Brief Report: Feasibility of Social Cognition and Interaction Training for Adults with High Functioning Autism

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Abstract

The goal of this study was to evaluate the feasibility and utility of a group-based cognitive behavioral intervention to improve social-cognitive functioning in adults with high-functioning autism (HFA). We modified the treatment manual of a previously validated intervention, Social Cognition and Interaction Training (SCIT), for optimal use with HFA adults (SCIT-A). We then conducted a pilot study to compare SCIT-A ($n = 6$) to treatment as usual (TAU) ($n = 5$) for adults with HFA. Feasibility was supported; attendance was high (92%) and satisfaction reports were primarily positive. Participants in SCIT-A showed significant improvement in theory-of-mind skills and trend level improvements in social communication skills; TAU participants did not show these improvements. Findings indicate SCIT-A shows promise as an intervention for adults with HFA.

Keywords

Social cognition; Adults; Group intervention; High functioning autism

Introduction

Impairments in social cognition and social functioning are defining features of autism (American Psychiatric Association 2000; Baron-Cohen and Wheelwright 2003; Orsmond et al. 2004). Social-cognitive deficits include difficulties with emotion perception and theory-of-mind (ToM), whereas social functioning deficits include problems interacting with others and developing positive social relationships. Such impairments emerge during early childhood and

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persist into adulthood, even for those with high-functioning autism (HFA), which includes individuals with Asperger syndrome, autism, or PDD-NOS with average intellectual ability. Individuals with HFA often desire social contact with peers, yet have poor friendships due to limited social-emotional understanding. This difference between social interests and skills often leads to social isolation, social rejection, and increased loneliness (Bauminger and Kasari 1999; Orsmond et al. 2004).

Adaptive social skills are impaired relative to cognitive skills in adults with HFA (Klin et al. 2006). In other words, social deficits outweigh cognitive deficits, implying that "high functioning" in cognitive terms does not equate with "high functioning" in social terms. This discrepancy between cognitive and social skills may affect the ability of adults with HFA to secure employment and live independently (Klin et al. 2006; Tantam 1991). Clearly, adults with HFA would benefit from an intervention that directly targets social-cognitive functioning by teaching skills needed to build positive social relationships.

Interventions that target social cognition and social skills in autism have shown positive, but often limited, effects (Bauminger 2002, 2007; Gevers et al. 2006; Hadwin et al. 1996; Ozonoff and Miller 1995). These studies have utilized a variety of techniques, including cognitive behavior therapy, video modeling, and peer modeling to teach a range of social cognitive and social interaction skills. In general, participants have been children or adolescents, and results have indicated improvements in specific targeted areas, with little generalization of skills outside the therapy setting. These interventions include three group therapy programs (Bauminger 2007; Hadwin et al. 1997; Ozonoff and Miller 1995). Both Hadwin et al. and Ozonoff and Miller targeted specific components of social cognition (e.g., theory of mind or emotion recognition) in addition to social skills. Bauminger (2007) recently tested a group intervention that targets several components of social cognition. However, this intervention includes a year of group intervention that follows a year of individual intervention. While these programs are promising for targeting social cognition and skill, none has included adult participants. Thus, little research has directly targeted social cognition and "real-world" social-functioning in adults with HFA.

Social Cognition and Interaction Training (SCIT; Roberts et al. 2004), is a group intervention that was originally designed for adults with psychotic disorders to improve social cognition, social skills, and community functioning (Couture et al. 2006). This program targets several components of social cognition, including emotion recognition, theory of mind, and attributions as well as social interaction skills. In a pilot study, Penn et al. (2005) found that SCIT was associated with improved performance in ToM and attributional style in a sample of inpatients with psychosis. Combs et al. (2007) demonstrated that individuals with psychosis who received SCIT showed greater improvement in emotion perception, ToM, attributions, and social functioning than individuals who participated in a coping skills group.

SCIT may be a useful starting point for adapting a treatment for autism. Individuals with schizophrenia and those with autism have similarities with respect to social-cognitive functioning (Couture et al. 2005), visual scanpaths (Sasson et al. 2007), and neural activation during social cognitive tasks (Pinkham et al. in press). Specifically, Couture et al. (2005) found no differences between these two groups on measures of emotion perception and theory of mind. Recently, Pinkham et al. (in press) found that individuals with HFA and those with paranoid schizophrenia showed similar patterns of neural activations while rating the "trustworthiness" of faces. Finally, Sasson et al. (2007) found similarities between visual scanpaths when viewing social scenes and identifying emotions displayed between the two groups. These similarities in social-cognitive functioning between individuals with autism and schizophrenia, combined with the success of the SCIT for use with individuals with

schizophrenia, suggest that SCIT may be a valuable tool to treat social-cognitive deficits in high-functioning adults with autism.

The goal of this study was to examine the feasibility of a version of SCIT modified for individuals with autism (coined "SCIT-A") for adults with HFA, and to investigate its impact on social-cognition and social functioning relative to treatment as usual (TAU). We hypothesized that individuals who received SCIT-A would show greater improvements in social cognition and social functioning relative to individuals who received TAU.

Methods

Participants

Adults with HFA were recruited from Division TEACCH, a state agency that provides services for individuals with autism in North Carolina ($n = 12$), and psychologists in the community ($n = 1$). Eligibility requirements included: (1) 18−55 years old; (2) clinical diagnosis and Autism Diagnostic Observation Schedule (ADOS; Lord et al. 2000) classification of an autism spectrum disorder (ASD); and (3) Full Scale IQ in the average range, as measured by the Weschler Abbreviated Scales of Intelligence (Wechsler 1999). Of the 13 adult participants, 11 completed all study procedures and thus were included in analyses. The other two did not return for follow-up evaluations (one participant moved out of the country and one could not be reached for scheduling).

The final sample comprised six adults with HFA who received SCIT-A and five IQ-matched adults with HFA who did not receive SCIT-A (see Table 1 for participant characteristics). Group assignments were initially determined randomly. However, two individuals assigned to the treatment condition opted not to participate in SCIT-A. One participant had conflicts with his job and the other changed his mind. Due to the small sample size of this pilot study, these participants were reassigned to the control condition. Therefore, this study is not a true randomized controlled design, but should be considered a quasi-experimental design.

Participants in both groups continued to receive other treatments. These data were available for 4/6 participants in the SCIT-A group (data are unavailable from one participant, and one participant declined to report this information). All were receiving a combination of job skills coaching, medication management, and/or individual therapy. Participants in the TAU group continued to receive other interventions (e.g., individual therapy, job skills coaching) during the SCIT-A trial. No participants in either group were participating in other group-based interventions concurrently with their participation in this study.

Eight of the 11 participants met criteria for autism and three met criteria for ASD on the ADOS (Lord et al. 2000). The three who met criteria for ASD were in the treatment group. Whereas there were no significant differences between groups on IQ or gender, the SCIT-A group was significantly older than the control group, $t(9) = 2.4$, $p < 0.05$. There was also a significant difference between groups in ethnicity, with the control group including a higher proportion of non-white participants, $X^2(1, n = 11) = 4.9$, $p < 0.05$. However, point-biserial correlations revealed that neither age nor race was significantly correlated with any of the dependent variables, all $ps > 0.1$, and therefore were not included as covariates in analyses.

Intervention Procedures

SCIT-A was conducted over an 18-week period (one session/week) with each session lasting ~50 min. Each 50-minute session included a review of the agenda for the session, check-in, homework review, and activities specific to the session topic. The original SCIT program is comprised of three phases: "Emotion training" (defining emotions, emotion mimicry training, and understanding paranoia), "figuring out situations" (distinguishing facts from guesses,

jumping to conclusions, understanding bad events), and "integration" (checking out guesses in real life). A more detailed description of SCIT is presented elsewhere (Penn et al. 2007). Each phase lasts ~6 sessions. For use with this diagnostic group, we modified the three phases. In phase one, the focus was shifted from the emotion of suspiciousness to interest/disinterest, and participants were taught to be more aware of social cues (i.e., addressing "missing the mark"). In phase two, we shifted the focus from distinguishing facts and guesses to distinguishing socially relevant facts from socially irrelevant facts. In contrast to participants with schizophrenia, we noted that adults with HFA were not "jumping to conclusions." However, they often were not reaching appropriate conclusions about social situations because they focused more on irrelevant facts (e.g., non-social details) than socially relevant facts (e.g., body posture, facial expressions).

Finally, we created videotape examples of social situations that were more appropriate for the social challenges of adults with autism. For example, one video presented a man who interrupted a work meeting and did not notice the social cues indicating that his interruption was disruptive. Participants were to identify the social cues that signaled that such behavior was disruptive. For a summary of the modifications we applied for SCIT-A, see Table 2.

Measures

Stakeholder Feedback—At post-test, we administered a short questionnaire that consisted of five statements about SCIT-A (e.g., "I found SCIT-A helpful") that the respondent rated on three-point scales (i.e., "disagree," "agree," and "strongly agree"), as well as three open-ended questions (e.g., "what suggestions would you make to improve SCIT-A?").

Social Cognition—Emotion perception was assessed with the Face Emotion Identification Test (FEIT; Kerr and Neale 1993), a 19-item test comprised of photographs of faces expressing six basic emotions (i.e., happy, sad, angry, afraid, surprised, and ashamed). The FEIT has been widely used in emotion perception studies (Mueser et al. 1996; Penn et al. 2000; Salem et al. 1996). Participants indicated which emotion was expressed in each photograph.

The Hinting Task (Corcoran et al. 1995) was used to measure ToM skills. This task consists of 10 brief, written vignettes that describe social interactions between two characters that end with one uttering a hint (e.g., "Gosh, these suitcases are heavy"). Participants indicated what the character really meant by the hint; a correct inference received two points. If the respondent was incorrect, a second, more obvious hint was provided (e.g., "I do not know if I can carry all three!"), and, if correct, the respondent received 1 point. Incorrect answers receive 0 points. Scores on the Hinting Task range from 0 to 20, with higher scores indicating better skills at inferring desires of others. The Hinting Task has been used in a variety of studies assessing ToM abilities and has good psychometric properties (Corcoran 2001; Greig et al. 2004; Marjoram et al. 2005).

Social Functioning—We also administered a self-report measure of social-communication skills, the Social Communcation Skills Questionniare (SCSQ) (McGann et al. 1997) and a performance-based measure of social skill, the Social Skills Performance Assessment (SSPA; Patterson et al. 2001). The SSCQ is a 26-item measure developed for use with individuals with traumatic brain injury that focuses on communication as a central feature of social competence. Each item is rated based on how well items describe the participant on a 5 point scale from "Always True "to "Never True." Summary scores were obtained by summing all ratings.

The SSPA is a role-play assessment in which the subject participates in three conversations for 3 min each on predetermined topics (e.g., "your landlord has not fixed a leak that you told him about last week, and now you are calling him on the phone to follow-up"). The SSPA has strong psychometric properties (Patterson et al. 2001). All role-plays were audio-taped and

rated by observers blind to group status and to pre- or post-treatment status. For each role-play, ratings of interest, fluency, clarity, focus, affect, social appropriateness, and conversation, were provided. Across the three role-plays, a total of 16 skills were rated. Each skill was scored on a 1−5 scale, with higher scores reflecting stronger social skill. Total scores on the SSPA range from 16 to 80. On our SSPA rating, all interactions were scored by two raters. Inter-observer reliability was high, with a Chronbach's α of 0.7. The two ratings were averaged to provide summary scores for each participant. Individual data are presented in Table 3, and group means and standard deviations are presented in Table 4.

Results

Feasibility

Group attendance levels were excellent (92% overall attendance; range 69−100%). Ratings of satisfaction were also high: Five out of six SCIT-A participants rated the group as "useful" or "very useful" in the brief survey administered at the end of treatment. The first open-ended question asked participants what they liked about the group. Answers included the size, topics covered, flexibility of group leaders, and opportunity to meet other adults with HFA. The second open-ended question asked what members did not like about the group. Respondents indicated that they wished that sessions had lasted longer, that they had more opportunity outside of the group to practice skills, and that this type of group had been available to them when they were younger.

Social Cognition

Because this design was quasi-experimental, we initially compared group performance at Time 1 on all outcome measures to ensure they were equivalent at baseline (see Table 3). For all measures, higher scores indicate better performance. Results of independent samples t-tests revealed no significant differences between groups on any of the social cognition or social functioning measures at baseline, all $ps > 0.10$.

Next, we conducted a series of 2 (Group) × 2 (Time: Pre-post) repeated measures analyses of variance (ANOVAs) to compare the treatment and control groups' changes in performance on each measure from baseline to post-treatment. On the FEIT, there was a significant main effect of group, $F(1,8) = 10.02$, $p < 0.05$, with participants in the SCIT-A group performing higher than participants in the TAU condition. The main effect for time and group × time interactions were not significant, $ps > 0.20$. The within-group effect size (Cohen's d) for the SCIT-A group was 0.94 (Cohen 1988), indicating a large treatment effect (see Table 3).

For the Hinting task, the main effect of group was not significant, $p > 0.20$. However, there was a significant main effect of time, $F(1,9) = 10.02$, $p < 0.05$, which was qualified by a significant group × time interaction $F(1,9) = 10.02$, $p < 0.05$. SCIT-A participants showed greater improvement in ToM than individuals who received TAU. Again, a large within-group treatment effect was observed for the group who received SCIT-A (Cohen's $d = 0.84$).

Social Functioning

On the SCSQ, the main effects of group and time were not significant, $ps > 0.20$. The group × time interaction approached significance, $F(1,9) = 3.3$, $p < 0.10$. Follow-up t-tests indicated that SCIT-A participants showed a non-significant increase in perceived social communication skills relative to control participants, whose social communication skills showed a non-significant decline over the study period. A small within-group treatment effect was observed for the group who received SCIT-A (Cohen's $d = 0.21$).

On the SSPA, the 2×2 ANOVA revealed that there were no significant main effects of group or time, nor was there a significant interaction of group by time, all *ps* > 0.20, suggesting no change over time for either group. These finding indicate that participants showed no changes in their performance on role-play scenarios as a result of participating in SCIT-A.

Discussion

This preliminary study of SCIT-A sought to examine the feasibility of this group intervention for high-functioning adults with ASD, a growing population (Fombonne 2005) with limited research focused on intervention. This initial study demonstrated both treatment feasibility and improvements in social cognition and perceived social functioning.

Feasibility data indicated that attendance was high and that most participants reported that the group was helpful. High attendance rates were especially promising given the independence level of our sample (i.e., all lived at least semi-independently and most were responsible for their own transportation to and from group), and the minimal effort made to remind participants of group sessions. Thus, SCIT-A appeared to be well-tolerated and accepted by participants. Future research may elucidate participant characteristics predictive of SCIT-A satisfaction.

In the area of social cognition, there was a large effect size (Cohen's $d = 0.94$) for the within-group effect of SCIT-A on the FEIT. We also found statistically significant improvement in ToM skills in SCIT-A participants relative to individuals who received TAU. Deficits in ToM are thought to underlie many of the challenges individuals with autism face in social situations, such as understanding vague language, reading non-verbal cues, and knowing when to approach potential social partners (Tager-Flusberg 1999). These findings are therefore promising because improvements in social thinking may ultimately lead to improvements in social behavior.

Finally, in the area of social functioning, we found trend-level improvement in SCIT-A participants' perceived social communication skills. It is possible that improved perceived social skills leads to greater confidence during social interactions. The SSPA required participants to interact for 3 min in a role-play scenario, and the SSPA did not reveal significant changes in observer-rated social skill related to SCIT-A. A variety of issues might account for this null finding: (1) The SSPA is not sensitive to change in this clinical population; (2) SCIT-A did not improve social skill; and (3) Situations in the SSPA are not relevant to individuals with HFA. No change on this measure may reflect that the initial goals of SCIT-A to teach participants to become better at understanding ambiguous social situations and to improve their social skills in those contexts. As these role-plays were structured and not ambiguous, our program may not have targeted the skills measured directly. Therefore, future research that assesses social skills in a more naturalistic context may be more sensitive to the changes in social functioning induced by SCIT-A.

Future directions for SCIT-A development include addressing social insight as a target of the intervention. During the SCIT-A sessions, participants were noted to become more adept at understanding social situations and how to improve their interactions with others. However, these improvements did not always translate to improved insight, a natural precursor to changes in behavior. For example, one participant was able to identify when a person in a video missed a cue that his social partner was in a hurry, but did not pick up on these cues in his own environment.

Limitations of the current study include the quasi-experimental nature of the design. A true randomized control design with larger samples and other control conditions would be optimal to test the efficacy of SCIT-A. However, at this initial stage of treatment development, we were interested in treatment feasibility, tolerability, and the determination whether SCIT-A has

promise. In this regard, we felt that SCIT-A achieved those goals and that SCIT-A appears to be a promising approach for continued development and evaluation. However, these results are clearly preliminary and should therefore be interpreted with caution. Future SCIT-A research should follow accepted guidelines for treatment research in autism (Smith et al. 2006) to further develop this intervention and to examine SCIT-A for use with individuals of different age ranges and abilities.

Acknowledgments

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Table 1

Demographic characteristics of sample

	Treatment (*n* = 6)	TAU control (*n* = 5)
Chronological age (years)		
Mean (s.d.)	42.5 (12.3)	28.8 (1.0)
Range	25−55	27−29
IQ[a]		
Mean (s.d.)	113.3 (20.0)	110.6 (14.7)
Range	84−144	87−124
Male (proportion)	5/6	5/5
Caucasian (proportion)	6/6	3/5

[a]Scores derived from the Wechsler Abbreviated Scales of Intelligence, Full Scale IQ—2

Table 2

SCIT phases (Roberts et al. 2004)

Sessions	Phase	Goals	Content	Autism modifications
1−6	I—Introduction and emotions	1. Begin building group alliance	Introduce SCIT and social cognition, establish group alliance, review the role of emotions in social situations, and conduct emotion training	• Focus on emotions of boredom and interest
		2. Introduce SCIT and the concept of social cognition		• Reduce focus on emotion of paranoia
		3. Share personal experiences of emotion and link them to social contexts		• Link additional non-verbal behaviors to emotions
		4. Define seven basic emotions		
		5. Link facial expressions to these emotions		
7−13	II—Understanding situations	1. Be able to recognize "jumping to conclusions"	Address jumping to conclusions, attributional biases, tolerating ambiguity, distinguishing facts from guesses, and gathering data to make better guesses	• Focus on distinguishing relevant social facts from irrelevant social facts
		2. Be able to brainstorm multiple possible explanations for negative events		• Recognize "missing the mark," or missing the important general picture of a social situation
		3. Appreciate the difficulty of interpreting ambiguous situations		
		4. Recognize difference between social facts and guesses		
		5. Practice gathering evidence instead of jumping to conclusions		
		6. Be able to judge the likelihood that a conclusion is right		
14−18	III—Integration: "Checking it out"	1. Collaboratively assess facts surrounding social events in members' lives that cause distress	Consolidate skills and generalize to everyday problems	• Practice catching relevant social cues in live interactions
		2. Recognize it is not always possible to understand a situation without gathering more information		• Focus on individuals' social insight to assist with generalization
		3. Appreciate that "checking out" guesses with another person can		

Sessions	Phase	Goals	Content	Autism modifications
		prevent jumping to conclusions		
		4. Identify appropriate questions to check out guesses in specific social situations		
		5. Role-play "checking it out"		

Table 3

Individual data on clinical and outcome measures

	ADOS comm	ADOS social	WASI 2-scale IQ	FEIT		Hint		SSCQ		SSPA	
				Pre	Post	Pre	Post	Pre	Post	Pre	Post
TAU participants											
#1	5	8	110	10	14	18	19	63	68	58.5	49.5
#2	4	10	118	11	11	16	16	77	77	49.5	56
#3	4	11	114	12	11	15	15	67	62	58	57
#4	5	6	124	14	10	17	15	69	57	47.5	48.5
#5	6	10	87	10	10	13	14	55	48	52.5	51.5
SCIT-A participants											
#1	3	6	116	13	14	16	19	55	57	57.5	62
#2	2	5	144	13	17	16	20	32	46	60	63
#3	7	13	84	15	15	10	12	31	22	32	26
#4[a]	5	8	101	-	12	15	16	72	73	51.5	49.5
#5	6	6	117	11	14	17	18	63	73	62.5	63
#6	3	5	118	14	13	13	16	80	89	72	66

[a] FEIT data are missing for one SCIT-A participant

Table 4

Measure of social cognition and social functioning

	SCIT-A treatment ($n = 6$)[a] Mean (s.d.)	TAU control ($n = 5$) Mean (s.d.)
Emotion perception (FEIT)		
Baseline	13.2 (1.5)	11.4 (1.7)
Post-test	14.2 (1.7)	11.2 (1.6)
Theory of mind (hinting task)		
Baseline	14.5 (2.6)	15.8 (1.9)
Follow-up	16.8 (2.8)	15.8 (1.9)
Social communication skills questionnaire (SCSQ)		
Baseline	55.5 (20.4)	66.2 (8.1)
Post-test	60.0 (23.8)	62.4 (11.0)
Social skill performance assessment (SSPA)		
Baseline	55.9 (13.5)	53.2 (4.9)
Post-test	54.9 (15.3)	52.5 (3.8)

For all measures, higher scores indicate better performance or stronger skills

[a] FEIT data are missing for one SCIT-A participant