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Enhancing the social interactions of preschool children with autism: The effectiveness of a peer-mediated intervention

Marjorie Katherine McCalla
University of Alabama at Birmingham

ENHANCING THE SOCIAL INTERACTIONS OF PRESCHOOL CHILDREN WITH AUTISM: THE EFFECTIVENESS OF A PEER-MEDIATED INTERVENTION

by

M. KATHERINE MCCALLA

SYLVIE MRUG, COMMITTEE CHAIR
KAREN DAHLE
SARAH O'KELLEY
STEPHANIE STOLL
LAURA STOPPELBEIN

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ENHANCING THE SOCIAL INTERACTIONS OF PRESCHOOL CHILDREN WITH AUTISM: THE EFFECTIVENESS OF A PEER-MEDIATED INTERVENTION

M. KATHERINE MCCALLA

MEDICAL/CLINICAL PSYCHOLOGY

ABSTRACT

Deficits in social interactions are considered the defining feature of Autism Spectrum Disorders (ASD) and are a powerful predictor of individual outcomes. Although a wide variety of methods for improving social skills in individuals with ASD have been examined, it is still unclear what approaches are most effective. This pilot study evaluated the efficacy of a new manualized social skills intervention package for preschoolers with ASD that integrated methods with demonstrated efficacy (i.e., ABA, peer training, and video modeling). Approximately two thirds of the intervention were delivered during free play in the classroom and on the playground, allowing children to practice their skills in a natural social environment. Nineteen children with ASD were assigned to either the treatment or wait-list control condition. Despite the small sample size and limited power to detect significant group differences, parents reported that children in the treatment group demonstrated significantly fewer social/communication deficits following the intervention compared to those in the control group. Results also revealed that at the 10-week follow-up, children in the treatment group demonstrated more independent play skills. Findings suggest that this intervention may improve social and play skills for preschool children with ASD; however, further research with a larger sample is needed.

Keywords: autism, social skills, intervention, peer-mediation, video modeling

DEDICATION

To John Wittenberg, my first preschooler with autism, and his wonderful family.

You taught me so much.

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INTRODUCTION

Autism Spectrum Disorder (ASD) is a category of complex neurodevelopmental disabilities characterized by profound deficits in social interactions and communication. A recent study conducted by the Centers for Disease Control and Prevention indicated that approximately 1 out of 68 children in the United States exhibits an ASD (CDC, 2014), which is a higher incidence than childhood cancer, diabetes, or Down syndrome. This disorder often has a devastating impact on families and costs our society between $236 and $252 billion annually (Buescher, Cidav, Knapp, & Mandell, 2014). Deficits in social interactions are considered the defining feature of ASD (Carter, Davis, Klin, & Volkmar, 2005; Kanner, 1943; White, Koenig, & Scahill, 2007) and are a powerful predictor of individual outcomes (Strain & Hoyson, 2000). Consequently, early intervention specifically targeting social deficits has the potential to improve long-term outcomes and reduce the societal burden of this disorder. This study will specifically examine the efficacy of a new manualized social skills treatment package for preschool children with ASD. In order to provide a framework for this investigation, the following sections will describe the diagnostic features of ASD, associated social impairments and their impact, theoretical explanations of these social deficits, the importance of early intervention for social skills, and existing empirical evidence for such interventions.

Diagnostic Features of Autism Spectrum Disorders

The current version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) specifies that the diagnosis of an ASD

is characterized by symptoms in two core areas of functioning: reciprocal social communication and restricted, repetitive patterns of behaviors, interests, or activities (APA, 2013). Impairments in the area of social communication and social interactions can be manifested as 1) difficulty with socioemotional reciprocity (e.g. failure to initiate or respond to social interactions, difficulty initiating or sustaining reciprocal conversations, reduced sharing of emotions, lack of imitation), 2) deficits in nonverbal communication used socially (e.g., poor eye contact, difficulty integrating verbal and nonverbal communication, reduced gesture use, impaired joint attention), and 3) difficulty developing, maintaining, and understanding relationships (e.g., reduced or atypical interest in peers, deficits in pretend play, difficulty making friends, difficulty understanding social relationships). The second group of diagnostic features encompasses restricted, repetitive patterns of behaviors and interests. In order to receive a diagnosis of ASD, examples from at least two of the categories below must have been observed or reported. These behaviors vary widely but fit in to four main categories 1) repetitive motor movements, use of objects, or speech (e.g., hand flapping), 2) rigid adherence to routines or ritualized patterns of behavior (e.g., aversion to transitions), 3) restricted interests that are unusually intense or have an unusual focus (e.g., a child preoccupied with ceiling fans), and 4) an unusual interest in or aversion to sensory stimuli (e.g., aversion to touching specific fabrics). Additionally, symptoms must present in early childhood and cause significant impairment in functioning. The results of the most recent prevalence study conducted by the Centers for Disease Control and Prevention (CDC) indicated that the median age of first ASD diagnosis is 53 months; however approximately 89% of children with an ASD had documented developmental concerns by

36 months of age (CDC, 2014). ASD occurs more frequently in males than females (i.e., at a ratio of 4.5:1) and is significantly more commonly diagnosed in Caucasian children than in African American or Hispanic children. Regarding cognitive abilities, 54% of children with ASD either have an intellectual disability (IQ $\leq$ 70) or fall in the borderline range (IQ = 71-85) (CDC, 2014).

Impairments in Social Interactions

The lack of appropriate social behavior is arguably the most differentiating component of ASD (Stella, Mundy, & Tuchman, 1999). For example, social deficits are weighted more heavily than symptoms related to restricted and repetitive behavior under the current diagnostic system (i.e., DSM-5; APA, 2013). Additionally, social abilities are a key element used to distinguish between a diagnosis of ASD and another developmental disability (Klin et al., 2007). Furthermore, differences in social interactions are among the earliest signs used to identify children with ASD (Landa, 2011).

Subtle differences in social behaviors of children with ASD versus typically developing peers begin to appear within the first year of life (Adrian, Lenoir, Martineau, & Perrot, 1993; Maestro et al., 2002; Werner, Dawson, Osterling, & Dinno, 2000; Zwaigenbaum, Bryson, & Garon, 2013). For example, retrospective studies have demonstrated that children with ASD are less likely to use early nonverbal behaviors to direct social interactions (Baranek, 1999), such as being interested in faces by 3 months of age, looking consistently to see if a parent is watching by 9 months, and directing the attention of others using gestures by 12 months. Prospective studies have compared the behavior of younger siblings of children with ASD who go on to have an ASD

themselves to younger siblings who go on to be typically developing. Results indicate that infant siblings who eventually receive an ASD diagnosis demonstrate less showing, shared enjoyment, coordination of sound with gaze, facial expression, and gesture, orienting to name, and eye contact (Bryson et al, 2007; Landa, Holman, & Garrett-Mayer, 2007; Wetherby et al., 2004; Zwaigenbaum et al., 2005; Zwaigenbaum, et al., 2013).

Within the area of social/emotional reciprocity, there are also a variety of differences between the behavior of a child with ASD and that of a typically developing child. For example, by 4 months of age, children later diagnosed with ASD will smile back at others less often than typically developing children (Maestro et al., 2002). Children with ASD are also less likely to demonstrate basic imitation (e.g., mimicking facial expressions, simple actions, or sounds) by 8 months of age or more complex imitation by 18 months of age (Landa, 2011; Nadig et al. 2007). Additionally, they are less likely to turn when their names are called (Baranek, 1999; Osterling, Dawson, & Munson, 2002) or play simple interactive games with caregivers by 12 months. Further discrepancies can be seen regarding peer relationships. Specifically, 9 month old children with ASD do not watch other children or attempt to be in their proximity as frequently as children who are typically developing (Klin, Volkmar, & Sparrow, 1992). Furthermore, between 18 and 24 months of age children with ASD engage in significantly fewer appropriate peer interactions and demonstrate more repetitive play than their peers (Wetherby et al., 2004).

Social deficits in children with ASD become more profound over time, possibly because early social impairments inhibit the gradual development of more complex social

skills. Whereas typically developing children cultivate their social skills through repeated interactions with adults and peers, impairments in social initiation, responsiveness, and communication among children with ASD inhibit what they are able to learn from natural social situations (Kasari & Locke, 2011). Prospective studies have shown that by age 2 children with ASD demonstrate the following social deficits compared to their peers: poor response to name, infrequent initiation of joint attention (e.g., pointing, showing), infrequent direction of play acts towards others, infrequent initiation of social communication, less shared positive affect, less imitation, and a lack of play with a variety of toys (e.g, Charman et al., 1997; Landa, 2011; Wetherby et al., 2004, Zawaigenbaum, et al., 2013). The social symptoms of ASD become even more prominent through the third and fourth years of life (Landa, Holman, & Garrett-Mayer, 2007; Stone et al., 1999); however, there is considerable individual variability in the developmental trajectories of these children. Several prospective longitudinal studies have examined changes in social impairment over time (Charman et al., 2005; Lord et al., 2006; Moss, Magiati, Charman, & Howlin, 2008; Starr, Szatmari, Bryson, & Zwaigenbaum, 2003; Szatmari, Bryson, Boyle, Streiner, & Duku, 2003). Some of these studies report a reduction in social deficits, but others report increased social problems. For example, Charman et al. (2005) found a gradual decline in symptoms related to poor social interactions and an increase in the variability of those scores across ages 2, 3, 4-5, and 7 years. However, the authors indicated that this improvement could be explained by receipt of special education services in the school setting, which was not measured. In contrast, other studies found increases in social deficits based on parent report from ages 2 to 9 (Lord et al., 2006) and from ages 4 to 13 (Szatmari et al., 2003).

Impact of Social Impairments

Early social impairments negatively impact the ability of children with ASD to interact with other children and to develop friendships. Additionally, social skills deficits and the distress they cause may increase with age due to more complex social environments and increased awareness of social challenges (Howlin, Mawhood, & Rutter, 2000; Tantam, 2003; White, et al., 2007). For example, one study demonstrated that high functioning children with ASD in 2nd and 3rd grade were not socially isolated from their peers, but were also not central to the class social structure. Typically, these children were friends with small groups of girls. However, for older elementary school children with ASD (i.e., 4th and 5th grade), fewer reciprocal friendships were identified (Chamberlain, Kasari, & Rotherham-Fuller, 2007). This pattern of increased social isolation seems to become worse with age. One longitudinal study found that fewer than 10% of adolescents and adults with ASD have a reciprocal friendship with a same-age peer. Friendship was defined as choosing to engage in a variety of reciprocal activities together outside of an organized setting. Furthermore, almost 46% of individuals with ASD did not have a reciprocal relationship with a same age peer either inside or outside of organized settings (Orsmond, Krauss, & Seltzer, 2004). Social interactions are typically still very difficult for adults with ASD regardless of cognitive abilities (Seltzer et al., 2011). Furthermore, in both children and adults social skills deficits have been shown to predict problems such as social anxiety (Bellini, 2006), aggression and property destruction (Matson, Fodstad, & Rivet, 2009). Social impairments are also related to mood problems (Kring, Greenberg, & Seltzer, 2008) and underachievement both at school and work (Howlin, Goode, Hutton, & Rutter, 2004).

Theoretical Explanations of Social Skills Deficits

The etiology of ASD is not well understood, although a variety of theories about the origins and development of this disorder and the social deficits that characterize it exist. Generally, there are two distinct ways to conceptualize problems with social functioning. First, under an operant conditioning conceptualization, social skills are considered the result of learned behavior. From this perspective, social deficits are caused by either a lack of competence (i.e., appropriate social behaviors were never learned; "I can't do it"), a lack of motivation (i.e., natural social consequences were not valuable; "I won't do it") or a combination of the two (Matson, 2008). This theory is supported by a plethora of evidence that operant conditioning techniques can be used to successfully teach and motivate social behaviors in individuals with ASD (e.g., Lovaas, 1987; Rogers & Vismara, 2008).

The second conceptualization is based on the idea that individuals with ASD have underlying cognitive impairments that manifest as social deficits (Rogers & Pennington, 1991). Three distinct cognitive theories have all gained substantial support in the literature: Executive Dysfunction, Theory of Mind Deficit, and Weak Central Coherence (Rajendran & Mitchell, 2007). The Executive Dysfunction theory (Ozonoff, Pennington, & Rogers, 1991) views ASD as resulting from a weakness in the ability to orchestrate more complex tasks. Specific areas of difficulty include planning, prioritizing, multi-tasking, shifting, incorporating feedback, impulse control, and inhibition, which could all potentially impact social interactions. The Theory of Mind Deficit describes children with ASD as having difficulty understanding the perspective of others (Baron-Cohen, 1995). A lack of understanding regarding the intentions, motives and emotions of others would

lead to a variety of problems in social situations. Finally, the Weak Central Coherence Theory posits that individuals with ASD have trouble processing things globally or as a whole, but instead attend to details or process complex concepts in a piecemeal fashion (Frith, 1989; Frith & Happe, 1994). In social interactions, this central deficit could lead to problems understanding the main idea of a conversation or integrating subtle social cues into a broader social concept. Overall, these three theories have each received empirical support and criticism. Consequently, a multiple-deficit account was proposed which states that all three types of cognitive dysfunctions may be present in the heterogeneous group of individuals with ASD and manifest in a variety of social deficits (Baron-Cohen & Swettenham, 1997).

Given the complex nature of both ASD and social interactions, it is probable that multiple mechanisms are at work. In fact, it is likely that underlying neurological abnormalities (e.g., recently reported functional underconnectivity across long distances and functional overconnectivity across short distances in the brain; Courchesne & Pierce, 2005) underlie impaired cognitive abilities, which result in dysfunctional behaviors. However, until these processes are better understood, the most effective method of intervention appears to be the application of operant conditioning principles to deficits in social skills competence and motivation.

Evaluations of Evidence-Based Practice

Given the prevalence of ASD and its impact on families and society, there have been several comprehensive literature reviews conducted to determine the level of research-based support for the myriad of available treatments. The two most notable reviews are the National Autism Center's National Standards Report (Wilczynski et al.,

2009) and the report produced by the Autism Evidence-Based Practice Review Group (Wong et al., 2014). Both of these reviews identified hundreds of articles describing a wide variety of treatments for ASD, had a team of trained experts evaluate the articles' scientific merit using a standard set of criteria, and compiled this data to determine what treatment methods should be considered "evidence based." The National Standards Report (Wilczynski et al., 2009) reviewed 724 articles published from 1957-2006 and identified 11 established treatments (e.g., antecedent package, behavioral package, modeling, peer training package, and schedules). The review conducted by Wong et al. (2014) evaluated 456 articles published between 1990 and 2011 and determined that 27 intervention practices were evidence-based. Some examples of these include antecedent-based intervention, modeling, peer-mediated instruction and intervention, prompting, reinforcement, and social skills training. The findings of both reports, although they were conducted independently using somewhat different criteria, were quite similar (Wong et al., 2014). Differences in the numbers can be explained to some degree by the fact that some of the established treatments identified by Wilczynski et al., (2009) (e.g., antecedent package) incorporated several of the evidence-based practices identified by Wong et al. (2014) (e.g., prompting, antecedent-based intervention, and time delay). Articles specifically focusing on evidence-based treatments for social skills deficits in young children are discussed below.

Importance of Early Intervention for Social Skills

As described above, a plethora of basic social skills are either absent or underdeveloped in young children with ASD. As these children grow, they are missing the foundations for more complex social interactions, which become subsequently more

difficult. However, there is substantial evidence that intensive early intervention can lead to improved outcomes for individuals with ASD (Goldstein, Lackey, & Schneider, 2014; Howard, Sparkman, Cohen, Green, & Stainslaw, 2005; Rogers & Vismara, 2008; Sallows & Graupner, 2005). Because early childhood (e.g., 3-5 years of age) is a critical period for major brain growth and organization (Courchesne et al., 2007), early interventions are likely to have more lasting effects. Therefore, in order to improve the long-term outcome of children with ASD, it is critical that they receive early interventions targeting improved social interactions.

Overview of Social Skills Interventions

Historically, social skills interventions have not been examined as much as interventions targeting other deficits in individuals with ASD (Volkmar, Lord, Bailey, Shultz, & Klin, 2004; Matson, Matson, & Rivet, 2007). Regardless, many of the early language and behavioral interventions included some social components (e.g., joint attention in Lovaas & Smith, 1988; play initiation in Haring & Lovinger, 1989). Over the past 10-15 years, there has been a dramatic increase in published studies examining social skills interventions. For example, in 2002 only 4 studies in this area met the criteria for "best evidence synthesis" (Salvin, 1986), while in 2007, 16 published studies met these criteria (Reichow & Volkmar, 2010). Furthermore, Goldstein et al., (2014) recently published a review of the intervention literature specifically for preschoolers with ASD identifying 68 articles published between 1982 and 2011 that met their criteria for evidence based practice.

Although a wide variety of methods for improving social skills in individuals with ASD has been examined, it is still unclear what approaches are most effective (e.g.,

Ferraioli & Harris, 2011; Goldstein et al., 2014; Reichow & Volkmar, 2010). Existing intervention studies vary across multiple dimensions, including the age of participants (e.g., preschool, school-age, adolescent, adult), setting (e.g., home, school, community, clinic), intervention agent (e.g., adult, peer, sibling, combination), method (e.g., applied behavior analysis (ABA), naturalistic, parent training, peer mediated, video modeling, social stories, social skills groups), and study design (e.g., randomized control trial, quasi-experimental multiple group comparison, single subject). These interventions also cover a diverse assortment of content, from joint attention and imitation to social etiquette and handling peer rejection. Most interventions cover multiple skills intended to initiate and maintain social interactions (Kasari & Locke, 2011).

Several trends have become evident in recent reviews of the social skills intervention literature. First, studies have primarily employed single subject research designs (85% of preschool studies reviewed by Goldstein et al., 2014; >90% of studies reviewed by Matson et al., 2007; 89% of preschool studies reviewed by Reichow & Volkmar, 2010;) and most used multiple baselines. ABA methods, utilizing modeling and reinforcement delivered by adults, have been used most frequently (Goldstein et al., 2014; Matson et al., 2007). However, an increasing number of studies have implemented peer-mediated methods (Reichow & Volkmar, 2010). The majority of studies describe interventions delivered in school settings, but social skills interventions delivered in clinics have become more frequent recently (Reichow & Volkmar, 2010).

Group Design versus Single Subject Design

Single subject research designs have provided convincing evidence regarding the effectiveness of social skills interventions on behavioral outcomes in individuals with

ASD (Wilczynski et al., 2009; Wong et al., 2014). By their nature, these types of designs are both flexible and individualized. However, there are several important advantages of implementing group designs in future research. Specifically, group designs provide the opportunity to analyze data using more complex statistical procedures, allow for the examination of possible interaction effects, and help address issues of generalizability. Currently, very few group comparisons or randomized controlled trials (RCT) have been conducted to examine social skills interventions in preschool children with ASD. The handful of studies that have used these designs demonstrated improved social skills in the treatment group compared to the control group. For example, treatment groups have demonstrated increased reciprocal social interactions (Aldred, Green, & Adams, 2004; Odom, et al., 1999), joint attention (Kaale, Smith, & Sponheim, 2012; Kasari, Freeman & Paparella, 2006), social initiation and responding (Kroeger, Shultz, & Newsom, 2007) and participation in social games (Smith, Goddard, & Fluck, 2004). One of the primary disadvantages of using a group design is that more participants are required than in single subject designs.

ABA/Modeling and Reinforcement

Concepts based in applied behavior analysis have been integrated into almost all social skills interventions for young children and have been widely successful (e.g., Apple, Billingsley, & Schwartz, 2005; Kasari, Freeman, & Paparella, 2006; Kohler et al., 2007; Pierce & Schreibman, 1994). These techniques (e.g., antecedent-based intervention, modeling, prompting, reinforcement) have extensive support as established, evidence-based treatments in the recent comprehensive reviews (Wilczynski et al., 2009; Wong et al., 2014). ABA methods attempt to directly tackle issues related to lack of

competence and lack of motivation, as described in the operant conceptualization of social skills deficits. ABA techniques explicitly teach and model skills, create multiple opportunities for practice, and provide frequent reinforcement with social praise, task related items (e.g., child says blocks, instructor provides blocks) and/or tangible items that have been determined to be rewarding for the child (e.g., cookies). Treatment should progress in a gradual and systematic way, slowly building upon existing skills (i.e., shaping). ABA methods have been criticized for a lack of generalizability. In response to this criticism, ABA tactics have been integrated into more naturalistic settings and activities through methods such as Pivotal Response Training (PRT) and Incidental Teaching (Goldstein, 2002). Overall, ABA has been used to treat social skills deficits longer than any other method and is frequently integrated into interventions using other methods to improve results (Reichow & Volkmar, 2010).

Peer Training

The method that has obtained the most empirical support in recent literature is peer training (Bass & Mulick, 2007; Goldstein et al., 2014; McConnell, 2002; Rogers, 2000). The reviews conducted by Wilczynski et al., (2009) and Wong et al., (2014) documented substantial empirical support for "peer training packages" and "peer-mediated instruction and intervention," respectively. This type of intervention focuses on teaching a peer to model, initiate, prompt and/or reinforce appropriate social behaviors. It is typically more effective to select motivated, typically developing peers who are about the same age as the child with ASD (Lord & Hopkins, 1986; Rogers, 2000). Other factors that have been incorporated into successful peer-mediated interventions include: having the peer role play with adults beforehand, using adults to prompt peers to interact in

natural settings, and having adults reinforce the peer during and/or after interaction attempts (Bauminger et al., 2008; Harper, Symon, & Frea, 2008; Koegel, Werner, Vismara, & Koegel, 2005). Skills that have been effectively targeted through peer training include social initiation, imitation, joint attention, sharing, eye contact and turn taking. These interventions have widely varied in duration. For example, a recent review (Reichow & Volkmar, 2010) described one successful study that was implemented only 15 minutes a day, 4 times a week for 5 weeks (Petursdottir, McComas, McMaster, & Horner, 2007) and another that was implemented 30 minutes per day, 2-4 times a week for up to 40 weeks (Nelson, McDonnell, Johnston, Crompton, & Nelson, 2007).

The main benefit of utilizing peer training is that it is the best method to address the generalizability of social skills (Matson, et al., 2007). Specifically, there is no need to transfer a newly learned skill from an adult to peers (Rogers, 2000). Several studies have demonstrated generalizability and maintenance of social skills trained by peers (Goldstein, Kaczmarek, Pennington, & Shafer, 1992; Odom et al., 1999). However, this occurs more frequently when multiple peer trainers are used (Brady, Shores, McEvoy, Ellis, & Fox, 1987) and when the intervention is delivered in a school (a more natural setting) as opposed to a clinic (Strain, Kohler, Storey & Danko, 1994).

Although peer training has substantial merit, it is important to consider its potential limitations. First, few group design studies of peer training have been conducted in preschool populations. Additionally, there is some evidence that peer training may not be the most efficient method to teach social skills to young children. For example, children's social initiations increased only when peer training was combined with direct instruction (i.e., via modeling and reinforcement) but not when it was administered alone

(Haring & Lovinger, 1989). Additionally, there is some evidence that children with ASD's verbal abilities may impact the efficacy of peer-mediated interventions (Goldstein et al., 1992). Specifically, nonverbal children did not demonstrate as much of an increase in social behavior as verbal children. Finally, while peer training may be associated with greater generalizability overall, some skills may not be demonstrated with anyone other than the "peer therapist" (Roeyers, 1996).

Video Modeling

Video modeling has also been used to teach a variety of social skills to children with ASD and was identified as evidence-based practice by Wong et al. (2014). In contrast, the National Standards Report (Wilczynski et al., 2009) identified modeling as an established treatment but did not specifically address video modeling. Typically, this intervention consists of an individual watching a video of someone (e.g., peer, sibling, therapist, parent, self) engaging in a desired behavior and then practicing that behavior. The content of video modeling interventions has included conversation skills (Charlop-Christy, Le, & Freeman, 2000; Taylor, Levin, & Jasper, 1999), compliments (Apple et al., 2005), eye contact (Scattone, 2008), greetings (Charlop-Christy, Le, & Freeman, 2000; Simpson, Langone, & Ayres, 2004), play skills (D'Ateno, Mangiapanello, & Taylor, 2003; Nikopoulos & Keenan, 2004), requesting (Wert & Neisworth, 2003), sharing (Simpson, Langone, & Ayres, 2004), and social initiations (Apple et al., 2005; Nikopoulos & Keenan, 2004; Buggey, 2005; Scattone, 2008). Similar to peer training, evidence suggests that video modeling used in isolation may not lead to behavior change (Apple et al., 2005; Maione & Mirenda, 2006), but likely needs to be paired with other opportunities to practice and receive reinforcement. Charlop-Christy, Le, & Freeman

(2000) demonstrated that video modeling was more efficient than in vivo (i.e., live) modeling for five children with ASD. Furthermore, generalization across settings and social partners has been reported with this mode of intervention (Charlop & Milstein, 1989; Charlop-Christy, Le, & Freeman, 2000; Sherer et al.,2001).

At the time of this review, only one group design study has examined the efficacy of video modeling to teach social skills to preschool children with ASD. Kroeger and colleagues (2007) assigned 25 children with ASD to either a video modeling group or to a play group. These groups were held for 1 hour per day, 3 times a week for 5 weeks. The structure of the group was consistent throughout the intervention: hello circle, video or play (i.e., depending on group assignment), free play with facilitators prompting social skills and goodbye circle. Results demonstrated that at the end of treatment, children in the video modeling group exhibited more social initiations, responses, and interactive behaviors than children in the play group.

Several advantages of the video modeling method have been identified. First, children with ASD typically view "screen time" as a preferred activity and consequently may be more motivated to watch a video than participate in direct teaching. Additionally, video modeling takes advantage of the visual learning style common in individuals with ASD (Kroger et al., 2007) and easily allows for frequent repetition (Ferraiolo & Harris, 2011). This method also decreases the complexity of instructors' work, because they are able to focus on prompting specific behaviors instead of teaching and modeling in addition to prompting (Weiss & Harris, 2001). Furthermore, instructors utilizing video modeling would require less training and fewer qualifications. Finally, video modeling allows for standardized instruction across participants (Kroger et al., 2007). One

limitation of the current video modeling research is a lack of knowledge about the efficacy of this method compared to other strategies (Bellini & Akullian, 2007). In addition, few studies have specifically examined generalizability of video-trained skills or intervention fidelity (e.g., when and how often is the video shown? Is the child attending to the video?; Bellini & Akullian, 2007).

Interventions at Recess

Not only is the method of social skills instruction a critical aspect of a successful intervention, but the environment or setting in which the intervention occurs is also extremely important. Recess at school provides a natural opportunity for children to play, interact with peers, and make choices about their activities. This unstructured social time is often very challenging for children with ASD and is therefore ripe for social skills interventions. To date, twelve single subject research studies have demonstrated some improvement in social interactions as a result of recess interventions (Lang et al., 2011). Behaviors that have been targeted in these studies include social initiations, positive social interactions, verbal initiations and social play. The most common method used has been peer-mediated intervention (Lang et al., 2011). Overall, this literature is limited due to the small number of studies that have been conducted and the small number of individuals that have been studied ($N = 41$). Regardless, recess interventions have the potential of increased generalizability, because they consist of multiple opportunities to practice skills with various peers in the natural environment (Chan et al., 2009). Additionally, the use of peers as the agents of intervention may reduce the demand on teachers and aides during a less structured activity. However, recess interventions may also contribute to problem behaviors among children with ASD in the classroom because

they increase rather than provide a "break" from social demands (Lang et al., 2011). Furthermore, providing adequate supervision at this time may be difficult and to some degree interferes with the "natural" environment.

Additional Limitations

The social skills intervention literature as a whole has several additional limitations that should be addressed when developing new treatment approaches. First, very few studies systematically select target behaviors to match the intervention to the child's specific deficits (Matson et al., 2007; Bellini, Peters, Benner, & Hopf, 2007). This could be accomplished by either administering a social skills measure to caregivers or preferably conducting a systematic observation of social behavior (e.g., the Verbal Behavior Milestones Assessment and Placement Program; VB-MAPP; Sunderberg, 2008) and then selecting intervention targets based on the results. The second limitation is that only a handful of studies use multiple outcome measures. For example, most of the current research with preschoolers has only utilized observational variables. Lord et al. (2005) recommended that in order to resolve challenges measuring treatment effects, outcome batteries should include measures that assess generalization (e.g., caregiver report, follow-up assessments) and measures specific to the intervention's goals. Another significant concern is the maintenance of skills post-intervention, which is rarely reported for studies using group designs and/or peer-mediation (Goldstein et al., 2014). Finally, generalization to other settings, fidelity of the intervention (e.g., how well did the therapist adhere to the treatment protocol) and social validity (e.g., did the child enjoy the activity? Are the parents satisfied?) are often not measured or reported (Bellini et al.,

2007; Gresham, Sugai, & Horner, 2001). These limitations undermine the ability to determine if an intervention is efficacious and should be addressed in future studies.

Rationale for Current Study

Given the potential long-term benefits of providing evidence-based social skills training to young children with ASD, it is critical that the methods employed have strong empirical support. The current pilot study developed a manualized treatment package that combined methods with demonstrated efficacy (i.e., ABA, peer training, and video modeling) in order to develop competence and motivation regarding social skills. We hypothesized that integration of these methods would enhance treatment effects. Target skills included those previously shown to be impaired in young children with ASD, such as directing play to others, playing with a variety of toys, initiating social communication, imitation and shared positive affect. These skills are basic social skills frequently enacted by typically developing preschool children and represent important building blocks for more complex social skills and tasks. A group comparison design with a wait-list control group was implemented in order to draw conclusions about treatment efficacy that would generalize to other children with ASD. Several additional strategies were implemented to maximize generalizability. First, the intervention was delivered in two natural social environments of a preschool setting, during recess and classroom playtime. Second, multiple peers were recruited to train children with ASD. Third, social skills were assessed both within and outside of the intervention context by multi-informant reports. In order to enhance maintenance and generalization of new skills teachers received brief training on ways to support social interactions. Finally, measures of treatment fidelity were collected to better understand the effects of the intervention.

METHOD

Participants

Initially, 21 children between the ages of 3 and 5, who were previously diagnosed with an ASD, were recruited to participate in the study. Recruitment was conducted at an early intervention preschool program that serves children with ASD and enrolls typically developing peers in integrated classes. At the beginning of the school year, each family who was enrolled in the preschool received a letter explaining the study. Additionally, caregivers were informed about the project verbally during orientation and throughout the first two weeks of school by the principal investigator, research assistants, and school personnel. Interested families were contacted by the research team to complete the informed consent and baseline measures of the child's social, cognitive, developmental and language abilities. Two children were excluded from the study during the baseline assessment because they produced fewer than five spontaneous spoken words, yielding a final sample size of 19. This exclusionary criterion was implemented because nonverbal children are less likely to benefit from this particular type of intervention, given that much of the instruction was delivered verbally (Pierce & Schreibman, 2007). Previous diagnosis of an ASD was confirmed based on file review. We verified that each participant's diagnostic assessment had included a parent interview and the Autism Diagnostic Observation Schedule (ADOS).

Setting

All participants were assessed and received standard treatment at the early intervention preschool program. This program's approach integrated behavior therapy, discrete trial training, and incidental teaching in order to foster adaptive, cognitive,

communication and social development. As part of the program, each child with ASD received an Individualized Education Plan (IEP) and his or her goals were based on an extensive annual behavior assessment as well as daily data collection. Each class was led by a certified teacher and at least two teaching assistants, yielding a low student to teacher ratio. Additionally, students with ASD received individual behavior therapy, speech therapy and occupational therapy as needed. The student's IEPs all included goals related to social skills. These goals were targeted most often in individual therapy or by using naturalistic teaching strategies in the classroom.

Design

Treatment assignment at the child level was not feasible because a substantial portion of the intervention occurred in the children's classrooms. Instead, group assignment was done at the classroom level. Specifically, a quasi-experimental design was utilized with two of the four classrooms assigned to the intervention group and the other two classrooms to the wait-list control group. The groups were matched on age and developmental level across the two conditions to the extent possible. For example, each group contained one class of younger children (e.g., ages 3-4) and one class of older children (e.g., ages 4-5). Children in the wait-list classrooms received the intervention after all assessments were completed.

Peer Trainers

The peer trainers were ten typically developing children enrolled in the classrooms assigned to the intervention condition. Families of typically developing peers also received a letter explaining the study, as well as verbal information about the project from the principal investigator, research assistants, and school personnel. Informed

consent was obtained from each child's parent before participation in the project. Based on the recommendations of Kerr and Nelson (1983) and Pierce and Schreibman (2007), peers were selected using the following criteria: age, availability, compatibility, and compliance. Children with ASD and typically developing peers were already assigned to classrooms based on age and developmental level. Consequently, the typically developing peers in each class generally served as age-appropriate models of social skills. This strategic classroom composition also increased the chance for friendship development between children with ASD and their peers. Throughout the intervention, participants and peer trainers were only paired or grouped with other children from their classroom. Additionally, multiple peers were used with each child with ASD in order to enhance generalizability and to provide varied examples of social and play skills.

Following the initial peer training, the frequency at which each typically developing child was selected to serve as a peer trainer varied based on availability, compatibility, and compliance. Peers who were usually available (i.e., not consistently absent from school) were selected to participate in the intervention sessions more frequently. Additionally, an effort was made to select typically developing peers who were compatible with the intervention and the target children. Some of the peer trainers occasionally had difficulty demonstrating appropriate social behavior and subsequently were utilized less frequently. Occasionally, a specific peer trainer and participant did not get along; therefore, effort was made to select a more compatible peer trainer for the next session. Finally, peers who were generally cooperative and compliant with adult instruction participated more frequently.

Assessment Procedure

An initial battery of assessments was administered to each participant with ASD before the intervention began. Specifically, assessments began approximately 3 weeks into the new school year to allow students to adjust to the environment and structure of the early intervention preschool program. As a part of the annual evaluation conducted by the preschool, participants received three assessments examining language and developmental abilities [i.e., the Preschool Language Scale (PLS-4) (Zimmerman, Steiner, & Pond, 2002) or the Clinical Evaluation of Language Fundamentals (CELF-4) (Semel, Wiig, & Secord, 2004), the Battelle Developmental Inventory (BDI) (Newborg et al., 2005), and the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP) (Sunderberg, 2008)]. These measures were administered by preschool staff, including speech language pathologists, teachers and behavior specialists. In addition, several other assessments were completed specifically for this study. Cognitive skills were assessed by a graduate student research assistant using the Differential Ability Scales (DAS-II). Social behavior in the natural environment was coded from videos taken of the children during free play. For each child, 20 minutes of free play in the classroom and 20 minutes of free play on the playground during recess were recorded and coded. Finally, parents and teachers reported on behaviors related to ASD via the Autism Spectrum Rating Scale (ASRS). All test administration was conducted by trained individuals blind to group assignment (i.e., preschool staff members and research assistants).

Immediately after the intervention (10 weeks after baseline) and at a 10-week follow-up assessment, three of the baseline measures were completed again. Children

were administered portions of the VB-MAPP evaluating social and play skills. Parents and teachers completed the ASRS and behavioral observations during inside and outside free play were collected and coded as described above.

Measures

Differential Ability Scales, Second Edition (DAS-II)

The DAS-II (Elliot, 2007) is an individually administered cognitive assessment for children ages 2 years, 6 months to 17 years, 11 months. This measure provides an estimate of global cognitive functioning (General Conceptual Ability) as well as verbal and nonverbal composite scores. Composites are calculated as standard scores based on age-based norms (mean = 100, standard deviation = 15). At baseline, participants were administered the Early Years Battery, which consists of either four or six subtests depending on the age of the child. The DAS-II has excellent reliability and good validity (Dumont, Willis, & Elliot, 2009). Preliminary analyses used the verbal and nonverbal composite scores to examine initial differences between the intervention and control groups.

Preschool Language Scale, Fourth Edition (PLS-4)

The PLS-4 (Zimmerman et al., 2002) is a standardized assessment of auditory comprehension and expressive language abilities for children from birth to 6 years, 11 months. This individually administered assessment has good reliability and validity (Zimmerman et al., 2002). A speech language pathologist chose to administer either the PLS-4 or the CELF-P2 (see below) to each child based on record review, brief observation, and teacher report of language skills and behavior, using clinical judgment. The PLS-4 utilizes both manipulatives and pictures; therefore, it was used for children

who would benefit from more hands-on activities. Standardized scores (mean = 100, SD =15) were produced for Auditory Comprehension and Expressive Language subscales at baseline. These scores were used to characterize the sample and evaluate potential language development differences between the intervention and control groups.

Clinical Evaluation of Language Fundamentals – Preschool: Second Edition (CELF-P2)

The CELF-P2 (Semel et al., 2004) is an individually administered language assessment designed for children ages 3 years to 6 years, 11 months. Good reliability and validity for the CELF-P2 have been reported (Semel et al., 2004). The CELF-P2 stimuli consist of pictures, not manipulatives, so the speech language pathologist used this test instead of the PLS-4 with children who did not require the use of hands-on activities. This measure produced standard scores (mean = 100, SD =15) for the Receptive Language and Expressive Language indices that were used to examine group differences at baseline.

Battelle Developmental Inventory, Second Edition (BDI-2)

The Battelle (Newborg et al., 2005) is a standardized measure of developmental skills across five domains: adaptive, personal-social, communication, motor, and cognitive. Administrator observation, caregiver interview and semi-structured interactions are all utilized to complete this battery. The measure produces standard scores (mean = 100, SD =15) for the five domains and an overall Developmental Quotient. Additionally, the measure yields percentile rank scores and age equivalents. The Battelle is a reliable and valid measure appropriate for children from infancy to 7 years, 11 months (Bliss, 2007). The Developmental Quotient and the Personal-Social domain score at baseline were used to evaluate differences between the two groups

before the intervention. The DAS-II was used instead of the cognitive domain of the Battelle because it provides estimates of both verbal and nonverbal abilities while the Battelle only provides an overall cognitive score.

Autism Spectrum Rating Scale (ASRS)

The ASRS (Goldstein & Naglieri, 2010) is a standardized rating scale designed to measure behaviors associated with an autism spectrum disorder (e.g., socialization, communication, unusual behaviors, behavioral rigidity, and sensory sensitivity). This measure is appropriate for children and adolescents between 2 and 18 years of age and consists of 70 items. Parents or teachers rate how frequently they observe specific behaviors on a five point Likert scale. This measure has good reliability and validity based on 7,000 assessments including both normative and clinical data (Goldstein & Naglieri, 2010). Parents and teachers rated children's behaviors at baseline, post-intervention, and 10-week follow-up on the ASRS (2-5 Years). The Social/ Communication and the Unusual Behaviors T-scores (mean = 50, standard deviation = 10) were used. On the ASRS, a higher T-score means that the rater endorsed more symptoms related to ASD. The Average range consists of scores from 40-59, 60-64 is considered Slightly Elevated, 65-69 is Elevated, and 70-85 is Very Elevated. Some ASRS items that were specifically related to this intervention were, "how often did the child play with others?" and "how often did the child respond when spoken to by another child?".

Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP)

The VB-MAPP (Sunderberg, 2008) is a skills assessment specifically designed for children with ASD and other language delays based on B.F. Skinner's developmental

analysis of verbal behavior. This measure provides criterion-referenced information for a wide variety of developmental abilities and can be used to track individual progress over time. It is comprised of five components, the first of which is the VB-MAPP Milestones Assessment which was used in this study. This component consists of 170 items across 3 developmental levels (i.e., 0-18 months, 18-30 months, 30-48 months). The items assess sixteen skill areas including Spontaneous Vocal Behavior, Listener Responding, Independent Play, Social Behavior, Motor Imitation, and Visual Perception Skills. Each skills area includes 15 specific developmental milestones. Examples of Social Behavior items are "Spontaneously follows peers or imitates their motor behavior 2 times", "Initiates a physical interaction with a peer 2 times", "Engages in sustained social play with peers for 3 minutes without adult prompts or reinforcement", and "Responds to five different questions or statements from peers". Children received a score of "0", "0.5", or "1" for every item based on the criteria outlined in the manual. In general, scores of "0" indicated skills that are not observed and scores of "1" indicated skills that occurred spontaneously and consistently. Therefore, raw scores in each skill area ranged from 0 to 15, with higher scores indicating more skills observed. Each child was assessed prior to the intervention with the entire VB-MAPP Milestones Assessment. At the conclusion of the intervention and at the 10-week follow-up assessment, the two skill areas most relevant for social behavior ("Independent Play" and "Social Behavior") were administered again.

Observational Coding of Social Behavior

As described above, videos of children's social behavior were collected for 40 minutes of inside and outside free play at baseline, at post-intervention, and at the 10-

week follow-up. Each video was coded twice, once to determine the *duration* of positive and negative social interactions and once to determine what social behaviors occurred at specified *intervals* (i.e., every 15 seconds). *Duration-based coding* was collected using stopwatches to time the length of both positive and negative social interactions as defined in the Coding Manual for Observed Social Behavior (See Appendix A). The *interval-based coding* system was adapted from existing observation systems developed by Fox et al. (1984), Bauminger (2002), and Reynolds and Kamphaus (2004). Thirteen categories of social behavior were coded: *1) positive physical initiation, 2) positive verbal initiation, 3) positive physical response, 4) positive verbal response, 5) parallel play, 6) negative physical initiation, 7) negative verbal initiation, 8) negative physical response, 9) negative verbal response, 10) avoids/ignores, 11) solitary engagement, 12) adult engagement,* and *13) not codable*. The coders wore a MotivAider that vibrated every 15 seconds as they watched the videos. When coders felt the vibration, they immediately assigned one of the 13 codes to the child's current behavior and continued watching the video. See Appendix A for a more detailed description of the entire coding procedure and the operational definition of each category of social behavior.

Coding was conducted by two trained graduate research assistants blind to group assignments and familiar with children with ASD, through coursework and clinical experience. The coders were initially trained using videotapes of preschool children with ASD not participating in this study. The training videos were recorded at the same preschool the previous year with children who graduated. During the training period, a variety of refinements were made to the coding manual. This typically consisted of adding more specific descriptions and clarifying examples. Next, the research assistants

coded videotapes independently. For the duration-based codes, Pearson correlations were used to calculate reliability with the trainer. On average, the coders obtained a correlation of 0.98 for the duration of positive social interactions and a correlation of 0.70 for the duration of negative social interactions. For the interval-based codes, reliability with the trainer was calculated using Cohen's kappa. The coders obtained a kappa of 0.82 averaged across the 13 categories of social behavior listed above. At this time, two of observational codes that were initially part of the coding system (i.e., imitates action with toy and passive observation) were excluded because they occurred infrequently, were somewhat difficult to operationally define, and/or did not reach an acceptable level of reliability.

Interrater Reliability for Observational Coding

More than 5 hours of video (15% of the sample) was selected randomly to be coded for interrater reliability. For the duration-based codes, Pearson correlations were used to evaluate reliability. The coders obtained acceptable reliability for the duration of positive social interactions ($r = 0.97$) and the duration negative social interactions ($r = 0.73$). Reliability was calculated for the interval-based codes using Cohen's kappa. Two of the codes (i.e., negative verbal initiation, negative physical response) were not observed on any of the reliability videos; therefore kappas could not be calculated. Interrater reliability was acceptable (e.g., kappa >.70) for all of the remaining social behavior codes except avoids/ignores. The reliability estimates were 1.00 for positive physical initiation, .75 for negative physical initiation, .94 for positive verbal initiation, .92 for positive physical response, .79 for positive verbal response, 1.00 for negative

verbal response, .89 for parallel play, .67 for avoids/ignores, .93 for solitary engagement, .85 for adult engagement, and .90 for not codable.

Data from Behavioral Observations

The research team set out to collect and code a total of 38 hours of video footage (i.e., 40 minutes for 19 children at 3 time points). However, the team was not able to collect 2.6% of the anticipated footage due to children's unanticipated absences and was not able to code 1.1% of the video collected because occasionally the child could not be seen in the shot. Therefore, proportion scores were calculated for both the duration-based codes (i.e., positive social interaction and negative social interaction) and each of the 12 interval-based codes (i.e., excluding "not codable"). For the duration-based codes, the proportion scores were created by dividing the amount of time a child engaged in either a positive or negative social interaction by the total amount of time coded. For the interval-based codes, the frequency of each social behavior was calculated and then divided by the total number of intervals that were coded. These proportion scores were used in all analyses.

Several of the interval-based codes occurred at relatively low frequencies and were conceptually closely related. Consequently, some of the codes were combined to reduce the number of statistical analyses. Specifically, the proportion scores for *positive physical initiation, positive verbal initiation, positive physical response*, and *positive verbal response* were added together to yield the summary code of *positive social engagement*. Additionally, the proportion scores for *negative physical initiation, negative verbal initiation, negative physical response, negative verbal response,* and

avoids/ignores were summed to yield *negative social engagement*. Figure 1 shows how the initial 12 codes were consolidated to the 5 summary codes.

Intervention Procedure

Treatment Content

A treatment manual (see Appendix B) was developed specifically targeting social skills that are often poorly developed in preschool children with ASD. The primary skills that were targeted by this intervention were proximal parallel play, social initiation, directing play towards peers, varied play (i.e., different ways to play with one toy), shared positive affect, turn taking, and imitation. Treatment content and methods for teaching these skills were adapted from Kids Helping Kids: Teaching Typical Children to Enhance the Play and Social Skills of their Friends with Autism and Other PDDs (Pierce & Schreibman, 2007), which was initially developed for school age children. The treatment manual was designed to teach social skills in a developmentally appropriate way. Specifically, more basic skills were targeted first and complex skills gradually built upon that foundation. The nine specific skills taught throughout the intervention were 1) "play close," 2) "get attention," 3) "ask to play," 4) "give choices," 5) "say what you play," 6) "show different play," 7) "say nice things," 8) "take turns," and 9) "play his (her) way." For additional details about the treatment content and delivery, see Appendix B.

Peer Training

The typically developing peers were trained based on the procedure adapted from Pierce and Schreibman, (2007). Training took place across 8-9 sessions in an environment relatively free of distractions. Peers were trained in small groups of 2-3

children for approximately 30-45 minutes at a time. In the initial peer training session, the experimenters explained the purpose of the intervention (e.g., "to help other kids in your class learn how to play and make friends"), praised peers for participating, and described the reinforcement system (e.g., "when you try hard to play with your friend you will get a sticker!"). Additionally, in all subsequent trainings the peer trainers were briefly reminded of the intervention purpose and rewards. During each peer training session, children were provided with strategies to encourage and reinforce social interactions. Specifically, the peer curriculum paralleled that of the target children and focused on the nine skills listed above. Peer trainers were provided direct instruction on how to use and teach these skills using a combination of verbal directions, visual supports, in-vivo modeling, role play with instructors, and role play with other peer trainers. They role played these strategies with the research assistants and with each other and until they could implement each strategy multiple times. On average across all training sessions, peer trainers implemented the target strategies spontaneously 55 percent of the time, with a prompt 38 percent of the time, and refused to implement strategies or ignored prompts 7 percent of the time.

Intervention Structure and Approach

An eclectic approach that integrated applied behavior analysis, peer-mediation and video modeling strategies was utilized. Trained experimenters (i.e., graduate students in psychology) with previous experience with children with ASD delivered the intervention. The intervention consisted of at least 15 sessions that were delivered across approximately 8 weeks. Throughout all sessions, children were prompted to demonstrate the target skills and were rewarded with verbal and tangible praise (i.e., stickers) for

attempting to do so. Sessions were broken down into two categories: initial *training sessions* and *generalization sessions*. At the beginning of the intervention, children participated in 5, 20-30 minute initial *training sessions* that were located in a playroom with reduced distractions. Typically either 1 or 2 children with ASD and 1 or 2 peer trainers were present at each session. During *training sessions*, participants were taught the nine target skills using a combination of verbal instruction, visual supports, in-vivo modeling, video modeling, and role play with peer trainers. After every child had completed the training sessions, ten *generalization sessions* occurred during free play in natural social environments (i.e., the playground, the classroom). Each *generalization session* was approximately 10-15 minutes long. On the playground, the intervention was delivered to dyads (one child with ASD, one peer trainer). In the classroom, between 2 and 4 children participated at a time. Small groups either had an equal number of children with ASD and peer trainers or more peer trainers. At the beginning of each *generalization session* children were reminded of the target skills and reward system. Then they were encouraged to play together using intervention specific prompts and reinforcement. Fidelity data was collected for 20% of the intervention sessions using pre-established checklists. Across three therapists, mean fidelity was 87%.

Video Modeling

Videos demonstrating appropriate social skills were filmed using several typically developing children from another local preschool, unfamiliar to the target children. Videos were approximately 1-2 minutes in length and were based on previously developed scripts demonstrating the target skills. Videos were viewed during training sessions on a laptop. Generally, children were very interested in the videos and attended

to them well. Immediately after they viewed the videos, they were instructed to practice what they observed.

Analysis Plan

In order to determine if the intervention and control groups differed on any demographic or baseline developmental variables, independent samples t-tests and Fisher's exact tests were conducted. The groups were compared on age, verbal and nonverbal cognitive abilities, receptive and expressive language abilities, social development, and overall development. Additionally, univariate distributions and bivariate associations among all dependent variables were examined.

Treatment effects were investigated using a series of analyses of covariance (ANCOVAs). Assumptions were examined for each ANCOVA conducted. To check the assumption of linearity, a scatterplot of the covariate and dependent variable, grouped by treatment condition, was visually inspected. Homogeneity of regression slopes was examined by conducting an ANCOVA to test for a significant interaction between the treatment group and the covariate. The Shapiro-Wilk test was conducted on the standardized residuals of the dependent variables for both treatment conditions and for the overall model to evaluate the assumption of normality. The assumption of homoscedasticity was assessed by visually inspecting scatterplots of standardized residuals against predicted values. Levene's Test of Equality of Error Variances was conducted to check the assumption of homogeneity of variances. Finally, outliers were detected by determining if there were cases with standardized residuals greater than ±3 standard deviations.

The main goal of the primary analyses was to examine group differences (i.e., the effect of treatment) on symptoms of ASD and social behavior after the intervention and at 10-week follow-up. Because of the small sample size, separate ANCOVAs were conducted for the post-test and 10-week follow-up dependent variables, with the same variable at baseline used as a covariate. The dependent variables fell into three categories: caregiver ratings, clinician-assessed skill level, and behavioral observations. Caregiver ratings included the Social/Communication scale and Unusual Behaviors scale from the ASRS completed by parents and teachers. Clinician assessed variables included the Independent Play scores and the Social Behavior scores from the VB-MAPP. Behavioral observation variables included the proportion scores for the duration of positive interactions, duration of negative interactions, and frequency of the 5 summary codes from the interval-based coding (i.e., positive social engagement, parallel play, negative social engagement, solitary engagement, adult engagement). Effect sizes (Cohen's *d*) were calculated based on adjusted means.

RESULTS

Preliminary Analyses

Descriptive statistics for the baseline characteristics of the treatment and control groups are provided in Table 1. The treatment and control groups did not differ on gender, race, age, cognitive abilities, language abilities, or developmental abilities. As a result, these variables were not included as covariates in the primary analyses.

Descriptive statistics for the dependent variables at all three time points are provided in Table 2. Additionally, Figures 2a - 2d show the means of teacher and parent ratings on Social/Communication Symptoms and Unusual Behavior Symptoms for the

two groups over time. The means at all three time points on clinician rated scores for Independent Play Skills and Social Behavior Skills are shown in Figures 3a and 3b. Figures 4a and 4b show the mean durations of positive and negative social interactions over time. The means for interval-based observations (i.e., positive social engagement, parallel play, negative social engagement, solitary engagement, and adult engagement) are shown over time in Figures 5a- 5e. Upon examining the univariate distributions of the dependent variables, there was positive skew in both the duration-based and interval-based codes. Consequently, logarithmic transformations were performed on those variables prior to the main analyses.

The bivariate associations between the dependent variables at baseline were examined using Pearson correlations, which can be found in Table 3. Overall, many of the variables measuring adaptive social skills (e.g., social behavior skills, positive social engagement) were positively related to one another and negatively related to variables examining social deficits or disengagement (e.g., solitary engagement). Regarding caregiver reports, there was a strong positive correlation between teacher and parent reports of social/communication symptoms, r = .81. Both teacher and parent report of social/communication symptoms were negatively correlated with clinician assessed measures of social skills (i.e., independent play skills, social behavior skills) as well as behavioral observations of adaptive social skills (i.e., duration of positive interactions, positive social engagement, parallel play). These significant correlations ranged from r = -.54 to r = -.79. Furthermore, teacher and parent report of social/communication symptoms were both positively correlated with observations of solitary engagement.

Clinician assessed independent play skills and social behavior skills were strongly positively correlated with each other, $r = .77$, and both of these variables were positively correlated with observations of adaptive social skills (i.e., duration of positive interactions, positive social engagement, parallel play) ($r = .55$ to $r = .77$). Additionally, independent play skills and social behavior skills were both negatively correlated with solitary engagement.

Behavioral observations of adaptive social skills (i.e., duration of positive interactions, positive social engagement, parallel play) were all positively correlated with each other and negatively correlated with solitary engagement. These significant Pearson correlations ranged from $r = .66$ to $r = .92$ and $r = -.80$ to $r = -.86$, respectively. The duration of negative social interactions was strongly positively correlated with negative social engagement, $r = .81$.

The results of the ANCOVA assumption testing indicated that all assumptions were met for parent ratings, teacher ratings, and clinician assessed skills at post-intervention and at follow-up, with three exceptions. The Shapiro-Wilk test revealed a violation of the assumption of normality for teacher ratings of Social Communication Symptoms at follow-up in the treatment group, $p<.05$. For clinician assessed skills post-intervention, the standardized residuals for social behavior skills were positively skewed for the treatment group, $p<.05$. At follow-up, the standardized residuals of clinician-rated independent play skills were positively skewed for the treatment group and the overall model, $p<.05$. Therefore, these analyses were repeated using logarithmic transformations of these three dependent variables and these results are reported below. After the three variables were transformed, the assumption of normality was met for social behavior

skills post-intervention and teacher ratings of Social Communication Symptoms at follow-up. The logarithmic transformation of the standardized residuals of clinician-rated independent play skills remained positively skewed for the treatment group and the overall model at follow-up, $p<.05$. Additionally, there were violations of the assumption of normality for the duration of negative interactions post-intervention, for negative social engagement at follow-up, and for adult engagement at follow-up which were already log-transformed. Given that ANCOVA is fairly robust to violations of normality, no further transformations were conducted. The results of Levene's test indicated that at follow-up there was a violation of homogeneity of variances for the duration of negative interactions, likely due in part to the low frequency of this behavior. All other ANCOVA assumptions were met.

Primary Analyses

The first set of ANCOVAs used the post-intervention values as the dependent variable and the baseline values of the corresponding variable as the covariate (see Table 4). The second set of ANCOVAs used the follow-up values as the dependent variable and the baseline values of the corresponding variable as the covariate (see Table 5).

Caregiver Ratings

At post-treatment (see Table 4), the intervention and control groups did not differ in teacher reported Social/Communication Symptoms or Unusual Behavior Symptoms. The effect size was small in favor of the control group for Social/Communication Symptoms (d = .19) and medium in favor for the treatment group for Unusual Behavior Symptoms (d = -.50). For parent report, children in the treatment group demonstrated significantly fewer Social/Communication deficits after the intervention compared to

those in the control group, with large effect size (*d* = -1.06). There were no significant differences in parent-reported Unusual Behavior Symptoms (d = -.20).

At the 10-week follow-up assessment (see Table 5), there were no significant differences in parent- or teacher-rated Social/Communication Symptoms or Unusual Behavior Symptoms. The effect size was medium for Social/Communication (*d* = -.66) and small for Unusual Behavior Symptoms (*d* = -.07). Per parent report, there were also no group differences at the follow-up assessment for Social/Communication Symptoms, or Unusual Behavior Symptoms, with medium effect sizes (*d* = -.62 and -.58, respectively) in favor of the treatment group.

Clinician Assessed Variables

The intervention and control groups did not differ in clinician assessed Independent Play Skills or Social Behavior Skills post-treatment (see Table 4). The effect size was large for Independent Play Skills (*d* = .96) and medium for Social Behavior Skills (*d* = .76) in favor of the treatment group. At the follow-up assessment (See Table 5), children in the treatment group demonstrated significantly more independent play skills than those in the control group. The effect size was large (*d* = .82). There were no significant group differences for Social Behavior Skills, with medium effect size (*d* = .67).

Behavioral Observations – Duration-based Codes

At post-treatment (see Table 4), there were no significant group differences in the duration of positive or negative social interactions. Effect sizes were small and in favor of the control group for both positive interactions (*d* = -.21) and negative interactions (*d* = -.15). Furthermore, the treatment and control groups did not differ in the duration of

positive or negative social interactions at the 10-week follow-up (see Table 5). The effect size was small for positive social interactions (d = .08) and medium for negative social interactions (d = -.60).

Behavioral Observations – Interval-based Codes

Immediately following the intervention (see Table 4), there were no significant group differences in Positive Social Engagement, Parallel Play, Negative Social Engagement, Solitary Engagement, or Adult Engagement. Effect size was small for Positive Social Engagement (d = .38), Negative Social Engagement (d = -.07), and Solitary Engagement (d = -.08). Effect size was medium and in favor of the treatment group for Parallel Play (d = .74) and in favor of the control group for Adult Engagement (d = -.65). At follow-up (see Table 5), no significant group differences were found for Positive Social Engagement, Parallel Play, Negative Social Engagement, Solitary Engagement, or Adult Engagement, with small effect sizes (d = .02, d = 05, d = -.15, d =.00, d = .32, respectively).

DISCUSSION

This pilot study evaluated the efficacy of a new manualized social skills intervention package that integrated peer training, video modeling, and behavioral treatment strategies. Approximately two thirds of the intervention were delivered during free play in the classroom and on the playground, which allowed children to practice their skills in a natural social environment. We hypothesized that integrating these evidence-based methods and delivering the intervention in natural settings would enhance treatment effects. Despite the small sample size and limited power to detect significant group differences, parents reported that children in the treatment group demonstrated

significantly fewer social/communication deficits following the intervention compared to those in the control group. Results also revealed that at the 10-week follow-up, children in the treatment group demonstrated more independent play skills, based on clinician assessment. These results suggest that this intervention may improve social and play skills for preschool children with ASD; however, further research with larger samples is needed.

Caregiver Ratings

Consistent with our hypothesis, there were significant group differences in parent report of symptoms of ASD after the intervention. Specifically, the treatment group demonstrated fewer social/communication deficits than the control group, after controlling for parent report at baseline. These findings indicate that compared to the control group, treatment group parents observed fewer core deficits of ASD in their children. Studies utilizing parent report as an outcome measure for older children (i.e., ages 6-11) have also demonstrated better social skills in the treatment group following an intervention (Frankel et al., 2010; Legoff & Sherman, 2006; Mandelberg, Frankel, Cunningham, Gorospe, & Laugeson, 2014; Owens, Granader, Humphrey, & Baron-Cohen, 2008). Regarding preschool populations, only a handful of studies have reported results of caregiver ratings and these results have been mixed (e.g., Aldred, et al., 2004; Odom, et al., 1999). For example, Aldred et al. (2004) found significant group differences following treatment for parent-reported communication skills on the MacArthur Communicative Development Inventory, but not on the Vineland Adaptive Behavior Scales. Given the recent recommendations to include broad measures of ASD, including caregiver ratings, in outcome batteries (Lord et al., 2005; White et al., 2007),

the parent-report results from this study are particularly important. However, it should also be noted that all of the parents in the study may not have been blind to treatment condition. Parents were not told directly which condition their child was assigned to; nonetheless, they were allowed to observe their children in the preschool. Some parents may have observed their children receiving additional social skills support and draw conclusions about treatment condition. In turn, this may have influenced how they rated their child's behavior.

Despite the significant difference post-treatment, group differences in parent-reported social/communication symptoms were not maintained 10 weeks after the completion of the intervention. The effect was of medium magnitude and in favor of the control group (i.e., parents reported more social/communication symptoms for the control group). This is consistent with some reports of social skill decline when interventions were removed (e.g., Harper et al., 2008; Lefebvre & Strain, 1998) and difficulty detecting change on caregiver report measures (e.g., Aldred, et al., 2004; Barry, Klinger, Lee, Palardy, Gilmore, & Bodin, 2003; Koenig et al., 2010). This finding may be interpreted in multiple ways. First, it could indicate the need for continued training and/or more robust maintenance strategies following social skills interventions. Additionally, it may be the result of small sample size and limited power.

No significant group differences in teacher report of social/communication symptoms were found. Post-intervention the magnitude of the effect was small and in favor of the treatment group, but at the 10-week follow-up the effect was medium and in favor of the control group. As noted above, few studies of social skills interventions for preschoolers with ASD have used teacher report as an outcome measure. Furthermore,

studies using teacher report as an outcome measure have yielded inconsistent results (Odom et al., 1999; Ozonoff & Miller, 1995). For example, in a study by Odom et al. (1999), one control and four treatment conditions were compared on teacher ratings of social competency. Results indicated improvements in teacher-reported social skills for one of the treatment groups post-intervention and for three treatment groups at follow-up. In another study, Ozonoff and Miller (1995) reported significant improvement on social skills directly targeted by their intervention but found no group differences for teacher report of similar social behavior. The failure to find group differences on teacher reported social/communication symptoms may indicate that the ASRS was not a sensitive enough measure or that the sample size was not large enough.

There were no significant group differences in parent and teacher report of unusual behavior post-intervention or at the 10-week follow-up. The effects were all in favor of the control group (i.e., more unusual behaviors were reported for the control group) and small to medium in magnitude. The analyses related to unusual behaviors were exploratory in nature and it was not anticipated that the social skills intervention would have an impact on children's restricted interests, repetitive behaviors, or sensory sensitivities.

Clinician Assessed Variables

In contrast to our hypotheses, the treatment and control groups did not differ on clinician ratings of social behavior at either time point. Both of these effects were of medium magnitude and in favor of the treatment group. Challenges related to outcome measurement have been repeatedly reported in the ASD intervention literature (e.g.,

Goldstein et al., 2014; Lopata et al., 2010; Lord et al., 2005) and are likely applicable here. Specifically, it is possible that the VB-MAPP was not a sensitive enough measure or simply that the study was underpowered. Notably, of the 15 items comprising the social behavior scale, only 6 were directly targeted by the intervention. For example, the VB-MAPP item "spontaneously engages in parallel play near another child for a total of 2 minutes" aligned closely with the intervention's target skill "play close" and the VB-MAPP item "spontaneously mands to peers to participate in games, social play, etc." aligned closely with the target skill "ask to play." However, several items on the social behavior scale were not directly addressed (e.g., "spontaneously mands to peers with a WH question 5 times," "engages in pretend social play activities with peers for 5 minutes without adult prompts"). In the future, outcome measures of social behavior should directly measure targeted social skills.

Based on clinician assessment, children in the treatment group demonstrated significantly more appropriate independent play skills than those in the control group at the 10-week follow-up. This finding indicates that children who received the intervention were observed demonstrating more functional and creative play skills. Despite the fact that improving play skills was not the primary goal of the intervention, the result is not surprising. A recent review of interventions targeting play skills determined that the common components of successful play interventions were modeling, prompting, reinforcement of target behaviors, and naturalistic instruction (Jung & Sainato, 2013). A substantial portion of the current intervention utilized the same strategies to teach peers how to facilitate play and to teach children with ASD the play skills needed for social engagement. Furthermore, continued exposure to peers trained to facilitate play may

account for maintenance and increase in play skills over time. Overall, improved play skills may be a secondary benefit of social skills training in young children. Immediately post-treatment group differences in play skills only approached statistical significance ($p=.059$, $d=.96$), indicating that the skills in the treatment group continued to develop after the intervention. Replication of these results with a larger sample is warranted.

Behavioral Observations

The treatment and control groups did not significantly differ on any of the social behaviors observed during free play. Effect sizes for theses analyses were generally small. However, post-intervention there was a medium effect for parallel play, in favor of the treatment group, and a medium effect for adult engagement, in favor of the control group. Additionally at follow-up, the effect for duration of negative interactions was of medium magnitude and in favor of the control group. The lack of significant group differences was unexpected; however, there are several possible explanations. First, as noted above, the small sample size led to a limited power to detect even large treatment effects. Another possible explanation is that the interval-based social behavior codes did not directly measure the specific skills that were taught in the intervention, but more broadly captured positive and negative social behaviors. This is consistent with the fact that the majority of published social skills intervention studies found significant changes for the specific behaviors that were targeted, but less frequently found differences in related behaviors (e.g., Ferraioli & Harris, 2011; Goldstein et al., 2014; Kasari & Locke, 2011; Reichow & Volkmar, 2010). Studies in the future should measure the behaviors that are directly targeted by the intervention.

Methodological Strengths

The study employed a quasi-experimental group design that randomly assigned classes to either a treatment or control condition. This produced groups that were similar on all baseline measures (i.e., gender, race, age, cognitive abilities, language abilities, or developmental abilities). Other methodological strengths included diagnosis of ASD by an outside evaluator using the ADOS and use of a treatment manual. Based on the recommendations in many reviews of the social skills treatment literature (e.g., Bellini et al., 2007; McConnell, 2002; Rogers, 2000, White et al., 2007; Wong et al., 2013), multiple strategies were implemented to enhance generalization (e.g., peer trainers, intervention delivered in the natural social environment) and maintenance of skills was measured at a 10-week follow-up assessment. Regarding outcome measures, information was obtained from multiple informants and ranged from broad reports of ASD symptoms to specific observations of social behavior. The relationships among many for the dependent variables provided evidence of the validity of those measures. For example, variables measuring adaptive social skills were significantly positively correlated to each other (e.g., clinician assessed "Social Behavior Skills," with behavioral observations of "Duration of Positive Interactions") and significantly negatively correlated to social deficits (e.g., caregiver report of "Social Communication Symptoms" was inversely related to behavioral observations of "Positive Social Engagement"). In summary, the design of this study demonstrated sufficient scientific rigor on all five dimensions of the Scientific Merit Rating Scale put forth by the National Standards Report (Wilczynsk et al., 2009).

Potential Intervention Revisions

Throughout the process of developing, implementing, and evaluating this intervention, the author has considered a wide variety of possible modifications. One reoccurring concern was how to determine the optimal dose of treatment. The intensity of effective social skills interventions for preschoolers with ASD has varied widely in previous research. For example the total time for several interventions was less than 5 hours spread across 4-22 weeks, (e.g., Boyd et al., 2007; Crozier & Tincani, 2007; Garfinkle & Schwartz, 2002; Kern et al, 2007) whereas other interventions were more than 20 hours over 5 to 40 weeks (e.g., Nelson et al., 2007; Kaale et al., 2012; Whalen & Schreibman, 2003). Additionally, given that the majority of studies are single subject designs, treatment intensity is individualized based on treatment response. In the current study, participants spent a relatively small amount of time engaged in the intervention (i.e., approximately 5 hours across 10 weeks). This small dose may not have been sufficient to improve social behavior for some children, especially given that there were 9 target skills. The structure of the intervention allowed for some additional sessions when children needed additional practice; however, making the interventions more individualized may be helpful. Future use of this intervention should strongly consider increasing the amount of time children with ASD are engaged in treatment. Additionally, it may be useful to establish specific criteria indicating skill mastery that a child should attain before proceeding to the next step.

Another modification that could enhance treatment effectiveness is to increase the use of video modeling. The intervention had children watch the videos within the context of treatment sessions. In the future, it may be beneficial to allow children to watch the

videos multiple times, for instance during free time or at home. Furthermore, including additional videos that show each skill implemented in a variety of ways (e.g., with different toys, different peers, slightly different techniques) may enhance generalizability.

One efficient way to increase the dose of the intervention while enhancing generalization and maintenance would be to provide more caregiver training. As part of the current study, the therapists met briefly with each teacher to discuss the treatment curriculum and techniques. Together, they reviewed handouts that described the target skills and strategies used to prompt and reinforce behaviors. The teachers were then asked to relay this information to their assistants and to try to use these strategies during unstructured play times. This method of teacher training was not particularly effective. Teachers were rarely observed to use the intervention techniques. One possible explanation is that they did not know the curriculum well enough and they had never had the opportunity to practice using it. Therefore, future studies would benefit from more intensive teacher training that includes modeling and role play. Additionally, teacher implementation of the intervention within the context of preschool curricula should be considered. Generalizability may be further enhanced if parents were also trained in the intervention.

Given that the intervention uses frequent verbal prompts and reinforcement, the addition of more visual supports could potentially enhance treatment effects. This strategy would take advantage of the visuospatial strengths that are often present in individuals with ASD (Mesibov, Shea, & Schopler, 2005). One study already found that the combination of visual strategies and peer mediation led to increased play initiation and social engagement (Nelson et al., 2007). Future implementation of the current

intervention could add visual cues demonstrating each target skill. Additionally, a visual schedule for the treatment sessions may help improve attention to the treatment content and related behavior (e.g., help children refrain from trying to play with toys before the didactic portion is complete).

Limitations and Future Directions

It is important to consider the limitations of this study when interpreting the findings. First and foremost, the sample size was very small, which limited power to detect significant effects. Another limitation was that random assignment was not feasible; therefore, children were assigned at the classroom level. It should also be noted that parents were not necessarily blind to group assignments and this could have influenced their ratings of the child's behavior. In the future, randomized controlled trials using larger samples and raters who are blind to treatment condition should be employed to evaluate social skills interventions for preschoolers with ASD. Continued assessment of treatment effects over time is also very important (e.g., Lord et al., 2005; Wilczynski et al., 2009; Wong et al., 2014). Given the exploratory nature of this study, many statistical analyses were conducted, which inflated the Type I error rate. Future studies should limit the number of outcome measures and statistically correct for Type I error inflation.

Several other factors likely limited our ability to find significant group differences. First, participants in both groups were simultaneously receiving intensive early intervention for more than 30 hours a week. Therefore, it was likely very difficult to substantially augment those comprehensive services with a relatively brief intervention.

Future studies may examine the effectiveness of the intervention for children who are receiving fewer services.

Another limitation is that the outcome measures examined here did not evaluate the precise skills taught during the intervention. Based on the recommendations of Lord et al. (2005), future studies should use a comprehensive battery that includes both broad measures of ASD symptomatology and behavioral observations of the specific skills targeted. For example, studies could conduct behavioral observations of children during free play tallying how frequently target behaviors were demonstrated over a specific period of time. It would also be useful to collect data on children's behavioral response during the intervention (e.g., their spontaneous social behavior and their responses to direct prompts).

Generalizability was limited by a somewhat homogeneous sample of children with ASD who were relatively high functioning. Specifically, participants were characterized by low average cognitive abilities, low average to below average language skills, and mild symptoms of autism as reported by their parents. Furthermore, most of the children were Caucasian, male, and came from relatively affluent families who could afford to pay for this intensive intervention program. Future studies should address these limitations by examining larger, more diverse samples of children with ASD. Additionally, it is likely that this intervention is more beneficial to children with stronger verbal and cognitive abilities given that much of the instruction was delivered verbally.

Challenges related to the implementation of this type of intervention in federally funded preschools should also be considered. Many early intervention programs serve

children under the broad category of "developmental delay" and the median age of initial diagnosis of ASD is 4 years, 5 months (CDC, 2014). Therefore, these programs may not have clear diagnostic information indicating that ASD specific treatment is warranted. Furthermore, they may not have the resources to provide services targeting ASD specific deficits. Federal education guidelines require that children receive developmentally appropriate, individualized instruction that includes on-going progress monitoring (IDEA, 1997). Future studies of this type intervention should ensure that these standards are being met and clearly explain this in related documentation.

In summary, this pilot study examined the efficacy of a social skills intervention package for preschool children with ASD that incorporated several evidence based techniques with strategies to enhance generalizability. Consistent with our hypotheses, parents reported that children in the treatment group demonstrated fewer social/communication deficits following the intervention compared to those in the control group. Additionally, children in the treatment group demonstrated more appropriate play skills than the control group 10 weeks after the intervention. These results suggest that this intervention may improve social and play skills for preschool children with ASD; however, further research is needed. Some of main the recommendations for future studies include recruiting larger and more diverse samples, implementing this intervention with children who receive less comprehensive intervention services, and measuring the precise skills targeted by the intervention.

TABLES

Table 1

Baseline Characteristics for Treatment Group (N = 11) and Control Group (N = 8)

Variable	Treatment Group *M (SD)*	Control Group *M (SD)*	$\chi^2(1)$	*p*
Percent Male	91%	88%	0.06	.811
Percent Caucasian	73%	100%	3.69	.055
			t(17)	
Age in Years	4.9 (0.7)	4.6 (1.1)	0.81	.432
Cognitive Abilities – Verbal	77.73 (21.62)	86.38 (20.33)	-0.88	.390
Cognitive Abilities – Nonverbal	87.27 (15.86)	89.00 (10.30)	-0.27	.790
Language Abilities – Receptive	77.64 (16.83)	83.13 (23.42)	-0.60	.559
Language Abilities – Expressive	75.36 (15.38)	84.50 (20.79)	-1.10	.285
Developmental Abilities – Social-Personal	70.78 (12.74)	68.29 (09.69)	0.43	.675
Developmental Abilities – Total	67.67 (14.41)	74.14 (12.64)	-0.94	.363

Note. Means and standard deviations for cognitive, language and developmental abilities are based on standard scores.

Table 2

Dependent Variables for Treatment Group (N = 11) and Control Group (N = 8)

Variable (Reporter)	Baseline *M (SD)*		Post-Intervention *M (SD)*		Follow-Up *M (SD)*	
	Treatment	Control	Treatment	Control	Treatment	Control
Social/Communication Symptoms (Teacher)[a]	64.18(11.41)	64.00(15.78)	64.00(12.72)	62.75(11.25)	63.73(12.55)	65.88(12.56)
Unusual Behavior Symptoms (Teacher)[a]	72.64(8.29)	64.88(14.86)	65.09(8.47)	65.25(14.76)	70.00(7.48)	66.75(10.58)
Social/Communication Symptoms (Parent)[a]	64.00(8.25)	63.38(9.74)	56.90(12.41)	64.86(10.95)	64.00(8.25)	63.37(9.74)
Unusual Behavior Symptoms (Parent)[a]	61.20(8.90)	61.63(7.73)	58.70(10.64)	59.71(6.26)	61.20(8.89)	61.63(7.73)
Independent Play Skills (Clinician)	11.68(2.91)	12.50(2.69)	12.59(2.29)	12.75(2.49)	12.82(2.39)	12.81(2.48)
Social Behavior and Play Skills (Clinician)	8.23(3.86)	7.94(4.88)	10.36(3.48)	8.88(4.48)	10.86(3.45)	9.56(4.32)
Duration of Positive Interactions (Coder)[b]	5.57(6.75)	5.04(6.79)	10.89(11.76)	11.21(13.68)	6.94(6.93)	6.94(10.31)
Duration of Negative Interactions (Coder)[b]	0.40(0.70)	1.04(1.29)	0.53(1.07)	0.82(1.19)	0.28(0.46)	0.56(0.77)
Positive Social Engagement (Coder)[b]	7.11(7.34)	7.61(11.78)	13.53(9.68)	11.18(11.10)	9.45(7.49)	9.75(10.50)
Parallel Play (Coder)[b]	55.07(11.49)	45.13(8.38)	50.23(10.82)	39.45(8.04)	54.66(9.07)	48.47(15.98)
Negative Social Engagement (Coder)[b]	1.32(1.63)	1.88(1.93)	1.21(1.39)	1.28(1.50)	0.74(1.05)	1.10(1.92)
Solitary Engagement (Coder)[b]	27.84(13.43)	41.88(19.26)	30.94(15.65)	43.72(19.51)	28.11(10.99)	35.55(19.07)
Adult Engagement (Coder)[b]	8.67(6.25)	3.51(3.26)	4.09(4.84)	4.37(2.35)	7.04(3.63)	5.13(2.60)

Note. [a] Means and standard deviations for social/communication and unusual behavior symptoms are based on standard scores.

[b] Means and standard deviations are based on proportion scores.

Table 3
Correlations between Dependent Variables at Baseline

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Social/Communication Symptoms – Teacher	–												
2. Unusual Behavior Symptoms – Teacher	.22	–											
3. Social/Communication Symptoms – Parent	.81**	.39	–										
4. Unusual Behavior Symptoms – Parent	.35	.18	.42	–									
5. Independent Play Skills	-.72**	.06	-.60**	-.28	–								
6. Social Behavior and Play Skills	-.79**	-.15	-.56*	-.07	.77**	–							
7. Duration of Positive Interactions	-.62**	-.17	-.55*	.05	.67**	.75**	–						
8. Duration of Negative Interactions	-.29	-.05	-.09	.10	.41	.26	.17	–					
9. Positive Social Engagement	-.61**	-.27	-.55*	-.03	.64**	.76**	.92**	.24	–				
10. Parallel Play	-.55*	-.07	-.54*	-.29	.55*	.58**	.66**	-.01	.53*	–			
11. Negative Social Engagement	-.17	-.12	.04	.19	.11	.14	.14	.81**	.18	.05	–		
12. Solitary Engagement	.68**	.15	.60**	.18	-.59**	-.71**	-.83**	-.15	-.80**	-.86**	-.16	–	
13. Adult Engagement	.06	.15	.11	-.01	-.36	-.26	-.31	-.16	-.30	-.25	-.22	.01	–

Note. Correlations between all dependent variables (n=19).
* $p < .05$.
** $p < .01$.

Table 4

Post-Intervention Outcomes

Variable (Reporter)	Treatment		Control		ANCOVA[a]		
	Adjusted		*Adjusted*				
	M	*SE*	*M*	*SE*	*F*	*Effect Size*	*p*
Social/Communication Symptoms (Teacher)	63.94	1.76	62.83	2.07	0.17	0.19	.690
Unusual Behavior Symptoms (Teacher)	63.15	2.95	67.92	3.49	1.04	-0.50	.324
Social/Communication Symptoms (Parent)	57.30	2.08	64.28	2.49	4.64[†]	-1.06	.049*
Unusual Behavior Symptoms (Parent)	58.59	2.02	59.87	2.42	0.17[†]	-0.20	.690
Independent Play Skills (Clinician)	12.87	0.16	12.36	0.19	4.13	0.96	.059
Social Behavior Skills (Clinician)[b]	0.98	0.03	0.91	0.03	2.61	0.76	0.13
Duration of Positive Interactions (Coder)[b]	0.73	0.13	0.82	0.15	0.21	-0.21	.653
Duration of Negative Interactions (Coder)[b]	0.14	0.07	0.17	0.08	0.09	-0.15	.769
Positive Social Engagement (Coder)[b]	0.90	0.14	0.72	0.17	0.66	0.38	.429
Parallel Play (Coder)[b]	1.68	0.03	1.61	0.04	2.01	0.74	.176
Negative Social Engagement (Coder)[b]	0.11	0.09	0.13	0.10	0.02	-0.07	.884
Solitary Engagement (Coder)[b]	1.48	0.05	1.54	0.06	0.52	-0.08	.480
Adult Engagement (Coder)[b]	0.38	0.12	0.62	0.14	1.58	-0.65	.228

Note. [a] Results of Analyses of Covariance using post-intervention variables as the dependent variable and baseline values as a covariate. Degrees of Freedom (1,16). Effect sizes (Cohen's d) were calculated based on adjusted means.

[†] Degrees of freedom were (1,14) for these analyses.

* $p < .05$

[b] Logarithmic transformations were performed on these variables due to positive skewness.

Table 5
Follow-Up Outcomes

Variable (Reporter)	Treatment		Control		ANCOVA[a]		
	Adjusted		*Adjusted*				
	M	*SE*	*M*	*SE*	*F*	*Effect Size*	*p*
Social/Communication Symptoms (Teacher)[b]	1.79	0.01	1.82	0.01	1.70	-0.66	.211
Unusual Behavior Symptoms (Teacher)	68.43	2.22	68.91	1.80	0.02	-0.07	.892
Social/Communication Symptoms (Parent)	59.38	1.84	62.80	2.63	1.51[†]	-0.62	.241
Unusual Behavior Symptoms (Parent)	59.01	2.30	62.98	2.09	1.31[†]	-0.58	.273
Independent Play Skills (Clinician)[b]	1.11	0.01	1.09	0.01	4.69	0.82	.046*
Social Behavior Skills (Clinician)	10.76	0.48	9.70	0.56	2.08	0.67	.169
Duration of Positive Interactions (Coder)[b]	0.66	0.11	0.63	0.13	0.05	0.08	.827
Duration of Negative Interactions (Coder)[b]	0.08	0.04	0.16	0.05	1.67	-0.60	.214
Positive Social Engagement (Coder)[b]	0.77	0.08	0.76	0.10	0.00	0.02	.966
Parallel Play (Coder)[b]	1.71	0.04	1.69	0.04	0.18	0.05	.676
Negative Social Engagement (Coder)[b]	0.07	0.07	0.10	0.08	0.10	-0.15	.762
Solitary Engagement (Coder)[b]	1.45	0.05	1.45	0.06	0.00	0.00	.999
Adult Engagement (Coder)[b]	0.77	0.10	0.67	0.12	0.37	0.32	.552

Note. [a] Results of Analyses of Covariance using post-intervention variables as the dependent variable and baseline values as a covariate. Degrees of Freedom (1,16). Effect sizes (Cohen's d) were calculated based on adjusted means.
[†] Degrees of freedom were (1,13) for these analyses.
* $p < .05$
[b] Logarithmic transformations were performed on these variables due to positive skewness

FIGURES

Figure 1

Consolidation of 12 Observed Social Behavior Codes into 5 Social Behavior Summary Codes

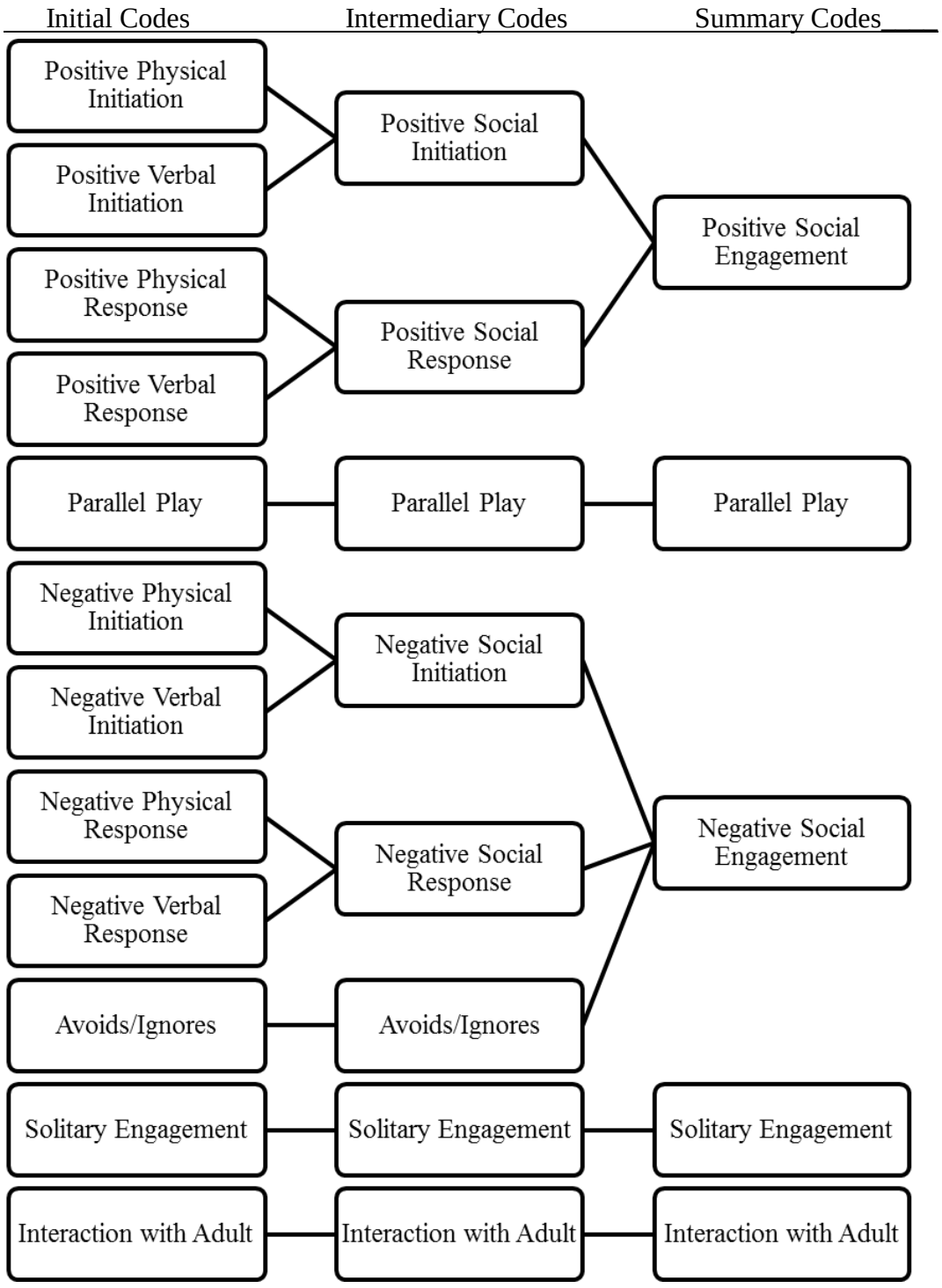


Figure 2a

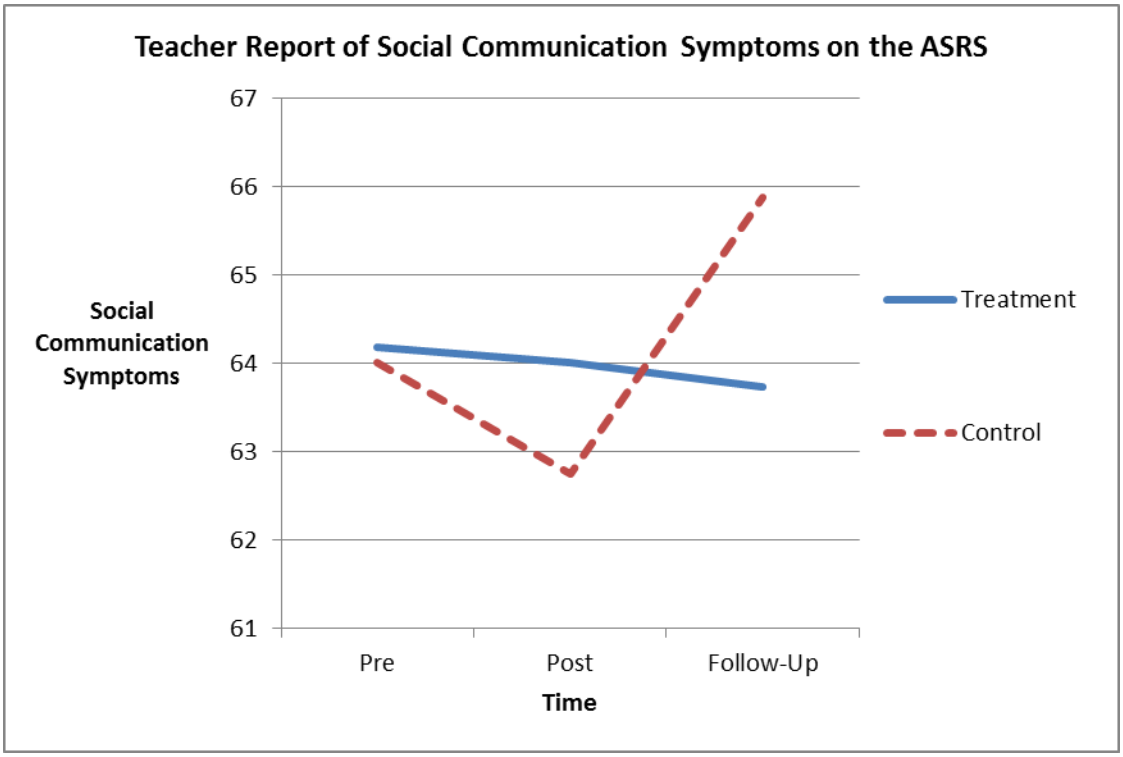


Figure 2b

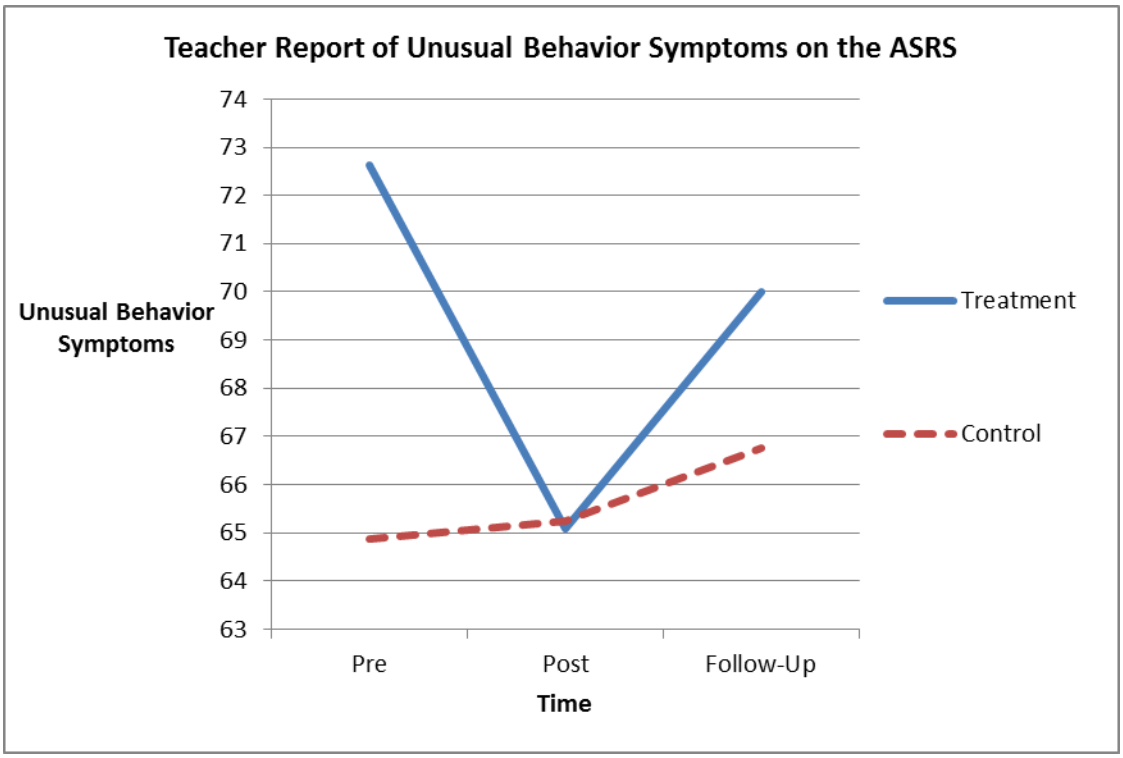


Figure 2c

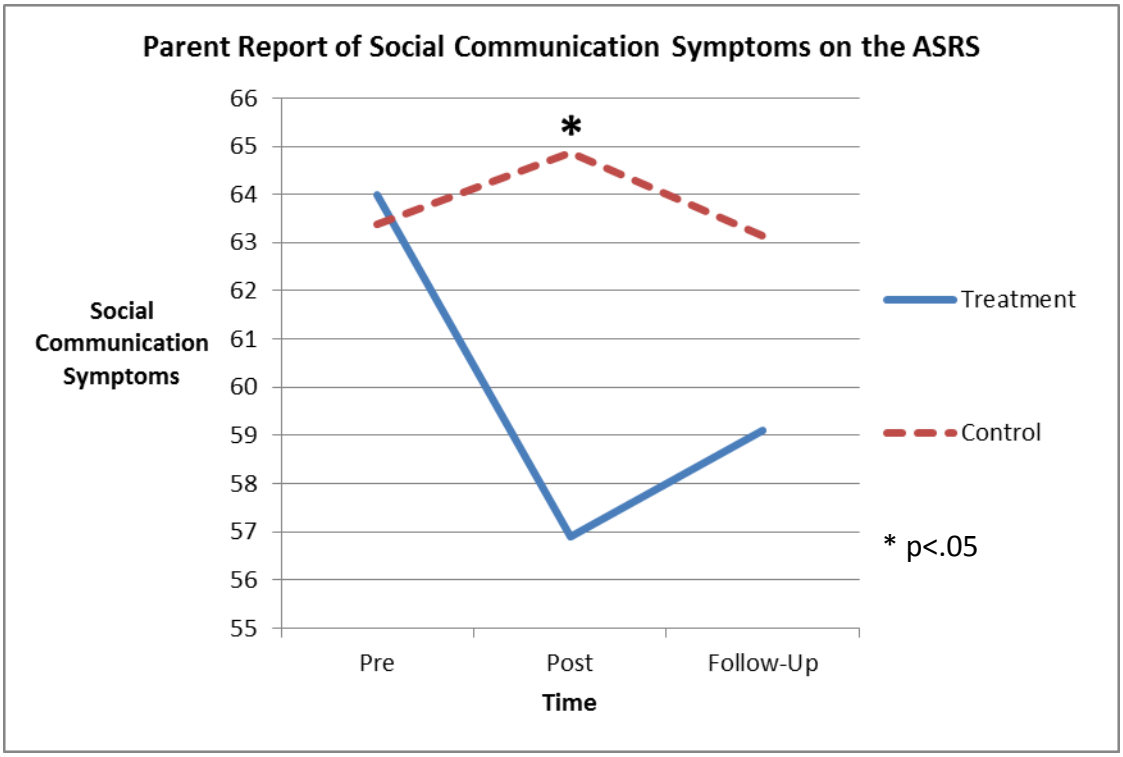


Figure 2d

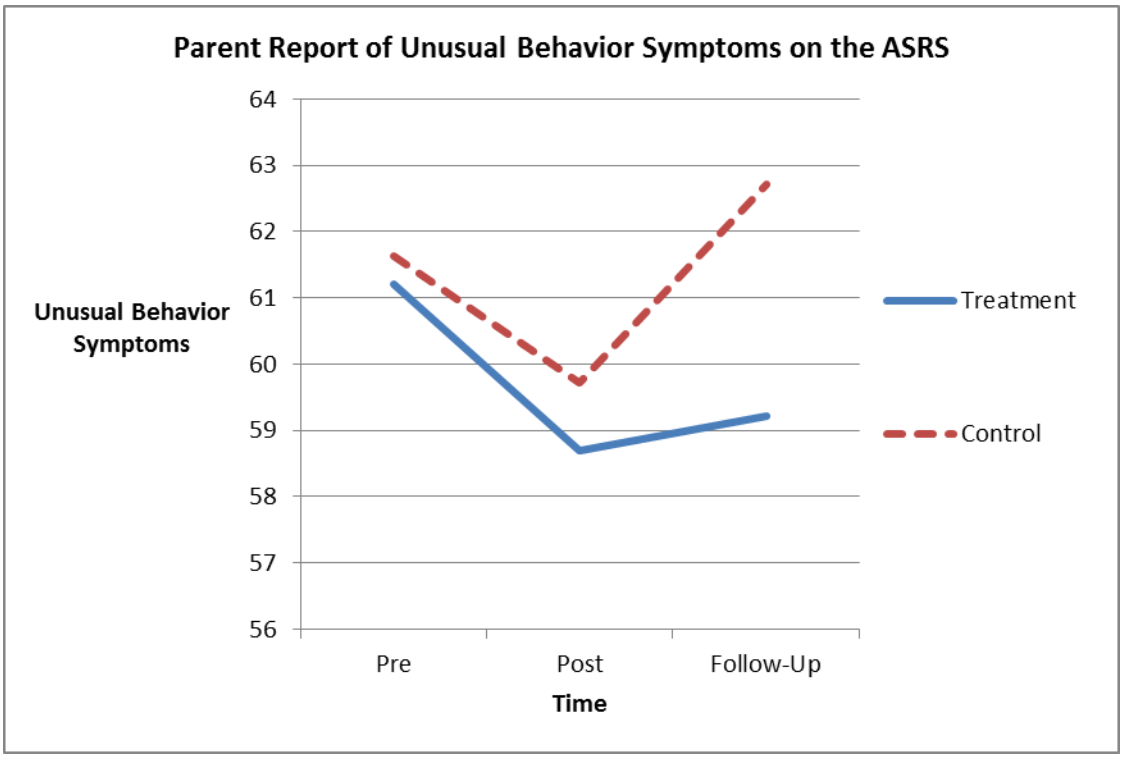


Figure 3a

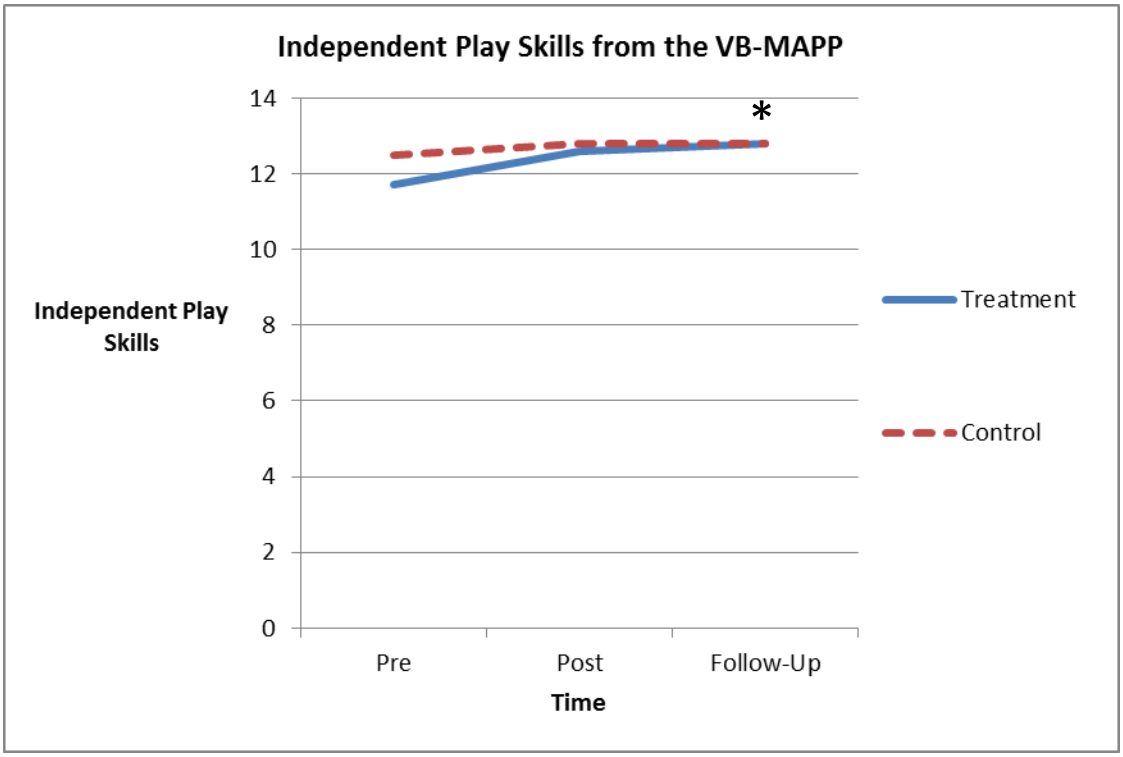


Figure 3b

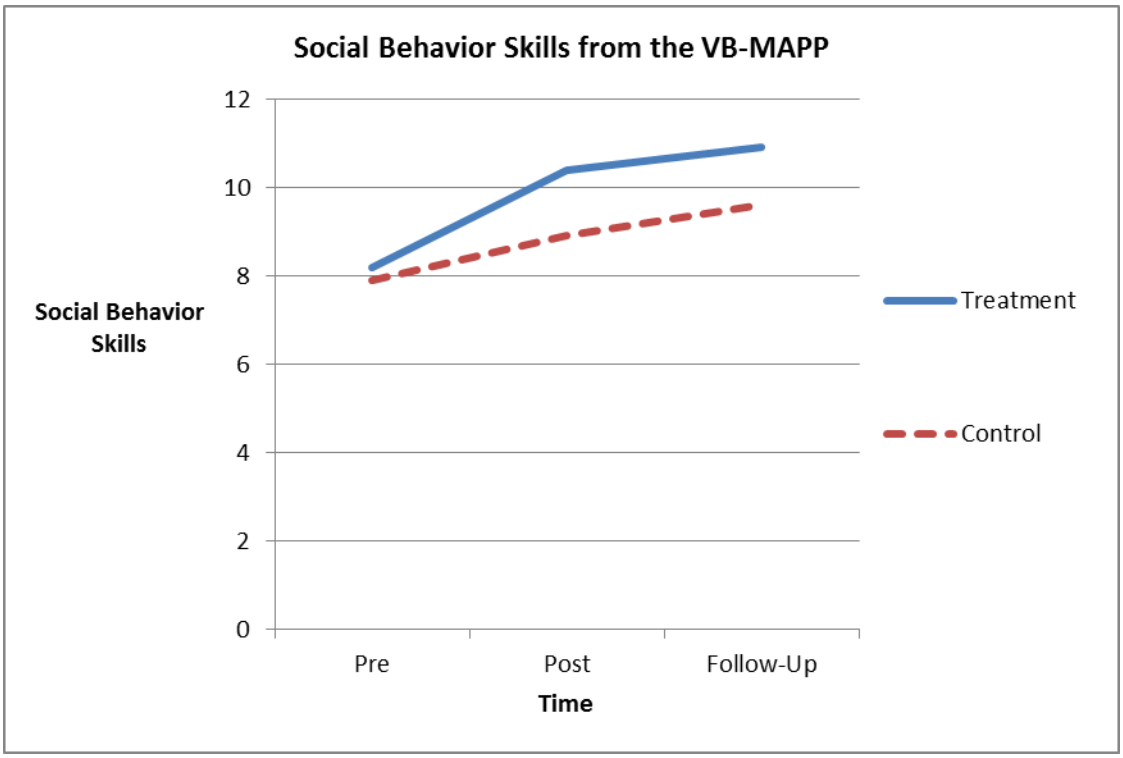


Figure 4a

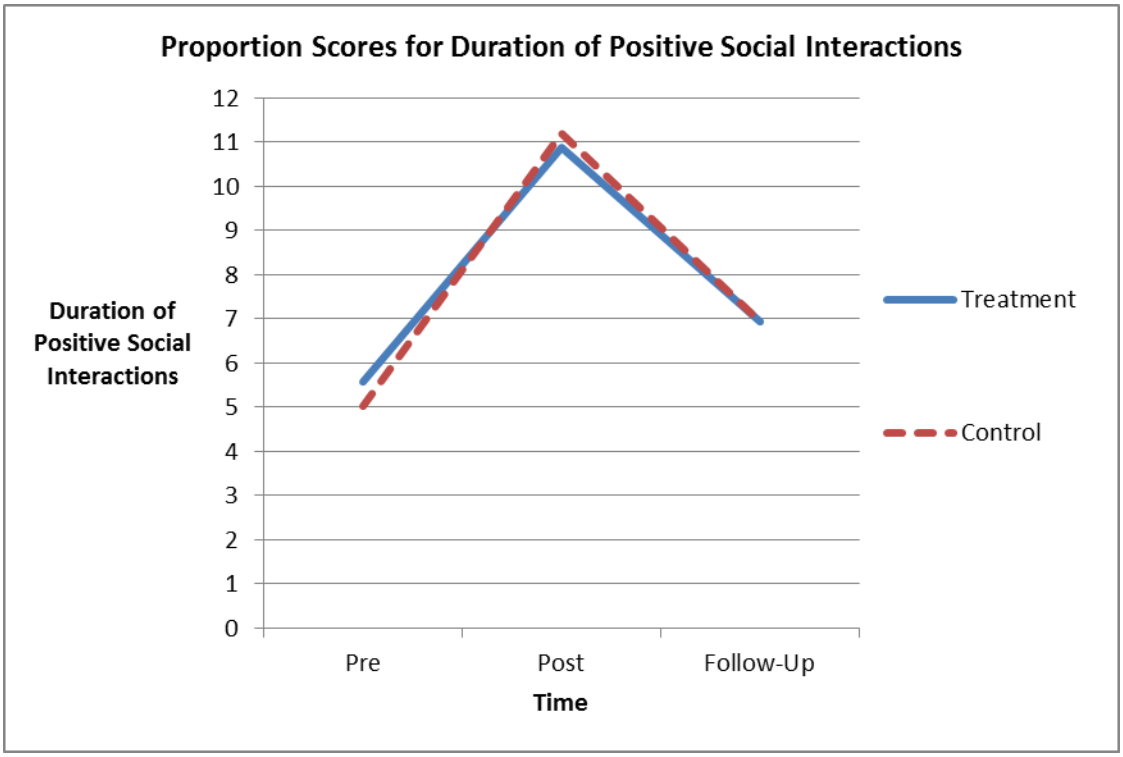


Figure 4b

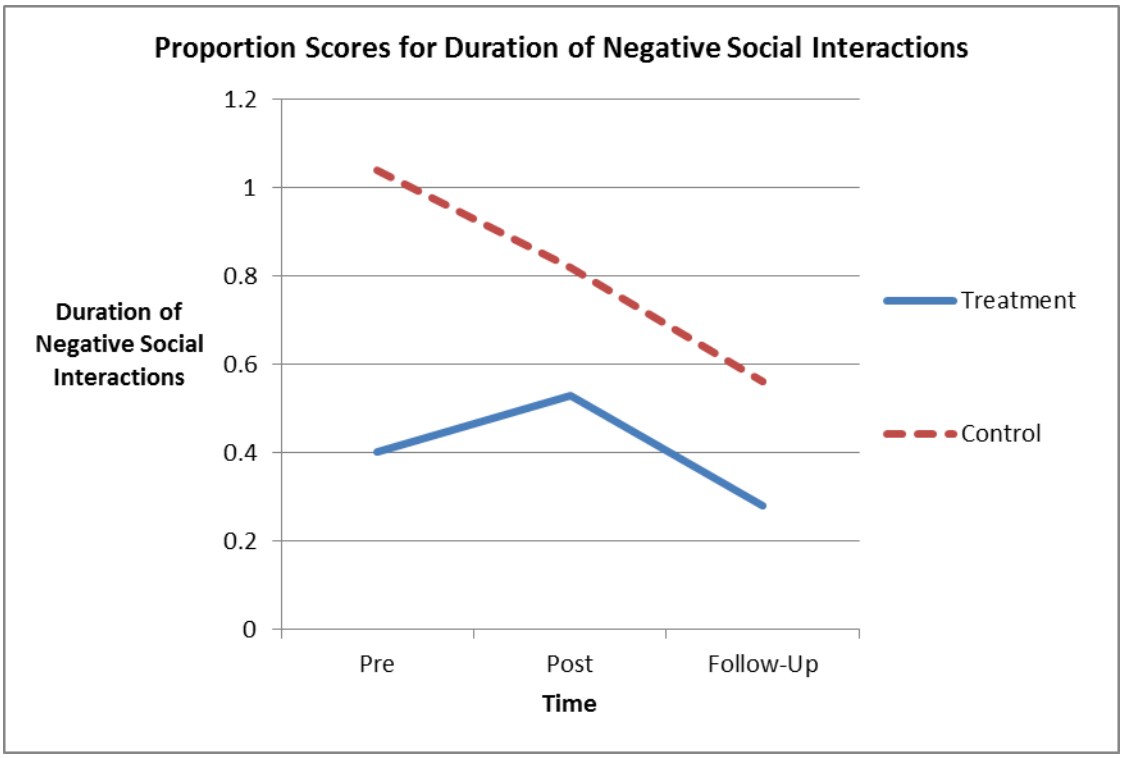


Figure 5a

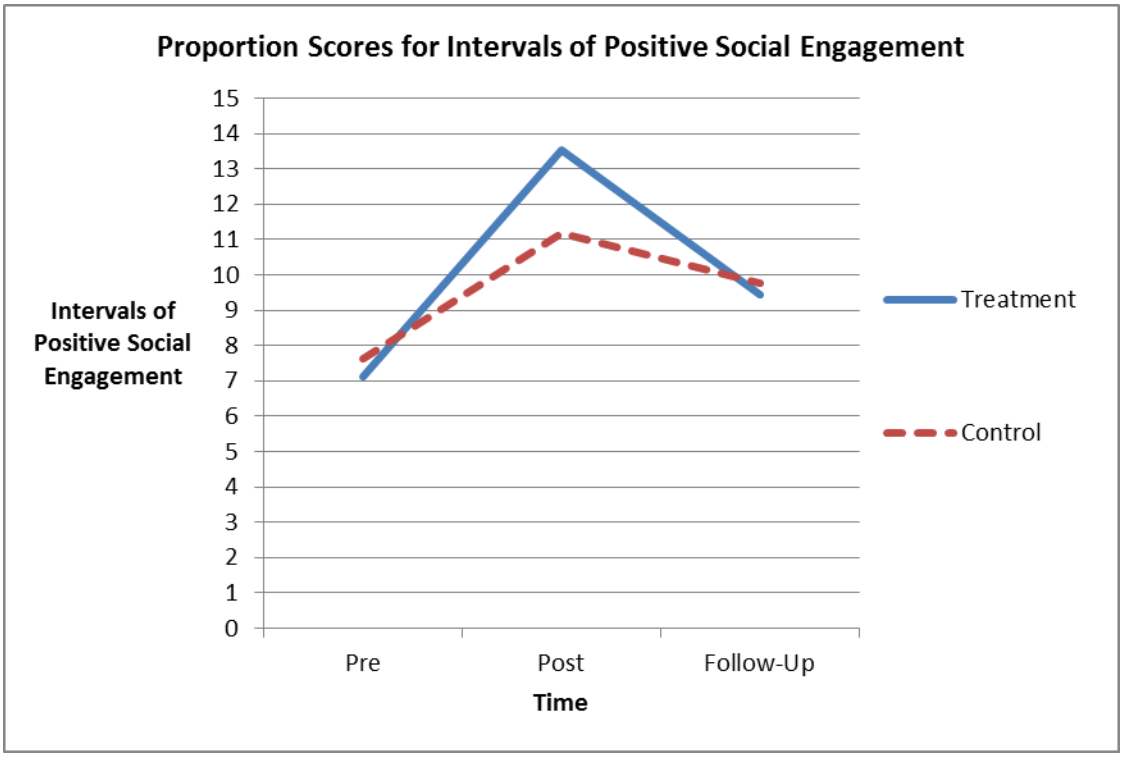


Figure 5b

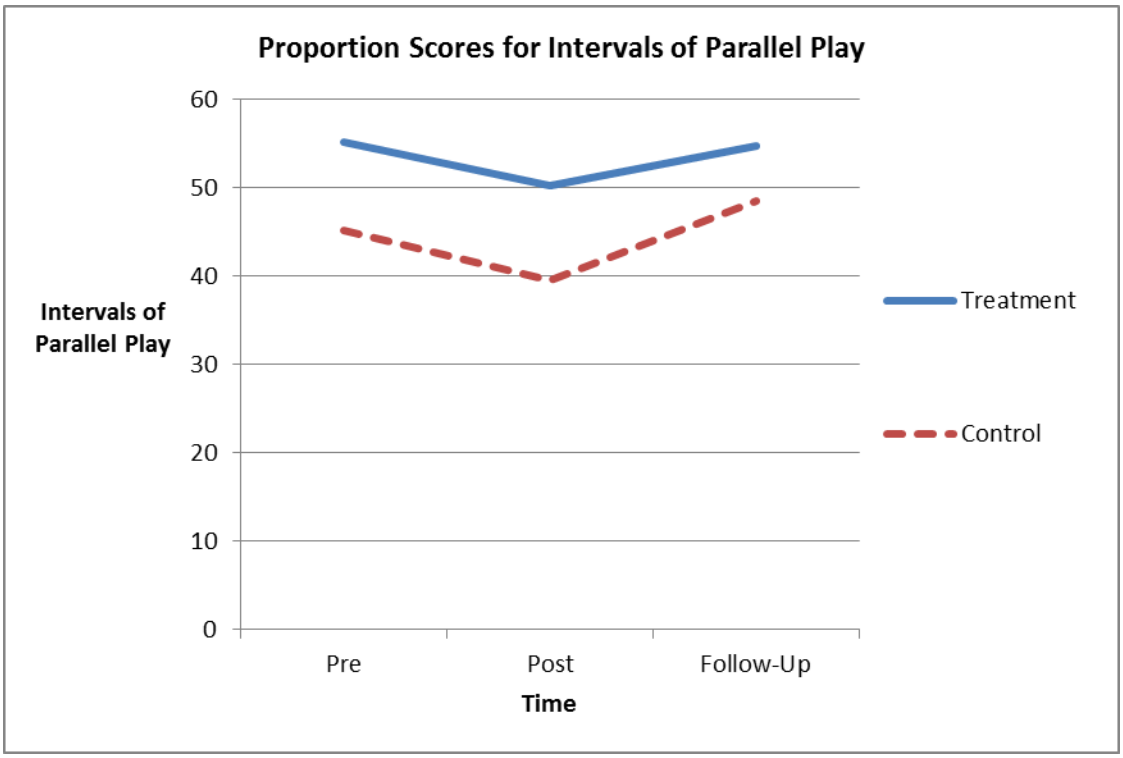


Figure 5c

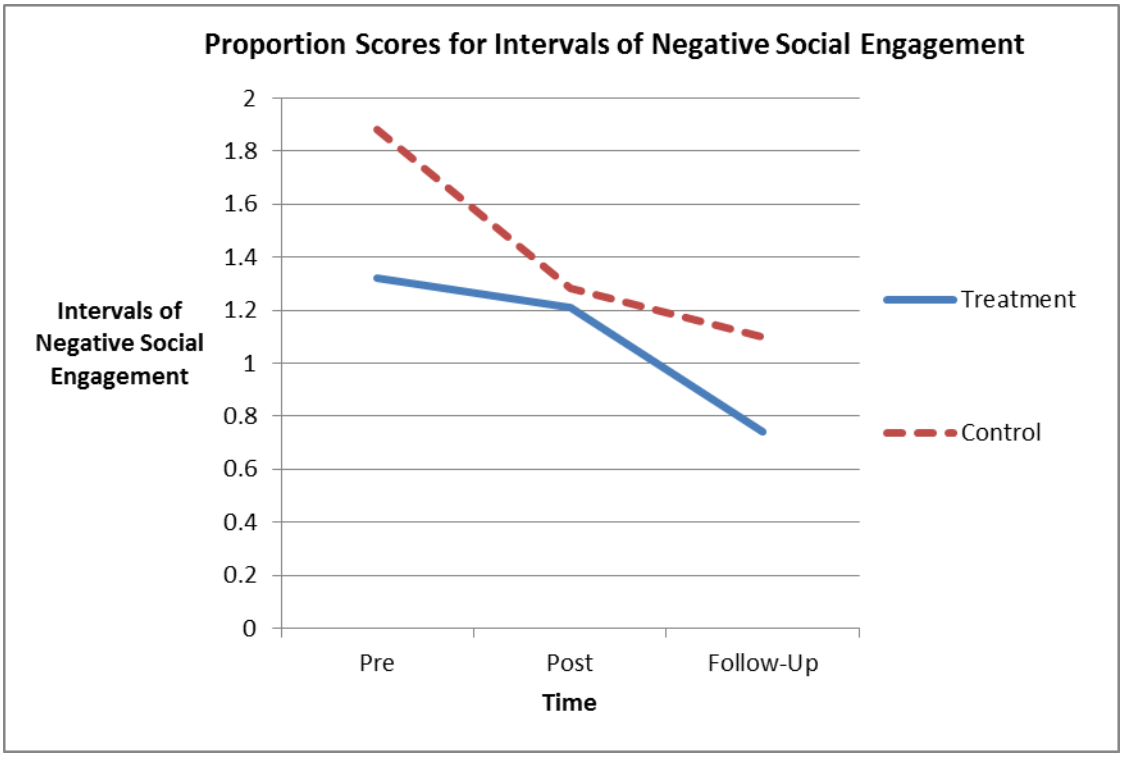


Figure 5d

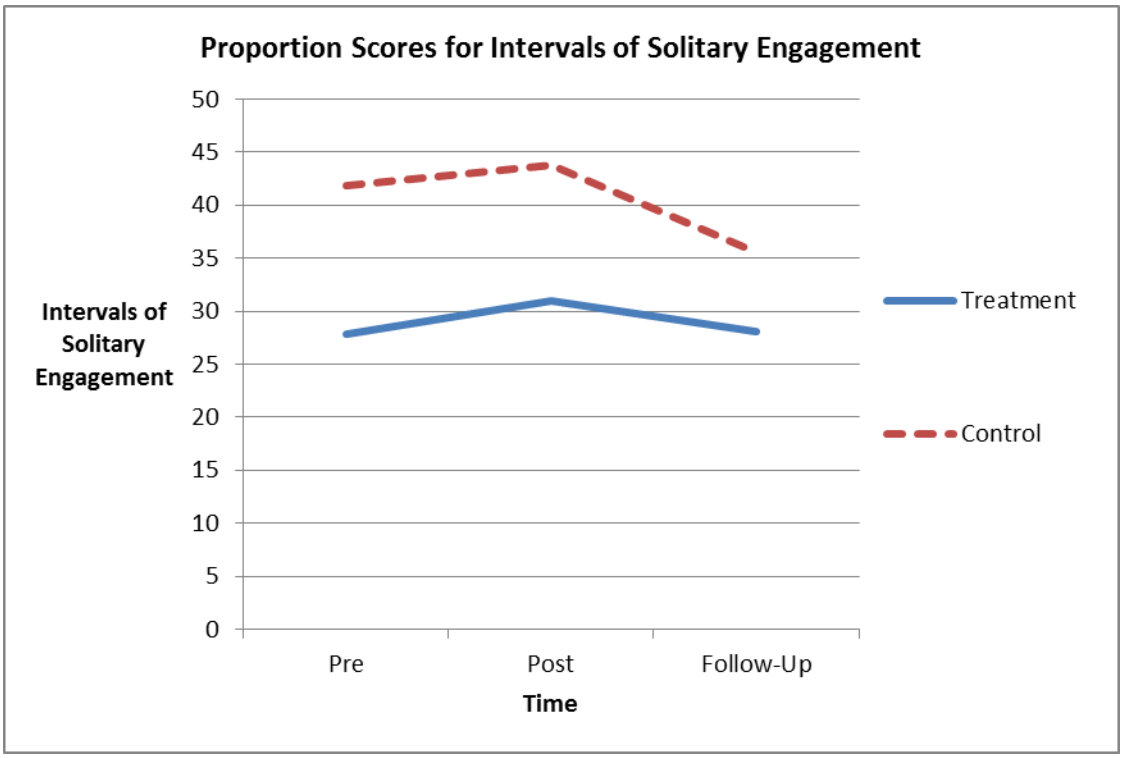


Figure 5e

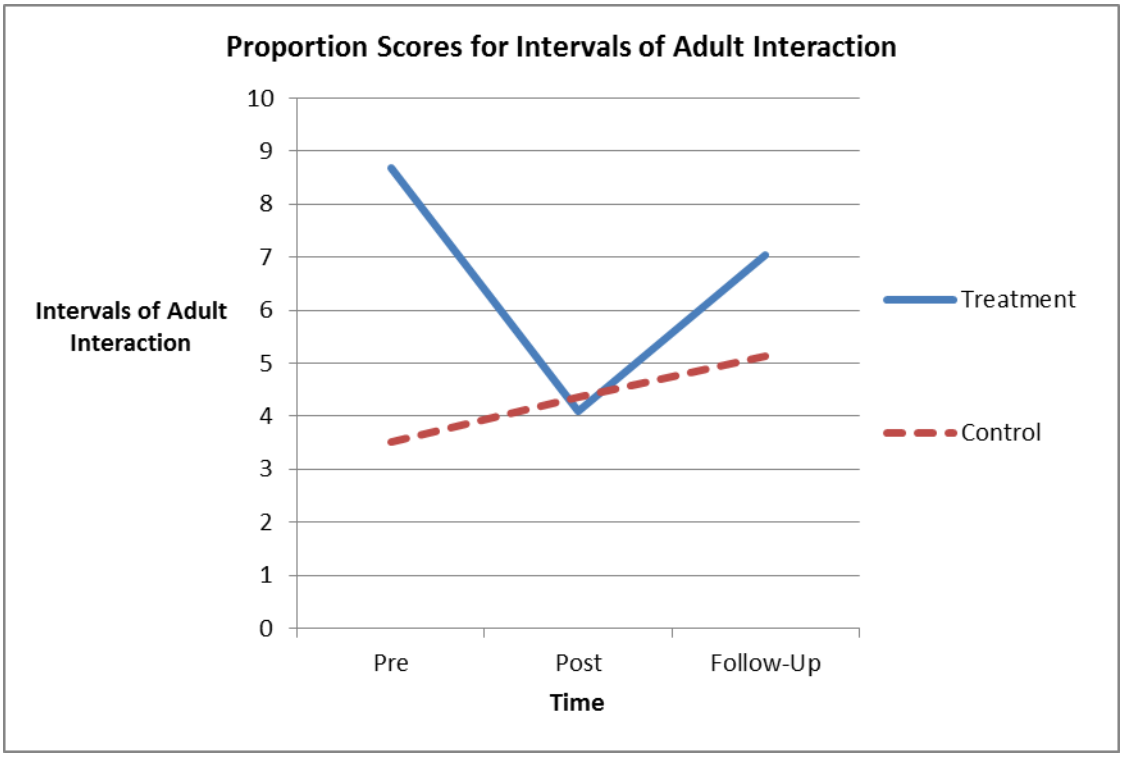

Proportion Scores for Intervals of Adult Interaction
Intervals of Adult Interaction
10
9
8
7
6
5
4
3
2
1
0
Pre
Post
Follow-Up
Time
Treatment
Control

Figure 6a

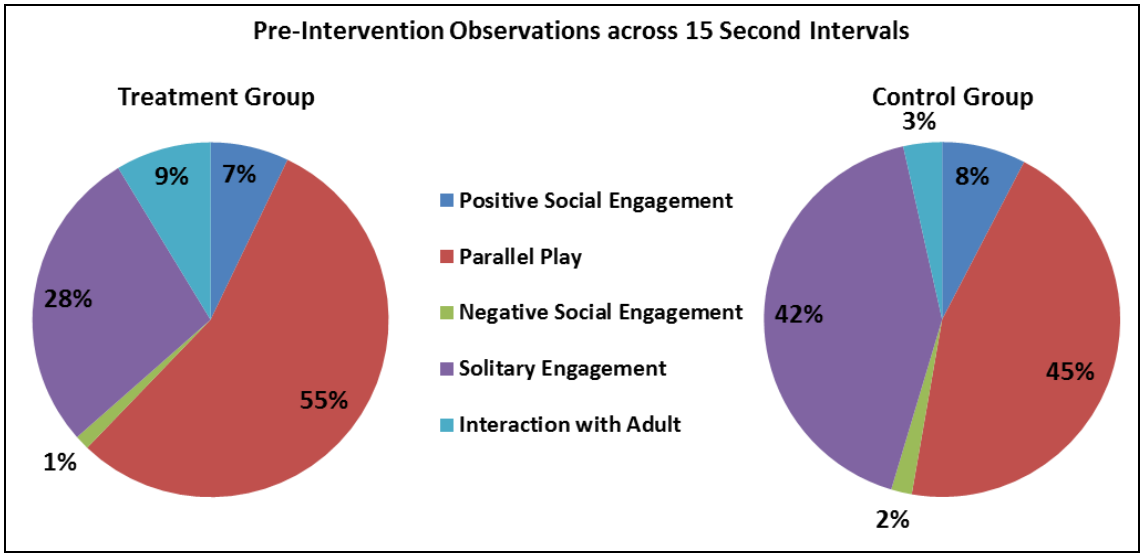


Figure 6b

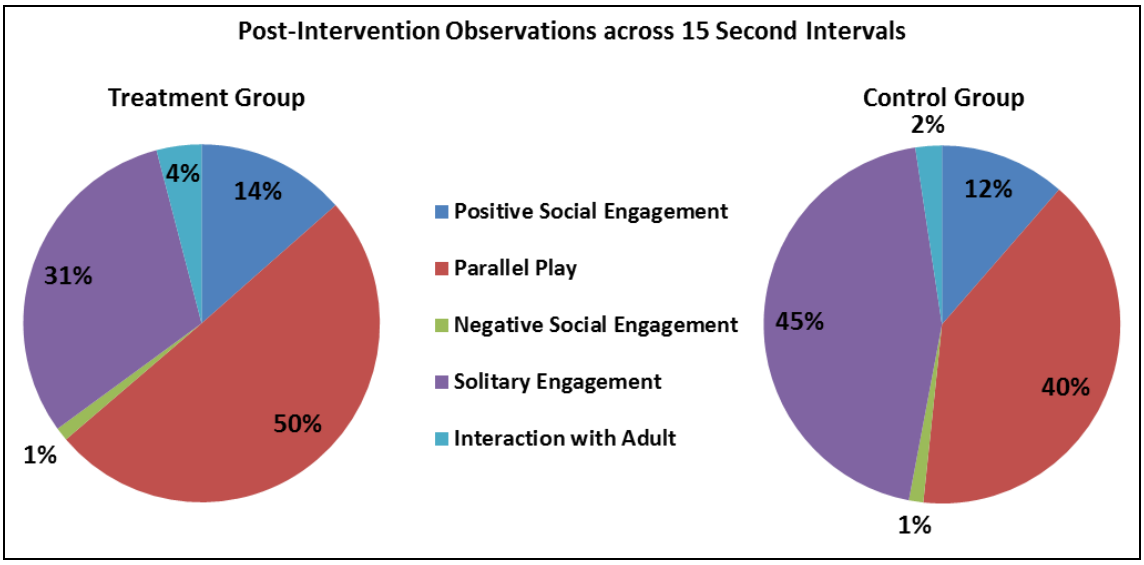
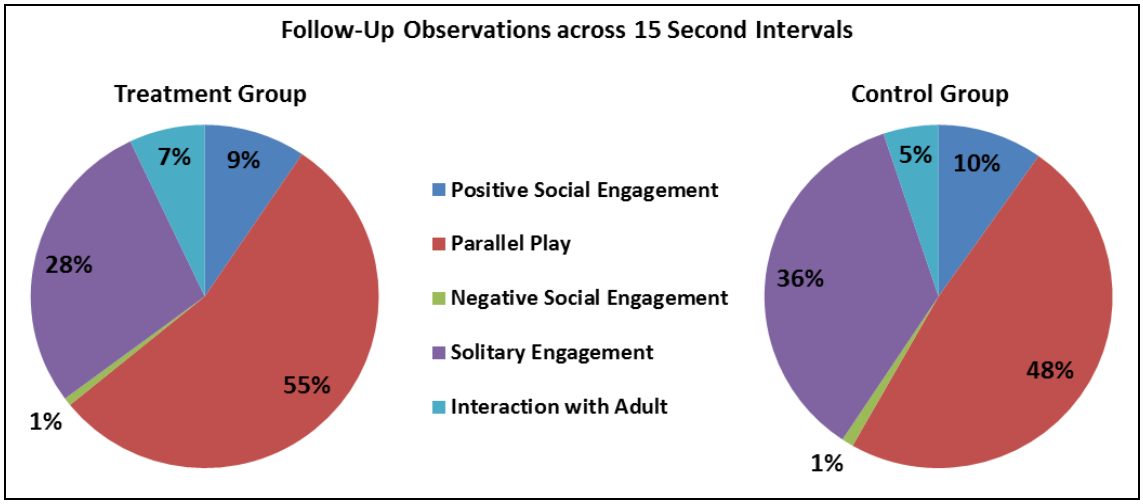


Figure 6c


Follow-Up Observations across 15 Second Intervals
Treatment Group
Control Group
9%
55%
1%
28%
7%
10%
48%
1%
36%
5%
Positive Social Engagement
Parallel Play
Negative Social Engagement
Solitary Engagement
Interaction with Adult

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APPENDIX A

CODING MANUAL FOR OBSERVED SOCIAL BEHAVIORS

Coding Manual for Observed Social Behaviors

General Guidelines:

- Each video is viewed at least twice, once to complete the duration-based coding and once to complete the interval-based coding. Coders may review a video as many times as necessary in order to obtain the appropriate code.
- Coders should complete the coding sheet at the end of this manual for each video.

DURATION-BASED CODING

Duration based coding is collected for two behaviors, positive social interaction and negative social interaction. The durations of these behaviors are recorded using stop watches and a 5-on, 5-off procedure.

5-on, 5-off Procedure

In order to implement the 5-on, 5-off procedure the coders constantly observe the child's behavior throughout the 20 minute videos. As soon as the target child initiates a social interaction or responds to a peer's initiation (see detailed descriptions of these behaviors below) the coders begin to count 5 seconds in their heads. If the child is already engaged in an interaction at the beginning of the video, coders begin to count to 5 immediately. If the child is still engaged in the interaction on the 5th second then the coder should immediately start the timer. When the coders perceive that the child has stopped interacting (e.g., turns away from the peer, walks away from the peer, stops speaking to the peer, stops playing with the same toy as the peer) they immediately begin to count to 5 in their heads. If by the end of the 5th second the child has not reengaged the peer, then the coder stops the timer. However, if the target child reengages the peer during the 5 seconds, then the timer should remain on.

1. **Positive Social Interaction**
   - The target child is engaged in an activity with at least one peer for at least 5 seconds.
   - None of the children show signs of aggression (e.g., hitting, pushing, throwing objects, pinching) or distress (e.g., crying, calling for a teacher) or avoidance (e.g., running away, ignoring).
   - Examples include:
     a. Talk to a peer
     b. Share toys
     c. Give help

2. **Negative Social Interaction**
   - The target child is engaged in an activity with at least one peer for at least 5 seconds.
   - At least one child shows signs of aggression (e.g., hitting, pushing, throwing objects), distress (e.g., crying, calling for a teacher) or avoidance.
   - Examples include:
     a. Arguing
     b. Whining
     c. Physical aggression

INTERVAL-BASED CODING

One code is assigned every 15 seconds during 20 minute behavioral observations. Coders wear MotivAiders that vibrate on the 15th second. The code is immediately assigned for the second after the buzz is felt. If the target child is 1) simultaneously engaging in a verbal and physical initiation (e.g., holding up a toy while saying "want to play?") or 2) simultaneously engaging in a verbal and physical response (e.g., hand a child a shovel while saying "yeah, let's make a big castle!") or 3) simultaneously avoiding and verbally responding (e.g., moving his body away while saying "stop!") only the verbal behavior was coded. To assign a code of physical initiation, verbal initiation, physical response, and verbal response, either a + of a – should be written on the coding sheet, depending upon whether the behavior was positive or negative. For all other codes, a tally should be marked for the assigned code.

1. **<u>Physical Initiation: Show/Point/Give (POSITIVE OR NEGATIVE)</u>**
   - The target child begins a new social exchange/*social interaction*, which is distinct from a previous exchange (e.g., new activity, new peer). Specifically, the child has not been interacting for at least 5 seconds prior to the initiation. A code of "initiates" is only assigned at the beginning of a social interaction.
   - Behavior is directed towards a peer in order to get a response.
   - Behaviors assigned to this code are physical (e.g., gesturing, reaching, holding an object up to show, and pointing at an item of interest).
   - Social initiations are coded as either positive or negative. Negative physical initiations include aggression, teasing (e.g., poking) or actions that would typically or have previously elicited distress or avoidance from the peer. Behaviors that are not clearly negative (i.e., questionable or neutral) should be coded as positive. See examples below:
     i. **POSITIVE →**
        a. Hold up a toy
        b. Point to an object
        c. Give peer a toy
        d. Put a toy in a peer's space
        e. Push a peer in a wagon
        f. Hold hands with a peer
        g. Smiling at a peer who is looking at the target child
        h. Immediately following a positive verbal initiation the target child is waiting for a response and looking at the peer
     ii. **NEGATIVE →**
        a. Push a peer
        b. Throw an object
        c. Hit a peer
        d. Pinch a peer

2. **<u>Verbal Initiation: (POSITIVE OR NEGATIVE)</u>**
   - The target child begins a new social exchange/*social interaction*, which is distinct from a previous exchange (e.g., new activity, new peer). Specifically, the child has not been interacting for at least 5 seconds prior to the initiation. A code of "initiates" is only assigned at the beginning of a social interaction.
   - Behavior is directed towards a peer in order to get a response and includes both greetings and invitations to play.
   - Behaviors assigned to this code are verbal.

- Social initiations are coded as either positive or negative. Negative verbal initiations include verbal aggression, teasing or statements that would typically or have previously elicited distress or avoidance from the peer. Behaviors that are not clearly negative (i.e., questionable or neutral) should be coded as positive. See examples below:
    - **i. POSITIVE →**
        a. "Hello!"
        b. "Watch me"
        c. "Let's play"
        d. "Wanna chase me?"
        e. "Let's be dinosaurs!"
    - **ii. NEGATIVE →**
        a. "Go away!"
        b. "Give me that toy!"

3. <u>Physical Response: (POSITIVE OR NEGATIVE)</u>

- The target child responds to a peer's social action within 5 seconds.
- The response is physical in nature (e.g., handing the peer a requested toy, pushing a peer on a swing)
- Social responses are coded as either positive or negative. Negative physical responses include aggression, teasing (e.g., poking) or actions that would typically or have previously elicited distress or avoidance from the peer. Behaviors that are not clearly negative (i.e., questionable or neutral) should be coded as positive. See examples below:
    - **i. POSITIVE →**
        a. Accept offered toy
        b. Hand peer requested toy
        c. Push peer in a wagon following request
        d. Put block on tower
        e. Look and/or smile at peer during *social interaction* (without the look = parallel play)
    - **ii. NEGATIVE →**
        a. Push a peer
        b. Throw an object
        c. Hit or pinch a peer
        d. Covering toys
        e. Blocking out a peer
        f. Taking toys

4. <u>Verbal Response: (POSITIVE OR NEGATIVE)</u>

- The target child responds to a peer's social action within 5 seconds.
- The response consists of a verbal statement (e.g., "Sure, let's go!") that indicates agreeing to play/join.
- Social responses are coded as either positive or negative. Negative verbal responses include verbal aggression, teasing or statements that would typically or has previously elicited distress or avoidance from the peer. Behaviors that are not clearly negative (i.e., questionable or neutral) should be coded as positive. See examples below:
    - **i. POSITIVE →**
        a. "Ok!"

b. "Sure, let's go"
c. "Yeah, let's build a castle!"
d. "I'm coming with you"

ii. NEGATIVE →

a. "No!"
b. "Uh uh, I don't want to"
c. "Go away!"
d. Crying

5. <u>Parallel Play</u>

- The target child is engaged in play within close proximity of a peer.
- The two children are not engaged with each other.
- The target child and the peer do not have to be playing with the same toy.
- Distances that are considered "close proximity" vary based on the environment. On the playground, children should be less than 5 feet apart without large objects or adults blocking the space between them. In the classroom, children should be in the same designated classroom area (e.g., kitchen area, art table, book area, circle), without large objects or adults blocking the space between them.
- Examples include:
    a. Sit in the sandbox and fill separate buckets
    b. In kitchen area, one plays with the oven, the other with the food
    c. Two kids in the tunnel

6. <u>Avoids/Ignores</u>

- Avoiding is observed when the target child either physically moves away from or turns away from a peer.
- Ignoring is observed when the target child fails to respond when he or she can obviously hear or see a peer's social attempt.
- Examples include:
    a. Walk away from initiating peer
    b. Turn away from peer offering toy
    c. No response when peer directs statement "Johnny, let's play"

7. <u>Solitary Engagement</u>

- The target child is engaged in an activity by himself. This could include appropriate play, scripting, restricted or repetitive behaviors, or staring blankly into space.
- Peers are not in close proximity (exception: if a peer walks or runs behind the target child, even though he or she is technically in proximity, this should still be coded at solitary engagement)
- The target child watches a peer's activities, but does not attempt to join in.
- The target child is not engaged in a *social interaction*.
- Examples include:
    a. Swing alone
    b. Play with toys alone
    c. Use an iPad alone
    d. Self-stimulatory or repetitive behavior
    e. Stare into space
    f. Watch a peer swing on the swing set
    g. Listen to peers' conversation without trying to engage with them

8. <u>Adult Engagement</u>

- The target child attempts to interact with or responds to a teacher, aide or member of the research team.
- Behavior that was immediately preceded by a teacher prompt should be coded as "Adult Engagement". Behavior that occurs after the initial response to teacher should be coded elsewhere.
- Examples include:
    a. Talk to a teacher
    b. Try to get a teacher's attention by calling her name
    c. Ask a teacher a question
    d. Hold a teacher's hand
    e. Show her an object
    f. Respond to a teacher's command
    g. Answer a teacher's question

9. <u>Not Codable</u>

- The target child moves out of view of the camera.
- This should only be assigned if the child cannot be seen at the moment he or she should receive a code.

Child's ID #: _____ **Date:** _____ **Start Time:** _____

Coder's Name: _____ **Playground or Classroom?** **End Time:** _____

	Initiates: Physical (+/-)	Initiates: Verbal (+/-)	Responds: Physical (+/-)	Responds: Verbal (+/-)	Parallel Play	Avoids/ Ignores	Solitary Engagement	Adult Engagement	No Code
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0:30									
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1:45									
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	Initiates: Physical (+/-)	Initiates: Verbal (+/-)	Responds: Physical (+/-)	Responds: Verbal (+/-)	Parallel Play	Avoids/ Ignores	Solitary Engagement	Adult Engagement	No Code

	Initiates: Physical (+/-)	Initiates: Verbal (+/-)	Responds: Physical (+/-)	Responds: Verbal (+/-)	Parallel Play	Avoids/ Ignores	Solitary Engagement	Adult Engagement	No Code
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19:45									
20:00									
	Initiates: Physical (+/-)	Initiates: Verbal (+/-)	Responds: Physical (+/-)	Responds: Verbal (+/-)	Parallel Play	Avoids/ Ignores	Solitary Engagement	Adult Engagement	No Code

Positive Social Interactions (Record Durations)	Negative Social Interaction (Record Durations)

APPENDIX B

TREATMENT MANUAL

Treatment Manual

SECTION I: Introduction

Overview of the treatment procedure
- Structure of the Intervention
- Materials
- Behavior Management
- Training Sessions
- Generalization Sessions

SECTION II: Treatment Content for Training Sessions*

Sessions 1 & 2
- Skill 1: Get Attention
- Skill 2: Say What You Play

Sessions 3 & 4
- Skill 3: Play Close
- Skill 4: Give Choices
- Skill 5: Say nice things

Sessions 5 & 6
- Skill 6: Show Different Play
- Skill 7: Take Turns

Sessions 7 & 8
- Skill 8: Ask to Play
- Skill 9: Play His (Her) Way

Session 9
- Review of All Target Skills

SECTION III: Generalization Sessions

Playground Sessions

Classroom Sessions

*Adapted from Kids Helping Kids by Karen Pierce and Laura Schreibman, 2007

Overview of the Treatment Procedure

Structure of the Intervention

The intervention consists of three types of sessions: 1) peer training sessions with therapists only, 2) peer training sessions with participants, and 3) generalization sessions. The training sessions are coupled. For example, in the first session, 2 skills (e.g., get attention, say what you play) are taught to the peers by therapists. Then in the next session, therapists review those 2 skills with the peers briefly before the participants enter the session to receive instruction and reinforcement. Eight training sessions are conducted in this manner (i.e., odd numbered sessions are peer training with therapists only, even numbered sessions are peer training with participants). The ninth session is a review of all skills covered and includes the participants. If peers have not demonstrated the desired skills multiple times (spontaneously or prompted), additional training sessions should take place. Following the completion of training, five generalization sessions occur at recess and five occur during free play in the classroom.

Materials

A variety of toys are used during each training session (i.e., based on developmental level, child interests, etc.). The number of toys available during one session is limited (e.g., 3-5) so that children are more likely to play together. The toys selected should lend themselves to the skills that are being taught. It is beneficial to select at least some toys that are not available in the classroom in order to enhance interest and participation. Novel toys are introduced in later sessions to maintain engagement. Toys that are appropriate include, but are certainly not limited to, Mr. Potato Head, Veterinarian Set, Car Ramp, Play Doh Pizza Shop, Hungry Hungry Hippos, and Chameleon Crunch. Other materials that are needed include stickers, sticker charts, smiley and frowney face visuals, data sheets, clipboards and a tablet computer or laptop.

Behavior Management

The training environment is physically structured to increase attention, participation, and compliance for both peer-trainers and participants. For example, distracting items are removed, children's seats are clearly marked with their names, and therapists maintain control of toys during didactic components. Children also receive frequent verbal praise for appropriate behavior (e.g., "Good sitting!" "Nice looking!" "Great waiting!"). Furthermore, children receive visual praise (i.e., stickers) for demonstrating target behaviors. If the peers need extra motivation, a certain number of stickers will be exchanged for a larger reward (e.g., prize from a treasure box, time on the iPad, or a piece of candy). This is not implemented in the first session in order to assess motivation. Additionally, several breaks to play with toys/practice skills are scheduled throughout each session and there is a longer opportunity to play/practice at the end. Children may need to be reminded of those reinforcing play times during the session (e.g., "First listen/watch, then you can play). If a child is still not able to attend and participate, he will return to his classroom and the therapists will include him later with different classmates.

Peer Training Sessions with Therapists Only

Training takes place outside of the classroom in an environment relatively free of distractions. At least two therapists conduct each training session so that they can appropriately model skills,

prompt peers, and reinforce desired behaviors. Peers are trained in groups of 2 or 3. The typical structure of a peer training session with therapists is:

- Remind peers of the purpose of being a "special helper"
- Remind peers of the reward system
- Introduce and model *Skill A, Part 1*
- Role play *Skill A, Part 1* with therapists
- Introduce and model *Skill A*, *Part 2*
- Role play *Skill A, Part 2* with therapists
- Demonstrate "ways not to play" for *Skill A*
- Introduce and model *Skill B*
- Role play *Skill B* with therapists
- Demonstrate "ways not to play" for *Skill B*
- Longer role play of *Skills A and B* with peers

While therapists are modeling the appropriate behaviors, a picture of a smiley face is visible to the peers. After each demonstration, peers are asked, "Did she do a good job?", while therapists smile, nod, and point to the smiley face. The therapist then asks, "What did she do that was good?" and "How did that make (name) feel?" and reinforces any reasonable answers. The same procedure is followed for the "ways not to play" with the following exceptions: 1) the frowney face is visible, 2) while the therapist asks, "Did she do a good job?" she frowns, shakes her head, and points to the frowney face, and 3) the therapist asks, "What did she do that was bad?" These questions are intended to increase attention and enhance understanding of the target social skills. Children never practice the "ways not to play."

During each role play, therapists prompt and reinforce target behaviors. Prompting is verbal and/or demonstrative depending upon the needs of each individual child. Therapists offer verbal and visual reinforcement (e.g., say "great asking to play!" and give a sticker) for most attempts to implement target skills (i.e., get attention, say what you play, play close, give choices, say nice things, show different play, take turns). Stickers are placed on a sticker sheet that contains the child's name, at least one visual representation of a target skill, and several empty circles.

Peer Training Sessions with Participants

Training sessions with peers and participants are similar to those with therapists only. Training takes place in an environment relatively free of distractions. At least two therapists conduct each training session so that they can appropriately model skills, prompt children, and reinforce desired behaviors. Training sessions with peers and participants usually consist of 1-2 peers and 1-2 participants. The typical structure of a peer training session with participants is:

- Remind peers of the purpose of being a "special helper"
- Remind peers of the reward system
- Briefly review and model *Skill A*
- Role play *Skill A*
- Briefly review and model *Skill B*
- Role play *Skill B*
- Role play *Skills A and B* with peers

- Bring in participants, remind them of the purpose and reward system
- Brief demonstration of *Skills A and B* – therapist and/or video modeling
- Longer role play of *Skills A and B* with participants

Modeling, prompting, and reinforcing target skills are implemented as described above. After the peers have reviewed and practiced the target skills, 1-2 participants join the session. Children with ASD receive brief demonstrations of target skills (via video and/or in vivo modeling) before all of the children have the opportunity to play together. Peer and participant treatment response data is collected during all role plays. Target behaviors are recorded as either "spontaneous," "prompted" or "refused/behavior problem" depending upon each child's performance. An example data sheet is provided at the end of this manual.

Generalization Sessions

At least five generalization sessions occur on the playground during recess and five occur in the classroom during free play. On the playground, one peer is paired with one participant. In order to enhance engagement, one of the children is given a choice between two possible play partners. In the classroom, children are assigned to small groups (i.e., 2-4 children) by teachers. Throughout the generalization sessions, therapists provide prompts and reinforcement. Peers and participants are verbally, demonstratively and/or physically prompted to use the target social skills for approximately 10-15 minutes. Treatment response data is collected for both peers and participants on the provided data sheets. Peers and participants are rewarded (e.g., verbal praise, stickers) for effort to demonstrate target skills.

Session 1 → Peer Training

❖ Initial Explanation

"You get to be a special helper! This means you get to help other kids in your class learn how to play and make friends. Sometimes you will get to watch a movie on the iPad and then do what the movie did. You will also get to play with special toys."

❖ Behavior Reinforcement System

"When you try hard to play with your friend, you will get a sticker!"

- Show peer sticker card and stickers. Allow them to select their stickers.
- [If the peers need extra motivation, a certain number of stickers will be exchanged for a larger reward (e.g., something from a treasure box, extra time on the iPad or a piece of candy). This is not implemented in the first session in order to assess motivation.]

❖ Introduce and Model Target Skill 1, Part 1 (Skills are modeled with at least 2 different toys, so that peers may choose preferred items for role play.)

Get Attention 1 →

DOs (Make the smiley face visible) ☺

i. Sit or stand in front of your friend and look at their eyes
ii. Hold a toy near their eyes
iii. Say his/her name

"Now we are going to learn some good ways to be a special helper! The first thing is to get your friends attention so they know you want to play. You need to face them and look them in the eye. Then hold up a toy near their eyes."

- Therapist 1 ("participant"): looks at light on ceiling and repetitively moves object
- Therapist 2 ("peer"): sits in front of target, places toy in front of target's eyes, waits for eye contact, says do you want to play _(toy)_

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice

- Each child demonstrates this skill at least once

❖ Introduce and Model Target Skill 1, Part 2

Get Attention 2 →

DOs (Make the smiley face visible) ☺

i. Tap your friend on the shoulder
ii. Say his/her name

*"Next we are going to **get attention** another way. This time you will by tap your friend on the shoulder and say their name."*

- Therapist 1 ("participant"): looks at light on ceiling and repetitively moves object
- Therapist 2 ("peer"): sits in front of target, holds toy in front of eyes, taps on shoulder and says "_(name)_ do you want to play _(toy)_"

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice
- Each child demonstrates this skill at least once

❖ Introduce and Model "Don'ts" for Target Skill 1

DON'Ts (Make the frowney face visible) ☹

i. Get attention from behind
ii. Ask questions
iii. Yell and/or whisper

"Now we are going to show you ways not to play."
- Demonstrate getting attention from behind
- Demonstrate asking questions (e.g., "What's your birthday?" "What's your favorite color?" "Where's your mom?")
- Demonstrate yelling and/or whispering

"Did she (he) do a good job?" Frown, shake head, and tap frowney face.
"What did she (he) do that was bad?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap frowney face. Praise reasonable answers.

❖ Introduce and Model Target Skill 2

Say What You Play →

DOs (Make the smiley face visible) ☺

i. Tell what you are doing while you are doing it

*"The next thing we are going to learn is to **say what you play.** This means that when you are playing you tell your friend about what you are doing."*
- Therapist 1("participant"): playing parallel to peer
- Therapist 2 ("peer"): plays with similar toys and narrates the action

"Did she (he) do a good job?" Frown, shake head, and tap frowney face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice
- Each child demonstrates this skill at least once

❖ Introduce and Model "Don'ts" for Target Skill 2

DON'Ts (Make the frowney face visible) ☹

i. Forget to say what you are playing
ii. Talk to fast
iii. Use lots of words

"Now we are going to show you the ways not to play."

- Demonstrate no talking – play silently
- Demonstrate talking really fast
- Demonstrate lots of language

"Did she (he) do a good job?" Frown, shake head, and tap frowney face.
"What did she (he) do that was bad?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap frowney face. Praise reasonable answers.

❖ Role Play/Peers Practice

*"Now let's try it all together! We are going to practice our good play skills. Remember, we are working on **Getting Attention**, and **Playing Close**."*

- Do this many times with the peers practicing on each other
- Incorporate new toys and lots of praise

"You guys have done such a great job! Remember as a special helper you are helping other friends learn to play better. Next time we are going to practice with different friends."

Session 2 → Peer & Participant Training

❖ Introduction: Purpose and Rewards

*"Hello special helpers! Remember last time we learned how to **get attention** and **say what you play**. Today we are going to practice those things with different friends. Remember you are helping your friends learn to play well and be good friends. When you try hard to play with your friends you will get a sticker!"*

- Allow peers to select their stickers.

❖ Briefly Model Target Skill 1, Part 1

Get Attention 1 →

DOs (Make the smiley face visible) ☺

i. Sit or stand in front of your friend and look at their eyes
ii. Hold a toy near their eyes
iii. Say his/her name

*"Remember, you need to **get your friend's attention** so they know you want to play. First, you need to face them and look them in the eye. Then hold up a toy near their eyes. You could also say their name."*

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill once with either therapists or peers

❖ Briefly Model Target Skill 1, Part 2

Get Attention 2 →

DOs (Make the smiley face visible) ☺

i. Tap them on the shoulder
ii. Say his/her name

*"The other way to **get attention** is to tap them on the shoulder and say their name."*

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill once with either therapists or peers

❖ Briefly Model Target Skill 2

Say What You Play →

DOs (Make the smiley face visible) ☺

i. Tell what you are doing

*"The last thing that we learned was **say what you play**. Remember that means to talk about what you are doing while you are playing."*

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill once with either therapists or peers

❖ More Role Play

*"Now let's try it all together! We are going to practice our good play skills. First **get your friends attention** and then **say what you play**"*

- Peers role play a couple of times to practice with each other
- Incorporate new toys and lots of praise

*"You guys have done such a great job, now it is time to try this with another person in your class! Remember as a special helper you are helping them learn to play better. Try to use your good play skills to **get their attention** and then **say what you play**."*

❖ Bring in Participants

"You get to have some special time to play with friends from your class! When you try to play together you will get a sticker! Playing together means playing close to your friend, looking at them and listening to them."

- Show participants sticker card and stickers. Allow them to select their stickers.

❖ Briefly Demonstration of Skills 1 and 2

*"We are also learning to **get attention** and **say what you play.** Now we are going to watch a movie of two boys playing together and then you will get a chance to play!"*

- Watch movie and point out skills

❖ Longer Role Play/Practice with Participants

*"Now you guys get to show off how well you can play! Try to play like the boys in the movie by **getting attention** and **saying what you play**. You also want to play close to your friend, look at them and listen to them."*

- Children play for 20-30 minutes
- Reward skill attempts with verbal praise and visual/tangible reinforcement
- Reward participants for:
  - Trying to Looking at their peer
  - Trying to Listening to their peer
  - Trying to **get attention**
  - Trying to **say what you play**
  - Trying to **play close**
- Reward peers for:
  - Trying to **get attention**
  - Trying to **say what you play**

Session 3 → Peer Training

❖ Introduction: Purpose and Rewards

*"Hello special helpers! Last week we learned how to **get attention** and **say what you play**. Today we are going to learn 3 new ways to help your friends learn how to play well! Remember, when you try hard to play with your friends you will get a sticker!"*

- Allow peers to select their stickers.

❖ Introduce and Model Target Skill 3, Part 1 (Skills are modeled with at least 2 different toys, so that peers may choose preferred items for role play.)

Play Close 1 →

DOs (Make the smiley face visible) ☺

i. Sit or stand close to your friend
ii. Play with toys

*"The first thing we are going to learn today is called **play close**. This means that you should sit or stand close to you friend while you play."*

- Therapist 1 ("participant"): sits playing with toys
- Therapist 2 ("peer"): moves close to target, plays with toys

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice

- Each child demonstrates this skill at least once

❖ Introduce and Model Target Skill 3, Part 2

Play Close 2 →

DOs (Make the smiley face visible) ☺

i. Sit or stand close to your friend
ii. Bring toys to your friend if there aren't any

"If your friend is not close to any toys, bring some toys close to your friend."

- Therapist 1 ("participant"): sits away from toys and others
- Therapist 2 ("peer"): moves close to target and brings a few toys

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice

- Each child demonstrates this skill at least once

❖ Introduce and Model "Don'ts" for Target Skill 3

DON'Ts (Make the frowney face visible) ☹

i. Play far away
ii. Take your friend's toys
iii. Move close without any toys

"Now we are going to show you some bad ways to play close."

- Demonstrate playing far away
- Demonstrate taking toys
- Demonstrate moving close without toys

"Did she (he) do a good job?" Frown, shake head, and tap frowney face.
"What did she (he) do that was bad?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap frowney face. Praise reasonable answers.

❖ Introduce and Model Target Skill 4, Part 1

Give Choices 1→

DOs (Make the smiley face visible) ☺

i. If your friend is not playing or looking at any toys – give 2 choices
ii. Hold up two toys
iii. Ask, "do you want to play ____ or ____?"

*"The next thing we are going to learn is called **give choices**. To do this, first see if your friend is already playing with or looking at something. If (s)he is not, give two choices and show them."*

- Therapist 1 ("participant"): looking around the room/at the ceiling, nothing in hands
- Therapist 2 ("peer"): "Do you want the cars or the lizard?" (holding up both items up at eye level)

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice

- Each child demonstrates this skill at least once

❖ Introduce and Model Target Skill 4, Part 2

Give Choices 2→

DOs (Make the smiley face visible) ☺

i. If your friend is playing with or looking at something – one of the choices should be that thing
ii. Point to the toy your friend has and also hold up a different toy
iii. Ask, "do you want to play ____ or ____?"

"If your friend is looking at something or playing with something already, point to it and hold up a new toy. Then ask which one they want to play with."

- Therapist 1 ("participant"): looking at the Potato Head
- Therapist 2 ("peer"): points to or taps Potato Head, holds up another toy at eye level, "Want to play Potato Head or animals?"

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice
- Each child demonstrates this skill at least once

❖ Introduce and Model "Don'ts" for Target Skill 4

DON'Ts (Make the frowney face visible) ☹

i. Give choices between toys your friend does not like
ii. Don't give choices

"Now we are going to show you ways not to play. You will help your friend more if you pick toys that he likes."

- Demonstrate choosing toys the target is not interested in
  - Therapist 1 ("participant"): pushes away lizard, looks at the Potato Head
  - Therapist 2 ("peer"): holds up lizard at eye level, "Want to play lizard?"
- Demonstrate not giving choices
  - Therapist 1 ("participant"): looking around room, not at peer
  - Therapist 2 ("peer"): doesn't get attention or hold up toy, says "Let's play cars!"
  - Therapist 1 ("participant"): keeps looking around room

"Did she (he) do a good job?" Frown, shake head, and tap frowney face.
"What did she (he) do that was bad?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap frowney face. Praise reasonable answers.

❖ Introduce and Model Target Skill 5

Say Nice Things →

DOs (Make the smiley face visible) ☺

i. Have fun playing with your friend
ii. Tell your friend they are doing a great job and that this is fun
iii. Laugh

*"The last thing we are going to learn today is called **say nice things**. This means that we want you to have fun playing with your friend! Tell your friend that he is doing a great job and that you like playing with him. Remember, laugh if something is funny and you are having fun!"*

- Therapist 1 ("participant"): sits playing with toys
- Therapist 2 ("peer"): playing with same toys, "This is so fun!", "You're really good at __"

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.

"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

- ❖ Role Play/Peers Practice
  - Each child demonstrates this skill at least once

- ❖ Introduce and Model "Don'ts" for Target Skill 5

  DON'Ts (Make the frowney face visible) ☹

  i. Say mean things

"Now we are going to show you ways not to play."

- Demonstrate saying mean things (e.g., "You are not good at ___." "Leave me alone!")

"Did she (he) do a good job?" Frown, shake head, and tap frowney face.
"What did she (he) do that was bad?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap frowney face. Praise reasonable answers.

- ❖ Role Play/Peers Practice

*"Now let's try it all together! We are going to practice our good play skills. Remember, we are working on **playing close**, **giving choices**, and **saying nice things**."*

- Do this many times with the peers practicing on each other
- Incorporate new toys and lots of praise

"You guys have done such a great job! Remember as a special helper you are helping other friends learn to play better. Next time we are going to practice with different friends."

Session 4 → Peer & Participant Training

❖ Introduction: Purpose and Rewards

*"Hello special helpers! Remember last time we learned how to **play close**, **give choices**, and **say nice things**. Today we are going to practice those things with different friends. Remember you are helping your friends learn to play well and be good friends. When you try hard to play with your friends you will get a sticker!"*

- Allow peers to select their stickers.

❖ Briefly Model Target Skill 3

Play Close→

DOs (Make the smiley face visible) ☺

i. Sit or stand close to your friend
ii. Bring toys to your friend if there aren't any
iii. Play with toys

*"Remember it is important to **play close** so that your friend knows that you want to play. This means that you should sit or stand close to your friend while you play. If your friend is not close to any toys, bring some toys to your friend."*

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill once with either therapists or peers

❖ Briefly Model Target Skill 4, Part 1

Give Choices 1→

DOs (Make the smiley face visible) ☺

i. If your friend is not playing or looking at any toys – give 2 choices
ii. Hold up two toys
iii. Ask, "do you want to play ____ or ____?"

*"It is important to **give choices** so that your friend gets to play something he likes. If your friend is not playing with or looking at anything, give 2 choices."*

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill once with either therapists or peers

❖ Briefly Model Target Skill 4, Part 2

Give Choices 2→

DOs (Make the smiley face visible) ☺

i. If your friend is playing with or looking at something – one of the choices should be that thing
ii. Point to the toy your friend has and hold up a different toy
iii. Ask, "do you want to play ____ or ____?"

"If your friend is playing with or looking at something point to that thing as one of the 2 choices."

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill once with either therapists or peers

❖ Briefly Model Target Skill 5

Say Nice Things→

DOs (Make the smiley face visible) ☺

i. Have fun playing with your friend
ii. Tell your friend that they are doing a great job and that this is fun
iii. Laugh

*"The last thing that we learned was **say nice things**. Remember, this means that we want you to have fun playing with your friends! You can tell your friend that he is doing a great job and that you like playing with him. You can also laugh if something is funny and you are having fun!"*

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill once with either therapists or peers

❖ More Role Play

*"Now let's try it all together! We are going to practice our good play skills. To do this let's **play close** to your friends, **give them choices** and **say nice things**."*

- Peers should role play a couple of times to practice with each other
- Incorporate new toys and lots of praise

*"You guys have done such a great job, now it is time to try this with other people in your class! Remember as a special helper you are trying to help them learn to play better. Try to use your good play skills and **play close** to your friends, **give them choices** and **say nice things**."*

❖ Bring in Participants

"Welcome back! You guys get to have some special time to play with friends from your class! When you try to play together you will get a sticker. Playing together means playing close to your friend, looking at them and listening to them."

- Show participants sticker card and stickers. Allow them to select their stickers.

❖ Briefly Demonstration of Skills 3, 4, and 5

*"We are also learning to **play close** to your friends, **give choices** and **say nice things.** Now we are going to watch a movie of two boys playing together and then you will get a chance to play!"*

- Watch movie and point out skills

❖ Longer Role Play/Practice with Participants

*"Now you guys get to show off how well you can play! Try to play like the boys in the movie by **playing close, giving choices,** and **saying nice words**. You also want to play close to your friend, look at them and listen to them."*

- Children play for 20-30 minutes
- Reward skill attempts with verbal praise and visual/tangible reinforcement
- Reward participants for:
  - Trying to look at their peers
  - Trying to listen to their peers
  - Trying to **play close**
  - Trying to **give choices**
  - Trying to **say nice things**
  - Trying to **get attention**
  - Trying to **say what you play**
- Reward peers for:
  - Trying to **play close**
  - Trying to **give choices**
  - Trying to **say nice things**
  - Trying to **get attention**
  - Trying to **say what you play**

Session 5 → Peer Training

❖ Introduction: Purpose and Rewards

*"Hello special helpers! Last week we learned how to **play close**, **give choices** and **say nice things**. Today we are going to learn 2 new ways to help your friends learn how to play well! Remember, when you try hard to play with your friends you will get a sticker!"*

- Allow peers to select their stickers.

❖ Introduce and Model Target Skill 6, Part 1 (Skills are modeled with at least 2 different toys, so that peers may choose preferred items for role play.)

Show Different Play 1 →

DOs (Make the smiley face visible) ☺

i. Tell your friend how to play with a toy, even if it seems easy
ii. Show your friend different things to do

*"The first thing we are going to learn today is called **show different play**. This means that after your friend chooses a toy, you should tell your friend how to play with it, even if it seems easy. You also want to show your friend lots of different things to do with a toy."*

- Therapist 1 ("participant"): sitting close to peer & Mr. Potato Head
- Therapist 2 ("peer"): "Let's put him together! First I'm putting in the eyes…"
- Therapist 1 ("participant"): watches and follows peers lead by putting in body parts
- Therapist 2 ("peer"): "Now let's make a silly Potato Head! I'm going to put his arm here…"
- Therapist 1 ("participant"): watches and follows peers lead by putting in body parts

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice

- Each child demonstrates this skill at least once

❖ Introduce and Model Target Skill 6, Part 2

Show Different Play 2 →

DOs (Make the smiley face visible) ☺

i. Tell your friend how to play with a toy, even if it seems easy
ii. Show your friend different things to do

*"Now let's see another example of **show different play**. Remember that means to tell your friend how to play and show your friend lots of different things to do with a toy."*

- Therapist 2 ("peer"): gives choice between cars and animals: holds up and says, "Wanna play cars or animals?"

- Therapist 1 ("participant"): touches car
- Therapist 2 ("peer"): models and narrates good play with cars (e.g., racing, getting gas, going to the car wash, driving to school, stopping at a red light)
- Therapist 1 ("participant"): watches and follows peers lead

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice
- Each child demonstrates this skill at least once

❖ Introduce and Model "Don'ts" for Target Skill 6

DON'Ts (Make the frowney face visible) ☹

i. Be quiet
ii. Do the same thing every time

*"Now we are going to show you ways bad ways to **show different play**."*
- Demonstrate playing quietly
- Demonstrate playing repetitively

"Did she (he) do a good job?" Frown, shake head, and tap frowney face.
"What did she (he) do that was bad?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap frowney face. Praise reasonable answers.

❖ Introduce and Model Target Skill 7, Part 1

Take Turns 1 →

DOs (Make the smiley face visible) ☺

i. Show Good Play for a little bit
ii. Stop, let your friend reach the toy and wait
iii. Say, "Your turn!"

*"The other thing we are going to practice today is called **taking turns**. This is important because it gives you a chance to show your friend how to play and gives them a chance to try new things. It is also important so that you can teach your friend how to share. To do this, first you show different play for a little bit and then you stop and wait so you friend can do something. You should say, 'Your turn'. It is important that your friend can reach the toys"*
- Therapist 2 ("peer"): "Do you want the lizard or the animals?" (holding up both items up at eye level)
- Therapist 1 ("participant"): touches lizard
- Therapist 2 ("peer"): "I'm going to put these bugs in his mouth, yum yum" (puts in bugs); stops, hold up a bug to participant and says, "Your turn!"
- Therapist 1 ("participant"): takes bug and puts in mouth
- Therapist 2 ("peer"): "You are good at this!"

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.

"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice
- Each child demonstrates this skill at least once

❖ Introduce and Model Target Skill 7, Part 2

Take Turns 2 →

DOs (Make the smiley face visible) ☺

i. Show good play for a little bit
ii. Stop, let your friend reach the toy and wait
iii. Say, "Your turn!"

*"Now watch how we **take turns** with a different toy. Sometimes your friend might not take their turn when you are ready. If that happens wait a little bit and then show good play again before giving them another turn."*

- Therapist 2 ("peer"): "Do you want the cars or the animals?" (holding up both items up at eye level)
- Therapist 1 ("participant"): touches animals
- Therapist 2 ("peer"): models several play strategies with the animals (e.g., putting the animals to bed, feeding animals, taking temperature, listening to heartbeat, making animals chase objects or each other, racing animals, etc.); this should be interspersed with pauses and requests for the participant to take a turn
- Therapist 1 ("participant"): initially just watches, offered a turn 3 times, then joins in
- Therapist 2 ("peer"): "This is fun!"

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice
- Each child demonstrates this skill at least once

❖ Introduce and Model "Don'ts" for Target Skill 4

DON'Ts (Make the frowney face visible) ☹

i. Let your friend play alone
ii. Forget to give your friend a turn

*"Now we are going to show you ways bad ways to **take turns**."*

- Demonstrate being quiet
- Demonstrate playing repetitively

"Did she (he) do a good job?" Frown, shake head, and tap frowney face.
"What did she (he) do that was bad?" Praise any reasonable answer.

"How did that make (name of Therapist 1) feel?" Tap frowney face. Praise reasonable answers.

❖ Role Play/Peers Practice

*"Now let's try it all together! We are going to practice our good play skills. Remember, we are working on **showing different play**, and **taking turns**. You can also **say what you play**, **get attention**, **play close**, **give choices**, and **say nice things**."*

- Do this many times with the peers practicing on each other
- Incorporate new toys and lots of praise

"You guys have done such a great job! Remember as a special helper you are helping other friends learn to play better. Next time we are going to practice with different friends."

Session 6 → Peer & Participant Training

❖ Introduction: Purpose and Rewards

*"Hello special helpers! Remember last time we learned how to **show different play**, and **take turns**. Today we are going to practice those things with different friends. Remember you are helping your friends learn to play well and be good friends. When you try hard to play with your friends you will get a sticker!"*

- Allow peers to select their stickers.

❖ Briefly Model Target Skill 6

Show Different Play→

DOs (Make the smiley face visible) ☺

i. Tell your friend how to play with a toy, even if it seems easy
ii. Show your friend different things to do

*"Remember it is important to **Show Different Play** so that your friend knows how to play with you and the toys. This means that after your friend chooses a toy, you should tell your friend how to play with it, even if it seems easy. You also want to show your friend lots of different things to do with a toy."*

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill once with either therapists or peers

❖ Briefly Model Target Skill 7

Take Turns→

DOs (Make the smiley face visible) ☺

i. Show different Play for a little bit
ii. Stop, let your friend reach the toy and wait
iii. Say, "Your turn!"

*"It is important to **take turns** so that your friend can see you play and can try new things. To take turns first show good play for a little bit and then you stop and wait so you friend can do something. You should say, 'Your turn'. Remember, it is important that your friend can reach the toys"*

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill once with either therapists or peers

❖ More Role Play

*"Now let's try it all together! We are going to practice our good play skills. To do this let's **show different play** and **take turns**."*

- Peers should role play a couple of times to practice with each other
- Incorporate new toys and lots of praise

*"You guys have done such a great job, now it is time to try this with other people in your class! Remember as a special helper you are trying to help them learn to play better. Try to use your good play skills and **show different play**, and **take turns**."*

❖ Bring in Participants

"Welcome back! You guys get to have some special time to play with friends from your class! When you try to play together you will get a sticker. Playing together means playing close to your friend, looking at them and listening to them."

- *Show participants sticker card and stickers. Allow them to select their stickers.*

❖ Briefly Demonstration of Skills 6 and 7

*"We are also learning to **show different play**, and **take turns.** Now we are going to watch a movie of two boys playing together and then you will get a chance to play!"*

- Watch movie and point out skills

❖ Longer Role Play/Practice with Participants

*"Now you guys get to show off how well you can play! Try to play like the boys in the movie by **showing different play**, and **taking turns**. You also want to play close to your friend, look at them and listen to them."*

- Children play for 20-30 minutes
- Reward skill attempts with verbal praise and visual/tangible reinforcement
- Reward participants for:
  - Trying to look at their peers
  - Trying to listen to their peers
  - Trying to **play close**
  - Trying to **give choices**
  - Trying to **say nice things**
  - Trying to **get attention**
  - Trying to **say what you play**
  - Trying to **show different play**
  - Trying to **take turns**
- Reward peers for:
  - Trying to **play close**
  - Trying to **give choices**
  - Trying to **say nice things**
  - Trying to **get attention**
  - Trying to **say what you play**
  - Trying to **show different play**
  - Trying to **take turns**

Session 7 → Peer Training

❖ Introduction: Purpose and Rewards

*"Hello special helper! You have done such a great job practicing your play skills with us so far. Last week we learned how to **show different play** and **take turns**. You have also learned how to **get attention**, **say what you play**, **play close**, **give choices**, and **say nice things**. Today we are going to learn 2 new ways to help your friends learn how to play well! When you try hard to play with your friend you will get a sticker!"*

- Allow peers to select their stickers.

❖ Introduce and Model Target Skill 8

Ask to Play →

DOs (Make the smiley face visible) ☺

i. Get your friends attention
ii. Say, "Do you want to play ____?"

*"The first thing we are going to learn today is called **ask to play**. This means that to start playing something new you should get your friend's attention and say, "do you want to play?"*

- Therapist 1 ("participant"): looking around the room bored
- Therapist 2 ("peer"): sits in front of target, holds toy in front of eyes, taps on shoulder and says "_(name)_ do you want to play _(toy)_"
- Therapist 1 ("participant"): says, "Ok!"

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice

- Each child demonstrates this skill at least once

❖ Introduce and Model "Don'ts" for Target Skill 8

DON'Ts (Make the frowney face visible) ☹

i. Yell and/or whisper
ii. Forget to get attention first

"Now we are going to show you ways not to play."

- Demonstrate yelling and/or whispering
- Demonstrate not getting attention first

"Did she (he) do a good job?" Frown, shake head, and tap frowney face.
"What did she (he) do that was bad?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap frowney face. Praise reasonable answers.

❖ Introduce and Model Target Skill 9

Play His (Her) Way →

DOs (Make the smiley face visible) ☺

i. Watch to see what your friend is playing with
ii. Play with the same kinds of toys as your friend

*"It is important to **play his (her) way** so that you and your friend are playing together. To **play his (her) way** first watch to see what your friend is playing and then play with those kinds of toys too."*

- Therapist 1 ("participant"): playing with (toy)
- Therapist 2 ("peer"): sits close, looks at what the other child is playing with, starts to play with similar toy or part of larger set, narrates play
- Therapist 1 ("participant"): notices "peer," smiles, joins in

"Did she (he) do a good job?" Smile, nod head, and tap smiley face.
"What did she (he) do that was good?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap smiley face. Praise any reasonable answer.

❖ Role Play/Peers Practice

- Each child demonstrates this skill at least once

❖ Introduce and Model "Don'ts" for Target Skill 9

DON'Ts (Make the frowney face visible) ☹

i. Play with another toy
ii. Take a toy away from your friend

*"Now we are going to show you bad ways to **play his (her) way**"*

- Demonstrate playing with another toy
- Demonstrate taking a toy

"Did she (he) do a good job?" Frown, shake head, and tap frowney face.
"What did she (he) do that was bad?" Praise any reasonable answer.
"How did that make (name of Therapist 1) feel?" Tap frowney face. Praise reasonable answers.

❖ Role Play/Peers Practice

*"Now let's try it all together! We are going to practice our good play skills. Remember, we are working on **asking to play** and **playing his (her) way**. You can also **say what your play, get attention, play close, give choices, say nice things, show different play,** and **take turns**."*

- Do this many times with the peers practicing on each other
- Incorporate new toys and lots of praise

"You guys have done such a great job! Remember as a special helper you are helping other friends learn to play better. Next time we are going to practice with different friends."

Session 8 → Peer & Participant Training

❖ Introduction: Purpose and Rewards

*"Hello special helper! You have done such a great job practicing your play skills with us so far. You have learned how to **get attention**, **say what you play**, **play close**, **give choices**, **say nice things, show different play,** and **take turns.** Remember last time we also learned how to **ask to play,** and **play his (her) way**. Today we are going to practice those things with different friends. The most important thing is to try to play with that friend. When you try hard to play with your friend you will get a sticker! If your friend is playing with a toy you should try to play with him with that toy."*

- Allow peers to select their stickers.

❖ Introduce and Model Target Skill 8

Ask to Play →

DOs (Make the smiley face visible) ☺

iii. Get your friends attention
iv. Say, "Do you want to play ____?"

*"Remember, it is important to **ask to play** so that your friend knows you are trying to play with them. This means that to start playing something new you should get your friend's attention and say, "do you want to play?"*

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill at least once

❖ Introduce and Model Target Skill 9

Play His (Her) Way →

DOs (Make the smiley face visible) ☺

iii. Watch to see what your friend is playing with
iv. Play with the same kinds of toys as your friend

*"It is important to **play his (her) way** so that you and your friend are playing together. To **play his (her) way** first watch to see what your friend is playing and then play with those kinds of toys too."*

- Therapists briefly model the skill

❖ Role Play/Peers Practice

- Each child demonstrates this skill at least once

❖ More Role Play

*"Now let's try it all together! We are going to practice our good play skills. To do this let's **ask to play,** and **play his (her) way**."*

- Peers should role play a couple of times to practice with each other
- Incorporate new toys and lots of praise

*"You guys have done such a great job, now it is time to try this with other people in your class! Remember as a special helper you are trying to help them learn to play better. Try to use your good play skills and **ask to play,** and **play his (her) way**."*

❖ Bring in Participant

"Welcome back! You guys get to have some special time to play with a friend from your class and we get to watch a movie! When you try to play together you will get a sticker. Playing together means playing close to your friend, looking at them and listening to them."

- Show participants sticker card and stickers. Allow them to select their stickers.

❖ Briefly Demonstration of Skills 1 and 2

*"We are also learning to **ask to play** and to **play his (her) way.** Now we are going to watch a movie of two boys playing together and then you will get a chance to play!"*

- Watch movie and point out skills

❖ Longer Role Play/Practice with Participants

*"Now you guys get to show off how well you can play! Try to play like the boys in the movie by **ask to play** and to **play his (her) way**. You also want to play close to your friend, look at them and listen to them."*

- Children play for 20-30 minutes
- Reward skill attempts with verbal praise and visual/tangible reinforcement
- Reward participants for:
  - Trying to look at their peers
  - Trying to listen to their peers
  - Trying to **play close**
  - Trying to **give choices**
  - Trying to **say nice things**
  - Trying to **get attention**
  - Trying to **say what you play**
  - Trying to **show different play**
  - Trying to **take turns**
  - Trying to **ask to play**
  - Trying to **play his (her) way**
- Reward peers for:
  - Trying to **play close**
  - Trying to **give choices**
  - Trying to **say nice things**
  - Trying to **get attention**
  - Trying to **say what you play**
  - Trying to **show different play**
  - Trying to **take turns**
  - Trying to **ask to play**
  - Trying to **play his (her) way**

Session 9 → Peer & ParticipantTraining

❖ Introduction: Purpose and Rewards

*"Hello special helper! You have done such a great job practicing your play skills with us so far. You have learned how to **get attention**, **say what you play**, **play close**, **give choices**, **say nice things, show different play, take turns, ask to play** and to **play his way**. Today we want you to help one friend from you class play better. The most important thing is to try to play with that friend. When you try hard to play with your friend you will get a sticker! If your friend is playing with a toy you should try to play with them with that toy."*

- Allow peers to select their stickers.

❖ Bring in Participant

"Welcome back! You guys get to have some special time to play with a friend from your class! When you try to play together you will get a sticker. Playing together means playing close to your friend, looking at them and listening to them."

- Show participants sticker card and stickers. Allow them to select their stickers.

❖ Longer Role Play/Practice with Participants

*"Now you guys get to show off how well you can play! You want to **play close** to your friend, look at them, and listen to them. You can also try to **give choices, say nice things, get attention, say what you play, show different play, take turns, ask to play,** and **play his (her) way**."*

- Children play for 20-30 minutes
- Reward skill attempts with verbal praise and visual/tangible reinforcement
- Reward participants for:
  - Trying to look at their peers
  - Trying to listen to their peers
  - Trying to **play close**
  - Trying to **give choices**
  - Trying to **say nice things**
  - Trying to **get attention**
  - Trying to **say what you play**
  - Trying to **show different play**
  - Trying to **take turns**
  - Trying to **ask to play**
  - Trying to **play his (her) way**
- Reward peers for:
  - Trying to **play close**
  - Trying to **give choices**
  - Trying to **say nice things**
  - Trying to **get attention**
  - Trying to **say what you play**
  - Trying to **show different play**
  - Trying to **take turns**
  - Trying to **ask to play**
  - Trying to **play his (her) way**

Playground & Classroom Training

Therapists will provide prompts and reinforcement on the playground and in the classroom. Peers and participant will be verbally, demonstratively and/or physically prompted to practice good social skills (i.e **play close**, **get attention**, **give choices**, **say what you play**, **show different play, say nice things, take turns, play their way, and ask to play**) for approximately 10-15 minutes. Peer participation and treatment response data should be collected on the provided data sheets. Peers and participants should be rewarded (e.g., verbal praise, stickers) for effort to use skills.

- Introduction: Purpose and Rewards

  "Hello special helper! Today I want to see how well you guys can play with one of your friends! Who do you want to play with today: ___, ___, or ___. (Provide choices of 3 participants.) Remember we are working on thinks like: ***play close, look (target ONLY), listen (target ONLY), get attention, give choices, say what you play, show different play, say nice things, , take turns, play their way, and ask to play****. The most important thing is to try to play with your friend. When you try hard to play with your friend you will get a sticker! If your friend is playing something you should try to play the same thing."*

  - Allow children to select their stickers.

- Longer Role Play/Practice with Participants

  "Now you guys get to show off how well you can play together!"

  - Children play for 10-15 minutes
  - Reward skill attempts with verbal praise and visual/tangible reinforcement

- Skills to prompt/reinforce/record

  ***Look*(target ONLY) →**

  DOs

  - Sit or stand in front of your friend
  - Look at their eyes

  ***Listen*(target ONLY) →**

  DOs

  - Listen to your friend when he talks to you
  - Answer if he asks a question

  ***Get Attention* →**

  DOs

  - Sit or stand in front of your friend and look at their eyes
  - Hold a toy near their eyes
  - Tap them on the shoulder
  - Say their name

  ***Say What You Play* →**

  DOs

  - Tell what you are doing

Play Close →

DOs

- Sit or stand close to your friend
- Bring your toys to your friend if there aren't any

Give Choices →

DOs

- If your friend is not playing or looking at any toys – give 2 choices
    - Hold up two toys
    - Ask, "do you wanna play ___ or ___?"
- If your friend is playing with or looking at something – one of the choices should be that thing
    - Point to th toy your friend has and also hold up a new toy
    - Ask, "do you wanna play ___ or ___?"

Say Nice Things →

DOs

- Have fun playing with your friend
- Tell your friend they are doing a great job and that this is fun
- Laugh

Show Different Play →

DOs

- Tell your friend how to play with a toy, even if it seems easy
- Show your friend different things to do with a toy

Take Turns →

DOs

- Show different play and say what you play for a little bit
- Stop, let your friend reach the toy and wait
- Say, "Your turn!"

Ask to Play →

DOs

- After you get attention/give choices, ask "wanna play…"

Play Their Way →

DOs

- Play with the same toys your friend is playing with
- Do the same kinds of play your friend is doing

Treatment Response Data Sheet

Date: ______________ Class: ______________ Session: ______________

Participant Name	Skill	Demonstrated Skill with Prompt	Demonstrated Independently	Refusal/ Behavior Problems
	Play Close			
	Look			
	Listen			
	Get Attention			
	Say What You Play			
	Show Different Play			
	Say nice things			
	Take Turns			
	Play Their Way			
	Ask to Play			
	Play Close			
	Look			
	Listen			
	Get Attention			
	Say What You Play			
	Show Different Play			
	Say nice things			
	Take Turns			
	Play Their Way			
	Ask to Play			
	Play Close			
	Look			
	Listen			
	Get Attention			
	Say What You Play			
	Show Different Play			
	Say nice things			
	Take Turns			
	Play Their Way			
	Ask to Play			
	Play Close			
	Look			
	Listen			
	Get Attention			
	Say What You Play			
	Show Different Play			
	Say nice things			
	Take Turns			
	Play Their Way			
	Ask to Play			

Peer Participation Data Sheet

Date: _____ **Class:** _____ **Session:** _____

Peer Name	Skill	Modeled Skill with Prompt	Modeled Skill Independently	Refusal/ Behavior Problems
	Play Close			
	Get Attention			
	Give Choices			
	Say What You Play			
	Show Different Play			
	Say nice things			
	Take Turns			
	Play Their Way			
	Ask to Play			
	Play Close			
	Get Attention			
	Give Choices			
	Say What You Play			
	Show Different Play			
	Say nice things			
	Take Turns			
	Play Their Way			
	Ask to Play			

Date: _____ **Class:** _____ **Session:** _____

Peer Name	Skill	Modeled Skill with Prompt	Modeled Skill Independently	Refusal/ Behavior Problems
	Play Close			
	Get Attention			
	Give Choices			
	Say What You Play			
	Show Different Play			
	Say nice things			
	Take Turns			
	Play Their Way			
	Ask to Play			
	Play Close			
	Get Attention			
	Give Choices			
	Say What You Play			
	Show Different Play			
	Say nice things			
	Take Turns			
	Play Their Way			
	Ask to Play			

APPENDIX C

IRB APPROVAL

8-13-13

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Institutional Review Board for Human Use

Form 4: IRB Approval Form
Identification and Certification of Research
Projects Involving Human Subjects

UAB's Institutional Review Boards for Human Use (IRBs) have an approved Federalwide Assurance with the Office for Human Research Protections (OHRP). The Assurance number is FWA00005960 and it expires on January 24, 2017. The UAB IRBs are also in compliance with 21 CFR Parts 50 and 56.

Principal Investigator:	MCCALLA, MARJORIE K
Co-Investigator(s):	
Protocol Number:	**X120803006**
Protocol Title:	*Enhancing the Social Interactions of Preschool Children with Autism: Evaluation the Effectiveness of a Peer Mediated Intervention*

The IRB reviewed and approved the above named project on 8-13-13. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This Project will be subject to Annual continuing review as provided in that Assurance.

This project received EXPEDITED review.

IRB Approval Date: 8-13-13

Date IRB Approval Issued: 8-13-13

Marilyn Doss

Marilyn Doss, M.A.
Vice Chair of the Institutional Review
Board for Human Use (IRB)

Investigators please note:

The IRB approved consent form used in the study must contain the IRB approval date and expiration date.

IRB approval is given for one year unless otherwise noted. For projects subject to annual review research activities may not continue past the one year anniversary of the IRB approval date.

Any modifications in the study methodology, protocol and/or consent form must be submitted for review and approval to the IRB prior to implementation.

Adverse Events and/or unanticipated risks to subjects or others at UAB or other participating institutions must be reported promptly to the IRB.

470 Administration Building
701 20th Street South
205.934.3789
Fax 205.934.1301
irb@uab.edu

The University of
Alabama at Birmingham
Mailing Address:
AB 470
1720 2ND AVE S
BIRMINGHAM AL 35294-0104