

12-1-2011

A Comparison Of Adult- And Peer-Mediated Intervention For Autism: A Case Study

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INTERVENTION FOR AUTISM:
A CASE STUDY**

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ABSTRACT

This study examined the response of a young child with autism to two play-based intervention conditions: adult-mediated and peer-mediated. The client was five years old, demonstrated moderate-to-severe autism, and exhibited developmental functioning between the 14 to 34 month level. The peer-mediated condition, based on a modified Integrated Play Group approach, utilized a typically developing peer who was three years of age. The study utilized an ABAB alternating treatment design to compare the impact of the adult- and peer-mediated interventions. Results from the current study suggest that the adult-mediated intervention resulted in increased engagement and more sophisticated social-communicative behaviors than the peer-mediated approach for the child with autism. Clinical implications, limitations, and future research directions are discussed.

KEY WORDS

Peer-Mediated Intervention, Adult-Mediated Intervention,
Autism

INTRODUCTION

Providing effective interventions that improve social and communicative functioning in children with autism and promote their inclusion in regular education is a high priority (McConnell, 2002; Odom, 2000). A variety of intervention approaches have been investigated in the literature, including peer-mediated interventions (PMIs). PMIs utilize typically developing peers trained in various therapeutic techniques for promoting the acquisition of communication and social skills in children with autism (Rogers, 2000; Chan, Lang, Rispoli, O'Reilly, Sigafos, & Cole, 2009). PMI approaches have been shown to yield improvements in various social-communicative skills, including the number of initiations made, increased joint attention, duration of engagement, and symbolic play behavior (e.g., Roeyers, 1996; Wolfberg & Schuler, 1993; Zercher, Hunt, Schuler, & Webster, 2001).

The interest in PMIs has been fueled by growing skepticism of approaches solely utilizing adults as agents of intervention. For example, adult-mediated interventions have been criticized for failing to incorporate the natural context of children's social interactions (e.g., the play that occurs between peers), thus limiting the extent to which children generalize learned communication and social skills to new situations (DiSalvo & Oswald, 2002; Rogers, 2000). In addition, the social-communicative behaviors of children with autism may differ when interacting with adults versus children. For example, Hauck, Fein, Waterhouse and Feinstein (1995) observed that when children with autism interact with adults, they typically request actions and objects (i.e., behavioral regulation) and engage in routine behavior. In contrast, with peers they more often engage in naturalistic interactions such as giving information and greeting.

Recently, Chan et al. (2009) conducted a systematic review of 42 studies investigating the effectiveness of PMI intervention approaches for individuals with autism spectrum disorders. Their review indicated that verbal explanation and modeling were the most frequently used methods for training peers who ranged from 3 to 13 years old ($M = 8.6$ years). Common intervention techniques included having peers initiate interactions with participants and prompting participants to engage in desired behaviors. The dependent variables typically measured social interaction (e.g., communication, initiations), academic skills, and/or challenging behaviors. Overall, the authors concluded that PMIs are potentially effective interventions for individuals with ASD given that outcomes were positive in 91% of the studies they reviewed.

One evidence-based peer-mediated approach that merits further attention is the Integrated Play Group (IPG; Neufeld & Wolfberg, 2010; Wolfberg, 2003; Wolfberg & Schuler, 1993). According to Schuler and Wolfberg (2000), reduced opportunity for peer play and lack of support needed to be successful in peer interactions are primary causes of the skill deficits exhibited by

children with autism. In the IPG approach, children with autism, referred to as Novices, participate in play activities with socially competent peers, referred to as Experts, under the guidance of a playgroup guide (i.e., Adult). The IPG model is characterized by the following significant features: natural integrated settings; well-designed play spaces; selection of play materials based on interactive potential and developmental level; establishment of a consistent schedule and routine; play-groups balanced in age and developmental status; a focus on child competence and motivation; guided participation; and full engagement in play (DiSalvo & Oswald, 2002; Wolfberg & Schuler, 1993; Zercher et al., 2001). Because schedule and routine offer the most tangible support structures, the play-groups meet on a regular basis over an extended period of time, two or more times a week for approximately 30 minutes to an hour. Routines provide reciprocal interaction patterns that represent the turn-taking aspect of conversation as well as assist a child's understanding of his/her active role in the social dynamic (Quill, 1995).

The roles of the play-group guide as well as the peers are integral to the success of the IPG. Prior to the interactions between the expert and novice, a peer-mediated social interaction training program occurs. The training program consists of social interaction skills instruction and teaching the experts to understand the child with autism's modes of communication (Garrison-Harrell & Kamps, 1997). The expert players are instructed prior to each session through direct instruction, such as role-play, adult cuing around play materials and activities, and reinforcement (Prelock, 2004). The play-group guide provides examples of specific ways in which the novice players could be included at their own level. Goals for the peers include learning to wait for the initiation of communication, offering bids for social interaction, reading the communicative attempts of the child with autism, and responding in a manner that will encourage continued interaction (Wetherby & Prizant, 1999). The play-group guide concomitantly mediates social exchanges and extends individual play themes as well as monitors individual and group behaviors (DiSalvo & Oswald, 2002; Quill, 1995). Research demonstrates that some level of prompting by a play-group guide appears necessary to ensure that normally developing preschoolers maintain their use of active initiation strategies (see Goldstein & Wickstrom, 1986 for a review).

The IPG approach is modeled upon the developmental theories of Vygotsky (1978) who identified play as a primary means by which children acquire symbolic capacities, interpersonal skills, and social knowledge. The IPG method relies heavily on Vygotsky's concept of the zone of proximal development (ZPD), which posits that children can reach higher levels of ability when supported by more experienced partners during meaningful social interactions. Specifically, play guides (i.e., adults) scaffold the social and communicative behaviors of children with autism to more developmentally advanced levels. Moreover, within the integrated play groups, typically

developing children provide models of more advanced behaviors and are encouraged by the play guides to support and reinforce the participation of the novice players (Neufeld & Wolfberg, 2010).

Although PMIs have yielded positive results in previous research, effective planning of PMI and its relative benefits compared to other intervention methods need further investigation. In a meta-analysis of interventions targeting social interactions in children with autism, Miller (2006) suggested that PMIs may not be as beneficial for younger children due to their less developed play and social interaction skills (e.g., early play is solitary rather than reciprocal). Miller's results indicated that collateral skills intervention may be more appropriate for young children with autism, and peer-mediated interventions may be more appropriate for school-age children with autism. Chan et al. (2009) also suggested that future research should examine what can be expected from peers of various ages and developmental levels. In addition, they described the need for further investigation into identifying the relative effectiveness of PMIs versus professionally implemented interventions and how the two approaches differentially influence behavior (see also Carter, Cushing, Clark, & Kennedy, 2005).

Purpose

The purpose of this study was to explore the response of a young child with moderate to severe autism to two play-based intervention conditions: adult-mediated and peer-mediated. The peer-mediated condition was based on a modified Integrated Play Group approach using a preschool-age peer. Of specific interest was the impact of both approaches on the child with autism's engagement in social interactions and the types of social behaviors he produced. Results of the current study will contribute to answering questions raised by researchers about the differential impact of adult-mediated versus peer-mediated interventions on the social and communicative behaviors of children with ASD (Carter et al., 2005; Chan et al., 2009; Miller, 2006). If the PMI approach results in greater benefits in terms of increased engagement and social communication in the child with autism, the current study would lend support to the incorporation of PMI strategies in a variety of therapeutic settings.

METHOD

Participants

Novice. The child with autism, referred to as the Novice, was 5;6 years old (years; months) at the beginning of the study. He was diagnosed at 2;6 with autism by a pediatric neurologist. Previous evaluations described his autism as moderate to severe, and clinical observations were consistent with this diagnosis. Previous to this study, he had been a client for 18 months in the university-based clinic where this study took place (in addition to his public school programming). IRB approval was obtained for the Novice's participation and his mother provided informed

consent. The Novice's developmental level at the beginning of the study was assessed using the *Vineland Adaptive Behavior Scale* (VABS; Sparrow, Balla, & Chicchetti, 1984). The VABS is a parent/caregiver checklist that assesses various aspects of development. The mother of the Novice responded to questions concerning his communication, daily living skills, socialization, and motor skills. All domains were documented to be three standard deviations below age-level expectations (age equivalencies ranged from 1;2 to 2;10; see Table 1). Previous therapy goals included increasing verbal and nonverbal communication and engaging in play interactions. Modest gains were observed in the frequency of spontaneous verbalizations, following one-step directions, initiating play activities, and engaging in reciprocal play with the clinician. The Novice attended a full-day public school program where he received speech-language and occupational therapy. He spent mornings in an inclusive classroom for children with disabilities and afternoons in a mainstream kindergarten classroom assisted by an educational aide. At the beginning of the current study, the Novice continued to display significant delays in his social-communicative skills and engagement in play interactions. Expressively, he imitated words when prompted and produced minimal spontaneous language, which mainly consisted of requesting objects or actions using single words (e.g., *more*, *open*). In terms of engagement, he exhibited infrequent interactions with people other than his mother. He rarely initiated interactions with others and primarily directed his attention toward stimulating objects (e.g., a spinning chair or ball). When others initiated interactions with the Novice, he generally ignored their attempts and continued in his solitary play.

Expert. The typically developing child, referred to as the Expert, was 3;8 years old at the beginning of the study. IRB approval was obtained for the Expert's participation and his mother provided informed consent. The VABS was administered and results indicated that all developmental domains were within typical limits for his age (see Table 1). The Expert was selected because he was approximately the desired age, the same sex as the client, and demonstrated age-appropriate language and social skills. Compared to the Novice, the Expert was developmentally advanced in order to provide more sophisticated models of play and language, yet he was young enough to enjoy the same activities as the Novice. Previous research has indicated that developmentally advanced peers may be able to scaffold more complex levels of play for children with autism than peers who are at similar developmental levels (Wolfberg & Schuler, 2006). Given the Novice's functional level (i.e., 1;2 – 2;10), a peer matched on developmental level would not have the maturity to comprehend the instructions and coaching provided by the Adult. The Expert did not have any previous play interactions or training with children with autism.

Setting and materials. The intervention occurred in a 300 square foot therapy room typically used for preschool language therapy

	Novice	Expert
Chronological Age (years; months)	5;6	3;8
VABS ^a Communication Domain		
Standard Score ^b	44	100
Age Equivalence	1;2	3;9
VABS Daily Living Skills Domain		
Standard Score	45	100
Age Equivalence	1;7	3;8
VABS Socialization Domain		
Standard Score	51	101
Age Equivalence	1;9	3;10
VABS Motor Skills Domain		
Standard Score	54	97
Age Equivalence	2;10	3;7

^a *Vineland Adaptive Behavior Scales* ^bMean=100, SD=15

Table 1.
Participant Characteristics.

at a university speech and hearing clinic located within a large Midwestern city. The toys were chosen based on developmental appropriateness and the likelihood that they would facilitate spontaneous communication and social interaction. The toys included a trampoline, large ball, blocks, bubble gun, blanket, assorted toy vehicles, kitchen set, and a spinning disk. The creation of an enticing space with spatially organized materials that are accessible and encourage imaginative and interactive play are essential for an effective play-based approach for children with autism (Schuler & Wolfberg, 2000). The interests and developmental level of the Novice were taken into account when choosing the materials and organizing the play space. As reviewed by Schuler and Wolfberg (2006), children with autism are more likely to show interest in toys that were matched to their interest, developmental level, and prevailing object initiations (e.g., banging, stacking).

Procedure

This study consisted of an ABAB alternating-treatment single subject design (A = adult-mediated, B = peer-mediated). The A phase (adult-mediated intervention) is the baseline phase, given that it represents the traditional therapy approach (Meline, 2010) and was the approach used during the Novice's previous 18 months of therapy at the clinic where the study occurred. The use of a traditional or "treatment as usual" intervention as the baseline phase is a common methodological approach in single-subject research (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005) and has been used in previous autism research (e.g., Mechling, Gast, & Cronin, 2006). The duration of each phase of intervention was as follows: (a) four weeks of adult-mediated intervention (AMI), (b) four weeks of peer-mediated

intervention (PMI), (c) four weeks of AMI, and (d) four weeks of PMI. Thirty-two sessions (eight per treatment phase) occurred over 16 weeks. Each session was 30 minutes in length and followed a similar sequence of activities regardless of treatment condition.

Intervention A. Intervention A treatment sessions utilized an adult as the agent of intervention and included play-based/naturalistic interactions. A child-centered approach was utilized where the Adult followed the Novice's lead, used rich affect, and imitated his spontaneous behavior to build imitation and reciprocity (Wolfberg & Schuler, 2006). The Adult prompted and elicited targeted behaviors (i.e., engagement and social communication; see descriptions below) through modeling, scaffolding and reinforcement (e.g., praise, providing a desired toy). The Adult also utilized attention-directing behaviors and language such as "Ready, Set, Go!" or "Jump!" to increase interaction. Sessions followed a routine of play and clean-up. Play activities included blowing and popping bubbles, jumping on a trampoline, building with blocks, playing with toy cars, and hide-and-seek.

Intervention B. Intervention B brought together the Novice and Expert into a modified Integrated Play Group. While Wolfberg (2003) recommends play groups of three to five children with a higher proportion of Experts to Novices, our play group consisted of one Expert and one Novice. Prior to each intervention session, the Expert received approximately 15 minutes of instruction and coaching from the Adult in the use of the attention-directing behaviors described in Intervention A. The adult served to monitor the play initiations between the

Novice and Expert, prompting the Expert to engage the Novice in play and acting as an interpreter to help the Expert understand and respond to the Novice's communicative attempts (Prendeville et al., 2006; Wolfberg & Schuler, 2006). For example, the Adult might prompt the Expert to "Put bubbles on his arm," "Ask him to play," and "[The Novice] is looking out the window – go ask him what he sees." This sociocommunicative guidance (Schuler & Wolfberg, 2000) facilitates a common focus of play between the Novice and Expert, encourages initiations of communicative and play behavior, and also appropriate responses from participating children. In addition, the adult scaffolded the interactions, particularly encouraging the Novice to engage in more complex play and communicative behaviors (e.g., prompting the Novice engage in turn-taking with the Expert; prompting verbal behavior; Schuler & Wolfberg, 2000).

The Adult (second author) was a graduate student in speech language pathology at the university clinic where the research took place. She was trained and closely supervised by a clinical instructor (certified speech-language pathologist) who had supervised the Novice's therapy for several semesters prior to this study. She provided input into the study's design and was fully supportive of the research aims. To ensure fidelity to the intervention approaches, the clinical instructor observed the sessions regularly and provided the Adult with written and oral feedback on a weekly basis. The first author (a certified SLP) also viewed live or videotaped sessions on a regular basis to ensure treatment fidelity.

Data collection and analysis. All sessions were videotaped and the dependent variables (see descriptions below) were later analyzed. Changes in the Novice's engagement in play interactions and social communication were the primary areas of interest, as these skills have been shown to be positively impacted by PMIs (Prendeville, Prelock, & Unwin, 2006; Chan et al., 2009). The specific behaviors chosen for analysis were based on variables used in previous studies investigating the effect of PMIs in children with autism spectrum disorders (Goldstein, Kaczmarek, Pennington, & Shafer, 1992; Hauck, Fein, Waterhouse, & Feinstein, 1995; Murdock, Cost, & Tieso, 2007; Prendeville et al., 2006). The Novice's developmental level and current therapy goals were also taken into consideration when choosing the dependent variables.

Engagement. Engagement was assessed through the measurement of three variables: *Communicative Exchanges*, *Initiations*, and *Corrective Responses*. *Communicative Exchanges* (CEs) occurred when two or more individuals interacted and the behavior of one evoked a response or modified the behavior of another (Dunst & Lowe, 1986). Adult-Novice CEs were analyzed in the A phases, and Adult-Novice and Expert-Novice CEs were analyzed in the B phases. *Initiations* by the Novice were CEs initiated by the Novice that evoked a response or behavior of the Adult or Expert. *Corrective Responses* by the Adult occurred when the Adult responded to inappropriate behaviors by the Novice (e.g.,

spitting). The rate of *Corrective Responses* was considered to indicate the Novice's lack of engagement in social-interactive play.

Social-Communication. Social-Communication was measured by coding four types of behaviors exhibited by the Novice when CEs occurred: *Behavioral Regulation*, *Attention to Play*, *Nonverbal Play*, and *Verbal Play* (Wolfberg & Schuler, 1999). *Behavioral Regulation* behaviors occurred when the Novice communicated a need or preference nonverbally (e.g., pulling the Adult's hand to the door to open it) or verbally (e.g., saying "open" when he wanted the Adult to open the door). *Attention to Play* behaviors occurred when the Novice gazed toward or physically approached the Adult or Expert engaged in a play activity. *Nonverbal Play* behaviors occurred when the Novice engaged in a play activity without an accompanying verbalization (e.g., Adult blew bubbles and said, "[Novice], pop the bubbles!" and the Novice popped the bubbles). *Verbal Play* behaviors occurred when the Novice engaged in a play activity while simultaneously producing a verbalization, either spontaneously or through imitation (e.g., Adult blows bubbles and says, "Look [Novice], bubbles!" and the Novice says, "Bubbles," while popping the bubbles).

RESULTS

Reliability

Every session was reviewed via videotape and occurrences of the dependent variables were scored by the second author. To determine interrater reliability, a second trained observer scored one session randomly chosen from each phase of the study for a total of four sessions (13%) and 636 data points (12%). Interrater agreement was based on the total number of agreements divided by the total number of judgments. The resulting interrater reliability was 85%, which is within the accepted range of interrater agreement ($\geq 80\%$; Kennedy, 2005; Horner et al., 2005).

Dependent Variables

Each session was analyzed and occurrences of the dependent variables were recorded. The data were graphed and visually analyzed for level (e.g., mean frequency), trend, and variability of performance (Horner et al., 2005; Kennedy, 2005). Kennedy (2005) defines variability as the degree to which individual data points deviate from the general trend, and these judgments are qualitative in nature. Changes in the dependent variables across treatment conditions (i.e., A or B phases) were examined in order to determine if functional relations between the independent and dependent variables were evident, being mindful of overlap in data points when interpreting the results (Kennedy, 2005).

Communicative Exchanges. The frequency of *Communicative Exchanges* (CEs) varied greatly between treatments and phases (see Figure 1). Specifically, there were 1464 CEs in phase A1 (mean per session = 183), 644 CEs in phase B1 (mean per session

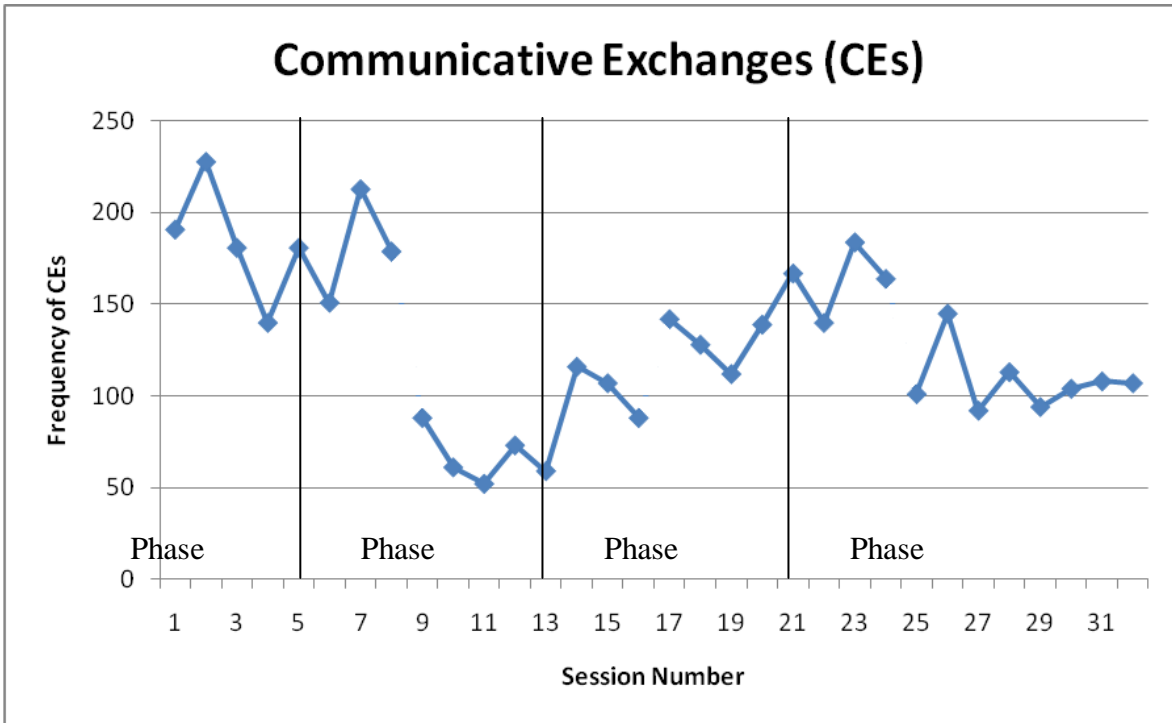


Figure 1.
Frequency of Communicative Exchanges (A Phases: Adult-Mediated; B Phases: Peer-Mediated).

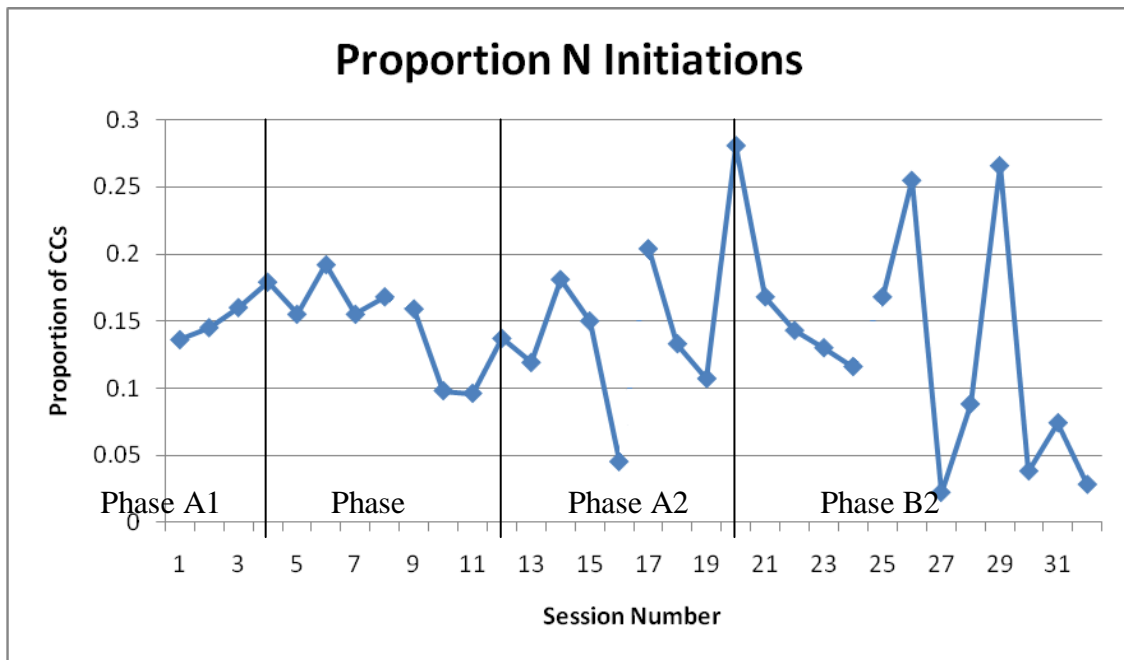


Figure 2.
Proportion of Communicative Exchanges (CEs) Initiated by the Novice
(A Phases: Adult-Mediated; B Phases: Peer-Mediated).

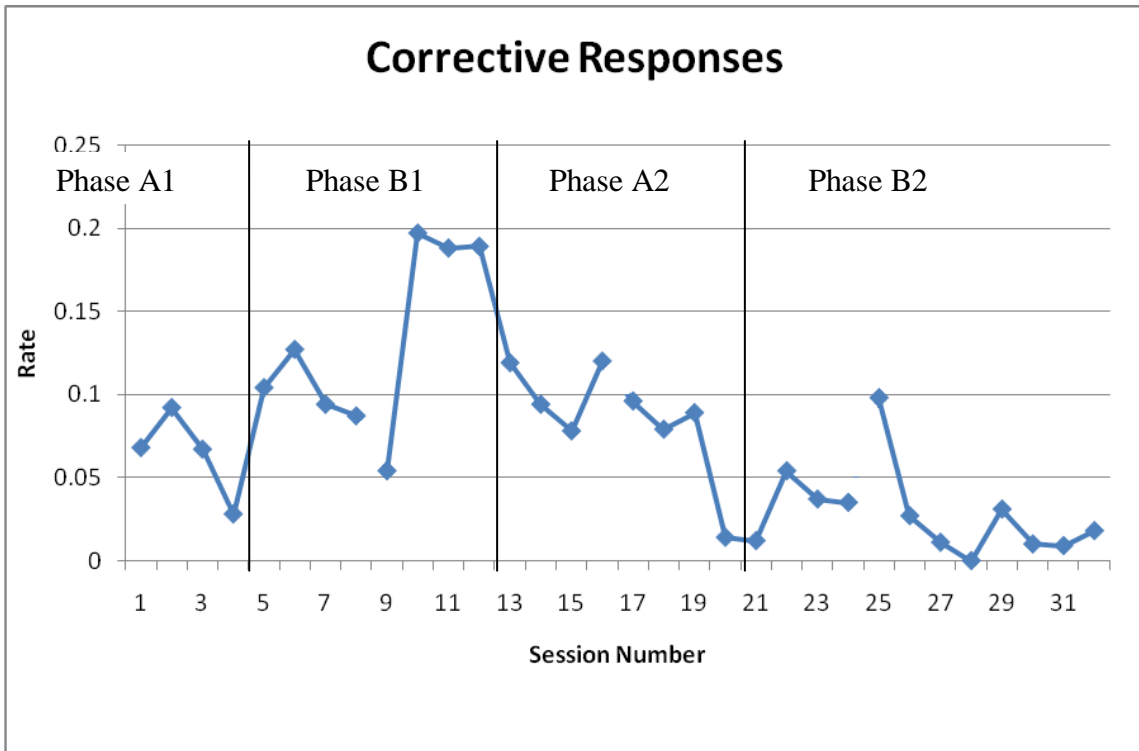


Figure 3.
Rate of Corrective Responses (A Phases: Adult-Mediated; B Phases: Peer-Mediated).

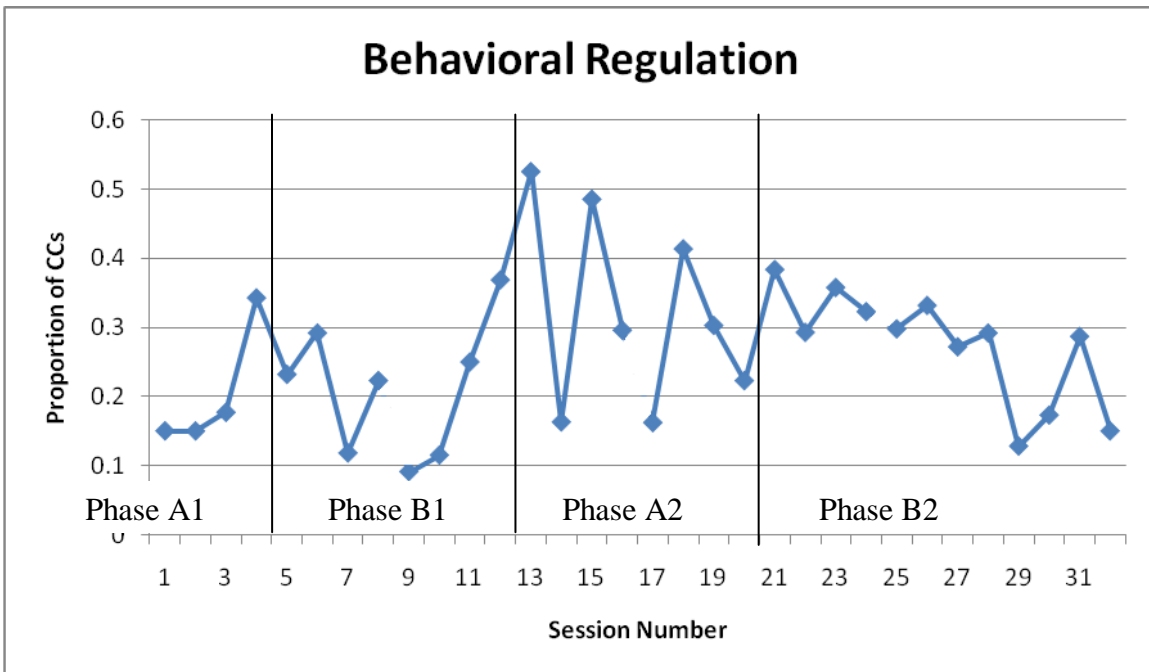


Figure 4.
Behavioral Regulation Behaviors (A Phases: Adult-Mediated; B Phases: Peer-Mediated).

= 81), 1176 CEs in phase A2 (mean per session = 147), and 864 CEs in phase B2 (mean per session = 108). Overall the frequency of CEs was higher in the A phases (Adult-Novice) than the B phases (Adult-Novice-Expert) with few overlapping data points between treatment conditions. An upward trend was apparent in A2, but for the remaining three phases trends were not exhibited. Due to the large variability in the frequency of CEs between sessions and phases, the remaining variables will be discussed in terms of proportions of CEs.

Initiations by the Novice. The proportion of CEs initiated by the Novice was calculated for each session (see Figure 2). In phase A1, the Novice initiated 16% of the CEs (range 14-19% across sessions). In phase B1, he initiated 13% (range 5 – 18%); in A2, 16% (range 11 – 28%); and B2, 12% (range 2 – 27%). The rates of initiations by the Novice were increasingly variable as the study progressed. Trends within phases were not apparent, and data values overlapped across phases.

Corrective Responses. The rate of *Corrective Responses* (CRs) by the Adult was measured by dividing the number of CRs by the number of CRs plus CEs for each session (see Figure 3). In phase A1, rate of CRs was 8.5% (range 3 – 13% across sessions); phase B1, 12% (range 5.4 – 20%); phase A2, 5% (range 1 – 9.6); and phase B2, 2.6% (range 0 – 10%). After a sharp increase in the rate of CRs in phase B1 (see sessions 2-4), the rate of CRs exhibited a steady decrease as the study progressed.

Behavioral Regulation. The rate of *Behavioral Regulation* behaviors (BRs) by the Novice was measured by dividing the number of BRs by the total number of CEs for each session (see Figure 4). In phase A1, rate of BRs was 20% (range 10 – 22% across sessions); phase B1, 29% (range 7 – 47.5%); phase A2, 31% (range 8 – 27); and phase B2, 25% (range 7.5 – 25%). The rates of BRs were moderately variable except for phase B1, where high variability was observed. Trends within phases were not apparent, and data values overlapped across phases.

Attention to Play. The rate of *Attention to Play* behaviors (ATPs) by the Novice was measured by dividing the number of ATPs by the total number of CEs for each session (see Figure 5). In phase A1, rate of ATPs was 28% (range 19 – 41% across sessions); phase B1, 46% (range 35 – 60%); phase A2, 24% (range 11.5 – 30.4%); and phase B2, 44% (range 25.5 – 54%). Upward trends were evident in phases A1 and B2. A downward trend was exhibited in phase B1 and no trend was apparent in A2. Variability was moderate within phases. Rates of ATPs were higher overall in the B phases, with few overlapping data points between treatment conditions.

Nonverbal Play. The rate of *Nonverbal Play* behaviors (NPs) by the Novice was measured by dividing the number of NPs by the total number of CEs for each session (see Figure 6). In phase A1, rate of NPs was 34% (range 26 – 51% across sessions); phase B1, 23% (range 5 – 42%); phase A2, 28% (range 19 – 39); and phase B2, 24% (range 12 – 44%). Rates of nonverbal play were

moderately to highly variable across the study. Trends within phases were not apparent, except for a downward trend in phase A1. Across phases, data values overlapped.

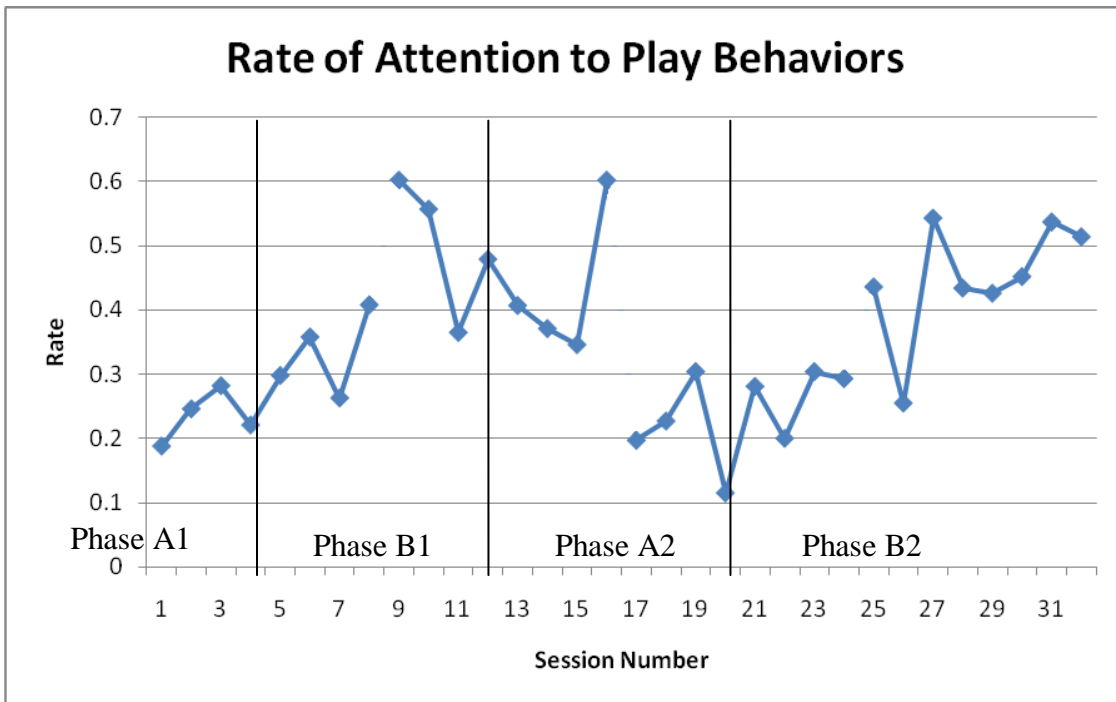
Verbal Play. The rate of *Verbal Play* behaviors (VPs) by the Novice was measured by dividing the number of VPs by the total number of CEs for each session (see Figure 7). In phase A1, rate of VPs was 18% (range 26 – 51% across sessions); phase B1, 2% (range 5 – 42%); phase A2, 17% (range 19 – 39); and phase B2, 7.3% (range 12 – 44%). High variability in the rates of VPs were observed in the A phases, compared to moderate variability in the B phases. No trends were apparent within any phases. Overall, the Novice's rate of VPs were higher in the A phases with minimal overlap in data points between treatment conditions.

To investigate differences in the Adult's focus of attention between conditions, a post hoc analysis was conducted. Two sessions (one from each treatment condition) were transcribed and analyzed for the percentage of Adult utterances directed toward the Novice and/or Expert. Each session was 30 minutes in length and the Adult produced a similar number of utterances in each session (278 in the adult-mediated session; 281 in the peer-mediated session). In the adult-mediated session, the Adult directed 278 of her utterances (100%) toward the Novice. In the peer-mediated session, the Adult directed 65 of her utterances (23%) specifically toward the Novice, 50 utterances (18%) toward both the Novice and Expert, and 166 utterances (59%) specifically toward the Expert.

An additional post-hoc analysis was conducted to examine if the Expert became more proficient at engaging the Novice and responding to his initiations during the course of the study. The percentages of CEs that were initiated by the Expert or included the Expert as the responder were calculated. In phase B1 the Expert initiated 255 CEs and was the responder in 45 CEs initiated by the Novice (40% and 7% of total CEs in B1, respectively). In phase B2 the Expert initiated 410 CEs and was the responder in 61 CEs initiated by the Novice (47% and 7% of total CEs in B2, respectively). Results indicate that the frequency of CEs involving the Expert rose from B1 to B2, and the proportion of CEs he initiated also increased slightly from B1 to B2.

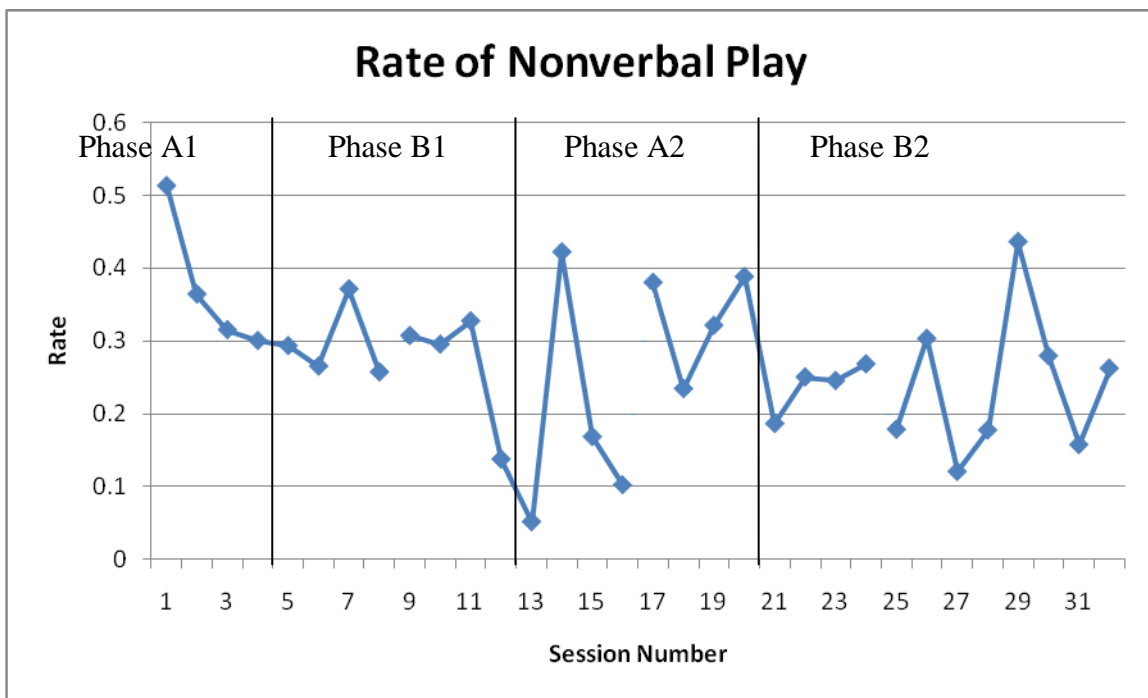
DISCUSSION

The current study examined the response of a five-year-old child with moderate to severe autism to two play-based intervention conditions: adult-mediated and peer-mediated. The dependent variables measured engagement and social-communication. Engagement was assessed by measuring *Communicative Exchanges* (CEs) involving the Novice, *Initiations* by the Novice, and *Corrective Responses* by the Adult. Results indicated that the frequency of CEs was higher in the adult-mediated phases than in the peer-mediated phases. The results are not surprising, given that during the peer-



[Figure 5.](#)

Rate of Attention to Play Behaviors (A Phases: Adult-Mediated; B Phases: Peer-Mediated).



[Figure 6.](#)

Rate of Nonverbal Play (A Phases: Adult-Mediated; B Phases: Peer-Mediated)

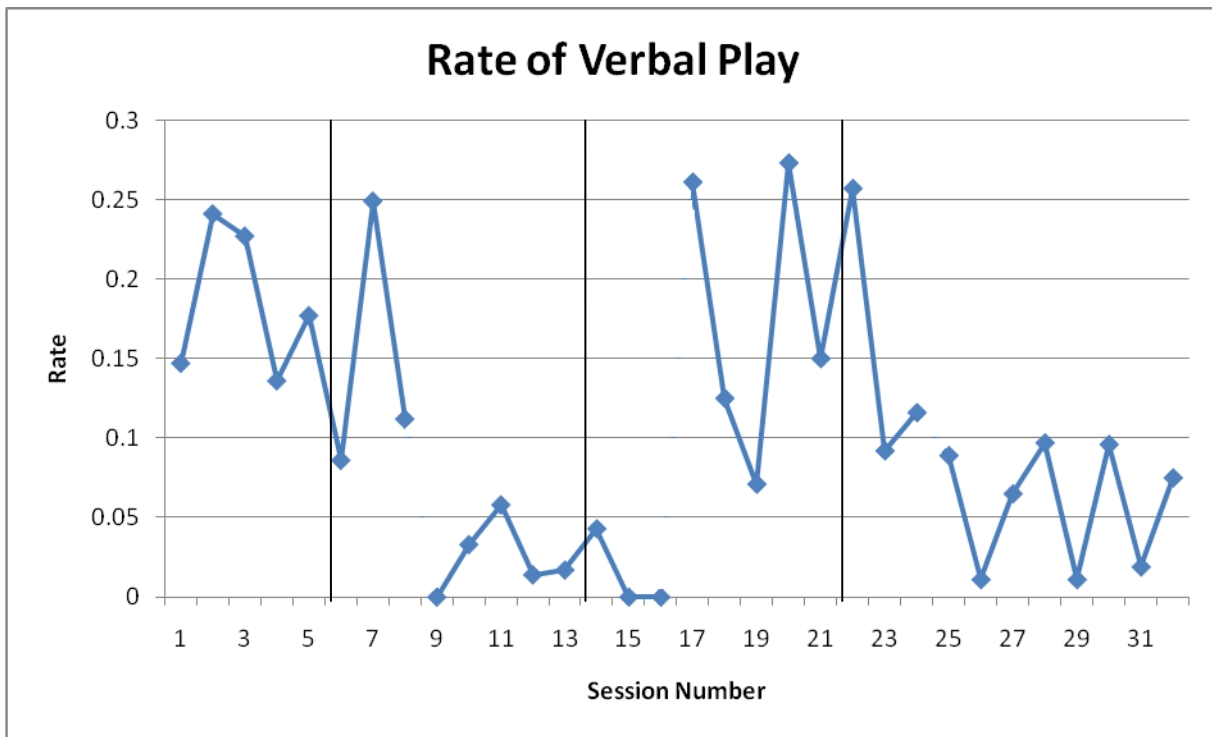


Figure 7.
Rate of Verbal Play (A Phases: Adult-Mediated; B Phases: Peer-Mediated).

mediated phases the Adult spent a large proportion of her time providing verbal guidance and modeling for the Expert, encouraging him to engage the Novice in play and respond to the Novice's initiations. As a result, the Adult's focus on the Novice decreased considerably in the peer-mediated condition (results of the post-hoc analysis supports these observations). The authors speculate that the Expert required on-going guidance and attention during the sessions (despite individual training before every session) due to characteristics related to his developmental level (discussed under Future Directions). On the other hand, the frequency of CEs rose from B1 to B2, which may have been partially due to an increased proficiency of the Expert in engaging the Novice in interactions. The post-hoc analysis indicated that the Expert's involvement in CEs increased from B1 to B2 (both as the initiator and responder). Perhaps with more intervention phases and additional training of the Expert, the frequency of CEs between the Expert and Novice would have continued to increase.

Rate of *Initiations* by the Novice was similar across phases and did not appear to be differentially impacted by treatment condition. Rate of *Corrective Responses* exhibited an increase from phase A1 to B1, perhaps due to the presence of the unfamiliar Expert, which elicited more anti-social behaviors from the Novice. Midway through phase B1 the rate of *Corrective Responses* started to steadily decline and continued to decrease as the study progressed, indicating that the Novice

was increasingly more engaged in positive play behaviors regardless of treatment condition.

Social Communication was assessed by measuring *Behavioral Regulation*, *Attention to Play*, *Nonverbal Play*, and *Verbal Play*. The rates of *Behavioral Regulation* behaviors (BRs) were similar when comparing the adult- and peer-mediated intervention, which was not expected given Hauck et al.'s findings that children with autism exhibit more behavioral regulation with adults than with peers.

The rates of *Attention to Play* behaviors (ATPs) were higher in the peer-mediated phases than in the adult-mediated phases. These behaviors (i.e., gaze toward play, approach to play) were lower in terms of social complexity than the other play behaviors measured. This result is consistent with the findings of Hauck et al. who observed that the school-age children with autism in their study exhibited more low-level behaviors, such as frequent looking (interpreted as social monitoring), during lunch vs. free play due to the forced proximity to peers at mealtime. Treatment condition did not impact the rates of *Nonverbal Play* behaviors (NPs). In contrast, *Verbal Play* behaviors were higher in the adult-mediated phases than in the peer-mediated phases.

Overall, the Novice exhibited more sophisticated social-communicative behaviors (i.e., *Verbal Play*) in the adult-mediated conditions than in the peer-mediated conditions.

These findings are unexpected given that previous research suggests that the play of children with disabilities is more complex in inclusive settings when interacting with typically developing peers than in segregated settings when interacting with adults or peers with disabilities (Hanline & Daely, 2002). One potential explanation of this finding may be related to the client's developmental level. Literature on the development of social play suggests that toddlers and young preschoolers engage in predominately solitary and parallel play that involves adult guidance (cf. L'Abate, 2009). Cooperative social play with peers develops in late preschool and kindergarten. Recall that the Novice's chronological age was 5;6 while his age-equivalencies in communication and socialization skills ranged from 1;2 to 2;10. Perhaps greater interaction during the adult-mediation is an indicator of this developmental sequence in social development. Consequently, our results suggest that clinicians should carefully consider the clients' level of social play skills when evaluating the use of adult-mediated and peer-mediated intervention.

In addition to the developmental level of the Novice, the current results may also have been influenced by the developmental level of the Expert, which may have limited his effectiveness as a peer in this study. The Expert was a preschool-age boy who exhibited typical social skills for his age and gender, including limited prosocial behaviors such as empathy and altruism. The authors observed that the Expert did not seem to fully appreciate the purpose of his role and the extent of the Novice's disability. For example, the Expert often refused to stop his own activity in order to join the Novice in a different game, unless it was something that truly interested him. Also, the Expert often did not want to share toys with the Novice which stifled potential play interactions, despite appearing to understand the importance of sharing during the pre-session trainings. According to Moreno, Klute, & Robinson (2008), children between two and four years of age are transitioning between the emotional behaviors of infancy and the more sophisticated emphatic behavior of older children. Research has also shown that boys demonstrate considerably less empathy than girls (Auyeung et al., 2009); however, caution should be taken when extending the results of group studies to the behavior of one individual. The challenges described above are consistent with various criticisms that have been made against PMIs, including the need to utilize peers with highly developed social skills, the extensive training of peers required for interventions to be successful, and the continued need for adults to facilitate and guide interactions (for a review see Bass & Mulick, 2007). Our results suggest that when evaluating the social skills of potential peer models, clinicians should specifically consider the characteristics of empathy and altruism.

Limitations

The results and implications should be taken cautiously given that the study involved only one child with autism. Additional research with more participants examining the differential effects of adult- and peer-mediated interventions is greatly

needed. In addition, the current research examined only two cycles of each treatment condition. Perhaps additional cycles would have resulted in more positive results for the peer-mediated intervention. Also, a modified Integrated Play Group was implemented with two children, including one Expert (rather than three to five children and a higher ratio of Experts to Novices, as recommended). Some researchers have suggested that training groups of typically developing peers is more effective than training one peer, because the peers reinforce each other (e.g., Owen-DeSchryver, Carr, Cale, & Blakeley-Smith, 2008); however, including another preschool peer in the current study may have further divided the Adult's attention. Other factors affecting the results may be related to developmental characteristics of the Novice and Expert (described above), which have implications for effective planning of PMI. Additionally, objective data examining treatment fidelity or the generalization of social-communicative behaviors were not collected.

Future Directions

Despite the limitations described above, single-case studies are valuable mechanisms for generating directions of future research (Meline, 2010). The results of the current study highlight the need for more evidence-based recommendations on the optimal characteristics and developmental levels of the Novices and Experts participating in PMIs in order to produce maximum treatment effects (Chan, et al., 2009; DiSalvo & Oswald, 2002; McConnell, 2002; Miller, 2006; Owen-DeSchryver et al., 2008). The meta-analysis by Miller (2006) was unable to detect specific moderating factors of Novices and Experts that influence treatment effectiveness, due in part to the lack of participant information provided within the studies themselves. The current study suggests that typically developing preschoolers may not be the most effective peers. If preschoolers are included in PMI, clinicians may want to consider evaluating their ability to empathize, share, and follow directions. Increased training may also be warranted. An alternative that warrants further exploration is using an older empathetic child or sibling who could model developmentally appropriate play (Bass & Mulick, 2007).

Additional research is needed to compare the benefits of inclusive and segregated settings for children of various abilities and developmental levels. Kishida & Kemp (2009) examined the engagement and interaction of children with autism who regularly attended both inclusive and segregated early childhood centers. They concluded that one setting was not superior to another; instead, both had strengths and weaknesses, and individual children responded differently within each setting. Similarly, the mother of the Novice noted advantages to both treatment conditions in the current study. She thought the adult-mediated approach elicited more engagement from her son, while the peer-mediated approach contributed to his ability to observe and imitate other peers.

Conclusion

The purpose of the current research was to examine the differential impact of adult- and peer-mediated intervention for a child with moderate to severe autism who was a client in a university-based speech and hearing clinic. Results from the current study suggest that the adult-mediated intervention resulted in increased engagement and more sophisticated social-communicative behaviors than the peer-mediated condition during this particular period of intervention. Future research directions include providing recommendations for intervention type depending on the characteristics of the child with autism (e.g., age), and guidelines for ideal characteristics of children participating in PMIs (both clients and peers). In addition, the benefits and disadvantages of various interventions and settings (e.g., inclusive, segregated) for children with autism need to be explored further.

ACKNOWLEDGMENTS

The authors would like to thank the participants and their families who made this research possible. We are also grateful to Mrs. Kathy Erdman and Dr. Steven Long for their valuable contributions.

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