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AUTISM SPECTRUM DISORDERS:
A REVIEW OF THE EXPERIMENTAL EVIDENCE

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Social Skills Intervention for Adolescents with Autism Spectrum Disorders: A Review of the Experimental Evidence

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The social situations that adolescents encounter on a daily basis require both speed and agility: they must select comments that directly address the topic at hand, control utterance length so as to not monopolize the conversation, take the perspective of others, and use both verbal and nonverbal methods to convey stated and implied meaning. In everyday communication, adolescents must also use language to share feelings, to control others' behaviors, and to critique themselves and make adjustments based on this critique. Over the course of adolescence, additional communication challenges continue to emerge, particularly as they enter the workforce, and adolescents must learn to adapt their social communication behaviors accordingly. Added to this, the idiomatic language of adolescent peer groups continually evolves, and familiarity with this language is important to building and sustaining relationships with one's peer group.

It is perhaps no surprise that many adolescents struggle to achieve success in social communication, and that many are referred to speech-language pathologists (SLPs) for social skills intervention. Currently, SLPs have a vast array of therapy materials and approaches available for these interventions, but to select the most appropriate ones clinicians need to know the evidence in support of current intervention practices. Consider, for instance, a clinician who is working with 15-year-old Charlie, an adolescent with autism spectrum disorder (ASD) who has significant impairments in conversation skills. These

include difficulties with selecting and maintaining conversational topics and recognizing and responding appropriately to the nonverbal communication of others. For this clinician to engage in evidence-based practice, she must study the published literature on social skills intervention and then integrate evidence from the literature with her knowledge of Charlie's specific strengths and needs to select the most appropriate intervention approach. To guide clinicians facing a similar task, in the remainder of this article we provide a description of a search strategy used by our hypothetical clinician, and discuss the findings of this search. The search we will outline focuses specifically on evaluating the empirical evidence for social skills intervention for adolescents with ASD, but the search outcomes are likely informative to identifying effective social skills interventions for adolescents with communication disorders of other etiologies.

This brief describes the outcomes of a search to identify effective social skills interventions for adolescents.

Social Skills Impairment and Autism Spectrum Disorders

Qualitative impairment in social interaction is a core and defining characteristics of ASD (DSM-IV, 1994; Kanner, 1943). Atypical social behaviors are among the earliest indicators of ASD, and these may include decreased responsiveness to one's name being called, diminished eye gaze and sharing of affect during interactions, and reduced symbolic play (Dawson et al., 2004; Osterling, Dawson, & Munson, 2002; Wetherby et al., 2004). Substantial evidence shows that the social impairments of individuals with ASD are enduring (Beadle-Brown et al., 2002; Holroyd & Baron-Cohen, 1993), and have the potential to significantly limit one's participation in everyday life situations (Orsmond, Krauss, & Seltzer, 2004). Despite the well-documented prevalence of social impairments for individuals with ASD (e.g., Charman, 1997; Rutherford & Rogers, 2003), relatively few studies have evaluated social skills intervention efficacy, and few of these focus on adolescents as a distinct group. Rather, most existing studies focus on preschool and school-aged children with ASD (e.g., Hutchins & Prelock, 2006; Krantz & McClannahan, 1993; Taras, Matson, & Leary, 1988), despite the consensus that life-span

services are needed (American Speech-Language-Hearing Association, 2006; Bernet & Dulcan, 1999). Thus, there is a need for both additional studies to be conducted in this area of practice, and also for consideration of the strengths and limitations of existing research.

Review of Existing Research

A comprehensive search was undertaken for this brief to identify studies of social skills intervention involving adolescents with ASD. The authors searched PubMed, ERIC, and PsychInfo using the following keywords: adolescent, autism, social skills, and treatment or training. To be selected for inclusion, a study was required to be data-based (thus omitting review or opinion papers), to have been published in a peer-reviewed journal, and to focus on intervention for adolescents with ASD (spanning the age range of 13 to 21 years). Studies were included even if adolescents were part of a larger participant group, whether the adolescent data were reported separately or were aggregated with data from children or adults; this occurred in four studies included for review (Bauminger, 2002; LeGoff, 2004; Mesibov & Stephens, 1990; Williams, 1989).

Evaluating the Evidence

Once the review corpus was identified, each study was classified according to the study design, similar to previous evidence reviews on communication and social behavior (e.g., Carney et al., 1999; Cicerone et al., 2000; Ylvisaker et al., 2006). Class I studies were randomized controlled trials (RCTs) with effective experimental controls, such as using random assignment and blinding assessors involved with data collection. Class II studies were experimental group studies with inadequate controls (e.g., lack of randomization, lack of control group). Class III studies were single-subject experiments with effective experimental controls. Class IV studies were case descriptions or single-subject designs using A-B procedures, in which a baseline period is followed by intervention.

The purpose of an evidence review is to establish practice patterns in a given area, based on the weight and quality of evidence (National Institutes of Health Consensus Development Panel, 1999). The strongest recommendation

is a *practice standard*, which requires evidence from two or more Class I studies. A *practice guideline* typically requires at least one Class I study or two congruent Class II studies. When the existing evidence is from a single Class II study or two or more Class III studies, the evidence is considered sufficient for a *practice option*.

Review Results

The search procedures yielded 16 studies that met the review criteria, as presented in Table 1. Appendix A provides a more detailed examination of each of these studies. As shown in Table 1, two studies were Class I RCTs (Ozonoff & Miller, 1995; Silver & Oakes, 2001). Six were Class II group studies, including four studies with an A-B design and no comparison group (Bauminger, 2002; Broderick, Caswell, Gregory, Marzolini, & Wilson, 2002; McGee, Krantz, & McClannahan, 1984; Williams, 1989), one study with a group pretest-posttest design with a multiple baseline across skills (Webb, Miller, Pierce, Strawser, & Jones, 2004), and one study in which participants served as their own wait-list controls (LeGoff, 2004). Seven were Class III studies using single-subject multiple-baseline designs (Gaylord-Ross, Haring, Breen, & Pitts-Conway, 1984; Groden & Cautela, 1988; Haring & Breen, 1992; Harris, Handleman, & Alessandri, 1990; Koegel & Frea, 1993; LeBlanc et al., 2003; Scattone, Wilczynski, Edwards, & Rabian, 2002), and one study was a Class IV group case description (Mesibov, 1984).

The intervention approaches examined in the 16 studies could be divided into three categories: (1) ASD social skills groups (seven studies), (2) group therapy with typically developing peers (three studies), and (3) individual social skills therapy (six studies). Table 2 provides an example of some approaches used in social skills intervention included in this body of research.

ASD Social Skills Groups

Participation in social skills groups is a frequently recommended strategy to address the social skills deficits of adolescents with ASD. The group setting creates opportunities for structured interactions with peer support and

feedback, and it also allows participants to practice social skills in a protected and predictable environment. Five of the studies reviewed used group treatment to address a variety of social skills (Broderick et al., 2002; LeGoff, 2004; Mesibov 1984; Webb et al., 2004; Williams, 1989), whereas two studies used groups to teach specific skills, namely perspective taking and theory of mind in one study (Ozonoff & Miller, 1995), and assertiveness in the other study (McGee et al., 1984). As shown in Table 1, four of the studies reported adolescent data separately (Broderick et al., 2002; McGee et al., 1984; Ozonoff & Miller, 1995; Webb et al., 2004), whereas three provided only aggregate data (LeGoff, 2004; Mesibov, 1984; Williams, 1989). The studies that reported data separately for adolescents involved a total of 31 participants, and the studies with aggregate data had a total of 69 participants, the majority of whom were not adolescents.

In all seven studies, groups were facilitated by adults with expertise in working with students with autism, often with support from colleagues or college students. The number of participants in the social skills groups ranged from 2 to 15 individuals, and groups were held in clinical or special education settings; most met weekly for 60 minutes. Two exceptions to this format were noted: Webb and colleagues (2004) described a group that met twice weekly for 60 minutes per session, and McGee and colleagues (1984) described a group that met daily for approximately 40 minutes per session. The duration of treatment ranged from 3.5 weeks (McGee et al., 1984) to 4 years (Williams, 1989). The specific intervention strategies used within these social skills groups varied widely across studies. Two studies included both group and individual intervention (LeGoff, 2004; Mesibov, 1984); two used specific curricula or intervention strategies (e.g., Social Stories, Broderick et al., 2002); and the remaining studies used such strategies as modeling, role-playing, coaching, and providing rewards and feedback to teach social skills.

All seven studies reported positive changes in the impairment-level functions of participants after intervention, and each reported the additional benefit that participants were introduced to social activities in which they might not have previously engaged. Four studies included statistical analysis of results (LeGoff, 2004; Ozonoff & Miller, 1995; Webb et al., 2004; Williams, 1989),

but three of these had relatively small sample sizes that made the interpretation of analyses difficult (Ozonoff & Miller, 1995; Webb et al., 2004; Williams, 1989) and only one reported an effect size (Ozonoff & Miller, 1995). For this study, the authors reported effect sizes in the medium to large range for intervention effects on participants' theory of mind task performance; an effect size of this magnitude suggests that positive changes were both clinically significant as well as statistically significant. Only two studies measured generalization outside of the treatment setting (Ozonoff & Miller, 1995; Webb et al., 2004); in both cases, participants' gains in social understanding did not translate into significant improvements in parent- or teacher-reported social skills of the participants. Two of the studies analyzed the relationship between specific adolescent characteristics and social skills outcomes: Ozonoff and Miller (1995) found that participants' age and verbal IQ were significantly related to improvements on theory of mind tasks, while Legoff (2004) found no significant relationship between these variables and participants' self-initiated social contacts.

This group of studies was not without its limitations. These included the following: (1) the small number of adolescent participants, (2) the limited empirical evidence of generalization beyond the treatment setting, and, in most studies, (3) the use of multiple intervention strategies and agents, making it difficult to determine which aspect or aspects of treatment contributed to positive social skill outcomes. For the studies in which participation spanned several years, it was also difficult to differentiate the effects of maturation versus treatment. This was particularly problematic as only one study included a control group. Taken together, the seven studies provide moderate support for the effectiveness of adult-facilitated social skills groups to address impairment-level functions in adolescents with ASD and to increase their participation in social activities. Review of this body of studies shows that this area of practice requires additional research to guide the use of evidence-based practice, particularly given that SLPs and other professionals frequently recommend and use social skills groups for adolescents with ASD.

Group Therapy with Typically Developing Peers

Three studies were identified for review that examined the effectiveness of training non-ASD peers and other agents (e.g., parents and teachers) to provide teaching, modeling, and feedback on social skills to adolescents with ASD within naturalistic environments (Bauminger, 2002; Gaylord-Ross et al., 1984; Haring & Breen, 1992). Two of these studies involved only adolescents (Gaylord-Ross et al., 1984; Haring & Breen, 1992), with a total of 4 participants; the third (Bauminger, 2002) involved 15 adolescents as well as younger children. In the latter study, the average age of participants was 11.3 years (range 8 to 17 years), suggesting that many of the participants were children.

Non-disabled peers can be trained to recognize and respond to the social overtures of peers with ASD.

These three studies used a combination of social skills intervention strategies. Two studies (Gaylord-Ross et al., 1984; Haring & Breen, 1992) involved training non-disabled peers to recognize and respond appropriately to the social overtures of their peers with ASD; this was combined with clinician-directed individual social skills training for the individuals with ASD. The third study used classroom-based social skills activities for participants with ASD and their peers (Bauminger, 2002). Intervention in these studies occurred at relatively unstructured times during the students' daily schedules, and ranged in duration from 5 minutes several times each day to 3 hours per week. Each of the studies used specific strategies to engage non-disabled peers in social interactions with their peers with ASD, including teaching adolescents with ASD to interact around objects that non-disabled peers found interesting (Gaylord-Ross et al., 1984), to choose members for peer support networks based on shared interests (Haring & Breen, 1992), and to have teachers present social skills within the regular education classroom to maximize the motivation of non-disabled peers to attend and participate.

Each of these studies reported positive changes in targeted social skills as a result of intervention. Only Bauminger (2002) used statistical analysis to evaluate the relationship between adolescent characteristics and social skills intervention outcome, finding no significant relationship between age or IQ

and social behaviors, with the exception of a significant positive correlation between verbal IQ and teacher ratings of cooperation. The main limitations of this group of studies were (1) the small number of adolescent participants, (2) limited empirical support for generalization of skills beyond the treatment context, and (3) lack of controls for variables such as maturation. This group of studies is also limited by confounding variables that are intrinsic to in-vivo studies, such as the fact that different treatment approaches were delivered by multiple individuals in various modalities at unpredictable times. These confounds make it difficult to determine which aspects of the treatment, if any, contributed to the reported improvements in adolescents' social skills.

The three studies reviewed here lend support to the idea that typically developing adolescents might facilitate the development and enhancement of social skills in their peers with ASD within naturalistic environments and with minimal training. This is an important finding given the documented limitations for the generalization of social skills training to naturalistic environments for adolescents receiving social skills interventions. If adolescents with ASD are taught socialization skills in context, then clinicians might have greater confidence that their clients might apply these skills within the natural environment. Results from this group of studies suggest that natural supports can be useful in teaching adolescents with ASD both social understanding and social interaction skills. Additionally, one of the studies (Haring & Breen, 1992) also provides preliminary evidence that peer social networks might benefit non-disabled peers as well as the students with ASD.

The studies reviewed suggest that typically developing adolescents can enhance the social skills of peers with ASD in naturalistic environments.

Individual Social Skills Therapy

A common clinical social skills intervention strategy is for professionals to work individually with individuals with ASD to break skills down into their component behaviors and then teach these skills until they become automatic in clinical and, ideally, extemporaneous social situations. Six studies were identified in this review that examined the effectiveness of individual treatment programs to improve social skills outcomes for adolescents with ASD.

Two of these treatment studies included only adolescents (Harris et al., 1990; Koegel & Frea, 1993), with a combined total of five participants. The other four studies included both children and adolescents (Grodén & Cautela, 1988; LeBlanc et al., 2003; Scattone et al., 2002; Silver & Oakes, 2001) and had a combined total of 31 participants. Two studies used technology (computer and video) to teach recognition and prediction of emotions and perspective-taking skills (LeBlanc et al., 2003; Silver & Oakes, 2001); five studies used strategies to increase appropriate social behavior (Grodén & Cautela, 1988; Harris, Handleman, & Alessandri, 1990; Koegel & Frea, 1993; LeBlanc et al., 2003; Silver & Oakes, 2001); and one study used a strategy to decrease an inappropriate social behavior that interfered with social interaction (Scattone et al., 2002). The studies in this corpus featured use of individual instruction to teach adolescents a range of specific social behaviors, such as appropriate eye-gaze, topic maintenance, and offers of assistance to others. The treatment methods included Social Stories (Scattone et al., 2002), variations of applied behavioral analysis (Harris et al., 1990; Koegel & Frea, 1993), and covert reinforcement (Grodén & Cautela, 1988).

All six studies reported positive changes in impairment-level functions associated with participation in individual social skills intervention. These changes occurred relatively rapidly – generally within weeks – and within relatively short treatment periods (approximately 5-30 minutes per day). Only Silver and Oakes (2001) included a statistical analysis of participant outcomes, and although there were statistically significant changes in adolescents' social behaviors, effect sizes were not reported and it was unclear if the magnitude of the change was clinically significant. Consistent with LeGoff (2004) and Bauminger (2002), Silver and Oakes (2001) did not find significant relationships between adolescent characteristics, such as age or verbal ability, and outcomes from social skills intervention.

Similar to the other groups of studies reviewed in this brief, the main limitations of this corpus of work were (1) the small number of adolescent participants, (2) the lack of controls for confounding variables, and (3) limited evidence of generalization beyond the training context. Although the speed with which adolescents acquired targeted social skills might suggest that these

forms of individual therapy are effective, the lack of consideration of outcomes beyond therapy makes the external validity of this body of work unclear.

Summary and Implications for Clinical Practice

The results of the review conducted for this brief suggest that it is possible to teach specific social skills to adolescents with ASD (e.g., theory of mind), and to increase their participation in social activities with their peers and adults. Nonetheless, this review shows there to be little if any evidence available regarding the type(s) of intervention associated with the most favorable outcomes, and there is no indication other than anecdotal reports that the adolescents involved valued their participation in these programs or that participation enhanced their quality of life. Additionally, no study considered whether intervention was associated with improved participation in social activities, although this is arguably the main motivation for intervention. These limitations show there to be a clear need for well-controlled research on this important topic of clinical practice.

As the results of this review show, the evidence in support of social skills intervention for adolescents with ASD is presently insufficient to generate *practice standards* or *practice guidelines*. Despite the vast array of treatment materials available, there is little research-based evidence concerning which of the published strategies, programs, and curricula are most likely to improve social skills outcomes for adolescents with ASD. The studies that do exist have significant limitations, and none has been replicated independently. Further, given the heterogeneity among participants and methods within the studies reviewed, the applicability of group results to an individual client in any given setting is unknown.

Despite the limitations of this body of work, clinicians maintain the responsibility to make informed, reasoned decisions concerning the treatment approaches they will use with adolescents with ASD as well as other clients for whom social skills intervention is warranted. These decisions are made based on evidence that includes not only empirical data but also expert opinion and the products of one's clinical experience (Montgomery & Turkstra, 2003), with the latter referring to the important task through which clinicians generate their

own evidence by conducting a series of single-subject experiments to generate evidence relevant to individual clients. Given the current state of evidence concerning social skills intervention for adolescents with ASD, it is clear that the task of generating one's own evidence through clinical experience remains an important if not critical component of evidence-based practice.

With this in mind, let us return to the hypothetical SLP introduced early in this article and her adolescent client, Charlie. The results of this review suggest that the SLP can feel optimistic that Charlie is likely to make some positive gains with impairment-level intervention (i.e., social skills training) if intervention is tailored to his individual needs and provided by a clinician who is knowledgeable about ASD. Although there is no current evidence to indicate whether one intervention model (i.e., ASD social skills group, group therapy with typically developing peers, or individual social skills therapy) or strategy (e.g., applied behavioral analysis, pivotal response training, social stories) will

This review suggests that SLPs can be optimistic about the effects of social skills intervention on impairment-level functions.

produce the best result for Charlie, all of these models and strategies have resulted in positive changes in social skills for at least some adolescents with ASD in the published literature. The evidence suggests that the likelihood with which Charlie will demonstrate generalized changes in social skills outside of the intervention context will depend on the development

of a specific generalization plan, including the training of natural supports and the availability of on-going social skills supports. As Charlie is an “N of 1”, the clinician will consider him as a single-case experiment, collecting data on treatment progress while attempting to control for – or at least consider – the effects of potentially confounding variables such as maturation and other concurrent interventions.

Conclusion

The results of this review suggest some challenges in engaging in evidence-based practice in this important area of clinical practice. The original

intent of evidence-based practice was to provide a framework through which professionals would consider multiple sources of empirical evidence when making clinical judgments, including individual and group studies, retrospective chart reviews, and detailed case descriptions (Guyatt et al., 2000). Given the state of the literature on social skills intervention for adolescents with ASD, it is clear that all types of evidence are needed. There is a particular need for studies relating social skills intervention to long-term psychosocial outcomes as well as studies showing generalization of effects beyond the treatment setting and to improvements in life participation. With access to this information, SLPs will be poised to engage in evidence-based practice that involves strategic consideration of the accumulated literature on effective intervention approaches that will maximize adolescents' participation in social life.

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Table 1. Summary of Studies Reviewed

Author(s)	Class	Experimental Design	Total N, Adolescent N	Evidence of Generalization to Naturalistic Environment?
ASD Social Skills Groups				
Ozonoff & Miller (1995)	I	Randomized controlled trial with no-treatment control group	9, 9	No (based on parent and teacher ratings on SSRS)
Webb, Miller, Pierce, Strawser, & Jones (2004)	II	Group pretest-posttest design with a multiple baseline across skills	10, 10	No (based on parent and teacher ratings on SSRS)
Broderick, Caswell, Gregory, Marzolini, & Wilson (2002)	II	Group pretest-posttest design with no comparison group	9, 9	Yes (based on anecdotal evidence by non-blind rater)
McGee, Krantz, & McClannahan (1984)	II	Group pretest-posttest design with no comparison group	3, 3	Yes (based on anecdotal evidence by teachers and parents)
LeGoff (2004)	II	Group pretest-posttest design with participants serving as their own wait-list controls	47, -	Yes (based on increased initiations and duration of initiations at school by non-blind rater)
Williams (1989)	II	Group pretest-posttest design with no comparison group	7, -	Unknown
Mesibov (1984)	IV	Group case description	15, -	Yes (based on anecdotal evidence by parents)

*Table 1 (continued)***Group Therapy With Typically Developing Peers**

Bauminger (2002)	II	Group pretest-posttest design with no comparison group	15, -	Yes (based on non-blind teacher ratings on SSRS)
Gaylord-Ross, Haring, Breen, & Pitts-Conway (1984)	III	Single subject multiple baseline design	3, 3	No
Haring & Breen (1992)	III	Single subject multiple baseline design	1, 1	Yes (by anecdotal reports by parents, peers, and teachers)

Individual Social Skills Therapy

Silver & Oakes (2001)	I	Randomized controlled trial with no-treatment control group	22, -	Unknown
Koegel & Frea (1993)	III	Single subject multiple baseline	2, 2	Unknown
Harris, Handleman, & Alessandri (1990)	III	Single subject multiple baseline	3, 3	Yes (but limited; better to novel school environment than home)
Scattone, Wilczynski, Edwards, & Rabian (2002)	III	Single subject multiple baseline	3, 1	Unknown
Groden & Cautela (1988)	III	Single subject multiple baseline	3, 1	Unknown
LeBlanc et al. (2003)	III	Single subject multiple baseline	3, 1	Unknown

Note: The symbol (-) indicates that the number of adolescent participants is unknown.

SSRS = Social Skills Rating System (Gresham & Elliott, 1990).

Table 2. Example of Approaches Used in Social Skills Interventions

Intervention	Description
Theory of Mind Tasks	<p>Theory of mind (ToM) is the ability to attribute mental states such as thoughts, beliefs, and expectations to oneself and others, coupled with the ability to then predict behavior based on that understanding (Baron-Cohen, Leslie, & Frith, 1985; Frith & Happe, 1994). Much of the research investigating the ToM abilities of individuals with autism focuses on first and second order false belief tasks. First order false belief tasks require an individual to know what another person knows or thinks (i.e., What does A think B thinks?); second order false belief tasks require an individual to predict what another person thinks a third person thinks (i.e., What does A think B thinks that C thinks?). False belief is often measured based on verbal responses to demonstrations with objects as well as pictured and written stimuli. The two most frequently cited false belief tasks include variations of the “Smarties” and “Sally Ann” tasks. The following is an example of the latter (Wimmer & Perner, 1983):</p> <ol style="list-style-type: none"> <li data-bbox="489 877 1136 909">1. The child watches Sally put a marble in a basket. <li data-bbox="489 915 956 948">2. The child sees Sally leave the area. <li data-bbox="489 954 1367 987">3. The child watches Anne move the marble from the basket to a box. <li data-bbox="489 993 1413 1064">4. Sally returns to the area and the child is asked where Sally will look for the marble. <p>Many children with ASD mistakenly indicate that Sally will look for the marble in the box, demonstrating a flawed understanding of false belief and theory of mind (or the ability to differentiate their knowledge from that of another).</p>
Social Stories	<p>Social Stories were developed by Carol Gray (The Gray Center, 2006), an autism consultant from Jenison, Michigan. A Social Story is a story that: “describes a situation, skill, or concept in terms of relevant social cues, perspectives, and common responses in a specifically defined style and format. The goal of a Social Story is to share accurate social information in a patient and reassuring manner that is easily understood by its audience. Half of all Social Stories developed should affirm something that an individual does well. Although the goal of a Story should never be to change the individual’s behavior, that individual’s improved understanding of events and expectations may lead to more effective responses” (The Gray Center, 2006).</p>

*Table 2 (continued)***Applied Behavioral Analysis**

Applied Behavior Analysis (ABA) is an approach to clinical intervention in which behaviors are strengthened through conditioning and reinforcement; behaviors may also be extinguished through negative reinforcement. Often, in APA approaches, a complex behavior – such as producing a word or phrase – is broken into its smallest discrete components, each of which is then taught to mastery until the complex behavior is achieved. Specific strategies that are utilized include: (1) breaking skills down into small steps, (2) providing repeated opportunities to practice and learn (discreet trial teaching), (3) use of strategies such as modeling, reinforcement, fading, and shaping of behavior, and (4) strict reliance on use of data collection on clinical prompts and participant responses to guide next steps in behavioral training.

SOCIAL SKILLS INTERVENTION FOR ADOLESCENTS
WITH AUTISM SPECTRUM DISORDERS:
A REVIEW OF THE EXPERIMENTAL EVIDENCE

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