

The Impact of the Advancing Social-Communication and Play (ASAP) Intervention on  
Preschoolers with Autism Spectrum Disorder

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### **Abstract**

This study evaluates an intervention targeting social-communication and play skills (Advancing Social-communication and Play; ASAP) implemented by school staff in a public preschool setting. With increases in enrollment of children with autism spectrum disorder (ASD) in school systems, establishing the effectiveness and feasibility of interventions implemented in school settings is important. In clinical settings, interventions targeting social-communication and play behaviors have increased these skills and impacted later language abilities. Results of this single-case design study indicated the ASAP intervention had a positive impact on social-communication and play skills for three preschoolers with ASD. All participants showed either increases in frequency or more stability in targeted behaviors. Social validity results provide additional support for the use of ASAP with preschoolers with ASD.

### **Key words**

autism, preschool, social-communication, play, intervention

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School systems are serving a large number of students with autism spectrum disorder (ASD; Data Accountability Center, 2009). Preschool children with ASD have difficulties with social-communication and play skills that reflect the core features of the disorder. Not only are these skills a necessary part of participation in a preschool classroom, but they also are related to concurrent language skills and are predictive of later language abilities, adaptive functioning, and academic performance (Doctoroff et al., 2006; Lyytinen et al., 1999; McGovern and Sigman, 2005; Mundy et al., 1990; Sigman and Ruskin, 1999). Such findings have led to hypotheses that early social-communication and play behaviors represent pivotal skills that have positive, cascading effects on other areas of learning (Kasari et al., 2005).

#### *Development of Social-Communication and Play in Children with ASD*

Early social-communication can be conceptualized as serving three separate but related communicative functions: social interaction, behavior regulation, and joint attention (Bruner, 1981). All three of these skills emerge by the end of the first year for typically developing infants (Crais et al., 2004). Multiple studies have shown that children with ASD have deficits in social interaction, behavior requests, and joint attention as early as one year of age (Bryson et al., 2007; Colgan et al., 2006; Osterling et al., 2002; Watson et al., 2007). Children with ASD show impairments in these skill areas compared to both typically developing children as well as children with other developmental disabilities (Mundy et al., 1990; Wetherby et al., 2007). Challenges in the area of social-communication are a hallmark of children with ASD across developmental stages.

Another challenging skill area for children with ASD is play. According to Casby (1992), play skills can be described in four hierarchical levels emerging between the ages of 2 and 24 months: exploratory, relational, functional, and symbolic. Children with ASD exhibit differences

in quality and quantity of play when compared to both typically developing children (Charman et al., 1997) as well as children with other developmental disabilities (Baranek et al., 2005; Rutherford et al., 2007). These restrictions in play skills have important implications for development. For example, the level of symbolic play exhibited by young children is frequently shown to predict later language skills (Lyytinen et al., 1999, 2001). Further, the number of pretend play acts demonstrated at preschool age by children with ASD is predictive of later social play abilities with peers (Sigman and Ruskin, 1999). Collectively, research demonstrates that both social-communication and play skills play a critical role in the later development of language and peer social skills.

#### *Interventions Targeting Social-Communication and Play Skills*

Deficits in social-communication and play seen in children with ASD and the prospective pivotal nature of those skills have led researchers to develop interventions to target these skills. Especially promising findings stem from the research on interventions developed by Kasari and colleagues (Kasari et al., 2006, 2008). In a study of children with ASD enrolled in a 30-hour per week applied behavior analysis (ABA) program, children were randomized to receive supplemental joint attention or symbolic play interventions for 30 minutes per weekday over a period of 6 weeks (Kasari et al., 2006). The children in the joint attention and symbolic play groups demonstrated higher levels of the respective targeted skills at posttest compared to the control group with no supplemental intervention. In 12-month follow-up testing, children in both intervention groups had significantly higher joint attention and expressive language skills than the control group, with large effect sizes (Kasari et al., 2008). This research demonstrated the efficacy of interventions to improve social-communication and play skills. However, the interventions were provided by trained research staff in a controlled clinical environment with

children receiving intensive ABA programming. The intervention was recently adapted and successfully implemented in a parent-mediated model (Kasari et al., 2010), suggesting promise across intervention agents (i.e., professional and parent). There is still a need to determine if interventions targeting social-communication and play can be implemented by practitioners in school settings because in many countries, these settings are the primary source of educational services for children with disabilities.

Building on previous research, Watson, Boyd, Baranek, Crais, and Odom (2009) developed an intervention program designed for implementation with children with ASD in public preschools called Advancing Social-communication and Play (ASAP). ASAP is a manualized intervention developed through an iterative process of synthesizing research and clinical expertise. First, the ASAP team collected and analyzed data from focus groups of public school employees (i.e., teachers and therapists), and created a manualized program to address the social-communication and play skills of preschool-aged children with ASD within the context of publicly-supported preschool classrooms. The ASAP program and its manual were developed in iterative cycles involving testing of intervention components in authentic educational settings, evaluating the implementation, eliciting systematic feedback from users through written questionnaires and interviews, revising the intervention, and testing the next version. The iterative process resulted in the version of ASAP evaluated in the present study, which was the first test of the full intervention as implemented by public school employees in school settings. The ASAP intervention includes hierarchies of social-communication and play objectives and is delivered in both one-to-one (i.e., adult and child) and group (i.e., adult with small group of children) activities (see methods and appendix for a more detailed description).

The purpose of the current study was to examine the effect of the ASAP intervention on the social-communication and play behaviors of preschoolers with ASD in public school classrooms by addressing the following research questions:

1. Does implementation of ASAP in a group setting improve social-communication and play skills in preschool children with ASD?
2. Does implementation of ASAP in both a one-to-one and group setting result in further improvements in social-communication and play skills?

Data obtained from the focus groups indicated inconsistent use of one-to-one instruction at the preschool level, whereas group services were provided to all children with ASD in school districts. Therefore, we chose to start with the group component, followed by the full intervention (i.e., one-to-one and group) in order to examine the added impact of more focused, individualized instruction.

## Methods

### *Design*

A multiple-baseline (MB) across participants, single case design (SCD) was utilized. With MB designs, intervention “effects are demonstrated by introducing the intervention to different baselines (e.g., behavior or persons) at different points in time” (Kazdin, 1982, p. 126). This study had three phases for each participant. In Phase A, baseline, data were collected as children received their typical instruction in one-to-one sessions led by a speech-language pathologist (SLP) and classroom group sessions led by a teacher or teaching assistant. During Phase B, teachers and/or teaching assistants were trained and began to implement the ASAP intervention during already-occurring group activities compatible with the structure and curriculum of the classroom. The SLP continued with typical instruction in one-to-one sessions.



In Phase C, the SLP was trained and began to implement ASAP; thus, the social-communication and play intervention was now implemented in both one-to-one and group settings (i.e., full implementation).

### *Recruitment*

Participants were recruited from three preschool classrooms in a large public school district in the southeastern United States. Inclusion criteria were that children be three to five years old and meet criteria for “autistic disorder” or “autism spectrum disorder” on the Autism Diagnostic Observation Schedule (ADOS, Lord et al., 1999). Exclusionary criteria included (1) diagnosis of a genetic disorder associated with ASD (i.e., Fragile X syndrome, tuberous sclerosis or Rett syndrome), (2) an uncontrolled seizure disorder, (3) severe visual impairment or hearing loss that was not corrected, and (4) traumatic brain injury. The teachers in each of the three preschool classrooms selected one student who met inclusionary criteria and had needs in the areas of social-communication and play. Consent forms were sent to the parents of the selected child from each classroom and parents of all three children initially identified by the teachers consented to their child’s participation. Pseudonyms are used for all participants.

### *Participants*

Selena was 44 months old at the beginning of the study. She is Hispanic, and Spanish is the primary language spoken in the home. Her mother obtained a high school level education and her father completed an education equivalent to or below sixth grade. Selena began receiving intervention upon enrolling in the public schools (around 36 months of age) and was not receiving any concurrent services outside of school at the time of the study. She used some vocalizations and one word approximations, but used very limited spontaneous communication overall. Kelsey was 49 months old. She is Asian and lives with her parents. Both her mother and

father completed some college. Based on parent report, Kelsey showed regression in language and motor skills around 17-18 months of age. She began receiving services at age 32 months and did not receive additional outside services during the study. Kelsey used some spontaneous words or word combinations, but exhibited regular use of delayed echolalia. Blake was 58 months old. He is Caucasian and lives with his mother and father, both of whom completed Bachelor's degrees. He started receiving intervention services at 30 months of age. During the study, he did not participate in any additional services outside the school. Blake used multi-word utterances, but had limited use of gestures such as pointing or showing.

All of the participants were enrolled in preschool classrooms that served only children with identified disabilities. The classrooms for Kelsey and Blake served students with a variety of disabilities, and teachers within those classrooms did not subscribe to any specific teaching philosophy or approach. Selena's classroom served primarily students with ASD and followed the TEACCH model (see Mesibov et al., 2004 for additional information on TEACCH. All teachers are female and Caucasian. At the time of the study, Selena's teacher had one year of experience, Kelsey's teacher had 17 years of experience, and Blake's teacher had 6 years of experience. The SLPs are also all female, one is African-American and two are Caucasian. All SLPs had over 5 years of experience.

### *Procedures*

Research staff conducted an interview with one parents of each child to obtain basic demographic information as well as ascertain diagnostic and treatment histories. Research staff administered the ADOS (Lord et al., 1999) with each of the participants. Kelsey and Blake were also given the Mullen Scales of Early Learning (Mullen, 1995) to assess cognitive skills. The Leiter International Performance Scale - Revised (Roid and Miller, 1997), a non-verbal IQ

measure, was administered to assess Selena's cognitive performance since English was not the primary language spoken in her home. See Table 1 for results of the pre-intervention measures.

*ASAP Intervention.* The Addressing Social-communication And Play (ASAP; Watson et al., 2009) intervention was developed as part of an intervention development grant funded by the U.S. Department of Education Institute of Education Sciences. Adapted from the interventions of Kasari and colleagues (2006; 2008), ASAP is designed to target social-communication and play of children with ASD in a preschool setting using developmental hierarchies. The ASAP instructional hierarchy provides 20 sequenced objectives across three categories of social-communication: social interaction, requesting, and joint attention. There are 21 sequenced objectives across the four categories of play: exploratory, relational, functional, and symbolic play.

To identify appropriate objectives for each child, classroom staff initially assessed the child using project-developed assessments. The staff could elect to use either the direct observation forms, completed via observation of the child in the classroom, and/or a structured assessment that could be administered one-on-one with the child. Both the informal and structured assessments attempt to identify where in the sequence of objectives (20 for social-communication and 21 for play) the child is functioning and the most appropriate place to start intervention. Based on the assessment, at least one objective from both the social-communication and play domains are identified as initial intervention targets. For Selena, initial ASAP objectives included engaging in face-to face games (social interaction) and using objects in simple pretend play (functional play). Kelsey's initial ASAP objectives targeted engaging in face-to-face games (social interaction) and directing simple pretend play toward self (functional play). Blake's initial ASAP objectives targeted pointing to nearby objects to request (requesting)

and including other people in simple pretend play (functional play).

ASAP implementation includes one-to-one instruction, which is conducted for a total of at least 40 minutes per week to provide maximal opportunities for practice of target objectives. Per the intervention manual, members of the classroom team can decide if this individual instruction will occur as “push-in” activities in which a professional works with the child one-to-one in the classroom setting, or “pull-out” activities that could involve taking the child to a different room for one-to-one interaction. In addition, the ASAP program includes group instruction conducted during at least three ongoing classroom activities (typically 10 to 15 minutes in length) on a daily basis to promote generalization of target objectives and peer interaction. During both the one-to-one and group instruction for each child, the ASAP manual indicates that the educator should work on at least one social-communication objective and one play objective each day.

All classrooms in this study had four or five days of educational programming per week, so classroom teams were expected to provide between 40 and 75 minutes of group intervention each week. Across settings, educators (i.e., teachers, teaching assistants, and speech-language pathologists) used strategies such as following the child’s lead, natural reinforcement, incidental teaching, and prompt hierarchies to target the sequenced objectives. Throughout the intervention, the teams used ongoing data collection to monitor progress and determine subsequent intervention objectives. The mastery criterion for each intervention objective was that the child exhibited three unprompted occurrences of the targeted behavior in a single day.

Prior to implementation of the ASAP intervention by either group of interventionists (i.e., teachers and assistants or SLPs), the research team provided a three-hour training session. Teachers and teaching assistants were trained approximately one to two weeks prior to Phase B

(group intervention only) to allow time for them to use the ASAP assessment materials to determine the appropriate target objectives for each child. SLPs were trained as close as possible to the start of Phase C (full implementation) for each child. The training included background information about the study, information about social-communication and play development, introduction to the ASAP sequenced objectives, and instruction on ASAP assessments and intervention. The first author also met with the interventionists to provide coaching approximately every two to three weeks throughout intervention.

*Data Collection.* Researchers used Pocket PCs equipped with headphones and the Multi-Option Observation System for Experimental Studies (MOOSSES; Tapp et al., 1995) software to collect data on child behavior in the school setting. Coders used a 10-minute partial interval coding system, with 10-second observation intervals and five-second recording periods, for a total of 40, 15-second intervals. During data collection sessions, the coder was positioned in close enough proximity to the child to observe social-communication and play behaviors. Data were collected in two instructional contexts—one-to-one and group. Data for one-to-one contexts were collected during the participants' speech-language therapy sessions. Both Blake and Selena received push-in services, during which the SLP typically pulled the student aside at a table or in a center for one-to-one activities. Kelsey received primarily pull-out services which the SLP conducted in her office. Data for the group contexts were collected in the same classroom center for individual participants: blocks for Selena, dramatic play for Kelsey, and blocks for Blake. Either the teacher or teaching assistant served as the interventionist for group sessions. During *baseline and full implementation*, researchers collected data twice per week in one-to-one and group instructional contexts. During the *group only* implementation, researchers collected group context data twice per week, and collected probe data in the one-to-one contexts at least once per

week (to determine if the intervention effects were generalizing to the child's interactions with the untrained SLP).

*Dependent Variables.* The data on social-communication and play behaviors of the participants are reported as the percentage of intervals during which a given behavior was displayed independently (i.e., with no gestural, verbal, or physical prompts). A coding manual with operational definitions for each of the behaviors was developed and refined during the coder training process. For this study, the behaviors of interest were initiating social interactions, initiating behavior requests, initiating joint attention, functional play acts, and symbolic play acts. See Table 2 for the specific definitions of the five target behaviors used by the coders. The full coding manual can be obtained from the first author.

#### *Reliability*

Three research staff members served as coders. All coders attended a training session with project investigators, and attained at least 80% reliability during coding practice sessions at a local child care center prior to the start of the study. Inter-observer agreement was calculated periodically throughout the study to monitor the need for retraining. Reliability was calculated on 19 - 21% of the sessions across the different phases using the percentage of inter-observer agreement, calculated by dividing the number of agreements by the total number of agreements plus disagreements and multiplying by 100. Overall, reliability ranged from 95-98% for social-communication behaviors and 91-98% for play behaviors across participants.

#### *Social Validity*

Research staff recorded ten-minute videos of teacher-student play sessions prior to intervention and at the conclusion of the intervention for each participant. A group of thirteen teachers, SLPs, and occupational therapists, who were experienced in working with preschool

children, but unfamiliar with the children in the study, participated as social validity raters. The raters were recruited from local school districts other than the district in which the study took place, and were blind to the design and hypotheses of the study. They viewed each of the six recorded play sessions in a quasi-randomized order, and responded to each of six statements by rating the social-communicative and play behaviors of each child on a 10-point scale. The raters were to base their ratings on what would be expected from typically developing preschool-aged children. The rating scale was anchored on each end, with a rating of 1 indicating “strongly disagree” and a rating of 10 indicating “strongly agree.” The six statements were: (a) The child appears to appropriately engage with other people; (b) The child appears to appropriately engage with toys and other materials; (c) The child appropriately responds to communication attempts from other people; (d) The child appropriately initiates communication (both verbally and nonverbally) with others; (e) The child displays appropriate imaginative or pretend play skills; and (f) The child appears socially competent.

#### *Fidelity of Implementation*

A 16-item measure was developed by investigators on the ASAP project to monitor fidelity of implementation. Observers used the measure to rate the use of critical strategies and elements of ASAP on a scale from 1 (No or minimal implementation) to 4 (Complete implementation). Fidelity was collected for 15 - 20 percent of the individual and group sessions during the implementation phase of the study. For Selena’s intervention, fidelity ranged from 2.67 to 3.85 with an average fidelity of 3.08 in group sessions and 3.72 in one-to-one sessions. For Kelsey, fidelity ranged from 2.76 to 4.00 with an average of 3.85 in group and 3.30 in one-to-one intervention sessions. For Blake, fidelity averaged 4.00 for group and 3.85 for one-to-one sessions, with an overall range of 3.85 to 4.00.

## Results

Research staff collected data over nineteen-and-a-half weeks with staggered implementation, which is a feature of MB design. Selena received the ASAP intervention over the course of fourteen weeks, with seven weeks of group only and seven weeks of full implementation. Kelsey received six weeks of the group component of ASAP and five-and-a-half weeks of full implementation, for a total of eleven-and-a-half weeks of intervention. Blake received seven-and-a-half weeks of ASAP, with four weeks of group only and three-and-a-half weeks of full implementation, which was shorter than other participants due to the end of the school year. The research team based decisions to move a participant to the next phase on visual inspection (i.e., examining the stability and trend of the data) of child social-communication and play data. Visual inspection is commonly used to analyze data in SCD research (Kazdin, 1982).

As described in the methods section, data were collected on three social-communication behaviors (initiations of social interaction, behavior requests, and joint attention) and two play behaviors (functional and symbolic play acts). However, since the interventionists addressed objectives from broad categories of social-communication and play (e.g., social interaction vs. behavior requests, functional vs. symbolic play) across participants, the individual behaviors that comprised those categories were aggregated to create social-communication and play composites. The social-communication composite was the average percentage of intervals across social interaction, behavior requests, and joint attention. The play composite was the average percentage of intervals across functional and symbolic play. All data were collected during instructional sessions. See Figures 1 and 2 for graphs of social-communication and play data for each participant.

### *Social-Communication*



Selena exhibited low levels of social-communication behaviors during Phase A (i.e., baseline) in both one-to-one and group settings. In Phase B, with implementation of the group component of the ASAP intervention, she continued to demonstrate a similarly low level of the social-communication behaviors across both settings. During Phase C (i.e. full implementation of ASAP), however, Selena showed increases in social-communication behaviors across both settings, but with increased variability.

During Phase A, Kelsey also demonstrated low levels of social-communication behaviors in both one-to-one and group settings. Aside from a small increase in social-communication behaviors at the beginning of Phase B, she continued to exhibit the low levels of social-communication behaviors throughout implementation of ASAP in group settings alone. The probe data collected during one-to-one sessions with the SLP showed a similar trend. During Phase C, Kelsey exhibited an increase in social-communication behaviors but with a high level of variability across both one-to-one and group settings.

Blake showed variable social-communication behaviors in one-to-one and group settings in Phase A. During Phase B, he continued to exhibit variability across both settings, but had several sessions in which his social-communication behaviors in the group setting exceeded baseline levels. Blake appeared to demonstrate even higher levels of variability in Phase C across one-to-one and group settings, although he had a peak in social-communication skills during the full implementation of ASAP at the end of the study.

### *Play*

During Phase A, Selena demonstrated few pretend play behaviors in one-to-one or group settings. She continued to show few pretend play behaviors across settings in Phase B during the

implementation of the group component of ASAP. In Phase C, Selena exhibited large increases in pretend play in both one-to-one and group settings, although the behavior was highly variable.

Kelsey exhibited a high level of variability in her pretend play behaviors in the group setting with almost no demonstration of pretend play skills in the one-to-one setting during Phase A. In Phase B, there was a notable increase in stability of her pretend play behaviors in the group setting, whereas pretend play behaviors hovered near zero in the one-to-one setting. During Phase C, there was a change in trend and level, with increasing pretend play behaviors in the group setting. For the one-to-one setting during Phase C, Kelsey demonstrated higher levels of pretend play behaviors with large variability across sessions.

During Phase A, Blake had a moderate amount of pretend play behaviors with some variability across both one-to-one and group settings. He showed an increase in level of pretend play behaviors in both settings during Phase B, although his behavior remained variable across sessions. In Phase C, there appeared to be a slight improvement in the stability of his play behaviors in one-to-one and group settings, with a potential change in trend during this phase.

#### *Percentage of Non-Overlapping Data*

In addition to visual inspection of the data, we also calculated percentage of non-overlapping data (PND) for social-communication and play skills (See Table 3). PND is the percentage of data points in a given phase above the highest data point from baseline data. Scores above 90 percent are considered very effective interventions, scores from 70 to 90 percent represent effective interventions, scores from 50 to 70 percent suggest possibly effective interventions, and scores below 50 percent are considered ineffective interventions (Scruggs and Mastropieri, 1998). For Phase B (i.e. group only), only PNDs from the group condition are

presented since the one-to-one condition consisted of probe data. For Phase C (i.e. full implementation), PNDs from both group and one-to-one conditions are presented.

### *Social Validity*

From pre- to post- intervention, the average ratings by unfamiliar teachers and therapists for the six questions increased for all three participants as shown in Table 4. Post-intervention ratings were significantly higher than pre-intervention ratings, based on the results of a repeated measures ANOVA for each child ( $\lambda = .893$ ,  $F_{(1,77)}=9.219$ ,  $p=.003$  for Selena;  $\lambda = .715$ ,  $F_{(1,77)}=30.718$ ,  $p<.001$  for Kelsey; and  $\lambda = .384$ ,  $F_{(1,77)}=123.582$ ,  $p<.001$ , for Blake).

### Discussion

Overall, the results of the study showed support for the implementation of the ASAP intervention in a public preschool environment. All participants showed at least some improvement in social-communication and pretend play skills, especially evident during Phase C (full implementation) of the intervention, as supported by visual inspection of the data and the PND results. The social validity ratings by unfamiliar teachers and therapists added weight to the conclusions that were based on visual inspection and PND analysis.

In social-communication, both Selena and Kelsey showed visible increases during ASAP implementation. Notably for these two children, group implementation alone did not result in changes; instead, the combined one-to-one and group components were necessary to produce change. Blake exhibited limited increases in social-communication behaviors during the group-only implementation and appeared to maintain these increases during full implementation. Social validity supported these positive changes across all three participants. Interestingly, the social validity coders rated Blake the highest in the questions related to social-communication for pre- and post-intervention measures and also rated him as having the largest changes from pre- to

post-intervention. Possibly, changes in Blake's social-communication skills were not as visible in the quantitative data because he was improving his skills in qualitative dimensions that were not captured by the coding system.

All participants had noticeable changes in their pretend play behaviors. Selena, similar to her performance in social-communication, appeared to benefit from the addition of the one-to-one component to the group component, as her play skills did not increase until Phase C of the study. Kelsey demonstrated moderate but highly variable levels of play skills in baseline which were stabilized by implementing ASAP in the group setting, and then increased with full implementation. Blake's pretend play performance appeared to increase with the group component of ASAP and maintain during the full implementation. One reason for the limited increase in play skill demonstration by Blake could be that he was increasing his diversity of play scripts or increasing his skill level qualitatively within a play category (e.g., moving from lower level symbolic play to higher level symbolic play), which would not have been captured by our coding system. As with social-communication, the social validity data confirmed these findings, with unfamiliar teachers and therapists rating play performance higher for post-intervention play sessions.

In addition to visual inspection of the data, the PNDs also offered support to the impact of the ASAP intervention. The PNDs for social-communication ranged from possibly effective to very effective for the full implementation of the intervention in at least one of the conditions (i.e. one-to-one or group sessions) for each participant. For play, the PNDs suggested the group component of the intervention alone was possibly effective for Blake. The full implementation of the intervention ranged from possibly effective to effective in improving play skills for the three

participants. Overall, the strongest effects were evident in the one-to-one setting during the full implementation of the intervention.

### *Limitations of Study*

There were several limitations to the study. All participants were enrolled in classrooms that only served children with disabilities within a single school district so it is difficult to generalize to other classroom types or school districts. Data collection was completed by three research staff who were aware of the purposes of the study and the phase of intervention. Further, the operational definitions of behaviors focused on quantifying the occurrence of social-communication and play behaviors within broad categories, which was necessary to optimize coding and reliability. The resulting limitation, however, was that the coding system failed to capture qualitative changes in behaviors, such as changes in levels of prompting needed for demonstration of a behavior. Although data were collected across multiple settings (i.e., one-to-one and group sessions), no measures of generalization or maintenance were collected.

The decision to create composite social-communication and play variables, although permitting comparison across time and across participants, may have also introduced some limitations to data interpretation. For example, many of Selena's gains in social-communication were within the behavior request category, so averaging the frequency across social-communication categories created the appearance of a smaller effect of the intervention. Also, only independently initiated behaviors were coded to set a relatively high bar for determining child progress, so progress in responding with lower levels of adult prompting were not captured in the data. Despite these limitations, the results indicated ASAP could be effective in promoting social-communication and play skills for preschool children with ASD in public preschool settings.

### *Clinical Implications*

This study has clear and important clinical implications. Previous research has demonstrated that social-communication and play skills act as pivotal skills, with cascading impacts on other areas of development (Kasari et al., 2008; Sigman and Ruskin, 1999). ASAP appears to hold promise as an intervention to target these crucial skills in public preschool settings. Motivated educational teams were able to attain good to excellent fidelity in implementing ASAP after a relatively brief introductory session (3 hours) and with ongoing coaching support consisting of approximately two 30- to 60-minute sessions per month. In post-intervention interviews, each teacher and SLP who had implemented the intervention indicated she intended to continue using ASAP in the future.

In addition to demonstrating that public school educational teams can implement ASAP with good fidelity, the child participants showed gains in social-communication and play skills from a supplemental intervention that was layered onto existing preschool classroom programs. The fidelity of intervention was varied between classroom teams, which creates some inconsistencies for internal validity but offers greater external validity. Based on the data, incorporating a one-to-one component of intervention had an additive impact on the progression of social-communication and play skills, and appeared especially important for the two students who started the intervention with lower skill levels. This finding supports the results from previous review studies indicating one- to-one intervention services are critical for children with ASD (National Research Council, 2001). However, the three SLPs who delivered the one-to-one intervention in this study indicated that 40 minutes per week exceeded the amount of time for direct services typically written into individualized education plans of children with ASD on

their caseloads. Therefore, it is important that parents, school staff, and other parties continue to advocate for the provision of adequate one-to-one services for children with ASD.

### *Future Directions*

Pursuing additional studies to support the efficacy and feasibility of the ASAP intervention in public school settings is a priority in this program of research. One goal is to expand studies to other types of classrooms (e.g., inclusive) and across school districts in order to determine effectiveness of ASAP across a range of settings. The examination of pre-intervention child and classroom characteristics for potential moderators of outcomes will be beneficial in helping to identify classrooms and children for whom the intervention is more likely to be effective. Collecting follow-up data to look at the longitudinal impact of the ASAP intervention is another future goal.

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Table 1. Descriptive information and diagnostic confirmation and for participants

Participant	Mullen Scales of Early Learning (MSEL) <sup>b</sup>				Autism Diagnostic Observation Schedule		
	Visual Reception	Fine Motor	Receptive Language	Expressive Language	Social Affect	Restricted/ Repetitive Behavior	Total
Selena (C.A.: 44 mos.)	Leiter-R Brief IQ <sup>a</sup> : 71	NA	NA	NA	Score: 17	Score: 4	Module 1 Score: 21 Dx: AU <sup>c</sup>
Kelsey (C.A.: 49 mos.)	T-score: 39 AE: 43 mos.	T-score: 30 AE: 39 mos.	T-score: 23 AE: 31 mos.	T-score: 20 AE: 29 mos.	Score: 12	Score: 3	Module 1 Score: 15 Dx: AU <sup>c</sup>
Blake (C.A.: 58 mos.)	T-score: 36 AE: 46 mos.	T-score: 20 AE: 36 mos.	T-score: 39 AE: 47 mos.	T-score: 23 AE: 36 mos.	Score: 12	Score: 3	Module 2 Score: 15 Dx: AU <sup>c</sup>

<sup>a</sup>Leiter-R Brief IQ scores have a mean of 100 and a SD of 15

<sup>b</sup>MSEL T-scores have a mean of 50 and a SD of 10

<sup>c</sup>AU indicates a diagnosis of autistic disorder.

Table 2. Coding definitions for social-communication and play behaviors

Behavior	Definition
Initiating social interactions	Any appropriate use of words, vocalizations, or gestures as well as alternative forms of communication (e.g., sign language or ‘PECS’) that the child self generates clearly directed towards another person. This may be for the purpose of getting the attention of another person, to get involved/included in an activity, to gain comfort, assistance, or affection from another person, or to share an object with another person <i>without</i> an effort to draw the attention of the other person to the object.
Initiating behavior requests	Any appropriate words, vocalizations, or gestures as well as alternative forms of communication (e.g., sign language, ‘PECS’) the child physically engages in to (1) get access to a tangible object/toy/activity, (2) have another person perform a certain action with the object, or (3) have another person make the object, itself, perform the action.
Initiating joint attention	Clear integration of eye contact with words, vocalizations, or gestures as well as alternative forms of communication (e.g., sign language, ‘PECS’) by the child to draw another person’s attention to an object/event for the purpose of just “sharing the experience” with the other person.
Functional play acts	Child acts using tangible and appropriate objects/toys in conventionally appropriate ways showing understanding for the function and purpose of different objects/toys.
Symbolic play acts	Child acts (1) using contexts, characteristics and materials that are not currently present (e.g., “hot” play stove), (2) using object substitution where one object represents another (e.g., block as “food”), or (3) participating in role play (“daddy” in play kitchen).

Table 3. Percentage of non-overlapping data (PND)<sup>a</sup> for social-communication and play

		Selena		Kelsey		Blake	
		Phase B <sup>b</sup> (Group)	Phase C <sup>c</sup> (Full)	Phase B <sup>b</sup> (Group)	Phase C <sup>c</sup> (Full)	Phase B <sup>b</sup> (Group)	Phase C <sup>c</sup> (Full)
Soc- Comm	Group data	0%	64%	11%	64%	38%	29%
	1:1 data	--	90%	--	60%	--	60%
Play	Group data	17%	55%	0%	45%	50%	57%
	1:1 data	--	60%	--	80%	--	80%

<sup>a</sup>Scruggs and Mastropieri, 1998

<sup>b</sup>Phase B consisted of ASAP intervention in the group condition only

<sup>c</sup>Phase C consisted of full ASAP intervention, in both group and one-to-one conditions

Table 4. Social validity ratings<sup>a</sup>

Skill	Selena		Kelsey		Blake	
	Pre	Post	Pre	Post	Pre	Post
Engages with other people	1.3	1.9	3.2	3.3	7.1	9.3
Engages with toys and activities	2.0	2.5	3.1	5.5	7.2	9.4
Responds to communication attempts from other people	1.4	1.8	2.6	3.8	7.5	9.4
Initiates communication with others	1.4	1.5	2.4	3.5	6.2	8.9
Displays imaginative or pretend play skills	1.6	1.9	2.9	4.2	6.9	9.3
Appears socially competent	1.5	1.9	2.6	3.9	6.9	8.9
<b>AVERAGE</b>	<b>1.5</b>	<b>1.9</b>	<b>2.8</b>	<b>4.0</b>	<b>7.0</b>	<b>9.2</b>

<sup>a</sup> The ratings ranged from 1 (“strongly disagree”) to 10 (“strongly agree”)



Figure 1. Social-communication behaviors across participants

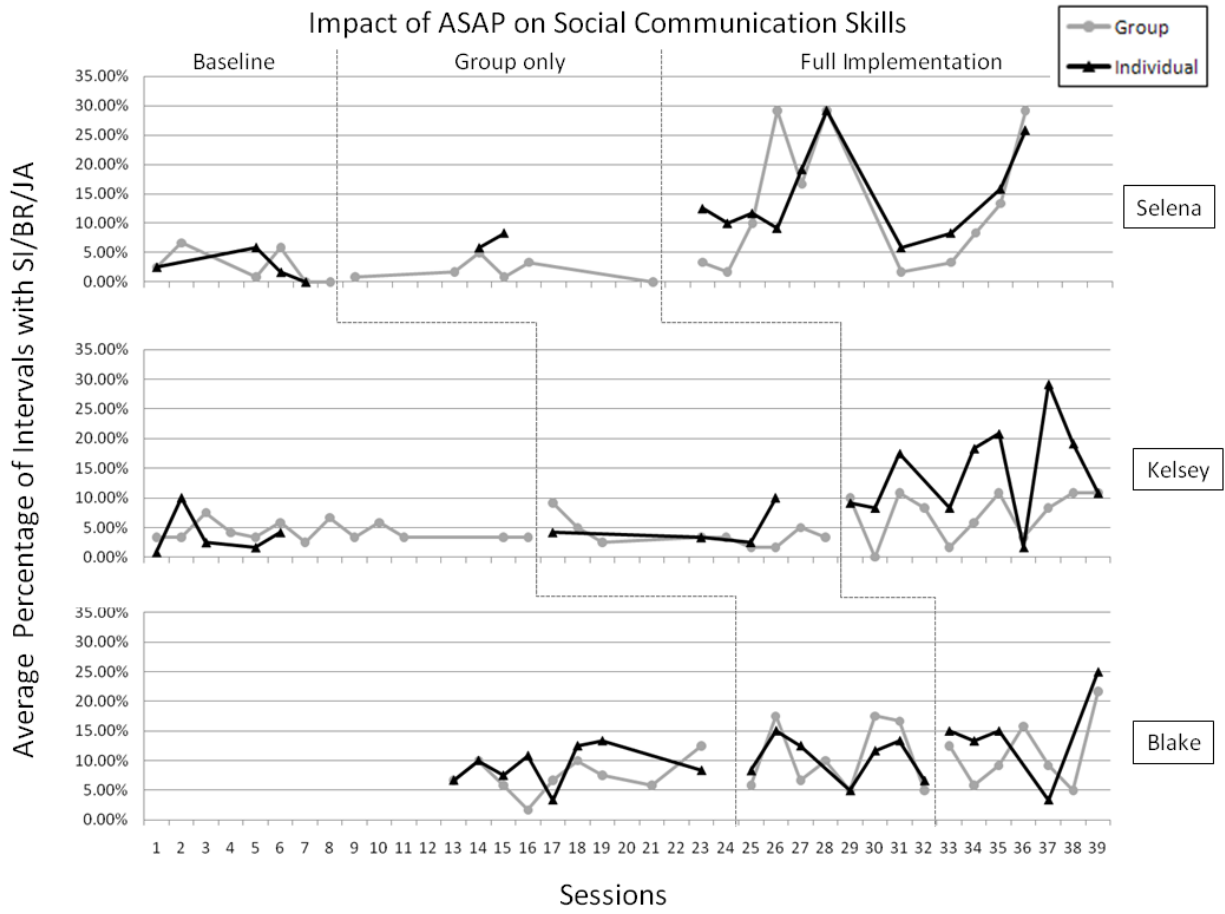
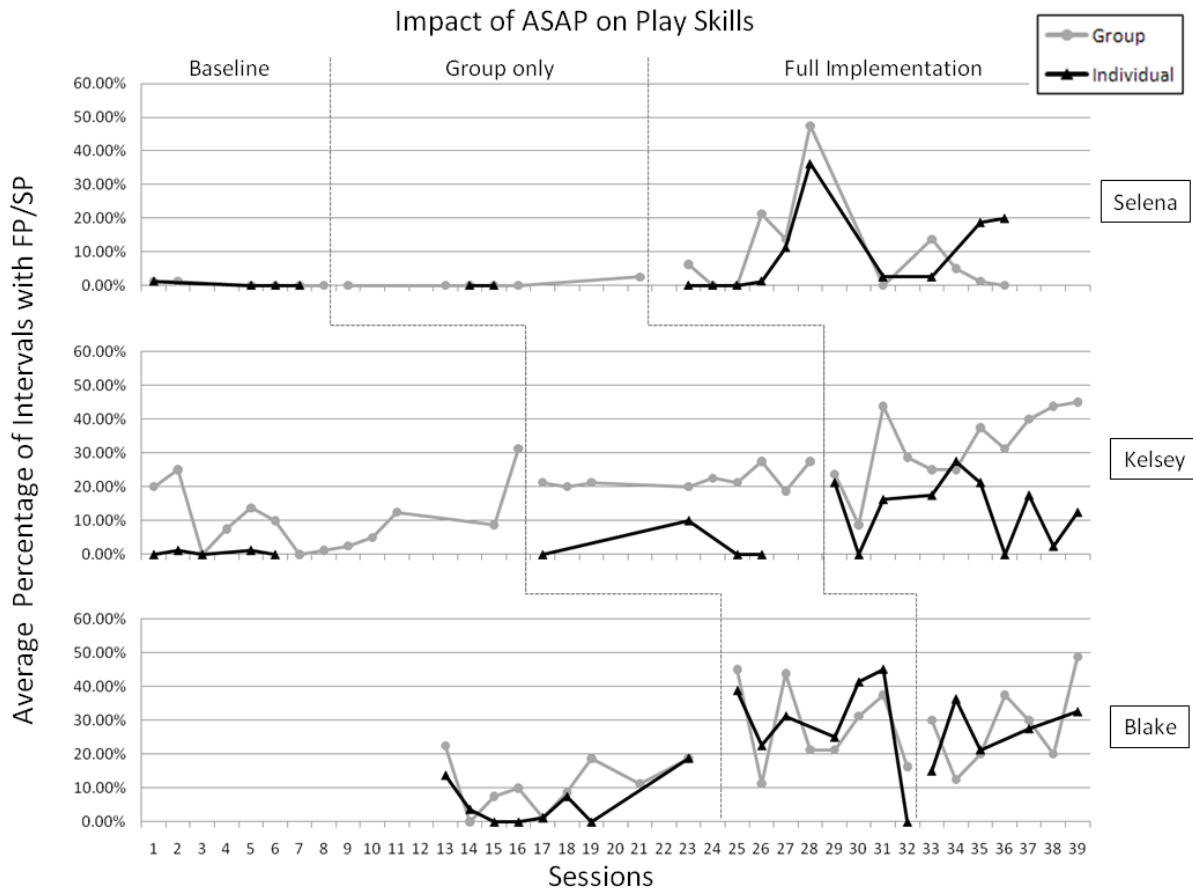


Figure 2. Play behaviors across participants



## Appendix. Overview of ASAP Intervention

### Examples of ASAP skills

Category	Examples of objectives
Social Interaction	SI2. While playing face to face games, physical activities, or routines, after a brief phase child shows wanting the game to continue
Requesting	RQ4b. Child points to nearby objects to request them
Joint Attention	JA2b. Child shows objects just to share interests in the objects with another person
Functional Play	F3. Child includes a doll/action figure in simple pretend play with toys
Symbolic Play	S4. Child uses one toy/object to represent or stand for another

### Sample ASAP activities

<b>Social-communication: One-to-one activity (JA2b)</b>	<b>Social-communication: Group activity (SI2)</b>
<p><u>Fishing Game</u> <i>Setting Up</i></p> <p>a. Objective: Shows objects just to share them with another person</p> <p>b. Materials: fishing pole (pencil or short wooden dowel, string, &amp; magnet), paper clips, picture cards (you can use fish or other items the child is more interested in), bucket or large bowl</p> <p><i>Engaging the Child</i></p> <p>a. Arrangement: Create a small fishing pole and picture cards with the paperclips hooked to them. Place the cards in the bucket. Sit in close proximity to child.</p> <p>b. Suggested Activities: Seated at the table, show the child how to “fish” for the picture cards. When s/he catches a “fish”, ask if you can see what s/he caught. If the child shows you the “fish”, comment on it and then encourage him/her to try to catch another one. If the child does not show you the “fish”, have another adult use hand-over-hand to hold it up to show you or hold up the child’s hand containing the “fish” and then label the item. Fade prompts as appropriate.</p>	<p><u>Gross Motor: Timber!</u> <i>Setting Up</i></p> <p>a. Objective: While participating in physical games or routines, child signals for continuation after a brief pause</p> <p>b. Materials: One or more foam “pool noodles” (floats).</p> <p><i>Engaging the Child</i></p> <p>a. Arrangement: Indoors in a large, open space or outdoors, stand a few feet from the child holding the noodle.</p> <p>b. Suggested Activity: Stand noodle on end. Say "Timber!!!" and let it fall. Child/children can try to catch it before it hits the ground. After establishing the routine, pause to see if child will signal for continuation. (Several foam noodles will make it possible for some children to play the game more independently with one another. If the teacher has to do all of the "Timber" move, s/he can possibly keep the game going at a faster pace if there are several foam noodles to use rather than having to retrieve one each time.)</p>
<b>Play: One-to-one activity (F3)</b>	<b>Play: Group activity (S4)</b>
<p><u>Beauty Salon</u> <i>Setting it up</i></p> <p>a. Objective: Plays with objects/toys in simple functional ways directed to doll figure</p> <p>b. Materials: doll, beauty supplies such as combs, brushes, hair ties, ribbons, etc.</p> <p><i>Engaging the child</i></p> <p>a. Arrangement: Have child in close proximity to teacher and materials</p> <p>b. Suggested Activities: Tell the child that the doll made an appointment at the salon. See if the child will brush the doll’s hair or put a bow or hair tie in the doll’s hair. If the child does not initiate, try demonstrating some of the actions. Use prompts as appropriate.</p>	<p><u>Sensory Table: Making Soup</u> <i>Setting Up</i></p> <p>a. Objective: Substitutes objects/toys in varied ways</p> <p>b. Materials: Stick, bowls, water or sand in the sensory table/large bin</p> <p><i>Engaging the Child</i></p> <p>a. Arrangement: Have the bowls and spoons in the sensory table with sand or water accessible to the children</p> <p>b. Suggested Activity: Tell the child you are making some soup (or another food that you know the child likes). Model stirring the “soup” if necessary or adding “ingredients”. This is also a good opportunity to use a peer model. Use prompts as appropriate.</p>