Chapter 10
Peer and Adult Socialization

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Impairments in social interaction are a hallmark feature of autism spectrum disorders (ASD). Deficits in social behaviors are often present by the end of the first year of life (Ingersoll 2011), and are one of the first recognizable signs of the disorder (e.g. Zwaigenbaum et al. 2005). In addition, studies examining the course of ASD symptoms over the lifespan suggest that most individuals with ASD continue to show significant social difficulties in adolescence and adulthood, and these symptoms are closely related to community inclusion (Orsmond et al. 2004) and other quality of life indicators (Howlin et al. 2004). Social symptoms appear to show less improvement over time (see Seltzer et al. 2004 for review) and may be less responsive to traditional treatments than symptoms in the other core ASD domains, such as language skills (Strain and Schwartz 2001). For these reasons, a variety of interventions have been developed that are specifically focused on increasing socialization in children with ASD.

Social skills interventions may be generally classified into three broad approaches, parent-mediated interventions, peer- and sibling-mediated interventions, and direct instruction in social skills. Although each of these approaches can be used with children with ASD at any stage of development, the different approaches are often targeted toward different developmental stages. For example, increasing early social-communication skills—such as social engagement, imitation, language, and play—with significant others is a primary goal for young children with ASD (Rogers 1999). Thus, many social skills interventions developed for toddlers and preschoolers with ASD utilize a parent-mediated approach, which teaches parents to use techniques to increase their child's social-communication skills during parent–child

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interactions. As children with ASD enter school, social skills with peers become more important. Thus, peer- and sibling-mediated interventions are often used with school-aged children with ASD in order to promote social interaction and friendships with other children. Direct instruction in social skills, in which the child with ASD is taught to engage in specific social behaviors with adults or other children, has been used with children with ASD across development; however, the specific strategies used often differ depending on the age of the child. This chapter will provide an overview of these different approaches to improve socialization in children with ASD. The reader is referred to several, recently published comprehensive reviews of social skills interventions for children with ASD (Bellini and Peters 2008; McConnell 2002; Reichow and Volkmar 2010; Rogers 2000; Scattone 2007) for a more detailed discussion of these approaches and their research base.

Parent-Mediated Interventions

Young children with ASD typically present with significant delays in early nonverbal social-communication skills—such as social engagement, joint attention, and imitation—as well as language and play skills (Wetherby et al. 2004). These behaviors are fundamental for establishing early social interactions with others (Tomasello 1995), and thus deficits in these skills often lead to interaction difficulties with caregivers and other adults (Sigman et al. 1986). Parent-mediated interventions provide caregivers with direct instruction in intervention strategies to manage their child's behavior and support their child's social-emotional development (Mahoney et al. 1999). A number of studies, including several recent randomized control trials, have demonstrated that parent-mediated intervention is an effective approach to improve social-communication skills in young children with ASD (McConachie and Diggle 2007) and can improve the quality of parent–child interactions (Green et al. 2010).

There are numerous benefits associated with parent-mediated interventions for children with ASD. Teaching parents to use specific intervention techniques provides children with more hours of intervention in daily settings with natural interaction partners. Learning in such natural contexts has been shown to be associated with increases in generalization and maintenance of child skill (e.g., Koegel et al. 1982). Participation in parent-mediated intervention programs has also been associated with improvements in parental and family functioning. For example, research suggests that training parents in intervention techniques can lead to reductions in parental stress and depression (Tonge et al. 2006), which is particularly important given the high levels of stress and depression experienced by parents of children with ASD (e.g. Estes et al. 2009; Quintero and McIntyre 2010). Furthermore, participation in parent-mediated intervention programs has been found to be associated with increases in family leisure and recreation time, and increases in parents' optimism about their child's future (Koegel et al. 1982). Additionally, when parents are trained in intervention techniques, they can teach other important individuals in the child's life (e.g. siblings, grandparents)

how to use these strategies, thereby producing more opportunities for the entire family's involvement in the child's education and intervention (Symon 2005).

Although there is considerable agreement that early, intensive intervention, including parent-mediated approaches leads to improvements in children's functioning (NRC 2001), there is debate in the field as to which intervention approach is best for the promotion of child's skill and long-term outcomes (Ingersoll 2010a). Traditionally, behavioral interventions based on the principles of applied behavior analysis have had the largest evidence-base for promoting social-communication skills in young children with ASD (NRC 2001). The literature examining parent implementation of these behavioral techniques in more naturalistic settings—such as Pivotal Response Training (PRT; Schreibman et al. 1991), Naturalistic Language Paradigm (NLP; Koegel et al. 1987), and Milieu Teaching (e.g. Kaiser et al. 2000)—suggests that such programs are effective to increase social-communication skills in children with ASD. Another body of research has indicated that parent-mediated intervention programs which take a developmental or social-pragmatic approach to intervention, such as Relationship Development Intervention (RDI; Gutstein 2001), Responsive Teaching (Mahoney and Perales 2003), and Hanen's More Than Words (Sussman 1999) can also produce significant improvements in a variety of child social-communication skills. With the recognition that parent training in both behavioral and developmental strategies can be effective intervention approach, investigators have begun to examine ways to integrate techniques from both approaches into parent training curricula. Initial evaluations of such programs, like Project ImPACT (Ingersoll and Dvortcsak 2010) and the Early Start Denver Model (ESDM: Rogers and Dawson 2009), suggest that the use of these "blended" parent-mediated intervention programs can be effective for increasing child social-communication skills.

Parent Training in Naturalistic Behavioral Intervention

Naturalistic behavioral parent training programs have traditionally focused on teaching parents prompting and reinforcement strategies to increase their child's use of core social-communication skills such as language and imitation. In one of the earliest studies of parent training for children with autism, Laski et al. (1988) examined the efficacy of training parents of children with ASD to use the Natural Language Paradigm to promote their children's spontaneous speech. Results from this study indicated that all parents increased their use of the intervention techniques, and all children increased their rate of vocalizations. Parents and children generalized their newly learned skills to additional non-training environments (Laski et al. 1988). In a different study, Kaiser and colleagues (2000) taught six mothers of children with autism to implement Enhanced Milieu Teaching (EMT) strategies to promote their children's spontaneous verbal language. All parents increased their correct use of the EMT techniques from baseline to intervention sessions, with five out of the six mothers achieving criterion level fidelity of implementation during the 24-session training program. Moreover, all six children showed increases in their total use of

communication targets; however, increases in spontaneous use of communication targets were variable across individual children. Most parents and children in this study were able to generalize use of skills across the majority of situations and over a period of time (Kaiser et al. 2000). Nefdt and colleagues (2009) created a computerized self-directed learning program for parents of children with ASD that taught motivational techniques from pivotal response training (PRT) to increase their children's social-communication, primarily verbal language. After the use of the computerized training program, parents were able to implement PRT strategies with fidelity, provided more language opportunities for their children, and displayed greater confidence when interacting with their children. Moreover, children of these parents demonstrated increases in their use of verbal language (Nefdt et al. 2009). Finally, Ingersoll and Gergans (2007) evaluated the efficacy of training parents to use a naturalistic behavioral intervention, reciprocal imitation training (RIT), in order to improve imitation skills in children with ASD. Parents were able to increase their use of intervention techniques in a lab setting as well as during play interactions with their children at home. Additionally, children in the study increased their spontaneous imitation with objects during lab sessions and were able to generalize these skills to their home environments. Taken together, these studies suggest that parents can be taught to implement naturalistic behavioral techniques with a high degree of fidelity to promote gains in their child's use of core social-communication skills.

Parent Training in Developmental/Social Pragmatic Intervention

A different, and growing, body of research suggests that parent-mediated developmental or social-pragmatic interventions can also lead to important gains in social-communication skills in children with ASD. These developmental parent training programs typically focus on enhancing the parent-child relationship and promoting child skills such as social engagement, shared affect, and social reciprocity (Brookman-Frazee et al. 2009). Many of the early evaluations of developmental parent-mediated intervention programs did not use experimental designs; although changes in important outcome measures were observed, it was difficult to attribute these changes to the parent training directly (Ingersoll 2010a). For example, Mahoney and Perales (2003) examined the effect of Responsive Teaching, a parent-mediated intervention, for 20 children with ASD using a pre-post study. Results from this study indicated that a majority of parents became more responsive with their children during participation in the program and a majority of children demonstrated significant gains in social-emotional skills, including social competence. Improvements in parents' responsiveness was associated with child gains in social-emotional skills. However, there were no controls in this particular study making it impossible to parse out maturational and other effects from the impact of the parent training program (Mahoney and Perales 2003). Recently, a handful of controlled trials of parent-mediated developmental interventions have been conducted to address limitations of the early work in this area. For example, McConachie and colleagues (2005)

evaluated the effect of Hanen's More than Words curriculum (Sussman 1999), a developmental parent-mediated intervention, on parents' ability to facilitate social-communication in their children with ASD. Parents who participated in the program used significantly more facilitative strategies during parent-child interactions than did parents in the control condition. Moreover, parents who received training indicated larger gains in child vocabulary than did parents in the control group. Green and colleagues (2010) evaluated the effect of a parent-mediated communication-focused intervention, Preschool Autism Communication Trial (PACT), on parent and child outcomes. Results from this study suggest that parents in the PACT group improved their parental synchrony with their child and rated their children as having greater improvements in language and social-communication skills than did the parents of children in the treatment as usual group. The results of investigations of developmental parent training programs suggest that parents can learn to increase their responsiveness in order to facilitate the development of social-communication skills in their children with ASD.

Parent Training in Blended Approach to Intervention

Although the underlying theoretical tenets of naturalistic behavioral and developmental approaches differ, they are actually quite similar in terms of the intervention techniques utilized to help parents promote their child's social-communication skills (Ingersoll 2010a). Appreciating these similarities, researchers have begun to examine parent-mediated interventions that integrate intervention techniques from both approaches in order to further enhance the social-communication skills of children with ASD (Ingersoll and Dvortsack 2006). In a pilot study of the Early Start Denver Model (Vismara et al. 2009), investigators examined the impact of participation in a blended program on parental skill acquisition and child social-communication skills. Seven out of eight parents were able to achieve mastery of implementation of the intervention techniques after participating in the program for 6 weeks. Moreover, these parents retained high levels of implementation fidelity over the next several months. Additionally, children whose parents completed the program demonstrated increases in social-communication skills including expressive language. A pilot study of another blended parent training program, Project ImPACT (Ingersoll and Dvortscak 2010), found similarly encouraging results for the use of such an approach (Ingersoll and Dvortsak 2006). The format of this particular parent training program was developed to be compatible with classroom-based intervention models, and thus the parent training can be conducted by clinicians as well as classroom teachers. Results from the pilot study revealed that parents increased their understanding of the intervention techniques, were highly satisfied with training format, and attributed gains in their child's social-communication skills to the program. A follow up study of Project ImPACT (Ingersoll and Wainer in press) found that the parent training program could be effectively implemented by educators in early childhood classroom settings to

produce improvements in parent's fidelity of intervention implementation, decreases in parental stress, and improvements in child social-communication skills.

Summary

The majority of empirical research on parent-mediated interventions for children with ASD has examined the efficacy and effectiveness of teaching various intervention techniques to parents to promote social-communication, and thus early socialization skills. Across studies, there is emerging evidence to suggest that these approaches can increase early social-communication skills in young children with ASD and that gains are maintained over time. As such, teaching parents how to promote their child's social-communication during daily routines and activities is recommended practice for ASD intervention (NRC 2001). Although research indicates that parent training can lead to gains in parents' implementation of intervention techniques, the differential effectiveness of various delivery formats, training procedures, and training materials on parental learning is less clear; nonetheless, a number of training models appear to be effective.

Peer- and Sibling-Mediated Interventions

While children with ASD typically show broad difficulties with social interaction, interaction with similar-aged peers is often even more challenging than interaction with adults (e.g. Stone and Caro-Martinez 1990). Given that children with ASD tend to have particular difficulty interacting with similar-aged children, a number of interventions have aimed to involve siblings or peers directly in interventions to promote socialization in children with ASD. Peer- and sibling-mediated intervention may confer several advantages over adult-delivered intervention. First, socially competent peers or siblings can serve as models for appropriate social behavior. Second, social behaviors learned with peers or siblings may be more likely to generalize to other peer interaction situations than skills learned only with adults. Finally, involving peers or siblings directly in interventions for children with ASD may help children form closer relationships or friendships with the involved peers or siblings.

A large body of research has examined the use of peer-mediated interventions for supporting socialization in children with ASD. These interventions range widely in the amount of structure and support given to the interaction partners to promote positive interactions between children with ASD and their typically-developing siblings and peers. Overall, peer-mediated approaches have been among the most well-researched interventions for promoting socialization in children with ASD (McConnell 2002; Rogers 2000). Peer-mediated intervention approaches have been categorized as "emerging and effective" in a recent review of single-subject design research (Odom et al. 2003) and McConnell (2002) includes the use of peer-mediated

strategies as a recommendation for educational practice. Social skills interventions that are implemented with the aid of typically-developing peers lead to better generalization and maintenance of skills than interventions implemented by adults alone (Rogers 2000). However, in many of these interventions, generalization of skills to untrained peers has been limited (McConnell 2002); therefore, children with ASD may have difficulty maintaining social gains after leaving a classroom environment in which a successful peer-mediated intervention has been implemented. A number of different intervention strategies involving peers and siblings as intervention agents will be described below.

Inclusion

The 1997 Reauthorized Individuals with Disabilities Education Act (IDEA) stipulates that individuals with disabilities, including those with ASD, should be educated in the "least restrictive environment" suitable for their educational needs. This enables students with ASD to have maximal access to normalized settings and typically developing peers, and to be "included" in classrooms with typically-developing peers. Given this provision, inclusion of children with ASD in classrooms with typically-developing students is a goal for many students with ASD. While typically developing students may be able to serve as models for appropriate social behavior and potential friends for children with ASD, simply placing children with ASD in classrooms with typically developing peers does not guarantee that students with ASD will improve their social interaction skills or form meaningful friendships (Mesibov and Shea 1996). In addition, placing children with ASD in regular classroom settings without additional support may be difficult or impossible for students with greater support needs. Therefore, recent models of inclusion advocate that educational placement in a typical classroom should be accompanied by careful educational planning and the use of a number of empirically supported intervention techniques (including the peer-mediated intervention strategies described below) in order to be most beneficial to children with ASD (Harrower and Dunlap 2001; Simpson et al. 2003).

Arranging the Environment to Promote Interaction

One way of supporting socialization between children with ASD and typically developing peers in an integrated classroom setting is by arranging the classroom situation to promote interactions between children with ASD and their typically developing peers. A classroom environment with structured activities which lend themselves to cooperation among peers, facilitated by adults, may increase the chance of successful social interactions between children with ASD and typically developing peers. For example, the integrated playgroup model typically includes a consistent schedule and routine with play activities appropriate to the developmental level of the

children with ASD (Wolfberg and Schuler 1993). In addition, a small number of familiar typically developing peers are involved, and an adult closely monitors the play interactions and encourages the children to become involved in joint activities. Integrated playgroups using these components have led to increased interaction between children with ASD and peers as well as increases in appropriate play behavior in children with ASD (Roeyers 1996; Wolfberg and Schuler 1993).

Peer Buddies/Tutors

Some peer-mediated intervention programs have provided additional impetus for children with ASD to interact directly with their typically developing peers by assigning typically developing peers to serve as "peer buddies" or "peer tutors" for children with ASD (e.g. Garrison-Harrell et al. 1997; Haring and Breen 1992; Kamps et al. 1997). In the peer buddy model, typically developing students are paired with students with ASD to serve as social supports for these students. Typically developing students are educated about the student with whom they are paired (e.g. taught how to use an augmentative communication system, taught to engage in or support specific social interaction behaviors) and may also be reinforced by teachers for engaging in positive interactions with their peer buddies. A related intervention model, a peer network model, pairs a number of students with the student with ASD, rather than using 1:1 pairs. This provides the student with ASD an opportunity to increase his social engagement with a larger number of peers. This approach has been found to be successful for increasing peer acceptance of students with ASD and frequency and duration of social interactions between the students with ASD and trained peers (Garrison-Harrell et al. 1997; Kamps et al. 1997) in young school-aged children. Haring and Breen (1992) reported similar results of a peer network approach when used with two 13-year-old boys with disabilities.

While peer buddy and peer network interventions pair students with the specific goal of promoting social interactions, peer tutoring interventions involve typically developing students as educational supports for children with ASD. In the peer tutoring model, typically developing students are taught to serve as academic tutors (e.g. in reading or math) for students with ASD. Typically developing students are taught specific tutoring skills and then paired with students with ASD. Peer tutoring interventions led not only to improved academic performance for the students with ASD, but also to increased social interactions during free time for these students, when compared to teacher-led programs (Dugan et al. 1995; Kamps et al. 1994, 1999). Peer tutoring has also been used to teach adaptive skills to lower-functioning students with ASD, with improved responding of students with ASD to typical peers reported over time, in addition to mastery of targeted adaptive behaviors (Blew et al. 1985). These studies suggest that pairing students with ASD with typically developing students can lead to social interaction gains for students with ASD, whether or not social skills are specifically targeted in the relationship.

Teaching Peers/Siblings to Initiate Interactions

While the previously described interactions have set up situations in specific ways in the hopes of facilitating social interaction between children with ASD and typical peers (e.g., by arranging the setting in specific ways or pairing children with ASD with typical peers), a number of interactions have directly taught peers skills specifically targeted at successfully initiating social interactions with students with ASD. A number of studies have demonstrated increases in the social interactions of young children with ASD when peers are trained to initiate interactions using "play organizers" such as helping, sharing, giving affection, and praise (e.g. Goldstein et al. 1992). These interventions have demonstrated robust changes in social interactions of children with ASD, including generalization to untrained peers. Generalization and maintenance have been strongest when multiple peers are trained in the intervention and peers are taught to self-monitor after adult prompting and reinforcement is faded (Rogers 2000 for review). These same interventions have also been used successfully to improve interactions between children with ASD and their siblings, with parents serving as teachers for the typically developing siblings (Strain and Danko 1995; Strain et al. 1994).

Teaching Peers/Siblings to Deliver Simple Treatments to Build Skills

A final class of peer- and sibling-mediated interventions has adapted skill-building treatments such as Pivotal Response Training and Incidental Teaching for use by typically developing peers and siblings. These treatments have been effective at increasing child skills (e.g. language, joint attention, play skills) when delivered by adults. Therefore, having peers or siblings deliver these treatment components may potentially confer the double advantage of building specific skills in the child with ASD while also promoting peer and sibling socialization skills. Interventions that have been adapted for use in peer- and sibling-mediated components consisted of skills such as modeling, prompting, and reinforcement in naturalistic settings and have been used with children as young as preschool-aged. McGee et al. (1992) taught preschool-aged children in an inclusive classroom to use incidental teaching with their peers with ASD. Incidental teaching consists of using preferred play materials to create opportunities to prompt and reinforce language use. McGee et al. (1992) found increases in reciprocal social behavior, social initiations, and peer acceptance following the use of peer-mediated incidental teaching. Peers have also successfully used Pivotal Response Training techniques, including modeling, shaping, and reinforcement, to improve social interactions in school-aged children with ASD (Pierce and Schreibman 1997).

Similar intervention procedures have also been used with siblings of children with ASD. Typically-developing siblings have been able to learn a number of interventions

that include skills such as modeling, prompting, and reinforcement of appropriate play and language behaviors in their siblings with ASD. Coe et al. (1991) taught school-aged siblings to prompt and praise their siblings' appropriate social behaviors, resulting in an increase in appropriate social interaction behaviors in the siblings with ASD. Walton and Ingersoll (in press) taught siblings to use Reciprocal Imitation Training, a naturalistic behavioral intervention targeting social imitation, leading to qualitative changes in play interactions between the siblings. Tsao and Odom (2006) taught siblings a more complex intervention. In a series of ten lessons, siblings were taught skills such as staying in proximity to their sibling with ASD, creating opportunities for social interaction, giving clear directions, and providing feedback. This intervention led to increases in social interaction as well as joint attention skills for the children with ASD.

These studies suggest that peers and siblings of children with ASD can learn relatively complex intervention packages often used by adult therapists to increase social skills in children with ASD. These interventions lead to skill gains for the children with ASD and facilitate social interactions between the typically developing children and their peers or siblings with ASD.

Summary

In conclusion, a number of techniques involving peers or siblings as intervention agents have been successful at promoting socialization with same-aged play partners in children with ASD. While merely placing children with ASD in the same classrooms as typically developing peers may not be enough to facilitate successful peer interactions, a number of peer-mediated interventions can be implemented to increase successful socialization among these children. Interventions that can successfully promote socialization in children with ASD include organizing and facilitating a supportive environment for peer interaction, pairing typically developing peers with children with ASD as peer buddies or tutors, teaching peers and siblings to initiate interactions with children with ASD, and teaching peers or siblings to deliver more complex intervention packages for children with ASD. It is clear that involving typically developing children in socialization interventions for children with ASD aids in facilitating successful interactions among peers that are more likely to generalize to new settings and maintain over time.

Direct Instruction in Social Skills

A number of interventions have been developed to directly teach a range of appropriate social skills to children with ASD. Direct social skills interventions have been used with children from earliest diagnosis through adolescence; thus the type of skills targeted and the specific instructional techniques used differ depending on

the age and ability of the child. The most common techniques include naturalistic interventions, Social Stories, technological interventions (video-based or computer-based instruction), social skills groups, scripting, prompting, or priming procedures (as part of interventions using applied behavior analysis or pivotal response treatments), and self- monitoring (Bellini and Peters 2008; Reichow and Volkmar 2010). This section will focus on naturalistic interventions, video-based instruction, Social Stories, and social skills groups as they have garnered the most empirical support (Bellini and Peters 2008; Reichow and Volkmar 2010).

Naturalistic Interventions

A number of naturalistic interventions have been used to directly teach early social-communication skills—such as joint attention, joint engagement, and social imitation—to young children with ASD. These approaches, which embed teaching within child-chosen play activities, utilize the same intervention techniques as the parent-mediated naturalistic behavioral and developmental interventions described above; however, intervention is provided directly by a trained therapist rather than a caregiver.

A number of single-subject designs (e.g. Ingersoll and Schreibman 2006; Whalen and Schreibman 2003) and several recent randomized controlled trials (Ingersoll 2010b; Kasari et al. 2006) have shown that direct instruction using naturalistic interventions can improve early social skills in young children with ASD. For example, one randomized study examined the effect of adding a 6-week joint attention intervention or symbolic play intervention to a comprehensive program in 58 preschoolers with ASD (Kasari et al. 2006). Children in the treatment groups received 30 min per day of a joint attention or symbolic play intervention as part of an existing intervention program, while children in the control group received the existing program alone (the program did not specifically target early social communication skills). After 6 weeks, the children in the joint attention group used more joint attention and the children in the symbolic play group used more symbolic play acts than the children in the other groups. In addition, the children in both treatment groups had greater gains in language skills 1 year later (Kasari et al. 2008), suggesting that targeting early nonverbal social communication skills may promote the long term development of verbal skills in children with ASD. Another recent study examined the effect of an intervention targeting social imitation in toddlers and preschoolers with ASD (Ingersoll 2010b). Children in the treatment group received 3 h per week of treatment for 10 weeks while children in the control group received treatment as usual in the community. At post treatment, children in the treatment group had significantly greater gains in spontaneous social imitation skills than children in the control group. In a follow-up of the participants at 2–3 months post treatment, children in the treatment group made significantly greater gains in the initiation of joint attention during a structured assessment and on a parent-report measure of social-emotional functioning than the control group (Ingersoll 2012), suggesting that teaching social

imitation using a naturalistic treatment approach can lead to broader improvements in social functioning.

Video-Based Instruction

In recent years, video-based instruction has been used extensively to target social skills in individuals with ASD. Video-based instruction takes advantage of the fact that many children with ASD are stronger visual than auditory learners and find video and related technology very reinforcing (Kroeger et al. 2007). Video-based instruction comprises three techniques: video modeling, video self-modeling, and point-of-view modeling. In video modeling, the participant watches a video in which the target skill is modeled immediately prior to engaging in the relevant social situation. The instructor typically provides prompting and reinforcement to increase attention towards the relevant stimuli, and then the participant is given the opportunity to imitate the model demonstrated in the video (Bellini and Akullian 2007, Graetz et al. 2006; Shukla-Mehta et al. 2010; Sigafoos et al. 2007). Video self-monitoring is similar, except that the video is a recording of the actual participant appropriately displaying the target behavior (Hitchcock et al. 2003; Shukla-Mehta et al. 2010). Point-of-view modeling records the components of the environment and activity from the point-of-view of the participant. The video captures each step of the target skill at the eye level of the participant, allowing the individual viewing the recording to have a clear visual representation of what they are supposed to do to accomplish each part of a task (Shukla-Mehta et al. 2010).

A number of studies have supported the efficacy of video-based instruction for increasing a range of social skills in children with ASD (e.g. Kroeger et al. 2007; Nikopoulos and Keenan 2004). In fact, a recent meta analysis of video-based instruction recommended that it be considered an evidence-based practice for the treatment of social skills in ASD (Shukla-Mehta et al. 2010). Several studies have attempted to identify specific elements of video-based instruction that enhance learning by comparing different models (self vs. other, peer vs. adult) or presentation formats (e.g. playing whole video or one step at a time; e.g. Charlop-Christy et al. 2000; Gena et al. 2005). These studies have not found specific elements to be consistently more effective across participants (Shukla-Mehta et al. 2010); however, there is evidence that video models result in more rapid rates of skill acquisition than live models for children with ASD (Charlop-Christy et al. 2000).

Social Stories

Another common approach to direct instruction in social skills is the use of Social Stories. Social Stories are written instructions presented in a story format that are aimed at teaching a child a particular social (or behavioral) concept. The stories are

intended to be individualized to the social or behavioral needs of the child, and multiple stories are often used to instruct on a wide variety of skills (Karkhaneh et al. 2010; Reynhout and Carter 2006). Social Stories are composed of text with specific sentence structures, which may be complete or partial, with partial sentences used to encourage children with ASD to anticipate upcoming situations or specific responses (Reynhout and Carter 2006). However, strict adherence to the recommended construction is not always used and does not seem to negatively impact the efficacy of the intervention (Quirmbach et al. 2009; Reynhout and Carter 2006). Like video-based instruction, Social Stories are typically read immediately prior to engaging in the relevant social situation. However, homework, such as reading the story at home or practicing the behaviors described in the text, is also used (Reynhout and Carter 2006). Some Social Story interventions have included additional prompting and reinforcement by the instructor for engaging in the appropriate social behavior (e.g. Kuoch and Mirenda 2003).

Research on the effect of Social Stories on social skills in children with ASD has found inconsistent results, with some studies finding large positive effects whereas others with minimal benefit (see Ali and Frederickson 2006 for review). Variations in outcomes across studies are likely due to the complexity of social skills targeted, other components of the intervention (e.g. prompting and reinforcement), and the skill level of the participants. In the largest study examining the effectiveness of Social Stories (Quirmbach et al. 2009), 45 children with high-functioning autism (ages 7–14) were randomly assigned to a standard Social Story designed to increase game playing skills, a directive sentences only Social Story focused on increasing game play, or control story (Social Story unrelated to game play). Compared to the control group, children in the experimental groups exhibited significant improvement in game playing skills (e.g. asking another person to play a game and accepting their choice of games), as well as generalization of skills to other games. These gains were maintained after 1 week. However, one third of the participants (those with a verbal IQ below 68) did not improve their game playing skills through the intervention. These findings, along with others (e.g. Feinberg 2001), suggest that Social Stories are more likely to be effective for children with ASD whose verbal IQ is in the borderline range or above.

Social Skills Groups

Another approach that has often been used to teach social skills to children with ASD is social skills groups. This approach has been primarily used with school-aged children and adolescents with high-functioning autism or Asperger's Syndrome who have language abilities in the average range. Groups typically include 4–8 children with ASD and 1–2 instructors (e.g. Tse et al. 2007), and are often implemented in a clinic or other "pull-out" setting (Reichow and Volkmar 2010). The number of and content of sessions vary, but most groups are conducted once a week for at least

3 months and cover topics such as recognition and use nonverbal social behaviors, conversation skills, emotion recognition, effective coping, and friendship skills.

Across the literature there is general support for the use of social skills groups for youth with high-functioning ASD and social skills groups are one of the few intervention formats for social skills training that meet criteria set forth by Reichow and colleagues (2008) to be considered an evidence-based program. However, some studies report weak effects, inconsistent results, and poor maintenance of skills (Krasny et al. 2003; Reichow and Volkmar 2010; White et al. 2007). Most of studies that have found positive effects have examined changes in skills directly addressed by the intervention (e.g. improvement in emotion recognition skills). However, they have either not examined or failed to find generalized improvement in more global social skills (e.g. teacher report) or peer interaction skills outside of the group (White et al. 2007). These findings suggest that social skills groups may be limited in their ability to produce broader changes in social functioning, especially when it comes to peer relationships. However, several randomized controlled trials of the PEERS program, have found significant treatment effects on peer interaction skills for children and adolescents with ASD (Gantman et al. 2012; Laugeson et al. 2012). This intervention involves a concurrent parent training group that teaches parents how to help their children carry over their skills to other environments. Thus, parent-assisted social skills intervention implemented in a group format may significantly enhance social outcomes for high-functioning students with ASD.

Future Directions

There is emerging evidence to support the efficacy of a wide variety of interventions for improving social interaction and related skills with peers and adults for children with ASD. Although the evidence is promising, additional research is needed on the ability of these approaches to produce skill gains that generalize to new situations and interaction partners and maintain over time. Generalization appears to be most challenging for interventions that provide direct instruction to children with ASD in specific skills outside of the context in which they are expected to use them (e.g. social skills groups).

An important next step is to conduct direct comparisons between approaches to determine the most effective ways to teach specific types of social behaviors. Thus far, only one randomized controlled trial has directly compared the ability of different intervention approaches to improve peer-related social skills in children with ASD. Kasari and colleagues (2012) compared direct child instruction, peer training, and a combined approach, to a no treatment control in 60 school-aged children with high-functioning ASD included in regular education settings. Intervention (target child instruction or peer instruction) was conducted twice a week in 20 min sessions for 6 weeks. Primary social outcomes involved social network salience and peer engagement during a playground observation. The findings indicated that the peer-mediated approach led to better social outcomes than direct child instruction for both

primary outcomes, and that gains maintained at a 12 week follow-up. The children in the combined intervention had the greatest improvements in social network salience, suggesting that a combined approach which teaches both peers and the target child skills may have stronger effects.

There is also a need for the development and evaluation of interventions that can increase socialization in individuals with ASD who have significant intellectual disabilities and/or who remain nonverbal (Rogers 2000; Walton and Ingersoll in press). To date, most social skills interventions for school-age children and adolescents with ASD have been developed for those who are high-functioning or who have at least adequate verbal skills. This may be because these individuals are more likely to be educated in regular education settings and thus, the need for improving peer interaction skills may be viewed as more pressing. However, research indicates that the development of social relationships is an important aspect of quality of life for individuals with ASD across the spectrum (Plimley 2007) and thus it is important to develop approaches that can improve socialization in individuals with ASD who are typically underrepresented in the social skills literature.

In sum, there are a number of promising approaches for increasing socialization in children with ASD. Further research that can identify the optimal approaches for teaching specific types of social behaviors for children at different ages and ability levels is needed.

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