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Promoting social communication in high functioning individuals with autistic spectrum disorders

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Social and communicative dysfunctions are arguably the most handicapping conditions associated with Asperger syndrome. Although the rubric *social communication* is used frequently to encompass these deficits, *social communication* is actually a redundant term. All communication, by its definition as an exchange of information between speaker and listener, is social in nature. The purpose of using the term *social communication* here, however, is to focus attention on the close relationship between the linguistic forms of communication used by high functioning individuals with autistic spectrum disorders (ASDs), and the function of these skills in the achievement of social interaction. In fact, in typical individuals over the age of 3 years, linguistic communication is the primary modality of social interchange.

Although linguistic communication skills are used for a variety of purposes—regulating others' behavior, referring to objects and events, narrating and predicting experiences, and learning academic content, for example—the present paper focuses on just one of these functions: achieving mutuality and engagement with others. Effectively establishing this engagement, even with access to advanced language skills, constitutes one of the core deficits of intelligent individuals with AS. Social communicative abilities are crucial to achieving the community integration and peer acceptance that would seem to be within the grasp of these bright young people, yet so often eludes them. The high rates of depression reported in verbal adolescents with ASDs are generally interpreted to

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be a reaction to this frustrating situation [1]. Young people with AS are frequently eloquent in their despondency at their isolation from the social world [2].

This review of programs for addressing social communication needs in people with AS, then, highlights what is known about recruiting the language competencies possessed by high functioning individuals in the service of promoting cooperative play, social inclusion, and friendship. It examines programs that target interactive skills at a range of developmental levels from preschool through adolescence, and with a range of theoretic perspectives from highly teacher-directed discrete trial methods to more naturalistic and child-centered approaches. An effort is made to highlight programs that have reported carefully applied research designs, well defined groups of children, and appropriate measures of change and generalization in peer-reviewed venues, which, unfortunately, constitute a minority of the programs advocated for this population. Although the focus of this volume is on Asperger syndrome, the needs of children with this disorder do not differ greatly from those of high functioning children with other kinds of ASDs. Because most research on social communication training has focused on children with autism or pervasive developmental disorders-not otherwise specified (PDD-NOS) and few published studies have looked at AS exclusively, studies that include high functioning, verbal children at all points along the autistic spectrum are included. At the conclusion of the review, this information is interpreted in light of the specific characteristics of AS, and recommendations for selecting programs most appropriate for the AS population are made.

Early social communicative interventions

During the preschool period, between 3 and 5 years of age, typical children develop a range of social interaction skills that are mediated in important ways by their language development. Garvey [3] showed that children as young as age 3 years use language to negotiate play roles and activities (“I’ll be the doctor and you can be the sick person”). According to Patterson and Westby [4], by age 3 years, children use language for a multitude of purposes in play, including to narrate action, to plan future events in the play context, to mark dialogue with metalinguistic markers such as “he said,” and to vary voices to distinguish characters. Children with AS, even though they do not show significant delays in the acquisition of the forms of language, are, as a result of their core deficits, less able to demonstrate these varied uses of language in the context of cooperative play, and often show great difficulty in entering sociodramatic play situations without support [5]. For these reasons, social communication programs in the preschool period typically use play as the primary context.

Wolfberg [6] reports that, without support, verbal children with ASDs tend toward repetitive enactments of solitary routines around their obsessive interests and avoid social play or approach peers with obscure, one-sided overtures that are unlikely to be reciprocated. Schuler and Wolfberg [5] discuss the challenges in helping children with ASDs participate more successfully in social play. One

of the paradoxes of this endeavor is that play—by its nature—is symbolic, exclusively child-centered, open-ended, and defined by joint attention and action. Yet these very attributes tap the most profound areas of deficit in children with ASDs. Moreover, it is known that effective interventions for children with ASD are highly structured, routine, predictable, and adult-organized [7]. How, then, can adult-structured interventions help youngsters to participate in the child-directed, dynamic flow of interactive play?

Schuler and Wolfberg [5] argue that the way to resolve this conflict is to provide children with ASDs with opportunities for *guided participation* in social play. There are two primary means of supplying this guidance: through coaching by adults and through mediation provided by trained peers. Brown and Conroy [8], Lord and McGee [9], and Rogers [10] provide reviews of published literature on preschool social communication intervention. These reviews reveal that children with ASDs do show increases in social play when appropriate supports are provided. For the present review, some examples of adult-mediated approaches are presented, and then those that make use of trained peers are discussed.

Adult-mediated interventions

Early studies in this area focused on adult-mediated interactions, using applied behavior analysis procedures. Allen and colleagues [11] showed that restructuring teachers' reinforcements to socially isolated children, by ignoring their initiations to adults and reinforcing attention to peers, was enough to increase child-to-child interactions. Odom et al [12] used teacher prompting without reinforcement to increase social interactions of young children with ASD. Individual coaching using teacher prompts and praise in the context of peer play was also found to increase rates of social initiation by target children, but these bids were only responded to 50% of the time by typical peers [13]. Only when peer training was added did rates of successful interaction increase. Drasgow et al [14] suggested that these procedures need to be practiced in all the environments in which generalization is to occur for the interactive behaviors to be maintained.

Goldstein et al [15] used adults to teach sociodramatic scripts to two trios of preschool children (one target child with ASD and two peers with typical development) within an inclusionary preschool classroom environment. All children were taught each of three social roles (eg, doctor, nurse, patient) using teacher instruction that was systematically reduced over time. Results revealed that interaction and generalization improved during free play periods at preschool, but effects depended on the continuation of teacher prompts and did not lead to increases in other social exchanges during the rest of the class day.

Less operant approaches to promoting social interaction also have been used. Wolfberg and Schuler [16] provided an overview of an integrated play-group model that uses a social constructivist framework (ie, one that relies on the notion of play as an artifact of the "culture of childhood"). This framework requires ethnographic observations of play to avoid developing interventions that interfere with its organic structure. Thus, strategies include monitoring play initiations to

discover their form in the particular “cultural group” of the target child’s classroom, scaffolding interactions by acting as an interpreter for the target child and providing appropriate cues to interaction, guiding social communication by fostering invitations to play, enlisting reluctant peers, helping target children respond to peers’ cues, maintaining and expanding interactions with narrative language, and guiding play by incorporating the target child’s unusual behaviors (eg, lining up objects) into a meaningful play context (eg, acting as clerk who neatens up shelves in a play store). Wolfberg and Schuler [16] present preliminary results of a case study that argue for the effectiveness of this approach.

Another naturalistic approach to social communicative intervention is referred to under the rubric of “friendship” activities [8]. These approaches typically rely on teachers’ prompting children to compliment and show affection for each other within the naturally occurring routines of the preschool day (unlike the more operant approaches that use more structured training in out-of-class environments). McEnvoy et al [17] have applied these techniques to preschool children with ASDs with some positive results.

Other approaches make use of “hybrid” methods, those that combine elements of operant techniques with more naturalistic methods. One hybrid approach that has been used to increase socialization in preschoolers with ASDs is incidental teaching. This method involves arranging the environment so that objects and activities known to interest the child are in sight but out of reach, following the child’s attentional lead to choose the focus of interactions, and using expectant waiting rather than prompts to elicit communication from the child, so that the child is the initiator. Incidental teaching approaches have been shown to promote language use and to enhance social initiations and responses in children with autism [18], and results have been maintained over time [19].

Krantz and McClannahan [20] used script-fading procedures with preschoolers with minimal reading skills. The children were taught to use the written cues “Look” and “Watch me” to initiate conversation with adults who did not prompt but only responded to conversation directed to them. The scripts were faded by cutting away portions of the cue cards. Unscripted interactions were found to continue and generalize to new topics.

Quill [21] has presented a comprehensive curriculum for developing social and communicative skills in young children with autism at various levels of functioning. The curriculum advocates highly structured and naturalistic approaches and suggests focusing on the target child’s responsiveness to typical peers, rather than promoting initiations. Intervention guidelines include organization of the environment to facilitate participation and cooperation, careful selection of materials, and activities structured to foster the target child’s participation. Activities early in this sequence include:

- Closed-ended activities, such as putting features on a Mr. Potato Head
- A limited set of materials
- Separate materials for each player
- Activities that require no sharing, turn-taking, or waiting (eg, parallel play)

The target child is given coaching and practice in observing, responding to, and imitating the typical play partner to progress to activities that are more open-ended, use a wider variety of materials, and involve more interactive play. Coaching of typical peers to use strategies such as nonverbal cues to gain the target child's attention, to wait for a response, and to interpret unusual responses is also a part of this curriculum. Numerous examples of ways to embed these principles in typical preschool classroom activities are provided. As a synthetic, comprehensive curriculum, this program draws on methods devised in many of the earlier studies reported, but it does not provide any independent empiric validation of its efficacy.

Similarly, empiric studies that contrast hybrid approaches with naturalistic friendship techniques or more structured approaches like Goldstein et al [15] have not been reported. Moreover, most of the studies cited earlier involved single subject or very small group designs and used general outcome measures, such as social initiations, without looking more specifically at the use of particular communication strategies (eg, pointing, signing, talking). Thus, we have much to learn before we can identify the most efficient teacher-directed approaches for promoting verbal means of social interaction in young children with AS.

Peer-mediated interventions

The drawbacks of adult-mediated play interventions seem to be that target children become dependent on adult input to continue interacting. Although some systematic fading procedures have attempted to address this problem [12], highly trained adults are needed to implement them appropriately, and teachers often express reluctance to engage in them [22]. Brown and Conroy [8] point out that teacher interventions may even serve to interrupt direct child-to-child interactions.

For these reasons, recent approaches to enhancing social interactions in this population have turned to peers as primary agents of intervention. Initially, it was hoped that merely placing children with disabilities in classrooms with typical peers would enhance social communication. Although modest improvements were observed in some studies [23], others failed to find any effects at all [24,25]. Further, these studies focused on children with a range of developmental disabilities and did not focus on the specific difficulties in socialization presented by children with ASDs.

The work of Strain and colleagues represents the most sustained effort to develop successful peer-mediated socialization strategies and provides the strongest empiric support [26–28]. In their approach, typical peers are taught to present and persevere in presenting “play organizers” to classmates with ASDs. Organizers consist of sharing, helping, giving affection, and praising. Peers are taught these skills in role-playing activities with adults and then are cued and reinforced by the adults in play sessions with target children. Reinforcements are carefully faded. Work by this group [27,29] and in replication studies [30,31] has demonstrated generalization and maintenance. Strain et al [32] also

have shown that self-monitoring techniques can be used so that interactions are successfully maintained without adult reinforcement. The importance of delivering interventions within inclusive preschools rather than in laboratory settings for achieving generalization and maintenance also has been emphasized.

In a case study involving a high functioning child with ASD, Oke and Shreibman [33] extended this method by adding two components: they trained a typical peer to differentiate between parallel and interactive play, and trained the target child to initiate interaction with the peer. They found that these additions led to maintaining high rates of interaction, decreased inappropriate behaviors, and generalization across peers (but not across settings).

Despite the evidence supporting their success, these programs are difficult and labor-intensive to implement, requiring highly trained peers and precise adult control of the peer training. Although training manuals [34] and extensive discussions of the method in the research literature are available, teachers outside of comprehensive university- or hospital-based settings object to implementing them [35]. Moreover, Strain and Hoyson [36] have argued that a comprehensive inclusionary program implemented over a sustained period of time during the preschool period is necessary to achieve the levels of success reported in the literature, so that even if carefully implemented peer social communicative programs are instituted, they may not achieve maximum effectiveness without the other features offered by comprehensive programs.

As a consequence of these difficulties and limitations, some approaches have attempted to devise simpler forms of peer-mediated intervention. Goldstein and colleagues [37] have extended their script-based methods to include peer-mediation, for example. Their Buddy Skills Training Program teaches three simple strategies to peer “buddies:”

- **STAY** with your buddy: maintain physical proximity to assigned partner
- **PLAY** with your buddy: maintain proximity while continuing to play with your partner (in programs specifically adapted for children with ASDs, partners are offered a choice of one activity each from a visual “choice board,” then are instructed to play with each partner’s choice for half the “buddy period” session, usually 10–20 minutes)
- **TALK** with your buddy: say your partner’s name to establish joint attention, make suggestions for playing together, talk about the play, respond to what your partner says by repeating, saying more about it, or asking a question

Research on this program demonstrated improvements in the frequency of social communication between buddies that persisted outside the specific “buddy time” sessions [38]. English et al [38] noted that training the target children in buddy skills did not increase social interactions any further, suggesting that training typical peers is adequate to achieve the observed increases in reciprocity. This program was not developed specifically for children with ASDs, but recent extensions with specific modifications for children with ASDs, such as visual choice boards, have shown promise.

Another attempt at a simplified program is presented by Garfinkle and Schwartz [39]. Three children with ASD were taught to imitate peers during small group activities in an inclusionary preschool classroom. Results suggest that participants increased peer imitation behaviors in the training setting, and also generalized them to free play settings. Increases in other social behaviors, such as proximity to peers and number of peer interactions, also were reported to increase.

There have been few studies that compare different procedures for enhancing social interaction at this developmental level. One study that compared structured play, adult instruction, peer instruction, and a combination of approaches found that peer-mediated methods resulted in largest effects and the greatest generalization and maintenance [27]. Children with autism, however, were not part of the subject group. Careful comparison studies among social communication training methods for children with ASDs are clearly needed.

Social communicative interventions for school-aged children

During the school age period, typically developing children expand the purposes for which they use language. Much talk during the preschool period concerns the here-and-now, immediate, tangible environment. Language reflects what the child already knows about the world around. During school age, however, children begin using language to acquire new information about objects and events with which they have no direct sensory experience [40]. For example, people talk to preschool children about where their shoes are. They talk to school-aged children about where the Andes are. Talk between peers changes during the elementary school years also. One prominent change is a move away from sociodramatic play as the primary context for social interaction to more topic-centered forms of interaction, such as discussing shared interests and playing games with rules. These changes result in necessary shifts in the contexts in which social skills training takes place.

School age is the time when higher functioning individuals with ASDs begin to be aware of loneliness and isolation. Bauminger and Kasari [41] reported that 22 children with autism (ages 7–14 years) reported significantly higher levels of loneliness and poorer quality of friendship than a matched group of typical peers in an interview study. Thus, children with AS are likely to begin to experience social isolation in the elementary school years, and social communicative training should be an important part of their intervention programs. Like programs for younger children with ASDs, programs for school-aged children fall at various points along the continuum of naturalness and make use of adult- and peer-mediated strategies.

Adult-mediated interventions

Coe et al [42] used direct instruction and primary reinforcers to teach two children with autism four steps (pick up, throw, initiate, praise) in a chain of

actions involved in playing ball. The children were found to increase their interactive behaviors in ball play, although generalization and maintenance were not reported.

Hwang and Hughes [43] reviewed 16 studies aimed at increasing social communication skills in children with ASDs. They examined five studies that used time delay (presenting a stimulus and waiting for specified periods before giving the child a prompt to respond) as the primary form of intervention for verbal children with ASDs. These studies resulted in increases in verbal responses during free play, but had little effect on eye contact. When time delay was combined with other strategies, such as teaching social amenities (please and thank you) and naturally occurring reinforcement, results were similar. Results of probes for generalization and maintenance were mixed, however, reinforcing that consistent carry-over is difficult to achieve with highly structured, adult-directed methods.

More child-centered methods for children at this level also have been presented. Harris et al [44] and Tiegerman and Primavera [45] used contingent imitation, having the adult imitate the child's actions. Tiegerman and Primavera [45] reported that imitating the child's play behaviors led to increases in the frequency and duration of gaze toward the adult. Harris et al [44] had adults imitate the child's self-stimulatory behaviors to increase positive affect and attention to others. Findings indicated positive changes, but generalization and maintenance were not examined. Gutstein and Sheely [46] produced a collection of exercises based on Greenspan and Wieder's [47] Relationship Development Intervention. Empiric data about effectiveness, generalization, and maintenance, however, are not available.

Another child-centered method that has attracted a good deal of interest in recent years is the use of social stories [48]. The stories are written collaboratively between the child and the facilitator. They are usually focused on reducing maladaptive behaviors, rather than on social interaction, using a specified format. They state a problem ("Waiting in line is hard"), give a reason for the socially accepted action ("The teacher needs to make sure everyone gets outside safely without pushing"), give the child an acceptable action to perform ("I can wait in line. I can think about how much fun it will be to play outside while I am waiting"), and an evaluation ("My teacher will be happy when I wait quietly in line. I will feel good when I get outside"). An initial study used a multiple baseline approach to monitor changes in three social behaviors targeted in social stories for one girl with autism, and found changes in only one of the three [49]. More recent studies, however, have added some features to the intervention that seem to facilitate its efficacy. Hagiwara and Myles [50] used a computer-based format for social stories with three school-aged boys with ASD. Using a multiple baseline design, the study showed the intervention increased skill levels of some of the participants in certain settings, with some generalization to new settings. Cullain [51] used social stories to reduce anxiety and inappropriate behaviors in five elementary school children with autism who were placed in inclusive classrooms. Using a treatment-withdrawal-treatment design, the study suggested a decrease in frequency of inappropriate behaviors and anxiety levels. Social

stories, then, seem to be somewhat effective in reducing problem behaviors, but limited evidence of generalization or maintenance is available.

In another child-centered approach, Baker, Koegel, and Koegel [52] created group games for three high functioning children with ASD based on each child's special interest, then taught the game to the target child and peers for use during a free period at school. Results suggested strong increases in peer interaction that were maintained through the followup period and generalized to other activities. Increases in positive affect in target children also were seen.

Hybrid methods of adult-mediated social communication programs provide high levels of structure and models while allowing the child to initiate social interactions. Two hybrid approaches reviewed by Hwang and Hughes [43] are *naturally occurring reinforcement* and *environmental arrangement*. These two approaches were combined in studies by McGee et al [53] and Pierce and Shreibman [54]. Both trained peers through modeling, role playing, and direct instruction to use natural reinforcement and to arrange environmental events to elicit communication from verbal children with autism. Both studies reported prolonged social interactions with peers. Pierce and Shreibman [54] also reported some generalization across persons and settings.

Another hybrid method that has been used in peer-mediated social skills programs is Pivotal Response Training (PRT). This approach involves choosing behaviors as targets that will have widespread, positive effects on a range of behaviors. In this way, PRT is believed to produce generalized improvements in areas that do not receive direct intervention. Pivotal areas that have been identified include responding to multiple cues and increasing motivation, self-initiation, and self-management [55]. Most germane to social communication are programs that have aimed at self-initiation. Koegel et al [56] used asking questions as a pivotal behavior, and taught children with autism to spontaneously initiate questions by putting objects in an opaque bag and, using prompt-fading procedures, training them to ask "What's that?" to be able to play with the object. Results indicated that, after completion of training, subjects used the question to obtain labels for objects whose names they did not know, that responses were generalized to the home setting, and that expressive vocabulary size increased as a result of their requests for names of new objects. In another study using this method, Thorp et al [57] reported increases in appropriate language, social engagement and decreases in inappropriate behavior using this method, but less effect on social initiations. Generalization and maintenance were not assessed.

Jahr et al [58] investigated the way in which language can be used to support social skills learning. Six high functioning school-aged students with autism were taught cooperative play skills using two methods. The first involved observing two models enact a play scene, then having the target student take one of the roles in repeating the scene. The second method was the same, except that the student with autism was required to give a verbal description of the scene before reenacting it. Results showed that students failed to acquire cooperative play until the verbal description was included in the training. With verbal descriptions, the subjects were able to take longer turns within episodes than during pretrain-

ing, and skills generalized across play partners, setting, and time. This study demonstrates that for verbal students with autism, language can serve as an important support to skill acquisition.

Krantz and McClannahan [59] used printed cues within classroom routines to stimulate social initiations in four verbal students with autism. Peer initiations increased significantly, and all four subjects used novel language to initiate interaction. Effects were maintained when cues were faded, and generalized to new peers.

Another approach that has shown promise is the use of video modeling. Charlop and Milstein [60] successfully used this method to teach conversational skills to three high functioning boys with autism. The boys were shown a videotape containing simple, appropriate conversations, and then they practiced the same conversations with an adult. In a later study, Charlop et al [61] showed that video modeling resulted in faster acquisition of skills, such as spontaneous labeling of objects and greetings, than did modeling from live demonstrations, and was effective in promoting generalization. Corbett and Larson [62] also have used video modeling to teach social communicative skills.

Peer-mediated interventions

One of the earliest investigations involving peer training for school-aged children was done by Strain et al [63]. Typical peers were taught to elicit, prompt, and reinforce social behavior in two pairs of children with autism. Social behaviors were found to increase during treatment, but fell when interventions were withdrawn. Later studies have shown the importance of using natural contexts in achieving generalization. Shafer et al [64] used direct models and prompt training to teach peers to elicit interactive play with four children with autism. Increases in responses and initiations in children with autism were seen, were maintained over time, and were generalized to new peers when these joined the play groups. Lord [65] reviewed research by her group showing that daily exposure in peer play with trained peers increased several social behaviors in children with autism, including proximity, appropriateness, and time spent looking at peers, although it did not increase initiations. These results also generalized to new trained peers. Findings were replicated with high functioning children with autism.

Pierce and Shreibman [66] trained eight peers to deliver pivotal response training (PRT) to two children with autism. Multiple baseline results showed that each target student made gains in maintaining social interactions and generalized across people, settings, and materials. Followup data demonstrated maintenance of skills over a 2-month period. Gains in initiations were not documented, however.

The difficulties of implementing these kinds of peer-mediated approaches are similar to those seen at the preschool level. They are labor-intensive and require constant monitoring and readjustment. Again, researchers have attempted to use simpler methods for achieving increased peer interaction. One method is the Social Skills Group. Kamps et al [67] conducted daily play sessions in groups of

one target and three typical students. Scripted social skills instruction, including greeting, sharing, taking turns, and helping, was provided to the group for 10 minutes, followed by 10 minutes of play in a planned activity. Increases in social skills, length of interactions, and consistency of responding were found for target students. Followup evaluation at the end of the school year showed that some skills were maintained over time.

Roeyers [68] presented another simplified approach. Children with ASD aged 5–13 years were paired with peers who were simply told to stay “on the same level” as their partner. Although improvements in rate of interaction were seen, children with autism still had difficulty managing social situations. Gunter et al [69] taught elementary school students to “prompt and praise” two students with autism while engaging in free play dyads. Prompts involved simple statements such as “Say hello to ____.” Peers also were taught to offer verbal praise to the target student when a prompt elicited the desired reply. A “multiple exemplar approach” in which several peers took turns with each student proved effective in increasing initiations by students with autism. Some generalization to untrained peers and environments was seen.

Peer networks are another strategy that has been used to increase social acceptance and involvement of children with disabilities. Peer networks involve awareness training about disabilities for typical peers and supervised joint activities in which typical peers are taught to initiate and model appropriate social interactions. Kamps et al [70] applied this method to three students with autism. Two to five peers served as a support network for each target student during several 10–20-minute sessions during the school day, including reading, lunch, and game time. They were taught to structure activities using scripts, prompting, and reinforcement for interaction. Results showed increased interaction time for all target students and generalization to new settings for two of the three. Other versions of the peer network approach include Special Friends and Circle of Friends [71,72]. These programs provide information about disabilities to students and teachers, specific information about the target student (eg, likes and dislikes, communication abilities), and ideas for support that peers can provide. Few data are available to support the efficacy of these programs, and there have been few instances in which they have been applied to students with autism. Whitaker et al [73] provide an initial report of the use of a Circle of Friends approach with six children with ASD.

Social communicative training at the elementary school level strengthens the suggestions seen in research on preschoolers, as shown below.

- In adult-mediated approaches, direct instruction is the most effective method for initial skill acquisition.
- Although direct, teacher-directed instruction is effective in improving interaction skills, less direct, more child-centered and hybrid methods also can be successful.
- Peers are powerful mediators and greatly enhance the ability of students with ASD to participate in social interactions in natural environments. Peers

who mediate these interactions, however, require direct instruction, repeated models, and practice.

- Using multiple peers who meet the above standards seems to be particularly powerful.
- Although students with autism can be taught to respond to social interactions, training them to initiate socially seems to be more difficult.

Social communicative interventions in adolescence

In adolescence, typical young people begin to engage in social interaction primarily by “just talking.” Unlike younger children whose social interactions are mediated by activities such as games, teenagers use language as the primary channel for interaction, as their long hours on the telephone, and now on Instant Messaging, attest. Although students with AS may have the requisite language skills to engage in these kinds of interactions, they, like their younger counterparts, have severe difficulty in using the skills they have to engage in social interactions [74]. As we saw with younger children with ASD, intelligent individuals with these disorders frequently experience a haunting sense of aloneness that they feel powerless to overcome. Despite their command of language, they seem unable to marshal it to enter successfully into the social fray of adolescence. These limitations not only affect their ability to form friendships, but also limit their vocational opportunities, often confining these very intelligent young people to menial jobs that make no use of their considerable talents because of their inability to function in interviews or to get along with co-workers [75]. Intervention to address this social isolation remains crucial at this stage of development. In fact, for students with AS, social communicative training may be the most important feature of intervention at the secondary school level.

Adult-mediated interventions

Kyriassis [76] developed a strategy for teaching adolescents with ASD to engage in extended conversations with each other. Students were taught to extend conversations by asking a question about what the previous speaker had said. Training began with scripts that provided participants opportunities to ask questions. Scripts were gradually faded. Training scripts included *what*, *where*, and *when* questions; generalization was assessed on *who*, *why*, and *how*. Generalization was seen to untrained conversations, and participants were rated as improved in conversation skills by blind raters after the intervention was completed.

Self-management strategies are believed to be especially important for maintaining social behaviors, because real social situations provide infrequent, weak reinforcements. Koegel and Frea [77] reported improving conversation skills in two high functioning teenagers with autism by using reinforcement to teach social skills such as maintaining eye contact and appropriate topics. The students

rapidly learned these behaviors, then they used wrist counters to tally their own frequency of appropriate behaviors, which was converted to points and exchanged for reinforcement. The reinforcement schedule was gradually thinned. Conversational behaviors were maintained for 30-minute intervals between token reinforcers, with generalization of skills to new situations. Improvement was seen in related, but not in entirely new conversation skills.

Peer-mediated strategies

Morrison et al [78] combined peer mediation and self-monitoring in a study of four young teenagers with autism. The students were taught, together with a group of typical peers, to use and monitor social skills, including requesting, commenting, and sharing, during game play. Peer monitoring and self-monitoring were alternated. The investigators reported that both techniques increased initiations and social interaction time, with little difference between the two strategies. Generalization and maintenance were not reported.

Social skills groups also have been used at the adolescent level, as they have for elementary students. Ozonoff and Miller [79] used social skills groups to teach adolescents with autism about understanding others' mental states (Theory of Mind, ToM). Five teenagers with autism met weekly for 14 weeks. A structured curriculum on ToM was presented. Students improved in understanding others' mental states; however, generalized gains to other social skills failed to appear.

Haring and Breen [80] used Circle of Friends to create a social network for a junior high school student with autism. Typical peers volunteered to meet weekly for 30 minutes to plan social interactions with the target student. Peers were taught to initiate, prompt, and praise the student between class sessions. The intervention resulted in an increased frequency of social interactions with peers that were maintained over 2 months.

Social communicative interventions for adolescents are an essential, perhaps the most important, aspect of an intervention program. The small amount of research done on this age group suggests that, again, direct instruction in the skills to be learned is necessary. Teaching social skills, such as ToM, does not necessarily lead to improvement in general social interaction. All the programs developed for students at this level involve some form of peer-mediation. This approach stems from the great need to help students at this age develop direct peer interaction skills, and derives from a fact that seems clear from the bulk of this review: peer-mediated interactions are an extremely powerful intervention for improving social communication.

Implications for enhancing social communication for children and adolescents with AS

This article attempts to review studies that have investigated a variety of social communication skills curricula that included children with ASD. None of these

studies, however, focused specifically on children with AS. What can be gleaned from this review that can inform the practice of clinicians faced with helping these youngsters to engage in social interaction?

First, social communication skills are arguably the skills most in need of attention and intervention in children with AS, from the earliest point at which diagnosis is established and continuing throughout life. This implies that social communication skills should be a primary area within the Individualized Educational Plan of all students identified with AS.

Second, the data reviewed suggests that for children with ASDs, social communication skills require direct, focused instruction on the actual target behaviors. Teaching ToM for example, improves ToM performance, but does not necessarily improve social interaction. Each skill the child needs to learn should be the focus of intensive instruction.

Third, the context for social communication training needs to be developmentally appropriate. At the preschool level, pretend, dramatic, and toy play are the best contexts in which to foster social interaction. Supportive visual information in the form of simple word cards and picture schedules can be helpful, for example, as can verbal rehearsal before entering play interactions. At the elementary grade level, games with rules, “lunch buddies,” and social skills groups focused around crafts or themes of interest are good venues. Visual support in the form of written schedules and calendars and verbal rehearsal continue to be useful. For teenagers, discussion groups of peers with AS can be helpful for giving youngsters the opportunity to share feelings about their disability, much as other adolescents form social bonds through “just talking.” Social networks comprised of students with AS and trained typical peers can help the target student negotiate the difficult transition times during the school day.

Fourth, in addition to intensive, focused instruction in the initial learning phase, children with ASDs require abundant opportunities to practice newly learned skills in varied, naturalistic contexts to achieve generalization and maintenance. Because most children with AS are placed in mainstream or inclusive educational settings, these opportunities should be fairly easy to engineer, and natural opportunities for interaction will arise out of their day-to-day experiences. Letting the child “sink or swim” in the natural environment, however, is not sufficient. To increase the chances for enduring improvements, the aid of peers must be enlisted.

Fifth, peers can aid target children best when they receive training in techniques to facilitate inclusion and interaction with friends with ASDs. Peer training can take a variety of forms. In programs with highly trained and motivated staff, intensive peer training programs have demonstrated efficacy. Even in programs with less ideal conditions, however, simpler forms of peer training are available and can be powerful in enhancing social interactions. These simpler programs seem to work best when several peers are trained and “trade off” so that each target child has repeated opportunities to interact with multiple trained peers.

Klin and Volkmar [75] have presented intervention guidelines for students with AS in which they emphasize the need to teach social communication skills.

They highlight the following elements for inclusion in social skills training programs designed for this population:

- Use of visual supports, including written and pictorial representations of expected activities and behaviors.
- Social perception training. In addition to training students with AS to engage in social interactions, as the studies reviewed here have done, Klin and Volkmar suggest the need to help these students learn to “read” social cues given by others, as a way to facilitate appropriate interactions. ToM training could be one part of this aspect of social skills intervention.
- Training in conventional pragmatic and conversational rules. Again, studies to date have not addressed this issue, but direct instruction in increasing awareness of pragmatic and conversational conventions, and practicing appropriate conversations using scripts, visual supports, video modeling, and role playing various scenarios would seem to be logical avenues of intervention.
- Improving prosody. Students with AS often show abnormal prosodic behavior [81]. Again, this aspect of social communication has not yet been a focus of research, but prosodic behavior is known to affect social and vocational acceptance [82]. Increasing awareness of appropriate prosodic patterns, modeling, and practice of prosodic changes can be an important aspect of intervention.
- Self-monitoring. It is essential to help students with AS keep track of their own behavior and make on-line judgments about its appropriateness. Self-monitoring, too, requires direct instruction, and ongoing practice.

For students with AS, several of the programs reviewed here would seem to be particularly germane. Schuler and Wolfberg’s [5] *guided participation* model, using coaching by adults and mediation by trained peers, provides an appropriate form of intervention for preschoolers with AS who have the verbal skills to readily take advantage of these interventions. Incidental teaching methods aimed at increasing the quantity of verbal initiations also would seem to be useful at this stage of development. Krantz and McClannahan’s [20] script-fading procedures also are promising in that they capitalize on the frequently advanced reading skills in this population and put print to a meaningful purpose. Research on using simpler peer mediating techniques with children with autism is emerging that suggests techniques such as “Stay, Play, Talk” will be powerful [83].

For school-aged children and adolescents with AS, the data suggest hybrid techniques may be most effective, especially when aimed at pivotal verbal behaviors such as asking questions. Support of printed materials, such as visual schedules and calendars, and verbal rehearsal, are especially appropriate for highly verbal children with AS. Video modeling looks especially promising, and a combination of this approach with verbal rehearsal may be particularly useful in the AS population. Peer-mediated approaches continue to be important. Simple programs that can be adapted for public schools and other community venues, such as Social Skills groups and peer networks, seem valuable. Awareness

programs such as Special Friends or Circle of Friends, however, seem inadequate in themselves, without providing more specific training for peers as to how to actively facilitate social interactions with students with AS. This training, in the case of students with AS, should focus on verbal scripts, written then faded, that address a range of specific pragmatic situations (eg, making a date, inviting a friend to play a game, asking for help). Individual, more traditional speech therapy to address prosodic difficulties and to establish self-monitoring routines also should be considered.

Some of the best known social skills programs, such as Social Stories and Do-Watch-Listen-Say, have the least empiric support, whereas the best scientific evidence available supports the efficacy of many older but lesser known curricula, such as Play Organizers or Buddy Skills Training. This fact should alert us to the importance of “waiting until the facts are in” before adopting a highly touted new program. There are a good number of approaches to social skills training that have proven their effectiveness and that merit wider adoption in the educational programs of children with AS and other ASDs.

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