

# Training Paraprofessionals to Improve Socialization in Students with ASD

Robert L. Koegel · Sunny Kim · Lynn Kern Koegel

© Springer Science+Business Media New York 2014

**Abstract** An important line of research relates to whether school personnel, such as paraprofessionals, who are present during unstructured social periods, such as lunch-recess, could successfully implement interventions to improve socialization between students with ASD and their typical peers in a group setting. Therefore, within the context of a multiple baseline across participants design, we assessed whether training paraprofessionals to provide social interventions would enhance social development in students with ASD in a group setting. Results showed that paraprofessionals who were not providing any social opportunities during baseline were able to meet fidelity of implementation following a brief training. Consequently, the children with ASD increased their levels of engagement and rates of initiation with typically developing peers following intervention. Implications for training paraprofessionals to implement effective social interventions for students with ASD are discussed.

**Keywords** Paraprofessional · Training · Autism · Socialization · School

## Introduction

A number of researchers have suggested the importance of implementing interventions in the school setting to improve socialization and positive peer interactions for students diagnosed with ASD (Bauminger and Kasari

2000; Kasari et al. 2011; Koegel et al. 2001, 2009; Locke et al. 2010; Rotheram-Fuller et al. 2010). One intervention discussed in the literature is the incorporation of the preferred interests of students with ASD in the context of school clubs, wherein both the student with ASD and typical peers are able to contribute their respective strengths to social interactions (Koegel et al. 2012a, b, 2013). This type of social intervention provides a common ground upon which social relationships and friendships can be formed with typically-developing peers who share similar interests (Cohen 1977; Feld 1982). Moreover, many individuals with ASD have accumulated significant information about particular topics, and when properly incorporated into social activities it can provide them with a context to appropriately engage with their peers (Baker et al. 1998).

In addition to incorporating preferred interests, another component in this type of social intervention is setting up a context that promotes cooperative arrangements (Kim and Koegel 2012), where activities are arranged so that the students with ASD and their typically developing peers have to rely on each other in order to complete the task/activity (Jull and Mirenda 2011; Koegel et al. 2005). This is supported by research conducted by Dugan et al. (1995), who found that implementing cooperative arrangements in an inclusive classroom setting, where individuals contributed their specific strengths during group interactions, enhanced students with ASD's academic achievement and social interactions with their typical peers.

In addition to the above components, researchers have suggested that an adult (e.g., paraprofessional) facilitator's proximity to the target student can influence the social relationships between the student and his or her typically-developing peers (Feldman and Matos 2012; Marks et al. 1999; Robinson 2011; Werts et al. 2001; Young et al.

---

R. L. Koegel (✉) · S. Kim · L. K. Koegel  
Koegel Autism Center, Graduate School of Education,  
University of California, Santa Barbara, Santa Barbara, CA  
93106-9490, USA  
e-mail: Koegel@education.ucsb.edu

1997). For example, Giangreco et al. (1997) found that without proper training, paraprofessionals tend to maintain too close in proximity to students with disabilities (i.e., hovering), which results in limited social interactions between the target student and his or her typically-developing peers (Carter et al. 2009; Marks et al. 1999).

Unfortunately, research relating to effective training packages for paraprofessionals is limited, despite the fact that studies demonstrate that paraprofessionals generally have the most significant role in the education of students with ASD (Downing et al. 2000; Fisher and Pleasants 2012; French and Pickett 1997; Jones and Bender 1993). Therefore, the purpose of the present study was to assess whether training paraprofessionals to implement social interventions that incorporate variables shown to improve motivation and socialization (incorporation of the student with ASD's preferred interests, setting up and maintaining cooperative arrangements, maintaining appropriate proximity to the target child) would improve social interactions between students with ASD and their typically-developing peers. Specifically, the following research questions were asked: (1) Can paraprofessionals be trained to implement social interventions that include variables of child-preferred interests, cooperative arrangements, and appropriate paraprofessional-student proximity; (2) Will the engagement between students with ASD and their typically-developing peers improve in a group setting if the paraprofessionals are trained in these variables; and (3) Will the rate of initiations made by students with ASD to their typically-developing peers in a group setting improve when the paraprofessionals are trained?

## Methods

### Participants (see Table 1)

Four different school districts, representing a total of 18 schools were notified of this research study. The first three schools that contacted us were selected to participate. The students in the participating schools ranged in ethnic diversity and socio-economic status (see settings section below). Participating schools selected a paraprofessional who supported a student with ASD and met the following participation criteria: (1) The paraprofessional reported little to no knowledge of evidence-based intervention procedures; (2) The paraprofessional was hired by the school district as a full-time employee; (3) The paraprofessional was nominated by the Director of Special Education at each school as needing training on social facilitation; and (4) The paraprofessional's assigned student lacked appropriate social skills as determined by the Director of Special Education at each school. All participants (paraprofessionals and their

students with ASD) agreed to participate in the study with written permission in accordance with University IRBs and school district approvals.

### *Dyad 1*

The first paraprofessional was a Caucasian female in her early 50s. She graduated from college with a Bachelor of Science degree and had worked as a paraprofessional for 5 years. She had received crisis management training through the school district and had attended a workshop on teaching social stories but was not implementing any systematic interventions. She reported being unfamiliar with evidence-based procedures for students with ASD. Paraprofessional 1 worked with an 8 year old Iranian-American girl diagnosed with ASD who was fully included in the 2nd grade. She provided this student with partial support during the day, including the lunch-recess period. The student received pull-out services for speech and occupational therapy. The general education teacher and the special education teacher reported this student to be functioning cognitively at about a 7-year-old level and at about grade level academically. The general education teacher and the special education teacher reported concerns about this student's socialization, stating that she rarely interacted with any of her peers even though she had the ability to ask questions, make comments, and respond. They reported that the only time they observed her interact with her peers was when a peer was breaking a rule on the playground (such as climbing up the slide). During these instances, she would approach the classmate, state the rule, and report it to an adult. During the remainder (and majority) of the lunch recess period, she either walked around the school playground alone or entered classrooms to talk to teachers. Her preferred interests and strengths included arts and crafts activities, such as making jewelry or ornaments.

### *Dyad 2*

The second paraprofessional was a Hispanic-American female in her mid-40s. She graduated from high school and was working towards her Bachelor of Arts degree. She had worked as a paraprofessional for 19 years. The only formal training she received was in crisis management through the school district, and she reported having no prior training or experience with implementing evidence-based procedures for students with ASD. She provided full time one-on-one support for a 9-year-old Hispanic-American boy diagnosed with ASD who was in the 4<sup>th</sup> grade. He was included in regular education for most of his classes, but was pulled out for two subjects (i.e., language arts and literature) as well as for speech and occupational therapy. The general education teacher and the special education teacher reported

**Table 1** Participant information

	Dyad 1	Dyad 2	Dyad 3
<i>Paraprofessionals' information</i>			
Year as Paraprofessional	5	19	7
Training received	CPI and social stories workshop	CPI	CPI
Highest degree obtained	B.S.	H.S. (working towards college degree)	H.S.
Gender	Female	Female	Female
Ethnicity	Caucasian	Hispanic	Caucasian
<i>Student with ASDs' information</i>			
Chronological age	8	9	10
Grade	2nd	4th	5th
Gender	Female	Male	Male
Ethnicity	Iranian	Hispanic	Caucasian
Functioning level (Estimated by special educators)	1 year below age level	1 year below age level	5 years below age level
Preferred interest(s)	Arts and crafts (specifically making jewelry and ornaments)	Legos (specifically crane and vehicle legos)	Nickelodeon shows (specifically Dora the Explorer and Benny the Cow)

this student to be functioning cognitively at an 8-year-old level and academically about one year behind his grade level. The general education teacher and the special education teacher also reported concerns about his social skills reporting that he did not interact with his typically-developing peers. His preferred interests and strengths were building cranes and vehicles with Legos.

### *Dyad 3*

The third paraprofessional was a Caucasian female in her late 40s. She graduated from high school and had worked as a paraprofessional for 7 years. She had received crisis management training through the school district but had no prior training or experience with implementing evidence based procedures for students with ASD. She worked full-time with a 10-year-old Caucasian boy diagnosed with ASD who was fully included in the 5th grade. He received pull-out services for speech and occupational therapy and spent the remainder of the day in regular education. However, he was frequently pulled out of the classroom for disruptive behavior. The general education teacher and the special education teacher reported this student to be functioning cognitively at about a 5-year-old level, and academically at about a first grade level. The general education teacher and the special education teacher also reported that he never initiated interactions to his peers, and would only engage socially when he was continually prompted. He did not ask questions or make comments, but he spontaneously requested highly desired items. His preferred interests and strengths included drawing characters from various Nickelodeon shows such as Dora the Explorer and Benny the Cow.

### Settings

The study took place at three different public elementary schools representing a wide range of socio-economic status and ethnicity. All of the classrooms involved in this study followed an inclusive educational model wherein the students with disabilities were primarily educated with their typically-developing peers. The first school (Dyad 1) had a total of 317 students enrolled and 27 % of the students were considered to be socioeconomically disadvantaged. The majority of the students at this school were identified as Caucasian (57 %). The second school (Dyad 2) had a total of 447 students enrolled and 100 % of the students were considered to be socioeconomically disadvantaged. The majority of the students at this school were identified as either Hispanic or Latino (96 %). The third school (Dyad 3) had a total of 749 students enrolled and 39.3 % of the students were considered to be socioeconomically disadvantaged. Approximately 49 % of the students were identified as Caucasian and about 47 % of the students were identified as either Hispanic or Latino. All activities in the study took place on the school playground during each student's regular lunch-recess period.

### Materials

The materials used for the lunch-recess activities in this study consisted of resources already available in the schools, therefore the implementation of the social intervention was cost efficient.

## Data Collection

Data were collected in vivo by an advanced graduate student majoring in special education (who was also the trainer for the paraprofessionals) and by an undergraduate student majoring in psychology who was naïve to the experimental hypothesis of the study. Both the graduate and undergraduate students had prior experience with data collection. The observers were given written definitions of the target behaviors for this study, and were asked to record the data independently. Both stood close enough to hear the content of the verbal social interactions, but were far enough away from each other and from the participants to unobtrusively and independently record data to minimize reactivity effects. Data collection began as soon as the paraprofessional and the target student arrived to the playground (the time it took the paraprofessional and the target student to walk over to the playground from the cafeteria or area where the students ate lunch was not included). Data collection continued until the bell rang which signaled the end of the lunch-recess period. The length of the data recording sessions for Dyad 1 ranged from 11 to 15 min (between 22 and 30 intervals). The length of the data recording sessions for Dyad 2 ranged from 5 to 7.5 min (between 10 and 15 intervals), and the length of the data recording sessions for Dyad 3 ranged from 11 to 15 min (between 22 and 30 intervals).

## Dependent Measures

### *Percent Intervals with Fidelity of Implementation*

In order to provide an adequate amount of time to assess whether the paraprofessionals were implementing the procedures properly, and to maintain relative consistency with other research in this area (Feldman and Matos 2012; Robinson 2011), percent intervals with fidelity of implementation were recorded using a 30-s partial interval recording procedure (25-s observe/5-s record). For each interval, a plus (+) was recorded if the paraprofessional was implementing all three procedures correctly (see below) and a minus (−) was recorded if the paraprofessional was implementing any of the three procedures incorrectly. At the end of each session, the total number of correct intervals was divided by the total number of intervals in the session and multiplied by 100 to yield a percentage of fidelity of implementation per session. Specifically, the fidelity of implementation score indicated the paraprofessionals' correct use of all three procedures simultaneously and throughout the entire interval (incorporation of target student's preferred interests, implementation of cooperative arrangements, and appropriate proximity to the target

student) into lunch-recess games/activities. The following definitions were used to score fidelity:

1. *Appropriate proximity* was defined as the paraprofessional being attentive while standing far enough away (e.g., approximately 6 feet away) to not be hovering over the target student, but close enough to be within earshot of the student in order to be able to assess whether or not the preferred interest was incorporated into the activity. Inappropriate proximity was defined as the paraprofessional hovering next to the target student (e.g., standing or sitting between the target child and his or her peers) or standing too far (e.g., standing on the other side of the playground) from the target student.
2. *Cooperative arrangements* were defined as the paraprofessional arranging the game/activity so that the target student with ASD and typically-developing peers had to rely on each other to complete/continue the game/activity (e.g., sorting the game pieces and distributing them to each club member so that they had to ask one another for desired pieces). Not maintaining cooperative arrangements was defined as implementing the game/activity so that the target student with ASD and typically-developing peers did not have to rely on each other to complete/continue the game/activity.
3. The use of *Child Preferred Interests* was defined as the paraprofessional assessing the target student's preferred interest and strengths in order to incorporate the interest as the theme of a social activity/game (see intervention training procedures below for how the paraprofessional was trained to do this). For example, if the target child had a preferred interest and strengths related to building cranes, the paraprofessional would need to incorporate cranes into a social activity. Not using child-preferred interests was defined as the paraprofessional not incorporating the target student's preferred interest and strengths and instead choosing an arbitrary activity.

### *Student Data*

Data for the students with ASD were collected on parameters of social interaction frequently measured in previously published research (cf. Koegel et al. 2012a, 2013) as follows: (a) The student with ASD's *percent intervals with engagement* with their typical peers; and (b) The student with ASD's *rate of initiations* made to their typical peers.

*Percent intervals with engagement with typical peers* was recorded by using a 30-s partial interval recording procedure. Engagement with typical peers was defined as the target

student's appropriate use of at least three of the following engagement behaviors for 3 or more consecutive seconds for each social turn throughout the interval. Additionally, in order for the interval to be scored as appropriate engagement, the student with ASD and the typical child needed to be exhibiting reciprocal responses throughout the interval. These behaviors included facing peers, making eye contact, gesturing (e.g., pointing, high-fiving, fist pounding), responding to questions, asking questions, making comments, smiling, nodding, and/or sharing of activities or materials with peers during the interval (Koegel et al. 2012a, 2013). For each interval, a plus or minus was scored to denote the presence or absence of appropriate engagement with typical peers. At the end of each session, the total number of pluses was divided by the total number of intervals in the session and multiplied by 100 to yield a percentage of engagement with typical peers per session.

In addition to the engagement measure of reciprocal interaction, we also assessed the number of interactions that were initiated by the student with ASD, as initiations have been reported in the literature to be pivotal for treatment outcomes (Koegel and Koegel 2012; Koegel et al. 2003, 1999). *Rate of initiations made to typical peers* was recorded by tallying each independent spontaneous verbal social communicative initiation the target student directed toward another typically-developing peer without being prompted (Koegel et al. 2012b, 2013). Appropriate initiations included requests, questions, or comments made to typical peers that were relevant and/or elicited additional information pertaining to the current conversational topic. At the end of each session, the total number of tallies was divided by the length of the session to yield a rate of initiations per minute.

### Reliability

An advanced graduate student majoring in special education and an undergraduate student who was naïve to the experimental hypothesis independently recorded data. The undergraduate student recorded reliability data for at least 30 % of all sessions across all conditions. Reliability was calculated for percent agreement between observers. In addition to calculating standard reliability, Kappa was calculated for all measures in order to control for chance agreement.

For *fidelity of implementation*, agreements were defined as the observers recording identical marks (as denoted by a plus or minus) for each interval throughout the lunch-recess period. The average percent agreement for dyad 1 was 99.2 % (range 95.6–100 %) and Kappa yielded a score of 0.99. The average percent agreement for dyad 2 was 98.1 % (range 90.9–100 %) and Kappa yielded a score of 0.95. The average percent agreement for dyad 3 was

93.1 % (range 76.6–100 %) and Kappa yielded a score of 0.84.

For *percent intervals with engagement with typical peers*, agreements were defined as the observers recording identical marks (i.e., plus or minus) for each 30-s interval throughout the lunch-recess period. Disagreements were defined as the observers having a different mark for a 30-s interval. The average percent agreement for dyad 1 was 96.3 % (range 90.9–100 %) and Kappa yielded a score of 0.93. The average percent agreement for dyad 2 was 97.2 % (range 86.6–100 %) and Kappa yielded a score of 0.92. The average percent agreement for dyad 3 was 96.5 % (range 96.1–100 %) and Kappa yielded a score of 0.96.

In order to calculate reliability for *rate of initiations made to typical peers*, each session was divided into 1-min intervals. Agreements were defined as the observers recording the same number of initiations for each 1-min interval throughout the lunch period. Disagreements were defined as the observers recording a different number of initiations in a given 1 min interval for any specific session. The average percent agreement for dyad 1 was 92 % (range 80–100 %). The average percent agreement for dyad 2 was 90.1 % (range 73.3–100 %). The average percent agreement for dyad 3 was 95.8 % (range 90–100 %).

### Research Design

A repeated measures multiple baseline across participants experimental design (Barlow et al. 2009; Bailey and Burch 2002) was used to evaluate the effects of training paraprofessionals to facilitate social interactions between students with ASD and their typically-developing peers. The across-participant design with three dyads allowed for demonstrations of experimental effect at different points in time (cf. Horner et al. 2005). Data were collected two times per week for each participant throughout the study. Systematically staggered baselines of 4, 5, and 6 sessions were collected.

### Procedures

#### *Baseline*

All participants were observed participating in their regular lunch-recess activities during baseline. No changes were made to their environments, nor were the participants given any prompts or additional instructions. That is, paraprofessionals were not given instructions to incorporate child-preferred interests, provide cooperative arrangements, or stand in appropriate proximity. Likewise, students with ASD were not given instructions to engage or initiate to their typically-developing peers.

## Intervention Training

After baseline observations, intervention was conducted in the form of a didactic training workshop, with subsequent feedback available if needed (note: corrective feedback was rare, with only one paraprofessional needing one instance of corrective feedback on one fidelity component). Specifically, each paraprofessional was invited to attend a 1-h workshop presented by an advanced graduate student. During the workshop each paraprofessional was shown a PowerPoint presentation that consisted of 35 slides that described how to implement the three procedures used in the social activities: (1) Incorporate the student with ASD's preferred interests into social games/activities (e.g., if a student's preferred interests is cranes, incorporate this interest into a common playground activity such as a Lego game that could be used to build cranes); (2) Provide cooperative arrangements (e.g., if the activity used Legos, sort the pieces by color and assign each student a different color so that the students have to ask one another for different colored pieces to complete the activity); and (3) Maintain an appropriate distance from the target student (e.g., far enough to not be hovering but close enough to ensure that the student with ASD's preferred interests are being incorporated into the activity and cooperative arrangements are maintained). The paraprofessionals were also shown several video clips of other paraprofessionals successfully and unsuccessfully implementing the three aforementioned procedures. For each video clip example, paraprofessionals were asked to identify what the paraprofessional in the clip was doing correctly and/or incorrectly. Following the slide presentation each paraprofessional rank ordered the target student's interests, with the strongest interest listed at the top of the list. Once the strongest interest/interest cluster was determined the paraprofessionals provided examples of how they might set up and maintain cooperative arrangements that incorporated the target student's interest into a common playground game/activity. After the workshop, the graduate student observed the groups and feedback was provided, if necessary, (Paraprofessionals 1 and 3 did not require feedback and Paraprofessional 2 required one instance of verbal feedback regarding the implementation of cooperative arrangements). Approximately 2 days later, the paraprofessionals were again observed to assess whether they were continuing to implement the procedures correctly (no further feedback was required).

In regard to recruiting student participants, the games and activities were advertised via flyers posted around the school and given to classroom teachers to announce to their students. The activities tended to be popular, therefore a sign-up sheet was provided to the students during morning recess. To prevent the paraprofessionals from being

overwhelmed with too many students wanting to participate in the games/activities a limited number of spaces were determined depending on the club and the availability of materials. Generally, between 6 and 12 typically-developing students signed up to participate in the games/activities. Similar to other playground games and activities, the students could leave at any time, but most tended to stay for the entire activity. The composition of the groups and their styles of interactions varied from activity to activity. When the paraprofessional met the 80 % criteria for fidelity of implementation for two consecutive sessions, the graduate-level student no longer attended the sessions.

## Follow-up

Follow-up data points were collected by the advanced graduate student and a naïve observer approximately 3 weeks after completion of the intervention. Similar to baseline measures, no changes were made to the lunch-recess environments nor was feedback provided to the paraprofessionals during these follow-up measures. After obtaining follow-up data, the graduate student provided the paraprofessionals with a questionnaire that consisted of 6 questions (4 of the questions were rated on a 5-point Likert scale and the remaining 2 questions asked the paraprofessionals' level of education and number of years as an aide) (Table 1).

## Results

### Fidelity of Implementation

As can be seen in Table 2, during baseline none of the paraprofessionals met fidelity of implementation on any of the three components. However, following the workshop, two of the three paraprofessionals immediately met fidelity of implementation and Paraprofessional 2 required one in vivo feedback session (specifically on maintaining cooperative arrangements). The rapidity of these changes provides compelling evidence of the effectiveness of the training.

Specifically, Paraprofessional 1 did not meet fidelity of implementation during any of the baseline sessions. However, during the intervention phase, Paraprofessional 1 immediately reached high levels of fidelity with all but one of the sessions above the 80 % criterion. Paraprofessional 1 continued to meet fidelity of implementation at 93.3 % during the follow-up phase.

Paraprofessional 2 showed a similar pattern, and did not meet the minimum fidelity of implementation criteria during baseline. However, following the intervention training, Paraprofessional 2 reached 100 % of fidelity of implementation by the second intervention session.

**Table 2** Paraprofessional’s average implementation of each fidelity component

Paraprofessional	Proximity $\bar{x}$ (range) (%)	Cooperative arrangement $\bar{x}$ (range) (%)	Child preferred interests $\bar{x}$ (range) (%)	Percent intervals with correct overall fidelity $\bar{x}$ (range) (%)
<i>Baseline</i>				
Paraprofessional 1	0.0	0.0	0.0	0.0
Paraprofessional 2	0.0	13.3 (0–66)	0.0	0.0
Paraprofessional 3	3.9 (0–16)	3.83 (0–23)	3.83 (0–23)	2.78 (0–16)
<i>Intervention</i>				
Paraprofessional 1	92.5 (66–100)	93.3 (76–100)	94.0 (70–100)	89.9 (63–100)
Paraprofessional 2	100.0	66.6 (0–100)	100.0	66.0 (0–100)
Paraprofessional 3	86.2 (83–89)	100.0	100.0	86.2 (83–89)
<i>Follow-up</i>				
Paraprofessional 1	93.3	93.3	93.3	93.3
Paraprofessional 2	100.0	100.0	100.0	100.0
Paraprofessional 3	96.1	100.0	100.0	96.1

Average percent correct implementation of each fidelity component, as well as the average percent of intervals with correct overall fidelity of implementation are presented for each of the three paraprofessionals, for the baseline, intervention, and follow-up conditions

Paraprofessional 2’s fidelity of implementation remained at 100 % during the follow-up phase.

Paraprofessional 3 was also similar to the other paraprofessionals during baseline, never reaching the 80 % minimum criterion for fidelity of implementation. During intervention, Paraprofessional 3 reached fidelity of implementation immediately and remained above the 80 % criterion (range from 83.3 to 89.2 %) in all subsequent intervention sessions. Following the completion of the intervention, Paraprofessional 3 maintained a high level fidelity of implementation at 96.1 % during the follow-up phase.

**Student Outcomes**

Data on student behavior showed similar results to the paraprofessionals with low levels of social behavior during baseline and rapid improvements during the intervention phase. Specifically, during the baseline sessions (prior to training the paraprofessionals) the students exhibited low levels or no engagement with typical peers and initiated with their peers at a very low rate (see Figs. 1, 2). In contrast, when paraprofessionals were trained to provide social intervention, an increase in engagement between the student with ASD and the typical peers occurred. As well, an increase in rate of initiations made by the target students to their typical peers was also observed. Specific details for each measure are presented below.

**Percent Intervals with Engagement with Typical Peers (Fig. 1)**

Student 1 did not engage with typically-developing peers during any of the baseline sessions. During the intervention

phase, Student 1’s level of engagement with typical peers increased to an average of 80.4 % of the intervals, ranging from 37 to 100 %. During follow-up, Student 1 engaged with her peers during 100 % of the intervals.

Similarly, Student 2 did not engage with typically-developing peers during any of the baseline sessions. During the intervention training phase Student 2’s level of engagement increased to an average of 95.7 %, ranging from 90 to 100 %. During the first follow-up probe, Student 2 engaged with his typical peers during 33 % of the intervals, and during the second follow-up probe he engaged with his peers 97.5 % of the intervals.

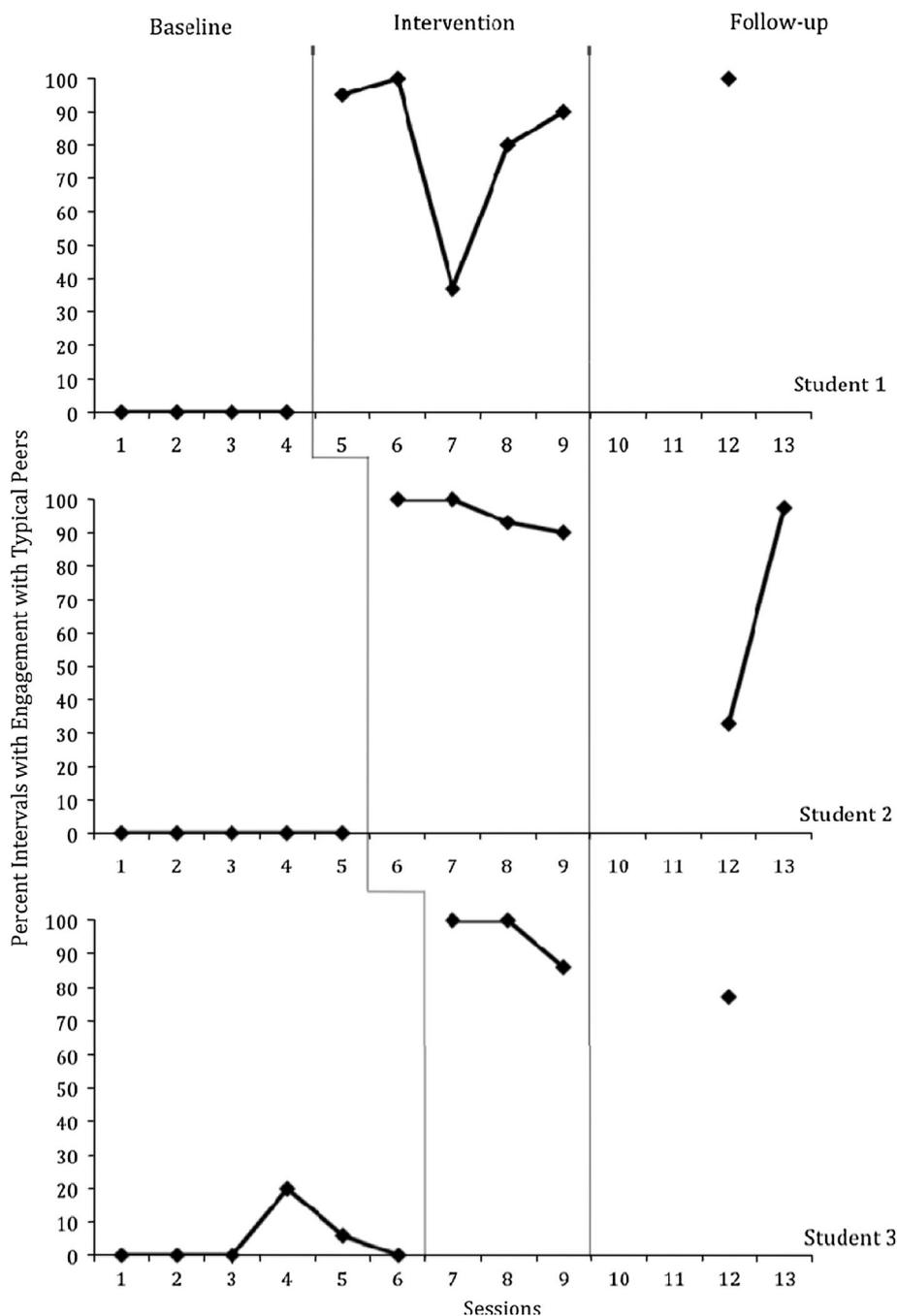
Student 3 rarely engaged with typically-developing peers during baseline, averaging 5 %, ranging from 0 to 20 %. During the intervention phase, Student 3’s level of engagement with typical peers increased to an average of 95 %, ranging from 86 to 100 %. During follow-up, Student 3 engaged with his peers during 77 % of the intervals.

**Rate of Initiations Made to Typical Peers (Fig. 2)**

Student 1 made no initiations to her typically-developing peers during any of the baseline sessions. During the intervention phase, Student 1 made an average of 0.69 initiations per minute, ranging from 0.2 to 1.06 initiations per minute. At follow-up, Student 1 initiated to her peers at a rate of 1.4 per minute. These rates are similar to those reported for typically-developing children (Tremblay et al. 1981).

Student 2 made between 0 and 0.13 initiations per minute to his typically-developing peers during baseline. During the intervention phase, Student 2 made an average 2.03 initiations per minute, ranging from 1.69 to 3.06

**Fig. 1** Student with ASD's percent intervals with engagement with typical peers



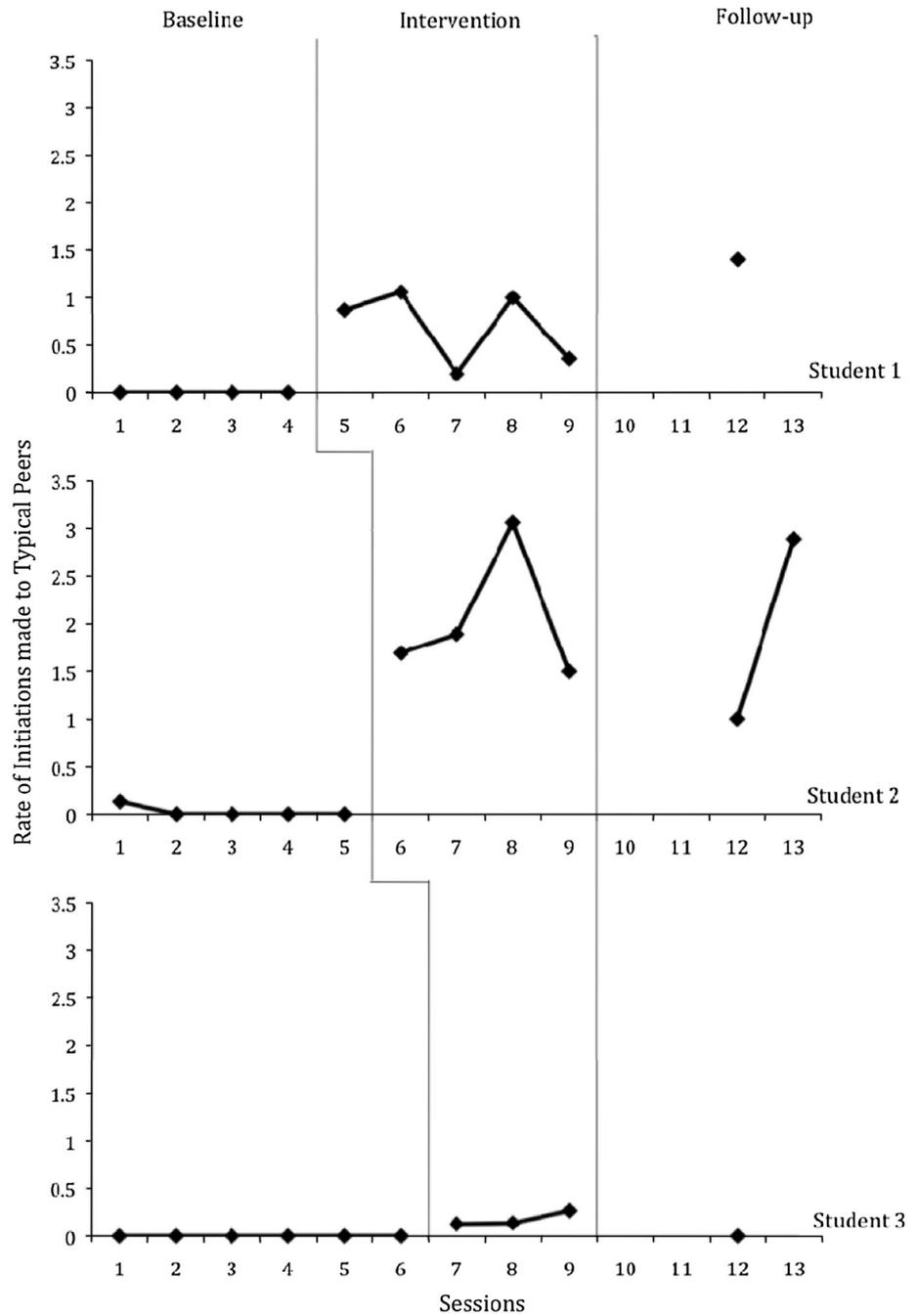
initiations per minute. During the first follow-up probe, Student 2 initiated to his peers at a rate of 1 per minute and during the second follow-up probe, Student 2 initiated to his peers at a rate of 2.89 per minute.

Student 3 made no initiations to his typically-developing peers during any of the baseline sessions. During the intervention phase, Student 3's rate of initiations increased slightly (i.e., on average 0.18 initiations per minute, ranging from 0.13 to 0.27 per minute). During follow-up, although Student 3 continued to engage with his peers (see Fig. 1), he did not initiate any interactions.

#### Post-Paraprofessional Training Survey Responses

Table 3 shows the survey responses from the paraprofessionals. The paraprofessionals had an average of 10.33 years of experience (Paraprofessional 1 had 5 years of experience, Paraprofessional 2 had 19 years of experience, and Paraprofessional 3 had 7 years of experience). The three paraprofessionals varied in regards to their level of education (Paraprofessional 1 received a B.S., Paraprofessional 2 was working towards a college degree, and Paraprofessional 3 graduated from high school). When asked generally about

**Fig. 2** Student with ASD's rate of initiations made to typical peers



how much they enjoyed working in this field, two reported that they enjoyed it (giving a rating of 2 on a 1 to 5 scale where 1 = loved it and 5 = hated it) and one reported a 4, indicating that she did not enjoy working in the field. When asked generally about how stressed they felt working with their assigned student, two reported that they were not stressed (giving a rating of either a 1 or 2 on a 1 to 5 scale where 1 = not stressed and 5 = extremely stressed), and one reported a 3, indicating that she was neutral. When asked generally about how happy they were working, two reported that they were really happy (giving a rating of 1 on a 1 to 5

scale where 1 = really happy and 5 = really unhappy) and one reported a 3, indicating that she was neutral. All three paraprofessionals reported that attending the workshop was helpful (overall score of 4 with 1 = not helpful and 5 = very helpful).

**Discussion**

The current study adds to the literature on training paraprofessionals by suggesting that with a brief training

**Table 3** Paraprofessional survey results

$n = 3$	Number of years as aide	Highest degree	How much do you enjoy working in this field? (1 = love it; 5 = hate it)	How stressed do you feel working with your assigned child? (1 = not stressed; 5 = extremely stressed)	How happy are you working? (1 = really happy; 5 = really unhappy)	The workshop was helpful (1 = not helpful; 5 = very helpful)
1	5	B.S	4	3	3	4
2	19	College	2	1	1	4
3	7	H.S	2	2	1	4
$\bar{x}$ (range)	10.33		2.67	2	1.67	4

program, paraprofessionals can learn to implement a social intervention program with fidelity. The results of this study also showed that all of the target students improved with respect to their engagement with typically-developing peers. In regards to initiations made to typical peers, Participants 1 and 2 made improvements from baseline to intervention. Participant 3's limited expressive language may have interfered with his ability to make initiations to his typically-developing peers. This could provide an interesting area for future research.

Consistent with previous intervention studies, training the paraprofessionals to fidelity of implementation was accomplished in a relatively short time period (Causton-Theoharis and Malmgren 2005; Mazurik-Charles and Stefanou 2010; Storey et al. 1993). After the paraprofessionals attended an hour-long workshop, all of the paraprofessionals were able to rapidly meet fidelity, suggesting that the intervention training was both time- and cost-efficient. Such time and cost efficiency may lead to ease of implementation in school districts.

Previous studies have investigated the effectiveness of using students with ASD's preferred interests in the school setting to enhance social development (Koegel et al. 2012a, 2013), but these interventions were implemented by experienced individuals specializing in the treatment of autism. This line of research has shown that schools may or may not continue to provide social facilitation upon completion of these types of specialized interventions, and that if existing school activities are not available around the student with ASD's interest, social interactions will return to low (baseline) levels (Koegel et al. 2012b, 2013). This study, however, showed that all participants were able to maintain their high levels of engagement. This emphasizes the importance of training school staff, such as paraprofessionals, to implement simple and effective social intervention programs for students with ASD.

Although the results of this study suggest that training paraprofessionals led to improved social behavior for students with ASD in their inclusive school environment, there were some limitations to this study. First, although staggered baselines with longer phase repetitions may have

provided additional information, the suddenness of the changes in the dependent measures, and the large effects that occurred provide compelling evidence of the intervention validity. The very large effects for child initiations and engagement were somewhat surprising. These large effects are rarely seen in research on social skills instruction for students with ASD. At this point, one cannot be entirely certain as to whether the large and very rapidly observed effects were due to characteristics of these particular children, the type of school environment, or the type of measurement procedure. It would be interesting in future research to examine the external validity of these optimistic findings across children, environments, etc. Additional formal student assessments may also help with future research examining external validity.

Second, the small amount of follow-up data on the paraprofessionals was another limitation of this study. It would be interesting for future research to investigate whether paraprofessionals can generalize their skills when working with other students and whether they can continue to implement such social interventions during the subsequent school year. Since the paraprofessionals were only assigned to one child, and this study was completed within the school year, we were unable to assess whether other children may have benefited from the training the paraprofessionals received.

Third, collecting training fidelity data may have improved the study. Such measures could have multiple benefits, including not only helping to demonstrate the validity of the procedures, but also may help in determining whether any variations in implementation might be important for specific subgroups of children.

Fourth, it would be interesting to collect data on the typically-developing peers, such as their social bids towards the students with ASD. While it is unlikely that the behaviors of the typically-developing peers was a major variable in the improvement in the students with ASD, as there was variation in the pairing of the children with similar results obtained across sessions, research in other areas suggests that concomitant training of the typically-developing peers may result in even greater gains (DiSalvo and Oswald 2002; Harper et al. 2008).

Fifth, it may be interesting to parse out the results more finely in future studies. For example, requesting is a low-level social behavior, and question asking and commenting are higher-order skills. It could be interesting to separate those in the results section/figures. Similarly, it could be interesting to divide verbal and nonverbal engagement.

Finally, it might be interesting to think about whether ecological factors may be important for improving social relationships. For example, in order to successfully incorporate the student with ASD's preferred interests into the intervention, the students in this study were seated when participating in the games and activities. It would be interesting for future research to investigate whether the type of activities (e.g., seated games or active games) results in different outcomes.

Although the present study has some limitations, it adds important information to the current literature in regards to training paraprofessionals. The current study suggests that with very little training, paraprofessionals can rapidly improve their skills with significant associated changes in their students with ASD's social behaviors. While paraprofessionals often have the bulk of the teaching responsibility (Giangreco et al. 2001; Lewis 2005) they receive very little training (Giangreco et al. 2010; Patterson 2006; Riggs and Mueller 2001). Future research relating to optimal training procedures that produce generalized and maintained skill acquisition in paraprofessionals, and the effect this training has on students with ASD, is likely to be highly productive.

**Acknowledgments** Thank you to the paraprofessionals and families with children with ASD who participated, the schools that collaborated with us in this research project. Funding for this research was provided by Organization for Autism Research. In addition, funding for this research was also provided in part by an URCA grant from the University of California, Santa Barbara, and by NIH research grant DC010924 from NIDCD. The authors also wish to thank the undergraduate research assistants. Finally, Robert and Lynn Koegel are also partners in the firm, Koegel Autism Consultants, LLC.

## References

- Bailey, J. S., & Burch, M. R. (2002). *Research methods in applied behavior analysis*. Thousand Oaks: Sage Publications Inc.
- Baker, M. J., Koegel, R. L., & Koegel, L. K. (1998). Increasing the social behavior of young children with autism using their obsessive behaviors. *The Journal of the Association for Persons with Severe Handicaps*, 23, 300–308.
- Barlow, D. H., Nock, M. K., & Hersen, M. (2009). *Single case experimental designs: Strategies for studying behavior change* (3rd ed.). New York: Pergamon Press.
- Bauminger, H., & Kasari, C. (2000). Loneliness and friendship in high-functioning children with autism. *Child Development*, 71(2), 447–456.
- Carter, W., O'Rourke, L., Sisco, L. G., & Pelsue, D. (2009). Knowledge, responsibilities, and training needs of paraprofessionals in elementary and secondary schools. *Remedial and Special Education*, 30(6), 359–433.
- Causton-Theoharis, J. N., & Malmgren, K. W. (2005). Increasing peer interactions for students with severe disabilities via paraprofessional training. *Council for Exceptional Children*, 71(4), 431–444.
- Cohen, J. M. (1977). Sources of group homogeneity. *Sociology of Education*, 50(4), 227–241.
- DiSalvo, C. A., & Oswald, D. P. (2002). Peer mediated interventions to increase the social interaction of children with autism: Consideration of peer expectancies. *Focus on Autism and Other Developmental Disorders*, 17(4), 198–207.
- Downing, J. E., Ryndak, D. L., & Clark, D. (2000). Paraeducators in inclusive classrooms: Their own perceptions. *Remedial and Special Education*, 21(3), 171–181.
- Dugan, E., Kamps, D., Leonard, B., Watkins, N., & Stackhaus, J. (1995). Cooperative learning groups during social studies for students with autism and fourth-grade peers. *Journal of Applied Behavior Analysis*, 28(2), 175–188.
- Feld, S. L. (1982). Social structure determinants of similarity among associates. *American Sociological Review*, 47(6), 791–801.
- Feldman, E.K., & Matos, R. (2012). Training paraprofessionals to facilitate social interaction between children with autism and their typically-developing peers. *Journal of Positive Behavior Interventions*. Published Online First: 13 September 2012. DOI: 10.1177/1098300712457421.
- Fisher, M., & Pleasants, S. L. (2012). Roles, responsibilities, and concerns of paraeducators: Findings from a statewide survey. *Remedial and Special Education*, 35(5), 287–297.
- French, N. K., & Pickett, A. L. (1997). Paraprofessionals in special education: Issues for teacher educators. *Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children*, 20(1), 61–73.
- Giangreco, M. F., Broer, S. M., & Edelman, S. W. (2010). "This was then, this is now!" Paraprofessional supports for students with disabilities in general education classrooms. *Exceptionality*, 10(1), 47–64.
- Giangreco, M. F., Edelman, S. W., Broer, S. M., & Doyle, M. B. (2001). Paraprofessional support of students with disabilities: Literature from the past decade. *Council for Exceptional Children*, 68(1), 45–63.
- Giangreco, M. F., Edelman, S. W., Luiselli, T. E., & MacFarland, S. Z. (1997). Helping or hovering? Effects of instructional assistant proximity on students with disabilities. *Exceptional Children*, 64(1), 7–18.
- Harper, C. B., Symon, J. B. G., & Frea, W. D. (2008). Recess is time-in: Using peers to improve social skills of children with autism. *Journal of Autism and Developmental Disorders*, 38(5), 815–826.
- Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single subject research to identify evidence-based practice in special education. *Exceptional Children*, 7, 165–179.
- Jones, K. H., & Bender, W. N. (1993). Utilization of paraprofessionals in special education: A review of the literature. *Remedial and Special Education*, 14(1), 7–14.
- Jull, S., & Mirenda, P. (2011). Parents as play date facilitators for preschoolers with autism. *Journal of Positive Behavior Interventions*, 13(1), 17–30.
- Kasari, C., Locke, J., Gulsrud, A., & Rotheram-Fuller, E. (2011). Social networks and friendships at school: Comparing children with and without ASD. *Journal of Autism and Developmental Disorders*, 41(5), 533–544.
- Kim, S., & Koegel, L. K. (2012). *How to improve socialization for high school students through school clubs*. Santa Barbara, California: University of California, Santa Barbara.

- Koegel, R. L., Fredeen, R., Kim, S., Danial, J., Rubinstein, D., & Koegel, L. K. (2012a). Using perseverative interests to improve interactions between adolescents with autism and their typical peers in school settings. *Journal of Positive Behavior Interventions*, 14(3), 133–141.
- Koegel, R. L., Kim, S., Koegel, L. K., & Schwartzman, B. (2013). Improving socialization for high school students with ASD by using their preferred interests. *Journal of Autism and Developmental Disorders*, 43(9), 2121–2134.
- Koegel, R. L., & Koegel, L. K. (2012). *The PRT pocket guide*. Baltimore: Brookes Publishing Company.
- Koegel, R. L., Koegel, L. K., & Brookman, L. I. (2003). Empirically supported pivotal response interventions for children with autism. In A. E. Kazdin, Yale University School of Medicine, & Child Study Center (Eds.), *Evidence-based psychotherapies for children and adolescents* (pp. 341–357). New York, NY: Guilford Press.
- Koegel, L. K., Koegel, R. L., Frea, W. D., & Fredeen, R. M. (2001). Identifying early intervention targets for children with autism in inclusive school settings. *Behavior Modification*, 25, 745–761.
- Koegel, L. K., Koegel, R. L., Harrower, J. K., & Carter, C. M. (1999). Pivotal response intervention I: Overview of approach. *The Association for Persons with Severe Handicaps*, 24(3), 174–185.
- Koegel, R.L., Robinson, S., & Koegel, L.K. (2009). Empirically supported intervention practices for autism spectrum disorders in school and community settings. In Sailor, Dunlap, Sugai, & Horner (Eds.), *Issues and practices*. In handbook of positive behavior support (pp 149–176).
- Koegel, L. K., Vernon, T., Koegel, R. L., Koegel, B., & Paullin, A. W. (2012b). Improving socialization between children with autism spectrum disorder and their peers in inclusive settings. *Journal of Positive Behavioral Intervention*, 14(4), 220–227.
- Koegel, R. L., Werner, G. A., Vismara, L. A., & Koegel, L. K. (2005). The effectiveness of contextually supported play date interactions between children with autism and typically developing peers. *Research and Practice for Persons with Severe Disabilities*, 30(2), 93–102.
- Lewis, K. C. (2005). Seen but not heard: ESEA and instructional aides in elementary education. *Review of Research in Education*, 29, 131–149.
- Locke, J., Ishijima, E. H., Kasari, C., & London, N. (2010). Loneliness, friendship quality and the social networks of adolescents with high-functioning autism in an inclusive school setting. *Journal of Research in Special Educational Needs*, 10(2), 74–81.
- Marks, S. U., Schrader, C., & Levine, M. (1999). Paraeducator experiences in inclusive settings: Helping, hovering, or holding their own? *Exceptional Children*, 65(3), 315–328.
- Mazurik-Charles, R., & Stefanou, S. (2010). Using paraprofessionals to teach social skills to children with autism spectrum disorders in the general education classroom. *Journal of Instructional Psychology*, 37(2), 161–169.
- Patterson, K. B. (2006). Roles and responsibilities of paraprofessionals: In their own words. *Teaching Exceptional Children Plus*, 2(5), 1–13.
- Riggs, C. G., & Mueller, P. H. (2001). Employment and utilization of paraeducators in inclusive settings. *The Journal of Special Education*, 35(1), 54–62.
- Robinson, S. E. (2011). Teaching paraprofessionals of students with autism to implement pivotal response treatment in inclusive school settings using a brief video feedback training package. *Focus on Autism and Other Developmental Disabilities*, 26(5), 105–118.
- Rotheram-Fuller, E., Kasari, C., Chamberlain, B., & Locke, J. (2010). Social involvement of children with autism spectrum disorders in elementary school classrooms. *The Journal of Child Psychology and Psychiatry*, 51(11), 1227–1234.
- Storey, K., Smith, D. J., & Strain, P. S. (1993). Use of classroom assistants and peer-mediated intervention to increase integration in preschool settings. *Exceptionality*, 4(1), 1–16.
- Tremblay, A., Strain, P. S., Hendrickson, J. M., & Shores, R. E. (1981). Social interactions of normal preschool children: Using normative data for subject and target behavior selection. *Behavior Modification*, 5(2), 237–253.
- Werts, M. G., Zigmond, N., & Leeper, D. C. (2001). Paraprofessional proximity and academic engagement: Students with disabilities in primary aged classrooms. *Education & Training in Mental Retardation & Developmental Disabilities*, 36(4), 424–440.
- Young, B., Simpson, R. L., Myles, B. S., & Kamps, D. M. (1997). An examination of paraprofessional involvement in supporting inclusion of students with autism. *Focus on Autism and Other Developmental Disabilities*, 12(1), 31–38.