Published in final edited form as:

J Autism Dev Disord. 2019 June ; 49(6): 2426–2436. doi:10.1007/s10803-019-03992-4.

Targeting IEP Social Goals for Children with Autism in an Inclusive Summer Camp

Lynn Kern Koegel,

Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, Palo Alto, CA 94305

Lindsay B. Glugatch,

Department of Special Education and Clinical Sciences, University of Oregon, Eugene, OR 97403

Robert L. Koegel, and

Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, Palo Alto, CA 94305

Fernanda A. Castellon

Koegel Autism Center, University of California at Santa Barbara, CA 93106

Abstract

Children with Autism Spectrum Disorder demonstrate challenges in socialization that can interfere with their participation in common childhood activities and can persist or worsen if not addressed. The purpose of this study was to assess whether Individualized Education Program (IEP) social goals could be targeted by a supervised paraprofessional during a short-term inclusive summer camp program. Data were collected using a concurrent multiple baseline design across four children. Results showed that following a two-week summer camp program all participants made social improvements, reaching their year-long IEP goals, that maintained at follow-up in natural environments. Further, the paraprofessionals reached fidelity of implementation. Findings are discussed in terms of the value and feasibility of providing social interventions in inclusive summer camps.

Keywords

Social engagement; peer socialization; autism spectrum disorder; inclusion; IEP social goals

Social challenges are a defining feature of children with autism spectrum disorder (ASD) (American Psychiatric Association, 2013), and if untreated can persist and worsen over time. These challenges are independent of language and cognitive ability (Carter, Davis, Klin, & Volkmar, 2005) and place the children at risk for loneliness and comorbid psychiatric

Correspondence concerning this article should be addressed to: Lynn Kern Koegel, Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, Palo Alto, CA 94305, USA, (805) 689-9493, Lynnk@Stanford.edu.

Compliance with Ethical Standards:

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent: Informed consent was obtained from all individual participants included in the study.

disorders, such as anxiety and depression (Jackson, Hart, Brown, & Volkmar, 2018; Koegel, Fredeen, Kim, Danial, Rubinstein, & Koegel, 2012; Mayes, Calhoun, Murray, & Zahid, 2011). Further, impairments in socialization can lead to academic underachievement, difficulty obtaining and maintaining employment, as well as engaging in fewer leisure activities with peers (Holwerda, Van der Klink, Groothoff, & Brouwer, 2012; Koegel, Koegel, Ashbaugh, & Bradshaw, 2014). In short, targeting social areas has been viewed as critical for the long-term well-being of individuals with ASD.

For most individuals with ASD, social deficits cannot be explained by a lack of social interest as self-reports indicate a desire to have friendships (Bauminger & Kasari, 2000). However, many appropriate social skills are not acquired without explicit individualized teaching (White, Keonig, & Scahill, 2007). In inclusive settings, where children with ASD are expected to participate in various activities with their typical peers, social challenges can be particularly difficult, as the contrast may be notably evident. In these settings, a lack of appropriate and effective interventions may compromise the social success of children with ASD (Camargo, Rispoli, Ganz, Hong, Davis, & Mason, 2014).

One benefit of inclusive settings is that willing peers can easily be recruited to assist with the interventions. A review of the literature assessing interventions delivered by adults and typically developing children showed that the peer-mediated interventions (PMIs) in inclusive settings are highly effective (Watkins, et al., 2014). Not only do PMIs promote socialization in children with ASD, but they also result in improvements in other non-targeted socially appropriate behaviors, such as increases in the frequency of language and decreases in inappropriate behaviors (Rogers, 2000).

Toward that end, an increasing number of PMIs are now effectively being incorporated into inclusive settings. Watkins and colleagues, (2014) reviewed studies using PMIs focused on improving social skills of children with ASD. The review showed that PMIs resulted in positive improvements in social skills with generalization and maintenance. However, it is important to note that improvements occurred only when interventions were actively implemented in the inclusive settings, and without the implementation of ongoing intervention children with ASD continued to be at risk for isolation and rejection (Chamberlain, Kasari, & Rotheram-Fuller, 2006).

In order to address the low levels or a complete lack of social interactions, school districts often use paraprofessionals to support the students and assist with goal implementation (Sutton, Webster, & Westerveld, 2018). However, the literature shows that without training well-meaning paraprofessionals often hinder social interactions either by hovering or by being excessively uninvolved (Brown & Stanton-Chapman, 2017). On a positive note, a growing number of studies show that paraprofessionals can be taught to facilitate interactions between children with autism and their typical peers to improve social and verbal interactions (Feldman & Matos, 2012). Yet, even when such interventions are provided in school, the absence of intervention programs during the summer months has typically been a source of concern for both parents and professionals (Brookman, Boettcher, Klein, Openden, Koegel, & Koegel, 2003).

Given the concern that children with ASD may not improve or might even regress during the summer, some research has focused on the effectiveness of implementing interventions during inclusive summer camps (Koegel & Koegel, 2003). In these settings, positive behavior support procedures, such as priming, self-management, and peer involvement have been effectively implemented by trained and supervised paraprofessionals (Brookman, et al., 2003). However, the feasibility of providing continuity with school interventions, by targeting IEP social goals during the summer, has not yet been addressed.

Therefore, the current study asked: (1) Would students with ASD make progress on IEP social goals during an inclusive two-week summer camp with interventions being implemented by a paraprofessional?; (2) Would gains in social goals maintain until the following school year and generalize to the child's natural settings (i.e., school and home)?; and (3) Would any collateral gains be evidenced following the implementation of an intensive social intervention during an inclusive summer camp?

Methods

Participants

Four children who received special education public school services under the “autism” category participated in this study. All four were diagnosed with ASD by an outside agency prior to the start of this study and were referred to our University Autism Center for intervention. The children exhibited deficits in social communication, restricted and repetitive patterns of behaviors and activities, and difficulties socializing with peers. Individual child characteristics are described below and in Table 1.

Participant 1.—Blake was a 7-year-old Caucasian boy entering the third grade. Blake had intact language structures, could produce syntactically and semantically correct sentences, and was able to engage in appropriate conversations with adults and peers, although many of his interactions were inappropriate. Standardized tests given by the school (BASC-2, ASRS, and ADOS-2) indicated areas that were “at risk or higher” across both school and home included hyperactivity, aggression, anxiety, depression, adaptability, unusual behaviors, self-regulation, socialization, social and emotional reciprocity, sensory sensitivity, stereotypy, and behavioral rigidity. The school also reported that, although he was on grade level in math and was “approaching” grade level in language arts, testing was difficult because of his noncompliance. Blake spent most of his school day in a general education classroom, with pull out services in specialized academic instruction to address his academic difficulties. Furthermore, he often displayed disruptive rigid behaviors. Specifically, he intentionally broke rules of a game (ran outside of the game boundaries, laid on the ground in the middle of the game), refused to participate in games, ran away from activities, laid on the floor crying during group activities that were competitive, and made inappropriate comments (e.g., “You have to cheat if you want to win” “This is stupid” “You can’t make me play”). Although his teachers implemented a token economy for disruptive behaviors as specified in his Behavior Intervention Plan, prior to this study he did not have any social goals on his IEP and he received no special education intervention to improve his social difficulties with peers in the school setting.

Participant 2.—Paulo was a 14-year-old Hispanic boy entering the ninth grade. Paulo was able to produce syntactically correct sentences but engaged in delayed echolalia relating to his favorite videos, such as a National Geographic video about bugs, the Angry Birds movie, and Zootopia. In addition, he had difficulties with prosody and spoke in a monotone. If an adult or peer asked him a question, he responded verbally but did not initiate any interactions. Standardized test scores (WIAT-III) provided by the school stated that he scored “very low” on language arts, “below average” on reading, reading comprehension, and reading fluency, and “very low” on math, with an overall achievement score of 68. At school, Paulo spent most of his day in a general education classroom, with pull out services from a Speech/Language Pathologist in order to address his social communication difficulties. Paulo had one social goal on his IEP; “he will give eye contact to persons speaking to him individually and in group activities without becoming distracted in 3 out of 5 opportunities throughout the day as measured by data collection.”

Participant 3.—Miranda was an 8-year-old Hispanic girl entering the fourth grade. Miranda could produce one to two-word utterances that functioned as requests, such as “more milk” “more cookies” “open” “pee-pee” “agua”, but more frequently engaged in nonverbal challenging behaviors, such as grabbing and crying when she wanted items. Socially, Miranda played by herself on the playground and did not independently interact with adults or peers. Miranda also engaged in restricted and repetitive behaviors, such as repetitively filling up cups of water then pouring the water out. She frequently ran away, had difficulty standing in line or waiting for her turn during activities, and occasionally demonstrated aggressive behavior (e.g., biting) if she had to wait for her turn. The school did not administer standardized assessments with Miranda but reported that she could replicate a five-block structure using visual models, sequence a set of photos with common routines, could read and receptively identify five high frequency words with about 75% accuracy, and could write the numbers 1–10. The school also reported that she was verbal, but they used alternative and augmentative communicative systems with her at school. Miranda spent the entire school day in a special education class. Miranda had one social goal on her IEP; “she will improve her pragmatic skills by participating in a turn-taking playing activity with a peer or adult for 4 out of 5 turns with 1–2 prompts across 3 sessions as measured by SLP tally, observation, record.”

Participant 4.—Evan was a 6-year-old Asian-American boy entering the second grade. Evan did not initiate any social interactions with adults or peers. He could produce syntactically correct sentences, but generally responded with single words when an adult asked a question. However, if the adult’s question topic included his restricted interest of Legos, he responded in longer utterances. He was not observed to interact with peers during baseline and often spent his lunchtime eating alone. When prompted to sit with peers, he complied, but did not engage in any social interactions. Evan’s California Assessment of Standardized Testing and Reporting (STAR) tests at school indicated that he was above grade level in reading and math. He spent the majority of his school day in a general education class, with pullout services for adapted physical education and with the school psychologist. Evan had two social goals on his IEP; “Evan will demonstrate improved pragmatics/social thinking skill by looking at another person’s eyes and identifying what

they are looking at and infer what they are thinking about with at least 80% accuracy on at least three occasions as measured by observation and data collection” and “he will tell about a recent experience including at least 3 details given general prompts on 4/5 occasions measured by observation and data collection.”

Research Design

A concurrent multiple baseline design across participants (Barlow, Nock, & Hersen, 2009) was used to assess the effect of the social intervention. Systematically staggered baselines with 3, 5, 6, and 8 probes collected over 3, 8, 10, and 14 weeks were recorded for Participants 1–4, respectively. Baseline data probes were collected in community settings (home, school) where peers were present on a weekly basis, with some breaks for Children 2, 3, and 4. During intervention the probe data were collected multiple times a week when peers were present during the two-week summer camp. Follow-up data were collected 1–3 months after the completion of the summer camp at school and home when peers were present.

Setting

The inclusive summer camp was held on a University campus. The camp was designed for children ranging in ages of 5 to 14 years. Campers were divided into 3 groups: Lower (5–6 years old), Inter (7–10 years old) and Upper (11–14 years old). The camp had about 200 participants that could attend week by week for a period of 10 weeks. Activities included swimming, dance, rock climbing, art, gymnastics, scooters, and playground ball games. The Participants in the present study attended camp from 9 am to 3 pm daily. Each day was divided into 45-minute activity blocks with one 20-minute snack break in the morning and a 45-minute lunch break. The children with ASD were assigned to a group based on their age and each group had approximately 10–15 typically developing campers with two camp counselors per group and one or two campers with ASD.

Paraprofessionals

One-on-one paraprofessionals supported the children with ASD throughout their camp day. Paraprofessionals were undergraduate students majoring in psychology who had taken an introductory undergraduate course in autism spectrum disorder. Graduate students with at least four years of experience working with children with ASD supervised the undergraduate students through in vivo feedback. The graduate students spent approximately 50 minutes per day with each paraprofessional-child dyad.

Procedures

Throughout all phases of the study, probe data were recorded for 10 minutes in-vivo, or using iPhones for later analysis, while the children had the opportunity to engage in social interactions.

Baseline data were collected when the participants had opportunities to interact with other children in their school or home prior to the start of summer camp and during the beginning of summer camp. During baseline, adults who were present when the children interacted with their peers were not given any instructions regarding prompting, intervening, or

socialization. However, during baseline most of the adults did provide some prompting (according to their usual patterns) for the children with ASD to engage in activities or to sit with other children.

Intervention took place during the summer camp. Blake, Paulo and Miranda attended camp for two consecutive weeks, (except the last two days for Blake due to illness). Evan attended camp for a total of two weeks with a three-week break between weeks 1 and 2. Intervention targeted Participants' social goals in their IEP (except for participant 1 who had no social goals at all on his IEP, requiring such goals to be created in collaboration with the school). Intervention consisted of Positive Behavioral Support (PBS) strategies, which were individualized for each child. The PBS strategies were as follow.

Priming.—Many of the activities organized by the camp (e.g., ropes, archery, gymnastics) were new to the participants. Therefore priming (Koegel & Koegel, 2006; Koegel, Koegel, Frea & Green-Hopkins, 2003) was used to expose the children with autism to activities before they encountered the activity with their peers in the summer camp. Specifically, the participants were provided with instructions as to the rules of the activities (e.g., you'll need to stand in line with your friends and wait for your turn), and what was expected (e.g., when it's your turn you will get a safety harness and then you can climb up as high as you can on the rope).

Peer Mediation.—In order to further promote participation in camp activities, typically developing peers, selected based on their requests to assist the child with ASD, were recruited to engage with the children with ASD. Paraprofessionals prompted the peers to initiate, take turns, engage in social conversations, and engage in social interactions with the participants based on each participant's individualized goals. For example, when engaging in turn-taking all of the campers were prompted to wait for their turns, and to help the child with ASD if she was having difficulty.

Self-Management.—Self-management, wherein the participants were taught to discriminate and record their occurrences or absence of targeted social behavior (Koegel & Koegel, 2006) during everyday activities with peers, such as social conversation. The specific procedures for each individual child are presented below.

Intervention Procedures for IEP Goals

Participant 1.—In collaboration with Blake's school's behavior specialist and based on observations of his lack of engagement with peers and the presence of disruptive behaviors relating to inflexibility during social interactions, the following IEP goal was developed: "Blake will independently stay appropriately engaged with peers during non-preferred camp activities for at least 80% of each activity." During intervention Blake was primed with a schedule regarding future activities and was taught to use a self-management program consisting of a pre-printed self-management sheet that included each 1-hour activity for the full camp day. Following each independent self-recording, the paraprofessional provided him with positive feedback or a reminder if he had inaccurately recorded a behavior. When Blake correctly completed four 50-minute self-recordings, indicating that he had behaved

appropriately on four out of five camp activities (these were a combination of preferred and non-preferred activities) he received a self-selected reward (a packet of Pokemon cards).

Participant 2.—During intervention peer mediation and self-management techniques were used to improve Paulo's appropriate eye contact. Interventions began with recruiting a typically developing peer who expressed an interest in interacting with Paulo to play the "eye contact game" wherein the goal of the game was to make eye contact as much as possible while they engaged in a social conversation. A self-management device was employed, consisting of a small hand-held clicker that fit inside of Paulo's fist or could be held inside of his pocket. At the beginning of the game every time Paulo made eye contact for 10 seconds or longer, he was praised and prompted to give himself a point on the clicker. After Paulo engaged in appropriate eye contact for 80% of the 10 second intervals during a five-minute probe, the interval was increased to 30 seconds. At that point, an iPhone timer was set for every 30 seconds to remind Paulo to record his behavior, and he was given verbal feedback as to whether he had correctly or incorrectly recorded his behavior. Every self-management point he correctly gave himself on the clicker could be exchanged for a minute of watching videos.

Participant 3.—Miranda's IEP goal was to engage in appropriate turn-taking. A typical peer who expressed interest in engaging with Miranda was recruited to interact with her during a variety of activities that took place at camp. During the activities, the paraprofessional provided opportunities for the peer to take turns. Miranda required prompts to appropriately take turns and the children were praised after appropriate turn-taking.

Participant 4.—Evan's social IEP goal involved providing at least three details about a past experience to a conversational partner. To target Evan's goal, priming, peer mediation, and self-management with a visual framework were used. Peers who showed an interest in Evan were recruited to engage in a "question and answer game" during snack and lunch times. Two to five peers joined in the game and all took turns asking and answering questions with three details, which provided Evan with multiple models of the target behavior. Prior to each question, Evan was reminded to share at least three details about past experiences with his friends. A self-management program was used that consisted of a pre-printed schematic with three rows of three boxes drawn on a piece of paper. Whenever Evan shared a detail after a typical peer asked him a question, he was prompted to check off a box until he finished checking off all three boxes. Prompting was faded after the first few sessions when he was independently recording the points during the game. All of the children who joined his group used the schematic and chose to earn small pieces of chocolate after accumulating nine points.

Follow-up

Follow-up probes were recorded by an adult who was unfamiliar to the child. Probes were collected in each child's natural settings (e.g., home, school, parks) without implantation of the programs that were used during intervention. These measures were collected one to three months after the camp program ended, with all children receiving a three-month probe. For children who were available, additional probes were collected one week after the previous

probe. Probes were collected when typical peers were present, during activities where it would be possible to have opportunities for the occurrence of the target behavior (e.g., games, social conversation). Adults supervising in these settings were naïve to the purpose of the study, and none were advised of the behavior that was being observed.

Fidelity of Implementation

To ensure that the treatment was conducted as intended, Fidelity of Implementation (FoI) measures were collected daily during the intervention phase at the summer camp by the graduate student supervisor. During these in-vivo observations, the initial 10 minutes were divided into one-minute intervals and the social intervention components listed in Table 2 were scored as “in place” “partially in place” or “not in place”. The paraprofessionals were recorded as having the procedures “in place” for above 90% of the intervention sessions. Thus, FoI was considered met for all paraprofessionals.

Dependent Measures—Blake’s social goal on his IEP was engagement, and each 10-minute weekly probe was coded in 30-second intervals. Engagement was scored as appropriate (denoted by a +) if Blake engaged in the activity with his peers and followed the rules of the game during the entire 30-second interval. Non-engagement was scored (denoted by a -) if Blake exhibited behaviors such as walking away from activity, laying on the ground, crying, screaming, playing another activity away from the group, saying “no” or other types of verbal refusals to engage. At the end of each session, the total number of pluses was divided by the total number of intervals and multiplied by 100 to yield a percentage of engagement per session.

Paulos’ IEP social goal was to improve eye contact and was measured by using a 10-second interval recording procedure during 10-minute conversation probes. Eye contact was scored as appropriate (denoted by a +) if his gaze was appropriately in the direction of the conversational partner or the relevant referent for the entire 10 seconds. Inappropriate eye gaze was recorded if he exhibited eye gaze away from the partner or relevant referents during any part of the interval. At the end of each session, the total number of pluses was divided by the total number of intervals and multiplied by 100 to yield a percentage.

Miranda’s IEP social goal was turn-taking and was measured through both the coding of videos and direct observations. When Miranda appropriately waited for her turn and took a turn without demonstrating disruptive behaviors the trial was scored with a plus (+). If Miranda left the area, engaged in disruptive behavior when it was not her turn, or did not take her turn during the activity, the trial was scored with a minus (-). At the end of each session, the number of pluses was divided by the total number of trials and multiplied by 100 to yield a percentage.

Evan’s IEP social goal was to provide at least three details when verbally retelling a recent experience. Responses were scored from videos during the table-top activities when the children engaged in social conversation. Data were collected during natural conversational interactions with peers following each question asked by a peer. If he provided at least three details the trial was recorded with a plus (+). If Evan did not respond to a peer’s question, or responded with fewer than three details, a minus (-) was recorded. Evan’s peers asked him

approximately three questions during an activity. At the end of each session, the number of pluses was divided by the total number of trials and multiplied by 100 to yield a percentage.

Collateral Gains

In addition to the target behaviors, collateral gains were scored during randomly selected (using a computer-generated program) baseline and follow-up video clips. Selected collateral behaviors for each participant were not targeted during intervention but were considered in the literature to be socially important (social verbal initiations and social engagement) (e.g., Watkins, Kuhn, Ledbetter-Cho, Gevarter, & O'Reilly, 2017; White, Koenig, Scahill, 2007). A social verbal initiation was scored when the participant spontaneously approached another child and verbally asked a question, made a comment, or verbally requested an item. These were tallied for each minute throughout the samples. Engagement was scored for Paulo, Miranda, and Evan. Engagement was defined as appropriately participating in an activity or social conversation with a peer throughout the entire one minute interval. Non-engagement was scored when a child left the group or activity, stared into space, did not participate in the activity, or engaged in off task or disruptive behavior. Disruptive behavior, which occurred for Blake, was recorded when he yelled at other children, ran away from the activity, laid down in the middle of the game so that the peers could not play, cried, and/or engaged in a tantrum.

Reliability

Two undergraduate students, one of whom was naïve to the experimental hypothesis independently recorded data for at least 30% of all sessions across all conditions. Reliability measures were calculated for percent agreement between the independent observers.

For percent intervals engaged with peers agreements were defined as the observers recording identical marks (+ or –) for each 30-second interval throughout the 10-minute probe. Disagreements were defined as the observers having different marks for the 30-second interval. The average percent agreement for engagement for Blake was 91%, (range 89–95%). In order to calculate reliability for appropriate eye contact for Paulo, each probe was divided into 10-second intervals. Agreements were defined as observers recording the same marks (+ or –) for each 10-second interval throughout the conversation. Disagreements were defined as the observers recording different marks for an interval. The percent agreement for recording eye contact for Paulo was 84% (range 78–93%). For percent of appropriate turn-taking, an agreement was defined as observers recording the same frequency of appropriate turns per interval. A disagreement was defined as the observers recording a different frequency. The average percent agreement for turn taking was 90% (range 82–100%). To calculate reliability for appropriate amount of detail for Eddie, agreements were defined as the observers recording the same number of details during each opportunity. Disagreements were defined as observers recording different numbers of details given during each opportunity. The average percent agreement for Eddie was 93% (range 83–100%).

For collateral gains, reliability was scored for one randomly selected (via a computer-generated program) baseline and one follow-up session for each child. Agreement for initiations was scored if both observers scored the same number of initiations during a 30-

second interval. The average percent agreement for initiations was 91% (range: 80%–100%). Agreements for engagement were defined as each coder recording either a (+) if the child engaged with peers throughout the entire 30-second interval or both recording a (–) if the child did not remain engaged throughout the 30-second interval. The average percent agreement for engagement was 92% (range: 81%–100%). For disruptive behavior, an agreement was recorded if both observers scored either a (+) if the child did not engage in disruptive behaviors throughout the entire 30-second interval or a (–) if the child engaged in disruptive behaviors at any time during the 30-second interval. The average percent agreement for the occurrence of disruptive behavior was 94% (range: 89%–100%).

Results

The first question asked in this study was whether students with ASD could make progress on IEP social goals during an inclusive two-week summer camp with interventions being implemented by a supervised paraprofessional. The results for each child's targeted IEP social goals are presented in Figure 1 and show that all four children improved on their targeted goals. Specifically, during baseline, Blake had relatively low levels of engagement, engaging in activities with peers without disruptive behavior for a mean of 26% of the intervals with his final point at 0%. In contrast, during the intervention, his appropriate non-disruptive engagement rapidly increased to an average of 87% (range 65%–100%) of the intervals.

Similarly, Paulo exhibited very low levels of eye contact during baseline probes. Throughout the five baseline points, he exhibited eye contact during a mean of 1% of the intervals, with most points at 0%. After the start of intervention, Paulo's eye contact increased to an overall mean of 60.8% (range 33%–83%).

Miranda also demonstrated a similar pattern for her targeted IEP goals. Prior to intervention, Miranda exhibited appropriate turn-taking for a mean of 30% of the opportunities (range 20%–40%). After the start of intervention Miranda's percent of appropriate turn-taking increased to an average of 91% of the opportunities (range 71%–100%).

Evan also showed an analogous pattern of results. That is, he engaged in low levels of responding with appropriate levels of detail during baseline probes with a mean of 37% (range: 20–50%) of his responses having at least 3 details during social conversation with peers. After intervention was introduced, Evan's appropriate levels of detail during social conversation increased to an average of 98% of the opportunities (range: 80%–100%).

The second question asked in this study was whether the gains in social goals would maintain until the next school year and generalize to natural settings. These results can be seen in the follow-up phase of Figure 1. All four children maintained their gains at follow-up in school and/or community settings. That is, Blake's gains in social engagement maintained at the one and three-month follow-up probes in his home and school with a mean of 93% (range: 83%–100%) of the intervals. At follow-up, Paulo maintained appropriate eye contact during a mean of 69% of the intervals with his school probe at 46% and his home probes at 78% and 83% respectively. Similarly, the three-month follow-up probe showed that

Miranda's gains decreased slightly from intervention, but were improved over her baseline probes, with a mean of 67% (range 64%–70%) appropriate turn taking at home with a similarly-aged peer. Evan maintained his gains at 100% of trials with appropriate details during social conversation with peers during all three follow-up probes in both home and school.

The final question asked in this study was whether any collateral gains would occur as a result of the social intervention. The data for collateral gains for the three children are shown in Table 3. These data show that all four children demonstrated collateral gains in untreated social areas at follow-up in comparison to baseline. Specifically, during baseline Blake had 0.8 initiations per minute with peers and engaged in disruptive behaviors during 70% of the probes. During the follow-up probe, Blake improved considerably, with 2.5 initiations per minute with peers and no disruptive behavior. Paulo also demonstrated collateral gains. That is, during baseline Paulo did not exhibit any initiations, nor did he engage with his peers. At follow-up Paulo increased his rate of initiations to 2.5 per minute and engaged with his peers during 100% of the intervals. Similarly, during baseline, Miranda did not initiate or engage with peers. During follow-up, Miranda initiated peer interactions an average of 0.13 times per minute and engaged with peers during 56.6% of the intervals. Finally, during baseline Evan initiated interactions with his peers an average of 0.67 times per minute and engaged with peers during 22% of the intervals. At follow-up, Evan increased to 1.3 initiations per minute and engaged with peers during 100% of the intervals.

Effect Sizes and Percentage of Non-Overlapping Data

Percentage of non-overlapping data (PND) was also calculated for all four participants for the intervention and follow-up in comparison to baseline. PND for engagement for Blake was 100%; for eye contact for Paulo was 100%; for turn taking for Miranda was 100%; and for providing at least three details for Evan was 100%.

Discussion

The results of this study contribute to the literature in several ways. First, all of the participants in this study were able to meet their yearlong social IEP goals during two-weeks of the inclusive summer camp. These results are important as they support previous research demonstrating that children with autism in inclusive settings are able to meet their IEP goals at faster rates compared to children with autism in non-inclusive settings (Kurth & Mastergeorge, 2010). Unstructured settings can be less conducive to social interaction than structured settings (Schenkelberg, Rosenkranz, Milliken, Menear, & Dziewaltowski, 2017), but carefully designed evidence-based social instruction in inclusive unstructured settings, such as summer camps, may be ideal for improving social competence. Further, this study suggests that paraprofessionals, with supervision, can competently implement social IEP goals and that the PBS strategies were effective with a wide age range of children.

These results also may help address concerns regarding the lack of services for children with autism throughout the summer months (Brookman, et al., 2003). Most schools offer extended school year programs (ESY) for students who are likely to regress in the summer (Katsiyannis, 1991). However, the exact outcomes of ESY programs, particularly for

students with disabilities, vary and are not uniformly effective (Reed, Aloe, Reeger, & Folsom, 2019). In particular, some children with ASD may not benefit from summer school programs for a variety of reasons, including the lack of evidence-based instruction to address IEP goals, unclear IEP goals, and non-measurable IEP goals (Ruble, McGrew, Dalrymple, & Jung, 2010). Further, because ESY programs are designed for students with disabilities, most schools do not provide an inclusive ESY setting for students with ASD. This study suggested that summer camps may be an ideal setting for students with ASD (Rudy, 2018) and targeting social goals with typically developing peers may result in rapid and long-lasting improvements. Thus, parents and school personnel should know that students with ASD may benefit by providing systematic social interventions at summer camps for the ESY. Again, there are few and infrequent options for many children with ASD to engage with typically developing peers during summer and many children do not receive interventions with peers outside of the school setting. Enrolling children with ASD in summer camps with typically developing children and providing the appropriate support may be an effective and efficient option to target social goals as this study suggests that the gains are transferrable and generalizable to peers in the home and school setting during the following school year.

Related, another interesting finding was that the gains made in summer camp maintained and generalized to novel and natural settings and with new peers during the following school year. It may be that implementing interventions throughout the six hours per day along with multiple exemplars throughout the various camp activities provided an intensiveness that resulted in a strong mastery of the target behaviors leading to maintenance and generalization to new and novel settings (Simacek, et al., 2018).

Another finding was that social areas improved during the camp across all participants who varied in cognitive level, language level, and co-morbid symptoms. Many schools are increasingly recognizing the importance of social interventions in inclusive settings for children and adolescents with ASD with average cognitive abilities (Croen, Grether, Hoogstrate, & Selvin, 2002; White, Keonig, & Scahill, 2006). The present study also suggests that children with greater support needs may also benefit from social interventions in inclusive settings.

In regard to collateral gains, interventions teaching specific skills through behavioral and social learning strategies often result in improvements (McConnell, 2002), however these improvements may be confined to only the skills that are specifically taught (White, et al., 2006). It may be that the massed practice of teaching six hours per day along with the benefits of an inclusive day long setting promoted collateral gains over time, across new peers, and in new settings. Research in this area could be beneficial for understanding mechanisms for longer lasting and more widespread improvements in socialization.

In summary, the results of this study suggest that inclusive summer camps with the implementation of evidence-based programs and supervised paraprofessionals may be ideal settings for targeting social areas. All of the participants in this study rapidly exhibited acquisition of targeted and untargeted social behaviors within two weeks, which maintained into the following school year in natural settings, such as the children's home, community,

and schools. Further research with a larger number of participants and a wider range of goals may be fruitful. Overall, the present study suggests optimism for the use of paraprofessionals implementing social goals during inclusive summer camp programs.

Acknowledgment:

The authors would like to thank Sunny Kim, Maya Fehler, and Madison Werchowsky for their assistance with data collection and analysis. This manuscript was partially funded by National Institute of Mental Health grant #MH28210 National Institute of Deafness and Other Communication Disorders #DC010924 the Kind World Foundation, the Bialis Family Foundation, and the Eli and Edythe L. Broad Foundation. Lynn and Robert Koegel are partners in the private firm Koegel Autism Consultants, LLC.

References

- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed). Arlington, VA: American Psychiatric Publishing.
- Barlow DH, Nock MK, & Hersen M (2009). *Single case experimental designs: Strategies for studying behavior change*: NY: Pearson Education.
- Bauminger N, & Kasari C (2000). Loneliness and friendship in high-functioning children with autism. *Child Development*, 71, 447–456. [PubMed: 10834476]
- Brookman L, Boettcher M, Klein E, Openden D, Koegel RL, & Koegel LK (2003). Facilitating social interactions in a community summer camp setting for children with autism. *Journal of Positive Behavior Interventions*, 5, 249–252.
- Brown TS, & Stanton-Chapman TL (2017). Experiences of paraprofessionals in US preschool special education and general education classrooms. *Journal of Research in Special Educational Needs*, 17(1), 18–30.
- Camargo SPH, Rispoli M, Ganz J, Hong ER, Davis H, & Mason R (2014). A review of the quality of behaviorally-based intervention research to improve social interaction skills of children with ASD in inclusive settings. *Journal of Autism and Developmental Disorders*, 44, 2096–2116. [PubMed: 24781498]
- Carter AS, Davis NO, Klin A, & Volkmar FR (2005). Social Development in Autism In Volkmar FR, Paul R, Klin A & Cohen D (Eds.), *Handbook of autism and pervasive developmental disorders: Diagnosis, development, neurobiology, and behavior* (pp. 312–334). Hoboken, NJ, US: John Wiley & Sons Inc.
- Chamberlain B, Kasari C, & Rotheram-Fuller E (2006). Involvement or isolation? The social networks of children with autism in regular classrooms. *Journal of Autism and Developmental Disorders*, 37, 230–242.
- Croen LA, Grether JK, Hoogstrate J, & Selvin S (2002). The changing prevalence of autism in California. *Journal of Autism and Developmental Disorders*, 32, 207–215. [PubMed: 12108622]
- Feldman EK, & Matos R (2012). Training paraprofessionals to facilitate social interactions between children with autism and their typically developing peers. *Journal of Positive Behavior Interventions*, 15, 169–179.
- Goldstein S, & Naglieri JA (2010). *Autism Spectrum Rating Scales (ASRS): Technical Manual*. Toronto, Canada: Multi-Health Systems, Inc.
- Holwerda A, Van der Klink JJ, Groothoff JW, & Brouwer S (2012). Predictors for work participation in individuals with an autism spectrum disorder: A systematic review. *Journal of Occupational Rehabilitation*, 22, 333–352. [PubMed: 22270229]
- Jackson SL, Hart L, Brown JT, & Volkmar FR (2018). Brief report: Self reported academic, social, and mental health experiences of post-secondary students with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 48, 643–650. [PubMed: 29022149]
- Katsiyannis A (1991). Extended school year policies: An established necessity. *Remedial and Special Education*, 12(1), 24–28.

- Koegel RL, Fredeen R, Kim S, Danial J, Rubinstein D, & Koegel L (2012). Using perseverative interests to improve interactions between adolescents with autism and their typical peers in school settings. *Journal of Positive Behavior Interventions*, 14, 133–141. [PubMed: 24163577]
- Koegel LK, Koegel RL, Ashbaugh K, & Bradshaw J (2014). The importance of early identification and intervention for children with or at risk for autism spectrum disorders. *International Journal of Speech-Language Pathology*, 16(1), 50–56. [PubMed: 24328352]
- Koegel RL, & Koegel LK (2006). *Pivotal response treatments for autism: Communication, social & academic development*. Baltimore, MD: Paul H. Brookes Publishing.
- Koegel LK, Koegel RL, Frea W, & Green-Hopkins I (2003). Priming as a method of coordinating educational services for students with autism. *Language, Speech, and Hearing Services in Schools*, 34, 228–235.
- Kurth J, & Mastergeorge AM (2010). Individual education plan goals and services for adolescents with autism: Impact of age and educational setting. *The Journal of Special Education*, 44, 146–160. doi: 10.1177/0022466908329825
- Lord C, Rutter M, DiLavore PC, Risi S, Gotham K, Bishop S (2012). *Autism Diagnostic Observation Schedule (ADOS)*, second edition Torrance, CA: Western Psychological Services.
- Mayes SD, Calhoun SL, Murray MJ, & Zahid J (2011). Variables associated with anxiety and depression in children with autism. *Journal of Developmental and Physical Disabilities*, 23, 325–337.
- McConnell SR (2002). Interventions to facilitate social interaction for young children with autism: Review of available research and recommendations for educational intervention and future research. *Journal of Autism and Developmental Disorders*, 32, 351–372. [PubMed: 12463515]
- Reed DK, Aloe AM, Reeger AJ, & Folsom JS (2019). Defining Summer Gain Among Elementary Students With or at Risk for Reading Disabilities. *Exceptional Children*, 0014402918819426.
- Reynolds CR, & Kamphaus RW (2004). *Behavior Assessment System for Children*, second edition Circle Pines, MN: American Guidance Service.
- Rogers SJ (2000). Interventions that facilitate socialization in children with autism. *Journal of Autism and Developmental Disorders*, 30, 399–409. [PubMed: 11098875]
- Ruble LA, McGrew J, Dalrymple N, & Jung LA (2010). Examining the quality of IEPs for young children with autism. *Journal of autism and developmental disorders*, 40(12), 1459–1470. [PubMed: 20373007]
- Rudy LJ (2018). Extended school year for kids with autism. Very Well Health. <https://www.verywellhealth.com/what-is-extended-school-year-esy-for-kids-with-autism-260451>
- Schenkelberg MA, Rosenkranz RR, Milliken GA, Menear K, & Dziewaltowski DA (2017). Implications of social groups on sedentary behavior of children with autism: A pilot study. *Journal of Autism and Developmental Disorders*, 47, 1223–1230.
- Simacek J, Reichle J, Byiers BJ, Parker-McGowan Q, Dimian AF, & Elmquist M (2018). Promoting conditional use of communication skills for learners with complex communication needs: A tutorial. *American Journal of Speech Language Pathology*, 27, 519–535. [PubMed: 29582087]
- Sutton BM, Webster AA, & Westerveld MF (2018). A systematic review of school-based interventions targeting social communication behaviors for students with autism. *Autism*. doi: 10.1177/1362361317753564
- Watkins L, O'Reilly M, Kuhn M, Gevarter C, Lancioni GE, Sigafoos J, & Lang R (2014). A review of peer-mediated social interaction interventions for students with autism in inclusive settings. *Journal of Autism Developmental Disorders*, 45, 1070–1083. doi:10.1007/s10803-014-2264
- Watkins L, Kuhn M, Ledbetter-Cho K, Gevarter C, & O'Reilly M (2017). Evidence-based social communication interventions for children with autism spectrum disorder. *The Indian Journal of Pediatrics*, 84(1), 68–75. [PubMed: 26581197]
- Wechsler D (2009). *Wechsler Individual Achievement Test* (3rd ed). San Antonio, TX: Psychological Corporation.
- White SW, Keonig K, & Scahill L (2007). Social skills development in children with autism spectrum disorders: A review of the intervention research. *Journal of Autism and Developmental Disorders*, 37, 1858–1868. [PubMed: 17195104]

Figure 1.

The percent of appropriate behaviors for each child during probes. Circles indicate the camp setting, squares indicate the home setting, and triangles represent school recess and neighborhood parks.

Table 1

Participants' Demographic Information

	Blake	Paulo	Miranda	Evan
Gender	Male	Male	Female	Male
Ethnicity	Caucasian	Hispanic	Hispanic	Asian American
Age	7	14	8	6
Grade	3rd	9th	4th	2nd
Class setting	98% General education/Special day class	98% General education/Special day class	Special day class	97% General education/Special day class

Table 2**Participants' Social IEP Goals and Intervention Components**

Participant	IEP goal	Multicomponent intervention description
Blake	* Will stay engaged in the activity with his peers during non-preferred activities for at least 80% of the time during a probe.	Self-management, praise, provide breaks, priming
Paulo	Will give eye contact to persons speaking to him and in group activities without being distracted in 3 out of 5 opportunities throughout the day.	Self-management, praise, peer-implemented simplified PRT
Miranda	Will improve her pragmatic skills by participating in turn taking play activity with a peer or adult for 4 out of 5 turns with 1 –2 prompts across 3 sessions	Prompting to wait for turns, counting to 10 before taking turn, praise, cooperative arrangements, alternating activities to incorporate M interests
Evan	Will tell about a recent experience including at least 3 details given general prompts on 4/5 occasions	Visual framework, self-management, prompts

* No social goals were stated in IEP; therefore, social goals were created by the school's behavior specialist and his interventionist at camp.

Table 3

Each Participant's Collateral Gains from Baseline to Follow-Up are Shown in Table 3

Participant	Collateral gain	Baseline	Follow-up
Blake	Rate of initiations (per minute)	0.8	2.5
	Percentage of intervals with disruptive behaviors	70%	0%
Paulo	Rate of initiations (per minute)	0	2.5
	Engagement with peers	0%	100%
Miranda	Rate of initiations (per minute)	0	0.13
	Engagement with peers	0%	56.6%
Evan	Rate of initiations (per minute)	0.67	1.3
	Engagement with peers	22%	100%