

**Training Parents to Enhance Social Skills in Children with Developmental Delays:
A Component Analysis**

by

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Abstract

Social skills deficits are a core feature of ASD (American Psychiatric Association [APA], 2000; Parsons & Mitchell, 2002), and they are related to a myriad of other social, developmental, and psychological challenges (Rogers, 2000). As such, it is important to identify effective means of teaching social skills to children with ASD. Research suggests that naturalistic training techniques such as Pivotal Response Training (Koegel, O'Dell, & Koegel, 1987; Stahmer, 1999) and techniques such as Integrated Play Groups that provide exposure to and prompted interaction with peers (Wolfberg & Schuler, 1993 & 1999) can enhance social skills in this population. However, generalization of these skills, or the ability to apply these skills in different contexts with different people, remains problematic (Stahmer, 1995). Training the adults who are with the child throughout his day to deliver social skills intervention would provide maximum exposure to naturalistic learning opportunities and may improve generalization. Indeed, researchers have suggested that training parents in other behavioral training techniques improves the generalization of the skills taught (Lovaas, Koegel, Simmons, & Long, 1973; Schreibman & Koegel, 1996). Many studies have demonstrated successful training of parents in a wide variety of behavioral interventions (e.g., Lafasakis & Sturmey, 2007; Kroeger & Sorensen, 2010; Wang, 2008) including naturalistic training techniques (e.g., Gillett & LeBlanc, 2006). The majority of these studies, however, have relied on the use of multicomponent training packages. Therefore the component or components responsible

for bringing about the desired results remains unknown. In addition, given the range of outcomes observed in parent training literature, parent characteristics such as stress may impact outcome (Bagner & Graziano, 2012; Strauss et al., 2012).

The primary aim of the current was to investigate how to effectively train parents to implement a social engagement procedure. Furthermore, it systematically analyzed the components of the training package to determine which components are responsible for behavior change and identify the most efficient method of training possible. A non-concurrent multiple baseline design was used to examine the effects of the training package. To further analyze the relative contribution of each component of the training package, each component was presented systematically, using an ABC design, until measures of participants' implementation of the procedure were stable. A secondary aim of the study was to consider how factors such as parent stress might be related to skill acquisition.

Results indicated that all participants who participated through completion were able to implement the procedure with fidelity following training. Furthermore, results suggest that feedback is an effective and efficient method of training when presented alone and may account for the majority of changes observed in parent behavior. Finally, parent affect remained neutral or improved over the course of their participation. Results are discussed in terms of possible reasons for the observed changes. Clinical implications and future directions are also discussed.

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List of Abbreviations

ABA	Applied Behavior Analysis
APA	American Psychiatric Association
AS	Asperger Syndrome
ASD	Autism Spectrum Disorders
BST	Behavioral Skills Training
DSM-5	<i>Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition</i>
DTT	Discrete Trial Training
HFA	High Functioning Autism
ID	Intellectual Disability
IPG	Integrated Play Groups
MR	Mental Retardation
PRT	Pivotal Response Training

Training Parents to Enhance Social Skills in Children with Developmental Delays: A Component Analysis

Introduction

Social skills can be defined as the verbal and nonverbal behaviors that lead to successful or positive social interactions (Rao, Beidel, & Murray, 2008). The presence of a social skills repertoire provides opportunities to interact with others in a manner that is reinforcing to both parties and to adapt to different social contexts (DiSalvo & Oswald, 2002). For most people, social skills are acquired over the course of development through interactions with parents, teachers, siblings, and peers across a variety of contexts (e.g., school, sports, family activities, etc.). However, these skills are often lacking or limited in children with Autism Spectrum Disorders (ASD; Parsons & Mitchell, 2002; Rao et al., 2008).

As characterized in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5; American Psychiatric Association [APA], 2013), the term “Autism Spectrum Disorders” refers to a group of neurobiological disorders characterized by deficits in two main categories: a) social communication and interaction, and b) restricted interests and repetitive behaviors. Among the defining features of this spectrum of disorders are impairments in social skills (APA, 2013; Parsons & Mitchell, 2002; Rao et al., 2008). In fact, social skills deficits serve as a major source of impairment in this population regardless of language or cognitive ability (Carter, Davis, Klin, & Volkmar, 2005). Common challenges faced by this population include, but are not limited to,

difficulty developing and maintaining age-appropriate peer relationships, poor use of nonverbal communication (e.g., eye contact, gestures, body posture, etc.), difficulty interpreting the social cues of others, problems understanding and expressing emotions, and a lack of reciprocity during social interchanges (Attwood, 2000; Weiss & Harris, 2001; White, Koenig, & Scahill, 2007).

ASD can be reliably diagnosed in children ages two to three years old (Chawarska & Volkmar, 2005; Landa, 2008); however, some researchers have demonstrated evidence of impaired social skills in children within the first year of life (Maestro et al., 2002; Osterling & Dawson, 1994; Osterling, Dawson, & Munson, 2002; Werner, Dawson, Osterling, & Dinno, 2000). For example, Werner and colleagues examined home videotapes of 15 children at 8 to 10 months of age who were later diagnosed with an ASD and compared them to videos of 15 typically developing same-aged children. The children with ASD less frequently responded to their names and were less likely to look at the face of another person while smiling compared to typically developing children. In a similar study, Osterling and colleagues (2002) reviewed home videotapes of the first birthday parties of three groups of children: those with an ASD, those with mental retardation, and typically developing children. Results revealed that children with an ASD showed less gesturing, orienting to name, looking at objects held by others, and looking at people when compared to typically developing children. Furthermore, children with an ASD exhibited less orienting to name and looking at others than children with mental retardation. Thus, some of the earliest signs of ASDs include deficient social engagement (e.g., eye contact, responding to name, etc.) and poor social-communicative behaviors (e.g., gesturing, requesting, etc.).

Not only are the social-communicative deficits a defining feature of ASD, but some have also considered them to be the most debilitating because of the myriad of challenges with which they are associated (Rogers, 2000). For example, social skills deficits often lead to social exclusion, ridicule, and rejection by the peer group (Church, Alisanski, & Amanullah, 2000; Howlin, 1997; Little, 2001). Bauminger and Kasari (2000) conducted a study of friendship among children with autism. Despite a reported desire for more social interaction, children with autism often expressed experiencing poor social support and more loneliness. Locke, Ishijima, Kasari, and London (2010) found similar results among adolescents with high functioning autism (HFA). Specifically, they assessed levels of loneliness, friendship quality, and the extent of the social networks of adolescents with HFA as compared to their typically developing peers. Results indicated that the adolescents with HFA reported higher levels of loneliness and poorer friendship quality. Furthermore, more adolescents in this group were isolated or peripheral with respect to their level of integration into the classroom.

Social skills deficits may also lead to problems with mood and anxiety later in life (Myles, Bock, & Simpson, 2001; Tantam, 2003). However, results supporting this assertion are mixed. Many researchers have documented the occurrence of comorbid mood and anxiety disorders in both children (e.g., Abdallah et al., 2011; Amr et al., 2012; Bryson, Corrigan, McDonald, & Holmes, 2008; Joshi et al., 2010; Leyfer et al., 2006; Mattila et al., 2010) and adults with ASDs (e.g., Ghaziuddin & Zafar, 2008; Lugnegard, Hallerback, & Gillberg, 2011; Ryden & Bejerot, 2008). Tantam (2000) posited that individuals with Asperger syndrome experience teasing and bullying, which may lead to increased frustration, low self-esteem, and suspiciousness of others. He goes on to

suggest that these experiences combined with an increased understanding of how one is perceived by others contributes to the co-occurrence of other psychological disorders (e.g., anxiety disorders) in individuals with Asperger syndrome (Tantam, 2000). Some researchers have documented a relationship between social functioning, negative peer relationships, and anxiety in both typically developing individuals (Ginsburg, La Greca, & Silverman, 1998; La Greca & Lopez, 1998) and individuals with an ASD (Bellini, 2004), providing additional support for Tantam's assertion. However, other researchers have failed to support this notion. Specifically, Green, Gilchrist, Burton, and Cox (2000) investigated the relationship between social functioning and later psychological functioning among male adolescents with Asperger syndrome as compared to adolescents with conduct disorder. They found no significant correlations between psychiatric symptoms and interpersonal difficulties for either group. Nevertheless, the adolescents with Asperger syndrome experienced more severe social difficulties than those with conduct disorder, thus reinforcing the notion that social skills impairments are a core behavioral deficits in ASD.

Social skills deficits do not subside with age and maturity. Rather these difficulties persist into later childhood (Church et al., 2000) and adulthood (Rao et al., 2008). Matson, Dempsey, and LoVullo (2009) assessed the social skill functioning of 336 adults with intellectual disability. They found that the presence of an ASD diagnosis was associated with greater levels of social impairment while characteristics such as gender, age, ethnicity, deafness, or the co-occurrence of epilepsy were not associated with any differences in social skills. These results clearly demonstrate that the same distinguishing social impairments that are present in childhood remain throughout the lifespan.

In sum, social skills impairments are a defining set of behavioral deficits of individuals with an ASD. Given the pervasive and persistent nature of these deficits, in combination with the host of additional problems to which these deficits are related, it is critical to investigate methods of improving social skills for this population.

Social Skills Interventions

Historical attempts to teach social skills to children with ASD aimed to teach the building blocks of social skills in a structured setting and were based on the principles of operant conditioning (Frankel, Leary, & Kilman, 1987; Lovaas & Taubman, 1981; Parsons & Mitchell, 2002). These interventions were successful at training specific behaviors such as making eye contact, emitting a vocalization in response to another person, increasing functional communication skills, and reducing problem behavior (Lovaas, 1987; Lovaas, Koegel, Simmons, & Long, 1973; Lovaas & Taubman, 1981; Schreibman, 2000; White et al., 2007). However, the learning environment was structured such that naturally occurring discriminative stimuli were replaced with contrived, trainer-driven trials (Frankel, et al., 1987). As a result, one major criticism of these interventions involves the lack of generalization to other people or contexts (Parsons & Mitchell, 2002; White et al., 2007). This is problematic because, while the child might be able to respond appropriately to an adult in a highly structured setting, he might continue to have difficulty interacting with peers and other people that he encounters in his daily life.

In recent years the number of social skills intervention studies being conducted has increased dramatically (Matson, Matson, & Rivet, 2007; Reichow & Volkmar, 2010). In a review of studies investigating social skills interventions, Matson and colleagues

(2007) noted an increase in the number of studies over the 25-year span covered by their review (i.e., 1979 to 2006). They indicated that only five studies were published between 1979 and 1985 while 30 studies were published between 2001 and the time the manuscript was written. Reichow and Volkmar (2010) described a continuation of this trend with 54 studies published between 2001 and 2007. A number of qualitative reviews of this literature have noted that children with an ASD respond positively to a wide variety of interventions (e.g., Cappadocia & Weiss, 2011; DiSalvo & Oswald, 2002; Matson et al., 2007; Rao et al., 2008; Reichow & Volkmar, 2010; Rogers, 2000; Schreiber, 2011; White et al., 2007). For example, Rogers (2000) presented a review of social skills interventions for children with ASD, highlighting studies that have been effective at teaching social skills to individuals with ASD across three age groups: preschool children, school-aged children, and adolescents. Among the effective interventions, she listed video-modeling, adult-directed approaches (e.g., visual-cuing, direct instruction, social stories, adult instruction in social skills games, social skills groups, and Pivotal Response Training [PRT]), and peer-directed approaches (e.g., peer mediated interventions, peer tutoring, and peer training in PRT).

While the list of effective interventions is encouraging, there is still work to be done to establish empirical support for interventions for children with ASD. Reichow and Volkmar (2010) sought to identify evidence-based practices for teaching social skills according to the criteria set by Reichow, Volkmar, and Cicchetti (2008).¹ They identified eight categories of social skills instruction (i.e., ABA, naturalistic interventions, parent training, peer training, social skills groups, visual, video modeling, and other). The only intervention types to meet criteria to be classified as empirically supported were social

skills groups and video modeling for school-aged children. None of the intervention types had enough empirical support to meet classification criteria for the preschool age group or the adolescents and adults. However, the authors noted that criteria were not applied to the three most commonly used techniques (i.e., ABA, parent-training, and peer-training) because of the wide variety of study procedures. Furthermore, this research synthesis restricted the scope of the review by only including recent publications (i.e., those published from 2001 to 2008). Nevertheless, social skills intervention research remains crucial.

Many researchers agree that peer involvement seems to be a central component to many successful social skills intervention (Attwood, 2000; Kohler, Strain, Hoyson, & Jamieson, 1997; Odom & Strain, 1987; Rogers, 2000). Some of the available techniques include antecedent interventions designed to maximize interactions between children with autism and their peers (e.g., Integrated Play Groups), peer-instruction to teach peers how to initiate and reinforce interactions with children with autism (e.g., peer-networks, PRT), and initiation training for children with autism to change peer expectancies (DiSalvo & Oswald, 2002). The basic premise behind these approaches is that typically developing peers can serve as models for children with less advanced skills (McEvoy & Odom, 1987). While a number of studies have demonstrated the effectiveness of peer-mediated interventions (e.g., Pierce & Schreibman, 1997; Roeyers, 1996; Trembath, Balandin, Togher, & Stancliffe, 2009; Wolfberg & Schuler, 1993), gaps in the literature with respect to interventions that result in adequate generalizability of acquired skills and socially validity remain. Thus, additional research is necessary to address these problems. The following section will present two social skills intervention approaches – Pivotal

Response Training and Integrated Play Groups – that show promise with respect to the development of an effective social skills intervention that may lead to better generalization of skills and more socially valid interventions.

Pivotal Response Training. One approach that has explicitly aimed to increase the generalization of acquired skills is known as Pivotal Response Training (PRT) (Koegel, O’Dell, & Koegel, 1987; Schreibman & Koegel, 1996; Stahmer, 1999). PRT is an intervention based in the principles of Applied Behavior Analysis (ABA). It employs a variety of techniques recommended by Stokes and Baer (1977) designed specifically to promote generalization (LeBlanc, Esch, Sidener, & Firth, 2006). For example, training takes place in the setting in which the behavior is expected to occur, multiple change agents (i.e., teachers, parents, peers, etc.) are trained to deliver the intervention, and multiple exemplars are presented (LeBlanc et al., 2006). In this approach, pivotal behaviors are targeted. Pivotal behaviors are behaviors that, when trained, are expected to lead to change in a wide range of additional behaviors, (Koegel & Frea, 1993). Examples include motivation to respond to social stimuli, responding to multiple discriminative stimuli, and engaging in self-management strategies. Interventions are designed to increase child motivation by allowing the child to choose preferred contexts, such as access to specific toys or engagement in specific activities. Target behaviors are then modeled and natural reinforcers are delivered contingent on imitation of or approximations to those behaviors. Finally, maintenance tasks are interspersed with new target skills in order to allow continued high rates of reinforcement (Stahmer, 1999).

Research has demonstrated that PRT can be successful in teaching language skills (Koegel, O’Dell, & Koegel, 1987), symbolic play (Stahmer, 1995), and socio-dramatic

play (Thorp, Stahmer, & Schreibman, 1995). There is also some evidence that PRT may be more effective at establishing generalization and maintenance than other forms of social skills training. For example, Lydon, Healy, and Leader (2011) compared video modeling and PRT for teaching play skills to children with ASD. Both interventions resulted in an increase in play behaviors. Interestingly, PRT resulted in greater gains in the generalization setting than did video modeling.

Despite these promising results, one criticism of PRT is that skills often fail to generalize to other peers. Stahmer (1995) used PRT to increase rate, complexity, and creativity of symbolic play in seven children with ASD. The rate of positive social responses increased following the intervention, and these skills generalized to new toys, new settings, and other adults. However, participants' responses to peers did not increase.

In order to address this shortcoming, some researchers began teaching peers to deliver PRT directly. Such an approach would more closely approximate the context in which the behavior is expected – one of the techniques to promote generalization recommended by Stokes and Baer (1977). One study to utilize this strategy was conducted by Pierce and Schreibman (1997). They trained peers to use PRT to increase maintenance of interactions and initiations in two children with ASD. A multiple baseline design across peer trainers was used, and the results were replicated in each of the two participants. The peers successfully implemented PRT and facilitated increases in social engagement and initiations in the participants. After two or three peers implemented the intervention with each child with ASD, advances in social engagement generalized to a new peer.

Integrated Play Groups. Another method of teaching social skills to children with autism is known as Integrated Play Groups (IPG). Wolfberg and Schuler (1993) developed this approach as a comprehensive model of play. This approach incorporates a transactional developmental approach (Prizant, Weatherby, & Rydell, 2000) within a sociocultural framework (Rogoff, 1990). In this model, children with social skills deficits (i.e., “novice players”) participate in play groups with typically developing children (i.e., “expert players”). An adult facilitator both encourages appropriate play and interaction in the novice players and fosters acceptance in the expert players (Wolfberg & Schuler, 1993). Progressively more competent forms of play are encouraged through various antecedent manipulations. First, intervention takes place in natural, integrated settings in which children with autism and similar developmental disabilities are presented with opportunities to interact with more socially competent peers. Secondly, group members are selected such that there is a balance of age and developmental level. More specifically, there are typically three to five members in the group with a greater number of socially competent children than children with autism. Children are fully immersed in play, rather than breaking down play into discrete subtasks. Furthermore, the physical arrangement of the play space is designed to maximize participation and social interaction, and play materials are carefully selected such that they will appeal to children at different developmental levels. A consistent routine is also established from the beginning to create a sense of predictability. Finally, each child’s level of competence is assessed, and the amount of support and guidance is adapted to meet each child’s needs. In addition to these antecedent manipulations, prompts and prompt fading are used as an

adult guides the child in participating in more and more complex forms of play then systematically decreases the amount of support provided.

Several studies have shown this model to be successful in increasing more complex and social forms of play, and these behaviors were maintained when adult prompts were withdrawn (Wolfberg & Schuler, 1993 & 1999; Yang, Wolfberg, Wu, & Hwu, 2003; Zercher, Hunt, Schuler, & Webster, 2001). Furthermore, the children's acquired social interaction behaviors generalized to other settings and people according to parent report (Wolfberg & Schuler, 1993; Yang et al. 2003). In one investigation, Wolfberg and Schuler (1993) evaluated the effectiveness of this approach for two children with autism and three of their typically developing peers. A multiple probe design was used to assess changes in quality of play (i.e., no interaction, object manipulation, functional play, and symbolic/ pretend play) and social integration (i.e., isolate, orientation, parallel or proximity play, and play with a common focus or cooperative play). Results showed decreases in manipulation and gains in functional object use. There were also decreases in isolate play and increases in common focus and parallel/proximity play. Higher rates of appropriate play were not maintained when adult support was withdrawn at Probe 1, but were restored at Probe 2.

In another study, Zercher, Hunt, Schuler, and Webster (2001) examined the effect of an integrated play group setting on social behaviors of 6-year-old twin boys with autism. The boys' sisters served as the expert players, and an adult trainer provided coaching in how to involve them in a variety of play themes. A multiple baseline design with three conditions (i.e., baseline, play with adult coaching, and play without adult coaching) was used to evaluate the effects of the play group. Results showed an increase

in joint attention, symbolic play, and language skills. Furthermore, parents reported an increase in the twins' interactions with their peers, though no formal evaluation of generalization was conducted. Although these results are promising, additional research is necessary to determine the generalizability of the skills learned in IPGs. Specifically, there are no objective measures of behavior in different contexts or with different people, so it is not possible to determine whether the behaviors truly generalized.

Summary. The interventions discussed above have demonstrated some success with respect to acquisition, generalization, and maintenance of social skills. Common among these procedures is a naturalistic approach in which children with developmental disabilities are prompted to interact with their peers during play. While the inclusion of peers seems crucial to successfully teaching social skills to children with developmental disabilities, mere exposure to peers is not sufficient (DiSalvo & Oswald, 2002; Rogers, 2000). The state of the literature appears to support the use of trained adults to mediate interaction between children with ASD and their peers or family members in order to bring about change in social skill development.

Parent Training

There are numerous reasons to train parents to implement social skills training for their children. First, in order to maximize naturalistic teaching opportunities so as to promote generalization and maintenance of skills, the adults who are with the child throughout his or her day should be trained to encourage appropriate interactions. Parents are in just such a position to offer the support needed. Researchers and practitioners have long recognized the benefits of parental involvement in behavioral therapies for children with ASD, noting improvements in generalization and maintenance of skills when parents

are trained to deliver behavior interventions (Koegel, Schreibman, Britten, Burke, & O'Neill, 1982; Lovaas, et al. 1973; Schreibman & Koegel, 1996). For example, Lovaas and colleagues (1973) provided intensive behavioral treatment to 13 children with autism. The children enrolled in an intensive behavioral intervention and were arranged into four groups based on the time period during which they were enrolled: (a) in the first group the parents were not involved in treatment, (b) in the second group the parents were trained to deliver the treatment procedures, (c) the parents of the children in the third and fourth groups received training and consultation services. Results showed improvement in the speech, play and social behaviors of all children as well as decreases in self-stimulation and echolalia. Furthermore, the children whose parents received training continued to improve. Therefore, training parents to deliver social skills intervention may aid in the generalization of these skills.

Furthermore, behavioral interventions have been criticized for lack of accessibility and affordability for the families who need them (Parsons & Mitchell, 2002; Rogers, 2000). Several authors have suggested that parent training may be more economical and allow more families to access critical services (Schreibman & Koegel, 1996; Schultz, Schmidt, & Stichter, 2011). One training method that has received considerable attention in the literature is Behavioral Skills Training (BST). BST is a training package consisting of instruction, modeling, rehearsal, and feedback. It has been used to train paraprofessional staff and teachers to implement Discrete Trial Training (DTT; Dib & Sturmey, 2007; Koegel, et al., 1977; LeBlanc, Ricciardi, & Luiselli, 2005; Sarokoff & Sturmey, 2004, 2008), deliver mand training (Nigro-Bruzzi & Sturmey, 2010), and conduct preference assessments (Lavie & Sturmey, 2002). In addition, BST

has been used successfully to train paraprofessional staff to conduct more naturalistic teaching procedures such as imbed teaching into everyday routines (Schepis, Reid, Ownbey, & Parsons, 2001), teach adaptive skills (Palmen, Didden, & Korzilius, 2010), and provide alternative and augmentative communication instruction (Wood, Luiselli, & Harchik, 2007).

Although BST has been used extensively in the staff training literature, the explicit use of BST in the parent training literature is less common. In fact, only three studies in the present review were identified as stating the use of BST. Two of these studies trained parents to implement DTT (Lafasakis & Sturmey, 2007; Ward-Horner & Sturmey, 2008). A third study, conducted by Stewart, Carr, and LeBlanc (2007) evaluated the effectiveness of BST to train family members of a boy with Asperger's disorder to implement a BST package targeting social skills. Many more studies have investigated training packages that include some form of the same components used in BST to train parents to implement DTT (Crockett, Fleming, Doepke, & Stevens, 2007), teach imitation skills (Ingersoll & Gergans, 2007), and enhance joint attention (Rocha, Schreibman, & Stahmer, 2007). Therefore, BST and similar training packages appear to be effective in training both paraprofessional staff and parents to deliver a wide variety of interventions.

In addition, there are numerous studies that used instruction, modeling, rehearsal, and feedback to teach parents how to implement naturalistic teaching strategies that target language and play skills (e.g., Coolican, Smith, & Bryson, 2010; Koegel, Symon, & Koegel, 2002; Reagon, & Higbee, 2009; Symon, 2005). For example, Gillett and LeBlanc (2006) taught parents to implement NLP through the use of didactic instruction,

modeling, rehearsal and both immediate and delayed feedback. Parents were able to implement NLP with fidelity following training. Furthermore, parents' implementation of the procedure resulted in increases in rates vocalizations and appropriate play.

In a similar study, Coolican and colleagues (2010) used a brief training program to teach parents of children with autism to implement PRT. The training program took place over the course of three 2-hour sessions and involved didactic instruction, modeling, rehearsal and feedback with more time spent on the later two components. Parents' fidelity scores increased following training, and the intervention resulted in increases in the children's use of functional verbal utterances. In short, BST and similar training packages can also be used to teach parents to implement naturalistic procedures to increase language and social skills in their children.

While a number of studies have demonstrated success in training participants to master a set of target skills through the use of multicomponent training packages, the specific components that are necessary to bring about mastery of the trained material remain unknown. Additional research is necessary to identify the effective components in order to develop the most efficient and cost-effective training packages possible.

The Need for a Component Analysis

As seen in the review presented above, there is ample research evidence for the effectiveness of training packages. Most involve some form and combination of didactic instruction, modeling, rehearsal, and feedback; however, it is unclear which of these components are necessary and/or sufficient to effectively teach the desired skills. Schultz, Schmidt, and Stichter (2011) suggested that a component analysis of training strategies

has important implications for practice. Specifically, knowledge of the components necessary and sufficient for adequate training may lead to more economical packages.

Few studies have conducted systematic analyses of the effectiveness of individual BST components; however, there is evidence that some components may be more effective than others. For example, several studies have shown that didactic training is insufficient when delivered alone (Feldman, Case, Rincover, Towns, & Betel, 1989; Sterling-Turner, Watson, & Moore, 2002; Sterling-Turner, Watson, Wildmon, Watkins, & Little, 2001). Sterling-Turner and colleagues (2002) investigated the effectiveness of a training package administered to four teachers who sought consultation for the disruptive behavior of individual students. Consultation was provided in four phases. An initial consultation period was delivered to identify the problem and gather baseline data on target students' behavior. Teachers' implementation of individualized behavior plans was then assessed after didactic training was provided. Finally, teachers' implementation of the plan was measured after modeling, role play, and feedback were provided. The percentage of participants' total treatment integrity was low following didactic instruction with participant averages ranging from 7 percent to 70 percent. After additional training was provided, however, these scores rose to a range of 81 percent and 97 percent. Although these studies demonstrate that didactic training should be used in conjunction with other training techniques to be effective, they do not provide any information regarding which of the other training components are necessary.

Other studies have suggested that rehearsal and feedback are effective strategies for training individuals to deliver behavioral services (Bolton & Mayer, 2008; Jones, Wickstrom, & Friman, 1997; Mortenson & Witt, 1998; Noell et al., 1997; Parsons &

Reid, 1995; Schepis, Reid, Ownby, & Parsons, 2001; Shanley & Niec, 2010). For example, Kaminski, Valle, Filene, and Boyle (2008) provided support for the importance of rehearsal in a meta-analytic review of parent training programs. They found that rehearsal, particularly rehearsal with one's own child, was reliably associated with higher effect sizes. There was little difference, however, between studies that included other BST components such as modeling and role play and those that did not. In addition, Leblanc, Ricciardi, and Luiselli (2005) used an abbreviated performance feedback intervention to improve staff's implementation of discrete trial instruction. Training consisted of a verbal review of the discrete trial instruction checklist and feedback on the implementation of each skill. During feedback, the trainer delivered praise for correctly implemented skills and clarification and verbal direction for skills that were not implemented with 100% accuracy. No modeling, role playing, or practicing correct performance of skills took place. Staff were able to deliver discrete trial instruction with fidelity following the intervention, and skills were maintained 11 weeks after training.

Another study conducted by Mueller, Piazza, Moore, and Kelley (2003) suggested that other components may be just as effective as rehearsal and feedback. These researchers investigated the effectiveness of three different training packages to teach parents to implement feeding protocols. After establishing the effectiveness of a full training package consisting of written protocols, verbal instruction, modeling, and rehearsal, the authors tested various combinations of these training components. One package included written protocols, verbal instruction, and modeling; a second package consisted of written protocols, verbal instruction, and rehearsal; and a third package included written protocols and verbal instruction only. To account for the effects of mere

exposure to the training material, verbal instruction was delivered twice in the last training package. All three training packages resulted in parents' implementation of a feeding program with high treatment fidelity. The authors speculated that the mode of presentation may not be as important as simply presenting the material more than one time.

In short, few studies have investigated the effectiveness of the individual components of BST. There is some evidence, however, that not all components are necessary to train individuals to deliver behavioral services with integrity. Therefore, additional research is necessary to identify the components responsible for observed changes in behavior.

Factors that Impact Training Success

In examining the training literature, it is clear that packages vary in length and intensity, and some learners acquire skills more readily than others. Much of the variation in acquisition may be accounted for by the particular training components delivered, but there may be other factors, such as parent characteristics, at play. Researchers have investigated predictors of attrition with mixed results. For example, some have suggested that demographic variables such as low socioeconomic status or minority status may predict dropout (Fernandez & Eyeberg, 2009; Lavigne et al., 2010). Others have found that factors such as parent stress better account for attrition rates (Werba, Eyeberg, Boggs, & Algina, 2006) or less than optimal outcome (Bagner & Graziano, 2012; Strauss, et al. 2012). Bagner and Graziano (2012) have suggested that multiple factors may have a cumulative impact on the lack of success in parent training. They examined the impact of factors such as socioeconomic status, maternal education, family structure,

minority status, maternal intelligence, and maternal distress on both attrition and outcome. Minority status and family structure predicted dropout, and maternal education was related to outcome. Furthermore, they found that risk of dropout increased dramatically with each additional risk factor (Bagner & Graziano, 2012). From their results, they concluded that it is important to regularly assess risk factors and attempt to ameliorate their effects so as to increase success and decrease attrition.

Parent stress is one such risk factor that has been given considerable attention in the parent training literature. Some studies have shown that high parent stress may impede parental treatment fidelity thereby negatively impacting child outcome (Bagner & Graziano, 2012; Strauss et al., 2012). However, other studies suggest that training can decrease parent stress (McConachie & Diggle, 2007, Sanders & Woolley, 2005; Tonge et al., 2006). For example, Keen, Couzens, Muspratt, and Rodger (2010) demonstrated that parent training workshops and professional support decreased parent stress and increased parent self-efficacy to a greater extent than parents receiving similar information via self-study DVD and activity sheet package. In sum, stress has been indicated as an important factor in parent training. Whether stress negatively impacts training outcome or training positively impacts stress, research suggests that it may be beneficial to monitor levels of parent stress during training.

Current Study

The primary aim of the current study was to evaluate how to most effectively train parents to implement a behavioral social engagement procedure similar to PRT. In addition, a systematic analysis of the components of the training package was conducted to determine which components primarily accounted for the behavior change and to

identify the most efficient method of training possible. A secondary aim of this study was to consider parent affect, including observed parent stress, and how it might be related to skill acquisition.

Method

Participants

Parents of children with ASD were recruited from locations that serve children with developmental disabilities (e.g., speech and language treatment facilities, occupational therapists offices, pediatricians' offices, schools, the university clinic, other local clinicians). Participants all had a child with a developmental delay or social skills deficit between the ages of 2 and 7 years. A total of 10 caregiver/child dyads were recruited for the study. One dyad was unable to participate due to scheduling conflicts. One dyad completed baseline sessions but discontinued participation before training began due to difficulty traveling to the training site. A third dyad began training sessions, but was unable to continue for personal reasons, and they discontinued participation before any change in behavior was observed. These first three participants will not be discussed in the results section as there were not sufficient data collected. A fourth dyad, began treatment and demonstrated improvement, but they discontinued participation for personal reasons before mastery criteria were met. Another dyad completed training, but illness and other family circumstances prevented them from returning for generalization and follow-up sessions. The remaining five participants completed training, generalization, and two to three follow up sessions as scheduling permitted.

Assessments. Participants completed questionnaires and assessments designed to identify characteristics that may impact training. First, they completed a demographic questionnaire that requested information pertaining to the parent's age, gender, level of

education, and the extent of any formal or informal training related to developmental disabilities. It also inquired about the child's age, diagnosis, participation in prior social skills interventions, and any current services the child was receiving. Finally, the parent was asked to identify the third party with whom the child would be interacting for generalization purposes and specify that person's age and relationship to the child.

Participants were also asked to complete the *Parenting Stress Index – Third Edition* (PSI; Abidin, 1995). This is a norm-referenced assessment designed to identify stress in the parent-child relationship. It consists of 101 items and yields a total stress score as well as scores on six child-related subscales and seven parent-related subscales. This measure has been widely used in the literature and has demonstrated adequate reliability and validity (Abidin, 1995).

In order to gather information about the child participants' diagnoses, developmental level, social skills, and language abilities, a series of assessments were given. First, a measure of the child's developmental level or intelligence was administered. One of two assessments was used depending on the child's age and language ability. These assessments include the *Mullen Scales of Early Learning* (Mullen, 1995), or the *Kaufman Brief Intelligence Test-Second Edition* (KBIT-2; Kaufman & Kaufman, 2004). The Mullen is a standardized, norm-referenced assessment that measures a child's skills in four domains (Visual Reception, Fine Motor, Receptive Language, and Expressive Language), and yields an Early Learning Composite score. The KBIT-2 measures verbal and nonverbal cognitive skills and provides an IQ composite score. Each the Mullen and the KBIT-2 demonstrate good psychometric properties (Kaufman & Kaufman, 2004; Mullen, 1995).

The *Childhood Autism Rating Scale-2nd Edition* (CARS2; Scholper, Van Bourgondien, Wellman, & Love, 2010) and the *Pervasive Developmental Disorder-Behavior Inventory, Parent Rating Form* (PDD-BI PRF; Cohen & Sudhalter, 2005) were administered to confirm the diagnosis of the child participants and provide an estimate of symptom severity. The CARS2 is a 15-item behavior rating scale that is completed by an evaluator based on direct observation. It helps identify children with autism and provides a measure of symptom severity. The PDD-BI is a norm-referenced questionnaire that measures children's functioning in communication, reciprocal social interaction, ritualistic activities, and learning skills. It is comprised of five composite scales (Approach/Withdrawal problems, Receptive/Expressive Communication abilities, Expressive Social Communication abilities, Repetitive, Ritualistic, and Pragmatic Problems), as well as an Autism Composite. Research has demonstrated sound psychometric properties for these two assessments (Cohen, 2003; Cohen, Schmidt-Lackner, Romanczyk, & Sudhalter, 2003; Scholper et al., 2010).

Parents also completed the *Vineland Adaptive Behavior Scales, Second Edition* (VABS-II; Sparrow, Cicchetti, & Balla, 2005). This is a norm-referenced rating scale that provides measures of the child's adaptive communication, daily living, and socialization skills relative to same-age peers as well as a measure of maladaptive behaviors. Research has demonstrated adequate psychometric properties of the VABS-II (Sparrow et al., 2005).

A preference assessment was also conducted with all child participants in order to identify activities in which they would readily engage as well as potential reinforcers that

could be delivered contingent on appropriate behavior. The format of the assessment (e.g., free operant, paired stimulus, multiple stimulus without replacement, etc.) was chosen according to the needs of each child. Because of his advanced verbal repertoire, Child 2 was able to give a verbal report of possible preferred items and activities at the start of treatment. He then participated in a brief multiple stimulus without replacement at the start of each session.

Participant characteristics. Descriptions of each participant dyad appear in the paragraphs below. See Table 1.1 for a summary of demographic information and assessment results for adult participants, and Table 1.2 for child demographics and assessment results.

Table 1.1

Adult Demographics and Assessment Results

Participant	Age	Relationship to Child	Ethnicity	Education	DD-related training	PSI %ile
Parent 1	32	Mother	African American	Bachelor's Degree	none	90-95
Parent 2	52	Grandmother	Caucasian	Associate's Degree	none	90-95
Parent 3	34	Mother	African American	Master's Degree	Observation only	45-50
Parent 4	32	Mother	Caucasian	Some College	none	N/A
Parent 5	32	Mother	Serbo-Croatian	Some Doctoral-level Training	none	60-65
Parent 6	30	Mother	African American	Bachelor's Degree	none	90-95
Parent 7	43	Mother	Caucasian	Some Master's-level Training	Yes	>99

Note: A summary of the demographic information and assessment results for adult participants.

Table 1.2

Child Demographics and Assessment Results

Participant	Age	Gender	Diagnosis	KBIT-2	Mullen	CARS2	PDD-BI	VABS-II Adaptive	VABS-II Maladaptive
Child 1	7y 1m	F	Multiple Disabilities	N/A	N/A	55	N/A	45	Elevated
Child 2	6y 5m	M	Autism	93	N/A	28	70	101	Clinically Significant
Child 3	6y 5m	M	Autism	41	N/A	30	56	78	Elevated
Child 4	5y 4m	M	Autism	N/A	Very Low	36.5	N/A	N/A	N/A
Child 5	4y 10m	F	Agenesis of the Corpus Callosum	91	N/A	24	25	91	Average
Child 6	4y 8m	M	PDD-NOS	65	N/A	31	40	111	Elevated
Child 7	2y 5m	M	PDD-NOS	N/A	Very Low	39.5	N/A	69	N/A

Note: A summary of demographic information and assessment results for child participants. Scores on the KBIT-2 and VABS-II Adaptive Composite are standard scores with a mean of 100 and a standard deviation of 15. Descriptive categories are listed for the Mullen as participants scored too low to calculate a score for some or all of the domains. Scores on the CARS2 below 30 suggest "Minimal-to-No symptoms" of ASD; 30-36.5 suggest "Mild-to-Moderate symptoms" of ASD; and 37 and above suggest "Severe symptoms" of ASD. The notation "N/A" is used to indicate scores that were not calculated because the assessment was not administered, the parent did not return the measure, or there was not sufficient data to calculate score.

Parent 1 was a 32-year-old, African American female who was married with two children. She had earned a bachelor's degree and worked as a Registered Respiratory Therapist and she reported no previous training relevant to developmental disabilities. Her total stress score on the PSI fell between the 90th and 95th percentiles. Her daughter, Child 1, was a 7-year, 1-month-old African American female with multiple disabilities including developmental delays, autism, and epilepsy, all diagnosed by a neurologist. She

was nonverbal and only emitted nonfunctional groans and grunts. Intellectual testing could not be completed as she did not attend to assessment stimuli or respond to verbal instructions. Likewise, an Autism composite score on the PDD-BI could not be calculated as sections related to expressive communication could not be scored. Child 1's CARS2 score indicated that she exhibits severe symptoms of ASD. Her mother's ratings on the VABS-II suggested that her adaptive behavior skills were low and her maladaptive behaviors were elevated.

Parent 2 was a 52-year-old Caucasian woman who was married. She and her husband serve as the legal guardians to their two grandchildren. Parent 2 earned an Associate's degree in accounting and two professional certificates and she worked as a medical transcriptionist. Parent 2 reported no training relevant to developmental disabilities. Her score on the PSI indicated that her level of stress fell between the 90th and 95th percentiles. Her grandson, Child 2, was a 6-year, 5-month-old Caucasian male who was diagnosed with autism by his pediatrician. Child 2's KBIT-2 score suggested that his intellectual functioning was within the average range. His CARS2-HF score revealed mild to moderate symptoms of ASD. His PDD-BI Autism Composite score was high as compared to other children with ASD. His VABS-II scores indicated adequate adaptive living skills and a clinically significant level of maladaptive behaviors.

Parent 3 was a 34-year-old, African American woman who was married with three children. Her highest level of education was a master's degree, and she worked as a physical therapist. Parent 3 reported that she did not have any training related to developmental disabilities, but she had observed and actively participated in her son's speech, occupational therapy, ABA, and special education services over the past three

years. Her total stress score on the PSI fell between the 45th and 50th percentiles, suggesting that she experiences average levels of stress as compared to the general population. Her son, Child 3, was a 6-year, 5-month-old African American male who was diagnosed with autism by a developmental neurologist. His KBIT-2 scores revealed intellectual functioning in the lower extreme range. His CARS2 score indicated the presence of mild to moderate symptoms of ASD, and his PDD-BI Autism Composite was typical of a child with ASD. Child 3's VABS-II score indicated moderately low levels of adaptive behavior and elevated levels of maladaptive behavior.

Parent 4 was a 32-year-old Caucasian woman who was separated and had two children. She had completed some college and was a stay-at-home mother. She had not received any training related to developmental disabilities. Her son, Child 4, was a 5-year, 4-month-old Caucasian male with autism. An Early Learning Composite score on the Mullen could not be calculated because his performance was too low, and his CARS2 score was at the high end of the mild to moderate range of symptoms of ASD. Despite numerous attempts during and after the study to have Parent 4 complete the assessment packet, she did not return a completed PSI, PDD-BI, or VABS-II; therefore, scores for those assessments are not available.

Parent 5 was a 32-year-old, female originally from Serbia. She was married with two children, and the family was bilingual in Serbo-Croatian and English. Parent 5 had earned a master's degree in biochemical engineering, worked as a regulatory manager, and was attending school to earn a doctoral degree in biochemical engineering. She reported no training related to developmental disabilities and she was experiencing average levels of stress as indicated by her scores on the PSI falling between the 60th and

65th percentiles. Her daughter, Child 5, was a 4-year, 10-month, Serbian female who was diagnosed with agenesis of the corpus callosum. Her scores on the KBIT-2 indicated average intellectual functioning. Her CARS2 score revealed minimal symptoms of ASD, and her PDD-BI Autism Composite score suggested fewer symptoms of ASD than is typically observed in children with the disorder. Although she did not have autism, Child 5 met criteria for the study in that she was diagnosed with a developmental delay, and she exhibited deficits in social interaction.

Parent 6 was a 30-year-old, African American female. She was married with three children and was a stay-at-home mother. She had earned a bachelor's degree in marketing and had no prior training specific to developmental disabilities. Parent 6's scores on the PSI suggest that her level of stress falls between the 90th and 95th percentiles. Her son was a 4-year, 8 month-old male who was diagnosed with Pervasive Developmental Disorder – Not Otherwise Specified by his pediatrician. His scores on the KBIT-2 revealed his level of intellectual functioning in the lower extreme. His CARS2 score indicated minimal symptoms of ASD, and his Autism Composite score on the PDD-BI fell just within the low end of the range typical for children with ASD. Child 6's adaptive skills were adequate, and he exhibited elevated levels of maladaptive behaviors according to ratings on the VABS-II.

Parent 7 was a 43-year-old Caucasian female. She was married with one child. Parent 7 had earned a bachelor's degree in rehabilitation services, and she had taken graduate level classes in ABA. She had previously worked in several different group homes for adolescents with developmental disabilities, but was a stay-at-home mother at the time of her participation in the study. Her scores on the PSI indicated levels of stress

that were above the 99th percentile. Her son was a 2-year, 5-month-old male who had been diagnosed with Pervasive Developmental Disorder – Not Otherwise Specified by a provider who specialized in diagnostic and consultation services for children with ASD. An Early Learning Composite score on the Mullen could not be calculated because his performance on the receptive and expressive language domains was too low to score. Similarly, an autism composite score on the PDD-BI could not be calculated as sections related to expressive communication could not be scored, but Child 7's CARS2 score suggested the presence of severe symptoms of ASD. His adaptive behavior composite score fell in the low range.

Setting and Materials

Sessions were video recorded with either a hand-held camera on a tripod or a built-in video monitoring system. Sessions took place in one of two locations. First, some participants came to the university clinic where sessions took place in a clinic playroom containing a child-sized table and chairs, a small adult-sized table, and bookshelves with a variety of age-appropriate toys (e.g., Mr. Potato Head, blocks or Legos, a dollhouse with furniture and dolls, etc.). Alternatively, some participants attended sessions at a speech and hearing clinic where training took place in small treatment rooms that contained an adult-sized desk and chairs, a child-sized table and chairs, and cabinets that housed treatment materials. The trainer arranged age-appropriate toys and games on the floor and on the child-sized table. There was at least one individual available to serve as a play partner during all sessions. An undergraduate research assistant served as the play partner during treatment sessions in order to control for extraneous variables that might impact training. Whenever possible, a typically developing peer was recruited to serve as

a play partner during baseline, generalization, and follow-up phases. Typically, the peer selected for participation was a sibling, another family member, or a family friend.

Design and Procedure

In order to demonstrate functional control of the training package, a non-concurrent multiple baseline design across participants was utilized. To further analyze the relative contribution of each component of the training package, each component was presented systematically, using an ABC design, until measures of participants' implementation of the procedure were stable. For the purpose of this study, stability was defined as at least three sessions with data points within 10% of each other and a stable or decreasing trend. Participants reached mastery criterion when they implemented the procedure with 90% fidelity in three consecutive sessions.

In applied settings, components of BST are often delivered in two groups or phases. In the first phase, the trainer instructs and demonstrates the procedure to the trainee with didactic instruction and modeling. This phase often does not require the presence of the child. In the second phase, the trainee is offered a chance to implement the procedure and receive more personalized instruction with rehearsal and feedback. Because components are often combined in this manner, the component analysis focused on these two combinations. Identifying the effectiveness of each of these combinations is clinically significant as it will help determine whether children must be present for training to be effective or whether parents can be trained independently. Furthermore, within the latter condition, feedback and rehearsal were further separated such that participants received feedback alone first followed by feedback plus rehearsal if necessary.

Evidence presented by Mueller, Piazza, Moore, and Kelley (2003) suggests that multiple components may be equally as effective when presented with didactic training, thus, it was important to account for order effects. As such, a modified counterbalancing procedure was used. Participants were divided into two groups. The first group of participants received didactic instruction and modeling first followed by feedback, and the second group received the same components in reverse order. Feedback plus rehearsal was introduced following feedback alone for participants who did not mastery criteria and showed stable accuracy scores during feedback.

Parent Training Procedures

Baseline sessions. During baseline sessions, participants received a written description of the procedure to review for ten minutes prior to the start of the session. They were then instructed to encourage the child and the play partner to play together following the procedure to the best of their ability. A variety of age-appropriate toys were available, but no specific instructions regarding the use of the toys was provided. Participants did not receive feedback on their efforts at facilitating play.

Training sessions. Training sessions lasted no longer than 30 minutes. During each session, a training probe during which the participant conducted the procedure under baseline conditions took place during the first 10 minutes for data collection purposes. Training activities (i.e., didactic instruction, feedback, etc.) took place during the second portion of the session. Descriptions of the components are presented below.

Didactic Instruction and Modeling. In these sessions, the trainer presented the rationale for the procedure, verbally reviewed the step-by-step instructions, and provided examples. The trainer then modeled the procedure in a role-play with the parent playing

the part of his or her child. Finally, the trainer answered any questions posed by the participant except those directly related to the participant's own performance so as to avoid providing feedback. The participant was then instructed to conduct the procedure until stability criteria were met. Instructions were repeated as often as requested by the participant, but no additional feedback was provided.

Feedback. During the first feedback session, the participant was instructed to conduct the procedure for approximately 15 minutes during which the trainer offered in vivo coaching and immediate feedback. After this 15-minute period the trainer provided feedback according to the steps of effective feedback (Bolton & Mayer, 2008; Parsons & Reid, 1995; Schepis, Reid, Ownbey & Parsons, 2001). For subsequent feedback sessions, the participant conducted the procedure for the data collection period and received feedback on his or her performance after the data collection period ended.

Feedback plus Rehearsal. These sessions were identical to feedback sessions with the addition of the parents' rehearsal of any incorrectly performed treatment components in a role play with the trainer playing the part of the child.

Generalization. Probes to assess generalization of parents' implementation of the procedure in a different setting and/or with a different play partner were conducted. When available, a child peer (e.g., a sibling, neighbor, or friend of the participant) served as a play partner. The first generalization probe took place under baseline conditions. If the parent did not implement the procedure with 90% fidelity during this probe, he or she received the training package that was found to be effective during the component analysis in the new setting or with the new play partner.

Follow up sessions. Two to three follow-up sessions were conducted under the same conditions as baseline between two and six weeks after completion of training as time and scheduling allowed.

Dependent Variables

Dependent variables included a rating of parents' accuracy of implementing the social engagement procedure as well as a rating of the parents' affect during interactions. These variables are described in more detail in the following sections.

Parent Accuracy. Data were collected during 5- to 8-minute observation sessions, depending on the needs of the participant. Specifically, higher functioning participants, or those children who could sustain attention in play activities for longer periods of time, participated in 8-minute sessions, while others (i.e., Dyad 1 and Dyad 7) participated in 5-minute sessions. A 30-second, partial interval recording system was used to rate parents' performance of the following behaviors: 1.) Bring children within arm's reach, 2.) Talk up items or activities, 3.) Verbally prompt an appropriate interaction, 4.) Model an appropriate interaction, 5.) Physically prompt the interaction, 6.) Reinforce appropriate behavior (See Table 2 for operational definitions). During each 30-second interval, each step of the social engagement procedure was coded as "correct" if every instance of the behavior in the interval was correct, "incorrect" if one or more instances of the behavior was performed incorrectly, or "no opportunity" if the parent did not have an opportunity to engage in the behavior during that interval. An overall accuracy score was calculated by dividing the number of correct intervals by the sum of the correct and incorrect

Table 2

Operational Definitions of Adult Behaviors

Behavior	Correct	Incorrect	No Opportunity
Have 2 or more children in a group	The adult prompts any unengaged child(ren) to join the group within 10 seconds of the noticing the unengaged child(ren)	The child(ren) are not engaged for more than 10 seconds	All child(ren) present are engaged with the group and no child(ren) are excluded from the group throughout the interval
Bring children within arm's reach	The children must be within an arm's reach of each other and/or the adult	The child(ren) are further than an arm's reach for more than 10 seconds with no attempt by the adult to bring the child(ren) back to the group	All child(ren) are within an arm's reach of each other and/or the adult throughout the interval
Talking up items or activities	Talking enthusiastically about the item or activity and encouraging children to get involved	Sitting quietly while the children play with no attempts to engage children in the activity	All children are actively engaged in the activity
Verbally prompt an appropriate interaction	Verbally instructing one or more of the children in the group to perform an action or emit an appropriate verbalization during an interval	No prompts occur during the interval	The children are actively engaging with each other independently and no prompt is necessary
Model an appropriate interaction	Wait 5 seconds after the verbal prompt then model an action or appropriate verbalization	Models after the child has emitted the behavior, does not wait 5 seconds after the verbal prompt, waits longer than 10 seconds after the verbal prompt, or does not model an appropriate interaction	The child performed the behavior independently or following a verbal prompt
Physically prompt the interaction	Wait 5 seconds after the model prompt then physically prompt an action or appropriate verbalization	Physically prompts after the child has emitted the behavior, does not wait 5 seconds after the model prompt, waits longer than 10 seconds after the model prompt, or does not physically prompt	The child performed the behavior independently or following the verbal or model prompt
Reinforce appropriate behavior	Deliver a reinforcer (to be determined on an individual basis) immediately following any appropriate behavior	Does not deliver a reinforcer within 5 seconds of the appropriate behavior, or delivers a reinforcer following an inappropriate behavior	The child does not perform an appropriate behavior

intervals and multiplying by 100. To ensure that participants had an adequate number of opportunities to run the procedure, the research assistant serving as the play partner was instructed to disengage from the social interaction approximately once per minute. Data were graphed and visually inspected.

Affect Ratings. Each session, parents' level of happiness, interest, and stress was rated based on a scale developed by Koegel, Symon, and Koegel (2002). Each of the three components was rated on a 6-point Likert scale ranging from 0 to 5. For happiness and interest, higher scores suggested more positive affect. Specifically, a score of 0 or 1 indicated a negative interaction style (i.e., discontent, limited interaction); a score of 2 or 3 indicated a neutral interaction style (i.e., neither happy nor unhappy, a moderate number of interactions); and a score of 4 or 5 indicated a positive interaction style (i.e., smiles or laughs, frequent interaction). In the current study, stress was rated such that higher scores indicated higher levels of stress. For example, a score of 0 or 1 indicated the presence of few indicators of stress and a relaxed interaction style, a score of 2 or 3 suggested that the parent was neither stressed nor relaxed, and a score of 4 or 5 indicated that the parent was tense or frustrated.

Interobserver Agreement

Parent Accuracy. For data collection purposes, undergraduate research assistants were trained on scoring criteria to 90% agreement. During training probes, the trainer or a research assistant coded adult behavior in vivo for treatment decision-making purposes. Later, a second independent coder scored video-taped sessions to obtain interobserver agreement (IOA) for at least 30% of all sessions for each participant evenly distributed throughout baseline, treatment, follow up, and generalization phases. Point-by-point

agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100 to obtain a percentage. An agreement was defined as both raters giving the same score for each behavior in each interval. The average IOA was 95.74% (range = 88.50-100.00) across all sessions.

Affect Ratings. A second independent rater also provided affect ratings for at least 30% of all sessions for each participant. To calculate IOA, an agreement was defined as both observers' scores being within one point of each other. Percent agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. The average IOA was 94.59% (range = 67.00-100.00) across all sessions.

Procedural Integrity

Procedural integrity was calculated for at least 30% of all sessions for each participant evenly distributed across all phases of the study. A series of behaviors for each training component was identified (see Table 3). Each behavior was coded as “correct” if it was present and “incorrect” if it was absent. A procedural integrity score was calculated by dividing the number of correct behaviors by the number of correct plus incorrect behaviors and multiplying by 100 to obtain a percentage. The average procedural integrity score was 98.43% (range = 60.00-100.00).

Table 3

Trainer behaviors

Didactics

- Cover all of the topics listed on the training sheet
- Present the step-by-step instruction sheet and verbally review each step
- Provide an opportunity to ask questions and answer all questions presented by the participant

Feedback (from Parsons & Reid, 1995; Schepis et al., 2001)

- Positive or empathetic general statement about the teaching session
- Praise for identifying and creating opportunities to teach and performing teaching skills correctly

Identify teaching skills that may have been performed incorrectly
Describe how to correctly perform those skills
Provide an opportunity to ask questions about the feedback and answer any questions posed
Offer a final positive or encouraging statement

Modeling

Demonstrate how to run the procedure with the children for 5 minutes

Role play

Play the part of the child
Respond to the participants prompts both correctly and incorrectly
Engage in behaviors similar to those observed by the target child with whom the participant is working

Social Validity

Social validity, or the degree to which the community, individual, or family finds a measure or treatment acceptable, is an important component of any treatment evaluation (Schwartz & Baer, 1991). Therefore, participants were asked to evaluate the training package and the trained intervention via a questionnaire. Specifically, participants were asked to rate the extent to which the training package was acceptable and whether they felt they learned how to more effectively promote social engagement as a result of the training package. In addition, they were asked to rate the acceptability and effectiveness of each of the components individually. Finally, participants were asked to rate the extent to which the child’s social skills improved following treatment. Participants ranked the extent to which they agreed with each statement on a 5-point Likert scale in which 1 indicated that they agreed “very much,” while 5 indicated that they did not agree at all.

Social validity questionnaires were completed by the five participants who completed all training and follow up sessions. All five participants gave a rating of 1 or 2 for the acceptability and effectiveness of the treatment package as a whole as well as each of its components. Three of the five participants indicated feeling better able to teach

their child social skills by rating that item a 1 or 2. One participant felt somewhat able to teach social skills as indicated by a rating of 3, and one did not feel able to teach her child social skills as indicated by a rating of 4. Finally, three of the five participants indicated that they noticed improvements in their children's social skills with ratings of 1 or 2, while two participants reported noticing little to no improvement in social skills by the end of the study with ratings of 4 or 5.

Results

Three participants received feedback first, while four participants received didactics and modeling first. In order to examine overall trends in the data and compare effectiveness of each of the treatment conditions, the average number of sessions from the start of treatment to demonstrated mastery was calculated (See Figure 1). Calculations were based on the first treatment session after baseline through the session in which the parent met mastery criteria, and these calculations do not include results for Parent 2 (in the feedback condition) given that she did not meet mastery criteria before withdrawing from the study. Results indicate that parents who received feedback first met mastery criteria in an average of 4 sessions, while those parents who received didactics and modeling first met mastery criteria in an average of 15.9 sessions (See Figure 1). In addition, the percent increase in average accuracy ratings from baseline in the treatment condition to each of the three main treatment phases was calculated (See Table 4). The average accuracy rating across sessions for parents who received didactics and modeling first (Parents 4, 5, 6, and 7) increased by 4%, 13%, 44%, and 35% from baseline to didactics and modeling respectively. Those same parents then made increases of 8%, 34%, 98%, and 46% from baseline to feedback. Finally, the two parents who continued with feedback plus rehearsal made gains of 36% and 104% from baseline to feedback plus rehearsal. Parents who received feedback first (Parents 1, 2, & 3) increased by 144%, 106%, and 66% respectively.

In order to further examine the effect of each component of the training package on an individual level, accuracy scores were graphed and visually inspected. Graphical displays of the results can be found in Figure 2.1 for parents who received feedback first and Figure 2.2 for those who received didactics and modeling first. Data for each parent-child dyad are described below.

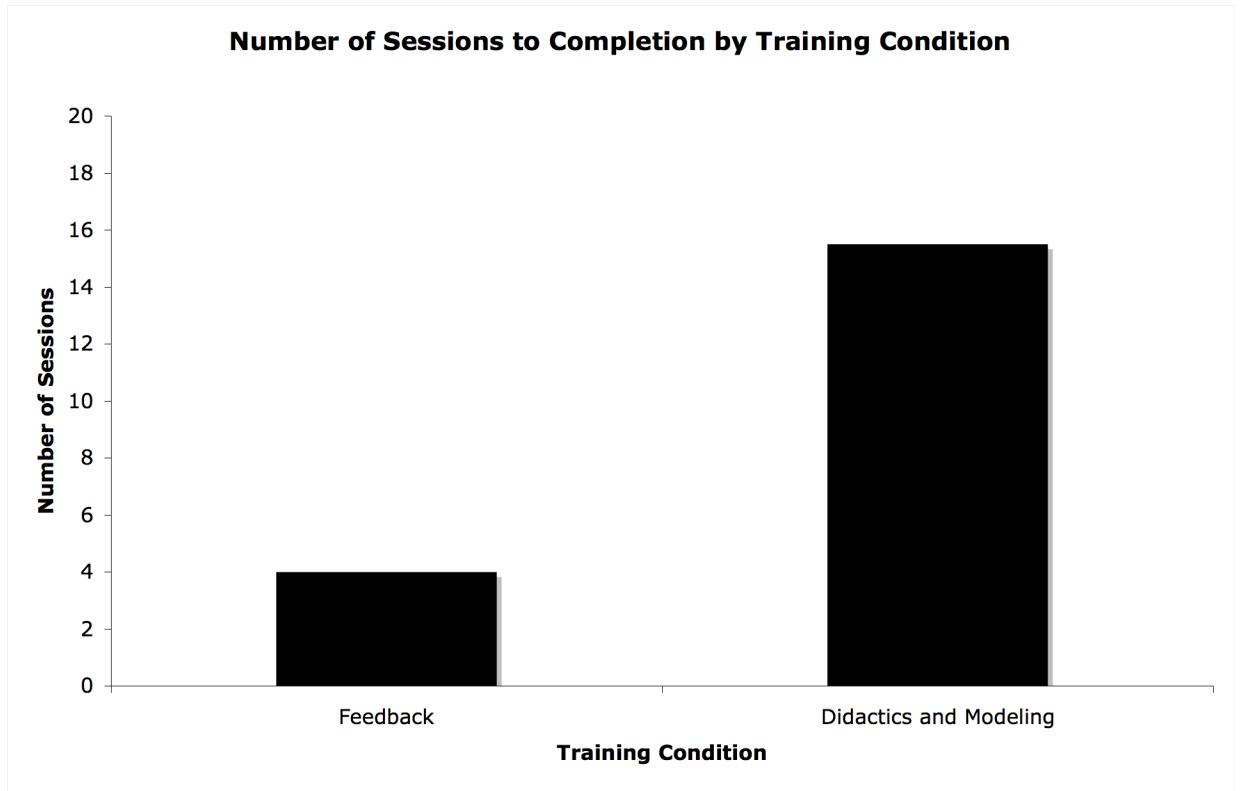


Figure 1. The average number of sessions from the first training session to the session in which mastery criteria were met for participants receiving feedback first and those receiving didactics and modeling first.

Table 4

Percent Increase from Baseline to Training Phases

Condition Participant	Baseline to Didactics & Modeling	Baseline to Feedback	Baseline to Feedback plus Rehearsal
Feedback			
Parent 1	N/A	144	N/A
Parent 2	N/A	106	N/A

Parent 3	N/A	66	N/A
Didactics and Modeling			
Parent 4	4	8	36
Parent 5	13	34	N/A
Parent 6	44	98	N/A
Parent 7	35	46	104

Note: Percent increase in average accuracy score from baseline in the treatment condition to the three main treatment phases.

Participants Receiving Feedback First

Dyad 1. Dyad 1 participated in three baseline sessions, four feedback sessions, and one generalization session. A free operant preference assessment revealed that Child 1 preferred to play with play food and balls. A paired stimulus preference assessment revealed Goldfish crackers to be the most preferred edible reward. Due to her severe deficits, targeted skills for Child 1 included basic interactions such as waving “hello,” rolling a ball to her play partner, and handing a toy to her play partner.

In baseline, Parent 1 scored an average of 40.13% correct (range = 36.40-43.90). Performance rose to over 90% correct after the first feedback session, and she met mastery criteria in the minimum number of sessions (i.e., three) required. One additional feedback session was conducted as it was necessary at the time to confirm the accuracy of the live coding before changing phases. Parent 1’s average accuracy score for these four sessions was 97.80% (range = 93.20-100.00) for a 144% increase from baseline to feedback. Because no typically developing peer was available for generalization, the generalization probe was conducted with a different research assistant in a slightly different setting (i.e., playing on the floor as opposed to playing at the table). Parent 1 performed 83.70% correct during the generalization probe.

Parents' Accuracy in Implementing Social Engagement Feedback

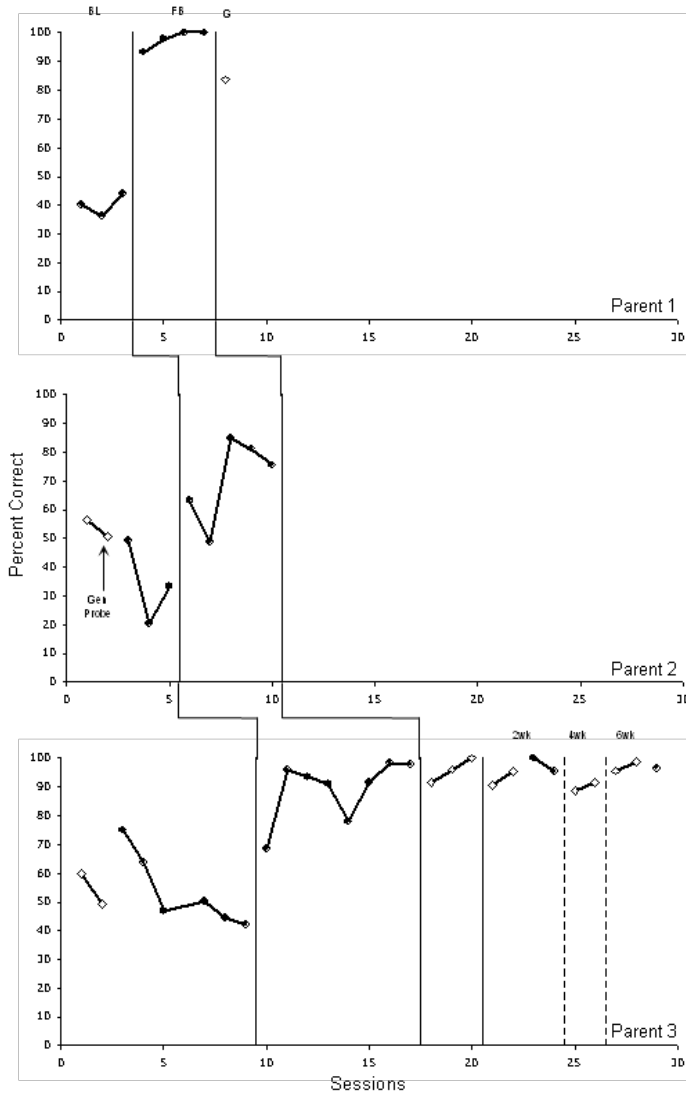


Figure 2.1. Accuracy ratings of parents who received feedback first. Closed circles represent accuracy in the training condition (i.e., with a graduate research assistant as the play partner), and open circles represent accuracy in the generalization probes (i.e., with a peer as the play partner and/or in a different setting). Phases include baseline (BL), feedback (FB), and generalization (Gen) as well as follow up at 2, 4, and 6 weeks (Parent 3).

Parents' Accuracy in Implementing Social Engagement
Didactics and Modeling

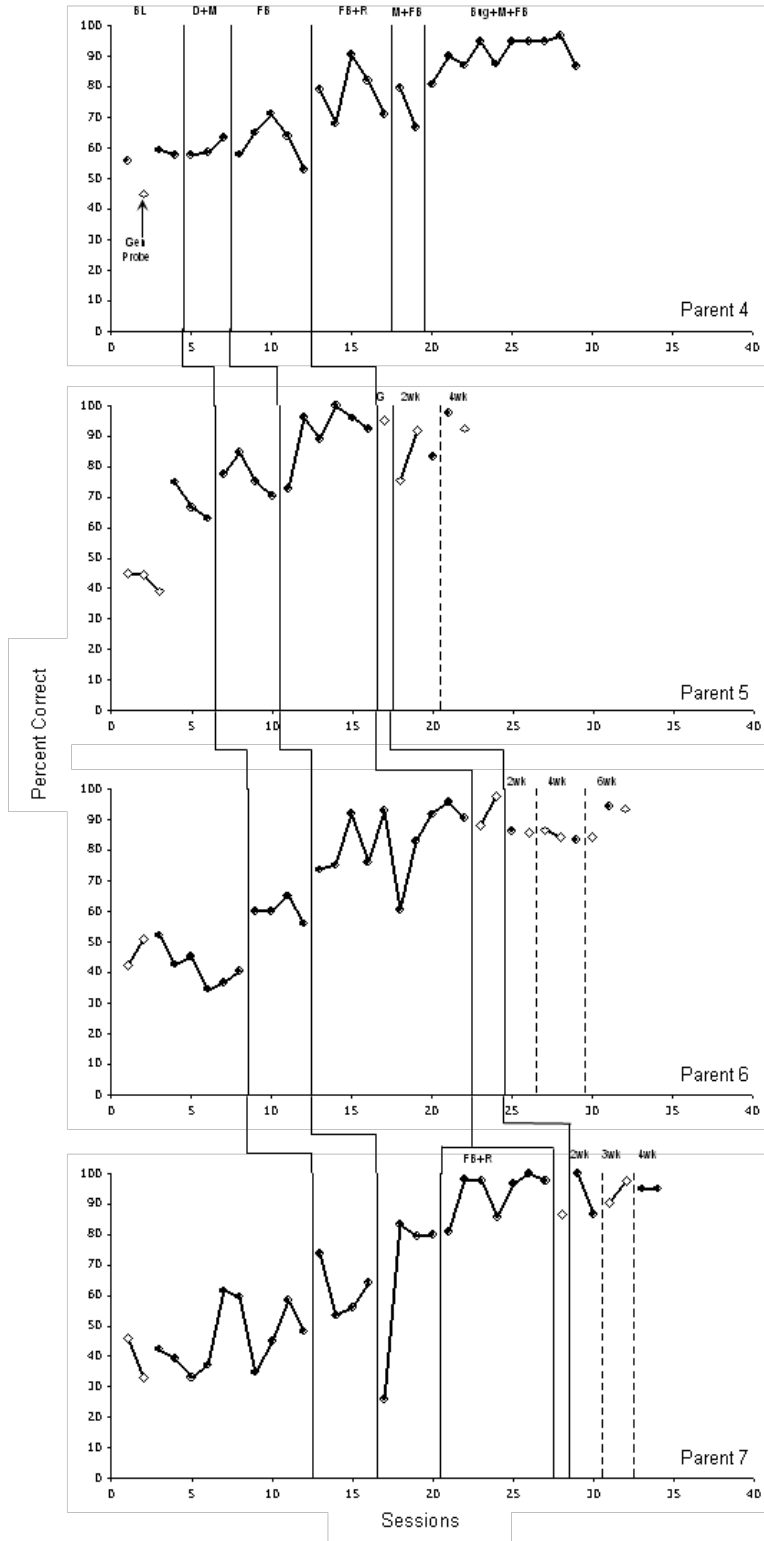


Figure 2.2. Accuracy ratings of parents who received didactics and modeling first. Closed circles represent accuracy in the training condition (i.e., with a graduate research assistant as the play partner), and open circles represent accuracy in the generalization probes (i.e., with a peer as the play partner and/or in a different setting). Phases include baseline (BL), didactics and modeling (D+M), feedback (FB), feedback plus rehearsal (FB+R), live modeling plus feedback (M+FB), coaching via bug in the ear plus modeling plus feedback (Bug+M+FB), and generalization (Gen) as well as follow up at 2, 3, 4, and/or 6 weeks.

Because of Child 1's multiple disabilities, it was evident from the start of her participation in the study that the social skills procedure would not be appropriate for her. Rather, Child 1 would require a more intensive, most-to-least prompting procedure in order to effect behavior change. The original intent was to train Parent 1 on the original procedure, then, when no progress was observed in Child 1, implement a more appropriate procedure. However, upon beginning baseline sessions with the new procedure, it became clear that Child 1's program would require substantially more supervision and oversight than could be offered within the constraints of the study. As such, a referral was made to a local behavior analyst, and Dyad 1 discontinued the study.

Dyad 2. Dyad 2 was unable to complete the study due to family conflicts; therefore only a brief discussion of trends in the data will be presented for this dyad. Dyad 2 completed five baseline sessions and five feedback sessions. Child 2 was able to verbally express his preference for activities. His preferences varied from session to session, but they often included activities with the dollhouse and dolls, puppets, cars, and action figures. Skills included giving compliments, offering a friend a turn, and accepting a friend's choice of activity when it differed from his own.

Parent 2 received an average accuracy score of 53.72% (range = 50.81-56.63) in the generalization condition and 34.38% (range = 20.38-49.31) in the treatment condition. Despite the variability in accuracy observed in baseline, treatment was initiated because the overall trend was decreasing. Parent 2's average accuracy score

across the five feedback sessions rose to 70.75% (range = 48.75-84.88) for a 106% increase from baseline to feedback. Accuracy scores were highly variable at the beginning of treatment, but variability reduced in the last three sessions with scores substantially higher than those observed in baseline. Had Dyad 2 continued with treatment, feedback and rehearsal would have been delivered in the next session. Although Parent 2 did not remain in the study long enough to meet mastery criteria, a treatment effect was observed with an increase in accuracy scores after feedback was provided.

Dyad 3. Dyad 3 completed eight baseline sessions, including two generalization probes, eight feedback sessions, three generalization sessions, and follow-up probes at two, four, and six weeks post-training. An MSWO preference assessment revealed Child 3's most preferred activities to be play-doh, play food, and, cars. His most preferred tangible rewards were a slinky, a toy fire truck, and Flarp. Child 3's 4-year old, typically developing sister served as the play partner in the generalization setting. Targeted skills included sharing, turn taking, requesting, commenting on play activities, and giving compliments.

During baseline, Parent 3 received accuracy scores averaging 54.60% (range = 59.88-49.31) in the generalization condition and 53.72% (range = 75.00-42.13) in the treatment condition. A decreasing trend was observed at the end of the baseline phase. Accuracy rose to 69.00% after the first feedback session then 96.00% after the second feedback session. Parent 3 met mastery criteria within the first four sessions after starting the feedback phase; however, an additional session was run before scores for the first four sessions were confirmed. There was a dip in performance during this fifth session,

with an accuracy score of 77.90%. Anecdotally, the appointment was disrupted by the crying from an infant sibling in the next room immediately prior to and continuing part way through this session. As such, it is possible that distraction may account for the dip in performance. Because of the decreasing trend observed, the feedback phase was continued. The feedback plus rehearsal phase was not introduced because the parent had mastered the procedure with feedback alone. Parent 3's accuracy scores once again rose to over 90%, and she met mastery criteria within the next three sessions.

Parent 3 conducted the social engagement procedure during three generalization probes with Child 3 and his typically developing sister. In these three sessions, Parent 3's accuracy score averaged 95.92% (range = 91.63-100.00). No feedback was necessary in the generalization condition. Accuracy scores remained high in both treatment and generalization conditions during 2-, 4-, and 6-week follow up sessions with scores at an average of 94.72 (range = 88.75-100.00).

During the last follow-up session, Parent 3 reported that she observed improved social skills in both Child 3 and his sister, who was socially anxious. Specifically, Parent 3 stated that Child 3 was making more independent comments during play and asking "Wh- questions" more frequently than he did before implementation of the social engagement procedure. His sister was also reportedly making more comments and speaking more frequently to people outside of her immediate family. Five months after the family completed participation in the study, Parent 3 contacted the researcher to report that the procedure continued to be effective. She explained that the children had learned more effective ways to communicate with each other and those communication skills generalized to interactions with others.

Participants Receiving Didactics and Modeling First

Dyad 4. Dyad 4 participated in four baseline sessions, including one generalization probe, three didactic and modeling sessions, five feedback sessions, and five feedback and rehearsal sessions. An MSWO preference assessment revealed Child 4's most preferred activities to be play-doh, puzzles, and Mr. Potato Head. His most preferred tangible rewards were a toy phone, and a spinning light, and his most preferred edible reward was Skittles. Child 3's 6-year old, typically developing brother served as the play partner in the generalization setting. Targeted skills included turn taking, requesting, and sharing.

Parent 4 obtained an average accuracy score of 57.59% (range = 55.63-59.38) during the baseline phase in the training condition with an accuracy score of 45.00% in the generalization probe. Didactic training resulted in little improvement, with an average accuracy score of 59.90% (range = 57.81-63.25). Training continued with feedback, and Parent 4's average accuracy score across the five feedback sessions was 62.18% (range = 52.81-71.19). With no substantial improvement in accuracy of implementation and the observation of a downward trend, feedback plus rehearsal was introduced. Across the five sessions in this phase, Parent 4's average accuracy score was 78.08% (range = 67.88-90.50).

After the standard training, Parent 4's accuracy scores had not met mastery criteria; therefore, additional training was offered. First, the trainer provided in vivo modeling for two sessions. In these sessions, the trainer modeled the procedure with Child 4 and the research assistant for 10 minutes while Parent 4 observed. This period of modeling was followed by additional didactics (i.e., explaining what was done during

modeling and why), as well as continued feedback. In these two sessions, Parent 4 received accuracy scores of 79.63% and 66.69%.

Finally, a “Bug-in-the-ear” device was used for nine sessions. During bug-in-the-ear sessions, the trainer provided in vivo coaching and immediate feedback through a portable bug-in-the-ear device. These sessions differed from standard feedback sessions in that the trainer provided step-by-step instruction immediately prior to the parent completing each step, in addition to immediate feedback. In this phase, Parent 3 received an average accuracy score of 91.19 (range = 80.8-96.63), and she reached mastery criteria after eight bug-in-the-ear sessions.

Due to family stressors and illness, Dyad 4 was unable to return for generalization probes and follow-up sessions. However, anecdotal reports indicate that Parent 4 continued to use the procedure after training, and Child 4’s social communication was improving.

Dyad 5. Dyad 5 completed six baseline sessions, including 3 generalization probes, four didactic and modeling sessions, six feedback sessions, one generalization session, and follow-up probes at two and four weeks post training. An MSWO preference assessment revealed a train set and play-doh to be Child 5’s most preferred activities. Neither tangible nor edible rewards were used as verbal praise was sufficient to maintain target behaviors. Child 5’s 2-year old, typically developing sister served as the play partner in the generalization setting. Targeted skills including commenting on play activities, asking questions, turn taking, and sharing.

Parent 5’s average accuracy score in baseline was 68.11% (range = 63.00-74.88) in the training setting and 42.90% (range = 39.00-45.13) in the generalization setting.

Scores did not improve substantially after didactic and modeling sessions, with an average accuracy score of 76.91% (range = 70.50-84.50). After one feedback session, Parent 5's accuracy score was 72.56%, then it rose to 96.25% after the second feedback session. The average accuracy score across all six feedback sessions was 90.98% (range = 72.56-100.00), and mastery criteria were met in the last three sessions. Parent 5's accuracy score remained high in the generalization condition at 95.43%, and no additional training was necessary. Across all six follow-up sessions, Parent 5 received an average accuracy score of 88.11% (range = 75.44-97.5), with scores over 90% in the last two probes.

Dyad 6. Dyad 6 completed eight baseline sessions, including two generalization probes, four didactic and modeling sessions, ten feedback sessions, two generalization sessions, and follow-up probes at three, five, and seven weeks post-training. An MSWO preference assessment revealed play-doh, a magnetic drawing board, and coloring to be Child 6's most preferred activities. Neither tangible nor edible rewards were used as verbal praise was sufficient to maintain target behaviors. Child 6's 2-year old, typically developing sister served as the play partner in the generalization setting. Targeted skills included sharing, turn taking, requesting, and giving compliments.

Average baseline accuracy scores for Parent 6 were 41.89% (range = 34.5-52.13) and 46.63% (range = 42.44-50.83) in the training and generalization settings respectively. Conditions necessitated the trainer also serve as the play partner for the first three didactic sessions rather than conduct in vivo coding of parent behaviors as usual. An equipment malfunction during those sessions resulted in an inability to code behaviors via video. As such, there are no objective data for didactic sessions 1-3. However, the

trainer estimated accuracy scores for these sessions to be between 60% and 65% based on observations during play sessions. A fourth probe in the didactic condition was conducted to confirm Parent 6's estimated scores while avoiding unnecessary practice effects. The score for this probe session was 55.94%. Because this score was below the estimated scores for the first three didactic and modeling sessions, training continued with feedback. Parent 6's accuracy scores were variable during the first seven feedback sessions and ranged from 60.50% to 92.69%. Because of the variability observed in these sessions, training continued with feedback, and Parent 6 met mastery criteria in feedback sessions 8-10. Her average accuracy score across all feedback sessions was 83.04% (range = 60.50-95.80).

In the first generalization probe, Parent 6 received a score of 88.06%. Her accuracy score then improved to 97.69% after feedback was provided. In follow-up sessions, Parent 6's accuracy score dropped to a range of 83.25% to 85.75%. However, after brief feedback after the first 6-week follow-up probe, accuracy scores returned to 94.25% and 93.56% in the generalization and training conditions respectively.

Upon completion of training, Parent 6 explained that she had been using the procedure with Child 6 and a same-aged, typically developing neighbor. She noted an increase in Child 6's sharing with that child as well as other peers, and she stated that she had observed him making more frequent appropriate social comments during play.

Dyad 7. Dyad 7 completed 12 baseline probes, including two probes in the generalization condition, four didactic and modeling sessions, four feedback sessions, seven feedback and rehearsal sessions, one generalization probe, and two sessions in each of 2-, 3-, and 4-week follow-up visits. A free operant preference assessment was

conducted because removal of stimuli elicited tantrums from Child 7. This preference assessment revealed cars, blocks, puzzles, and a Blue's Clues computer to be Child 7's most preferred activities. These activities provided opportunities for interaction, and access to these activities was used as the reinforcer for appropriate social interactions. The typically developing 2-year-old son of a family friend served as the play partner in the generalization condition. Because he was an early learner and demonstrated problem behaviors (i.e., crying, flopping to the ground, and kicking) when his play was interrupted, the initial focus of training was on building parallel play skills and increasing tolerance of the social overtures of others. Additional skills targeted included turn taking and requesting.

Under baseline conditions, Parent 7 received an average accuracy score of 45.89% (range = 33.00-61.48) in the training condition and 39.45% (range = 33.00-45.9) in the generalization condition. Upon implementation of didactics and modeling, Parent 7's average accuracy score rose to 61.85% (range 53.54-73.80).

With stable scores in didactic sessions, feedback was implemented. After the first feedback session, Parent 7's accuracy score dropped to 26.00%. As part of her feedback, Parent 7 had been instructed to prompt the play partner to interact with or give toys to Child 7 rather than the reverse as she had done previously. Consequently, Parent 7 turned her attention to prompting the play partner to engage in play behaviors but not behaviors that required a social interaction. For example, she would prompt the play partner to roll his car or stack his blocks, but she did not have Child 7 engage in these behaviors. As such, this score largely reflects the absence of prompted social interactions. After

receiving additional feedback, however, Parent 7's accuracy score rose to 83.30% and remained stable in the next two sessions with scores at 79.40% and 80.00%.

Because mastery criteria had not yet been met, feedback plus rehearsal was introduced. Parent 7 received an average accuracy score of 93.74% (range 80.80-100.00) across the seven sessions in this phase, meeting mastery criteria in the last three sessions.

One generalization probe was conducted during which Parent 7 received an accuracy score of 86.70%. Feedback was provided in the generalization condition, but it was not possible to conduct additional generalization probes due to limited time availability of the typically developing peer. Follow-up sessions were conducted at two and four weeks post training in the training setting and three weeks post training in the generalization setting. Parent 7's average accuracy scores across all follow up sessions was 94.08% (range 86.60-100.00). After training, Parent 7 reported that progress towards appropriate social interactions was limited. However, she did note some improvement in requesting items both verbally and through simple hand signs.

Affect Ratings

The first step in analyzing the affect rating scales was to calculate the correlation between each of the three subscales. The Spearman rank order correlation coefficient was calculated to determine the strength and direction of the relationships between each of the three subscales. Results revealed that happiness, interest, and stress were highly correlated with each other. Specifically, results indicated that as happiness ratings increased, interest ratings also increased ($\rho = 0.805, p \leq .01$), and stress ratings decreased ($\rho = -0.745, p \leq .01$). Furthermore, as interest ratings increased, stress ratings decreased ($\rho = -0.613, p \leq .01$). Because of the high correlation between the two positive affect

ratings, namely happiness and interest, only happiness was examined in the current study. Stress was retained as a separate rating to provide a measure of negative affect. These data were graphed and visually inspected. Graphical displays of the results can be found in Figure 3.1 for parents who received feedback first and Figure 3.2 for those who received didactics and modeling first. Data for each parent-child dyad are described below.

Patterns of change in affect varied greatly from participant to participant. For some participants, little to no change was evident over the course of treatment. For example, Parent 1 exhibited neutral ratings of both happiness and stress throughout the duration of her participation in the study. Similarly, Parents 2, 3, and 5 demonstrated little change in affect. Unlike Parent 1, however, these parents exhibited positive to neutral affect for the duration of their participation. More specifically, Parent 2 received positive ratings of happiness during baseline, which dropped slightly to neutral ratings once treatment began. Her ratings of stress, however, remained low over the course of her participation. Parent 3 received high happiness ratings for the duration of the study, apart from three sessions in the middle of her participation in which happiness dropped to more neutral scores. Anecdotally, these sessions correspond to those during which her infant child could be heard crying in the next room. Parent 3 similarly received low to neutral ratings of stress during her participation. Finally, Parent 5 exhibited a similar pattern to Parent 3 in that happiness ratings were high, and stress ratings were low over the course of her participation.

For other parents, changes in affect across phases of treatment were observed. Overall, these changes tended to be in the positive direction such that happiness ratings

increased and stress ratings decreased by the end of participation, but specific patterns of change varied. For example, Parent 4 began with positive to neutral ratings of happiness and low to neutral ratings of stress. During phases in which she was receiving feedback, happiness decreased and stress increased. Anecdotally, Child 4 exhibited problem behavior including crying, hitting, and attempting to elope during these sessions. When this parent began receiving more extensive support via a bug-in-the-ear device, her happiness increased and stress decreased. Change in affect for Parent 6 was gradual with neutral happiness and stress ratings in the beginning of her participation slowly, but steadily, fading to high happiness and low stress ratings by the end of her participation in the study. Finally, Parent 7 exhibited primarily high stress and low to neutral happiness ratings during the baseline phase. Once treatment started, her happiness ratings rose to neutral or positive, and these ratings ended in the positive range. Similarly, her stress ratings decreased to mostly low or neutral during treatment, and these ratings ended in the low range by the end of her participation.

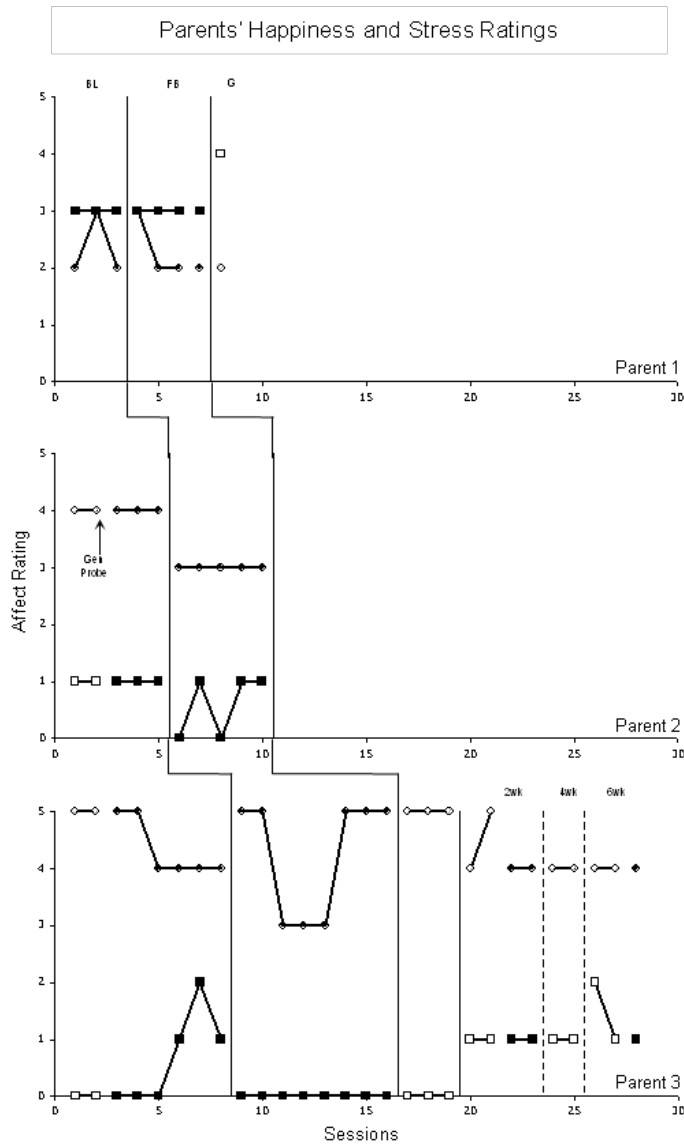


Figure 3.1. Ratings of happiness and stress for parents who received feedback first. Diamonds represent happiness and squares represent stress. Closed marks represent affect in the training condition (i.e., with a graduate research assistant as the play partner), and open marks represent happiness in the generalization probes (i.e., with a peer as the play partner and/or in a different setting). Phases include baseline (BL), feedback (FB), and generalization (Gen) as well as follow up at 2, 4, and 6 weeks (Parent 3).

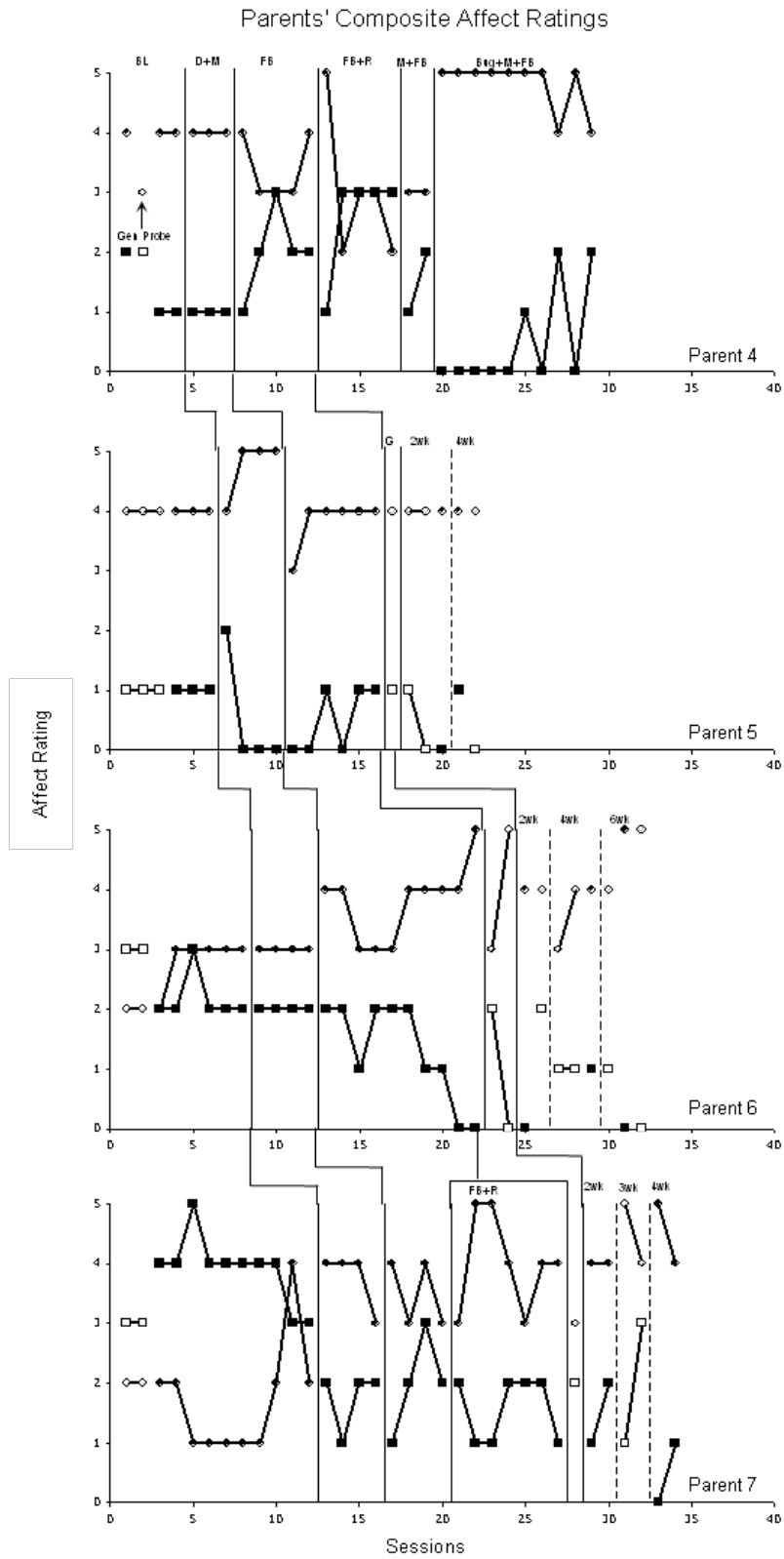


Figure 3.2. Ratings of happiness and stress for parents who received didactics and modeling first. Diamonds represent happiness and squares represent stress. Closed marks represent affect in the training

condition (i.e., with a graduate research assistant as the play partner), and open marks represent happiness in the generalization probes (i.e., with a peer as the play partner and/or in a different setting). Phases include baseline (BL), didactics and modeling (D+M), feedback (FB), feedback plus rehearsal (FB+R), live modeling plus feedback (M+FB), coaching via bug in the ear plus modeling plus feedback (Bug+M+FB), and generalization (Gen) as well as follow up at 2, 3, 4, and/or 6 weeks.

Discussion

The purpose of the current study was to examine the effectiveness of a behavioral skills training (BST) package for training parents to implement a behavioral social engagement procedure. It also aimed to identify the components of that training package that were responsible for behavioral change. These aims were tested through a multiple baseline design across participants to demonstrate functional control of the training package with a systematic presentation of individual components to examine their unique contributions to parent acquisition. A secondary aim of the study was to consider factors that might be related to parents' acquisition of the procedure. To this end, parent affect was coded during each session and patterns of change were examined.

Overall, the study demonstrated that BST is effective for training parents to implement a behavioral social engagement procedure with fidelity. All six parents who completed the training portion of the study met mastery criteria. The seventh parent, who discontinued participation prior to completing her training, demonstrated increased treatment fidelity following training despite not meeting mastery criteria. This finding is consistent with previous literature demonstrating the effectiveness of BST to train a variety of teaching strategies aimed at increasing social interaction or play skills (Coolican et al., 2010; Gillett & LeBlanc, 2006; Koegel et al., 2002; Reagon, & Higbee, 2009; Symon, 2005). In addition, most parents who learned to implement the procedure with a trained research assistant were able to generalize those skills to implementing the procedure either with a different research assistant in a different setting (i.e., Parent 1) or

with typically developing peers (i.e., Parents 3, 5, 6, and 7). In this way, the current study extends the literature by teaching parents a procedure to encourage social interaction between their children with developmental delays and their peers.

Components Analyzed

The primary purpose of the current study was to conduct a component analysis of the training package as recommended by Schultz and colleagues (2011) in order to identify those components that most directly bring about behavior change, thus, leading to more economical training packages. To this end, components of traditional BST were presented systematically in order to better assess the relative contribution of each component or combination of components. The analysis of these components is presented below.

Didactic training was not analyzed separately because of the extensive evidence in the literature that didactic training alone is not sufficient (Feldman et al., 1989; Sterling-Turner et al., 2002; Sterling-Turner et al., 2001). As such, the first combination of components to be analyzed included didactic training and modeling in the form of role play. There has been very little investigation of the relative effectiveness of modeling. In fact, only one study was identified as addressing this research question (Mueller et al., 2003), and it found that there was no differences in the effectiveness of modeling, rehearsal, or repeated verbal instruction. The current study failed to support these findings. While participants who received didactics and modeling first demonstrated some slight improvements in their accuracy of implementation, the magnitude of change from baseline to training sessions was small, and no participants approached mastery criteria after this training phase. A potential reason for this discrepancy may pertain to the

type of modeling utilized. Specifically, modeling in the current study took place in the form of role play with the trainer playing the part of the adult and the parent playing the role of the child. Results may have differed if parents had observed the role play rather than participated in it. For example, two therapists – one playing the part of the child and one playing the part of the parent – could have modeled the procedure as was done by Muller and colleagues (2003). Nevertheless, the current study provides valuable insight into the limited effectiveness of modeling in the form of role play with the parent.

The next components to be examined were feedback and feedback plus rehearsal. Numerous studies have demonstrated that rehearsal and feedback, when presented as a brief training package, can result in skill acquisition (Bolton & Mayer, 2008; Jones et al., 1997; Leblanc et al., 2005; Mortenson & Witt, 1998; Noell et al., 1997; Parsons & Reid, 1995; Schepis et al., 2001; Shanley & Niec, 2010). The current study supported these findings in that the majority of parents met mastery criteria following the feedback or feedback plus rehearsal training conditions. Two of the three participants who began their training with feedback (Parent 1 and Parent 3) met mastery criteria following feedback alone. Parent 2 also demonstrated marked improvement from baseline to the feedback phase of treatment despite not meeting mastery criteria before withdrawing from the study. In addition, the magnitude of change from baseline to feedback was notable.

Furthermore, by delivering components systematically, the current study extends the literature base by demonstrating that feedback or feedback and rehearsal are more effective than didactics and modeling. In general, improvements made by participants who received didactics and modeling first were more gradual and took place over a greater number of sessions than those observed in participants who began training with

feedback. Two of the four participants who began with didactics and modeling (Parent 5 and Parent 6) met mastery criteria following feedback. In addition, although these parents made little improvement from baseline to the didactics and modeling phase, the magnitude of change from baseline to the feedback phase was substantial.

Despite strong evidence that feedback alone was effective for four participants, three participants required additional training beyond feedback. One participant met criteria following feedback plus rehearsal (Parent 7), one participant required training beyond that which was originally specified in the protocol (Parent 4), and the extent of training that one parent (Parent 2) would have needed cannot be determined. These results suggest that, as one might expect, some parents required more practice and higher levels of support than others. Future research should aim to develop means to identify such parents prior to the start of training so as to better tailor training methods to meet the needs of the parent.

In sum, parents who received didactics and modeling first took an average of more than three times as long as parents in the feedback condition to reach mastery criteria. A larger sample size and more balanced distribution of participants is necessary to strengthen the findings of the current study. However, when these results are considered with previous literature providing support for feedback as an isolated training component (Bolton & Mayer, 2008; Jones et al., 1997; Kaminski, Valle, Filene, and Boyle 2008; Mortenson & Witt, 1998; Noell et al., 1997; Parsons & Reid, 1995; Schepis et al., 2001; Shanley & Niec, 2010), they provide evidence that focusing training efforts on the provision of feedback is more effective and efficient than providing didactics and modeling.

Affect

Previous research has suggested that parent stress may either decrease following parent training (Keen et al., 2010; McConachie & Diggle, 2007, Sanders & Woolley, 2005; Tonge et al., 2006) or negatively impact treatment outcome (Bagner & Graziano, 2012; Strauss et al., 2012). As such, the current study included ratings of parent affect in order to explore its relationship with parent acquisition of the trained procedure. Both positive affect (i.e., happiness) and negative affect (i.e., stress) were examined. In general, results suggested that affect either stayed the same or improved over the course of the study. In other words, parents with moderate to high ratings of happiness and moderate to low ratings of stress (Parents 1, 2, 3, and 5) retained those ratings over the course of the study. Conversely, the affect of parents with low levels of happiness and high levels of stress (Parents 6, and 7) improved over the course of the study such that happiness increased and stress decreased. A third pattern of change was observed in Parent 4, who began with high ratings of happiness and moderate to low ratings of stress, displayed more negative affect when training began, and returned to improved levels of affect once she reached mastery of the procedure. In sum, affect ratings suggest that the training package did not have a negative impact on parent affect, and these results corresponded to parent reports of social validity in that all parents rated the training package as acceptable.

Because affect was not a primary target of the current study, factors that may have impacted these changes were not controlled; therefore, it is not possible to determine the cause of these changes. However, observed changes raise interesting questions with regard to potential causes. The discussion that follows will first consider anecdotal

observations from the current study to formulate hypotheses for these changes then later examine evidence from the literature to further support these observations.

In keeping with researchers who have found that parent stress decreases as a result of parent training, (Keen et al., 2010; McConachie & Diggle, 2007, Sanders & Woolley, 2005; Tonge et al., 2006), the first potential reason for the observed changes is that the behavioral intervention, or training package, affected not only parents ability to implement the social engagement procedure, but also impacted their affect. It was observed that changes in affect did seem to correspond to parent acquisition of the procedure. Results from Parents 6 and 7 demonstrate this point. Both of these parents demonstrated gradual improvement in procedural fidelity from baseline to post-treatment phases. Their changes in affect were also gradual, starting with moderate to low happiness ratings and moderate to high stress ratings and ending with the reverse. Similarly, but in a slightly different manner, Parent 4's changes also correspond to her mastery of the procedure. While she demonstrated positive affect during baseline and in the didactic and modeling phase of treatment, her affect shifted to lower levels of happiness and higher levels of stress during the feedback phases, perhaps as she became more aware of her own inaccuracy. Her affect shifted again, however, at the end of the study as she demonstrated mastery of the procedure. Finally, several parents (Parents 1, 3, and 5) demonstrated little change in affect despite marked improvements in accuracy of implementation. For parents 3 and 5, ceiling and floor effects, or poor sensitivity of the rating scale, might account for this lack of change. The lack of change for Parent 1 suggests that perhaps another variable, such as child behavior, may be at play. This factor is discussed below.

As previously mentioned, it is possible that problem behaviors exhibited by the child, such as non-compliance, crying, and aggression, may have played a role in changes in parent affect, or lack thereof. Although such problem behaviors were not tracked explicitly in the current study, anecdotal evidence suggests that these factors may well have played a role. For example, Child 4 was observed to cry, hit and kick his mother and the adult play partner, and attempt to elope from the play area. These behaviors were not observed frequently in the beginning of the study, but they increased as his mother was instructed to prompt more interactions and follow through with her prompts. Again anecdotally, Parent 4 was not always effective in her prompting, frequently and unnecessarily prolonging restriction to Child 4's preferred items and activities, which often resulted in problem behavior. Towards the end of the study, Parent 4 received more direct support from the therapist and more effectively delivered reinforcement for appropriate behaviors, and Child 4 exhibited few problem behaviors. At this time, Parent 4's affect returned to more positive levels.

Similar child behavior problems were observed in Children 6 and 7. Child 6, for example, was non-compliant (i.e., did not respond to commands given by his mother), frequently eloped from the play area, and engaged in disruptions in the form of throwing toys and other materials. Child 7 cried, dropped to the floor, and pushed other people away when his play was interrupted. The behaviors of both of these children seemed to occur more frequently early in their participation, and they seemed to decrease over time, possibly corresponding to positive changes in parent affect.

Final support for the impact of problem behavior on parent affect come from the anecdotal observation of problem behaviors observed by the children whose parents did

not display changes in affect over time. Children 1 and 2, for example, both engaged in some problem behaviors. For Child 1, behaviors included elopement from the play area, mouthing objects, and negative vocalizations, and Child 2 exhibited behaviors such as verbal protests and non-compliance. Given their brief participation, there was little opportunity for any significant change in problem behavior or parent affect to occur. Finally, Children 3 and 5 engaged in very few problem behaviors during their participation. Both children were compliant and readily responded to their parents' prompts. One interesting observation is a drop in happiness for Parent 3 during sessions 11-13. As previously mentioned, Parent 3's infant daughter could be heard crying in the next room during these sessions, which may account for this drop in affect.

Parent Acquisition, Affect, and Child Behavior: Putting it Together

As might be expected, some parents required training beyond feedback, and two of these parents had already received didactic training. These results suggest that there may be parent- and child-specific factors, as opposed to the form of training delivered, that may impact the extent of training that a parent will require. Some of factors that seem to be relevant based on observations of the current participants include the parent's level of stress as well as symptom severity, or extent of problem behavior of the child. Indeed, there is evidence in the literature that provides support for the impact of these factors. For example, there is evidence that high parent stress may impede parental treatment fidelity thereby negatively impacting child outcome (Bagner & Graziano, 2012; Strauss et al., 2012). Furthermore, studies have demonstrated that symptom severity and behavior problems in children with developmental delays are associated with increased levels of parent stress, depression (Ingersoll & Hambrick, 2011; Lecavalier, Leone, &

Wiltz, 2006). Finally, behavior problems have been shown to be more predictive of levels of parent stress than are adaptive skills (Lecavalier, et al. 2006; Peters-Scheffer, Didden, & Korzilius, 2012), cognitive and developmental delays (Baker, Blacher, Crnic, & Edelbrock, 2002; Baker, McIntyre, Blacher, Crnic, Edelbrock, & Low, 2003; Herring, Gray, Taffe, Tonge, Sweeney, & Einfeld, 2006; Peters-Scheffer et al., 2012), and diagnosis (Herring, Gray, Taffe, Tonge, Sweeney, & Einfeld, 2006; Peters-Scheffer et al., 2012). Given this evidence, it follows that parents whose children display high rates of problem behavior may experience higher levels of stress and may, therefore, require more training and support than other parents.

Considering the evidence presented above, it is possible that examining factors such as parent stress and using that information to guide decisions about what training procedures should be utilized for each parent may ultimately lead to more effective and efficient training procedures. A prime example of how this approach may have been used in the current study can be seen with Parent 4. Specifically, Parent 4 reported a significant number of stressors both with respect to her response to her son's challenges as well as broader life stressors. Had these factors been considered earlier in training, higher levels of support may have been presented from the beginning thereby decreasing the overall time spent training and sparing the family from the stress related to ineffective training.

In sum, there are a number of factors that impact parent acquisition of the target behaviors. Examples include not only the methods by which material is delivered, but also factors such as parent stress and child problem behavior. Often these issues are overlooked in the behavioral literature. However, while attention to such factors may

seem to delay the start of addressing the main purpose of the training, taking time to address them may ultimately lead to more efficient training. This recommendation is based only on anecdotal evidence from the current study and a select few studies that lend support to those observations. Future studies should examine the relationships between these factors more systematically.

Limitations

There are a number of limitations to this study. First is related to the number and distribution of participants. Only seven out of the ten participants recruited participated in the study and only three of those participants received feedback first, making the groups unequal. Furthermore, one of the participants receiving feedback first withdrew from the study before demonstrating mastery of the procedure; therefore, it is not possible to determine how much additional training this participant would have needed to achieve mastery. Replication of the effectiveness of feedback or feedback plus rehearsal in a greater number of participants would strengthen the component analysis.

Although this study was primarily completed to examine parent behavior, a limitation might be argued for the absence of a measure of child social initiations and responses. Without these data, the current study cannot verify that this parent-implemented treatment resulted in gains in appropriate social initiations and responses in the children. Unfortunately, in order to ensure parents were following the procedure and prompting appropriately, children were left with little opportunity to independently initiate social interactions. Future studies might address this problem by adding probes of child behavior with no adult prompting periodically over the course of the study. In addition, and perhaps more importantly, future studies should include criteria for fading

prompts such that children are offered independent opportunities to engage with their peers.

Despite this limitation, however, the study offers anecdotal evidence of the effectiveness of the parent-implemented intervention. For example, Parent 2 reported to the primary investigator that her son had begun to comment more frequently without prompting, and he began to ask various “wh” questions in appropriate situations. Similarly, Child 4 was reported to have made gains in compliance and frequency of functional verbalizations by both his mother and the speech therapist that referred him to the study. Finally, Parent 6 reported that her son demonstrated an improved ability to take turns and compromise with his peers. While these reports are not objective and may be skewed by expectation of treatment effects, they do provide some evidence that the treatment was beneficial and socially valid.

A third limitation pertains to the absence of objective data for child problem behavior. As previously discussed, problem behavior seemed to play a major role in parents’ ability to implement the procedure with fidelity based on anecdotal evidence. Including a continuous measure of such behaviors would allow for more firm conclusions as to their impact on the results of the current study.

A final potential limitation pertains to the fact that current study quantified parent affect by using operational definitions found in Koegel, Symon, and Koegel (2002) rather than use repeated administrations of a psychometrically sound assessment instrument. This rating scale allowed for the continuous measurement of overt behaviors associated with parent affect while avoiding the monetary and temporal costs associated with using some assessments. Ratings were operationally defined to the extent possible, but it is

possible that parents would have reported levels of happiness and/or stress that are much different from those estimated by an outside observer. Furthermore, the current study found that ratings of happiness, interest, and stress were very highly correlated with one another, suggesting that these scales may not represent three independent factors. Future studies might allow parents to rate their own affective experiences so as to account and control for differences between self-and observer-report.

Strengths and Future Directions

The current study provides a systematic investigation of the components used in a behavioral skills training package and provides evidence for feedback as the component responsible for a significant portion of the behavioral change that was observed in parents. These results will be beneficial in designing and implementing parent training programs that are both effective and efficient. Such efficient packages may decrease cost and allow providers to deliver services to more parents than would otherwise be served. There are numerous other iterations of BST packages that can be investigated in this manner in pursuit of increasingly efficient training methods. For example, the current study used modeling in the form of role-play. It is possible, however, that different results would be observed if methods such as video modeling or in vivo modeling were used. It may also be beneficial to determine whether similar results could be obtained by providing feedback during role-play conditions, and whether those results would generalize to sessions with the children. Finally, future studies might also investigate the application of this training model in a group format.

In addition to providing insight into effective and efficient training strategies, the current study also incorporated a method to monitor parent affect. Although this aspect of

the current study was not the primary focus and the methods utilized do not allow for any direct statements regarding the connection between parent affect and skill acquisition, results do provide evidence that affect may be important to consider when training some parents. Future studies should more directly investigate this relationship as well as examine whether steps taken to decrease stress can positively impact parents' ability to learn and implement skills.

A final strength of the current study is related to participant demographics and the diversity of the sample. Many single subject studies in the literature related to parent training and social skills interventions for children with ASD include middle class, Caucasian families. The current study included Caucasian, African American, and European families with a range of education and socioeconomic status. This is an important aspect to consider as it gives some evidence for the external validity of these findings.

References

- Abdallah, M. W., Greaves-Lord, K., Grove, J., Norgaard-Pedersen, B., Hougaard, D.M., & Mortensen, E. L. (2011). Psychiatric comorbidities in autism spectrum disorders: Findings from a Danish historic birth cohort. *European Child & Adolescent Psychiatry, 20*, 599-601.
- Abidin, R. R. (1995). *Parenting Stress Index*. Lutz, FL: Psychological Assessment Resources.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (Fourth Edition – Text Revision). Washington D.C.: American Psychiatric Association.
- Amr, M., Raddad, D., El-Mehesh, F., Bakr, A., Sallam, K., & Amin, T. (2012). Comorbid psychiatric disorders in Arab children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 6*, 240-248.
- Attwood, T. (2000). Strategies for improving the social integration of children with asperger syndrome. *Autism, 4*, 85-100.
- Bagner & Graziano, (2012). Barriers to success in parent training for young children with developmental delay: The role of cumulative risk. *Behavior Modification, 37*, 356-377.
- Baker, B. L., Blacher, J., Crnic, K. A., & Edelbrock, C. (2002). Behavior problems and parenting stress in families of three-year-old children with and without developmental delays. *American Journal on Mental Retardation, 107*, 433-444.

- Baker, B. L., McIntyre, L. L., Blacher, K., Crnic, C. Edelbrock, C., & Low, C. (2003). Pre-school children with and without developmental delay: behavior problems and parenting stress over time. *Journal of Intellectual Disability Research, 47*, 217-230.
- Bauminger, N. & Kasari, C. (2000). Loneliness and friendship in high-functioning children with autism. *Child Development, 71*, 447-456.
- Bellini, S. (2004). Social skill deficits and anxiety in high-functioning adolescents with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 19*, 78-86.
- Bolton, J. & Mayer, M. D. (2008). Promoting the generalization of paraprofessional discrete trial teaching skills. *Focus on Autism and Other Developmental Disabilities, 23*, 103-111.
- Bryson, S. A., Corrigan, S. K., McDonald, T. P., & Holmes, C. (2008). Characteristics of children with autism spectrum disorders who received services through community mental health centers. *Autism, 12*, 65-82.
- Cappadocia, M. C. & Weiss, J. A. (2011). Review of social skills training groups for youth with Asperger Syndrome and High Functioning Autism. *Research in Autism Spectrum Disorders, 5*, 70-78.
- Carter, A. S., Davis, N. O., Klin, A., & Volkmar, F. R. (2005). Social development in autism. In F. R. Volkmar, R. Paul, A. Klin, & D. Cohen (Eds.), *Handbook of Autism and Pervasive Developmental Disorders: Vol. 1. Diagnosis, Development, Neurobiology, and Behavior*. Hoboken, NJ: John Wiley & Sons.

- Chawarska, K. & Volkmar, F. (2005). Autism in infancy and early childhood. In F. R. Volkmar, P. Paul, A. Klin, & D. Cohen (Eds.), *Handbook of Autism and Pervasive Developmental Disorders: Vol. 1. Diagnosis, Development, Neurobiology, and Behavior*. (pp. 223-246). Hoboken, NJ: John Wiley & Sons.
- Church, C., Alisanski, S., & Amanullah, S. (2000). The social, behavioral, and academic experiences of children with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities, 15*, 12-20.
- Cohen, I. L. (2003). Criterion-related validity of the PDD Behavior Inventory. *Journal of Autism and Developmental Disorders, 33*, 31-45.
- Cohen, I. L., Schmidt-Lackner, S., Romanczyk, R., & Sudhalter, V. (2003). The PDD Behavior Inventory: A rating scale for assessing response to intervention in children with pervasive developmental disorder. *Journal of Autism and Developmental Disorders, 33*, 47-53.
- Cohen, I. L. & Sudhalter, V. (2005). *The PDD-Behavior Inventory*. Lutz, FL: Psychological Assessment Resources.
- Coolican, J., Smith, I. M., & Bryson, S. E. (2010). Brief parent training in pivotal response treatment for preschoolers with autism. *Journal of Child Psychology and Psychiatry, 51*, 1321-1330.
- Crockett, J. L., Fleming, R. K., Doepke, K. J., & Stevens, J. S. (2007). Parent training: Acquisition and generalization of discrete trials teaching skills with parents of children with autism. *Research in Developmental Disabilities, 28*, 23-36.

- Dib, N. & Sturmey, P. (2007). Reducing student stereotypy by improving teachers' implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis, 40*, 339-343.
- 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 Disabilities, 17*, 198-207.
- Feldman, M. A., Case, L., Rincover, A., Towns, F., & Betel, J. (1989). Parent education project III: Increasing affection and responsivity in developmentally handicapped mothers: Component analysis, generalization, and effects on child language. *Journal of Applied Behavior Analysis, 22*, 211-222.
- Fernandez, M. A. & Eyeberg, S. M. (2009). Predicting treatment and follow-up attrition in parent-child interaction therapy. *Journal of Abnormal Child Psychology, 431-441*.
- Frankel, R. M., Leary, M., & Kilman, B. (1987). Building social skills through pragmatic analysis: assessment and treatment implications for children with autism. In D. J. Cohen, A. M. Donnellan, & R. Paul (Eds.), *Handbook of Autism and Pervasive Developmental Disorders* (pp. 333-359). Chichester: John Wiley & Sons.
- Ghaziuddin, M. & Zafar, S. (2008). Psychiatric comorbidity of adults with autism spectrum disorders. *Clinical Neuropsychiatry, 5*, 9-12.
- Gillett, J. N. & LeBlanc, L. A. (2006). Parent implemented natural language paradigm to increase language and play in children with autism. *Research in Autism Spectrum Disorders, 1*, 247-255.

- Ginsburg, G. S., La Greca, A. M., & Silverman, W. K. (1998). Social anxiety in children with anxiety disorders: Relation with social and emotional functioning. *Journal of Abnormal Child Psychology*, 26, 175-185.
- Green, J., Gilchrist, A., Burton, D., & Cox, A. (2000). Social and psychiatric functioning in adolescents with Asperger syndrome compared with conduct disorder. *Journal of Autism and Developmental Disorders*, 30, 279-293.
- Herring, S., Gray, K., Taffe, J., Tonge, B., Sweeney, D., & Einfeld, S. (2006). Behaviour and emotional problems in toddlers with pervasive developmental disorders and developmental delay: associations with parental mental health and family functioning. *Journal of Intellectual Disability Research*, 50, 874-882.
- Howlin, P. (1997). Prognosis in autism: do specialist treatments affect long-term outcome? *European Child and Adolescent Psychiatry*, 6, 55-72.
- Ingersoll, B. & Gergans, S. (2007). The effect of a parent-implemented imitation intervention on spontaneous imitation skills in young children with autism. *Research in Developmental Disabilities*, 28, 163-175.
- Ingersoll, B. & Hambrick, D. Z. (2011). The relationship between the broader autism phenotype, child severity, and stress and depression in parent of children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 5, 337-344.
- Jones, K. M., Wickstrom, K. F., & Friman, P. C. (1997). The effects of observational feedback on treatment integrity in school-based behavioral consultation. *School Psychology Quarterly*, 12, 316-326.
- Joshi, G., Petty, C., Wozniak, J., Henin, A., Fried, R., Galdo, M., Kotarski, M., Walls, S., & Biederman, J. (2010). The heavy burden of psychiatric comorbidity in youth

with autism spectrum disorders: A large comparative study of a psychiatrically referred population. *Journal of Autism and Developmental Disorders*, 40, 1361-1370.

Kaminski, J. W., Valle, L. A., Filene, J. H., & Boyle, C. L. (2008). A meta-analytic review of components associated with parent training program effectiveness. *Journal of Abnormal Child Psychology*, 36, 567-589.

Kaufman, A. S. & Kaufman, N. L. (2004) *The Kaufman Brief Intelligence Test-2*. Minneapolis, MN: Pearson Assessments.

Keen, D., Couzens, D., Muspratt, S., & Rodger, S (2010). The effects of a parent-focused intervention for children with a recent diagnosis of autism spectrum disorder on parenting stress and competence. *Research in Autism Spectrum Disorders*, 4, 229-241.

Koegel, R. & Frea, W. D. (1993). Treatment of social behavior in autism through the modification of pivotal skills. *Journal of Applied Behavior Analysis*, 26, 369-377.

Koegel, R. L., O'Dell, M. C., & Koegel, L. K. (1987). A natural language teaching paradigm for nonverbal autistic children. *Journal of Autism and Developmental Disorders*, 17, 187-200.

Koegel, R. L., Schreibman, L., Britten, K., Burke, J. C., & O'Neill, R. E. (1982). A comparison of parent training to direct child treatment. In R. L. Koegel, A. Rincover, & A. I. Egel (Eds.) *Educating and Understanding Autistic Children*. Houston: College Hill Press.

- Koegel, R. L., Symon, J. B., & Koegel, L. K. (2002). Parent education for families of children with autism living in geographically distant areas. *Journal of Positive Behavior Interventions, 4*, 88-103.
- Kohler, F. W., Strain, P. S., Hoyson, M., & Jamieson, B. (1997). Merging naturalistic teaching and peer-based strategies to address the IEP objectives of preschoolers with autism: An examination of structural and child behavior outcomes. *Focus on Autism and Other Developmental Disabilities, 12*, 196-206.
- Lafasakis, M. & Sturmey, P. (2007). Training parent implementation of discrete-trial teaching: effects on generalization of parent teaching and child correct responding. *Journal of Applied Behavior Analysis, 40*, 685-689.
- La Greca, A. M. & Lopez, N. (1998). Social anxiety among adolescents: Linkages with peer relations and friendships. *Journal of Abnormal Child Psychology, 26*, 83-94.
- Landa, R. J. (2008). Assessment of social communication skills in preschoolers. *Mental Retardation and Developmental Disabilities Research Reviews, 11*, 247-252.
- Lavie, T. & Sturmey, P. (2002). Training staff to conduct a paired-stimulus preference assessment. *Journal of Applied Behavior Analysis, 35*, 209-211.
- Lavigne, J. V., LeBailly, S. A., Gouze, K. R., Binns, H. J., Keller, J., Pate, L. (2010). Predictors and correlates of completing behavioral parent training for the treatment of oppositional defiant disorder in pediatric primary care. *Behavior Therapy, 41*, 198-211.
- LeBlanc, L. A., Esch, J., Sidener, T. M., & Firth, A. M. (2006). Behavioral language interventions for children with autism: Comparing applied verbal behavior and naturalistic teaching approaches. *The Analysis of Verbal Behavior, 22*, 49-60.

- LeBlanc, M., Ricciardi, J. N., & Luiselli, J. K. (2005). Improving discrete trial instruction by paraprofessional staff through an abbreviated performance feedback intervention. *Education and Treatment of Children, 28*, 76-82.
- Lecavalier, L., Leone, S., & Wiltz, J. (2006). The impact of behaviour problems on caregiver stress in young people with autism spectrum disorders. *Journal of Intellectual Disability Research, 50*, 172-183.
- Leyfer, O. T., Folstein, S. E., Bacalman, S., Davis, N. O., Dinh, E., Morgan, J., Tager-Flusberg, H., & Lainhart, J. E. (2006). Comorbid psychiatric disorders in children with autism: Interview development and rates of disorders. *Journal of Autism and Developmental Disorders, 36*, 849-861.
- Little, L. (2001). Peer victimization of children with Asperger spectrum disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*, 995-996.
- 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 Education Needs, 10*, 74-81.
- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Counseling and Clinical Psychology, 55*, 3-9.
- Lovaas, O. I., Koegel, R., Simmons, J. Q., & Long, J. S. (1973). Some generalization and follow-up measures on autistic children in behavior therapy. *Journal of Applied Behavior Analysis, 6*, 131-166.

- Lovaas, O. I. & Taubman, M. T. (1981). Language training and some mechanisms of social and internal control. *Analysis and Interventions in Developmental Disabilities, 1*, 363-372.
- Lydon, H., Healy, O., & Leader, G. (2011). A comparison of video modeling and pivotal response training to teach pretend play skills to children with autism spectrum disorder. *Research in Autism Spectrum Disorders, 5*, 872-884.
- Lugnegard, T., Hallerback, M. U., & Gillberg, C. (2011). Psychiatric comorbidity in young adults with a clinical diagnosis of Asperger syndrome. *Research in Developmental Disabilities, 32*, 1910-1917.
- Maestro, S., Muratori, F., Cavallaro, M. C., Pei, F., Stern, D., Golse, B., & Palacio-Espasa, F. (2002). Attentional skills during the first 6 months of age in autism spectrum disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 41*, 1239-1245.
- Mattila, M., Hurtig, T., Haapsamo, H., Jussila, K., Kuusikko-Gauffin, S., Kielinen, M., Linna, S., Ebeling, H., Bloigu, R., Joskitt, L., Pauls, D. L., & Moilanen, I. (2010). Comorbid psychiatric disorders associated with Asperger syndrome/High-functioning autism: A community- and clinic-based study. *Journal of Autism and Developmental Disorders, 40*, 1080-1093.
- Matson, J. L., Dempsey, T., & LoVullo, S. V. (2009). Characteristics of social skills for adults with intellectual disability, autism and PDD-NOS. *Research in Autism Spectrum Disorders, 3*, 207-213.

- Matson, J. L., Matson, M., L., & Rivet, T. T. (2007). Social-skills treatments for children with autism spectrum disorders: An overview. *Behavior Modification, 31*, 682-707.
- McConachie H. & Diggle, T. (2007). Parent implemented early intervention for young children with autism spectrum disorder: a systematic review. *Journal of Evaluation in Clinical Practice, 13*, 120-129.
- McEvoy, M. A. & Odom, S. L. (1987). Social interaction training for preschool children with behavioral disorders. *Behavioral Disorders, 12*, 242-251.
- Mortenson, B. P. & Witt, J. C. (1998). The use of weekly performance feedback to increase teacher implementation of a prereferral intervention. *School Psychology Review, 27*, 613-627.
- Mueller, M. M., Piazza, C. C., Moore, J. W., & Kelley, M. E. (2003). Training parents to implement pediatric feeding protocols. *Journal of Applied Behavior Analysis, 36*, 545-562.
- Mullen, E. M. (1995). Mullen Scales of Early Learning. Circle Pines, MN: American Guidance Service Inc.
- Myles, B. S., Bock, S. J., & Simpson, R. L. (2001). *Asperger syndrome diagnostic scale*. Austin, TX: Pro-Ed.
- Nigro-Bruzzi, D. & Sturmey, P. (2010). The effects of behavioral skills training on mand training by staff and unprompted vocal mands by children. *Journal of Applied Behavior Analysis, 43*, 757-761.
- Noell, G. H., Witt, J. C., Gilbertson, D. N., Rainer, D. D., & Freeland, J. T. (1997). Increasing teacher intervention implementation in general education settings

- through consultation and performance feedback. *School Psychology Quarterly*, 1, 77-88.
- Odom, S. L. & Strain, P. S. (1986). A comparison of peer-initiation and teacher-antecedent interventions for promoting reciprocal social interactions of autistic preschoolers. *Journal of Applied Behavior Analysis*, 19, 59-71.
- Osterling, J. & Dawson, G. (1994). Early recognition of children with autism: A study of first birthday home videotapes. *Journal of Autism and Developmental Disabilities*, 24, 247-257.
- Osterling, J. A., Dawson, G. & Munson, J. A. (2002). Early recognition of 1-year-old infants with autism spectrum disorder versus mental retardation. *Development and Psychopathology*, 14, 239-251.
- Palmen, A., Didden, R., & Korzilius, H. (2010). Effectiveness of behavioral skills training on staff performance in a job training setting for high-functioning adolescents with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 4, 731-740.
- Parsons, S. & Mitchell, P. (2002). The potential of virtual reality in social skills training for people with autistic spectrum disorders. *Journal of Intellectual Disability Research*, 46, 430-443.
- Parsons, M. B., & Reid, D. H. (1995). Training residential supervisors to provide diagnostic feedback for maintaining staff teaching skills with people who have severe disabilities. *Journal of Applied Behavior Analysis*, 28, 317-322.

- Peters-Scheffer, N., Didden, R., Korzilius, H. (2012). Maternal stress predicted by characteristics of children with autism spectrum disorder and intellectual disability. *Research in Autism Spectrum Disorders, 6*, 696-706.
- Pierce, K. & Schreibman, L. (1997). Multiple peer use of pivotal response training to increase social behaviors of classmates with autism: results from trained and untrained peers. *Journal of Applied Behavior Analysis, 30*, 157-160.
- Prizant, B., Weatherby, A., & Rydell, P. J. (2000). Communication intervention issues for young children with autism spectrum disorders. In B. Prizant & A. Weatherby (Eds.) *Language Issues in Autism and Pervasive Developmental Disorder: A Transactional Developmental Perspective* (pp. 193-224). Baltimore, MD: Brookes.
- Rao, P. A., Beidel, D. C., & Murray, M. J. (2008). Social skills interventions for children with Asperger's syndrome of high-functioning autism: A review and recommendations. *Journal of Autism and Developmental Disorders, 38*, 353-361.
- Reagon, K. A. & Higbee, T. S. (2009). Parent-implemented script fading to promote play-based verbal initiations in children with autism. *Journal of Applied Behavior Analysis, 42*, 659-664.
- Reichow, B. & Volkmar, F. R. (2010). Social skills interventions for individuals with autism: evaluation for evidence-based practices within a best evidence synthesis framework. *Journal of Autism and Developmental Disorders, 40*, 149-166.
- Reichow, B., Volkmar, F. R., Cicchetti, D. V. (2008). Development of the evaluative method for evaluative and determinig evidence-based practices in autism. *Journal of Autism and Developmental Disorders, 38*, 1311-1319.

- Rocha, M. L., Schreibman, L., & Stahmer, A. C. (2007). Effectiveness of training parents to teach joint attention in children with autism. *Journal of Early Intervention, 29*, 154-172.
- Roeyers, H. (1996). The influence of nonhandicapped peers on the social interactions of children with a pervasive developmental disorder. *Journal of Autism and Developmental Disorders, 26*, 303-320.
- Rogers, S. J. (2000). Interventions that facilitate socialization in children with autism. *Journal of Autism and Developmental Disorders, 30*, 399-409.
- Rogoff, B. (1990). *Apprenticeship in thinking*. New York: Oxford University Press.
- Ryden, E. & Bejerot, S. (2008). Autism spectrum disorders in an adult psychiatric population. A naturalistic cross-sectional controlled study. *Child Neuropsychiatry, 5*, 13-21.
- Sanders, M. R. & Woolley, M. L. (2005). The relationship between maternal self-efficacy and parenting practices: implications for parent training. *Child: Care, Health, & Development, 31*, 65-73.
- Sarokoff, R. A. & Sturmey, P. (2004). The effects of behavioral skills training on staff implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis, 37*, 535-538.
- Sarokoff, R. A. & Sturmey, P. (2008). The effects of instructions, rehearsal, modeling, and feedback on acquisition and generalization of staff use of discrete trial teaching and student correct responses. *Research in Autism Spectrum Disorders, 2*, 125-136.

- Schwartz, I. S. & Baer, D. M. (1991). Social validity assessments: Is current practice state of the art? *Journal of Applied Behavior Analysis, 24*, 189-204.
- Schepis, M. M., Reid, D. H., Ownbey, J., & Parsons, M. B. (2001). Training support staff to embed teaching within natural routines of young children with disabilities in an inclusive preschool. *Journal of Applied Behavior Analysis, 34*, 313-327.
- Scholper, E., Van Bourgondien, M. E., Wellman, G. J., & Love, S. R. (2010) *Childhood Autism Rating Scale-2nd Edition (CARS2)*. Los Angeles, CA: Western Psychological Services.
- Schreiber, C. (2011). Social skills interventions for children with high-functioning autism spectrum disorders. *Journal of Positive Behavior Interventions, 13*, 49-62.
- Schreibman, L. (2000). Intensive behavioral/psychoeducational treatments for autism: Research needs and future directions. *Journal of Autism and Developmental Disorders, 30*, 373-378.
- Schreibman, L. & Koegel, R. L. (1996). Fostering self-management: Parent delivered pivotal response training for children with autistic disorder. In E. D. Hibbs & P. S. Jensen (Eds.), *Psychosocial treatment for child and adolescent disorders: Empirically based strategies for clinical practice* (pp. 525-552).
- Schultz, T. R., Schmidt, C. T., & Stichter, J. P. (2011). A review of parent education programs for parents of children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 26*, 96-104.
- Shanley, J. R. & Niec, L. N. (2010). Coaching parents to change: The impact on in vivo feedback on parents' acquisition of skills. *Journal of Clinical Child and Adolescent Psychology, 39*, 282-287.

- Sparrow, S. S., Cicchetti, D. V. & Balla, D. A. (2005) *The Vineland Adaptive Behavior Scales, Second Edition*. Circle Pines, MN: American Guidance Service, Inc.
- Stahmer, A. C. (1995). Teaching symbolic play skills to children with autism using pivotal response training. *Journal of Autism and Developmental Disorders*, 25, 123-141.
- Stahmer, A. C. (1999). Using pivotal response training to facilitate appropriate play in children with autistic spectrum disorders. *Child Language Teaching and Therapy*, 15, 29-40.
- Sterling-Turner, H. E., Watson, T. S. & Moore, J. W. (2002). The effects of direct training and treatment integrity on treatment outcomes in school consultation. *School Psychology Quarterly*, 17, 47-77.
- Sterling-Turner, H. E., Watson, T. S., Wildmon, M., Watkins, C. & Little, E. (2001). Investigating the relationship between training type and treatment integrity. *School Psychology Quarterly*, 16, 56-67.
- Stewart, K. K., Carr, J. E., & LeBlanc, L. A. (2007). Evaluation of family-implemented behavioral skills training for teaching social skills to a child with Asperger's disorder. *Clinical Case Studies*, 6, 252-262.
- Stokes, T. F. & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis*, 10, 349-367.
- Strauss, K., Vicari, S., Valeri, G., D'Elia, L., Arima, S., & Fava, L. (2012). Parent inclusion in Early Intensive Behavioral Intervention: The influence of parental stress, parent treatment fidelity and parent-mediated generalization of behavior targets on child outcomes. *Research in Developmental Disabilities*, 33, 688-703.

- Symon, J. B. (2005). Expanding interventions for children with autism: Parents as trainers. *Journal of Positive Behavior Interventions, 7*, 159-173.
- Tantam, D. (2000). Psychological disorder in adolescents and adults with Asperger syndrome. *Autism, 4*, 47-62.
- Tantam, D. (2003). The challenge of adolescents and adults with Asperger syndrome. *Child and Adolescent Psychiatric Clinics, 12*, 143-163.
- Thorp, D. M., Stahmer, A. C., & Schreibman, L. (1995). Effects of sociodramatic play training on children with autism. *Journal of Autism and Developmental Disorders, 25*, 265-282.
- Tonge, B., Bereton, A., Kiomall, M., MacKinnon, A., King, N., & Rinehart, N. (2006). Effects on parental mental health of an education and skills training program for parents of young children with autism: A randomized controlled trial. *Journal of the American Academy of Child and Adolescent Psychiatry, 45*, 561-569.
- Trembath, D., Balandin, S., Togher, L., & Stancliffe, R. J. (2009). Peer-mediated teaching and augmentative and alternative communication for preschool-aged children with autism. *Journal of Intellectual and Developmental Disability, 34*, 173-186.
- Wang, P. (2008). Effects of a parent training program on the interactive skills of parents of children with autism in China. *Journal of Policy and Practice in Intellectual Disabilities, 5*, 96-104.
- Ward-Horner, J. & Sturmey, P. (2008). The effects of general-case training and behavioral skills training on the generalization of parents' use of discrete-trial

- teaching, child correct responses, and child maladaptive behavior. *Behavioral Interventions*, 23, 271-284.
- Weiss, M. J. & Harris, S. L. (2001). Teaching social skills to people with autism. *Behavior Modification*, 25, 785-802.
- Werner, E., Dawson, G., Osterling, J., & Dinno, N. (2000). Brief report: Recognition of autism spectrum disorder before one year of age: A retrospective study based on home videos. *Journal of Autism and Developmental Disorders*, 30, 157-162.
- Werba, B. E., Eyeberg, S. M., Boggs, S. R., & Algina, J. (2006). Predicting outcome in parent-child interaction therapy: Success and Attrition. *Behavior Modification*, 30, 618-646.
- White, S. W., Koenig, 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.
- Wolfberg, P. J. & Schuler, A. L. (1993). Integrated play groups: A model for promoting the social and cognitive dimensions of play in children with autism. *Journal of Autism and Developmental Disorders*, 23, 467-489.
- Wolfberg, P. J. & Schuler, A. L. (1999). Fostering peer interaction, imaginative play and spontaneous language in children with autism. *Child Language Teaching and Therapy*, 15, 41-52.
- Wood, A. L., Luiselli, J. K., & Harchik, A. E. (2007). Training instructional skills with paraprofessional service providers at a community-based habilitation setting. *Behavior Modification*, 31, 847-855.

Yang, T., Wolfberg, P. J., Wu, S., & Hwu, P. (2003). Supporting children on the autism spectrum in peer play at home and school: Piloting the integrated play groups model in Taiwan. *Autism, 7*, 437-453.

Zercher, C., Hunt, P., Schuler, A., & Webster, J. (2001). Increasing joint attention, play and language through peer supported play. *Autism, 5*, 374-398.

Footnote

¹ Reichow, Volkmar, and Cicchetti (2008) presented a method for evaluating empirical evidence in order to establish evidence based practices in autism. Each study should be evaluated according to a series of primary and secondary quality indicators. The primary quality indicators listed include, but are not limited to, the availability of participant characteristics, adequate definitions of independent and dependent variables, the presence of a comparison (group design) or baseline (single subject design) conditions, and appropriate data analysis techniques (i.e., statistical tests for group designs and visual analysis in single subject designs). Examples of secondary quality indicators include blind raters, treatment fidelity, and evaluation of generalization and maintenance. The evidence provided by the study is then rated as “Strong,” “Adequate,” or “Weak” according to the number of primary and secondary quality indicators included in the study. Please see Tables 1-3 of the manuscript (Reichow et al., 2008; pp. 1313-1314) for a more thorough description of the quality indicators and criteria for rating the strength of research.