

Social Skills Interventions for Children with Asperger's Syndrome or High-Functioning Autism: A Review and Recommendations

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Abstract This paper reviews the literature examining social skills training (SST) programs for youth with AS/HFA, with an emphasis on critically evaluating efficacy and highlighting areas of future research. The review highlights the disparity between SST programs described in the extant literature, including lack of a universal definition of social skills, various levels of intensity and duration of treatment, divergent theoretical backgrounds, and variety in services provided in clinic or classroom settings. Overall, it is clear that, despite their widespread clinical use, empirical support for SST programs for children with AS/HFA is minimal at this time. Based on this critical review, a “roadmap” for future research, consistent with recommendations put forth by a leading group of autism researchers, is presented.

Keywords Asperger's syndrome · High-functioning autism · Social skills · Intervention · Review

Introduction

Social skills can be defined as specific behaviors that result in positive social interactions (Elliott & Gresham, 1987; Gresham, 1986) and encompass both verbal and non-verbal behaviors necessary for effective interpersonal communication. Examples of social skills include: smiling and making eye contact, asking and responding to questions, and giving and acknowledging compliments during a social

exchange (Beidel, Turner, & Morris, 2000). Social skills in childhood have consistently been linked to positive developmental outcome, including peer acceptance, academic achievement, and mental health (Hartup, 1989).

Children who are deficient in social skills lack the behavioral repertoire necessary to interact with others according to social convention, a deficit that affects both academic and social development. Among children deficient in these skills are those diagnosed with Asperger's syndrome (AS) or high-functioning autism (HFA). Unlike children with other subtypes of Pervasive Developmental Disorders, children with AS/HFA have intelligence and language within the normal range of functioning (American Psychiatric Association, 2000). Although their general cognitive functioning is preserved, impaired social skills are a core feature of AS/HFA, and these difficulties permeate all areas of academic, emotional, and social development. For these children, social skills deficits can affect interactions with family, peers, and other adults. In turn, limited social abilities can affect their ability to achieve normal developmental milestones and establish satisfying peer and familial relationships (Krasny, Williams, Provençal, & Ozonoff, 2003).

Social skill deficits identified in children with AS/HFA include: lack of orientation towards a social stimulus and inadequate use of eye contact, problems initiating social interactions, difficulty interpreting both verbal and non-verbal social cues, inappropriate emotional response, and lack of empathy to others' distress (Weiss & Harris, 2001). Youth with AS/HFA also have difficulty sharing affective experience or understanding the perspective of others, two skills that are vital to social reciprocity and the development of friendships (Gutstein & Whitney, 2002).

As early as preschool, children with AS/HFA demonstrate social skills deficits that distinguish them from their

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typically developing peers. By elementary school, they have significant social relational problems; the majority experience great difficulty initiating and maintaining friendships with same-aged peers. By early adolescence, their lack of social skills can result in ridicule and rejection by the peer group (Church, Alisanski, & Amanullah, 2000).

In a recent comparative study (Macintosh & Dissanayake, 2006), teachers and parents rated children diagnosed with either AS or HFA as significantly more deficient in cooperation, assertion, and self-control than a matched group of their typically developing peers. Moreover, because of their high levels of intelligence, children with AS/HFA are often painfully aware of their social skills deficits. In a self-report study (Knott, Dunlop, & McKay, 2006), children with AS/HFA rated themselves on average, more than one standard deviation below the mean of typically developing children in social skills (e.g., temper management, joining groups) and social competence (e.g., development of close friendships). Interestingly, in this same study, parents rated these children even lower in these skills (i.e., nearly two standard deviations below the mean for normal controls).

Furthermore, children with AS/HFA do not simply “outgrow” these social skills deficits, rather these difficulties persist into adulthood, where they continue to negatively impact social and occupational functioning. Adults with AS/HFA are much more likely than the general population to be unemployed or underemployed and much less likely to have satisfying social relationships (Szatmari, Bartolucci, & Bremner, 1989; Venter, Lord, & Schopler, 1992). Given the pervasive impact and long-term nature of these deficits, social skills training (SST) programs implemented early in life might prevent or at least attenuate subsequent social dysfunction.

Social skills training programs are designed to teach children the skills necessary to navigate their social environment. Acquisition of these skills should enable the child to assimilate into the peer group and to interact with both familiar and unfamiliar adults (Gresham, 1986). Several researchers have reviewed the literature for social skills training programs for children with autism (e.g., DiSalvo & Oswald, 2002; Rogers, 2000; White, Keonig, & Scahill, in press), but have not examined outcome separately for children with AS/HFA. Furthermore, very few SST interventions are designed specifically for children with AS/HFA; most have been developed for a broader population of children with autism (Cragar & Horvath, 2003), and thus may not target directly the specific deficits of children with AS/HFA. Ironically, despite the paucity of SST programs designed specifically for them, the AS/HFA population may have the most pressing need for these interventions.

The number of youth diagnosed with Autism Spectrum Disorder has increased significantly over the past fifteen years (Fombonne, 2005), and both empirical and clinical

evidence suggests that children with AS/HFA may be the fastest growing segment of the autism population (Sansosti & Powell-Smith, 2006b). Because the majority of these children are fully included in the regular education classroom, they are more consistently exposed to social pressures and demands than their lower functioning counterparts. Thus, despite the small extant literature base, a thoughtful examination of the efficacy of SST for youth with AS/HFA is warranted at this juncture. The purpose of this review is to examine the SST intervention literature for youth with AS/HFA, with an emphasis on critically evaluating the efficacy of the extant studies and highlighting areas in need of future research.

Methods

Inclusion Criteria

To be included in the review, studies had to meet the following criteria: (a) consist of a population of children or adolescents (age 18 or younger) diagnosed with Asperger’s syndrome (AS) or high functioning autism (HFA), (b) involve a SST intervention that directly targets the children/adolescents with AS/HFA, (c) use an *experimental* research design (an intervention group and a comparison or control group), a *single case* design (either a *multiple baseline* or *multiple probe* research design), or an *open clinical trial* using validated psychometric assessment measures, and (d) include a direct measure of change in social skills as at least one measure of outcome assessment.

Search Procedure

A computerized multi-database literature search was conducted in *February of 2007*, selecting the *PsycINFO*, *PsychARTICLES*, *ERIC*, *Psychology & Behavioral Sciences*, and *Academic Search Primer* databases from the EBSCO search engine. The terms *Asperger*, *autism*, *PDD*, *social skills*, and *intervention* were entered in the descriptor fields, with “language” limited to *English* and “source” limited to *peer-reviewed journal articles*. In addition, the “online first” database of the *Journal of Autism and Developmental Disorders* was searched for articles published online, but not yet in print.

Results

The Literature Review

A total of 95 citations were retrieved through the EBSCO search engine and the abstract of each article was reviewed

for relevance. As a first step in the review process, 12 citations that were clearly not relevant to the topic of SST interventions for children with AS/HFA were eliminated. Next, 31 citations not describing an intervention study were eliminated; these included 20 literature reviews, three editorials and eight survey or descriptive studies. Next, 41 citations describing an intervention study, but including a sample of children with lower functioning autism or mixed diagnoses were eliminated, resulting in a total of 11 citations describing intervention studies for children with AS/HFA. Next, the full text of these 11 citations was retrieved and thoroughly reviewed. Upon careful analysis, three studies that did not meet inclusion criteria (one article that included a mixed sample of adolescents and adults with AS and two articles consisting of descriptive case studies) were eliminated, resulting in eight SST intervention studies targeting children with AS/HFA. The reference section of these eight articles was then reviewed for any studies not identified during the search procedure. One additional article (Marriage, Gordon, & Brandt, 1995) that met inclusion criteria was located in the reference section of one article and the full text was retrieved and reviewed. One additional study meeting inclusion criteria (Tse, Strulovitch, Tagalzkis, Meng, & Fombonne, in press) was located through the search of the “online first” database of the *Journal of Autism and Developmental Disorders*. Thus, a total of 10 peer-reviewed journal articles meeting selection criteria were identified and included in the literature review. See Table 1 for an overview of study characteristics of articles included in the review.

Framework for Critiquing the Literature

The 10 articles summarized in this review used diverse approaches to SST. In some instances, SST was delivered using a traditional behavioral model in either a clinic or

classroom setting. Other strategies added community practice or homework assignments in an effort to address the issue of generalization. Each article was critiqued based on its research design, the specific components of the SST program, and the assessment strategies and outcome measures used to evaluate its efficacy. In addition, each study’s strengths and limitations were highlighted. Below, all available empirical data are reviewed.

Traditional Social Skills Training

Using a multiple baseline design, Kamps et al. (1992) implemented a classroom-wide SST intervention for first graders (three 7-year-old boys with high-functioning autism, two students with physical disabilities, and 11 typically developing classmates). There were four assessment phases: baseline, SST, feedback, and follow-up. At baseline, each child with HFA was assigned to a group with three typically developing classmates. Baseline social skills were rated during non-directed activities over a two-week period. During the SST phase, 10 min training sessions were conducted 4 times per week during the academic year (9 months) and included training in the following social skills: greetings, initiating and responding to interactions, maintaining interactions, giving and receiving compliments, turn taking, and sharing. During the feedback phase, teachers provided reinforcement by placing a star next to the child’s name if he/she engaged in social interaction during 20 min free-play sessions. A follow up assessment was conducted during free-play groups occurring during the last month of school. Two observers using a computerized observational coding system rated both the target children and their typically developing classmates for frequency and duration of social initiations, responses, and interactions. In addition, observers completed a social skills rating scale assessing the frequency of social skills.

Table 1 Study characteristics

Study	N	Design	SST Duration	Additional Component	Follow-up Assessment	Outcome
1. Barnhill et al. (2002)	8	Open Trial	12 weeks	Community activities	none	negative
2. Barry et al. (2003)	4	Single Case	8 weeks	Peer interaction	6 week	positive
3. Bauminger (2002)	15	Open Trial	7 months	Peer facilitators	none	positive
4. Kamps et al. (1992)	3	Single Case	Academic year	Peer interaction	none	positive
5. Marriage et al. 1995	8	Open Trial	8 weeks	Homework	none	negative
6. Ozonoff and Miller (1995)	9	Experimental	7 weeks ^a	Community Outings	none	negative
7. Sansosti and Powell-Smith (2006)	3	Single Case	2 x’s per day ^b	none	2 week	positive
8. Solomon et al. (2004)	18	Experimental	20 weeks	Parent education	none	positive
9. Tse et al. (in press)	46	Open Trial	12 weeks	none	none	positive
10. Webb et al. (2004)	10	Single Case	6.5 weeks	none	none	positive

^a Ozonoff and Miller (1995) conducted a 14 week program, but only the first 7 weeks included social skills training

^b Sansosti and Powell-Smith (2006) did not specify the duration of the intervention, only that it took place twice a day

Following SST, all children with HFA, as well as their typically developing classmates, increased the frequency, duration and time engaged in social interactions throughout the academic year. This study's strength is its long duration of delivery of treatment over the course of the school year; however its findings are questionable given ambiguity concerning the blinded status of raters to either the purpose of the study or time of assessment, lack of attention to generalization (e.g., whether children interacted or increased interaction with individuals outside of the treatment group), and failure to obtain teacher or parent ratings of skill or improvement.

The utility of a commercialized six and one-half week SST program developed for use with children with learning disabilities was examined for 10 boys with HFA (ages 12 to 17; Webb, Miller, Pierce, Strawser, & Jones, 2004), using a multiple baseline design. The SST program included role-play exercises and games to teach the following social skills: sharing of ideas, compliments, offering help, recommending changes, and exercising self-control. Prior to the initiation of SST, a parent education session and two teacher training sessions were conducted. Following baseline behavioral assessment, intervention was conducted in 60-min sessions, two times per week, for six and one-half weeks. Two trained research assistants aware of the purpose of the study and the time of assessment rated role-play interactions designed to assess each of the social skills taught during the intervention. At post-treatment, the ratings indicated significant increases over baseline for four of the five targeted skills. In addition, the boys' ability to know when to use the correct skill (as measured by a survey of situation discrimination) increased significantly from pre- to post-treatment. However, there were no differences on the Social Skills Rating System (SSRS; Gresham & Elliott, 1990; a widely used, standardized parent and teacher rating scale) from pre- to post-treatment, suggesting that the social skills acquired during the intervention did not generalize outside of the treatment setting. In addition to lack of skill generalization, limitations of this study included the use of unblinded raters.

Sansosti and Powell-Smith (2006a) used social stories to remediate the specific social skills deficits of three boys with Asperger's syndrome, ages 9 to 11. Each social story was based on parent and teacher interviews as well as investigator observations of the boys during "free time" activities at school (either on a playground or in a courtyard). Story content consisted of social skills deficits during team sports activities (e.g., yelling at teammates, calling them names) for Boy A, inability to sustain a conversation (e.g., walking away in the middle of a conversation, blurting out inappropriate comments) for Boy B, and initiating conversations or joining group activities for Boy C. The social stories were written in a book format and

parents read the story twice a day to the boys, before and after school. Investigators called the parents weekly to assure compliance with the protocol. Using a multiple baseline design, the SST interventions were evaluated based on total time spent engaged in positive interaction in targeted social behaviors during free play. Intervention was staggered across subjects at weekly intervals. Significant increases in the use of positive targeted social skills behavior followed initiation of the intervention for two of the three boys. A major strength of this study was the use of blinded observer ratings to determine behavior change.

Using a quasi-experimental design, Ozonoff and Miller (1995) evaluated seven weeks of SST combined with a Theory of Mind (TOM) training program with nine boys (ages 11–16) with HFA (full scale mean IQ score = 93). The first five boys were assigned to the 14-week intervention, and the other four were assigned to a waitlist control group of equal duration. SST consisted of 90-min sessions focused on social interaction and conversational skills. Following a 3-week break, the boys participated in seven weeks of TOM skills training (which consisted of correction of false beliefs and perspective taking tasks), with each session 90 min in length. At post-treatment, there were no significant group differences in parent and teacher ratings of participants' social behavior on the SSRS. A significant limitation of this study was its research design; specifically, improvement in social skills was not assessed until completion of the entire program, which was 10 weeks following cessation of SST. Thus, it is unclear whether the skills were ever successfully acquired or if initially acquired, then deteriorated 10 weeks later (i.e., lost at follow-up).

Using an open clinical trial, Tse et al. (in press) evaluated the efficacy of SST groups for 46 adolescents with HS/HFA, ages 13–18. Each SST group consisted of seven to eight adolescents, led by one trained social worker and one trained psychologist. The groups met for 12 consecutive weeks, and lasted for 90 min per session. Social skills training included eye contact and introducing oneself to others, awareness and expression of feelings, non-verbal communication recognition, politeness, listening, conversational skills, negotiation, dealing with teasing and bullying, hygiene, and dining etiquette. Groups met at the clinic, with one trip to a restaurant to teach dining etiquette. In addition to social skills review, practice, and role play, each session included a snack break and an activity. Using the Social Responsiveness Scale (SRS; Constantino, Przybeck, Friesen, & Todd, 2000), the Aberrant Behavior Checklist (ABC; Aman, Singh, Stewart, & Field, 1985), and the Nisonger Child Behavior Rating Form (N-CBRF; Aman, Tasse, Rojahn, & Hammer, 1996), results revealed significant improvement in parental ratings of social competence and problem behavior in children following the

intervention. A subset of parents and adolescents responded to post-intervention surveys, and rated the program favorably, with higher ratings by the parents. The strength of this study was its large sample size, allowing for adequate power to detect a significant change in social skills from pre- to post-intervention. The major weakness was the lack of a comparison or control group; thus we cannot be sure that the increases in social skills and reductions in problem behavior were due to the intervention itself, or to other spurious factors (e.g., opportunity to interact with other adolescents, attention from authority figures, etc.).

In the only randomized experimental study (Soloman, Goodlin-Jones, & Anders, 2004), 18 boys with AS or HFA, ages 8 to 12, matched for age and IQ, were randomized to either a 20-week SST program or to a waitlist control. SST consisted of weekly 90-min sessions, divided into two, 10-week modules. The first module focused on teaching emotional awareness, friendship and conversational skills. The second module reinforced and elaborated upon friendship and conversational skills, but focused primarily on teaching problem solving skills, sometimes considered different from social skills. Parent education groups, run concurrently with the SST program, educated parents about the objectives of their children's treatment and taught them to use a problem-focused approach to parenting. Parents kept weekly "Problem Behavior Logs" that they used as tools for training and discussion during weekly therapy sessions. The results of this study indicated that both modules were successful in achieving some of their targeted learning objectives. Compared with the waitlist control group, the nine boys in the SST group made significant improvement in emotional understanding (as measured by facial expression recognition) in both children and adults (module one) as well as significant gains on real life problem solving tests (module two). A major strength of this study was its randomized design. However, the use of only one outcome measure of social skill (i.e., facial expression recognition) limits the potential robustness of the treatment effects.

Social Skills Training Plus Generalization

One challenge for SST is facilitating the transfer of skills from simple acquisition in the treatment setting to their consistent use in the community (DiSalvo & Oswald, 2002; Krasny et al., 2003; Rogers, 2000; Weiss & Harris, 2001). Several investigators have attempted to address this issue by specifically designing generalization sessions as part of the overall intervention strategy. In an open trial investigation (Barnhill, Cook, Tebbenkamp, & Myles, 2002), 12 weeks of SST consisting of weekly 1 h sessions of direct instruction, role-playing, modeling and reinforcement

of recognition and expression of emotions, was followed by 2–3 h of community activities, allowing group interaction in a less structured environment. The efficacy of this approach was evaluated in 8 adolescents diagnosed with AS/HFA (ages 12–17; 1 girl and 7 boys). Results indicated that SST did not enhance recognition of facial expression and non-verbal communication, the behaviors targeted for change. However, all seven boys reported the establishment of a friendship with at least one other group member, indicating that they would make an effort to continue contact following treatment termination. In contrast, the lone female participant reported feeling socially isolated during the intervention, suggesting the need to carefully consider the gender composition of these group interventions.

Barry et al. (2003) used social scripts (pictures and written cues that progressively guide subjects through a social situation) to teach the specific social skills of greeting, conversation, and play to 4 children with HFA (ages 6 to 9; 3 males and 1 female). The intervention consisted of 8 weekly SST sessions, each 2 h in duration. Seven trained typically developing peers (ages 7 to 9) participated in play sessions following each of the SST sessions, where each group member was paired with a trained peer. Assessment measures consisted of behavioral observation of the play sessions and weekly telephone interviews with the parents to assess use of social skills outside of the clinic. In addition, children completed the Social Support Scale for Children (Harter, 1985) and the Loneliness Scale (Ashler & Wheeler, 1985) and parents completed the SSRS (Constantino et al., 2000). Two trained research assistants aware of the purpose of the study and time of assessment coded the play sessions for social interactions. These ratings indicated significant treatment gains over baseline for initiating and responding to greetings and play skills but not for conversation skills. Also, children reported a significant increase in perceived social support from classmates following the intervention. However, parental interviews indicated that only greeting skills increased outside of the clinic, an outcome that was confirmed by scores on the SSRS, where ratings did not change from pre- to post-treatment and remained in the clinically significant range of social skill impairment. Using typically developing peers to facilitate the intervention was a major strength of this study. However, restricting the social interaction with the peers to the clinic setting may have attenuated opportunities for generalization treatment gains. A further limitation was the use of unblinded coders to determine treatment outcome.

Using a school-based intervention (Bauminger, 2002), teachers implemented a SST curriculum that emphasized social cognition, emotional understanding, and social interaction for 3 h per week for 7 months with 15 youth

with HFA (11 males and 4 females, ages 8–17). Similar to the Barry et al. (2003) study, in addition to SST, target youth were paired with a trained peer twice a week to practice their newly acquired skills. Efficacy was assessed by a trained research assistant through behavioral observations of children with untrained peers during school recesses both before and after the intervention. The results indicated a significant increase from pre to post-treatment in eye contact, verbal expression of interest in the peer, and experience sharing. In addition, teachers' ratings (SSRS-teacher version; Constantino et al., 2000) before and following the intervention revealed significant increases in cooperation and assertion in the target children. The major strength of this study is its assessment of the generalization of social skills outside of the clinic. However, raters were not blinded to the study's purpose or to the time of assessment, which could have influenced their ratings.

Eight boys with AS (ages 8–12) participated in an 8-week SST intervention (Marriage et al., 1995) designed to progress from teaching basic social skills (e.g., greeting people, making eye contact) to teaching more complex social skills (e.g., knowing when to stop talking on a particular topic). Each session was 90 min in length. A parent discussion group met concurrently with SST sessions. At the end of each session, participants were given written homework assignments (social skills tasks to be completed at home) that were collected and discussed at the next session. To help promote skill generalization, groups met at four different settings and SST sessions were conducted by four different therapists. Following a 2 week break, six of the eight boys participated in six 90-min reinforcement sessions in which skills acquired during SST were practiced and reinforced. Outcome evaluation consisted of pre- and post-intervention questionnaires that allowed parents to rate their child on the following social skills: holding a conversation with other children and adults, behaving properly in public, joining peer activities, and responding appropriately to criticism. An analysis of the data revealed no significant treatment gains as a result of SST. Moreover, parents reported no evidence of skill generalization to home, school or community settings. Clinically, parents did report increased eye contact and enhanced ability to initiate conversations as well as to verbalize feelings, as unsolicited "write in" responses on the questionnaires. This study may have been limited by the use of only one informant and one outcome measure—an experimenter designed parental questionnaire of unknown reliability and validity. Pre- and post-intervention observational assessments may have found increased use of social skills within the treatment setting. A further benefit may have come through the use of social skills practice sessions with peer facilitators, perhaps yielding generalization of skills to community settings.

Discussion

Ten SST intervention studies for youth with AS/HFA were reviewed in this paper. Of these, seven (70%) reported positive treatment effects (Barry et al., 2003; Bauminger, 2002; Kamps et al., 1992; Sansosti & Powell-Smith, 2006a; Solomon et al., 2004; Tse et al., in press; Webb et al., 2004), although in some studies, the positive outcome was in only a subset of subjects or outcome measures (e.g., Sansosti & Powell-Smith, 2006a, 2006b). Three of the 10 studies (33%) reported no treatment efficacy (Barnhill et al., 2002; Marriage et al., 1995; Ozonoff & Miller, 1995). While some progress has been made in recent years in remediation of social skills deficits in children with AS/HFA, it is clear from this review that much work remains to be done in order to provide relevant and efficacious interventions for children with AS/HFA. Below, limitations of the existing literature are discussed.

The first limitation is a lack of a common definition of social skills. While certain social skills appear to be universally included (e.g., greeting, initiating conversations), others appear to be more idiosyncratic and often represent very complex behavior patterns (e.g., problem solving skills, exercising self control). The lack of an agreed upon group of behaviors considered to be within the domain of social skills represents a challenge for the scientific literature. First, it makes it difficult to make comparisons across studies. Second, some of these behaviors (e.g., exercising self control) are difficult to operationalize and assess, making it difficult to determine the efficacy of a treatment program.

Second, few investigations utilized group designs to control for the effects of maturation and time over the course of treatment. Only two studies (Ozonoff & Miller, 1995; Solomon et al., 2004) used a comparative group design, and only the latter investigation randomized subjects to either intervention or a waitlist control group. Studies using a placebo control (true randomized controlled studies) have yet to be conducted. Until the results of such studies are available, it will be difficult to determine whether a specific intervention is more efficacious than mere clinical attention, or is relevant for the general population of children and adolescents with AS/HFA.

The third limitation involves sample sizes lacking sufficient power for meaningful data analysis. As depicted in Table 1, only three studies included more than 10 participants (Bauminger, 2002; Solomon et al., 2004; Tse et al., in press). The only controlled trial (Solomon et al., 2004) had 18 subjects (9 subjects per group), while the only quasi-experimental design (Ozonoff & Miller, 1995) included nine subjects, five in the treatment group, and four in a waitlist control. Larger samples are needed to allow for

better control over subject variability, thereby increasing both internal and external validity (White et al., in press).

A fourth limitation is the use of unblinded observer ratings to determine treatment response. Although the inclusion of behavioral observation to determine treatment efficacy is a major strength of these investigations, in the majority of these studies, observers were aware of the purpose of the study as well as the time of assessment. Indeed, only one study (Sansosti & Powell-Smith, 2006a) used blinded raters; in two studies (Bauminger, 2002; Kamps et al., 1992), teachers aware of students' participation in the SST also rated the study participants on their use of social skills following treatment. Although it may be difficult to prevent raters from identifying a child with AS/HFA, keeping raters unaware of the study's purpose, the child's active participation in SST, and the time of assessment, should be standard procedure for future clinical trials (White et al., in press).

A fifth limitation concerns the lack of generalization of treatment effects to people and settings external to the treatment environment (Smith et al., in press). Indeed, two of the three studies that specifically attempted to promote generalization of skills had disappointing results (Barnhill et al., 2002; Marriage et al., 1995). Interestingly, the one study that had some limited success with skills generalization offered participants an opportunity to interact with typically developing peers outside of the treatment setting (Barry et al., 2003), a strategy that has been used effectively with children with social anxiety disorder (Beidel et al., 2000).

A final limitation is the lack of follow up assessments to determine the stability of treatment over time. In fact, only one study included any follow up assessment (Barry et al., 2003) and was relatively short-term (i.e., six weeks post treatment). Without longitudinal assessment, the stability of any positive treatment outcome remains unknown.

Conclusions and Directions for Future Research

Overall, it is clear that, despite its widespread clinical use, empirical support for social skills training (SST) programs for children with AS/HFA is in its infancy. Although its utility for other psychological disorders is well documented, specific efficacy of SST programs for children and adolescents with AS/HFA has yet to be firmly established. SST programs can be expensive and time consuming; thus the need to determine their efficacy has both scientific and practical implications.

At present, autism researchers are using a wide variety of SST programs from diverse theoretical foundations, with disparate program designs, differing levels of intensity and variable duration of treatment. Clearly, as summarized in comprehensive reports from a NIMH convened panel of

experts in autism research (Lord, Wagner, Rogers et al., 2005; Smith et al., in press), there is a need to establish efficacy through more single-case and open trial research designs and effectiveness through controlled randomized clinical trials. Based on this critical review, we would make the following recommendations.

First, although some researchers are beginning to investigate social skills deficits specific to youth with AS/HFA (e.g., Macintosh & Dissanayake, 2006), there is a need for further documentation of the specific deficits in this subgroup, which may be different from those identified for children with other disorders inside or outside of the autism spectrum. For example, the social skills deficits identified for children with social anxiety disorder are different from those identified in children with ADHD (Beidel & Turner, 2005). Thus, without an examination of the specific social skills deficits of youth with AS/HFA, interventions may be inappropriate and/or ineffective. Similarly, SST programs for children with autism spectrum disorders need to be tailored to meet the specific needs of subgroups of children within the diagnostic category. Using mixed samples of children within the autism spectrum could result in treatment programs inadequate for any subgroup. Thus, SST programs that require higher level cognitive and language skills need to target children in the higher functioning range of the autism spectrum, specifically those with AS or HFA, while less complex programs need to be developed for less cognitively and verbally capable children.

Second, there is a need to establish the effectiveness of SST interventions for youth with AS/HFA. Although single subject designs can serve as a first step in testing the efficacy of an intervention, effectiveness can only be established through the use of randomized controlled trials (Smith et al., in press), including samples large enough to provide sufficient power for investigating statistically as well as clinically significant treatment effects. Moreover, both short-term and long-term follow up studies are needed to determine if the effects of intervention hold up over time.

Third, SST programs need to be designed to facilitate skill generalization outside of the treatment setting. In a review of peer-mediated approaches to social skills enhancement in children with autism, DiSalvo and Oswald (2002) asserted: "the ultimate goal with social skills training is for children to be able to interact appropriately in their natural social contexts..." (p. 199). One avenue to assure generalization of skills is through programmed practice in naturalistic settings, allowing practice with unfamiliar adults and children (Beidel et al., 2000; Krasny et al., 2002). Thus, including opportunities to practice skills acquired in treatment with unfamiliar peers and adults in unfamiliar settings appears to be a necessary treatment component.

Finally, comprehensive, manualized SST programs that can be easily implemented in naturalistic settings such as schools and community centers need to be developed. It is also imperative to have qualified professionals to conduct SST programs; thus, those who conduct these programs need to have concrete manualized programs and receive rigorous training in both program delivery and behavioral therapy. At present there are few programs that meet these criteria (Krasny et al., 2002).

In summary, there is a growing literature examining SST interventions for children with AS/HFA, and the literature to date has demonstrated the feasibility of these strategies for children with AS/HFA. This review has highlighted both the extant literature base and areas in need of further investigation. Additionally, we have identified a “roadmap” for future research aimed at developing efficacious and effective SST programs, consistent with the recommendations of the NIMH autism working group (Smith et al. in press). Following the recommendations presented in this section will further enhance interventions for this population.

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