Keys to Play: A Strategy to Increase the Social Interactions of Young Children with Autism and their Typically Developing Peers

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Abstract: Crucial to the successful inclusion of young children with disabilities is the premise that benefit occurs when children socialize with peers and are actively involved in preschool activities including play. Playgroups are often primary to learning in typical preschool classrooms since it is within playgroups that preschool-age children learn both preacademic and social skills. However, this critical avenue of learning is often closed to young children with autism who may have difficulty initiating play interactions with other children. This study examined the effects of a visual intervention strategy on the play initiations of four young children with autism in inclusive preschool classes.

The strategy was successful in increasing the play initiations of the participating young children with autism. At the same time, the children’s engagement time within playgroups concomitantly increased, as did the sophistication level of their play.

Central to the successful inclusion of young children with disabilities in preschool classes is the premise that benefit occurs when children are in proximity to peers, socialize with them, and actively engage in typical preschool activities including play (Harris & Hettleman, 1997; Kellegrew, 1995; Koegel, Koegel, Harrower, & Carter, 1999; McGee, Morrimer, & Daly, 2001; McWilliam, Trivette, & Dunst, 1985; Rogers, Hall, Osaki, Reaven, & Herbsman, 2001; Strain, 1983). Unfortunately, skills that facilitate such behaviors are frequently impaired in young children with autism. Social interactions are often fundamentally different from those of typically developing children because they may not exhibit joint attention to play activities and may fail to respond when other children seek their attention and interest (Carpenter & Tomasello, 2000; Wetherby, Prizant, & Schuler, 2000). Children with autism may be able to talk, but unable to initiate conversation and interaction (Layton & Watson, 1995; Quill, 1995a). Young children with autism may produce few, if any, social initiations and may exhibit stimulus selectivity in which they fail to respond to multiple environmental cues (Koegel et al.). In addition to such difficulties with social initiations and responses, children with autism frequently engage in stereotypic, self-stimulatory and other undesirable behaviors that serve to further isolate them from typically developing peers (Simpson, 1999).

Young children acquire social knowledge and skills in play (Bruner, 1986; Parten, 1932). It is within play that they learn to coordinate interpersonal skills such as turn-taking and reciprocity and learn the strategies necessary for collaborative and symbolic pretend play (Schuler & Wolfberg, 2000; Wolfberg, 1995). Through social play, children learn and practice social skills such as asking to enter into peer or play groups and inviting others to play (Dodge, Schlundt, Schocken, & Delugach, 1983). The play of young children with autism...
is frequently impoverished in both form and content. They may engage in a single play sequence for hours or months and may manipulate play objects in a stereotypic manner. Pretend play may be nonexistent or extremely limited in variety (Wolfberg, 1995). In addition, children with autism often have difficulty conveying a desire to play or join in activities and they may fail to respond to invitations of others to play. As a result, they are often found outside of peer play groups (Wolfberg, 1995). Visual cues or symbols have been identified as one strategy that can assist in the provision of support for social communication (Bondy & Frost, 1994; Hodgdon, 2000; Jolly, Test, & Spooner, 1993; Krantz & McClannahan, 1993; Quill, 1995a, 2000; Wolfberg & Schuler, 1993; Zanolli, Daggett, & Adams, 1996).

Visual-graphic symbols include pictographic symbols, printed words, and pictures that may be used for both receptive and expressive purposes. They have been widely used with children with autism because they are usually iconic and capitalize on the relative strengths of individuals with autism in the areas of visual-spatial skills, rote memory, cued recall, and associative learning (Mirenda & Ericson, 2000; Prior & Chin, 1976; Quill, 1997, 1998; Sigman, Dissanayake, Arbelle, & Ruskin, 1997). Visual cues are static and allow the child to focus on a cue as long as necessary and revisit it as needed (Schuler, 1995). Visual communication tools are gestalt by nature, concrete and specific in appearance, and convey broad concepts or ideas rather than specific language structures (Quill, 1995b, 1997). Furthermore, recent research suggests that the use of visual strategies for communicative purposes promotes the use of oral language in children with autism (Bondy & Frost, 1994; Schwartz, Garfinkle, & Bauer, 1998).

The current study used peer-mediated instruction that was embedded within ongoing preschool activities to teach the use of a visual strategy for initiation. Embedded instruction is at the core of many naturalistic intervention strategies (Horn, Lieber, Scouming, Sandall, & Schwartz, 2000). It involves the systematic and normalized expansion, modification, or adaptation of activities in order to maximize opportunities for the child to practice specific goals (Bricker, Pretti-Frontczak, & McComas, 1998). Embedded instruction and practice within preschool activities has enjoyed widespread support in the field of early childhood special education (Hemmeter, 2000; Sandall, McLean, & Smith, 2000; Sandall et al., 2002); however, there have been few studies examining actual efficacy in preschool classrooms (Daugherty, Grisham-Brown, & Hemmeter, 2001). Peer-mediated strategies in preschool classrooms often involve prompting peers to interact with children with disabilities and peer modeling (Kohler & Strain, 1997). Such strategies have been shown to increase the interactions among children with and without disabilities in preschool classrooms (e.g., Goldstein, Kaczmarek, Pennington, & Shafer, 1992; Odom & Strain, 1984).

In summary, few empirical studies have examined effective strategies for teaching social skills to young children with autism within the routines of inclusive preschools. Several studies have been completed that examined the effectiveness of various applications of peer-mediated intervention with children with autism, but few studies have looked at naturalistic or embedded strategies or have empirically examined the combination of naturalistic and peer-mediated intervention strategies for use with young children with autism in preschool classes. In the same vein, while visual strategies offer much promise for the remediation for the specific deficits seen in children with autism and their use is rapidly increasing (Hodgdon, 2000), the research base as to their actual effectiveness as well as their impact on speech development in young children with autism is very limited.

The Keys to Play intervention package utilized an embedded instruction, class-wide, peer-mediated teaching strategy to promote the use of a laminated paper key that was shown to peers to initiate play. The study examined the effectiveness of the Keys to Play intervention package in increasing initiations and responses of children with autism in inclusive preschool classrooms. The specific research questions were: (a) Does the Keys to Play intervention package increase the play initiations of young children with autism? (b) Does the Keys to Play intervention package increase the time young children with autism spend engaged in playgroups? (c) Does the Keys to Play intervention package affect the
child with autism’s concomitant or singular use of another communication strategy such as speech, sign language, or manipulation of play materials to enter playgroups? and (d) How do classroom staff and family members rate the acceptability and perceived effectiveness of the Keys to Play intervention package for children with autism?

Method

Participants and Settings

The four participants were children identified as meeting the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorder (1994) criteria for autism (with or without the presence of other disabilities) by agencies not connected with this research. Each participant attended different preschool programs, including two Head Start classes, a community preschool class, and an integrated special education class in which the majority of children were typically developing. Participating children were identified through observations by research staff and by their classroom teachers as appearing to have an interest in the play of other children or in classroom activities, but also as having difficulty with social-communication initiations and responses.

Participant 1, “Emerson,” was a 4 year 5 month (53 month) old Caucasian boy who attended an urban Head Start classroom five days per week. Results from the Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Renner) indicated that he had severe autism. According to the Achenbach Child Behavior Checklist (Achenbach, 1991), Emerson was in the clinically significant range on the withdrawal scale. Observations in the classroom environment revealed that during free-play or learning center time, Emerson primarily moved around the periphery of the room holding small objects such as a piece of straw up to his eye and putting inedible objects such as staples in his mouth. He engaged in brief onlooker behavior to a few select activities but made no attempt to interact with the children in the groups. Spanish was the predominant language spoken in his home, and although both English and Spanish were spoken in the classroom, English predominated. Emerson was observed to respond to some requests in either English or Spanish and would occasionally clearly repeat words heard in either language although most of his vocalizations were unintelligible.

Participant 2, “Aaron,” was a 4 year 1 month (49 month) Caucasian boy who two mornings per week attended an integrated special education preschool class in which the majority of the children were typically developing. Aaron scored as having mild to moderate autism on the CARS (Schopler et al., 1988), the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore, & Risi, 2000) and the Gilliam Autism Rating Scale (GARS: Gilliam, 1995). Both the classroom teacher and school district psychologist reported that Aaron had verbal language but much of it was echolalic. He had pronoun confusion and referred to himself by name rather than as “I.” He had a lack of social timing and reciprocity, difficulty with pragmatic language and exhibited impairments in his ability to initiate or sustain conversations. Aaron appeared interested in the play of his peers, but in classroom observations frequently engaged in onlooker behavior and his attention to any one play activity was brief. He initiated interactions with adults and occasionally with peers, but many of his initiations to peers were ignored and were thus unsuccessful.

Participant 3, “Enrique,” was a 3 year 9 month (45 month) old boy of Latino and African American heritage who attended an urban Head Start class three mornings per week. Enrique presented as having mild to moderate autism on the CARS (Schopler et al., 1988). His score on the Preschool Language Scale (PLS-3 Zimmerman, Steiner, & Pond, 1991) was three standard deviations below the norm. He was described by the diagnosing agency as having no language, making little eye contact, and “playing in his own world.” In classroom observations, Enrique walked around the periphery of the room holding small objects such as a piece of straw up to his eye and putting inedible objects such as staples in his mouth. He engaged in brief onlooker behavior to a few select activities but made no attempt to interact with the children in the groups. Spanish was the predominant language spoken in his home, and although both English and Spanish were spoken in the classroom, English predominated. Enrique was observed to respond to some requests in either English or Spanish and would occasionally clearly repeat words heard in either language although most of his vocalizations were unintelligible.
Participant 4, “Daniel,” was a 4 year 3 month (51 month) old Caucasian boy who attended an inclusive community preschool class in a suburban setting three mornings per week. Daniel scored in the severe autism range on both the CARS (Schopler et al., 1988) and the ADOS (Lord et al., 2000). He was below the standard scales on the Mullen Scales of Early Learning (Mullen, 1995). Daniel had some limited verbal language but used it infrequently. During classroom observations, Daniel frequently went to the book area and chose books. He turned the pages rapidly without stopping to look at the pictures. He did not appear interested in the books other children were looking at and did not attempt to obtain joint attention to his selected books. Occasionally, Daniel approached play groups and watched children for brief periods of time.

**Measurement**

Dependent measures were the percentage of opportunities that a child (a) used the Keys to Play successfully to enter a playgroup, or (b) used another strategy such as words, sign language, or parallel manipulation of objects to enter a playgroup. Amount of time spent engaged in playgroup activities was also measured. Duration of engaged time with peers was cumulatively totaled throughout each session. Engaged time in a playgroup was defined as time spent in proximity (within 2 feet) of one or more peers and either manipulating play or learning materials in a similar manner as the other children in the group, or interacting with peers. Acting-out behaviors such as hitting, crying, or having tantrums were not counted as engaged time. An opportunity for use of the Keys to Play was said to occur when the target child (a) was not engaged in a playgroup or other learning center activity for a period of three minutes, and/or (b) looked at and approached a peer or play group (within 3 feet). The interventionist ensured that there were between five and 10 opportunities for initiation per session. A play group was defined as two or more children (including the target child) interacting with play or child-selected learning materials in a similar manner within three feet of each other. A summary of the definitions used is contained in Table 1.

**Baseline.** Opportunities and initiations by the target child to join playgroups were counted during learning center time. Up to 10 initiations were recorded if they occurred anytime during a given session. The cumulative time spent engaged in playgroups during each session was also recorded. Additional information gathered included the mode of communication used for the initiation, if the initiation was to a child or an adult, if the opportunity was natural or created, the types of errors made (e.g., no response, aggression, hovering, or moving away), if, and how, the target child responded to play initiations by peers (e.g., affirm, refuse, ignore), and what type of play the child used within the playgroup. The researcher collected baseline data on a probe basis of one day per week with more frequent probes taken just before the onset of the intervention phase.

**Intervention.** During intervention, the same information was collected with the addition of data regarding the type of prompt used to encourage initiation (e.g., establishment of joint attention, model, indirect verbal or gestural prompt, direct verbal or gestural prompt, partial physical or full physical prompt). The percentage of correct and successful initiations of play out of available opportunities was counted throughout the learning center time. Intervention sessions occurred between two and four days per week depending on how frequently each child attended preschool and excluded holidays or other special events within the preschools.

**Maintenance.** The same information collected in baseline and intervention was collected on a weekly basis during the maintenance condition. The maintenance phase began when the target child achieved a stable rate of 75% unprompted initiations in the classroom and continued for up to four weeks. The school year ended before the last two children achieved a stable rate of unprompted initiations.

**PDA-based data collection system.** A Personal Digital Assistant (PDA)-based data collection system asked the following questions and stamped the time when each answer was entered: (a) Is there an opportunity? (b) Is the opportunity for initiation or responding? (c)
### Keys to Play Definitions

**Engaged time:** Time spent in proximity (within 2 feet) of peers and manipulating play or learning materials or interacting with peers. Acting-out behaviors such as hitting, having tantrums, or crying are not counted as engaged time.

**Opportunity to initiate:** The target child is not engaged in a playgroup or other learning center activity for a period of 3 minutes and/or looks at and approaches (within 3 feet) a peer or play group.

**Interventionist created opportunity:** If target child is not engaged in playgroup for a period of 3 minutes and does not look at and approach a playgroup, the interventionist will create an opportunity by verbally and gesturally directing a child’s attention toward an activity that the child has engaged with in the past. The interventionist will pause 5 seconds and if there is no response, will deliver a full physical prompt leading the child to the activity. The interventionist may also assist classroom staff to add motivating materials or activities if none are available that are of interest to the child.

**Play group:** 2 or more children (including the target child) interacting in a similar fashion with play or child selected learning materials that are the same or belong together and are within 3 feet of each other.

**Intervention sequence:**
1. Comment on interest and natural cues
2. Five second time delay
3. Model use of key
4. Verbal prompt "You can use your key to say you want to play"
5. Full physical prompt
6. Prompt will decrease to partial physical from wrist or elbow when child reaches 90% level

### Categories of Play (adapted from Parton, 1932)

1. **Solitary:** Child plays alone and independently with toys that are different from those used by other children who are within speaking distance. Child does not reference what other children are doing.
2. **Onlooker:** Child spends most of the time watching other children play. He may talk to children whom he is observing or give suggestions but does not overtly enter the play. The child stands or sits within speaking distance of the group.
3. **Parallel:** The child plays independently, but the activity he chooses naturally brings him among other children. He plays with toys that are like those which the children around him are using but he plays with the toy as he sees fit and does not try to modify or influence the activity of the other children. He plays beside rather than with the other children and does not attempt to control the coming or going of children in the group.
4. **Associative play:** The child plays with other children. The conversation concerns the common activity and there is a borrowing and loaning of play material. All members engage in similar if not identical activity but there is no division of labor and no organization of the activity among the children around any goal or product. Each child acts as he wishes.
5. **Cooperative play:** The child plays in a group that is organized for the purpose of making some material product or striving to obtain some competitive goal, or of dramatizing situations of adult and group life, or of playing formal games. There is a division of labor, the taking of different roles by various group members, and the organization or activity so that the efforts of one child are supplemented by those of another.

### Possible child initiation errors:

1. **Aggression:** The child either uses verbal aggression such as a shout or physical aggression such as hitting, kicking, or grabbing or destroying play materials.
2. **Move away:** The child moves away from the play group
3. **Hover:** The child stays in proximity of the group but does not initiate play-instead seems to hover around the group
4. **Move closer:** The child moves closer to the group, but does not initiate play or use the play materials
5. **No response:** There is no identifiable response to either the play or the intervention sequence.

### Communication Form

1. **Key:** The child lifts the key and directs it toward another person
2. **Verbal:** The child uses a verbalization such as “I want to play” to indicate a desire to play
3. **Key plus verbal:** Child uses the key as above in addition to a vocalization such as “I want to play”
4. **Gesture:** Child uses a gesture such as pointing to indicate a desire to play
5. **Sign:** Child uses a formal sign to request play
6. **Picture:** The child uses a picture symbol (could also be an object symbol) other than the key and either points at it or gives it to a peer or adult to request play.
7. **Positional:** The child stands or sits beside (within 1 foot) a child or adult playing
8. **Object or toy:** The child picks up or manipulates an object or toy that is being used within the play group. The object or toy is one that is actually part of the play rather than a representation or a toy,
If there is an opportunity for initiation, did the child initiate? When the answer was yes, choices of communication modes were then presented and a question regarding whom the child initiated to (child or adult) appeared. When the answer was no, choices of possible errors were presented; (d) when the opportunity was for the child to respond to an invitation, three choices (ignore, affirm, deny) appeared on the screen; (e) each time yes was answered for opportunity, a question also appeared asking for level of adult prompt, (f) when a child entered a play group, the data collector pushed an icon that activated a timer to record engagement time; and (g) a final question appeared that asked for the level of play primarily used by the child as per the Parten Scale (Parten, 1932). Categories used in the Parten Scale include unoccupied play, solitary play, onlooker behavior, parallel play, associative play, and cooperative play.

**Interobserver Agreement**

The first author of the study conducted training on data collection methods and teaching strategies for the use of the Keys to Play and practice with the PDA data collection system with the interventionist, the research assistant, and the secondary data collector. The data collectors (first and second authors) reached 90% or better point-by-point agreement on all behavior categories during an on-site observation of a preschool program with children other than the target children and on one observation of each target child before formal data collection began.

The primary and secondary data collectors collected data simultaneously during 20 to 25% of sessions across all phases (baseline, intervention and maintenance) per child. The point-by-point formula used was agreement divided by agreement plus disagreement multiplied by 100 (Kazdin, 1982). A tolerance of plus or minus five seconds was set as an acceptable level of agreement for each event. The time-stamping feature of the PDA data collection system allowed for point-by-point comparison. Agreement of engagement time was calculated by comparing agreement on each period of engagement. Mean agreement for Emerson was 98% across phases (all scores were 99% during baseline and ranged from 92 - 99% during intervention and maintenance). Mean agreement for Aaron was 97% across phases (range = 98 - 99% during baseline, and 93 - 98% during intervention and maintenance). For Enrique, mean agreement was 96% across phases (range = 98 – 100% during baseline and 93 - 96% during intervention), and for Daniel, mean agreement was 99% (range = 98 – 100% during baseline and 99% during intervention).

A research assistant (a university student in special education) observed the interventionist to monitor fidelity to teaching procedures one time per week during the intervention phase across children. This was accomplished through the use of a checklist of the intervention procedures including prompting sequences and error correction. Fidelity data were calculated by dividing the number of interventionist behaviors exhibited by the number of planned interventionist behaviors during completed opportunities and multiplying by 100. Data indicated that the interventionist correctly performed the planned behaviors during completed opportunities with a mean of 96% accuracy (range of 92% to 100%).

**Design**

A multiple-baseline probe (Tawney & Gast, 1984) design across children and settings was used to evaluate the effectiveness of the Keys to Play visual strategy for young children with autism. Each child experienced a baseline phase and an intervention phase. Two of the children experienced the maintenance phase before the school year ended.

**Procedure**

The visual strategy, Keys to Play, consisted of 4-inch long, gold colored laminated paper keys that were either worn around the neck or attached at the hip with Velcro. All children and adults in the preschool programs were given instruction in the use of the Keys to Play visual strategy and were given the option of wearing and using them during learning center time. The Keys to Play use was taught, prompted, and measured within learning center time (approximately 30 minutes per day) in preschool classrooms. The interventionist
was a research assistant trained in special education who was constant across children to ensure fidelity to the prescribed teaching sequence.

**Baseline.** During the baseline condition, the children with autism were given the Keys to Play to wear, but no instructions, training, or prompting on their use was provided. Classroom routines and procedures were not altered during this phase except that the interventionist was stationed in the same learning center as the target child. Baseline probes were taken weekly with three probes in succession taken before moving to the intervention phase. The baseline phase was continued until data were stable.

**Intervention.** Typically developing peers in the classroom initially received instruction in the use of the Keys to Play within the large group activity that preceded learning center time. Adults in the classroom modeled the use of the keys during learning center time. Typically developing peers were prompted by the adults in the classroom to show their keys to the target child in the class and either verbally ask him/her to play or show the child play materials. They were told to continue showing the key to the target child until they got a response or the child left.

Target children received training on the use of and response to the keys through an incidental-teaching, peer mediated intervention model (McGee, Morrimer, & Daly, 1999; Prizant, Wetherby, & Rydell, 2000). The interventionist first ensured play activities were available that were motivating to the target child. Preference was given to delivering intervention within ongoing learning center activities but when activities did not provide a high level of motivation, the interventionist added materials to ensure that motivating activities were available across all children. When the child was not engaged in a play group and showed an interest in a play activity by directing attention and approaching the activity, the interventionist commented on the child’s interest in the activity and the natural cues that would indicate to a child to ask to play and paused for 5 seconds to allow the child time to initiate entry into the play. If the child did not initiate, the interventionist went over to the playgroup and modeled use of the key combined with the verbal phrase “I want to play.” The interventionist again paused for 5 seconds to allow the target child an opportunity to initiate play. If the child did not initiate play, either through key use or other symbolic communication means, the interventionist prompted the child by using a verbal prompt, “You can use your key to say you want to play.” If still no response, the interventionist delivered a full physical prompt. The prompting level decreased to a partial physical prompt from either the elbow or wrist as success reached the 90% level. All correct responses were verbally reinforced and the natural consequence of getting to play was emphasized. If the target child was not engaged in a playgroup for a period of 3 minutes and did not look at and approach a playgroup, the interventionist created an opportunity by verbally and gesturally directing the child’s attention toward an activity that the child had engaged with in the past. The interventionist then paused 5 seconds and if the child did not respond, a full physical prompt was delivered leading the child to the activity. This level of opportunity creation was noted on the PDA data collection system. The interventionist ensured that there were between five and 10 opportunities to initiate play in each 30-minute period.

**Maintenance.** This condition began when the child reached a stable rate of 75% or higher unprompted initiations as defined by three initiations at or above this level. Initiations continued to be reinforced by the classroom teacher on an intermittent basis. Data were collected once a week for up to four weeks to assess whether the behaviors were continuing.

**Data Analysis**

The dependent variable was plotted on a multiple baseline graph for the participating children (see Figure 1). Data were examined by visual analysis for changes in level, the latency of change between phases, and changes in trend within phases. Other information such as mode of communication, prompts needed, and type of errors made is reported through descriptive statistics using mean scores. Results of the social validity survey were analyzed using descriptive statistics for ordinal data (median and mode) for each question.
Figure 1. Percentage of correct and successful initiations across participants
Results

Data presented in this section examine the dependent variables of (a) successful initiation of playgroup entry, (b) percentage of time spent engaged in playgroups, and (c) communication forms utilized in play initiations. In addition, social validity data provided by teachers, teaching assistants, and parents are presented.

Impact on Successful Play Initiations

Data pertaining to the dependent variable of correct initiation of successful playgroup entry have been summarized as the percentage of opportunities for initiation. There were between five and ten such opportunities in each session. Figure 1 presents summarized daily data for the baseline, intervention, and maintenance conditions for all the participating children. In order to be counted as correct, play initiations had to result in successful playgroup entry. Correct initiation forms included use of the Key to Play, verbal behavior, gestures, and nonverbal strategies such as parallel play. The solid line in Figure 1 reflects the total number of successful prompted initiations for each child. The dotted line reflects successful initiations that were unprompted.

During baseline, play initiations were, for the most part, consistently low for each of the four children. However, Aaron and Enrique had a spike of higher initiation when a particularly favored learning center was introduced (sand for Aaron and bubbles for Enrique). The general trend or slope for all of the participants in the intervention phase was upward.

Impact on Engagement Time

The daily percentage of learning center time that each child spent engaged in playgroups across the conditions of the study was examined. Engaged time in a playgroup was defined as time spent in proximity (within 2 feet) of one or more peers and manipulating play or learning materials in a similar manner as the other children in the group, or interacting with peers. The mean rate of engagement for each of the children rose substantially across the conditions. The total increase in Emerson’s mean engaged time was 66.3% as it rose from a mean of 1.7% in baseline (range = 0 - 6.48%) to 48.3% in intervention (range = 13.4 - 83.8%), and finally, 68% in maintenance (range = 21.2 - 93.5%). Aaron’s mean length of engagement increased by 35.4% as it rose from 26.8% in baseline (range = 0 - 62.7%) to 59.5% in intervention (range = 41.1 - 86.5%) and 62.2% in maintenance (range = 48.1 - 88.8%). Enrique had not met the criterion for unprompted initiations and so he did not experience the maintenance condition, however, his mean length of time spent engaged in play groups increased by 34% as it rose from 8.7% in baseline (range = 0 - 34.1%) to 42.7% in intervention (range = 19 - 88.2%). Daniel’s intervention phase was short in duration, yet the rise in his rate of engagement was substantial. His mean percentage of engagement time rose 47.4% over the baseline mean of 3.1% (range = 0 - 21.5%). His mean rate of engagement during intervention was 50.7% (range = 32.6 - 70.4%).

Impact of the Strategy on Communication Forms used for Initiation

In order to determine the impact of the Keys to Play strategy on communication forms used for initiation, the communicative form used for each play initiation was recorded. Initiations that were counted as correct included (a) verbal, (b) gestural, (c) positional (e.g., standing or sitting in or by a playgroup), (d) parallel manipulation of play objects or materials, (e) the Keys to Play, and (f) the Keys to Play paired with verbal language. Data collection on the use of sign language and picturegraphic symbol use other than the Key to Play was planned; however these communicative forms were not used by any of the children during the study. Figure 2 represents the percentage of correct unprompted or prompted by comment only initiations by form used across participants and across the baseline, intervention, and maintenance conditions of the study. The forms are represented as a percentage of opportunities that were either unprompted or prompted by comment only and that were initiated correctly. Therefore, the number of opportunities in baseline for
Figure 2. Mean percentage of communication forms used in play initiations across participants.
Figure 2. Continued

Enrique

Daniel

Percent Communication Form Used

Conditions

Baseline

Intervention

Key

Verbal

Key + Verbal

Gesture

Position

Object Play

Figure 2. Continued
some of the children is very low and the percentages may not be representative.

As illustrated by Figure 2, the verbal language of all of the children increased across conditions. Manipulation of play materials also increased as an initiation form of choice or remained relatively stable for all of the children except Daniel. All of the children used the Keys to Play either alone or in combination with verbal language during the intervention condition. The two children who experienced the maintenance condition, Emerson and Aaron, either rarely used the visual strategy of the Keys to Play or did not use it at all during maintenance.

Social Validity

Education team survey. At the conclusion of the study, classroom teachers and teaching assistants (N = 10) in the involved classrooms independently and anonymously completed surveys regarding the significance, effectiveness, and utility of the study. All of those surveyed reported that it is either important or very important for children to use symbolic communication to express a desire to play with other children. With regard to the effectiveness of the strategy, 30% said that the strategy was very useful in helping the child with autism successfully play with peers, 40% said it was useful, and 30% said it was somewhat useful. Fifty percent indicated that the child with autism would be likely to continue to use the Keys to Play strategy in the future. In looking at the utility of the strategy, 60% said the strategy did not disrupt the activities and routines of the classroom and 40% said it was a little disruptive. Those who reported that it was a little disruptive indicated that the number of adults involved in the research was at times, overwhelming. A majority (60%) thought the strategy would be easy to implement, 30% somewhat easy, and 10% somewhat difficult (n = 1). Ninety percent of the teaching staff thought it would not be difficult to implement the strategy and still meet the needs of the other children in the classroom while 10% thought it would be a little difficult. Furthermore, 90% of the respondents indicated that the time required to implement the strategy was worth the observed benefits, and 80% plan to continue to use the strategy in the future.

Discussion

Keys to Play Package Can Increase the Play Initiations of Children with Autism

Results of the study suggest that the intervention package was successful in teaching preschool aged children with autism to initiate entry into playgroups. All children in the study exhibited increases in initiations of play over the course of the study. However, the dependent variable of using the Keys to Play or another communication form to successfully initiate play is multifaceted and as such includes at least three major components. The first is learning to use the Key or another communicative strategy such as the words, “I want to play;” the second is viewing children playing in playgroups as possible opportunities to initiate play; and the third is actually using a communicative strategy to successfully gain entry into a playgroup. Day by day data gathered through use of the PDA showed that three of the four children (Emerson, Aaron, and Daniel) demonstrated an understanding of how to use the Keys to Play and/or how to say “I want to play” by the second day of intervention and showed an increase in unprompted or minimally prompted initiations by that time. The fourth child, Enrique, only began to demonstrate an understanding of the communicative properties of the Keys to Play and the words, “I want to Play” during the last 10 days of intervention. Demonstrating an interest in the play of others and actually using the Keys to Play strategy or another strategy to initiate entry into playgroups varied across the children and was often dependant on their interest in activity materials.

Keys to Play Package Can Result in Increased Time Spent Engaged in Playgroups and Increased Level of Play

During the baseline condition, the play interests of all of the children were narrow and each spent a high percentage of learning center time engaged in solitary activities on the periphery of the centers. By the end of intervention, all of the children showed significant
gains in time spent engaged in playgroups. As engagement time went up, other play benefits were also noted. Both Emerson and Aaron, the only two children to complete the intervention condition and experience maintenance, generally sampled most of the available playgroups; however Emerson continued to avoid centers that involved fine motor activities. During the maintenance phase, Emerson and Aaron also engaged frequently in pretend play which supports the literature base demonstrating that increased play leads to more symbolic and pretend play (Schuler & Wolfberg, 2000; Wolfberg, 1995). In addition, the levels of play as delineated by Parten (1932) also evolved concomitantly with the increased time spent in playgroups (see Figure 3). For example, both Daniel and Enrique demonstrated increases in parallel play and decreases in onlooker and solitary play as their time engaged in playgroups increased. Therefore, although the study made no claim on what would happen once children successfully initiated play and entered playgroups, results indicate that an increased number of playgroup entries results in increased engagement time within playgroups and consequent increases in play skills for the participating children.

Keys to Play Package May Promote the Use of Verbal Language for Initiation Purposes

Consistent with previous findings that visual supports may promote the use of verbal language in young children with autism (Bondy & Frost, 1994; Johnston, Nelson, Evans, & Palazolo, 2003; Schwartz et al., 1998), the data in this study point to increases in verbal initiations across children. As noted by Johnston et al. (2003), the choice of communication form might be explained by the tenets of matching theory that hold that when given a choice between two or more responses, individuals will select the form that is perceived as most efficient (Mace & Roberts, 1993). Aaron had verbal skills that were easily understandable at the beginning of the study and so might have perceived continued use of such skills as most efficient. Emerson had verbal skills, but at the beginning of the study rarely used them, and may have not found them to be efficient until later in the study when they...
were more practiced and thus more readily reinforced. Daniel had limited verbal skills and may have perceived the combination of the visual support and verbal language as most efficient. Enrique, however, did not have consistently understandable verbal language and still chose to use it over the visual support of the Key.

Although verbal in both the baseline condition and beginning intervention, Aaron consistently referred to himself in the third person as “Aaron” rather than using a personal pronoun. A serendipitous effect of the intervention appeared during intervention as Aaron began to use the pronoun “I” that he used in the “I want to play” portion of the strategy. Interesting too, was the evolution of Emerson’s verbal initiations as they expanded beyond the practiced phrase of “I want to play” in both late intervention and maintenance conditions. Such initiations began to included phrases such as, “Hey, I want to play too, where’s a chair for me?” and “I’m going to get some paint so I can play too.”

It is important to note that consistent with the literature regarding play initiations of typically developing children (Cosaro, 1979, 1995; Craig & Washington, 1993), manipulation of play materials continued to play a large role in the initiations of all of the children in the study except Daniel, who had limited intervention time. The frequency of usage of this communication form occurred regardless of symbolic communication use. Furthermore, as the number of playgroup entries increased, the sophistication and acceptance of the nonsymbolic communications increased as children moved from hovering behaviors to more sophisticated manipulation of materials.

**Limitations**

There are some limitations associated with the study that could affect the extent to which results of the study can be generalized to other settings or children. In order to ensure that the intervention was constant across settings, an interventionist who was not a member of the classroom teaching staff was used. Therefore, it is not known if the same results could be obtained by classroom staff. However, in a similar study (Johnston et al., 2003), the classroom teacher did fulfill the role of the interventionist and was able to effect change in the dependent variable of increased symbolic initiations through the use of a visual strategy.

Although four separate sites were utilized in the study, without systematic replication it is difficult to say that these sites are representative of inclusive preschool programs. In the same vein, it is not known if the four participating children are representative of the population of children with autism. Also, only two of the four children completed the intervention portion of the study and experienced the maintenance condition before the end of the school year. Therefore, it is unknown if gains made by the other two children would have maintained without intervention support.

**Implications for Further Research**

Several studies have demonstrated that visual strategies have the potential to increase initiative behaviors in young children with autism or Autism Spectrum Disorder (e.g., Johnston et al., 2003; Jolly et al., 1993; Shabani et al., 2001; Wolfberg & Schuler, 1993; Zanolli et al., 1996) and results of this study lend themselves to several future research activities in this area. In order to discover the relative importance of each component of the intervention package in increasing play initiations, future research should systematically examine the impact of each variable (e.g., the visual strategy, the least to most intensive prompting sequence, the creation of opportunities, and the non-exclusion rule) on intervention outcomes. Also of interest would be a comparison of the relative effectiveness of embedded teaching of the initiative skill versus priming of the strategy prior to the activity. Effects of the addition of a zero-delay condition on the efficiency of obtaining unprompted initiations would also be of interest to the field.

Although the existing research base is promising, more inquiry is needed into the impact of visual strategies on verbal language in children with autism as well as children who are typically developing. At the same time, given the importance of the nonsymbolic strategy of parallel manipulation of play materials, research examining strategies to help young children with autism make effective and salient use of such naturally occurring materials.
nonsymbolic strategies is also warranted. Results of this study suggesting that increased initiations of play can lead to increased engagement time as well as increases in play skills need further investigation. Of specific importance would be inquiries into the respective roles played by the provision of increased time within playgroups and the increased use of symbolic communication by children on their subsequent gains in play skills. Finally, comments made by the parents of the participating children suggested that the strategy resulted in play initiations in settings outside of school (e.g., daycare, church, and neighborhood). An inquiry into such generalization could inform the field of the efficacy of such a visual strategy in impacting the social interactions of young children with autism across settings.

**Implications for Practice**

The outcomes of this study, while not definitive, offer several implications for practitioners in early childhood classrooms. First, during the baseline period, all four children with autism were allowed to participate or not participate in classroom activities as they chose. Both initiations of play and time spent engaged in the playgroups were very low. A major component of the Keys to Play intervention involved prompting children to enter playgroups when they displayed interest in a playgroup or when they were not engaged for three minutes. Results of this study provide impetus for more structured intervention than free-choice of activities dictates. It would appear that free-choice in the absence of a structure to assist children with autism to engage in activities is associated with isolation and low engagement within playgroups. Second, the inclusion of specific materials in learning centers that attracted the interest of the children with autism also appeared to increase play initiations and result in a concomitant increase in engaged time. Finally, results support previous research demonstrating that use of a visual strategy for the purpose of initiation can provide a socially valid way to increase both verbal and nonverbal play initiations in children with autism.

**References**


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