging from 0.90 to 0.96. Measures of test-retest stability were conducted with an age
grouping of 126 two-year-old children and a grouping of 126 four-year-old children, for a total of 252 children. Test-retest correlations ranged from 0.74 to 0.91 with a median of 0.80 for the grouping of two-year-old children, while the mean differences ranged from -0.1 to +0.7, with a median of +0.2. For the grouping of four-year-old children, the test-retest correlations ranged from 0.74 to 0.91, with a median of 0.86, while the mean difference ranged from 0.0 to +0.9, with a median of +0.4.

The BDI-2 presented with acceptable content validity and criterion validity at the time of publication (Newborg, 2005). More information about its validity is needed from studies that examine its application to various populations of infants, toddlers, and children. Content-related validity was examined through professional judgment, evidence of important constructs, and empirical item analyses (Kamphaus, 1993). Methods of empirical item analysis included item-total correlations, age trends, and model-data-fit statistics (e.g., Rasch estimation methods and Mantel-Haenzel statistics) (Holland & Thayer, 1998). Items with poor Rasch-fit statistics and high differential item functioning analysis (using gender and racial/ethnic groups) were deleted from the BDI-2, resulting in a final measure with more homogeneous, unifactor scales and content relevance.

Criterion validity was established by examining test scores with other developmental scales, including the: (1) Battelle Developmental Inventory (BDI: Newborg, Stock, Wnek, Guidubaldi, & Svinicki, 1984), (2) Denver Developmental Screening Test-II (DDST-II: Frankenburg, Dodds, Archer, Bresnick, Maschka, Edelman, & Shapiro, 1992), (3) Preschool Language Scale, Fourth Edition (PLS-4: Zimmerman, Steiner, & Pond, 2002), and the (4) Vineland Social-Emotional Early Childhood Scales (Vineland SEEC: Sparrow, Balla, & Cicchetti, 1998). It also was examined by comparing the BDI-2 to other measures, including the:
(1) Comprehensive Test of Phonological Processing (CTOPP: Wagner, Torgesen, & Rashotte, 1999), (2) Wechsler Preschool and Primary Scale of Intelligence-Third Edition (WPPSI-III: Wechsler, 2002), and (3) Woodcock-Johnson III Test of Achievement (WJ-III ACH: Woodcock, McGrew, & Mather, 2001). Correlations generally were in the .60-.75 range, although correlations between subscales or domains where one would expect little correspondence fell within the 30-.50 range; however, test standardization samples were generally small (i.e., ranged between 30 to 191 children and spanning a large age range) and included a racially and ethnically diverse population, resulting in small subgroups that reduced confidence consistent trends in bias or stable measurement relationships.

**Developmental Play Assessment.** The DPA (Lifter, 2000) is a measure used to assess the quality and developmental progress of children’s play based on a 30-minute sample of spontaneous play, during which children use four groups of toys in the presence of a familiar adult. Spontaneous play occurs when children perform play activities on their own without adult elicitation, prompting, or teaching. In contrast, prompted play occurs when children perform activities in response to verbal, gestural, or physical direction (e.g., hand-over-hand prompting) from an adult. For the DPA, children are evaluated on what they do with the toys. While children are not required to use language, a sample of spontaneous commenting can be obtained during the 30-minute observation period. Play activities performed during the observation are examined according to 15 qualitatively different categories of play activities that follow a developmental sequence, ranging from indiscriminative actions to socio-dramatic/fantasy play. The DPA play sequence (see Appendix F) was generated from developmental sequences of play categories described in the empirical play literature (Lifter, 2000).
Progress through the DPA play sequence is determined based on quantitative criteria applied to each category. These criteria, derived from Lifer and Bloom (1989), are based on the frequency of the category and variety of different examples of the category that are expressed. They impose a relative degree of certainty regarding how well a child knows a category of play. *Mastery* requires a minimum frequency of 10 activities, with at least four examples of the category within the ten activities (e.g., for the category “Presentation,” four examples could be “puts drivers in truck,” “nests the nesting cups,” “puts pieces in puzzle,” and “puts beads in the bead bowl”). The criteria for *emergence* are less stringent (i.e., frequency = ≥ 4, exemplars = ≥ 2); accordingly, there is less certainty, based on quantitative analysis, that the child knows the kind of activity represented by the category. Finally, there is even less certainty with *absence* (i.e., frequency = < 2, exemplars = < 2). Please refer to Appendices G, H, and I to see the three coding sheets that are used to record DPA activities and determine play category classifications.

According to Lifer, Ellis, Cannon, and Anderson (2005) the reliability of DPA was assessed to be .91 by inter-observer agreement. Trained observers achieved agreement in identifying the behaviors assessed by the DPA ranging from .82 to 1.00 on a sample of children with PDD.

**Observation of spontaneous commenting during the DPA administration.** Language targets were not established for this study, but the researcher reviewed each child’s DPA administration for an analysis of spontaneous general commenting and commenting about target play activities (i.e., activity-specific commenting). Spontaneous language is defined as any vocalization (i.e., word approximation, word, or phrase) that a child produced independently (i.e., without imitating others). Language that was produced by an adult, child, or media source (e.g., television show, computer video, and/or song) and then repeated by the child (i.e., imitated language) was not coded for this study.
A comment was defined as a word, word approximation (i.e., most but not all syllables in a word pronounced intelligibly), or phrase that is used to describe an object, toy, or action. Examples of commenting would include a child saying “bah” while pushing a ball (i.e., word approximation), “cup” while extending a cup to a doll’s mouth (i.e., a commenting word), and “Go baby” while brushing a figure’s teeth (i.e., a commenting phrase). Language that was produced for pragmatic purposes other than commenting were not coded for this study. That is, a word, word approximation, or phrase was not coded as a comment if it used to: (1) request an object or action (e.g., saying “Please” or “I want the car” while reaching for a toy), (2) negating or protesting (e.g., saying “No;” “I don’t want it”), or (3) asking a question (e.g., “Where is Mommy?”).

Two forms of commenting were documented for this study: general commenting and activity-specific commenting. Any comments produced during baseline, intervention, or maintenance sessions were classified either as a general comment or an activity-specific comment. General commenting was defined as a comment that was produced during a session 1) to indicate a toy (e.g., child said the word approximation “appa” when picking up an apple) and/or 2) during the performance of a play activity other than specified target activities. If a child was learning to perform child-as-agent activities and said “cup” while nesting cups, which is a Presentation Combination activity (i.e., not the target activity), that word would be classified as a general comment. An activity-specific comment was defined as a comment that was produced during the demonstration of a target play activity. If the child with Child-As-Agent play targets said “cup” while extending a cup to a doll’s mouth (i.e., a target Child-As-Agent activity), that word would be classified as a activity-specific comment.
Materials and Equipment

The following sections provide a description of the materials and equipment used in this study. It begins by overviewing the caregiver training materials and toy set development. The concluding paragraphs describe the caregivers’ videotaping equipment and study datasheets.

Development of caregiver training materials. The researcher developed a set of multi-modal training materials (i.e., five handouts and two four-minute video segments) to help caregivers understand the purpose of this study and increase their ability to deliver baseline, intervention, and maintenance sessions in accordance with study procedures. The first handout (see Appendix J) summarized the DPA play categories and indicated how play intervention targets would be developed. The second handout (see Appendix K) highlighted the benefits of caregiver-delivered play teaching for young children with ASD, while the third handout (see Appendix L) described single-subject research designs and the rationale for holding children in baseline. The fourth handout (see Appendix M) described study procedures and intervention techniques, including least-to-most prompting. The fifth and final handout (see Appendix N) was developed so caregivers were aware of upcoming study activities and could indicate ones that they completed.

The researcher also developed two four-minute video segments that featured a mother and a toddler with ASD who did not participate in the study. The first segment showed the mother delivering a baseline session, demonstrating how caregivers can sit with and attend to a child without eliciting or responding to play activities. The second segment showed the mother using behavioral strategies to teach play activities to her toddler; instances of spontaneous play actions, prompted play actions, and physically guided play actions were included in the segment. During both segments, the toddler exhibited motor restlessness and had trouble sustaining
attention and sitting, which reflected the regulation difficulties exhibited by many toddlers with ASD. These portions were kept in the training footage to show participating caregivers how teaching can occur despite these barriers.

A major priority when developing the training footage was to ensure the privacy and confidentiality of the mother and son who provided the training sample. Prior to filming the segments on a mini-DVR cassette, the mother was informed that the footage would only be used to train study participants and not for other purposes; to reinforce this point to the mother and the caregivers who viewed the footage, each segment began with a disclaimer from the researcher noting that the footage was strictly for training purposes. During the footage, the mother opted to use her son’s legal name, which is not his common name, and did not use her own name; while their faces were visible, all other identifying information was removed from the segment (e.g., edited footage when the toddler’s sibling entered the room). The researcher gave the mini-DVR cassette to the mother in July 2012 after all participating caregivers had watched the intervention training footage. The mother opted to record over the two training segments.

**Development of toy sets.** Four toy sets were created for each single child for the implementation of the intervention. Rather than creating four toy sets for each twin (i.e., eight toy sets in total), the brothers instead shared four toy sets. In addition to being more cost- and space-efficient, this approach better reflected how the twins generally played together: by sharing materials.

The toy sets consisted mostly of the children’s toys, with a few supplementary objects added by the researcher. Each set had enough objects and toys so that a minimum of six target play activities could be performed, meeting the requirement of a sufficient number of response exemplars in programming for generalization (Stokes & Osnes, 1989). The children used all four
toy sets during baseline and maintenance sessions. They received direct instruction with three toy sets during intervention sessions. To assess whether children performed target activities with novel toys, generalization probe sessions were conducted during the intervention phase, during which children engaged in free play with the fourth toy set. The researcher gave each caregiver four bins or closable bags, based on his or her preference, for storing the toy sets. All toy sets remained at the families’ homes. The children were able to use the toys whenever they wanted during their day; however, they only were recorded during baseline, intervention, and maintenance sessions. Caregivers cleaned the toys at their own discretion.

**Videotaping devices.** The researcher used her personal digital video (DV) camcorder with mini-DV cassettes to record each child’s DPA administration and any baseline, intervention, and maintenance sessions she attended. All cassettes were stored in a locked box in a locked filing cabinet in a locked office. When the researcher was not present, each family used their own recording device, which included I-pads and digital camcorders with memory cards. One family borrowed the researcher’s camcorder to film sessions. The researcher provided families with recording supplies (e.g., memory cards, mini DV cassettes, and recordable DVD discs) and provided reimbursement for any cost accrued for recording the sessions (e.g., family buying additional memory cards). All memory cards, cassettes, and DVDs are to be returned to the families at the conclusion of the study.

**Data sheets.** Caregivers used the datasheet in Appendix O to record the date of each completed baseline, intervention, and maintenance session. The researcher used the data sheet in Appendix P to record the occurrence of spontaneously demonstrated play activities and comments during each session. Treatment fidelity data were coded on the back of the datasheet in Appendix P. Three dichotomous variables were assessed for treatment fidelity, with each
variable receiving a code of “yes” or “no.” The first variable assessed whether an activity prompted by the caregiver was a target activity. The second variable examined whether a caregiver used least-to-most prompting to facilitate the completion of any prompted activity. For this second variable, it did not matter whether the prompted activity was a target activity, but instead focused on whether the caregiver helped the child complete a prompted activity using gestural and physical prompts. The third and final treatment fidelity variable assessed whether the caregiver provided positive social after the completion of the prompted play activity, again not mattering whether the completed activity was a target activity.

**Setting**

The caregivers delivered the play intervention to their children in their homes. Baseline, intervention, and maintenance sessions occurred in a room with open floor space (e.g., living room, finished basement) and/or with a small table and chair. Caregivers delivered teaching while sitting on the floor or at a table with the child. Siblings sometimes remained in the room, but were asked to leave if they interfered with the teaching (e.g., playing with toys in a way that prevented the study participant from using them; exhibiting maladaptive behaviors that required caregivers’ attention and removed them from the play teaching).

**Study Design**

This intervention study represents a single-subject, multiple-baseline design across children (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005). Single-subject designs (SSD) provide researchers with a flexible, parsimonious lens for analyzing data and examining treatment effects for individuals and across groups (Nock, Michel, & Photos, 2007; Tawney & Gast, 1984). Given the small number of participants and straightforward analytic procedures, SSD can clearly portray behavior change patterns as a result of intervention procedures. They
also are a cost-effective way to gather preliminary data that can inform larger-scale studies with more robust statistical procedures. SSD also allow researchers to tailor intervention procedures to fit participants’ specific needs and yield rich qualitative information about the intervention process and outcomes, which may be lacking from large-group studies.

A multiple-baseline design with staggered baselines was determined to be the most appropriate SSD for this intervention study. Play skill development is not a readily reversible behavior and may not be examined thoroughly with withdrawal research designs (e.g. A-B-A design; A-B-A-B design). Further, withdrawing a potentially effective intervention raises some ethical concerns. A multiple-baseline design coincides with play skill development and also omits the need to use a withdrawal design to investigate treatment effects. It also allows for a level of experimental control by staggering the start of the intervention phase, which allows for the generation of inferences about causal effects.

Although the single-subject, multiple baseline design coincides with the theoretical underpinnings and interpretive objects of this study, the methodological limitations also warrant mention (Nock, Michel, & Photos, 2007). Interpretations about SSD data stem from descriptive statistics and a visual inspection of graphed data. This absence of more robust statistical control limits the ability to make causal inferences about intervention outcomes. The design also limits threats to external validity and does not provide a mechanism for measuring multiple treatment interactions. Further, while the small number of participants can afford the ability to gather and process a deeper amount of qualitative information, it also limits the overall generalizability of treatment effects.

**Toy set rotation.** Children alternated playing with the four toy sets across sessions. Each child’s toy set rotation was determined using randomization software and indicated which set
should be used for each session (see Appendix W). Three separate rotations were generated for baseline, intervention, and maintenance sessions. For this study, the actual order of the toy set rotation was not paramount; the schedule only was developed to provide caregivers with a framework for deciding which toy set to use and to ensure that the children did not play with the same toy set more than twice consecutively. Caregivers were asked to follow the toy set rotation but were assured that deviations were permitted as long as their child did not play with the same toy set for more than two consecutive sessions.

**Procedures**

Study procedures consisted of nine primary components: 1) questionnaire and BDI-2 assessment activities, 2) the DPA administration, 3) identifying target play behaviors, 4) assigning children to groups, 5) delivering caregiver training activities; 6) implementing the intervention (i.e., baseline, intervention, and maintenance phases); 7) coding target play activities and comments; 8) establishing interobserver agreement; and 9) assessing treatment fidelity. The following sections detail each of these procedure activities.

**Administration of questionnaires and BDI-2 assessment activities.** All caregivers completed the family activities and toy inventory questionnaires. Please see Appendix Q for a description of toys that each child owns, as reported on the toy inventory questionnaire.

If an EI assessment team administered the BDI-2 within six months of the caregiver signing the *Statement of Informed Consent*, results were used to describe the child’s developmental functioning. Scores from Vincenzo and Brent’s most recent EI evaluation were used for this study but the researcher administered the BDI-2 to John, Edward, and Travis because they had not completed the BDI-2 within six months of their caregiver signing the *Statement of Informed Consent*. All caregivers were assured that results of a BDI-2 administered
by the researcher would not be used to determine intervention goals, would not be video recorded, and would not impact their child’s EI service provision.

John and Edward had both completed several hours of ABA therapy prior to their BDI-2 administration and seemed fatigued throughout testing, which likely impacted their performance. Vincenzo, Brent, and Travis complied with the BDI-2 evaluation process and results were believed to provide an accurate reflection of their development across domains. Table 9 provides an overview of each child’s score on this measure. While all of the children scored within either the low average (i.e., Edward and Travis) or average (i.e., John, Vincenzo, and Brent) in the motor domain, they all showed delays in their personal/social and communication skills. While Travis showed low average performance in the cognitive domain and John showed low average performance in terms of adaptive skills, the other children exhibited deficits in these areas. Taken together, results indicate that the five toddlers that were enrolled in the study showed delays in their language, social and cognitive abilities.

DPA administration. The DPA was administered to three children right after the Statement of Informed Consent was signed. The two other children were administered the DPA the day after the Statement of Informed Consent was signed. For the administration, the children and caregivers sat together on the floor for a 30-minute period. While the children engaged in free play, the caregivers refrained from eliciting their play. Instead, the caregivers sat next to their children, directed them back to the toys if they left the play area, and addressed maladaptive behaviors (e.g., throwing toys). Every seven-and-a-half minutes, the researcher placed a new toy set in front of the children; thus, by the end of the administration, the children had been exposed to four different toy sets. Each administration was video recorded and reviewed by the researcher to establish the presence of emerging play categories and document any general and activity-
specific comments. During the administration, the researcher provided each caregiver with training prompts to 1) indicate when they were responding to their children as they would during a baseline session or 2) provide corrective feedback about prompting their child’s play. Because the DPA administration was video recorded, the researcher did not record the frequency of general comments and activity-specific comments produced during the administration. Instead, she watched the video, recorded all intelligible comments, and classified them as general comments or activity-specific comments based on what the child was doing with the toys.

**Results of John’s DPA administration.** John completed the DPA while sitting in the living room with his mother. He had completed five hours of ABA therapy prior to the administration and seemed fatigued during the administration. Table 10 provides an overview of his DPA performance. John scored within the emerging level in the General Combination and Specific Physical categories. He did not comment during the administration. The researcher provided John’s mother with two training prompts.

**Results of Edward’s DPA administration.** Edward completed the DPA while sitting on the living room floor with his mother and brother. When Edward’s brother attempted to play with the DPA toys, his mother routinely redirected him away; however, his brother’s intrusions may have impeded Edward’s access to the toys. Nonetheless, as Edward sustained attention throughout the 30-minute play period, results seem to provide an accurate reflection of his play abilities. Table 11 presents Edward’s performance on the DPA. He showed emergent skills within the General Combination, Specific Physical, and Child-As-Agent categories. Edward said “uh oh” while throwing a block, representing one instance of a general comment. During the administration, the researcher provided Edward’s mother with three training prompts.
Results of Vincenzo’s DPA administration. Vincenzo’s performance on the DPA is detailed in Table 12. His ability to complete play activities within the Presentation Combination category was emerging. He produced one comment while playing, saying an approximation of “Uh oh” when a peg fell. The researcher provided eight training prompts to Vincenzo’s mother.

Results of Brent and Travis’ DPA administration. Brent’s performance on the DPA is illustrated in Table 13. His ability to complete play activities within the General Combinations, Specific Physical, and Specific Conventional categories was emerging. He exhibited ten instances of spontaneous commenting, saying “Dog,” “Go,” “Blue,” and “Night Night.” Travis’ performance on the DPA is presented in Table 18. He scored within the emergent level with the Presentation Combinations, General Combinations, and Specific Physical categories. Travis did not comment during the DPA administration. The researcher noticed that Brent and Travis’ father was eliciting play activities during the DPA administration. To help correct and shape his behavior, she provided Brent and Travis’ parents with twenty two training prompts.

Interobserver agreement of the DPA administration and observation of commenting. After the researcher finished coding the DPA for play activities and commenting, the research assistants reviewed the videotapes to determine interobserver agreement for documented play activities, play activity categorization, play category levels, and commenting. Interobserver agreement was determined for all five children (see Table 20) and was calculated by dividing the total number of agreements by the total number of agreements plus disagreements. Across children, agreement was 0.93 (SD = 0.02; range: .90-.96) for documented play activities, 0.89 (SD = 0.08; range: .77-.98) for play activity categorization, 0.97 for play category levels (SD = 0.03; range: .93-1.0), and 1.0 for commenting. The lowest level of agreement occurred for Edward with the play activity categorization and stemmed from discrepancies about high frequency
discriminative actions. For example, the researcher observed 32 instances of placing the gas pump handle on the gas pump while the research assistant documented 30 instances.

**Identification of target behaviors.** Play categories were selected for intervention based on each child’s DPA performance and play activity presentation during baseline. Categories at the *emergence level* were selected temporarily for intervention. Data from baseline sessions were analyzed to verify that occurrences of activities in these categories were observed. Table 21 lists which categories were emerging on each child’s DPA administration and which were targeted for intervention after baseline data were analyzed. Target play activities were gleaned from prior play intervention studies (Lifter et al., 1993, 2005, in progress), from the DPA training manual (Lifter, 2000), and from the toy inventory and family activity questionnaires that were created by the student researcher. Appendix S presents target activities that were selected for Edward, while John’s target activities are detailed in Appendix T. Vincenzo’s target activities are listed in Appendix U. Please refer to Appendix V for a list of Brent’s activities and Appendix W for a list of Travis’ activities.

**Assigning children to groups.** To create experimental control within the multiple baseline design, each child was assigned to one of two intervention groups. The first group consisted of two single children from different families: John and Edward. The second group consisted of a single child from one family, Vincenzo, and twins from a different family, Brent and Travis. For the remainder of this manuscript, the former is referred to as “Group One” or the “first group” and the latter is called “Group Two” or the “second group.”

**Caregiver training.** The caregiver training sessions consisted of three components: (1) baseline training activities, (2) intervention training activities, and (3) ongoing treatment fidelity.
The first two portions of this section detail the baseline and intervention training activities. A discussion of treatment fidelity procedures follows.

**Baseline training activities.** After initial assessment activities were completed, the caregivers reviewed the baseline training handouts, watched the baseline video footage, and discussed associated questions. Caregivers then delivered practice baseline sessions while the researcher was present, which allowed them to receive live feedback about their adherence to and deviations from baseline procedures. Practice baseline sessions occurred until caregivers met the discontinuation criterion of prompting a child’s play three or fewer times during a practice session. Once caregivers meet this criterion, they were able to deliver baseline sessions independently without the researcher present. The researcher collected recorded baseline sessions from each caregiver at the end of every week. During the following week, she met with caregivers and showed them segments from the recorded baseline sessions to review when and how they implemented baseline procedures correctly and incorrectly. Verbal feedback and guided practice were provided to correct the reviewed errors.

**Intervention training activities.** Training for the intervention sessions occurred while baseline sessions were being conducted but nearly concluded. Once the children in the first group showed six stable baseline points, the researcher reviewed intervention training materials with their caregivers. Caregivers from the second group started reviewing intervention training materials once each member of the first group had completed two intervention sessions. For the intervention training, caregivers reviewed handouts, watched the intervention training video, watched a live four-minute demonstration of the researcher delivering the teaching procedures to the child, and discussed various questions.
Once the baseline phase was completed, caregivers began delivering practice intervention sessions, which all were video recorded. The researcher sat with the caregivers as they delivered the 10-minute practice sessions. Feedback and prompting were provided to help the caregivers become more comfortable and independent with delivering the teaching techniques. Once caregivers used least-to-most prompting independently on 10 occasions to teach target play activities to their child, they were able to conduct intervention sessions independently.

**Ongoing treatment fidelity.** During the intervention phase, caregivers were provided with monthly feedback from the researcher about their adherence to the teaching protocol. At the end of every month, the researcher met with each caregiver in person or by phone to discuss and correct deviations from the teaching protocol. Corrective feedback involved describing the error, showing an example of the error from the recorded intervention sessions, and modeling the correct approach.

Treatment fidelity was evaluated by reviewing 50% of the total intervention sessions for each caregiver. Brent and Travis’ parents alternated with delivering the intervention to their sons during each session. Accordingly, for both Brent and Travis, treatment fidelity for was calculated for their mother and their father. When determining treatment fidelity, focus was placed on whether caregivers (1) taught target play activities, (2) provided reinforcement after teaching a target or non-target activity, and (3) used least-to-most prompting to ensure that children completed prompted activities.

**Implementing the intervention.** This study was implemented in three phases: baseline, intervention, and maintenance. During the intervention phase, some of the caregivers implemented generalization probes; John’s mother implemented two generalization probes while Brent and Travis’ parents completed one. At the beginning of the study, the caregivers and
researcher each decided how many play sessions would occur each week. The caregivers did not have to deliver a uniform number of baseline sessions per week. Instead, each caregiver could opt to deliver anywhere from three to seven 30-minute sessions per week. Each caregiver initially committed to delivering at least three baseline and intervention sessions per week. Table 22 lists the number of baseline, intervention, and sessions that each family completed and the number of sessions that were coded for interobserver agreement and treatment fidelity. At the beginning of each week, the researcher contacted the caregivers by email, text, or telephone, based upon their preference, to remind them which toy sets to use during the upcoming week.

**Baseline sessions.** During each baseline session, the caregiver, researcher, or another trusted adult (e.g., ABA or EI clinician, spouse) started the recording device. The caregiver then placed one of the four toy sets in front of their child. The children were recorded engaging in free play. While the children played, the caregivers refrained from directing, responding to, commenting on, and praising the performance of play activities. The caregivers were encouraged to respond to disruptive off-task behaviors (e.g., throwing toys, grinding teeth).

**Intervention sessions.** All conditions in intervention remained the same as baseline, except that the caregivers taught, reinforced (e.g., praised), and commented on (e.g., “You washed the doll’s face”) target play activities. Additionally, the children only used one of the three toy sets that were designated for the teaching sessions. Teaching procedures occurred when the child either attended to a toy (i.e., looking at it, doing something with it, or saying something) or to an adult activity (i.e., what a caregiver does with an object by looking at the action or saying something about it). Least-to-most prompting was used to facilitate the performance of a target play action.
To begin a teaching activity, the caregiver waited for the child to attend to a toy spontaneously. If spontaneous attending did not occur, the caregiver either gave the child a toy or placed it in front of him. The caregiver waited to see how or if the child attended to the toy and then provided a verbal cue, such as, “You have a saw.” If the child subsequently enacted a target action (e.g., picked up wood and sawed it), he received praise and was presented with a comment from the caregiver about the play activity (e.g., “saw wood, you sawed the wood,” given an action-object language target), leading to the completion of that specific teaching opportunity. If the child did not enact a target action, the caregiver gestured toward the toy in the child’s view (i.e., gestural prompt) and gave another verbal prompt, such as, “Here’s the wood” or, “Saw the wood.” If the child enacted the target action, he/she received praise, as described above, signaling the end of the specific teaching opportunity. If the child did not enact a target action following the verbal and gestural prompts, the caregiver either modeled the action for the child or provided physical guidance, after which praise and commenting were provided and the teaching opportunity ended.

**Generalization probe.** During the intervention phase, each child participated in some generalization sessions with the fourth toy set, which contained toys that were not used during direct play instruction. The generalization probe was conducted to examine whether children performed target play activities with toys that were not used during the play teaching. It was intended to provide information about play skill generalization and associated commenting. During generalization probes, the caregiver placed the fourth toy set in front of the child and allowed him to play without adult elicitation.

**Maintenance phase.** The maintenance phase occurred after everyone in a group showed a stable or rising trend line within the intervention phase. Similar to the baseline conditions,
children were given one of the four toy sets and had the opportunity to play without adult direction. Each maintenance session was recorded and reviewed to evaluate the children’s progress.

**Explanation of play activities, play exemplar, and commenting coding.** When coding play session data, the researcher only documented the occurrence of target activities (i.e., did not record information about non-target activities) and classified them as spontaneous or prompted responses. Spontaneous responses were defined as activities that were performed independently (e.g., without prompting). Prompted activities were activities that were performed after a caregiver 1) provided a physical, gestural, or verbal prompt (e.g., caregiver picks up soap and a doll, hands both objects to the child, and says, “Wash the baby) or 2) imitated an activity (e.g., caregiver pushes train cars on a track and the child repeats the action). The frequency of spontaneously demonstrated play activities was coded and regarded as the first dependent variable for this study.

The researcher also indicated the number of play exemplars (i.e., different kinds of activities) that were performed spontaneously during each session, which served as the second dependent variable. Play exemplars that occurred during baseline sessions were recorded (e.g., putting a spoon in a cup; stacking a block onto another block) and the demonstration of new play exemplars (i.e., activities that only occurred during intervention sessions) was monitored. As with the play frequency data, exemplars were classified as spontaneous or prompted responses. Finally, the examiner recorded all spontaneously produced comments and classified them as general comments or activity-specific comments. Comments were not recorded if they were imitations of words said by adults, children, or media sources.
Interobserver agreement of baseline, intervention, and maintenance sessions.

Interobserver agreement between the researcher and research assistants was achieved by reviewing 25% of the baseline, intervention, and maintenance sessions for each caregiver. Comparisons were made in terms of 1) spontaneously performed target play activities and 2) spontaneously produced comments. Interobserver agreement was not calculated for activities or comments that were prompted. Agreement was calculated by dividing the total number of agreements by the total number of agreements plus disagreements.

Data analysis. For each session, all spontaneously performed target play activities and comments were recorded and coded with respect to play activity frequency, play exemplar production, general commenting, and activity-specific commenting. Each child’s data were graphed and analyzed following the procedures for a single-subject, multiple-baseline design. Data were analyzed to examine the impact of the caregiver-implemented play intervention by conducting a visual analysis of the level, trend, and variability of performance during baseline, intervention, and maintenance. (Gay & Airasian, 2003; Horner et. al, 2005). To determine the level of performance, data were analyzed to determine the mean performance during the baseline, intervention, and maintenance phases. To determine the trend of performance, a best-fit straight line was applied to examine the rate of increase for the four dependent variables for each child. A visual analysis of the variability of performance involved examining how the child’s performance fluctuated around the mean during each condition (Horner, et al, 2005).
CHAPTER 4

Results

This fourth chapter presents the results of this intervention study, highlighting each child’s individual progress and the overall response to intervention across groups. The first section of this chapter describes two primary components of this intervention: ongoing caregiver training and implementing the intervention. The second section provides a description of each child’s performance during baseline, intervention, and maintenance sessions. Reflecting the multiple baseline design, the third section provides a comparative depiction of each group’s progress throughout the study. Finally, a summary of the children’s overall response to intervention is presented, which includes a discussion of intervention implementation constraints.

General Overview of Intervention

This study was designed to evaluate the effects of a caregiver-implemented play intervention on the play and commenting abilities of toddlers with ASD. Procedures were developed to help caregivers deliver instruction in accordance with the teaching methods being evaluated for this study. Specifically, to bolster treatment fidelity, all caregivers were asked to complete a series of training activities prior to starting the baseline and intervention phases. Additionally, throughout the baseline and intervention phases, they would receive feedback from the researcher about their procedural adherence.

Using a multiple-baseline design across two groups of subjects, participants’ responsiveness to intervention would be monitored across baseline, intervention, and maintenance phases, as well as during generalization probes. Based on the two-group design, it was planned that the five participants be randomly assigned to one of two groups. Both groups were to start baseline sessions within a span of a two-week period. Coinciding with multiple-
baseline procedures, the first group of children were going to transition to the intervention phase once they showed steady baseline responding. The second group would remain in baseline while the first group received direct instruction in play and completed the occasional probe session. Once the first group showed a steady responsiveness to the play intervention, the second group would transition from baseline to intervention. Once the first group showed a steady state of responding during intervention, they would transition to the maintenance phase. Similarly, the second group would start maintenance sessions once their responsiveness during intervention was steady.

Implementation of Training Activities and Two-Group Multiple-Baseline Design

This intervention project was conducted over a twelve-month period, with initial assessment activities and intervention goal development beginning in March 2012 and baseline, intervention and maintenance sessions occurring until March 2013. Coinciding with the planned procedures, all five caregivers completed the training activities prior to baseline and intervention. Similarly, they all received formative feedback about their intervention delivery throughout the study.

After the BDI-2 and DPA were administered to each child, the researcher randomly assigned the participants to one of the two groups. John and Edward were assigned to the first group, while Vincenzo, Brent, and Travis were assigned to the second group. As planned, all of the children completed the baseline phase and transitioned to the intervention phase. The first group started intervention at the specified period—when they showed a decreasing trendline or steady trend across play and commenting variables; however, due to time constraints, the second group transitioned from baseline to intervention prematurely. Rather than starting intervention sessions when the first group showed a steady treatment responsiveness, the second group
transitioned after each member of the first group completed three intervention sessions. While the second group’s premature intervention initiation is a notable limitation of the study, staggering the baselines across groups nonetheless allowed for a replication of treatment effects to be evaluated. Thus, results provide some evidence about the effect of the intervention (i.e., caregiver-implemented teaching in play) within each data series (i.e., for each child) and across the data set (i.e., across participating children).

Another difference between the proposed plan and the actual study implementation involved caregivers’ completion of the intervention phase. Vincenzo’s family, who was assigned to the second group, discontinued their participation after completing six intervention sessions due to family circumstances. Following Vincenzo’s withdrawal, only four of the five children remained in the study at the end of the intervention phase. Three weeks later, after completing 14 intervention sessions, Edward’s family withdrew from the study. Thus, at the beginning of the maintenance phase, John was the only child remaining in the first group while Brent and Travis remained in the second group. Notably, these three participants completed maintenance sessions. Also in contrast of the proposed procedures, John, Brent, and Travis were the only children who completed generalization probes. Specific information about the number of generalization and maintenance sessions delivered to each child is detailed in later sections.

**Caregiver Training**

For this intervention, the caregivers were responsible for delivering the teaching to their children. The researcher served as a consultant who provided ongoing training to help caregivers deliver direct instruction in play in accordance with teaching procedures. Caregiver training involved three major components: 1) training activities prior to starting baseline sessions, 2)
training activities prior to starting intervention and maintenance sessions, and 3) formative treatment fidelity feedback during baseline and intervention sessions.

**Training activities prior to baseline sessions.** Prior to starting baseline sessions, all of the caregivers completed training activities with the researcher. They reviewed handouts and a training video, and delivered practice baseline sessions until they met the discontinuation criteria of prompting a child’s play three or fewer times during a practice session. John’s mother and Edward’s mother met discontinuation criteria after completing two practice sessions. Vincenzo’s mother and the parents of Brent and Travis met discontinuation criteria after three practice sessions.

**Training activities prior to intervention and maintenance sessions.** Prior to starting intervention sessions, the caregivers participated in a second training with the researcher, which involved reviewing handouts and the training video and delivering practice intervention sessions until they met the discontinuation criteria of using least-to-most prompting independently on 10 occasions to teach target play activities to their child. Once this discontinuation criterion was met, families started delivering intervention sessions. John’s mother and Brent and Travis’ parents met the discontinuation criterion after two practice sessions. Vincenzo’s mother and Edward’s mother met the criterion after three practice sessions.

Prior to starting maintenance sessions, caregivers were prompted to return to baseline conditions once the intervention phase concluded. That is, during maintenance sessions, caregivers were asked to sit with their child without prompting play activities. Having met discontinuation criterion during baseline training activities, all of the caregivers demonstrated an ability to proceed in accordance with baseline procedures. Accordingly, based on data from their
baseline training performance, caregivers were prompted to return to baseline conditions and did not participate in formal training before starting maintenance sessions.

**Formative treatment fidelity feedback.** During the baseline and intervention sessions, the researcher reviewed each recorded session and provided caregivers with feedback about what was working well and what should be adjusted in accordance with the teaching protocol. The researcher did not provide the caregiver with feedback about their presentation during maintenance sessions. Treatment fidelity data from 25% of the intervention sessions for each child, which are described in later sections, demonstrated caregivers’ high levels of responsiveness to feedback.

**Implementation of the Intervention**

Each caregiver initially committed to delivering at least three sessions each week, and had the option of completing more if possible. Throughout the course of the study, Edward’s mother (group one) and Vincenzo’s mother (group two) had difficulty completing three thirty-minute sessions per week. Further, because of family circumstances, both children withdrew from the study before completing the intervention phase. When Vincenzo discontinued participation, Brent and Travis were the only children remaining in the second group. When Edward discontinued participation three weeks later, John alone remained in the first group. Thus, by the end of the intervention phase, only three of the original five children remained in the study: John in the first group and Travis and Brent in the second group.

In sum, Edward’s mother (group 1) and Vincenzo’s mother (group 2) completed a variable number of sessions per week across the baseline and intervention phases. Vincenzo’s family withdrew from the study after completing six usable sessions. Edward’s mother completed 14 intervention sessions and then opted to withdraw from the study. John’s mother
(group 1) and Brent and Travis’ parents (group 2) completed the baseline phase, the intervention phase with generalization probes, and the maintenance phase, conducting an average of three sessions per week.

**Implementation of baseline sessions.** During baseline, each child was given one of four toy sets and engaged in free play for a 30-minute period while he sat near his caregiver. Caregivers sat silently and allowed the child to play. They did not interject ideas for play activities or interrupt activities that the child was completing. Caregivers intervened when a child’s behavior became unsafe (i.e., throwing toys), if he became ill, if he requested a snack or drink, if he needed a toileting break, when his play became repetitive, and/or if he did not engage with any toys for more than three minutes. In the case of the latter, caregivers attempted to foster the children’s engagement by placing the toys in front of them, making noises with them (e.g., shaking a box of beads), and, when children left the room, guiding them back to the play area.

**Implementation of intervention sessions.** Intervention sessions occurred at any time of day when the caregiver and child were available and the caregiver could record a session. Occasionally, sessions were interrupted by extraneous factors, such as important telephone calls, toileting needs, and unexpected home visits from home-based service providers. A few sessions were discontinued for Vincenzo because he became sick. During intervention, the children played on the floor or at a small table with one of three toy sets and received direct instruction from their caregivers in order to learn and execute target play activities. During generalization probes, which were completed by John, Brent, and Travis, participants were given the fourth toy set and allowed to engage in free play to see how they used toys that were not involved in the direct play teaching.
Implementation of maintenance sessions. John, Brent, and Travis were the only children to complete maintenance sessions. Similar to baseline, they were given one of four toy sets and engaged in free play for thirty minutes while sitting near his caregiver. Caregivers sat silently and only intervened when the child demonstrated maladaptive behaviors, became ill, needed a snack or drink, needed a toileting break, or demonstrated repetitive play for three minutes.

Impact of Toddlers’ Needs on Intervention Implementation

The children’s needs and behaviors influenced the administration of the intervention. Although the children typically sat and played for thirty minutes, they all occasionally fussed and stopped playing after fifteen or twenty minutes, even after attempts to reengage them in the teaching. To ensure that recorded sessions included comparable observation durations, sessions that were at least 20 minutes were included in the coding; sessions that were 19 minutes or shorter were discarded. Table 19 details the number of sessions that were discarded for each participant across study phases; this information also is detailed in each child’s response to intervention description. Throughout the three study phases, each child had sessions that were discarded because of being too short. Please refer to each child’s specific data, which are detailed in each child’s Response to Intervention section, for a description of how many sessions were discarded for each phase. Additionally, all of the children were periodically distracted by extraneous factors, such as unexpected house guests, a bursting water heater, their siblings, and preferred shows being put on the television.

Children’s Responses to Intervention

The following sections describe caregivers’ treatment fidelity data and each child’s response to intervention with play and commenting variables across baseline, intervention, and
maintenance sessions. Specifically, the presented data reflect each child’s progress with play activity frequency, exemplar production, general comments, and activity-specific comments, with the latter two being combined to reflect total commenting. To evaluate each child’s responsiveness across subjects, data were analyzed in two manners: 1) through a visual analysis of graphed data and 2) by comparing each child’s mean performance with play and commenting variables across study phases. John and Edward were assigned to the first experimental group; thus, their intervention results are presented first. Results for Vincenzo, Brent, and Travis, who comprised the second group, are presented subsequently.

**Inter-Observer Agreement**

Across children, interobserver agreement was 0.96 for the target play activities and 0.98 for commenting. For each child, 25% of the recorded sessions were coded for interobserver agreement. Please see Table 23 for an overview of the high levels of interobserver agreement across children and for each child. Overall, agreement between the researcher and research assistant’s coding was high for both the play and commenting variables.

**Overall Calculation of Treatment Fidelity across Caregivers**

Calculations across caregivers indicated that they demonstrated 0.88 fidelity with teaching target activities, 0.96 fidelity with providing reinforcement after teaching, and 0.86 fidelity with using least-to-most prompting. Treatment fidelity data for each individual caregiver are presented in Table 20. Similarly, a description of each caregiver’s treatment fidelity data is detailed in the following sections in conjunction with describing each child’s responsiveness data.

**John’s Response to Intervention**

John completed baseline, intervention, and three maintenance sessions. During intervention, his mother conducted two generalization probes. Six sessions were discarded for
being too short. Four of the discarded sessions occurred during baseline while the other two were recorded during the intervention phase. Specifically, out of 17 total recorded baseline sessions, four were discarded while 13 were retained for use in this study. Out of 16 recorded intervention sessions, two were discarded, resulting in 14 usable recorded sessions. All of the recorded maintenance sessions were retained for use in this study.

**Treatment fidelity data: John’s mother.** As indicated in table 20, John’s mother displayed high levels of fidelity (i.e., > 0.80) across variables. Throughout the study, she adhered to treatment procedures in terms of teaching target play activities, rather than using instructional time to teach non-targeted activities. John’s mother also was consistent with using least-to-most prompting techniques. Similarly, she routinely provided verbal praise and commented after John performed a prompted play activity.

**John’s play activity frequency.** Figure 1 shows John’s performance with play activity frequency. During baseline, John produced an average of 16.8 play activities spontaneously per session (SD = 9.4; range: 5-35) and showed a decreasing trend line (b = -0.46). With data that yielded a stable trend line (b = -0.05), he exhibited increases in play activity frequency during intervention, demonstrating 30.3 spontaneous activities on average per session (SD = 13.1; range: 14-56). Relative to intervention, John produced fewer spontaneous activities during probe sessions (i.e., six during the first and 11 during the second); however, during maintenance, he applied skills that he acquired through direct play instruction, with his average play frequency mean (M = 31; SD = 18.5; range: 13-50) approximating his performance during intervention. Thus, as a result of the intervention, John spontaneously produced target play activities with increasing frequency.
**John’s play activity exemplars.** Figure 2 presents John’s progress with play activity exemplars. He exhibited an average of 3.2 exemplars per baseline session (SD = 2.4; range: 1-10), which yielded a stable trend line (b = -0.03). During intervention, John produced 5.9 exemplars (SD = 3.2; range: 1-12), which yielded a stable trendline (b = 0.04) and performed more new exemplars (M = 5.2; SD = 3.3; range: 0-12) relative to previously demonstrated exemplars (M = 0.75; SD = 0.62; range: 0-2). Relative to his performance during intervention, John performed similar amounts of exemplars during probe sessions (i.e., two during the first session and five during the second) and maintenance sessions (M = 6; SD = 2.6; range: 4-9), but again produced more new exemplars (M = 4.7; SD = 2.1; range: 3-7) relative to previously demonstrated exemplars (M = 1.3; SD = 0.58; range: 1-2). In sum, in response to intervention, John exhibited increasing numbers of play exemplars. Additionally, he was able to perform increasing numbers of novel activities.

**John’s total commenting.** Figure 3 illustrates John’s response in terms of total commenting. He transitioned from producing an average of 3.2 total comments per baseline session (SD = 1.99; range: 0-6), which yielded a stable trend line (b = 0.11), to 25.7 total comments per intervention session (SD = 21.2; range: 2-56), which yielded an ascending trend line (b = 3.86). Relative to intervention, John produced fewer total comments during the probe sessions, exhibiting seven during the first and 27 during the second. In contrast, he exhibited high levels of total commenting during maintenance (M = 34; SD = 8.9; range: 24-41). As demonstrated by the data, John demonstrated increases in his overall commenting abilities in response to intervention.

**John’s general and activity-specific commenting.** Figure 4 illustrates John’s general and activity-specific commenting. For the two commenting variables, he showed a stable
baseline trend line \((b = 0.04)\) with an average of 2.7 general comments \((SD = 1.97; \text{range: 0-6})\) and a stable baseline \((b = 0.07)\) with an average of 0.46 activity-specific comments \((SD = 0.66; \text{range: 0-2})\). He made progress with activity-specific commenting \((M = 6.8; SD = 7.2; \text{range: 0-24}; b = 1.18)\) and general commenting \((M = 19.1; SD = 16.9; \text{range: 1-57}; b = 2.87)\) in response to intervention, showing an ascending trend with both variables. As can be seen in figure 4, during probe sessions, he produced fewer general comments (i.e., six during the first and two during the second) and variable performance with activity-specific comments (i.e., one during the first probe but ten during the second). In contrast, John produced high levels of general commenting \((M = 22.3; SD = 9.7; \text{range: 14-33})\) and activity-specific comments \((M = 11.7; SD = 4.7; \text{range: 8-17})\) during maintenance. Overall, John’s performance yielded an ascending trend in terms of his ability to comment generally and about specific activities during play teaching.

**Overview of John’s performance across play and commenting variables.** Taken together, John’s performance is consistent with the proposed hypotheses. That is, a functional relation was revealed between the implementation of caregiver-delivered instruction and increases in John’s play and commenting behaviors. Specifically, in response to teaching, John performed a greater number of spontaneous play exemplars more frequently during intervention and maintenance. Relative to his baseline presentation, he also produced higher levels of general, activity-specific, and total commenting during and after having received direct instruction in play.

**Edward’s Response to Intervention**

Edward completed baseline and intervention sessions. He did not participate in any maintenance or probe sessions. Six of Edward’s sessions were discarded because they were under 20 minutes. Five of the discarded sessions were recorded during baseline while the other
one occurred during intervention. Specifically, out of 18 recorded baseline sessions, five were discarded and 13 were retained. Out of 15 intervention sessions, one was discarded while 14 were retained for coding. A review of baseline data indicates that Edward transitioned to the intervention phase prematurely. He showed a steadily decreasing trend line throughout baseline but, due to time and schedule constraints, teaching sessions started before a stable pattern of baseline play frequency was obtained. This dynamic complicates the ability to assess Edward’s rate of responsiveness as a function of the intervention.

**Treatment fidelity data: Edward’s mother.** As demonstrated in Table 20, Edward’s mother displayed high levels of fidelity (i.e., > 0.80) across variables. In response to direct feedback from the researcher, she developed a consistent ability to teach more target activities and use hand-over-hand prompting during intervention sessions. Further, throughout the study, she consistently praised and commented on play activities performed by Edward. While data revealed high levels of fidelity, some factors nonetheless impeded the intervention delivery. Qualitatively, Edward’s mother endorsed her hesitation with redirecting her older son away when he used toys and blocked Edward’s access to them during play sessions. Edward’s mother shared that her older son was jealous because he was excluded from Edward’s therapy home visits, and that he often sought her attention. Thus, when her older son became upset, Edward’s mother sometimes allowed him to play with the toy sets, which limited Edward’s access to the toys during teaching sessions. Further, when the older son misbehaved, Edward’s mother attended to him (e.g., cuddling with him in her lap) rather than teaching activities to Edward.

**Edward’s play activity frequency.** Figure 5 reflects how frequently Edward performed target play activities. Across baseline sessions, which was notable for a decreasing trend line ($b = -2.04$), Edward demonstrated an average of 50.9 activities ($SD = 17.3$; range: 36-97). He
exhibited little progress with play activity frequency in response to intervention. Although his performance yielded an increasing intervention trend line \( (b = 1.21) \), he performed fewer activities on average per session \( (M = 31.5; SD= 15.5; \text{range: 5-54}) \) relative to baseline. Taken together, the data are insufficient for proposing the presence of a functional relation between the play instruction and Edward’s ability to perform target play activities more frequently.

**Edward’s play exemplar frequency.** Figure 6 displays Edward’s play exemplar data. Demonstrating a descending trend during baseline \( (b = -.08) \), Edward performed an average of 3.6 exemplars \( (SD = 1.1; \text{range: 2-6}) \). Rather than showing gains, he produced a comparable number of exemplars during intervention \( (M = 3.9; SD = 2.2; \text{range: 1-8}) \) and yielded a stable baseline throughout the phase \( (b = 0.01) \); however, he performed slightly more new exemplars \( (M = 2.9 \text{ new exemplars}; SD = 2.2; \text{range: 0-7}) \) relative to previously demonstrated exemplars \( (M = 1.1; SD = 0.73; \text{range: 0-2}) \). Overall, when compared to his steady state baseline responding, Edward did not produce increasing numbers of play exemplars in response to the caregiver-implemented teaching intervention, although he demonstrated increases in performing new kinds of activities.

**Edward’s total commenting.** Figure 7 illustrates Edward’s progress with total commenting. Displaying a decreasing baseline trend line \( (b = 0.32) \), Edward produced an average of 4.8 total comments \( (SD = 3.7; \text{range: 0-11}) \) per baseline session. He displayed comparable levels of total commenting during intervention \( (M = 5.0; SD: 2.96; \text{range: 1-11}) \) relative to baseline and showed a stable trendline throughout the phase \( (b = 0.33) \). Taken together, Edward’s data do not support the presence of a functional relation between delivering the play intervention and increases in total commenting abilities.
Edward’s general and activity-specific commenting. Figure 8 depicts Edward’s performance with general and activity-specific commenting. He performed an average of 4.4 general comments per baseline session (SD = 3.2; range: 1-11), which yielded a decreasing trend line (b = -0.21), and 0.9 specific comments (SD = 1.5; range: 0-5), which yielded a rising trend line (b = 0.04). During intervention, Edward’s data yielded rising trend lines as he showed comparable levels of general commenting (M = 3.3; SD = 1.9; range: 1-7; b = 0.08) relative to baseline but slight increases in specific commenting (M = 1.9; SD = 1.8; range: 0-6). In terms of specific commenting, Edward demonstrated a rising trendline throughout baseline (b = 0.21) and intervention (b = 0.29). As steady baseline responding was not achieved, one cannot make a claim about the relation between the play intervention and his specific commenting abilities. While a difference in trend was noted for general commenting abilities across study phases, results reveal that comparable numbers were made during baseline and intervention, providing little support in terms of a relation between the intervention and increased general commenting.

Overview of Edward’s performance across play and commenting variables. Taken together, Edward’s results are difficult to interpret. His mother started teaching sessions prematurely and Edward showed comparable levels of performance across baseline and intervention phases for play exemplar, general commenting, and total commenting. Thus, he did not show responsiveness to intervention for these three variables. His performance in terms of play activity frequency contradicted the proposed hypothesis. Although he switched from showing a decreasing baseline trend line to showing a rising intervention trend line, Edward performed markedly fewer play activities on average during intervention. Showing an increasing trendline across baseline and intervention phases, little can be demonstrated about the impact of the intervention on his specific commenting skills. The only data-documented gain demonstrated
by Edward during the teaching sessions involve performing more new exemplars relative to previously demonstrated exemplars.

Vincenzo’s Response to Intervention

Vincenzo’s progress was assessed across 16 baseline sessions and six intervention sessions. Nine of his sessions were discarded for being too short. Four of the discarded sessions occurred during baseline while the other five were recorded during intervention. Specifically, out of 20 recorded baseline sessions, four were discarded and 16 were retained for use in this study. Out of 11 recorded intervention sessions, five were discarded, resulting in six usable intervention sessions. Vincenzo used all four toy sets during baseline. During intervention, he only used the three toy sets that were designated for teaching, and did not use the fourth toy set for a generalization probe.

Treatment fidelity data: Vincenzo’s mother. As noted in Table 20, Vincenzo’s mother showed high levels of fidelity (>0.80) across treatment variables. Nonetheless, some factors impeded how baseline and intervention sessions were delivered. When providing feedback to Vincenzo’s mother on six different occasions, the researcher stated that Vincenzo’s mother should sit near Vincenzo without prompting his play during baseline sessions. While she verbally endorsed her intent to comply with the feedback, she nonetheless diverted from the teaching protocol. Vincenzo’s mother endorsed her hesitation to let Vincenzo attempt activities without help during baseline because she did not want him to become angry. Similarly, per her report, she did not want to frustrate Vincenzo during intervention sessions by providing hand-over-hand support with new target activities and sometimes used hand-over-hand prompting inconsistently. Despite some repeated inconsistencies with not prompting play during baseline and using hand-
over-hand properly during intervention, Vincenzo’s mother generally complied with teaching procedures, as evidenced by the treatment fidelity data.

**Vincenzo’s play activity frequency.** Figure 9 reflects the frequency of Vincenzo’s target play activities. During baseline, Vincenzo performed an average of 3.94 target play activities (SD = 2.7; range: 0-9), which yielded a decreasing trendline (b = -0.24). When receiving instruction during intervention, he showed marked gains and an ascending trend line (b = 2.11) with spontaneously performing target play activities (M = 26.7; SD = 6.1; range: 13-29). While a limited number of usable intervention sessions were conducted (n = 6), preliminary results indicate that Vincenzo performed increasing numbers of play activities in response to intervention.

**Vincenzo’s play activity exemplars.** Figure 10 presents Vincenzo’s exemplar data. During baseline, Vincenzo performed an average of 1.69 exemplars (SD = 0.87; range: 0-3 exemplars) and a decreasing trend line (b = -0.04). In contrast, displaying a rising trend line, (b = 0.37) Vincenzo showed gains with exemplar production in response to intervention (M = 4.83; SD = 1.5; range: 3-7 exemplars). He performed a comparable number of previously demonstrated exemplars (M = 1.67; SD = 0.82; range: 1-3) and new exemplars (M = 3.17; SD = 1.72; range: 0-5). In sum, preliminary results indicate that Vincenzo started performing more activities and new kinds of activities in response to the caregiver-delivered instruction in play.

**Vincenzo’s total commenting.** Figure 11 highlights Vincenzo’s production of total comments. He was quiet throughout most of the baseline sessions and only produced an average of 0.56 total comments (SD = 0.63; 0-2) per session, which yielded a stable baseline trend (b = 0.01). In response to intervention, he showed slight gains in his ability to produce total comments (M = 2.0; SD = 1.79; range: 0-4), which yielded an ascending trendline (b = 0.34). Overall, in
response to direct instruction, Vincenzo started to comment more frequently during play sessions.

**Vincenzo’s general and activity-specific commenting.** Figure 12 illustrates his progress with general and activity-specific commenting. He rarely commented during baseline and only produced an average of 0.38 general comments (SD = 0.5; range: 0-1), which yielded a stable trendline \(b = 0.01\), and 0.19 activity-specific comments (SD = 0.40; range: 0-1), which also yielded a stable trendline \(b = 0.03\). In contrast, during intervention, he showed slight gains with producing general comments \((M = 1.33; SD = 1.2; \text{range: } 0-2)\), which yielded a stable trendline \(b = 0.06\), and activity-specific comments \((M = 0.67; SD = 0.82; \text{range: } 0-2)\), which yielded an ascending slope \(b = 0.29\). In sum, his ability to make general comments improved when the play instruction intervention was applied, while his activity-specific commenting levels remained similar.

**Overview of Vincenzo’s performance across play and commenting variables.** Family circumstances required that Vincenzo terminate his participation after six intervention sessions, which limited the ability to continue monitoring his progress. Nonetheless, throughout the brief intervention period, he performed an increasing variety of play exemplars more frequently. He also produced slightly more general, activity-specific, and total comments relative to baseline.

**Brent’s Response to Intervention**

Brent completed baseline, intervention, and two maintenance sessions. His parents conducted one generalization probe. Three of his sessions were discarded because they were shorter than 20 minutes. Two of the discarded sessions were from baseline while the other occurred during intervention. Specifically, out of 18 recorded baseline sessions, two were discarded and 16 were retained. Only one of the 19 recorded intervention sessions was discarded,
with 18 usable intervention sessions remaining. All of the maintenance sessions were retained for use in this study.

**Treatment fidelity data: Brent’s mother and father.** Brent is one of the twins who participated in this study. As the twins’ parents’ delivered play sessions simultaneously to Brent and Travis, treatment fidelity data were collected for both caregivers. As indicated in table 19, Brent’s mother demonstrated high fidelity (>0.80) when teaching Brent. When delivering play teaching, Brent’s mother consistently prompted Brent to perform target play activities, rather than using instruction time to teach other activities. She demonstrated a consistent ability to use least-to-most prompting and to reinforce Brent after he performed any prompted play activity. In contrast, Brent’s father showed variable accuracy with his teaching. Specifically, he demonstrated high accuracy with teaching target activities and providing reinforcement; however, he showed lower accuracy (0.77; range: 0.38-1.0) with using least-to-most prompting because he hesitated to use hand-over-hand prompting with Brent.

**Brent’s play activity frequency.** Figure 13 illustrates Brent’s progress with play activity frequency. During baseline, Brent performed an average of 8.93 activities (SD = 6.0; range: 2-28) and displayed a stable trendline (b = 0.13). Yielding a pattern of increasing responsiveness, he exhibited an average of 23.9 activities (SD = 14.5; range: 1-59) during intervention, which yielded an ascending trend line (b = 1.23) and an average of 57.5 activities (SD = 2.1; range: 56-59) during maintenance. During the one generalization probe, he performed 28 play activities. Taken together, results provide support of a functional relation between the caregiver-delivered intervention and an increasing performance of target play activities.

**Brent’s play activity exemplars.** Brent’s exemplar data are presented in Figure 14. He performed an average of 2.88 exemplars per baseline session (SD = 1.7; range: 1-7), which
yielded a stable baseline (b = 0.02) and an average of 9.2 exemplars (SD = 4.3; range: 1-15) per intervention session, which yielded an ascending trend line (b = 0.21). Most of his exemplars were new (M = 7.5; SD = 3.7; range: 1-15) relative to previously performed exemplars (M = 1.71; SD = 1.7; range: 0-5). During the generalization probe, he produced 9 exemplars. During maintenance, he performed an average of ten exemplars (SD = 4.2). In sum, relative to baseline, Brent demonstrated a responsiveness to intervention by performing more exemplars and an increasing number of new activities.

**Brent’s total commenting.** Figure 15 details Brent’s progress with total commenting. During baseline, he produced an average of 2.47 total comments (SD = 1.8; range: 0-6), which yielded a stable baseline (b = 0.19). During intervention, he produced an average of 14.7 total comments (SD = 12.2; range: 1-40), which yielded an ascending trend line (b = 1.36). During maintenance, he produced an average of 16.5 total comments (SD = 3.5; range: 14-19). On the one occasion his parents conducted a generalization probe, he produced 33 total comments. Based on available data, Brent responded to intervention by commenting more frequently across intervention and maintenance phases.

**Brent’s general and activity-specific commenting.** Brent produced an average of 2.13 general comments (SD = 1.8; range: 0-5; b = 0.15) and 0.33 specific comments (SD = 0.81; range: 0-3; b = 0.03) per baseline session. In response to intervention, he showed marked progress that was notable for a rising trend line (b = 1.15) and an average of 12.7 general comments (SD = 10.5; range 0-37). Similarly, during intervention, he performed an average of 1.94 specific comments (SD = 2.5; range: 0-8) and displayed a rising trend line (b = 0.20). During maintenance, he produced an average of 11.5 general comments (SD = 3.5; range: 9-14) and five specific comments (SD = 7.1; range: 0-10). On the one occasion a generalization probe
was conducted, he produced six activity-specific comments and 17 general comments. In sum, data support the possibility of a functional relation between the caregiver-delivered play intervention and Brent’s ability to produce general and activity-specific comments.

**Overview of Brent’s performance across play and commenting variables.** Overall, Brent’s performance across variables supports the proposed hypothesis. Relative to his baseline performance, Brent performed more types of play at a higher frequency in response to intervention. Similarly, data support the possibility of a functional relation between the play intervention and Brent’s ability to produce general, activity-specific, and total comments. Considering his presentation during maintenance, Brent’s progress across variables was sustained when he was not receiving instruction and when he used new toys that were not involved in the teaching.

**Travis’ Response to Intervention**

Travis completed baseline, intervention, and two maintenance sessions. His parents conducted one generalization probe. As noted with Brent, three of his baseline sessions were discarded because they were under 20 minutes, with two occurring during baseline and the other one occurring during intervention. Specifically, out of 18 recorded baseline sessions, two were discarded and 16 were retained. Only one of the 19 recorded intervention sessions was discarded, with 18 usable intervention sessions remaining. All of the maintenance sessions were retained for use in this study.

**Treatment fidelity data: Travis’ mother and father.** As indicated in Table 20, Travis’ mother demonstrated high fidelity (>0.80) with teaching target activities, using least-to-most prompting, and reinforcing Travis after he performed prompted play activities. Travis father showed high fidelity with reinforcing play activities and using least-to-most prompting but lower
fidelity (0.71; range: 0.23-1.0) with teaching target activities. While completing teaching sessions together, Brent and Travis were each taught a different category of play. Trent’s father sometimes became confused about which activities to teach Travis, erroneously prompting him to complete activities that were intended for Brent. Further, when Travis was upset, his father often prompted him to complete a puzzle, which was a mastered play activity that was not targeted for intervention.

Travis’ play activity frequency. Figure 17 presents Travis’ play activity frequency data. With data that yielded a descending trend line (b = -0.40), Travis completed an average of 14.9 activities per baseline session (SD = 8.6; range: 4-41). His progress with the play variables yielded a rising trend line during intervention (b = 1.69) and increasing frequency levels (M = 29.2; SD = 29.6; range: 6-136). During the generalization probe, he performed 27 play activities. During the maintenance phase, Travis produced 83 activities during the first session and six activities during the second session. Given the large spread between the two activity frequencies, a mean was not calculated for the maintenance sessions. Taken together, Travis’ performance during intervention, when compared with his stable baseline response rate, supports the possibility of a functional relation between the play intervention and the frequency of Travis’ play activities production.

Travis’ play activity exemplars. Figure 18 illustrates Travis’ exemplar production across study phases. Demonstrating baseline data that yielded a stable trend line (b = 0.06), Travis completed an average of 3.19 exemplars per session (SD = 1.5; range: 1-6). Displaying a rising trend line, he showed comparable levels of exemplar production during intervention (M = 6.18; SD = 2.2; range: 3-8), which yielded a continued stable trend line (b = 0.09); however, he performed more new exemplars (M = 4.8; SD = 2.0; range: 1-8) relative to previously
demonstrated activities ($M = 1.35; SD = 0.93; \text{range:} \ 0-5$). During the generalization probe, Travis performed eight exemplars. During the maintenance phase, Travis produced one exemplar during the first session and six exemplars during the second session. In sum, Travis showed moderate responsiveness to producing more exemplars during intervention and notable increases with performing new kinds of activities.

**Travis’ total commenting.** Figure 19 displays Travis’ progress with total commenting. During baseline, he produced an average of 0.13 total comments ($SD = 0.5; \text{range:} \ 0-2$), which yielded a stable trend line ($b = -0.04$). Showing minimal progress with commenting, he produced more total comments ($M = 2.1; SD = 4.2; \text{range:} \ 0-16$) and a slightly ascending trend line ($b = 0.28$) during intervention. Travis did not comment during either maintenance session or the generalization session. Taken together, data do not support the presence of a functional relation between the play intervention and Travis’ overall commenting abilities.

**Travis’ general and activity-specific commenting.** Figure 20 displays Travis’ progress with general comments and activity-specific comments. During baseline, he did not produce any activity-specific comments and only exhibited an average of 0.13 general comments ($SD = 0.5; \text{range:} \ 0-2$), which yielded a stable trend line ($b = -0.04$). He showed minimal progress with commenting, producing an average of 0.5 activity-specific comments ($SD = 1.1; \text{range:} \ 0-4$) with a stable trend line ($b = 0.08$) and 1.5 general comments ($SD = 3.5; \text{range:} \ 0-14$) with an ascending trendline ($b = 0.20$). He did not comment during either maintenance session or the generalization probe.

**Overview of Travis’ performance across play and commenting variables.** Travis’ response with play variables coincided with the proposed hypothesis. As evidenced through visual analysis and a comparison of means between sessions, he showed robust gains with play
frequency and modest gains with play exemplars. In contrast, he showed minimal gains with commenting, displaying comparable levels of general, activity-specific, and total commenting across baseline, intervention, and maintenance sessions. Overall, Travis’ ability to perform target play activities and exemplars varied when engaging in free-play and/or using novel toys.

**Implementation of the Multiple Baseline**

In addition to assessing each child’s individual responsiveness across variables, the researcher also evaluated the replicability of intervention data across subject groups. The following sections provide a comparative reflection of the groups’ responsiveness across four variables: 1) play activity frequency, 2) play activity exemplar, 3) general and activity-specific commenting, and 4) total commenting.

**Performance of Target Play Activities: Frequencies**

Figure 21 presents the groups’ progress with demonstrating target play activities across baseline, intervention, and maintenance sessions. Based on a visual inspection of the data, four of the five children responded to the play teaching as hypothesized. Specifically, they exhibited fewer target play activities during baseline and a higher frequency during intervention. Relative to their intervention performance, the three children who completed generalization and maintenance sessions all showed a consistent pattern of demonstrating play frequency levels that were similar to their performance during intervention. Edward’s performance differed from the other children, deviated from the proposed hypothesis, and was difficult to interpret. He showed a higher play activity mean with decreasing trend line during baseline but a lower mean with a rising trend line during intervention.

**Performance of Target Play Activities: Number of Exemplars**
Figure 22 illustrates each group’s response to intervention with producing play activity exemplars. Compared to their baseline performance, four of the five children demonstrated an increasing number of exemplars during intervention, although Travis only showed modest responsiveness relative to the progress shown by John, Vincenzo, and Brent. As demonstrated through visual analysis of the graphed data, the three children who completed generalization probes and maintenance phases continued to perform increasing numbers of exemplars. Again deviating from the trend shown by the other children, Edward did not exhibit growth in play exemplar production, but instead showed comparable means across baseline and intervention; however, he moved from showing a decreasing trend line during baseline to yielding a stable intervention trend line. During the intervention and maintenance phases, four of the five children demonstrated higher levels of new exemplars relative to previously demonstrated exemplars, while Vincenzo demonstrated comparable amounts of both.

**Total Commenting**

Figure 23 presents the children’s progress with total commenting. Coinciding with the proposed hypothesis, three of the children exhibited higher total commenting rates in response to teaching, as evidenced through an analysis of graphed data. Specifically, John and Brent showing marked growth and Vincenzo showing slight gains. In contrast, Edward and Travis showed minimal progress, exhibiting comparable total commenting levels across baseline and intervention.

**General and Activity-Specific Commenting**

Figure 24 reflects each group’s response in terms of general and activity-specific commenting. Three of the children exhibited higher general commenting rates in response to teaching, with John and Brent showing marked growth and Vincenzo showing slight gains. In
contrast, Edward and Travis demonstrated minimal gains, exhibiting comparable general commenting levels across baseline and intervention. Contrary to the proposed hypothesis, only one child showed notable progress with producing activity-specific comments in response to intervention; Brent showed marked progress while John, Edward, Vincenzo, and Travis showed little to no gains.

**Summary of the Children’s Responsiveness to Intervention**

This study, which involved a multiple baseline design across two participant groups, was designed to examine how five toddlers with ASD responded to caregiver-delivered instruction that targeted developmentally specific play activities. Each child’s performance was monitored across baseline, intervention, and when applicable, generalization and maintenance sessions to assess individual responsiveness. Their performance also was compared to the other participants’ progress through a two-group multiple-baseline design. The results of this study are interpreted with caution, given some limitations, but nonetheless reveal themes about the children’s progress with: 1) target play activity frequency, 2) play exemplar production, 3) general commenting, and 4) activity-specific commenting.

It was hypothesized that in response to intervention, the children would demonstrate higher play activity frequencies and more play exemplars, general comments, and activity-specific comments. Four of the five children showed higher play frequencies and more exemplars as a result of the intervention. Edward was the only participant who displayed a lower play frequency during intervention relative to baseline and comparable exemplar levels across baseline and intervention. During the intervention phase, four of the five children completed more new play exemplars relative to previously demonstrated exemplars, with Vincenzo performing similar levels of both.
The children’s progress also was monitored to examine if they displayed increases in general, activity-specific, and total commenting in response to intervention. Coinciding with part of the hypothesis, three of the children produced higher rates of general and total commenting, while the other two displayed comparable amounts across study phases. Only one child exhibited more activity-specific comments, with the other four children displaying minimal progress with this more specific commenting skill.

Taken together, results of this single-subject, multiple-baseline intervention across groups provide tentative support for using caregiver-delivered instruction to help toddlers with ASD perform a wider range of developmentally specific play activities with increasing frequency. It also provides preliminary evidence about using this approach to help toddlers with ASD bolster their overall commenting abilities. Minimal support was gathered in terms of increasing the frequency of activity-specific comments through caregiver-delivered instruction in play.
Chapter 5

Discussion

The fifth and final chapter reviews the rationale and purpose of this investigation, which examined how caregiver-delivered instruction in play impacted the play and commenting abilities of five male toddlers with ASD. Participant characteristics are overviewed, followed by a discussion of empirical outcomes and study limitations. The most important findings from this study are then discussed in terms of their practical and theoretical significance. Special emphasis is placed on the strengths and limitations of field-based research approaches. This chapter concludes with a reflection of clinical implications and directions for future research.

Overview of Study

A field-based research approach, using a multiple baseline across groups design, was used to examine how five male toddlers with ASD responded to caregiver-implemented instruction in play across four variables: 1) frequency of spontaneously occurring target play activities, 2) target play exemplars, 3) general comments, and 4) comments related to target play activities (i.e., activity-specific comments). Play categories at the emergence level were identified from each child’s DPA administration and verified during the baseline phase (i.e., whether the categories were emergent or mastered). The manner in which play targets were generated reflects the best practice of linking assessment to intervention. To evaluate each child’s response to play instruction, progress was monitored across baseline, intervention, and maintenance phases and compared across groups through a single-subject, multiple-baseline design.

This play intervention study is one of the few delivered to toddlers with ASD, and the first to examine how caregiver-delivered teaching of developmentally-specific activities impacts
their play and commenting abilities. It also was novel in that children’s toys were used as the primary teaching tools. Notably, for the purpose of this study, a toy was defined as any object or entity that could be related to another object, person, or body part (e.g., child’s hand) in order to provide a demonstration of an activity that a child already knows or a demonstration of what a child is learning currently, which reflects the definition of play provided by Lifter and Bloom (1998). Consistent with the scientist-practitioner model, this study was designed to address two interconnected purposes: 1) to inform the clinical practice of early interventionists and school psychologists by examining a theoretically-based teaching approach for toddlers with ASD and 2) to yield preliminary data that examine the proposed research questions and inform future investigations. These clinical and empirical objectives are relevant given the increasing number of toddlers who are receiving ASD diagnoses and educational autism classifications, and thus accessing EI and school-based services.

**Overview of Caregivers’ Intervention Implementation and Treatment Fidelity Data**

It was planned that each caregiver would deliver play teaching to their child at least three times per week and show high levels of fidelity (i.e., ≥ 80%) in response to receiving corrective feedback from the researcher. Three of the caregivers delivered play teaching on average three times a week. The other two caregivers had difficulties with recording sessions and terminated their participation during intervention. They ultimately delivered fewer than three sessions per week.

All five of the caregivers responded to treatment fidelity feedback in the manner predicted as they consistently provided reinforcement after their children completed a prompted activity. Four of the five caregivers demonstrated high fidelity with teaching target activities and using least-to-most prompting. The twins’ father demonstrated lower accuracy with using least-
to-most prompting with Brent and teaching target activities to Travis. Overall, results of this study provide preliminary evidence that caregivers can adhere to teaching procedures in response to receiving formative corrective feedback, although some may need more intensive prompting in order to increase their fidelity.

**Overview of Children’s Progress in Response to Intervention**

This study was conducted to evaluate four variables. Specifically, it was hypothesized that in response to intervention, children would demonstrate higher play activity frequencies and more play exemplars. Similarly, in response to intervention, it was hypothesized that the children would demonstrate higher levels of general and activity-specific commenting, which, in combination, depicted their total commenting abilities.

**Response to intervention for play variables.** Four of the five children responded to the intervention in the manner predicted for both play variables. Across intervention and maintenance sessions, they exhibited higher play frequencies and more exemplars relative to their baseline performance. Only one child displayed a higher play frequency during baseline and lower play frequency during intervention, and also exhibited comparable exemplar levels across baseline and intervention. While one child performed similar amounts of previously demonstrated and new exemplars across study phases, four of the five children completed more new play exemplars in response to the play teaching.

Reflecting the EI priority of delivering naturalistic teaching in a family-centered environment, this study was developed to investigate how children responded to play instruction using incidental teaching methods. Across play intervention studies, incidental learning has been used to move children forward in their play development by targeting developmentally-specific play activities (Lifter et al., 1993, 2005). This approach allows for teaching to occur during
naturally occurring activities (Charlop-Christy & Leblanc, 1999) and within the context of family routines (McGee, Morrier, & Daly, 1999), which has been shown to increase skill generalization relative to more adult-directed approaches (Charlop-Christy & Carpenter, 2000; Kaiser, Yoder, & Keetz, 1992; McGee, Morrier, & Daly, 1999).

Taken together, results of this single-subject, multiple-baseline intervention study provide tentative support for using caregiver-delivered instruction to help toddlers with ASD perform a wider range of developmentally specific play activities with increasing frequency.

**Response to intervention for commenting variables.** Three of the children responded to the intervention in the manner predicted by displaying higher rates of general and total commenting in response to play teaching. The other two children performed comparable amounts of general and total commenting across study phases. As evidenced by a visual analysis of graphed data and a comparison of means across study phases, only one child exhibited higher frequencies of activity-specific commenting in response to intervention, with the other four exhibiting minimal progress. This finding indicates a diminished likelihood that a functional relation exists between activity-specific commenting and the caregiver-delivered play intervention under study. Taken together, results of this investigation provide preliminary support for using play interventions to help toddlers with ASD produce more general and total commenting. Little support was gathered for using direct play instruction for increasing the frequency of activity-specific comments.

**Clinical, Educational, and Empirical Implications**

**Focus on conducting play intervention research.** To meet best practices in evidence-based psychology, the onus is on practitioners to develop interventions with strong empirical underpinnings (Drake et al., 2004; Gresham, 2001; Kazdin, 2004; Kratochwill & Shernoff, 2004;
Caregiver-Implemented Play 175

McCabe, 2004; Sheridan, 2001; Strein et al., 2003). Young children with ASD have benefitted from evidence-based interventions that addressed a range of deficits, including marked delays in play (e.g., Ingersoll & Schreibman, 2006; Stahmer, 1995; MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009; Kassari, Freeman, & Paparella, 2006; Lifter, Sulzer-Azaroff, Anderson, & Cowdery, 1993; Lifter, Ellis, Cannon, & Anderson, 2005; Lifter & Foster-Sanda, in progress; Wong, Kasari, Freeman, & Paparella, 2007); however, the majority of play intervention studies have involved preschool-aged children with ASD. Although ASD prevalence rates are rising and more toddlers are accessing EI services, there is a paucity of play intervention research conducted with this population.

This study was designed to address a concern facing many EI clinicians: having a limited empirical literature base to inform the development and implementation of play interventions for toddlers with ASD. It was conducted to examine the impact of play teaching on toddlers’ play and commenting skills through single-subject, multiple-baseline analytic procedures. Results of this study provide preliminary evidence about the efficacy of teaching developmentally specific play activities to toddlers with ASD and can inform future play intervention investigations with more robust study procedures, statistical procedures, and experimental control.

**Focus on incidental teaching.** Derived from the tradition of behavior theory and applied behavior analysis (ABA; Lovaas, Ackerman, Alexander, Firestone, Perkins, & Young, 1981; Zager, 2005; Stahmer, Ingersoll, & Carter, 2003), many play interventions have been developed using the techniques of in vivo modeling, video modeling, DTT, PRT, and incidental learning. All of these techniques have been applied to teach play skills to young children with ASD, with each presenting with strengths and limitations. Empirical research has revealed children’s
responsiveness to these behavioral teaching approaches, but no studies to date have compared the
efficacy across approaches, presenting as an area for future research.

Results of this study indicated that children responded to incidental teaching approaches
that targeted developmentally-specific play intervention goals. That is, by providing increasing
levels of support, four of the five children were able to display higher play activity frequency and
exemplar production. While gains were made in response to least-to-most prompting (LMP), a
question arises about its comparability to errorless teaching, also known as most-to-least
prompting (MLP). LMP involves increasing prompting support whereas MLP starts with the
highest level of support and fades as children acquire skills into their repertoires. To date, few
studies have compared outcomes of play skills taught using LMP and MLP. Research by Libby,
Weiss, Bancroft, and Ahearn (2008) is the exception; they examined children’s progress with
learning to construct Lego structures through LMP and MLP methodologies. Results indicated
that MLP helped children learn to build Lego structures with fewer errors but also yielded a
slower rate of learning and skill acquisition relative to LMP. Ultimately, children showed
different responses to LMP and MTL, which indicates that teaching techniques should be
tailored to the learner. Little is known about the outcomes of LMP relative to MLP in terms of
teaching children developmentally specific play activities, thus presenting as an area of future
research.

Focus on teaching developmentally-specific play activities to toddlers with ASD. The
majority of studies with incidental learning procedures for teaching developmentally-specific
play activities have been conducted with preschool-aged children with ASD (e.g. Lifter et al.,
1993, 2005, 2011; Kasari et al., 2006; Ingersoll & Schreibman, 2006); toddlers have not been
included in prior investigations. The Play and Language for Autistic Youngsters (PLAY) Project
Caregiver-Implemented Play

(Solomon et al., 2007; Soloman, 2008) is unique because it focuses on using structured teaching to teach play to toddlers with ASD, but teaches skills vaguely without regard to the children’s specific developmental level. Taken together, a major reason for conducting this study was to examine how providing direct instruction of developmentally specific play activities using incidental learning procedures impacted the play abilities of toddlers with ASD. When children were given direct instruction with performing activities at the emergent level, they demonstrated an ability to demonstrate these activities more frequently and to incorporate new activities into their play repertoires. One child displayed comparable levels of exemplars across study phases, which may have related to the fact that he sometimes was prompted to attempt activities that were above his emergent level or activities that he already mastered. Overall, while this study provided preliminary outcome data, additional focus is needed to help children strengthen their play skill repertoire by targeting activities that they show a developmental readiness to learn.

**Focus on caregiver-delivered teaching.** Developmental psychologists have long emphasized the importance of environmental factors on individualized outcomes (e.g., Piaget, 1962; Vygotsky, 1934; Bronfenbrenner, 1979), including the impact of ecological influences on children’s play with toys and objects (e.g., Darvill, 1982; Malone & Langone, 1999; Malone, 2009). Much of what is known about children’s play presentation comes from research conducted in classroom-based settings (Malone & Langone, 1999; Malone, 2009), which coincides with recent educational emphasis on inclusive early childhood settings. The home environment also is an important element in young children’s lives (Bronfenbrenner, 1979; Malone, 2009), and infants and toddlers spend the majority of their time in home-based settings; however, there is very little research on children’s home-based play. A few play interventions have been delivered in home settings, albeit by research assistants or therapists (e.g., Lifter et al,
A novel feature of this study was investigating the effects of home-based, caregiver-directed instruction on the play skills of toddlers with ASD. Involving caregivers as interventionists builds upon a salient role for many parents: being the primary teaching agent and source of information for young children; thus, this study reflected a relevant dynamic for many families of young children, particularly for the families who participated in this specific study.

In order for teaching to be systematic, caregivers must abide by teaching procedures when delivering play interventions to toddlers with ASD. The PLAY Project Home Consultation (PPHC) program is a consultation-based, caregiver-delivered play intervention package for toddlers with ASD that is modeled around a DIR/Floortime approach (Solomon et al., 2007). Rather than having procedural fidelity measured formatively, caregivers’ intervention delivery behaviours were examined summatively, comparing their pretest and post-test scores on the Functional Emotional Assessment Scale (FEAS). Accordingly, this dissertation project represents one of the first attempts to track procedural fidelity while caregivers deliver structured play teaching to toddlers with ASD, notably while using a behavioral teaching approach.

Within the context of this study, all of the caregivers showed high fidelity with reinforcing children’s completion of prompted activities. Four caregivers showed high fidelity with using least-to-most prompting and with teaching target play activities. While these treatment fidelity data are high, it is difficult to know how normative they are in terms of parents delivering play teaching to toddlers. That is, in the literature, to what extent would caregivers show similar levels of procedural fidelity when delivering play interventions to toddlers? To gain a better understanding, more studies are warranted in order to evaluate the extent of procedural fidelity that caregivers show when delivering explicit play instruction.
Implications of DSM-5 ASD criteria and toddlers’ access to play interventions. In May 2013, the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) was released at the American Psychiatric Association’s Annual Meeting (2013). This new release sparked heated conversations in the autism community because of changes to the diagnostic criteria. Specifically, the diagnostic standards for the DSM-IV category Pervasive Developmental Disorders were revised in the DSM-5 in three primary ways (Barton, Robins, Jashar, Brennan, & Fein, 2013). Firstly, the sub-categories of Autistic Disorder, Pervasive Developmental Disorder, Not Otherwise Specified, and Asperger’s disorder have been eliminated. Rather, the classification of symptomology, which is based on observations of children’s behavioral presentation, is conceptualized as the broad spectrum of Autism Spectrum Disorder (ASD). Secondly, per DSM-IV criteria, children were given diagnoses based on how their skills presented relative to a triad of difficulties with social interactions, social communication, and repetitive and restricted behaviors. Under DSM-5 criteria, restricted and repetitive behaviors were maintained as one category while social interaction and social-communication have been combined to form the second, and only other, category. The third change associated with DSM-5 diagnostic criteria involves more stringent standards for diagnosing ASD. Specifically, under the new diagnostic parameters, individuals would only receive a diagnosis if they meet all three criteria in the social-communication category and two of four criteria in the restricted and repetitive behaviors category. This third change would have the most impact on children with diagnoses of PDD-NOS, which has less stringent diagnostic criteria relative to the other DSM-IV subcategories. Under the new guidelines, children who previously had diagnoses of PDD-NOS may not meet diagnostic guidelines specified in DSM-5, and thus would have less access to services.
Three participants in this study had diagnoses of PDD-NOS, which was an inclusionary factor that allowed them to participate in this play intervention. The question arises as to whether these participants would have maintained a diagnosis of an ASD under the new DSM-5 criteria or whether their constellation of symptoms would fall below the diagnostic threshold. These implications are important because while these three children showed marked delays in play skills, it is possible that they may not meet diagnostic criteria under the DSM-5 guidelines, and thus would not have access to services that could move them forward in their play development. This potential highlights the importance of diagnosing children accurately, but also providing interventions to children who show delays in play to move them forward in their development, irrespective of their particular diagnosis.

**Strengths and Challenges of Field-Based Research**

Research can yield relevant empirical information whether it is conducted in laboratories, clinics, or naturalistic settings like a child’s home; however, results from studies conducted in laboratories or clinics may be influenced by demand characteristics, may not capture the flexible, dynamic nature of naturalistic settings, and may have reduced generalizability (e.g., Chafouleas & Riley-Tillman, 2005). In contrast, field-based research data are useful to scientist-practitioners with clinical and research priorities. This field-based play intervention study was conducted to contribute to the empirical literature by investigating the effects of an intervention delivered in a naturalistic context (Chafouleas & Riley-Tillman, 2005; Horner et al, 2005; Raab & Dunst, 2004; Lifter et al., 2002). Conducting this intervention in children’s homes with their caregivers and own toys allowed them to learn in their natural environment with familiar materials and persons (Kashinath, Woods, & Goldstein, 2006; Lifter, 2002; Mancil, Conroy, & Nakao, 2006; Raab &
Dunst, 2004; Steege, Mace, Perry, & Longenecker, 2007; Woods & Wetherby, 2003), which improved the generalizability of study results.

While field-based research methods generate data that inform applied educational practice, they also pose methodological challenges, which notably manifested during this dissertation project. Relative to studies conducted in clinical settings, field-based projects have a lower degree of experimental control, treatment fidelity, and repeatability (e.g., Chafouleas & Riley-Tillman, 2005). For example, in naturalistic settings, experimental control is compromised by frequently occurring extraneous events. Thus, while the caregivers showed commitment to the research and were flexible with scheduling play sessions, accommodations to the project were made in response to their needs and schedules. For example, all of the children became disengaged during teaching sessions because of distracting events, such as unexpected visitors, the water heater bursting, neighbors mowing the lawn, and utility workers arriving to fix household problems. All of these factors occurred during teaching sessions and impacted teaching procedures, which ultimately impacted measurement precision, increased the threats to internal validity, and heightened the uncertainty of the intervention’s effectiveness. Additionally, because the intervention was conducted amidst the children’s schedule of EI and ABA services, there were limitations and constrictions on scheduling (Ahern, Clark, & MacDonald, 2007; Kashinath, Woods, & Goldstein, 2006). Both the number of sessions per week and the total number of sessions were limited in order to accommodate caregivers’ and children’s availability.

**Field-work and conducting multiple-baseline designs.** EI clinicians, early childhood educators, and school psychologists all privilege the progress of individual learners and formative data collection. Accordingly, they often use single-subject designs to evaluate the effects of any delivered interventions. Conducting a multiple-baseline design in families’ homes
was useful but also posed procedural challenges. On the one hand, single-subject designs are applied to examine participants’ responsiveness to intervention through ongoing data collection. Delivering the intervention and collecting data in the families’ homes may have increased their willingness to continue participating, relative to being asked to travel to another location. On the other hand, when conducting single subject designs in home settings, families have the labor- and time-intensive responsibilities, such as recording each session and getting formative feedback from the researcher. Using a summative data analytic approach would be less resource intensive, requiring families to spend less time on study tasks; however, these techniques limit a researcher’s ability to examine the presence of any functional relations between delivered interventions and behavior change, which are best monitored through formative, single-subject technologies. Overall, when designing a field-work based study for early childhood populations, there are many factors to consider in terms of benefits and limitations of delivering single-subject designs in this context.

**Constraints on Implementation of the Intervention and Overall Study Limitations**

A systematic review of study procedures revealed constraints that influenced the implementation of this intervention. Discussing these constraints ensures that limitations of this study are acknowledged, results are interpreted accurately, and data-based conclusions derived from this intervention are credible. In the following sections, primary intervention constraints are discussed, which include using a sample of convenience, shortened timeframes, challenging family circumstances, and the requirement of recording sessions.

**Sample of convenience.** Participating children were recruited from an EI center in southeastern Massachusetts where the researcher worked. Families who responded to distributed recruitment materials and met inclusion criteria were enrolled. The manner in which participants
were contacted and enrolled lends to problems in terms of result generalizability. Outcome data reflect the experiences of families who were interested in participating in a research study, spent at least 30 minutes per day with their children, and resided in southeastern Massachusetts. They do not necessarily match the experiences of the more general and diverse population of families with toddlers with ASD. Thus, while trends can be noted within the study data, they cannot be generalized to other families with toddlers with ASD.

**Shortened timeframes.** Multiple baseline designs are experimental designs that involve staggering the start of treatment conditions. Optimally, the first group transitions to the treatment phase once they show baseline data that yield a trend line that is steady or slopes in the opposite direction of the intended behavior change. The second group should remain in baseline until the first group shows a consistent responsiveness to the delivered intervention. While this study involved a multiple-baseline design, some of the phases were initiated prematurely, which reduced the overall experimental control. Specifically, the first group transitioned to the intervention phase before a stable response pattern was established in baseline. In addition, the second group started before the first group showed a consistent response pattern to intervention conditions.

Before the researcher moved to a different state for her pre-doctoral internship, she had to complete all intervention training activities and ensure that the caregivers were prepared to deliver intervention sessions independently. Edward’s mother, who was in the first group, had difficulty filming the baseline sessions during the first few weeks of the study; accordingly, it took longer for the first group to come close to showing a stable baseline pattern and reduced the time that was available for intervention training activities and for caregivers to learn to deliver the intervention independently. To account for this shortened time frame, the first group of
toddlers started intervention before they showed a stable baseline pattern of responsiveness with the play variables; instead, when teaching sessions began, John presented with a slighter decreasing baseline trend line but Edward continued to show a steadily declining responsiveness. Additionally, the second group of toddlers started the intervention phase after the first group had completed three intervention sessions, and not once children in the first group showed responsiveness to the intervention. These premature starts limit the ability to infer that the toddlers’ response patterns reflected a responsiveness to intervention per se and did not derive from chance factors.

Challenging family circumstances. Challenging family factors also impeded children’s participation in the study. Four of the five families received several hours of home-based therapies per week, and all of the children napped, both of which limited when play teaching could be delivered. Frequent illnesses during the winter and spring months also prevented the caregivers from delivering the intervention three times a week; on weeks when a child or caregiver was ill, fewer play sessions were conducted. Edward’s family completed all of the baseline and intervention sessions but were unable to complete maintenance sessions due to sudden family health concerns. An unexpected move and family difficulties prevented Vincenzo’s family from completing the intervention sessions and participating in maintenance sessions.

Requirement of recording sessions. The requirement of recording each session also presented as a constraint. All of the families worked diligently to ensure that play teaching sessions were recorded in their entirety; however, they often forgot to charge their recording devices because their days were busy and hectic, and sometimes did not conduct a session because they could not record it. Had they not been required to film each sessions, they could
have potentially delivered more play instruction each week. The families also had some difficulty managing the data they filmed, and occasionally taped over or lost a previously recorded session, which limited the amount of data that was available for coding.

**Future Research Directions**

Given the value of conducting field-based research and the need for additional play intervention studies, particularly for populations of toddlers with ASD, future research directions are proposed. The utility of caregiver-delivered play interventions can be examined with a wider range of toddlers with varied ASD profiles and can be examined using single-subject and large-scale research designs with greater experimental control and involving larger participant samples. While teaching developmentally-specific activities, studies also can compare outcomes derived across behavioral teaching methodologies (e.g., incidental versus a video modeling approach) and intervention implementers (e.g., caregivers versus therapists), while also investigating the impact of using the children’s own toys relative to toys brought by the intervention implementers. The impact of MLP relative to LMP for teaching developmentally specific activities is unknown and also should be explored through empirical investigation. Further, future studies to examine the use of multi-person intervention delivery should be conducted, investigating how several members of a family system can be incorporated into the delivery of play interventions. Finally, from a longitudinal perspective, efforts can be placed on examining how teaching of play during early childhood impacts later play development, and how the implementation of play interventions within the context of early intervention can be linked to the continued teaching of play in preschool contexts.
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Appendix A

Recruitment Flyer

Do you have a child with autism?
Would you like to spend more time playing with your child?
Would you like to teach your child to perform more complex play activities using his/her own toys?

You are invited to participate a study, which is examining how caregiver-directed teaching impacts the play and commenting skills of toddlers with autism!

Who is running the study?
- Suzie Foster-Sanda, a developmental specialist and school psychology doctoral student at Northeastern University

What will the study involve?
- You and Suzie will work together to conduct an assessment of your child’s play skills, and to help you teach developmentally-relevant play activities to your child.

What are the benefits of participating in this study?
- You can play with your child several times a week, which can help increase his/her play and commenting skills!
- For participating in the study, you will receive:
  - A detailed description of your child’s play skills and progress throughout the intervention
  - Recommendations for future play-teaching goals
  - A new toy set, worth $50, and a Visa ® gift card worth $50 dollars at the end of the study

How can I learn more about this study?
- Please sign the bottom portion of this flyer and give it to your service coordinator, who will give it to Suzie.
- Suzie then will contact you shortly!
- You also can contact Suzie by telephone: (732) 778-8207 or email: SoozFoster@gmail.com

Yes, I’d like to learn more about this study! ( )
Please contact me by phone: ________________
Please contact me by email: _________________
Dear Parents and Caregivers,

My name is Suzie Foster-Sanda, and I am a developmental specialist at the XXX. I also am a doctoral candidate in the combined school and counseling psychology program at Northeastern University. I'm writing, with great enthusiasm, to invite you to participate in an exciting research project designed for toddlers with autism and their parents!

Children with delays in play, including children with autism, can make great gains in their play and commenting skills when the teaching is delivered by parents, builds upon daily routines, and involves toys they already own. Thus, through my study, we can work together for approximately 7-12 weeks to help you teach developmentally-specific play activities to your child using simple and naturalistic teaching procedures.

At the conclusion of the study, I will provide you with the materials needed to continue teaching developmentally-specific play activities to your child. Additionally, for your participation, your child will receive a new toy set (worth $50) and you will receive a $50 Visa giftcard.

Attached, please find a flyer that provides more information about my study. If you are interested in learning more about the study, please contact me at my primary email: SoozeFoster@gmail.com and/or my primary telephone number: 732-778-8207. You also will receive a copy of the study flyer from your child's early intervention service coordinator. Please feel free to give the bottom of the flyer with your preferred contact information to your child's service coordinator, who then will give it to me so I can contact you as soon as possible.

I am so excited to share this research opportunity with you, and look forward to connecting with you soon!

Warm Regards,
Suzie
Appendix C

Statement of Informed Consent

(Northeastern University Logo and Human Subjects Research Protection Header)

Northeastern University
Department of Counseling and Applied Educational Psychology
Researchers:
   Suzanne Foster-Sanda, MS, CEIS, Student Researcher, Doctoral Candidate at Northeastern University
   Karin Lifter, Ph.D., Dissertation Chair
   Emanuel J. Mason, Ed.D., Dissertation Committee Member
   Louis Kruger, Psy.D., Dissertation Committee Member
Title of Project:
   Enhancing the Play and Commenting Abilities of Toddlers with Autism Spectrum Disorders through Caregiver-Implemented Teaching of Play

CONSENT FORM FOR PARENTS/CAREGIVERS

Informed Consent to Participate in a Research Study
We are inviting you and your child to participate in a doctoral dissertation project, which is self-funded by the student researcher, Suzanne Foster-Sanda. This form describes the study, which also will be explained to you by the student researcher. You may ask the student researcher any questions that you have about the study. When you are ready to make a decision, you may tell the researcher if you want to participate or not. Your participation is voluntary; you do not have to participate in this study if you do not want to. If you decide to participate, the student researcher will ask you to sign this statement and will give you a copy to keep.

Why am I being asked to take part in this research?
We are asking you and your child to participate in this study because you have a child who is between 14 and 36 months old and has a diagnosis of an autism spectrum disorder. We are recruiting six children between the ages of 14 to 36 months who have a diagnosis of an autism spectrum disorder and are receiving early intervention services through the Attleboro Branch of the Kennedy Donovan Center. We are including caregivers are fluent in English.

Why is this research study being done?
This study is designed to evaluate the effects of a caregiver-implemented play intervention on the play and commenting abilities of toddlers with ASD. Children with autism often have delays in play, which impact their play skills and their ability to comment about ongoing events,
activities, and objects. Providing direct instruction of developmentally specific play activities can move children forward in the development of their play and commenting abilities. While this approach has been delivered to preschool- and school-aged children with autism, this project is the first to examine the use of this approach with toddlers with autism. It also is the first home-based study to use parents and caregivers as the primary interventionist, which promotes individualized learning that is facilitated by the primary teaching agents of young children in a familiar setting.

What will I be asked to do?
If you decide to take part in this study, we will ask you to participate in three main activities: 1) conducting introductory evaluations with you and your child, 2) participating in ongoing caregiver training, and 3) implementing the intervention (baseline, intervention, and maintenance).

Conducting introductory evaluations. Two evaluation measures will be used in this study: 1) the Battelle Developmental Inventory, Second Edition (BDI-2) and the Developmental Play Assessment (DPA). Many children who receive early intervention services in Massachusetts were administered the Battelle Developmental Inventory, Second Edition (BDI-2) to determine their eligibility. If your child was administered the BDI-2 as an early intervention eligibility measures, scores from that evaluation will be used to provide information about your child’s development across domains. If you child was not administered the BDI-2, the student researcher will administer the BDI-2, which will take approximately one-and-a-half to two hours. Scores from a BDI-2 administered by the student researcher only will be used within the context of this study; it will have no impact on your child’s eligibility for early intervention services. You and your child also will participate in a 30-minute period during which the Developmental Play Assessment (DPA) will be facilitated and recorded by the student researcher. The recorded DPA administration will be reviewed retrospectively by the student research and research assistants to establish play intervention goals and determine the initial frequency of general commenting and commenting related to the target play activities. Additionally, you will be asked to fill out two questionnaires. One questionnaire will provide information about your family’s interests, routines, and learning opportunities. The second questionnaire will provide information about toys that you child owns and/or can access, which will inform the creation of the four study toy sets.

Ongoing caregiver training. For this project, caregiver training is an ongoing process, which consists of four components: 1) reviewing and discussing caregiver training materials, 2) viewing baseline and intervention training video samples, 3) receiving baseline and intervention delivery support from the student researcher investigator, and 4) reviewing video samples about treatment fidelity.

The initial training steps involve reviewing and discussing five training handouts that describe the play intervention process, which will take approximately 30 minutes. The next step will involve viewing a baseline training video segment, which is four minutes in length. Before starting baseline sessions, you will participate in practice baseline sessions, which are 10 minutes in length. The ten-minute practice baseline sessions will be discontinued upon meeting a discontinuation criterion: refraining from prompting your child’s play three or fewer times
during a practice session. At this point, you will start doing baseline sessions with your child, which is described later.

The student researcher will collect the recorded baseline sessions from you at the end of the week and review them over the weekend. During the following week, she will show you two segments from the recorded baseline sessions when procedures were implemented correctly and segments when the procedures were implemented incorrectly. Verbal feedback and guided practice will be provided to correct the reviewed errors.

While you are conducting the final few baseline sessions, you will begin the intervention training process. Intervention training materials will be reviewed, which will take approximately 30 minutes. You will view an intervention training video segment, which is four minutes in length. The intervention sessions initially will begin with the student researcher sitting with you and providing feedback as you deliver the play intervention. As you become more familiar with the intervention procedures, you will conduct them independently (i.e., the student researcher will only attend occasional sessions). All intervention sessions will be recorded. The student researcher will pick up the recorded intervention sessions at the end of the week and review them over the weekend. She will meet with you during the following to review two instances when the teaching procedures were implemented correctly and also and instances when the procedures were delivered incorrectly. Verbal feedback and guided practice will be provided to review the errors.

Implementing the intervention. This study has three primary phases: baseline, intervention, and maintenance. All sessions will be video recorded.

Baseline sessions. All baseline sessions will be 30 minutes in duration and be conducted in your home between three to seven times each week. You and the student researcher will decide collaboratively how many play sessions will occur each week. During each 30-minute baseline session, you will place one of the toy sets in front of your child, who will be recorded engaging in free play (i.e., playing with the toys without any elicitation from his/her parent). Baseline sessions will be evaluated to confirm which play categories are emerging and to determine the frequency of commenting during play activities. You will be asked to refrain from prompting your child, responding to any play actions, commenting on any demonstrated activities and providing praise (e.g., “Good job playing!). You will be asked to respond when the target child engages in disruptive, off-task behaviors (e.g., throwing toys, grinding teeth). Each baseline session will be recorded.

Intervention sessions. All conditions in intervention will remain the same as baseline, except that you will be asked to teach, reinforce, and comment on target play activities. The intervention sessions will be 30 minutes long, will occur 3 to 7 times each week, and will involve one of three toy sets, which were created with your child’s toys. Teaching procedures will occur when your child either attends to a toy (i.e., looking at it, doing something with it, or saying something) or to an adult activity (i.e., what a caregiver does with an object by looking at the action or saying something about it). Least-to-most prompting will be used to promote the performance of a target play action. During the intervention phase, you also will be asked to deliver a
generalization probe. You will give your child a fourth toy set and allow him/her to play with it without providing direct instruction in play. All generalization probes will be recorded.

Maintenance phase. The maintenance phase will occur after the intervention phase. You will give your child one of the four toy sets and give them the opportunity to engage in free play (i.e., play with the toys without receiving direct instruction in play). Each maintenance session will be recorded.

Where will this take place and how much of my time will it take?
The initial assessments and play intervention phases will be conducted at your home. Each week, you will spend approximately one and a half to four hours playing with your child (i.e., delivering the intervention). You will be asked to play in a room with open floor space and/or with a small table and chair. You have the option of delivering play sessions while sitting on the floor or sitting at a table with your child. It is anticipated that the overall intervention process will last for three to six months.

Will there be any risk or discomfort to me or my child?
We anticipate minimal risk to you and your child. The play sessions will take place in a physically safe environment (e.g., home) with you, the child’s primary caregiver. Toys from the BDI-2, if applicable, and the DPA will be cleaned with disinfectant wipes before being used. Your child’s toys, which will be used to create four intervention toy sets, will remain at your home and can be cleaned based on your discretion. Your child may experience some level of frustration with the BDI-2 administration and the intervention teaching procedures because some children have difficulty sustaining attention. These circumstances also may lead to you experience some frustration.

Will I benefit from being in this research?
You will be providing direct instruction in play to your child, which can foster gains in his/her play and commenting skills. You also will receive: 1) a description of your child’s play skills based on the assessment we administer at the beginning of the study, 2) an overview of his/her progress throughout the intervention, and 3) recommendations for future steps after the intervention is concluded.

Who will see the information about me?
The only people who will see the information about you and your family (e.g., contact information, assessment data, play intervention data) are the four researchers listed in the beginning of this informed consent (Foster-Sanda, Lifter, Mason, Kruger) and three research assistants who are graduate students in the school psychology masters and doctoral programs at Northeastern University. The director of the Attleboro branch of the Kennedy Donovan Center will have access to minimal personally identifying information (i.e., your name, your child’s name, your child’s date of birth), which is available through the agency’s electronic records. Any information about you and your family will be kept separately in a locked file cabinet in a locked office that is only accessible to the four primary researchers. When collecting data about your child’s play activities, no identifiable information will be included. We will do this by assigning all participants an ID number that is not related in any way to your personal information. All
materials created through data collection (i.e., the assessment forms with data; the videotapes of your child playing) will only have your ID number.

**If I do not want to take part in the study, what choices do I have?**
Your participation in this research is completely voluntary. You do not have to participate if you do not want to. If you decide not to participate, you will not lose rights, benefits, or services that you would otherwise have, such as early intervention services, Early Head Start, or preschool.

**What will happen if I suffer any harm from this research?**
We anticipate no physical or psychological harm from our proposed activities because this study is regarded as one with no more than minimal risk.

**Can I stop my participation in this study?**
You may stop participating at any time. If you decide to stop, you will not lose any rights, benefits, or services that you would otherwise have, such early intervention, Early Head Start, or preschool services.

**Whom can I contact if I have questions or problems?**
You may contact Suzanne Foster-Sanda, the student researcher for this project, at: Phone: (732) 778-8207; Email: SoozeFoster@gmail.com. You also may contact Karin Lifter, PhD, the dissertation chair of this project, at: Northeastern University, 440 International Village, 360 Huntington Avenue, Boston MA, 02115; Phone: (617) 373-5916; Email: k.lifter@neu.edu.

**Whom can I contact about my rights as a participant?**
If you have any questions about your rights as a participant, you may contact Nan C. Regina, Director, Human Subjects Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02115. Phone: (617) 373-7570; Email: irb@neu.edu. You may call anonymously if you wish.

**Will I be paid for my participation?**
Your child will receive a set of toys worth approximately fifty dollars and a Visa ® gift card worth $50 at the completion of the intervention.

**Will it cost me anything to participate?**
It will not cost you anything to participate, with the exception of one and a half to four hours per week of your time to interact in the play intervention and review study materials and progress monitoring data. You also will be asked to use your video camera to record each play session. A recording device can be provided to you upon request. You will be reimbursed by the student researcher for any costs associated with recording the play sessions.

**Is there anything else I need to know?**
You must be the child’s parent or legal guardian to grant consent for your child’s participation and sign this form.
I agree to have my child and I take part in this research.

Child’s Name

Signature of parent/caregiver agreeing to take part  Date

Printed name of person above

Signature of person who explained the study to the participant above and obtained consent  Date

Printed name of person above
# Appendix D

## Toy Inventory Questionnaire

<table>
<thead>
<tr>
<th>MY CHILD OWNS THE FOLLOWING TOYS: (please check all that apply)</th>
<th>Container Toys and Single-Action Toys</th>
<th>Puzzles and Lacing Beads</th>
<th>Animals, Figures, and Figure Play Sets</th>
<th>Food/Kitchen Toys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish Fill and Spill ❑</td>
<td>Three-piece puzzle with knobs ❑</td>
<td>Action Figures ❑</td>
<td>Kitchen ❑</td>
<td></td>
</tr>
<tr>
<td>Sports Fill and Spill ❑</td>
<td>Multi-piece puzzle with knobs ❑</td>
<td>Little People® Figurines ❑</td>
<td>Kitchen Accessories and Utensils ❑</td>
<td></td>
</tr>
<tr>
<td>Bug Jug Fill and Spill ❑</td>
<td>Three-piece puzzle without knobs ❑</td>
<td>Little People® Play Set ❑</td>
<td>Plastic/Wooden/Felt Food (Whole) ❑</td>
<td></td>
</tr>
<tr>
<td>Picnic Basket Fill and Spill ❑</td>
<td>Multi-piece puzzle without knobs ❑</td>
<td>Zoo Play set ❑</td>
<td>Plastic/Wooden/Felt Food (Cutting Set) ❑</td>
<td></td>
</tr>
<tr>
<td>Ball Popper ❑</td>
<td>Magnetic puzzle with fishing pole ❑</td>
<td>Playground Play set ❑</td>
<td>Grocery Cart ❑</td>
<td></td>
</tr>
<tr>
<td>Telephone ❑</td>
<td>Shape Sorter ❑</td>
<td>Carnival Play set ❑</td>
<td>Cookie Toy set ❑</td>
<td></td>
</tr>
<tr>
<td>Musical Instruments ❑</td>
<td>Shape Sorter Clock ❑</td>
<td>Large Dinosaurs ❑</td>
<td>Pizza Toy set ❑</td>
<td></td>
</tr>
<tr>
<td>Large Balls ❑</td>
<td>Foam Puzzles ❑</td>
<td>Small Dinosaurs ❑</td>
<td>Cupcake Toy set ❑</td>
<td></td>
</tr>
<tr>
<td>Medium Balls ❑</td>
<td>Leapfrog® Magnetic Puzzle (Animal or Letters) ❑</td>
<td>Dinosaur Play set ❑</td>
<td>Cake Toy set ❑</td>
<td></td>
</tr>
<tr>
<td>Small Balls ❑</td>
<td>Melissa and Doug® Stacking Train ❑</td>
<td>Farm Animal Figures ❑</td>
<td>Taco Toy set ❑</td>
<td></td>
</tr>
<tr>
<td>Ball and Hammer Set ❑</td>
<td>Stack and Sort Board ❑</td>
<td>Barn Play set ❑</td>
<td>Ice cream toy set ❑</td>
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</tr>
<tr>
<td>Peg and Hammer Set ❑</td>
<td>Magnetic Dress Up Puzzle ❑</td>
<td>Jungle Animals Figures ❑</td>
<td>Tea Set ❑</td>
<td></td>
</tr>
<tr>
<td>Piggy Bank ❑</td>
<td>Lacing Beads ❑</td>
<td>Jungle Animals Play Set ❑</td>
<td>Sandwich toy set ❑</td>
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</tr>
<tr>
<td>Cookie Jar ❑</td>
<td>Lacing Sneaker ❑</td>
<td>Aquatic Animal Figures ❑</td>
<td>Sushi toy set ❑</td>
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<tr>
<td>Push and Pop Up Characters ❑</td>
<td>Mr. or Mrs. Potato Head ❑</td>
<td>Aquatic Animal Play Set ❑</td>
<td>Brownie toy set ❑</td>
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</tr>
<tr>
<td>Ball Platforms and Slides ❑</td>
<td>Pegboard:</td>
<td>Aquatic Animal Play Set ❑</td>
<td>Donut toy set ❑</td>
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</tr>
<tr>
<td>Other: ❑</td>
<td>Other:</td>
<td>Wrestler Action Figures ❑</td>
<td>Grill toy set ❑</td>
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<tr>
<td>Other: ❑</td>
<td>Other:</td>
<td>Wrestler Play set ❑</td>
<td>Picnic Basket Toy Set ❑</td>
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</tr>
<tr>
<td>Tools ❑</td>
<td>Wooden Blocks ❑</td>
<td>Dolls ❑</td>
<td>Other:</td>
<td></td>
</tr>
<tr>
<td>Tool Set/Work Bench ❑</td>
<td>Plastic Blocks ❑</td>
<td>Doll House ❑</td>
<td>Other:</td>
<td></td>
</tr>
<tr>
<td>Purse ❑</td>
<td>Rubber Blocks ❑</td>
<td>Doll House Furniture ❑</td>
<td>Vehicles</td>
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</tr>
<tr>
<td>Play Set</td>
<td>Toy 1</td>
<td>Toy 2</td>
<td>Toy 3</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>---------------------</td>
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</tr>
<tr>
<td>Grocery Store Play Set</td>
<td>Cardboard Blocks</td>
<td>Doll Clothes</td>
<td>Bus</td>
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<tr>
<td>Lemonade stand Play Set</td>
<td>Cloth Blocks</td>
<td>Baby Doll</td>
<td>Plane</td>
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<tr>
<td>Mail Play Set</td>
<td>Stacking Rings (Plastic)</td>
<td>Baby Doll Carriage</td>
<td>Dump truck</td>
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<tr>
<td>Play Money Play Set</td>
<td>Stacking Rings (Cloth)</td>
<td>Baby Doll Accessories</td>
<td>Fire truck</td>
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<tr>
<td>Cash Register</td>
<td>Stacking Rings (Wood)</td>
<td>Baby Doll High Chair</td>
<td>Garbage Truck</td>
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<tr>
<td>Medical Kit</td>
<td>Animal-Shaped Stacking Toys</td>
<td>Castle</td>
<td>Trucks</td>
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<tr>
<td>Hair Styling and Make Up Kit</td>
<td>Nesting Cups/Beakers/Blocks</td>
<td>Knight Play Set</td>
<td>Truck Play set</td>
<td></td>
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<tr>
<td>Flower Kit with watering can</td>
<td>Stacking Balls</td>
<td>Pirates</td>
<td>Tractor</td>
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<tr>
<td>Laundry Play Set</td>
<td>Pop Beads</td>
<td>Pirate Ship</td>
<td>Magnetic Train Cars</td>
<td></td>
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<tr>
<td>Cleaning Play Set</td>
<td>Interlocking Chain Beads</td>
<td>Sesame Street ® Play Set</td>
<td>Train Cars</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td>Legos</td>
<td>Other:</td>
<td>Train tracks</td>
<td></td>
</tr>
<tr>
<td>Lego Play set</td>
<td>Other:</td>
<td>Other:</td>
<td>Train set accessories</td>
<td></td>
</tr>
<tr>
<td>Duplo Blocks</td>
<td>Other:</td>
<td>Other:</td>
<td>Train activity table</td>
<td></td>
</tr>
<tr>
<td>Duplo Play set</td>
<td>Other:</td>
<td>Other:</td>
<td>Cars</td>
<td></td>
</tr>
<tr>
<td>K’Nex Building Set</td>
<td>Other:</td>
<td>Other:</td>
<td>Car Play set</td>
<td></td>
</tr>
<tr>
<td>Interlocking Waffle Blocks</td>
<td>Other:</td>
<td>Other:</td>
<td>Car Set Accessories</td>
<td></td>
</tr>
<tr>
<td>Mega Blocks</td>
<td>Other:</td>
<td>Other:</td>
<td>Tow Truck</td>
<td></td>
</tr>
<tr>
<td>Mega Blocks Play N Go set</td>
<td>Other:</td>
<td>Other:</td>
<td>Boat</td>
<td></td>
</tr>
<tr>
<td>Sort and Snap Color Match</td>
<td>Other:</td>
<td>Other:</td>
<td>Boat Play Set</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td>Other:</td>
<td>Other:</td>
<td>Helicopter</td>
<td></td>
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<tr>
<td>Other:</td>
<td>Other:</td>
<td>Other:</td>
<td>Car Carrier</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td>Other:</td>
<td>Other:</td>
<td>Rocket Ship</td>
<td></td>
</tr>
<tr>
<td>OTHER:</td>
<td>Other:</td>
<td>Other:</td>
<td>Other:</td>
<td></td>
</tr>
</tbody>
</table>
Appendix E

Inventory of Toddlers and Family Activities Practices

INVENTORY OF TODDLER AND FAMILY ACTIVITIES AND PRACTICES
Northeastern University

1) Some infants and toddlers are enrolled at daycare or childcare settings. My child has attended the following childcare settings (please check all that apply):

**CENTER-BASED CHILDCARE SETTING 1**
Previously ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______
(approximate number of children at daycare) ______

Currently ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______
(approximate number of children at daycare) ______

**CENTER-BASED CHILDCARE SETTING 2**
Previously ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______
(approximate number of children at daycare) ______

Currently ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______
(approximate number of children at daycare) ______

**CENTER-BASED CHILDCARE SETTING 3**
Previously ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______
(approximate number of children at daycare) ______

Currently ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______
(approximate number of children at daycare) ______

**HOME-BASED CHILDCARE SETTING 1**
Previously ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______

Currently ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______

**HOME-BASED CHILDCARE SETTING 2**
Previously ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______

Currently ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______

**HOME-BASED CHILDCARE SETTING 3**
Previously ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______

Currently ( )
(child’s age at time of enrollment) ______
(number of months your child has attended) ______

**MY CHILD HAS NOT ATTENDED A CENTER- OR HOME-BASED DAYCARE:**
But I plan to enroll him/her in the future when he/she is ______ months old ( )
And I do not plan to enroll him/her in the future ( )

2) My child has participated in the following community-based groups/resources (please check all that apply):
### Previously

(n.b., only check if your child used to participate in these services/groups but no longer participates)

<table>
<thead>
<tr>
<th>Service/Group</th>
<th>Previously</th>
<th>Currently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Head Start</td>
<td></td>
<td>Early Head Start</td>
</tr>
<tr>
<td>Early Head Start Play Groups</td>
<td></td>
<td>Early Head Start Play Groups</td>
</tr>
<tr>
<td>Project Connect Home Visits</td>
<td></td>
<td>Project Connect Home Visits</td>
</tr>
<tr>
<td>Project Connect Play Groups</td>
<td></td>
<td>Project Connect Play Groups</td>
</tr>
<tr>
<td>Library Groups</td>
<td></td>
<td>Library Groups</td>
</tr>
<tr>
<td>YMCA Play Groups</td>
<td></td>
<td>YMCA Play Groups</td>
</tr>
<tr>
<td>YMCA Classes</td>
<td></td>
<td>YMCA Classes</td>
</tr>
<tr>
<td>Music Classes</td>
<td></td>
<td>Music Classes</td>
</tr>
<tr>
<td>Dance Classes</td>
<td></td>
<td>Dance Classes</td>
</tr>
<tr>
<td>Gymnastic Classes</td>
<td></td>
<td>Gymnastic Classes</td>
</tr>
<tr>
<td>Art Classes</td>
<td></td>
<td>Art Classes</td>
</tr>
<tr>
<td>Groups for the Mothers of Twins Associations</td>
<td></td>
<td>Groups for the Mothers of Twins Associations</td>
</tr>
<tr>
<td>Play Groups at the Kennedy Donovan Center</td>
<td></td>
<td>Play Groups at the Kennedy Donovan Center</td>
</tr>
<tr>
<td>Play Groups at other early intervention agencies</td>
<td></td>
<td>Play Groups at other early intervention agencies</td>
</tr>
<tr>
<td>Play Group at other locations</td>
<td></td>
<td>Play Group at other locations</td>
</tr>
<tr>
<td>Please name location:</td>
<td></td>
<td>Please name location:</td>
</tr>
<tr>
<td>Play Dates with other children</td>
<td></td>
<td>Play Dates with other children</td>
</tr>
<tr>
<td>Age of playmates:________</td>
<td></td>
<td>Age of playmates:________</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td>Other:</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td>Other:</td>
</tr>
</tbody>
</table>

### Currently

<table>
<thead>
<tr>
<th>Service/Group</th>
<th>Currently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Head Start</td>
<td></td>
</tr>
<tr>
<td>Early Head Start Play Groups</td>
<td></td>
</tr>
<tr>
<td>Project Connect Home Visits</td>
<td></td>
</tr>
<tr>
<td>Project Connect Play Groups</td>
<td></td>
</tr>
<tr>
<td>Library Groups</td>
<td></td>
</tr>
<tr>
<td>YMCA Play Groups</td>
<td></td>
</tr>
<tr>
<td>YMCA Classes</td>
<td></td>
</tr>
<tr>
<td>Music Classes</td>
<td></td>
</tr>
<tr>
<td>Dance Classes</td>
<td></td>
</tr>
<tr>
<td>Gymnastic Classes</td>
<td></td>
</tr>
<tr>
<td>Art Classes</td>
<td></td>
</tr>
<tr>
<td>Groups for the Mothers of Twins Associations</td>
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</tr>
<tr>
<td>Play Groups at the Kennedy Donovan Center</td>
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<tr>
<td>Play Groups at other early intervention agencies</td>
<td></td>
</tr>
<tr>
<td>Play Group at other locations</td>
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<tr>
<td>Please name location:</td>
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</tr>
<tr>
<td>Play Dates with other children</td>
<td></td>
</tr>
<tr>
<td>Age of playmates:________</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
</tr>
</tbody>
</table>

3) I expect my child to start (please check all that apply):

<table>
<thead>
<tr>
<th>Public Preschool</th>
<th>Private Preschool</th>
<th>Head Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never ( )</td>
<td>Never ( )</td>
<td>Never ( )</td>
</tr>
<tr>
<td>in 1-3 months ( )</td>
<td>in 1-3 months ( )</td>
<td>in 1-3 months ( )</td>
</tr>
<tr>
<td>In 4-6 months ( )</td>
<td>In 4-6 months ( )</td>
<td>In 4-6 months ( )</td>
</tr>
<tr>
<td>In 7-10 months ( )</td>
<td>In 7-10 months ( )</td>
<td>In 7-10 months ( )</td>
</tr>
<tr>
<td>In 11-12 months ( )</td>
<td>In 11-12 months ( )</td>
<td>In 11-12 months ( )</td>
</tr>
<tr>
<td>In 13-24 months ( )</td>
<td>In 13-24 months ( )</td>
<td>In 13-24 months ( )</td>
</tr>
</tbody>
</table>

These next questions are about things that different children do at different ages. These things may or may not be true for your child. Also, some parents and caregivers may not have had a chance to observe these things, so you can record if that’s the case for any of these questions.

4) Compared to other children his/her age, how often is your child able to sit still?
   - Never ( )
   - Rarely ( )
   - Sometimes ( )
   - Often ( )
   - Very Often ( )

5) How often can your child identify the names of his/her favorite toys by name?
Caregiver-Implemented Play 250

6) How often can your child identify the names of his/her favorite characters (e.g., from books, movies, television, or other mediums)?
   All of the time (   ) Some of the time (   ) Rarely or Never (   )

7) Some toddlers do not show a preference for characters. Others show a clear preference for certain characters. If your child has a preference, what are some of his/her favorite characters (please check all that apply)?

<table>
<thead>
<tr>
<th>Thomas and Friends ™( )</th>
<th>The Wiggles ™ ( )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuggington ™ ( )</td>
<td>Sesame Street ®( )</td>
</tr>
<tr>
<td>Dora the Explorer ™ ( )</td>
<td>Wonder Pets! ™ ( )</td>
</tr>
<tr>
<td>Go, Diego, Go! ™( )</td>
<td>Max and Ruby ™ ( )</td>
</tr>
<tr>
<td>Barney the Dinosaur ™ ( )</td>
<td>Wow! Wow! Wubbzy! ™ ( )</td>
</tr>
<tr>
<td>Dinosaur Train ™ ( )</td>
<td>Barbie ®( )</td>
</tr>
<tr>
<td>Tinkerbell ™/Disney Fairies ™ ( )</td>
<td>Bob the Builder and Friends ™( )</td>
</tr>
<tr>
<td>Strawberry Shortcake ™ ( )</td>
<td>Handy Manny ™( )</td>
</tr>
<tr>
<td>Spiderman ™ ( )</td>
<td>Superman ™( )</td>
</tr>
<tr>
<td>Iron Man ™ ( )</td>
<td>Captain America ™ ( )</td>
</tr>
<tr>
<td>The Hulk ™ ( )</td>
<td>Green Lantern ™ ( )</td>
</tr>
<tr>
<td>Characters from Madagascar ( )</td>
<td>Characters from Toy Story ( )</td>
</tr>
<tr>
<td>Winnie the Pooh ( )</td>
<td>The Muppets ™ &amp; ©( )</td>
</tr>
<tr>
<td>Characters from Kung-Fu Panda ® ( )</td>
<td>Characters from Shrek ®</td>
</tr>
<tr>
<td>Spongebob Squarepants ™ ( )</td>
<td>Angelina Ballerina ™( )</td>
</tr>
<tr>
<td>Caillou ™ ( )</td>
<td>Fireman Sam ™( )</td>
</tr>
<tr>
<td>Pajanimals ™ ( )</td>
<td>Super WHY ™ ( )</td>
</tr>
<tr>
<td>Rubbadubbers ™( )</td>
<td>Mickey Mouse Clubhouse ( )</td>
</tr>
<tr>
<td>Kipper ™( )</td>
<td>Bubble Guppies ™( )</td>
</tr>
<tr>
<td>Yo Gabba Gabba! ®( )</td>
<td>Franklin ™and Friends ( )</td>
</tr>
<tr>
<td>The Backyardigans ™( )</td>
<td>Olivia ™( )</td>
</tr>
<tr>
<td>Blue’s Clues ™ ( )</td>
<td>Curious George ( )</td>
</tr>
<tr>
<td>Jay Jay the Jet Plane ™( )</td>
<td>Sid the Science Kid ( )</td>
</tr>
<tr>
<td>Cars ( )</td>
<td>Shrek ( )</td>
</tr>
<tr>
<td>Other:</td>
<td>Other:</td>
</tr>
<tr>
<td>Other:</td>
<td>Other:</td>
</tr>
<tr>
<td>Other:</td>
<td>Other:</td>
</tr>
</tbody>
</table>

8) How often does your child initiate eye contact with others?
   Never ( ) Rarely ( ) Sometimes ( ) Often ( ) Very Often ( )

9) How often does your child speak?
   Never ( ) Rarely ( ) Sometimes ( ) Often ( ) Very Often ( )

10) Only answer if you responded sometimes, often, or very often to question 9: When your child speaks, how often is he/she understandable to people who do not know him/her very well?
<table>
<thead>
<tr>
<th></th>
<th>Yes/No</th>
<th>How often?</th>
<th>By whom?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Told him/her a story?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>2</td>
<td>Taught him/her numbers or letters?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>3</td>
<td>Taught him/her signs or words?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>4</td>
<td>Taught him/her songs or music?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>5</td>
<td>Did arts or crafts, for example, coloring, painting, pasting, or using clay?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>6</td>
<td>Played sports or engaged in physical play?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>7</td>
<td>Played with toys?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>8</td>
<td>Visited a zoo, aquarium, or museum?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>9</td>
<td>Went to a movie?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>10</td>
<td>Watched television or a movie?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>11</td>
<td>Does most of your family eat dinner together, either at home or somewhere else most of the time?</td>
<td>Yes ( ) No ( ) Not sure ( )</td>
<td>Once ( ) Twice ( ) Three times or more ( )</td>
</tr>
<tr>
<td>12</td>
<td>Talked with your child about his/her ethnic heritage or</td>
<td>Yes ( ) No ( )</td>
<td>Once ( ) Twice ( )</td>
</tr>
<tr>
<td>Question</td>
<td>Not sure ( )</td>
<td>Three times or more ( )</td>
<td>Older sibling ( )</td>
</tr>
<tr>
<td>----------</td>
<td>--------------</td>
<td>-------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>13) Attended an event sponsored by a community, religious, or ethnic group?</td>
<td>Yes ( )</td>
<td>Once ( )</td>
<td>Mom ( )</td>
</tr>
<tr>
<td></td>
<td>No ( )</td>
<td>Twice ( )</td>
<td>Dad ( )</td>
</tr>
<tr>
<td></td>
<td>Not sure ( )</td>
<td>Three times or more ( )</td>
<td>Older sibling ( )</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other ( )</td>
</tr>
</tbody>
</table>
### Description of DPA Play Categories

<table>
<thead>
<tr>
<th>Play Categories</th>
<th>Play Category Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Indiscriminative</td>
<td>Treats all objects alike</td>
</tr>
<tr>
<td>II Discriminative</td>
<td>Differentiates single objects</td>
</tr>
<tr>
<td>III Presentation Combinations</td>
<td>Re-assembles presentation</td>
</tr>
<tr>
<td>General Combinations</td>
<td>Assembles undifferentiated configurations</td>
</tr>
<tr>
<td>Pretend Self</td>
<td>Relates objects to the self in pretend</td>
</tr>
<tr>
<td>IV Specific Physical Combinations</td>
<td>Preserves physical features in configuration</td>
</tr>
<tr>
<td>V Child-as-Agent</td>
<td>Extends familiar actions to dolls, figures</td>
</tr>
<tr>
<td>Specific Conventional Combinations</td>
<td>Preserves conventional features in configuration</td>
</tr>
<tr>
<td>VI Single Scheme Sequences</td>
<td>Extends same action to multiple figures</td>
</tr>
<tr>
<td>Substitutions</td>
<td>Uses one object as substitute for another</td>
</tr>
<tr>
<td>VII Doll-as-Agent</td>
<td>Attributes actions to dolls, figures</td>
</tr>
<tr>
<td>Multi-scheme Sequences</td>
<td>Extends different actions to dolls, figures</td>
</tr>
<tr>
<td>VIII Socio-dramatic/Fantasy Play</td>
<td>Role adoption in play</td>
</tr>
</tbody>
</table>

*Note.* M = mastery (4 types, 10 frequencies); E = emergence (2 types, 4 frequencies); A = Absent or anything less than emergence.
### First DPA Coding Sheet: DPA Play Activity Datasheet

<table>
<thead>
<tr>
<th>CHILD</th>
<th>AGE</th>
<th>DATE</th>
<th>Anticipated actions</th>
<th>Frequency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>puzzle</td>
<td></td>
<td></td>
<td>takes piece out of puzzle*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>puts piece in puzzle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>beads in</td>
<td></td>
<td></td>
<td>takes bead out of bowl*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bowl</td>
<td></td>
<td></td>
<td>puts bead in bowl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>bowl to mouth (to drink)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>stacks bead on bead</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>rolls bead</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>throws round bead</td>
<td></td>
<td></td>
</tr>
<tr>
<td>beads w/</td>
<td></td>
<td></td>
<td>strings bead</td>
<td></td>
<td></td>
</tr>
<tr>
<td>string</td>
<td></td>
<td></td>
<td>puts string in bowl/truck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>truck &amp;</td>
<td></td>
<td></td>
<td>takes figure out of seat*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>driver</td>
<td></td>
<td></td>
<td>puts figure into seat in truck</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>turns truck tire wheel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>puts block/bead in truck (container)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>puts block/bead in truck (to transport)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>puts block/bead in truck (&quot;cargo&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>pushes truck on floor +/- fig.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fig./lamb in dumper for ride</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>walks driver</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sits on truck for ride</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>makes driver load/unload truck</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dumps dump truck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wooden</td>
<td></td>
<td></td>
<td>stacks block on block</td>
<td></td>
<td></td>
</tr>
<tr>
<td>blocks</td>
<td></td>
<td></td>
<td>puts objects in bowl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lamb</td>
<td></td>
<td></td>
<td>hugs, kisses lamb</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>walks lamb</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SEQUENCES OF ACTIONS

**Note:** Actions of mouthing and banging objects are counted only if that is all the child does; they are coded as Indiscriminative Actions.

*Takes-Apart Actions are counted only if the sum of activites in the other categories is less than 25.
<table>
<thead>
<tr>
<th>CHILD</th>
<th>AGE</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 2</strong></td>
<td>Anticipated Actions</td>
<td>Frequency</td>
</tr>
<tr>
<td>blocks &amp; sticks in</td>
<td>takes block/stick from box*</td>
<td></td>
</tr>
<tr>
<td>plastic box</td>
<td>puts block on stick</td>
<td></td>
</tr>
<tr>
<td>nesting cups</td>
<td>takes cup from nest*</td>
<td></td>
</tr>
<tr>
<td>babydoll</td>
<td>hugs doll</td>
<td></td>
</tr>
<tr>
<td>spoon</td>
<td>touches spoon to mouth</td>
<td></td>
</tr>
<tr>
<td>blanket</td>
<td>spreads blanket</td>
<td></td>
</tr>
<tr>
<td>comb, mirror</td>
<td>touches comb to head</td>
<td></td>
</tr>
<tr>
<td></td>
<td>combs own hair</td>
<td></td>
</tr>
<tr>
<td></td>
<td>combs doll’s hair/head</td>
<td></td>
</tr>
<tr>
<td>looks in mirror</td>
<td>puts mirror in doll’s hand</td>
<td></td>
</tr>
<tr>
<td>holds mirror for doll to see self</td>
<td>holds mirror for obs. to see self</td>
<td></td>
</tr>
<tr>
<td>puts comb in doll’s hand</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SEQUENCES OF ACTIONS**

**Note:** Actions of mouthing and banging objects are counted only if that is all the child does; they are coded as Indiscriminative Actions.

*Takes-Apart Actions are counted only if the sum of activities in the other categories is less than 25.
<table>
<thead>
<tr>
<th>CHILD</th>
<th>AGE</th>
<th>DATE</th>
<th>Anticipated actions</th>
<th>Frequency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 3</strong></td>
<td></td>
<td></td>
<td><em>Anticipated actions</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>farm</td>
<td></td>
<td></td>
<td>takes animal from box*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>animals</td>
<td></td>
<td></td>
<td>puts animal in animal box</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in plastic</td>
<td></td>
<td></td>
<td>walks animal +/- fig. on it</td>
<td></td>
<td></td>
</tr>
<tr>
<td>box</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-part</td>
<td></td>
<td></td>
<td>turns train wheel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>train</td>
<td></td>
<td></td>
<td>pushes train car on floor +/- fig.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>attaches train cars</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>pushes train on floor +/- fig</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sits on train for ride</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>puts animal on train for ride</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>objects in train (container)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>objects in train (to transport)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>objects in train (to move &quot;cargo&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>boy</td>
<td></td>
<td></td>
<td>walks boy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>family</td>
<td></td>
<td></td>
<td>puts boy on train for ride</td>
<td></td>
<td></td>
</tr>
<tr>
<td>figure</td>
<td></td>
<td></td>
<td>puts boy on farm animal for ride</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cup,</td>
<td></td>
<td></td>
<td>puts cup on saucer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>saucer,</td>
<td></td>
<td></td>
<td>uses pitcher to pour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pitcher</td>
<td></td>
<td></td>
<td>pours pitcher to cup</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>puts objects in cup/pitcher</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>touches cup to mouth</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cup to mouth (to drink)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cup to doll's mouth (&quot;&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cup to obs.' mouth (&quot;&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nuts &amp;</td>
<td></td>
<td></td>
<td>takes nut or bolt from dish*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bolts on</td>
<td></td>
<td></td>
<td>puts nut or bolt on dish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dish</td>
<td></td>
<td></td>
<td>screws nut on bolt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>stacks nut on nut</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SEQUENCES OF ACTIONS**

**Note:** Actions of mouthing and banging objects are counted only if that is all the child does; they are coded as Indiscriminative Actions.

*Takes-Apart Actions are counted only if the sum of activities in the other categories is less than 25.*
<table>
<thead>
<tr>
<th>CHILD</th>
<th>AGE</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 4</strong></td>
<td>Anticipated Actions</td>
<td>Frequency</td>
</tr>
<tr>
<td>large</td>
<td>takes beaker from nest*</td>
<td></td>
</tr>
<tr>
<td>nesting</td>
<td>nests nesting beaker</td>
<td></td>
</tr>
<tr>
<td>beakers</td>
<td>stacks nesting beaker</td>
<td></td>
</tr>
<tr>
<td></td>
<td>touches beaker to mouth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>beaker to mouth (to drink)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>beaker to fig.’s mouth (*)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>beaker to obs’ mouth (**)</td>
<td></td>
</tr>
<tr>
<td>car</td>
<td>turns car wheel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>pushes car on floor +/- fig.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tries to ride on car</td>
<td></td>
</tr>
<tr>
<td></td>
<td>objects in car (container)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>objects in car (to transport)</td>
<td></td>
</tr>
<tr>
<td>mother/</td>
<td>walks figure</td>
<td></td>
</tr>
<tr>
<td>father</td>
<td>puts mother in car</td>
<td></td>
</tr>
<tr>
<td>family</td>
<td>puts father in car</td>
<td></td>
</tr>
<tr>
<td>figures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gas pump</td>
<td>takes handle off pump*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>replaces gas pump handle</td>
<td></td>
</tr>
<tr>
<td>oil can,</td>
<td>turns crank on gas pump</td>
<td></td>
</tr>
<tr>
<td>tire gauge</td>
<td>tire gauge to car tire to fix</td>
<td></td>
</tr>
<tr>
<td>screw-</td>
<td>oil can to car to fix</td>
<td></td>
</tr>
<tr>
<td>driver</td>
<td>tool to car to fix</td>
<td></td>
</tr>
<tr>
<td></td>
<td>gas pump to car to fill</td>
<td></td>
</tr>
</tbody>
</table>

**SEQUENCES OF ACTIONS**

**Note: Actions of mouthing and banging objects are counted only if that is all the child does; they are coded as Indiscriminative Actions.**

* Takes-Apart Actions are counted only if the sum of activities in the other categories is less than 25.
# Appendix H

Second DPA Coding Sheet: Categorization of DPA Play Activities

<table>
<thead>
<tr>
<th>Indiscriminative behaviors**</th>
<th>Discriminative behaviors</th>
<th>Presentation Combinations</th>
<th>General Combinations</th>
<th>Specific: Physical</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indiscriminative behaviors</strong></td>
<td><strong>Discriminative behaviors</strong></td>
<td><strong>Presentation Combinations</strong></td>
<td><strong>General Combinations</strong></td>
<td><strong>Specific: Physical</strong></td>
<td><strong>Frequency</strong></td>
</tr>
<tr>
<td>rolls bead</td>
<td>puts piece in puzzle</td>
<td>objects in truck (container)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>throws round bead</td>
<td>puts bead in bowl</td>
<td>objects in train (container)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pushes truck on floor +/- fig.</td>
<td>puts figure into seat in truck</td>
<td>objects in bowl (container)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>turns truck tire wheel</td>
<td>puts block/stick in box</td>
<td>objects in car (container)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dumps dump truck</td>
<td>nests nesting cup</td>
<td>objects in box (container)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hugs/kisses lamb</td>
<td>puts garment on doll</td>
<td>objects in cup/pitcher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>touches n.cup to mouth</td>
<td>puts animal in animal box</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hugs/kisses doll</td>
<td>puts nut or bolt on dish</td>
<td></td>
<td>Variety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>touches spoon to mouth</td>
<td>nests nesting beaker</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>spreads blanket</td>
<td>replaces gas pump handle</td>
<td>stacks bead on bead</td>
<td>Specific: Physical</td>
<td>(physical relationship btwn objs)</td>
<td></td>
</tr>
<tr>
<td>folds blanket</td>
<td></td>
<td>strings bead</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>touches comb to head</td>
<td></td>
<td>stacks block on block</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>looks in mirror</td>
<td></td>
<td>puts block on stick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walks lamb/animal +/- fig. on it</td>
<td></td>
<td>stacks nesting cup</td>
<td>Variety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>turns train wheel</td>
<td></td>
<td>attaches train car</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pushes train car +/- fig</td>
<td></td>
<td>attaches train car</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pushes train +/- fig</td>
<td>(familiar action to self)</td>
<td>screws nut on bolt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>uses pitcher to pour</td>
<td>sits on truck for ride</td>
<td>stacks nut on nut</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walks driver/people/doll</td>
<td>bowl to mouth (to drink)</td>
<td>stacks nesting beaker</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>touches cup to mouth</td>
<td>cup to mouth (to drink)</td>
<td>objects in truck (to transport)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>touches beaker to mouth</td>
<td>spoon to mouth (to eat)</td>
<td>objects in train (to transport)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Variety</td>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------</td>
<td>-----------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>turns car wheel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pushes car on floor +/-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fig.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>turns crank on gas pump</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>covers self w/ blanket</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>objects in car (to transport)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>combs own hair</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sits on train for ride</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>beaker to mouth (to drink)</td>
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<tr>
<td>Single Scheme Sequences</td>
<td></td>
<td>(same action, repeated)</td>
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<tr>
<td>varieties</td>
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<tr>
<td>Frequency</td>
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</table>

| Child as Agent            |         |           |
|                          | (pretend behavior to do figure) | Variety |
| puts fig/lamb in dumper for ride |         |           |
|                           | Frequency |           |
| cup to doll/obs.' mouth to drink |     | Specific: Conventional (conventional relationship btwn objs) | Variety |
| spoon to doll/obs.' mouth to eat |         |         | Frequency |
| covers doll w/ blanket |         | scoops into cup w/ spoon | Substitutions (one object to stand for another, |
| combs doll/obs.' hair/head |         | puts cup on saucer | bowl on head for hat |
| puts animal on train for ride |         | pours pitcher to cup | |
| puts boy on train for ride |         | tire gauge to car | |
| puts boy on animal for ride |         | oil can to car to fix | |
| beaker to fig./obs.' mouth to drink |         | tool to car to fix | Sociodramatic play episodes (role play, familiar themes) |
| puts people fig. in car to ride |         | gas pump to car to fill | |
| holds mirror for doll/obs. to see self |         | puts block/bead in truck ("cargo") | |
| puts block/bead in truck ("cargo") |         | objects in train (to move "cargo") | |
| Variety                   |         |           |
| Frequency                 |         |           |

<p>| Doll as Agent             |         |           |
| makes figure load/unload truck |       | Variety |
|                           | Frequency |           |
| gives toy to doll to play |         | Multischeme Sequences (different actions in series) |
| puts spoon into doll's hand |         |           |
| puts mirror in doll's      | Variety  |           |</p>
<table>
<thead>
<tr>
<th>Hand</th>
<th>Frequency</th>
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<tr>
<td>Puts comb in doll's</td>
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<td>Hand</td>
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### Third DPA Coding Sheet: Play Category Levels

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<tr>
<th>Name</th>
<th>Variety</th>
<th>Frequency</th>
<th>Status***</th>
<th>Targets</th>
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<tbody>
<tr>
<td>Date, Age</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>I Indiscriminative Actions**</td>
<td></td>
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<tr>
<td>Discriminative behaviors on single objects</td>
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<tr>
<td>II Takes-apart Combinations*</td>
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<tr>
<td>Presentation Combinations</td>
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<tr>
<td>III General Combinations</td>
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<tr>
<td>Pretend Self</td>
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<tr>
<td>IV Specific: Physical (physical relationship btwn obs)</td>
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<tr>
<td>Child-as-Agent</td>
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<tr>
<td>V Specific: Conventional (conventional relationship btwn obs)</td>
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<tr>
<td>Single-scheme Sequences</td>
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<td></td>
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<tr>
<td>VI Substitutions</td>
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</table>
**Caregiver-Implemented Play**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Example</th>
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<tr>
<td><strong>Doll-as-Agent</strong></td>
<td>VII</td>
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<tr>
<td><strong>Multi-scheme Sequences</strong></td>
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<tr>
<td><strong>Sociodramatic Play</strong></td>
<td>VIII</td>
<td></td>
</tr>
<tr>
<td><strong>Fantasy Play</strong></td>
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</table>

*Total behaviors*

- *Takes-Apart Actions* are counted only if the sum of activities in the other categories is less than 25.
- **Indiscriminative Actions** (i.e. actions of mouthing, banging) are counted only if that is all the child does.
- ***Mastery*** ("M") ≥ 4 Varieties, Frequency of 10; **Emergence** ("E") ≥ 2 Varieties, Frequency of 4; Absence ("A") = anything less
Appendix J
First Caregiver Handout-Play Intervention Activities and Targets

PLAY INTERVENTION ACTIVITIES AND TARGETS

What is the Developmental Play Assessment (DPA)?
- You and your child will participate in 30 minutes of spontaneous play.
- He/she will play with four groups of toys, which are alternated every 7.5 minutes.
- You and Suzie will figure out which play activities are at your child’s leading edge of learning (i.e., emerging)
- You will teach these emerging play activities to your child.

What are the DPA Play Categories?

<table>
<thead>
<tr>
<th>Play Categories</th>
<th>Play Category Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Indiscriminative</td>
<td>Treats all objects alike</td>
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<tr>
<td>II Discriminative</td>
<td>Differentiates single objects</td>
</tr>
<tr>
<td>III Presentation Combinations</td>
<td>Re-assembles presentation</td>
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<tr>
<td>General Combinations</td>
<td>Assembles undifferentiated configurations</td>
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<tr>
<td>Pretend Self</td>
<td>Relates objects to the self in pretend</td>
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<tr>
<td>IV Specific Physical Combinations</td>
<td>Preserves physical features in configuration</td>
</tr>
<tr>
<td>V Child-as-Agent</td>
<td>Extends familiar actions to dolls, figures</td>
</tr>
<tr>
<td>Specific Conventional Combinations</td>
<td>Preserves conventional features in configuration</td>
</tr>
<tr>
<td>VI Single Scheme Sequences</td>
<td>Extends same action to multiple figures</td>
</tr>
<tr>
<td>Substitutions</td>
<td>Uses one object as substitute for another</td>
</tr>
<tr>
<td>VII Doll-as-Agent</td>
<td>Attributes actions to dolls, figures</td>
</tr>
<tr>
<td>Multi-scheme Sequences</td>
<td>Extends different actions to dolls, figures</td>
</tr>
<tr>
<td>VIII Socio-dramatic/Fantasy Play</td>
<td>Role adoption in play</td>
</tr>
</tbody>
</table>

Total codable actions

What play activities will I teach to my child?
- You and Suzie will complete the Developmental Play Assessment with your child.
- We will figure out which play categories are at the emerging level.
- We will figure out which play activities to teach based on the emerging play category, using your child’s toys.
- The DPA only will be administered at the beginning of this study to determine which play activities to teach.
Appendix K

Second Caregiver Handout-Caregiver-Implemented Play Interventions

Why Should Parents Teach Play to Children with Autism?

What is play?
- Pervasive and natural activity of early childhood
- Provides a meaningful context for learning
- Central to the development of young children
- Through play, children demonstrate what they know and obtain new knowledge and information

How does play develop?
- Play develops sequentially

**Early Stages**
1) Picking up, banging, and dropping objects
2) Taking objects apart
3) Moving objects between places (e.g., putting blocks into bowls)

**Middle Stages**
1) Connecting objects based on their physical properties (e.g., stacking cups and blocks)
2) Relating objects to self in a pretend manner (e.g., drinking from a cup).
3) Extending pretend activities to others (e.g., spoon to caregiver's mouth)

**Later Stages**
1) Linking activities (e.g., feeding and washing a doll and then putting it to bed).
2) Making dolls perform pretend activities (e.g., moving luggage into a car).
3) Pretending to be people (e.g., superhero, policeperson, construction worker)

Intervention approaches
- Many intervention approaches come from the tradition of applied behavior analysis (ABA).
- Incidental teaching is an approach that:
  o Focuses on the child’s motivation
  o Occurs naturally in home, school, and community settings
  o Promotes skill generalization
  o Has been used to teach children with autism a variety of skills, including play
**Why should parents teach play to children with autism and pervasive developmental disorders?**

- Children with autism show delays in their play, communication, and language skills
- Teaching children to play can:
  - Move them forward in the development of their play skills
  - Help them comment more on the objects, toys, and activities in their environment.
- Caregivers are the most salient teaching figures in the lives of young children and can play an important role in teaching their children.
- Thus, caregivers can play an important role in teaching play to their children!
Appendix L

Third Caregiver Handout-Single-Subject Designs and Baseline Phases

Single-Subject Research Designs and the Baseline Phase

Study design
- This intervention study represents a single-subject, multiple-baseline design.
- With this design, your child’s results are individualized. Results will be examined by comparing your child’s performance before, during, and after the intervention rather than comparing how he/she performs relative to other children.

What are baseline data?
- Baseline data are data that are collected before a program or intervention begins.
- Comparing baseline data to intervention data (i.e., data that are collected during the intervention) and maintenance data (i.e., data that are collected after the intervention ends) will provide information about the effectiveness of an intervention.
- Collecting baseline data will allow us to see how your child performed certain play activities and commented before starting the intervention, and how his/her play and commenting skills change in response to the play intervention you will deliver.

How will the baseline data collection work?
- Your child will be assigned to one of two groups (i.e., conditions).
- The second group of children will start the intervention phase once the first group of children starts responding to the intervention phase (please see the second page of this handout for a visual demonstration).
- Depending on how the first group responds to the intervention phase, your child may remain in the baseline phase for a few weeks or months before he/she begins the intervention phase.

Why would my child have to wait to start the intervention phase and remain in the baseline phase?
- Having two different intervention starting points will provide more information about the effectiveness of the intervention, and whether it can be used with other children with autism in the future.
- It sometimes can feel very frustrating to remain in baseline because you feel like you are not delivering an intervention to a child.
- However, your role as an active participant in the baseline data phase is ESSENTIAL to the research process and provides a lot of rich information not only about your child’s responsiveness to intervention but also whether an intervention can be used with other children with autism and their families.
By participating in this study, you will not only gain individualized information about your child’s development and but also will be doing a great service by contributing to research that can inform best practices for other children with autism!
Figure 5. Adam’s overall commenting and commenting about target play actions.
Procedures and Teaching Techniques

What does “teaching my child to play” mean?
- You will be asked to teach, reinforce (e.g., praise), and comment on (e.g., “You washed the doll’s face”) target play activities.

How much time will it take to teach my child to play?
- The intervention sessions will be 30 minutes long and will occur 3 to 7 times each week.
- You and Suzie will work together to determine how many times per week you will deliver the play intervention.
- Depending on how your child responds to the teaching techniques, you may be using these play intervention techniques for anywhere from a few weeks to a few months.

How do the play teaching procedures work?
- Teaching will occur when your child either attends to a toy (i.e., looking at it, doing something with it, or saying something) or attends to your activity by looking at the action or saying something about it.
- You will use least-to-most prompting to teach play activities to your child.

What is least-to-most prompting?
- Least-to-most prompting is a technique that provides your child with decreasing levels of adult support to help him/her perform play skills more independently.
- With this technique, you will use a step-wise process to prompt your child to perform a target play activity using:
  - Placement cues
  - Verbal cues
  - Gestural cues
  - Physical cues
LEAST-TO-MOST PROMPTING TECHNIQUE

Wait five seconds for your child to attend to a toy.

If your child performs a target play activity (e.g., picks up wood and sawed it) with the toy, provide praise and comment on the action (e.g., “Wow! You sawed the wood!”).

If he/she performs a target play action (e.g., picks up wood and sawed it) after the placement cue, provide praise and a comment about the play activity (e.g., “Wow! You sawed the wood!”).

If your child performs a target play action (e.g., picks up wood and sawed it) after the verbal cue, provide praise and a comment about the play activity (e.g., “Wow! You sawed the wood!”).

If your child performs a target play action (e.g., picks up wood and sawed it) after the verbal and gestural cues, provide praise and a comment about the play activity (e.g., “Wow! You sawed the wood!”).

PLACEMENT CUE: If your child does not attend to the toy, give it or place it in front of him/her. Wait five seconds to see what your child does with the toy.

VERBAL CUE: If your child does not perform a target play activity once he/she is given the toy, provide a verbal cue, such as, “You have a saw.”

GESTURAL CUE: If he/she does not perform the target play activity after the verbal cue, gesture toward the toy and give another verbal prompt, such as, “Here’s the

PHYSICAL CUE: If he/she does not perform a target action in response to the verbal and gestural cues, provide physical guidance with completing the play activity (e.g., guide child’s hand, which is holding the toy saw, to saw the wood) and provide praise and a comment.
# Primary Study Activities

<table>
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<th>Study Activity</th>
<th>Projected Completion Date</th>
<th>Actual Completion Date</th>
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<td>Phone Conversation about Study</td>
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<td>Initial Appointment to Review Study Procedures</td>
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<td>Informed Consent Signed</td>
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<td>BDI-2 Administration (if needed)</td>
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<td>DPA Administration</td>
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<td>Baseline Training-Review Handouts</td>
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<td>Baseline Training-Watch Training Video</td>
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<td>Baseline Practice Sessions</td>
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<td>Start Baseline Sessions</td>
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<td>Intervention Training-Review Handouts</td>
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<td>Intervention Training-Watch Video</td>
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<td>Intervention Practice Sessions</td>
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<td>Finish last Baseline Session</td>
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<td>Start first Intervention Session</td>
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<td>Finish last intervention session</td>
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<td>Start first maintenance session</td>
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<td>Finish last maintenance session</td>
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Appendix O

Dates of Completed Sessions

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Appendix P

Coding Target Play Activities

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<th>Activity</th>
<th>Spontaneous</th>
<th>Verbal Cue</th>
<th>Gestural Cue</th>
<th>Physical Cue</th>
<th>DPA Play Category</th>
<th>Target Play Activity</th>
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**INTEROBSERVER AGREEMENT:**
Please use this form to calculate Interobserver Agreement. Write agreements and disagreements in red ink.

Please write which DPA play category was demonstrated. Please check Yes if it was a target play activity and check No if it was not a target play activity. FOR TARGET PLAY ACTIVITIES, please check if the caregiver provided reinforcement and commented after the performance of the play activity.

**SPONTANEOUS TARGET PLAY ACTIVITIES**
Total Frequency:
Total Exemplars:
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<tr>
<td>Total Target Exemplars:</td>
<td>Total Frequency of Spontaneous Actions:</td>
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### Appendix Q

**Toy Inventory Questionnaire Information**

#### Toys Owned by John’s Family

<table>
<thead>
<tr>
<th>Ball popper</th>
<th>Shape sorter</th>
<th>Legos ®</th>
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<tbody>
<tr>
<td>Telephone</td>
<td>Mr. Potato Head</td>
<td>Singing octopus</td>
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<tr>
<td>Large balls</td>
<td>Wooden blocks</td>
<td>Cars</td>
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<tr>
<td>Medium balls</td>
<td>Little People ® figurines</td>
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<tr>
<td>Small balls</td>
<td>Barn play set</td>
<td></td>
</tr>
<tr>
<td>Push and pop up characters</td>
<td>Water table</td>
<td></td>
</tr>
<tr>
<td>Garage and tools</td>
<td>Wrestler action figures</td>
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<tr>
<td>Letters</td>
<td>Wrestler play set</td>
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</tr>
<tr>
<td>Three-piece puzzle with knobs</td>
<td>Play dough ®</td>
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</tr>
<tr>
<td>Multi-piece puzzle with knobs</td>
<td>Fire truck</td>
<td></td>
</tr>
<tr>
<td>Three-piece puzzle without knobs</td>
<td>Garbage truck</td>
<td></td>
</tr>
<tr>
<td>Multi-piece puzzle without knobs</td>
<td>Pedaling giraffe</td>
<td></td>
</tr>
</tbody>
</table>

#### Toys Owned by Edward’s Family

| Three-piece puzzle with knobs | Little People ® figurines | Pretend felt food |
| Multi-piece puzzle with knobs | Large dinosaurs | Pretend felt food basket |
| Three-piece puzzle without knobs | Small dinosaurs | Car |
| Shape Sorter | Farm animal figurines | Car racing track |
| Lacing beads | Squirt ing bath toys | Calilou ® figurine |
| Lacing card with string | Duplo ® blocks | Helicopter |
| 35 piece Mr. Potato Head ® | Fire trucks | Mega blocks ® |
| Large Balls | Magnetic train cars | Mega blocks ® car set |
| Medium Balls | Train tracks | Bear figurine |
| Small Balls | Train set accessories | Dog figurine |
| Shape and Hammer Set | Train activity table | Spoons |
| Wooden Blocks with Alphabet | Wooden conductor figures | Cups |

#### Toys Owned by Vincenzo’s Family

| Kitchen Accessories and Utensils | Pretend food | Spoon |
| Kitchen Set | Grocery car | Cups |
| Mr. Potato Head ® | Pillow Pets ® | Wooden blocks |
| Barn Playset | Weebles ® | Magnetic train cars |
| Pirate Ship | Mega Blocks ® | Cars |
| Cloth blocks | Dump truck | Police car |
| Wooden puzzle with knobs | Fire truck | Small Balls |
| Large Balls | Trucks | Push and Pop-up Toy |
| Medium Balls | Train tracks | Sand Containers |
### Toys Owned by Brent and Travis’ Family

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<td>Musical Instruments</td>
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<td>Mega Blocks</td>
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<td>Ball and Hammer set</td>
<td>Train Tracks</td>
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<td>Little People Figurines</td>
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Appendix R

Toy Set Rotation

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<tr>
<th>Sessions</th>
<th>Edward</th>
<th>Vincenzo</th>
<th>John</th>
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### Toy Set One: John

- Lego Garbage Truck
- Legos
- Stacking rings
- Stacker
- Musical cookie jar
- 6 cookie shapes
- Plastic cookie jar with 4 cookies

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<tr>
<th>Toy Set One: John</th>
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- Small puzzle with shapes
- 5 interlocking rings and container
- Animal lacing board with string
- Toothbrush
- Towel
- Bottle of Soap
- Farm Animals

**CONDUCT A PROBE SESSION WITH THIS PLAY SET (i.e., baseline session)**
**DO NOT PROVIDE DIRECT INSTRUCTION IN PLAY WITH THESE TOYS**
**TOY SET TWO**

- Wooden blocks
- Plastic string
- Little Tykes dump truck
- 2 Little People
- Apple with worm
- Beads in container
- Blocks with letters
- Barn set
- Farm Animals
- Octopus

1) String wooden blocks onto plastic string

2) Put into dump truck:
   - Little People
   - Beads
   - Blocks
   - Barn Animals

3) Extend toothbrush to:
   - Little people
   - Farm animals
   - Octopus
   - Worm
   - Mother, father, brother, or other person

4) Extend toothbrush to:
   - Blocks
   - String
   - Dump truck
   - Apple
   - Beads
   - Bead container
   - Barn

5) Extend toothpaste to toothbrush

6) Extend toothpaste to mouth of:
   - Little people
   - Farm animals
   - Octopus
   - Worm
   - Mother, father, brother, or other person

7) Extend toothpaste to:
   - Blocks
   - String
   - Dump truck
   - Apple
   - Beads
   - Bead container
   - Barn

8) Extend apple to mouth of:
   - Little people
   - Farm animals
   - Octopus
   - Worm
   - Mother, father, brother, or other person

9) Extend cup to mouth of:
   - Little people
   - Farm animals
   - Octopus
   - Worm
   - Mother, father, brother, or other person

10) Put in cup:
    - Spoon
    - Toothbrush

11) Extend spoon to mouth of:
    - Little people
    - Farm animals
    - Octopus
    - Worm
    - Mother, father, brother, or other person

12) Extend towel to:
    - Little people
    - Farm animals
    - Octopus
    - Worm
    - Mother, father, brother, or other person

12) Extend towel to:
    a. Blocks
    b. String
    c. Dump truck
    d. Apple
    e. Beads
    f. Bead container
    g. Barn
TOY SET THREE

- Mr. Potato Head
- Peg and Hammer Set
- Duplo Blocks
- Slide/swing with playground
- 5 smiley face balls
- Little People Garbage Truck
- 1 garbage can
- 6 wooden blocks
- Little People figurines
- Interlocking colored pop rings in a bowl
- Utensils
- Plates

1) Objects in Garbage Truck
   a) Garbage can
   b) Duplo block
   c) Wooden block
   d) Little people
   e) Smiley face ball
   f) Peg
   g) Hammer

2) Correct body part of Mr. Potato Head

3) Extend spoon to
   a) Potato Head
   b) Little people
   c) Smiley face balls

4) Characters (balls, people, potato head) on
   a) Swing
   b) Slide

5) In garbage truck cab
   a) Potato head
   b) Little people
   c) Smiley face balls

6) Extend hammer to
   a) Pegs
   b) Duplo blocks
   c) Slide
   d) Swing
   e) Garbage truck
   f) Wooden blocks
   g) Pop beads
   h) Bowl

7) Spoon in bowl

8) Extend bowl to
   a) Little people
   b) Smiley face balls
   c) Potato Head
**TOY SET FOUR**

- Castle
- Two horses
- Knight
- Castle flag
- Elmo mailbox
- Blue letter
- 2 blue shapes with mailbox
- 6 wooden blocks (colored)
- Plastic vile
- Musical turtle with 2 balls

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<tbody>
<tr>
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<td>Castle</td>
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<td>Knight</td>
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<td>Castle flag</td>
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<td>Elmo mailbox</td>
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<td>Blue letter</td>
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<td>2 blue shapes with mailbox</td>
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<tr>
<td></td>
<td>6 wooden blocks (colored)</td>
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<td></td>
<td>Plastic vile</td>
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<tr>
<td></td>
<td>Musical turtle with 2 balls</td>
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<tr>
<td></td>
<td>Blue cup</td>
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<td>Little dumptruck</td>
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<td>Little truck</td>
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<td></td>
<td>Little people</td>
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<tr>
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<td>Cargo</td>
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</tbody>
</table>

1) Horse in castle
2) Knight in castle
3) Flag on castle
4) Mail in mailbox
5) Shape in mailbox
6) In cargo of dumptruck
   a) Horses
   b) Knight
   c) Mail
   d) Blue shapes
   e) Wooden blocks
   f) Cargo
   g) Little People
7) In dumper of big truck
   a) Horses
   b) Knight
   c) Mail
   d) Blue shapes
   e) Wooden blocks
   f) Cargo
   g) Little people
8) Extend cup to
   a) Horse
   b) Knight
   c) Elmo
   d) Turtle
   e) Little people
### Appendix T

### Edward’s Play Activities

<table>
<thead>
<tr>
<th>Toy Set One: EDWARD</th>
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<tbody>
<tr>
<td>● 4 balls</td>
<td>●</td>
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<tr>
<td>● Ball Holder</td>
<td>●</td>
</tr>
<tr>
<td>● 1 egg</td>
<td>●</td>
</tr>
<tr>
<td>● Small house with chairs</td>
<td>●</td>
</tr>
<tr>
<td>● Swing</td>
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<tr>
<td>● Little person (blue)</td>
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<tr>
<td>● Letter blocks</td>
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</tr>
<tr>
<td>● Boat</td>
<td>●</td>
</tr>
<tr>
<td>● Peg board</td>
<td>●</td>
</tr>
<tr>
<td>● Mr. Potato Head Pipes and cargo</td>
<td>●</td>
</tr>
<tr>
<td>● Tooth brush and Towel</td>
<td>●</td>
</tr>
<tr>
<td>● Little bottle of shampoo</td>
<td>●</td>
</tr>
</tbody>
</table>

1) Person in:
- House
- Boat
- Chair
- Swing

2) Put ball or egg into ball holder

3) Stack letter blocks

4) Insert Potato Head pieces into Mr. Potato Head

5) Extend toothbrush to:
- Little person or Mr. Potato Head
- Brother, mother, or father

6) Extend toothbrush to:
- House
- Chair
- Balls or Ball Holder
- Swing
- Letter blocks
- Boat
- Pegboard
- Egg

7) Extend towel to:
- Little person
- Mr. Potato Head
- Brother, mother, or father

8) Extend towel to:
- House
- Chair
- Balls or Ball Holder
- Swing
- Letter blocks
- Boat
- Pegboard
- Egg

10) Extend little bottle of shampoo to:
- Little person
- Mr. Potato Head
- Brother, mother, or father

11) Extend little bottle of shampoo to:
- House
- Chair
- Balls or Ball Holder
- Swing
- Letter blocks
- Boat
- Pegboard
- Egg

12) Extend little bottle of shampoo to:
- Toothbrush
- Towel

13) Insert small object into egg

14) Extend egg to:
- Little person
- Mr. Potato Head
- Brother, mother, or father
**Toy Set Two: EDWARD**

<table>
<thead>
<tr>
<th>Top left</th>
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<tbody>
<tr>
<td>Sesame street house</td>
<td>Two cars</td>
</tr>
<tr>
<td>Digger truck</td>
<td>One bead</td>
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<tr>
<td>Sesame street cup</td>
<td>Bob the Builder</td>
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<tr>
<td>Garbage Truck</td>
<td>Construction Worker</td>
</tr>
<tr>
<td>Driver</td>
<td>Puzzle Shape sorter</td>
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<tr>
<td>Duplo blocks</td>
<td>Toothbrush and Towel</td>
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</tbody>
</table>

**CONDUCT A PROBE SESSION WITH THIS PLAY SET (i.e., baseline session)**

**DO NOT PROVIDE DIRECT INSTRUCTION IN PLAY WITH THESE TOYS**
<table>
<thead>
<tr>
<th>Toy Set Three: EDWARD</th>
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<tbody>
<tr>
<td>• Apple with worm</td>
<td>• Mega blocks</td>
</tr>
<tr>
<td>• Truck with carrier</td>
<td>• Veggies and Veggie basket</td>
</tr>
<tr>
<td>• Interlocking rings</td>
<td>• Finger puppets Towel</td>
</tr>
<tr>
<td>• Bumpy dump truck</td>
<td>• Little bar of soap</td>
</tr>
<tr>
<td>• Construction worker</td>
<td>• Toothbrush</td>
</tr>
</tbody>
</table>

1) Put construction worker into driver’s seat of truck
2) Put into truck:
   • Rings
   • Mega blocks
   • Veggies
   • Apple
3) Feed apple to:
   • construction worker
   • finger puppet
   • mother, brother, or father
4) Put veggies into veggie basket
5) Feed veggies to:
   • construction worker
   • finger puppet
   • mother, brother, or father
6) Extend towel to:
   • construction worker
   • finger puppet
   • mother, brother, or father
7) Extend towel to:
   • Rings
   • Mega blocks
   • Veggies
   • Veggie basket
   • Apple
8) Extend toothbrush to:
   • construction worker
   • finger puppet
   • mother, brother, or father
9) Extend toothbrush to:
   • Rings
   • Mega blocks
   • Veggies
   • Veggie basket
   • Apple
10) Extend bar of soap to:
11) Extend bar of soap to:
12) Extend bar of soap to:
13) Stack megablocks
14) Interlock rings
Toy Set Four: EDWARD

- Trains
- Train cars
- Train Cargo
- Train tracks
- Mega Blocks
- Threading animals with string
- Magnetic balls and sticks
- Picture blocks
- Little People
- Fruit
- Fruit Basket
- 2 wooden figures
- Towel and Toothbrush
- Dish soap

1) Connect train cars
2) Place train on track
3) Push train on track
4) Put cargo into train
5) Stack mega blocks
6) Thread string into animal threading board
7) Connect magnetic sticks and balls
8) Stack picture blocks
9) Extend fruit to:
   - Little people
   - Two wooden figures
   - Mother, brother, or father
10) Place fruit into fruit basket
11) Extend dish soap to:
    - Fruit
    - Fruit basket
    - Towel
    - Toothbrush
    - Animal
    - Trains
    - Train cargo
    - Train tracks
    - Mega blocks
    - Animal threading board
    - Magnetic balls and sticks
    - Picture blocks
12) Extend dish soap to:
    - Little people
    - Two wooden figures
    - Mother, brother, or father
13) Extend dish soap to:
    - Toothbrush
    - Towel
14) Extend toothbrush to:
    - Fruit
    - Fruit basket
    - Towel
    - Toothbrush
    - Animal
    - Trains
    - Train cargo
    - Train tracks
    - Mega blocks
    - Animal threading board
    - Magnetic balls and sticks
    - Picture blocks
15) Extend towel to:
    - Little people
    - Two wooden figures
    - Mother, brother, or father
16) Extend towel to:
    - Fruit
    - Fruit basket
    - Towel
    - Toothbrush
    - Animal
    - Trains
    - Train cargo
    - Train tracks
    - Mega blocks
    - Animal threading board
    - Magnetic balls and sticks
    - Picture blocks
Appendix U

Vincenzo’s Play Activities

**Toy Set One: VINCENZO**

<table>
<thead>
<tr>
<th>Items</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mega Blocks ®</td>
<td>• Cloth blocks</td>
</tr>
<tr>
<td>• Mega Blocks ® Pirate Ship</td>
<td>• Interlocking rings</td>
</tr>
<tr>
<td>• Mega Blocks ®Pirate</td>
<td>• Digger truck</td>
</tr>
<tr>
<td>• Top of Pirate Ship</td>
<td>• Cement Truck</td>
</tr>
<tr>
<td>• Screws and nuts</td>
<td>• Little Yellow Buses Weebles ®</td>
</tr>
<tr>
<td></td>
<td>• Plastic bucket</td>
</tr>
</tbody>
</table>

1) Connect/stack Mega Blocks ®
2) Stack Mega Blocks ® onto pirate ship
3) Stack pirate on:
   • Mega Blocks ®
   • Megablock pirate ship
   • Top of megablock pirate ship
4) Stack top of pirate ship on pirate ship
5) Attach nut on screw
6) Stack cloth blocks
7) Interlock rings
8) Putting into the pirate ship
   • Weebles ®
   • Interlocking rings
9) Putting onto the cloth block
   • Megablock
   • Megablock pirate
   • Top of pirate ship
   • Screw or nut
   • Ring
   • Little yellow bus
10) Putting objects into the plastic bucket
    • Mega Blocks ®
    • Little yellow buses
    • Mega Blocks (r) Pirate
    • Screws
    • Nuts
    • Interlocking rings
    • Weebles ®
11) Putting objects into the digger of the truck
    • Mega Blocks ®
    • Little yellow buses
    • Mega Blocks (r) Pirate
    • Screws
    • Nuts
    • Interlocking rings
    • Weebles ®
12) Putting objects onto the bucket
    • Megablock
    • Megablock pirate
    • Top of pirate ship
    • Screw or nut
    • Ring
    • Little yellow bus
13) Putting objects onto the bucket
    • Megablock
    • Megablock pirate
    • Top of pirate ship
    • Screw or nut
    • Ring
    • Little yellow bus
<table>
<thead>
<tr>
<th>Toy Set Two: VINCENZO</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Train tracks</td>
</tr>
<tr>
<td>• Dump truck</td>
</tr>
<tr>
<td>• Pop beads</td>
</tr>
<tr>
<td>• Chunky stacking platforms</td>
</tr>
<tr>
<td>• Pink castle bucket</td>
</tr>
<tr>
<td>• Beads</td>
</tr>
<tr>
<td>• Colored balls</td>
</tr>
<tr>
<td>• Nesting cups</td>
</tr>
</tbody>
</table>

1) Connect train tracks
2) Connect pop beads
3) Stack chunky stacking platforms
4) Put objects into the pink castle bucket
   • Train tracks
   • Pop beads
   • Chunky stacking platforms
   • Beads
   • Balls
   • Nesting cups
5) Put objects into the dump truck
   • Train tracks
   • Pop beads
   • Chunky stacking platforms
   • Pink castle bucket
   • Beads
   • Balls
   • Nesting cups
6) Put objects into the nesting cups
   • Train tracks
   • Pop beads
   • Beads
   • Colored balls
7) Stack on the chunky stacking platforms
   • Train tracks
   • Pop beads
   • Pink castle bucket
   • Beads
   • Colored balls
   • Nesting cups
8) Stack nesting cups
9) Stack on the nesting cups
   • Train tracks
   • Pop beads
   • Pink castle bucket
   • Beads
   • Colored balls
   • Chunk stacking platforms
10) Nest nesting cups
Toy Set Three: VINCENZO

- Potato Head
- Fish bowl
- Clams and fish
- Shape sorter that makes noise
- Shapes for shape sorter
- Puzzle pieces

- Puzzle piece in puzzle board
- Blue cup
- Blue pail
- Small dump truck
- Balls Small wooden blocks

1) Put pieces into Mr. Potato Head
2) Put clams and fish into the fish bowl
3) Put shapes into the shape sorter
4) Put puzzle pieces into the puzzle board
5) Put into the fish bowl:
   - Mr. Potato head pieces
   - Shapes from the shape sorter
   - Puzzle pieces
   - Blue cup
   - Blue pail
   - Small dump truck
   - Balls
   - Wooden blocks

6) Stack on the shape sorter:
   - Potato head
   - Fish bowl
   - Clams and fish
   - Puzzle pieces
   - Puzzle board
   - Blue cup
   - Blue pail
   - Dump truck
   - Wooden blocks

7) Put into blue cup:
   - Mr. Potato head pieces
   - Shapes from the shape sorter
   - Puzzle pieces
   - Blue cup
   - Small dump truck
   - Balls
   - Wooden blocks

8) Put into blue pail:
   - Mr. Potato head pieces
   - Shapes from the shape sorter
   - Puzzle pieces
   - Blue cup
   - Small dump truck
   - Balls
   - Wooden blocks

9) Stack blue cup on blue pail
10) Stack wooden blocks
11) Put into dumper of dump truck
    - Potato head pieces
    - Clams and fish
    - Puzzle pieces
    - Blue cup
    - Blue pail
    - Wooden blocks
<table>
<thead>
<tr>
<th>Toy Set Four</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden box</td>
<td>People</td>
</tr>
<tr>
<td>Garden tools</td>
<td>Ferris wheel</td>
</tr>
<tr>
<td>Lacing beads</td>
<td>Duplo blocks</td>
</tr>
<tr>
<td>Egg and Egg carton</td>
<td>Wooden blocks</td>
</tr>
</tbody>
</table>

DO NOT TEACH PLAY ACTIVITIES WITH THIS TOYSET!

PROBE (i.e., baseline) SESSION
Appendix V

**Brent’s Play Activities**

<table>
<thead>
<tr>
<th>Toy Set One: BRENT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Three Little People Cars</td>
<td>• Baby Jaguar</td>
</tr>
<tr>
<td>• Pull and Latch Car Carrier</td>
<td>• Mega blocks</td>
</tr>
<tr>
<td>• Diego Back pack</td>
<td>• Helicopter</td>
</tr>
<tr>
<td>• Diego viewer</td>
<td>• Little People Construction Site with ramp</td>
</tr>
<tr>
<td>• Four matchbox cars</td>
<td>• Two stacking platforms</td>
</tr>
<tr>
<td>• Plastic Solo ®cups</td>
<td>• Four Plastic spoons</td>
</tr>
<tr>
<td>• Blue elephant</td>
<td>• Little towel</td>
</tr>
<tr>
<td>• Sea creature puzzle</td>
<td>• Toothbrush</td>
</tr>
<tr>
<td>• Bug puzzle</td>
<td>• Baby jaguar</td>
</tr>
<tr>
<td>• Bumpy blocks and base</td>
<td>• Sea creature puzzle pieces</td>
</tr>
<tr>
<td></td>
<td>• Blue elephant</td>
</tr>
<tr>
<td></td>
<td>• Little people</td>
</tr>
</tbody>
</table>

1) Scoop spoon into cup
2) Extend spoon to:
   • Adult’s mouth
   • Baby jaguar’s mouth
   • Blue elephant’s mouth
   • Little people’s mouth
   • Sea creature puzzle pieces
   • Mouth on Diego’s backpack
3) Extend cup to:
   • Adult’s mouth
   • Little people’s mouth
   • Blue elephant’s mouth
   • Baby jaguar’s mouth
   • Sea creature or bug puzzle pieces
   • Mouth on Diego’s backpack
4) Put little people in:
   • A car
   • A helicopter
5) Put car and helicopter onto car carrier
6) Wash with towel:
   • Car or Helicopter
   • Baby jaguar
   • Blue elephant
   • Diego’s backpack
   • Spoons and cup
   • Construction site and blocks
   • Sea creature puzzle pieces
   • Baby jaguar’s food dish
7) Eat from baby jaguar’s food bowl
   • Baby jaguar
   • Sea creature puzzle pieces
   • Blue elephant
   • Little people
8) Take a drink from baby jaguar’s water bowl
   • Baby jaguar
   • Sea creature puzzle pieces
   • Blue elephant
   • Little people
9) Brush teeth
   • Blue elephant
   • Baby jaguar
   • Little people
   • Diego’s backpack
   • Sea creature puzzle pieces
   • Bug puzzle pieces
10) Use toothbrush to brush objects
    • Car or Helicopter
    • Diego’s backpack
    • Spoons and cup
    • Construction site and blocks
    • Sea creature puzzle pieces
    • Baby jaguar’s food dish
11) Put legos onto car carrier
12) Driving cars on tracks of the construction site ramp
### Toy Set Two: BRENT

<table>
<thead>
<tr>
<th>Category</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dump truck</td>
<td>Tool carrier</td>
</tr>
<tr>
<td>Batman car</td>
<td>6 screws</td>
</tr>
<tr>
<td>Mr. Potato head</td>
<td>Drill</td>
</tr>
<tr>
<td>Shape sorter with shapes</td>
<td>Hammer</td>
</tr>
<tr>
<td>Four little legos</td>
<td>Board with cogs</td>
</tr>
<tr>
<td>Super hero little people</td>
<td>DW Doll</td>
</tr>
<tr>
<td>Brush</td>
<td>Bottle of shampoo</td>
</tr>
<tr>
<td>Bar of soap</td>
<td>Towel</td>
</tr>
</tbody>
</table>

1) Wash with shampoo
   - Mr. Potato head
   - DW doll
   - Super hero little people

2) Using shampoo bottle to wash objects
   - Dump truck
   - Batman car
   - Shape sorter
   - Legos
   - Tool carrier
   - Tools
   - Screws
   - Board with cogs

3) Wash with bar of soap
   - Mr. Potato head
   - DW doll
   - Super hero little people

4) Using bar of soap to wash objects
   - Dump truck
   - Batman car
   - Shape sorter
   - Legos
   - Tool carrier
   - Tools
   - Screws

5) Brush
   - Mr. Potato head
   - DW doll
   - Super hero little people

6) Using brush to brush objects
   - Dump truck
   - Batman car
   - Shape sorter
   - Legos
   - Tool carrier
   - Tools and screws
   - Board with cogs

7) Extend tools to dump truck to fix:
   - dump truck
   - cars
   - board with cogs

9) Insert hammer or drills into screws
10) Extend tools to legos to fix legos

11) Pretend to rub soap onto:
    - Towel
    - Toothbrush

12) Pretend to pour shampoo onto:
    - Towel
    - Toothbrush

13) Superheroes in vehicles
    - Dumptruck
    - Cars

14) Putting people and objects in the dumper of a dump truck
    - Legos
    - Little people
    - Tools
    - Screws
    - Cogs from cogboard
    - Towel
    - Bar of soap
    - Toothbrush
    - Bottle of shampoo
    - Little cars
| Toy Set Three: BRENT |
|-------------------|-------------------|
| • Cube base       | • Little People   |
| • Cubes           | • Tonka dump truck|
| • Mega blocks     | • Driver          |
| • Ferris Wheel    | • Fake food       |
| • ATM with money  | • Chicken with ball|
| • Teddy bear      | • Cake bowl with cover|
| • Little yellow plate | • Interlocking green cups |
| • Little yellow cup | • Nesting cups    |
| • Hammer and tools| • Dish Detergent Bottle|
| • Towel and toothbrush |                    |

1) Put money in the ATM machine
2) Extend tool to:
   • ATM machine
   • Cube
   • Ferris Wheel
   • Dump truck
   • Cake bowl
   • Cups
   • Mega blocks
3) Insert Little People into Ferris Wheel
4) Place Little people onto cube base for a ride
5) Place cup onto the plate
6) Scoop spoon into the cup
7) Extend spoon to:
   • Teddy bear
   • Little People
   • Chicken
   • Other people
8) Extend cup to:
   • Teddy bear
   • Little People
   • Chicken
   • Other people
9) Put fake food on/in:
   • Nesting cups
   • Yellow plate
   • Yellow cup
   • Cake bowl
   • Frying pan
   • Dump truck
10) Put dish detergent on towel or toothbrush
11) Use knife, spoon, fork, or tool to cut fake food
12) Use towel to wash:
    • Cubes and Cube base
    • Ferris wheel
    • Atm and Money
    • Teddy bear
    • Plate, Cup, Knife, Spoon, and Fork
    • Tools
    • Little people
    • Dump truck
    • Food
    • Chicken
    • Cake bowl
    • Interlocking green cups
13) Use toothbrush to wash:
    • Cubes and Cube base
    • Ferris wheel
    • Atm and Money
    • Teddy bear
    • Plate
    • Cup
    • Tools
    • Little people
    • Dump truck
    • Food
    • Chicken
    • Cake bowl
    • Interlocking green cups
14) Extend fake food to:
    • Teddy bear
    • Little People
    • Chicken
    • Other people
<table>
<thead>
<tr>
<th>Toy Set Four</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Barn door with cow</td>
<td>• Two balls</td>
</tr>
<tr>
<td>• Veggie shapes</td>
<td>• Ball container</td>
</tr>
<tr>
<td>• Ball</td>
<td>• 7 rings</td>
</tr>
<tr>
<td>• Little People Digger</td>
<td>• Big Screws and nuts</td>
</tr>
<tr>
<td>• Little People dump truck</td>
<td>• Two big eggs</td>
</tr>
<tr>
<td>• Two Little People</td>
<td>• Two little people cars</td>
</tr>
<tr>
<td>• ______________________</td>
<td>• ______________________</td>
</tr>
<tr>
<td>• ______________________</td>
<td>• ______________________</td>
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<tr>
<td>• ______________________</td>
<td>• ______________________</td>
</tr>
</tbody>
</table>

DO NOT TEACH PLAY ACTIVITIES WITH THIS TOYSET!
PROBE (i.e., baseline) SESSION
### Appendix W

#### Travis’ Play Activities

<table>
<thead>
<tr>
<th>Toy Set One: TRAVIS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Three Little People Cars</td>
<td>• Baby Jaguar</td>
</tr>
<tr>
<td>• Pull and Latch Car Carrier</td>
<td>• Mega blocks</td>
</tr>
<tr>
<td>• Diego Back pack</td>
<td>• Helicopter</td>
</tr>
<tr>
<td>• Diego viewer</td>
<td>• Little People Construction Site with ramp</td>
</tr>
<tr>
<td>• Four matchbox cars</td>
<td>• Two stacking platforms</td>
</tr>
<tr>
<td>• Plastic Solo ®cups</td>
<td>• Four Plastic spoons</td>
</tr>
<tr>
<td>• Blue elephant</td>
<td>• Little towel</td>
</tr>
<tr>
<td>• Sea creature puzzle</td>
<td>• Toothbrush</td>
</tr>
<tr>
<td>• Bug puzzle</td>
<td></td>
</tr>
<tr>
<td>• Bumpy blocks and tray table</td>
<td></td>
</tr>
</tbody>
</table>

1) Put spoon into cup
2) Put objects into:
   - Cup
   - Diego backpack
   - Bumpy blocks
3) Put objects onto car carrier
4) Insert puzzle pieces into puzzle
5) Put car and helicopter onto car carrier
6) Cover with towel:
   - Car or Helicopter
   - Baby jaguar
   - Blue elephant
   - Diego’s backpack
   - Spoons and cup
   - Construction site and blocks
   - Sea creature puzzle pieces
   - Baby jaguar’s food dish
7) Stack legos
8) Connect ramps on construction site
9) Drive cars on tracks and ramps of the construction site
10) Put legos onto car carrier
11) Insert middle section of bumpy block to into the base
12) Connect bumpy blocks
13) Stack bumpy blocks onto the base
14) Place blue semi-circles onto bumpy block base
15) Insert shapes into holes in blue semi-circle
16) Place shapes into holes of other blue semi-circle
<table>
<thead>
<tr>
<th>Toy Set Two: TRAVIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dump truck</td>
</tr>
<tr>
<td>• Batman car</td>
</tr>
<tr>
<td>• Mr. Potato head</td>
</tr>
<tr>
<td>• Shape sorter with shapes</td>
</tr>
<tr>
<td>• Four little legos</td>
</tr>
<tr>
<td>• Super hero little people</td>
</tr>
<tr>
<td>• Brush</td>
</tr>
<tr>
<td>• Bar of soap</td>
</tr>
<tr>
<td>• Cloth blocks</td>
</tr>
<tr>
<td>• __________________</td>
</tr>
<tr>
<td>• Tool carrier</td>
</tr>
<tr>
<td>• 6 screws</td>
</tr>
<tr>
<td>• Drill</td>
</tr>
<tr>
<td>• Hammer</td>
</tr>
<tr>
<td>• Board with cogs</td>
</tr>
<tr>
<td>• DW Doll</td>
</tr>
<tr>
<td>• Bottle of shampoo</td>
</tr>
<tr>
<td>• Towel</td>
</tr>
<tr>
<td>• __________________</td>
</tr>
</tbody>
</table>

1) Put driver in dump truck  
2) Put objects in dump truck  
   • Mr. Potato head  
   • DW doll  
   • Super hero little people  
   • Batman car  
   • Shape sorter  
   • Legos  
   • Tool carrier  
   • Tools  
   • Screws  
   • Board with cogs  
   • Toothbrush  
   • Bar of soap  
3) Put cogs onto cogboard  
4) Put shapes into shape sorter  
5) Put objects into shape sorter  
   • Bar of soap  
   • Legos  
   • Screws  
5) Insert body parts into Mr. Potato Head  
6) Putting little people figures into the batman car  
7) Stacking legos  
8) Insert hammer or drills into screws  
9) Placing tools into tool box  
10) Placing objects into the tool box  
   • Mr. Potato head  
   • DW doll  
   • Super hero little people  
   • Batman car  
   • Shape sorter  
   • Legos  
   • Tool carrier  
   • Tools  
   • Screws  
   • Board with cogs  
11) Covering objects with the towel  
12) Stacking cloth blocks  
13) Putting a cloth roof on a cloth block
<table>
<thead>
<tr>
<th>Toy Set Three: TRAVIS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Cube base</td>
<td>- Little People</td>
</tr>
<tr>
<td>- Cubes</td>
<td>- Tonka dump truck</td>
</tr>
<tr>
<td>- Mega blocks</td>
<td>- Driver</td>
</tr>
<tr>
<td>- Ferris Wheel</td>
<td>- Fake food</td>
</tr>
<tr>
<td>- ATM with money</td>
<td>- Chicken with ball</td>
</tr>
<tr>
<td>- Teddy bear</td>
<td>- Cake bowl with cover</td>
</tr>
<tr>
<td>- Little yellow plate</td>
<td>- Interlocking green cups</td>
</tr>
<tr>
<td>- Little yellow cup</td>
<td>- Nesting cups</td>
</tr>
<tr>
<td>- Hammer and tools</td>
<td>- Dish Detergent Bottle</td>
</tr>
<tr>
<td>- Towel and toothbrush</td>
<td></td>
</tr>
</tbody>
</table>

1) Insert coins in the ATM machine  
2) Stack cube on top of the cube base  
3) Insert cubes into the holes in the cube base  
4) Insert objects into the holes of the cube base
   - Cups  
   - Mega blocks  
   - ATM money  
   - Little People  
   - Fake food  
5) Insert ball into chicken  
6) Place objects into the cake bowl  
7) Insert Little People into Ferris Wheel  
8) Interlock green cups  
9) Connect the Velcro fruit  
10) Put objects into cup  
11) Put fake food on/in:
    - Nesting cups  
    - Yellow plate  
    - Yellow cup  
    - Cake bowl  
    - Frying pan  
    - Dump truck  
12) Use object to cut fake food  
13) Put driver into dump truck  
14) Use towel to cover:
    - Cubes and Cube base  
    - Ferris wheel  
    - ATM and Money  
    - Teddy bear  
    - Plate, Cup, Knife, Spoon, and Fork  
    - Tools  
    - Little people  
    - Dump truck  
    - Food  
    - Chicken  
    - Cake bowl  
    - Interlocking green cups  
15) Put objects into the dumper of the dump truck
    - Cups  
    - Mega blocks  
    - ATM money  
    - Little People  
    - Fake food
<table>
<thead>
<tr>
<th>Toy Set Four: TRAVIS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Barn door with cow</td>
<td>• Two balls</td>
<td></td>
</tr>
<tr>
<td>• Veggie shapes</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>• Little People dump truck</td>
<td>• Two big eggs</td>
<td></td>
</tr>
<tr>
<td>• Two Little People</td>
<td>• Two little people cars</td>
<td></td>
</tr>
<tr>
<td>• __________________</td>
<td>• __________________</td>
<td></td>
</tr>
<tr>
<td>• __________________</td>
<td>• __________________</td>
<td></td>
</tr>
</tbody>
</table>

**DO NOT TEACH PLAY ACTIVITIES WITH THIS TOYSET!**

**PROBE (i.e., baseline) SESSION**
Table 1

*Play Assessments in which Play is regarded as a Developmental Domain*

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Reliability Reported</th>
<th>Validity Reported</th>
<th>Age Range</th>
<th>Type of Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental Play Assessment (DPA; Lifter, 2000)</td>
<td>Lifer, Ellis, Cannon, &amp; Anderson (2005)</td>
<td>None reported</td>
<td>8-60 months</td>
<td>15 categories</td>
</tr>
<tr>
<td>Play Assessment Scale (Fewell, 1986)</td>
<td>Stone &amp; Yoder (2001)</td>
<td>Finn &amp; Fewell (1994)</td>
<td>2-36 months</td>
<td>Manipulation of toys in a sensory, functional, or symbolic manner; Focused on more cognitive aspects of play</td>
</tr>
<tr>
<td>Play in Early Childhood Evaluation System (Kelly-Vance and Ryalls, 2005)</td>
<td>Kelly-Vance &amp; Ryalls (2005)</td>
<td>None reported</td>
<td>19-46 months</td>
<td>13 exploratory and pretend play behaviors</td>
</tr>
<tr>
<td>Test of Pretend Play (ToPP; Lewis &amp; Boucher, 1997)</td>
<td>None reported</td>
<td>Clift, Stagnitti &amp; DeMello (1998)</td>
<td>36 months and older (verbal assessment)</td>
<td>Symbolic play (1. Substituting object for another object/person; 2. attributing imagined property to object/ person; 3. making reference to absent object/ person/ substance; Pretend play</td>
</tr>
<tr>
<td>Westby Symbolic Play Scale (Westby, 2000)</td>
<td>None reported</td>
<td>None reported</td>
<td>9-60 months</td>
<td>Considers cultural and environmental factors that affect type and themes of symbolic play</td>
</tr>
</tbody>
</table>
Table 2

*In Vivo and Video Modeling Approaches in Play Interventions for Children with ASD*

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Sample Size</th>
<th>Participant Age in Years</th>
<th>Intervention Focus</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Play interventions with in vivo modeling</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goldstein &amp; Cisar (1992)</td>
<td>3 children with ASD and 6 children without ASD</td>
<td>3-5</td>
<td>Sociodramatic play and increased social interactions</td>
<td>Increases in theme-related social behavior during play</td>
</tr>
<tr>
<td>Jahr, Eldevik, &amp; Eikeseth (2000)</td>
<td>6 children with ASD</td>
<td>4-12</td>
<td>Investigated acquisition, transfer, and maintenance of cooperative play</td>
<td>Following training with verbal description, children initiated and sustained play with parents, engaged in longer periods of turn-taking, showed varied play, and transferred skills across partners, settings, and time</td>
</tr>
<tr>
<td>Tryon &amp; Keane (1986)</td>
<td>3 children with ASD</td>
<td>4.0-4.7</td>
<td>Manipulative play skills</td>
<td>Increased frequency of imitative play and decreased frequency of self-stimulatory behavior</td>
</tr>
<tr>
<td><strong>Play interventions with video modeling</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dauphin, Kinney, &amp; Stromer (2004)</td>
<td>1 child with ASD</td>
<td>3</td>
<td>Social skills in play</td>
<td>Increased scripted play and unmodeled play with teacher prompting</td>
</tr>
<tr>
<td>Kleeberger &amp; Mirenda (2010)</td>
<td></td>
<td>4</td>
<td>Singing songs and toy play activities</td>
<td>Generalized imitation to actions not previously mastered</td>
</tr>
<tr>
<td>Macdonald, Sacramone, Mansfield, Wiltz, &amp; Ahearn (2009)</td>
<td>2</td>
<td>5-7</td>
<td>Engage in reciprocal pretend play with peers</td>
<td>Acquired and maintained extended scripted play and verbalizations, unscripted verbalizations, reciprocal verbal interactions, and cooperative play</td>
</tr>
<tr>
<td>Paterson &amp; Arco (2007)</td>
<td>2</td>
<td>6-7</td>
<td>Verbal and motor aspects of play</td>
<td>Increases in appropriate play with associated generalization and decreases in repetitive play</td>
</tr>
<tr>
<td>Reagon, Higbee, &amp; Endicott (2006)</td>
<td></td>
<td>4</td>
<td>Social and play behaviors</td>
<td>Increased unscripted play with no additional prompting or reinforcement</td>
</tr>
<tr>
<td>Taylor, Levin, &amp; Jasper, (1999)</td>
<td>2</td>
<td>6</td>
<td>Play comments with siblings</td>
<td>Significant increase in scripted comments but no effects with unscripted comments</td>
</tr>
</tbody>
</table>
### Table 3

**Intervention Studies that Involve Direct Teaching to Support Developments in Play**

<table>
<thead>
<tr>
<th>Study</th>
<th>Children</th>
<th>Intervention Approach</th>
<th>Play Targets</th>
<th>Source of Play Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>DiCarlo &amp; Reid (2004)</td>
<td>5 children with disabilities (aged 26-30 months)</td>
<td>Pretend play</td>
<td>Staff report and prebaseline play observations suggesting pretend play</td>
<td>frequencies below peers (for baseline/inclusion)</td>
</tr>
<tr>
<td>Lifter et al. (1993)</td>
<td>3 preschoolers with autism</td>
<td>Child-as Agent, Doll-as-Agent</td>
<td>Developmental Play Assessment (DPA; Lifter, 2000)</td>
<td></td>
</tr>
<tr>
<td>Lifter et al. (2005)</td>
<td>3 preschoolers with autism</td>
<td>Pretend self, Specific Physical, Child-as-Agent, Specific Conventional</td>
<td>Developmental Play Assessment (DPA; Lifter, 2000)</td>
<td></td>
</tr>
<tr>
<td>Lifter et al. (2011)</td>
<td>2 preschoolers with autism</td>
<td>Child-as Agent, Specific Conventional, Single scheme sequences, Multischeme sequences</td>
<td>Developmental Play Assessment (DPA; Lifter, 2000)</td>
<td></td>
</tr>
<tr>
<td>MacDonald, Clark, Garrigan, &amp; Vangala (2005)</td>
<td>2 boys with pervasive developmental delays/autism (aged 4-7 years)</td>
<td>Pretend play</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>Rogers et al. (1986)</td>
<td>26 children with autism, pervasive developmental disorders, or other diagnoses (mean age 48 months)</td>
<td>Symbolic play</td>
<td>Play Observation Scale (Rogers et al., 1986) (to determine developmental level and target)</td>
<td></td>
</tr>
<tr>
<td>Sherratt (2002)</td>
<td>5 children with autism and learning difficulties (aged 5-6 years)</td>
<td>Symbolic play (i.e., object substitution, attribution, reappearance/disappearance)</td>
<td>Test of Pretend Play (ToPP; Lewis &amp; Boucher, 1997); Symbolic Play Test (SPT; Lowe &amp; Costello, 1988) (to determine developmental level)</td>
<td></td>
</tr>
<tr>
<td>Stahmer (1995)</td>
<td>7 children with autism (aged 4-7 years)</td>
<td>Symbolic play</td>
<td>Peabody Picture Vocabulary Test—Revised (PPRT)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Expressive One-Word Picture</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Participants</td>
<td>Setting</td>
<td>Measures</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------------------</td>
<td>------------------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Thorp et al. (1995)</td>
<td>3 boys with autism (aged 7-9 years)</td>
<td>Sociodramatic play</td>
<td>Vocabulary Test—Revised (EOWPRT), MacArthur Communicative Development Inventory (CDI) (for inclusion, because of correlation between language and play skills)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Play History Interview (Rogers et al., 1986) (for baseline)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 4

**Caregiver-Training Intervention Studies Designed for Young Children with ASD**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Participants</th>
<th>Focus of Intervention</th>
<th>Research Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charlop-Christy &amp; Carpenter (2000)</td>
<td>3 boys, Age: 6-9 years, 3 parents</td>
<td>Examine efficacy and use of modified incidental teaching sessions (MITS) and compare MITS, incidental teaching, and discrete trial</td>
<td>Alternating treatments design comparing 3 treatment conditions; multiple baseline design across children</td>
</tr>
<tr>
<td>Drew, Baird, Baron-Cohen, Cox, Slonims, Wheelwright, et al. (2002)</td>
<td>Parent-training group (11 boys, 1 girl), Local services group (8 boys, 4 girls), Parents (including fathers)</td>
<td>Compare parent training intervention focusing on joint attention and joint engagement with locally available services only</td>
<td>Randomized control trial</td>
</tr>
<tr>
<td>Elder, Valcante, Yarandi, White, &amp; Elder (2005)</td>
<td>4 boys, 4 girls, Age: 24 to 84 months, Mean age: 56.7 months, 18 fathers</td>
<td>Evaluate effects of an in-home training program on fathers of children with ASD</td>
<td>Single-subject design to evaluate intervention component effects in individual participants; Group analysis to assess external validity</td>
</tr>
<tr>
<td>Ingersoll &amp; Gergans (2007)</td>
<td>2 boys, 1 girl, Age: 31-42 months, 3 mothers</td>
<td>Assess effectiveness of parent-implemented reciprocal imitation training (RIT)</td>
<td>Single-subject, multiple-baseline design across participants and behaviors</td>
</tr>
<tr>
<td>Jones, Carr, &amp; Feeley (2006)</td>
<td>2 boys, Age: 2 years 2 months; 3 years, 3 parents (2 mothers, 1 father)</td>
<td>Extend joint attention skills taught by teachers to children’s interactions with parents</td>
<td>Clinical extension of skills already acquired</td>
</tr>
<tr>
<td>Kaiser, Hancock, &amp; Nietfeld (2000)</td>
<td>6 boys, Age: 2.5-5 years, Mean age: 42 months, 6 mothers</td>
<td>Examine effects of parent-implemented enhanced milieu teaching (EMT) on social communication skills</td>
<td>Single-subject, multiple-baseline design across parent-child dyads</td>
</tr>
<tr>
<td>Kashinath, Woods, &amp; Goldstein (2006)</td>
<td>4 boys, 1 girl, Age: 2-6 years, 5 mothers</td>
<td>Examine effects of facilitating generalized use of teaching strategies by parents of children with ASD within daily routines</td>
<td>Multiple-baseline design across teaching strategies</td>
</tr>
<tr>
<td>Mahoney &amp; Perales (2003)</td>
<td>12 boys, 8 girls, Mean age: 32 months, 20 mothers</td>
<td>Investigate effectiveness of relationship-focused intervention on social and emotional well-being of children with ASD</td>
<td>Pretest/posttest without control group</td>
</tr>
<tr>
<td>Moes &amp; Frey (2002)</td>
<td>2 boys, 1 girl, Age: 3 years, 3 mothers</td>
<td>Evaluate contextualized functional communication training (FCT) in family routines</td>
<td>Multiple-baseline design across participants</td>
</tr>
<tr>
<td>Study</td>
<td>Participants</td>
<td>Design</td>
<td>Interventions</td>
</tr>
<tr>
<td>-------</td>
<td>--------------</td>
<td>--------</td>
<td>---------------</td>
</tr>
<tr>
<td>Rogers, Hayden, Hepburn, Charlifue-Smith, Hall, &amp; Hayes (2006)</td>
<td>10 boys (5 in each condition) Age: 20-65 months</td>
<td>10 parents and trainers</td>
<td>Examine 2 models of intervention for speech development</td>
</tr>
<tr>
<td>Seung, Ashwell, Elder, &amp; Valcante (2006)</td>
<td>6 boys, 2 girls Age: 4-7 years</td>
<td>8 fathers</td>
<td>Examine efficacy of in-home father training on verbal communicative outcomes</td>
</tr>
<tr>
<td>Symon (2005)</td>
<td>3 boys Age: 2-5 years</td>
<td>3 mothers (primary caregivers) 1 father (significant caregiver) 2 service providers (significant caregivers)</td>
<td>Evaluate generalized effects of an intensive parent education program</td>
</tr>
</tbody>
</table>
Table 5

Overview of Participating Children

<table>
<thead>
<tr>
<th>Child</th>
<th>Diagnosis</th>
<th>Age in months at time of diagnosis</th>
<th>At start of study</th>
<th>Enrolled in daycare</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>AD</td>
<td>20</td>
<td>Age: 32, # of Weekly ABA Service Hours: 24</td>
<td>No</td>
</tr>
<tr>
<td>Edward</td>
<td>AD</td>
<td>30</td>
<td>Age: 32, # of Weekly ABA Service Hours: 15</td>
<td>No</td>
</tr>
<tr>
<td>Vincenzo</td>
<td>PDD-NOS</td>
<td>18</td>
<td>Age: 23, # of Weekly ABA Service Hours: 0</td>
<td>No</td>
</tr>
<tr>
<td>Brent</td>
<td>PDD-NOS</td>
<td>25</td>
<td>Age: 26, # of Weekly ABA Service Hours: 6</td>
<td>No</td>
</tr>
<tr>
<td>Travis</td>
<td>PDD-NOS</td>
<td>20</td>
<td>Age: 26, # of Weekly ABA Service Hours: 4</td>
<td>No</td>
</tr>
</tbody>
</table>

Note. All names and personal information were de-identified to protect participants’ confidentiality.
Table 6

**Participants' Birthing and Medical History**

<table>
<thead>
<tr>
<th>Child</th>
<th>Gestational Age in Weeks</th>
<th>Pre- or Perinatal Difficulties</th>
<th>Notable Medical Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>40</td>
<td>None Reported</td>
<td>Gluten, Caesin, and Daily free Diet</td>
</tr>
<tr>
<td>Edward</td>
<td>37</td>
<td>None Reported</td>
<td>None Reported</td>
</tr>
<tr>
<td>Vincenzo</td>
<td>42</td>
<td>None Reported</td>
<td>None Reported</td>
</tr>
<tr>
<td>Brent</td>
<td>38.6</td>
<td>None Reported</td>
<td>None Reported</td>
</tr>
<tr>
<td>Travis</td>
<td>38.6</td>
<td>None Reported</td>
<td>None Reported</td>
</tr>
</tbody>
</table>
Table 7

*Overview of Participating Caregivers*

<table>
<thead>
<tr>
<th>Child</th>
<th>Caregiver who Delivered Intervention</th>
<th>Parent age in years at start of study</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>Mother</td>
<td>33</td>
</tr>
<tr>
<td>Edward</td>
<td>Mother</td>
<td>30</td>
</tr>
<tr>
<td>Vincenzo</td>
<td>Mother</td>
<td>30</td>
</tr>
<tr>
<td>Brent</td>
<td>Mother and Father</td>
<td>32</td>
</tr>
<tr>
<td>Travis</td>
<td>Mother and Father</td>
<td>32</td>
</tr>
</tbody>
</table>
Table 8

Overview of Family Characteristics

<table>
<thead>
<tr>
<th>Child</th>
<th>Primary Caregivers</th>
<th># of Siblings</th>
<th>Primary Residence</th>
<th>Parents Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>Biological Mother and Father</td>
<td>1</td>
<td>Single Family Home</td>
<td>Father</td>
</tr>
<tr>
<td>Edward</td>
<td>Biological Mother and Father</td>
<td>1</td>
<td>Condo</td>
<td>Father</td>
</tr>
<tr>
<td>Vincenzo</td>
<td>Biological Mother and Father</td>
<td>0</td>
<td>Rented Apartment</td>
<td>Both Parents</td>
</tr>
<tr>
<td>Brent</td>
<td>Biological Mother and Father</td>
<td>1</td>
<td>Single Family Home</td>
<td>Both Parents</td>
</tr>
<tr>
<td>Travis</td>
<td>Biological Mother and Father</td>
<td>1</td>
<td>Single Family Home</td>
<td>Both Parents</td>
</tr>
</tbody>
</table>
Table 9

*BDI-2 Scores that Reflect Participants’ Development across Domains at the Time of Study Enrollment*

<table>
<thead>
<tr>
<th>Domain</th>
<th>John(^a)</th>
<th>Edward(^a)</th>
<th>Vincenzo(^b)</th>
<th>Brent(^b)</th>
<th>Travis(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive</td>
<td>80</td>
<td>61</td>
<td>55</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>Personal/Social</td>
<td>73</td>
<td>67</td>
<td>72</td>
<td>76</td>
<td>70</td>
</tr>
<tr>
<td>Communication</td>
<td>61</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>63</td>
</tr>
<tr>
<td>Motor</td>
<td>104</td>
<td>82</td>
<td>90</td>
<td>91</td>
<td>87</td>
</tr>
<tr>
<td>Cognitive</td>
<td>71</td>
<td>71</td>
<td>67</td>
<td>77</td>
<td>84</td>
</tr>
</tbody>
</table>

\(^a\) Scores from the BDI-2 administered by the student researcher

\(^b\) Scores from the initial eligibility evaluation
Table 10

*John’s DPA Performance*

<table>
<thead>
<tr>
<th>Category</th>
<th>Variety</th>
<th>Frequency</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discriminative behaviors on single objects</td>
<td>3</td>
<td>21</td>
<td>M</td>
</tr>
<tr>
<td>Presentation Combinations</td>
<td>6</td>
<td>28</td>
<td>M</td>
</tr>
<tr>
<td><strong>General Combinations</strong></td>
<td>2</td>
<td>4</td>
<td>E</td>
</tr>
<tr>
<td>Pretend Self</td>
<td>1</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td><strong>Specific: Physical (physical relationship btwn objs)</strong></td>
<td>2</td>
<td>5</td>
<td>E</td>
</tr>
<tr>
<td>Child-as-Agent</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Specific: Conventional (conventional relationship btwn objs)</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Single-scheme Sequences</td>
<td>1</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>Substitutions</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Doll-as-Agent</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Multi-scheme Sequences</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Sociodramatic Play</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Fantasy Play</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
</tbody>
</table>
Table 11

Edward’s DPA Performance

<table>
<thead>
<tr>
<th></th>
<th>Variety</th>
<th>Frequency</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discriminative behaviors on single objects</td>
<td>4</td>
<td>30</td>
<td>M</td>
</tr>
<tr>
<td>Presentation Combinations</td>
<td>5</td>
<td>59</td>
<td>M</td>
</tr>
<tr>
<td><strong>General Combinations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretend Self</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td><strong>Specific: Physical (physical relationship btwn objs)</strong></td>
<td>3</td>
<td>16</td>
<td>E</td>
</tr>
<tr>
<td>Child-as-Agent</td>
<td>2</td>
<td>8</td>
<td>E</td>
</tr>
<tr>
<td>Specific: Conventional (conventional relationship btwn objs)</td>
<td>1</td>
<td>35</td>
<td>A</td>
</tr>
<tr>
<td>Single-scheme Sequences</td>
<td>1</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>Substitutions</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Doll-as-Agent</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Multi-scheme Sequences</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Sociodramatic Play</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Fantasy Play</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
</tbody>
</table>
### Vincenzo’s DPA Performance

<table>
<thead>
<tr>
<th>Category</th>
<th>Variety</th>
<th>Frequency</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discriminative behaviors on single objects</td>
<td>8</td>
<td>64</td>
<td>M</td>
</tr>
<tr>
<td><strong>Presentation Combinations</strong></td>
<td>3</td>
<td>32</td>
<td>E</td>
</tr>
<tr>
<td>General Combinations</td>
<td>1</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>Pretend Self</td>
<td>1</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>Specific: Physical (physical relationship btwn objs)</td>
<td>2</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>Child-as-Agent</td>
<td>1</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>Specific: Conventional (conventional relationship btwn objs)</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Single-scheme Sequences</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Substitutions</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Doll-as-Agent</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Multi-scheme Sequences</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Sociodramatic Play</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Fantasy Play</td>
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</table>
### Brent’s DPA Performance

<table>
<thead>
<tr>
<th>Category</th>
<th>Variety</th>
<th>Frequency</th>
<th>Status</th>
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<tbody>
<tr>
<td>Discriminative behaviors on single objects</td>
<td>5</td>
<td>48</td>
<td>M</td>
</tr>
<tr>
<td>Presentation Combinations</td>
<td>1</td>
<td>7</td>
<td>A</td>
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<tr>
<td><strong>General Combinations</strong></td>
<td><strong>2</strong></td>
<td><strong>11</strong></td>
<td><strong>E</strong></td>
</tr>
<tr>
<td>Pretend Self</td>
<td>1</td>
<td>11</td>
<td>A</td>
</tr>
<tr>
<td><strong>Specific: Physical (physical relationship btwn objs)</strong></td>
<td><strong>2</strong></td>
<td><strong>17</strong></td>
<td><strong>E</strong></td>
</tr>
<tr>
<td>Child-as-Agent</td>
<td>6</td>
<td>27</td>
<td>M</td>
</tr>
<tr>
<td><strong>Specific: Conventional (conventional relationship btwn objs)</strong></td>
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<td><strong>24</strong></td>
<td><strong>E</strong></td>
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<tr>
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<td>A</td>
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<tr>
<td>Substitutions</td>
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<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Doll-as-Agent</td>
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<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Multi-scheme Sequences</td>
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<td>A</td>
</tr>
<tr>
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Table 14

*Travis’ DPA Performance*

<table>
<thead>
<tr>
<th>Category</th>
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<tr>
<td>General Combinations</td>
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<td>7</td>
<td>E</td>
</tr>
<tr>
<td>Pretend Self</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Specific: Physical (physical relationship btwn objs)</td>
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<td>47</td>
<td>E</td>
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<tr>
<td>Child-as-Agent</td>
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<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Specific: Conventional (conventional relationship btwn objs)</td>
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<td>8</td>
<td>A</td>
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<tr>
<td>Single-scheme Sequences</td>
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<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Substitutions</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Doll-as-Agent</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Multi-scheme Sequences</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Sociodramatic Play</td>
<td>0</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Fantasy Play</td>
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</table>
Table 15

*Interobserver Agreement of the DPA Administration and Observation of Spontaneous Commenting*

<table>
<thead>
<tr>
<th></th>
<th>John</th>
<th>Edward</th>
<th>Vincenzo</th>
<th>Brent</th>
<th>Travis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documented Play Activities</td>
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<td>.90</td>
<td>.94</td>
<td>.96</td>
<td>.92</td>
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<td>Play Activity Categorization</td>
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<td>.77</td>
<td>.98</td>
<td>.91</td>
<td>.89</td>
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<td>1.0</td>
<td>.96</td>
<td>.93</td>
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<td>1.0</td>
<td>1.0</td>
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<td>1.0</td>
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Table 16

*DPA Play Categories that were targeted for Intervention*

<table>
<thead>
<tr>
<th>Child</th>
<th>Emerging on the DPA</th>
<th>Targeted for Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>General Combination; Specific Physical</td>
<td>Specific Physical; Child-as-Agent; Specific Conventional</td>
</tr>
<tr>
<td>Edward</td>
<td>General Combination; Specific Physical</td>
<td>Specific Physical; Child-As-Agent</td>
</tr>
<tr>
<td></td>
<td>Specific Physical; Child-As-Agent</td>
<td></td>
</tr>
<tr>
<td>Vincenzo</td>
<td>Presentation Combinations</td>
<td>Presentation Combination; General Combination; Specific Physical</td>
</tr>
<tr>
<td>Brent</td>
<td>General Combinations; Specific Conventional</td>
<td>Child-As-Agent; Specific Conventional</td>
</tr>
<tr>
<td>Travis</td>
<td>Presentation Combinations; General Combinations; Specific Physical</td>
<td>General Combination; Specific Physical</td>
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Table 17

*Overview of Completed Sessions and Sessions Designated for Coding*

<table>
<thead>
<tr>
<th></th>
<th>Number of Sessions Conducted</th>
<th>Number of Sessions Coded</th>
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<th></th>
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<td>Maintenance</td>
<td>Total</td>
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<tr>
<td>Edward</td>
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<td>14</td>
<td>0</td>
<td>27</td>
<td>7</td>
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<tr>
<td>John</td>
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<td>14</td>
<td>3</td>
<td>30</td>
<td>8</td>
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<td>Vincenzo</td>
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<td>6</td>
<td>0</td>
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<td>Brent</td>
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<td>18</td>
<td>2</td>
<td>36</td>
<td>9</td>
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<td>Travis</td>
<td>16</td>
<td>18</td>
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Table 18

**Interobserver Agreement across Baseline, Intervention, and Maintenance Sessions**

<table>
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<tr>
<th></th>
<th>Play</th>
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<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>Range</td>
<td>M</td>
<td>SD</td>
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<td>John</td>
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<td>.71-1.0</td>
<td>.94</td>
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<td>.06</td>
<td>.85-1.0</td>
<td>.97</td>
<td>.04</td>
</tr>
<tr>
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<td>.04</td>
<td>.90-1.0</td>
<td>1.0</td>
<td>.01</td>
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<tr>
<td>Brent</td>
<td>.99</td>
<td>.02</td>
<td>.95-1.0</td>
<td>.98</td>
<td>.04</td>
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<tr>
<td>Travis</td>
<td>.94</td>
<td>.04</td>
<td>.90-1.0</td>
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</table>
Table 19

*Number of Recorded Sessions that were Discarded*

<table>
<thead>
<tr>
<th>Child</th>
<th>Baseline</th>
<th>Intervention</th>
<th>Total</th>
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<tbody>
<tr>
<td>John</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Edward</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Vincenzo</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Brent</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Travis</td>
<td>2</td>
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<td>3</td>
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Table 20

*Treatment Fidelity of Caregivers’ Intervention Delivery*

<table>
<thead>
<tr>
<th></th>
<th>Target Play Activities</th>
<th>Reinforcing Activities</th>
<th>Least-to-Most Prompting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>Range</td>
</tr>
<tr>
<td>John</td>
<td>.91</td>
<td>.05</td>
<td>.83-1.0</td>
</tr>
<tr>
<td>Edward</td>
<td>.93</td>
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<td>.82-1.0</td>
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<td>.10</td>
<td>.79-.93</td>
</tr>
<tr>
<td>Brent-Mother</td>
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<td>.02</td>
<td>.95-1.0</td>
</tr>
<tr>
<td>Brent-Father</td>
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<td>.22</td>
<td>.38-1.0</td>
</tr>
<tr>
<td>Travis-Mother</td>
<td>.85</td>
<td>.09</td>
<td>.62-.91</td>
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<tr>
<td>Travis-Father</td>
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<td>.25</td>
<td>.23-1.0</td>
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</tbody>
</table>
Figure 1. Frequency of John’s Spontaneously Occurring Target Play Activities

Note. G = Generalization probe
Figure 2. John’s Performance of Previously Demonstrated and New Play Activity Exemplars

Note. G = Generalization Probe
Figure 3. John’s Total Commenting

Note. G = Generalization Probe
Figure 4. John’s General and Activity-Specific Commenting

Note. G = Generalization Probes.
Figure 5. Frequency of Edward’s Spontaneously Occurring Target Play Activities
Figure 6. Edward’s Performance of Previously Demonstrated and New Play Activity Exemplars
Figure 7. Edward’s Total Commenting

![Graph showing Edward's Total Commenting with Baseline and Intervention phases. The graph plots the number of comments over sessions.](image-url)
Figure 8. Edward’s General and Activity-Specific Commenting
Figure 9. Frequency of Vincenzo’s Spontaneously Occurring Target Play Activities
Figure 10. Vincenzo’s Performance of Previously Demonstrated and New Play Activity Exemplars
Figure 11. Vincenzo’s Total Commenting
Figure 12. Vincenzo’s General and Activity-Specific Commenting
Figure 13. Frequency of Brent’s Spontaneously Occurring Target Play Activities

Note. G = Generalization Probe
Figure 14. Brent’s Performance of Previously Demonstrated and New Play Activity Exemplars

Note. G = Generalization Probe
Figure 15. Brent’s Total Commenting

Note. G = Generalization Probe
Figure 16. Brent’s General and Activity-Specific Commenting

Note. G = Generalization Probe
Figure 17. Frequency of Travis’ Spontaneously Occurring Target Play Activities

Note. G = Generalization Probe
Figure 18. Travis’ Performance of Previously Demonstrated and New Play Activity Exemplars

Note. G = Generalization Probe
Figure 19. Travis’ Total Commenting

Note. G = Generalization Probe
Figure 20. Travis’ General and Activity-Specific Commenting

Note. G = Generalization Probe
Figure 21. Frequency of Spontaneously Occurring Target Play Activities

Note. G = Generalization Probe
Figure 22. Play Activity Exemplars

Note. G = Generalization Probe
Figure 23. Total Commenting

Note. G = Generalization Probe
Figure 24. General and Activity-Specific Commenting

Note. G = Generalization Probe