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Social Cognitive Skills Training in Schizophrenia: An Initial Efficacy Study of Stabilized Outpatients

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Abstract

Social cognitive deficits are promising treatment targets for new interventions to improve functional outcome in schizophrenia. A few preliminary studies of inpatients support the feasibility of improving social cognition through psychosocial interventions. This clinical trial evaluated a new 12-session social cognitive skills training program designed to address four aspects of social cognition (affect perception, social perception, attributional style, Theory of Mind) in outpatients with psychosis, a population for whom such interventions will likely be very useful. Thirty-one clinically stabilized outpatients were randomly assigned to a social cognition skills training intervention or a time-matched control condition (illness self-management and relapse prevention skills training), and completed pre- and post-treatment assessments of social cognition, neurocognition, and symptoms. The social cognition group demonstrated a large, significant improvement in facial affect perception, which was not present in the control group. This improvement was independent of changes in basic neurocognitive functioning or symptoms. Results support the efficacy of a social cognitive intervention for community-dwelling outpatients and encourage further development of this treatment approach to achieve broader improvements in social cognition and generalization of treatment gains.

Introduction

Impairments in social functioning are among the most debilitating and treatment refractory aspects of schizophrenia (Bellack et al 2007). It has become clear that further improvements in social functioning will not occur through gains in psychotic symptom management alone, since psychotic symptoms are typically not closely related to functional adaptation levels in community-dwelling outpatients (Carter 2006; Heydebrand et al 2004) and there has been little improvement in community functioning over the past 100 years (Hegarty et al 1994). Instead,

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Conflicts of Interest

There are no conflicts of interest

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treatments that directly address the key determinants of poor social functioning are required to ameliorate these impairments. There has been good success in identifying basic neurocognitive processes that predict social dysfunction (Green et al 2000; Green et al 2004), which has been one rationale for major NIMH initiatives to stimulate the development of new pharmacological treatments for cognitive deficits (Marder and Fenton 2004). However, it is unlikely that interventions targeting only basic neurocognition will be sufficient to achieve optimal functioning since neurocognitive deficits typically account for only 10% to 40% of the variance in outcome (Green et al 2000; Green et al 2008; Penn et al 2006). Thus, there is a critical need to identify and treat other determinants of poor outcome.

Rapidly growing evidence indicates that impairments in the domain of social cognition are important determinants of functional outcome in schizophrenia. Social cognition is a multifaceted construct that refers to the mental operations underlying social interactions, which include processes involved in perceiving, interpreting, and generating responses to the intentions, dispositions, and behaviors of others (Brothers 1990; Fiske and Taylor 1991; Kunda 1999). Schizophrenia patients show substantial deficits in several aspects of social cognition, including emotional processing, social perception, Theory of Mind, and attributional style (Penn et al 2006). There is a general consensus that social cognition is distinct from, though related to, basic neurocognition and other clinical features of schizophrenia (Green et al 2005; Penn et al 1997; Sergi et al 2007). Furthermore, social cognition shows *unique* relationships to functional outcome, above and beyond basic cognition (Couture et al 2006). For example, social cognition has been found to mediate the relationship between basic neurocognition and functional outcome (Addington et al 2006; Brekke et al 2005; Sergi et al 2006; Vauth et al 2004). Hence, social cognition appears to be more proximal to functional outcome than basic cognition and, for that reason, could be an even better target for intervention.

A few research groups have demonstrated that the social cognitive deficits of schizophrenia are modifiable through brief experimental manipulations or more intensive psychosocial interventions (see (Horan et al 2008)). For example, performance on facial affect recognition tests has been enhanced through brief (e.g., an hour or less) intervention probes such as attentional manipulations or monetary reinforcement (Combs et al 2006; Penn and Combs 2000; Russell et al 2006; Silver et al 2004). In addition, longer-term studies that incorporated social cognitive training exercises into multi-component treatment packages (often including neurocognitive remediation) demonstrate improvements on social cognitive tests (Bell et al 2001; Hodel et al 2004; Hogarty et al 2004; van der Gaag et al 2002). However, specifically attributing any intervention effects to the social cognitive training in these longer-term treatments is difficult because the procedures were embedded within multi-component rehabilitation programs.

A handful of research groups have begun developing and testing treatment programs that specifically target social cognition. For example, Wolwer and colleagues in Germany developed the Training in Affect Recognition program to remediate facial emotion perception deficits in schizophrenia. This 12-session computer-based training program is administered to pairs of patients at a time. It initially focuses on recognition of specific facial features associated with basic emotions and progresses to more complex facial displays in social contexts. Following an initial uncontrolled feasibility study (Frommann et al. 2003), a randomized trial demonstrated that inpatients who received this intervention demonstrated significant improvements in facial affect perception (and working memory), whereas patients in a time-matched neurocognitive remediation program or treatment as usual did not (Frommann et al 2003; Wolwer et al 2005). Since only facial affect perception was assessed, it is unknown whether this resource-intensive intervention leads to improvements in other social cognitive processes.

Penn and colleagues in North Carolina developed Social Cognitive and Interaction Training (SCIT; (Penn et al 2007b), an 18-session intervention that addresses three social cognitive processes: emotion perception, attributional bias, and Theory of Mind. The intervention is designed for small groups of six to eight patients and includes a variety of interactive training exercises, such as distinguishing facts from guesses, avoiding jumping to conclusions about suspicious beliefs, and gathering information about others' emotions and beliefs. An uncontrolled feasibility study of seven inpatients demonstrated improvements in attributional bias and Theory of Mind (but not emotion perception), as well as clinical symptoms (Penn et al 2005). A subsequent study using a slightly modified treatment manual demonstrated improvements in social attribution and Theory of Mind, as well as facial emotion perception, in 18 forensic inpatients compared to patients receiving treatment as usual (Combs et al 2007). Recently, a quasi-experimental study by Roberts and Penn (Roberts and Penn in press) evaluated an outpatient sample that received either SCIT plus treatment as usual or treatment as usual-only (without random assignment to condition). The SCIT group showed significant treatment benefits on a facial affect perception task, but not on measures of the other two targeted social cognitive processes.

These encouraging findings across studies (also see (Roncone et al 2004)) have several limitations, including: 1) most did not include active control groups matched for time in treatment, 2) it is unclear from these studies whether social cognitive improvements merely reflected changes in basic neurocognitive functioning, and 3) with one exception, all used inpatients who often showed concurrent improvements in clinical state that could influence social cognition results. Because schizophrenia inpatients comprise a small fraction of patients, social cognitive interventions will find greater use in stabilized outpatients. Hence, it is critical to evaluate the efficacy of targeted social cognitive interventions in community-dwelling outpatients.

We report here the initial results of a randomized, controlled clinical trial for a new integrative social cognitive intervention for outpatients with psychotic disorders designed to improve four domains, including facial affect perception, social perception, attributional style, and Theory of Mind. As detailed below, this program combines successful elements from two existing programs (Frommann et al 2003; Penn et al 2007b) with a variety of novel training exercises and materials. We evaluated whether this new intervention results in specific improvements on social cognitive tests.

Methods

Design

In this 6-week clinical trial, 34 study participants were randomly assigned to either Social Cognition or Control (Illness Self-Management and Relapse Prevention Skills) intervention conditions. Three participants completed less than four sessions and did not complete post-treatment assessments, including two participants in the Social Cognition group (one obtained a job that conflicted with the group schedule, one decided he did not want to participate after a single session) and one in the Illness Self-Management group (obtained a job that conflicted with the group schedule). Thus, complete pre- and post-treatment data was available for final samples sizes of 15 in the Social Cognition group and 16 in the Control group. These group-based interventions were equated for total training time (12 one-hour groups that met twice weekly), group structure and format, and types of instructional aids used. Training took place in groups of six participants with two facilitators, including a licensed clinical psychologist (WPH) and a bachelor's level clinician (KS), who co-led all groups. For both groups, training methods included didactic and videotape instruction, instructional Powerpoint slides presented on a screen, modeling and social reinforcement. Both groups completed the same pre- and post-treatment assessment batteries. Written informed consent was obtained from all study

participants based on a complete description of the study. Participants received financial compensation (\$12) after each session.

Subjects

Outpatients were recruited from the VA Greater Los Angeles Healthcare Center. All patients met DSM-IV criteria for schizophrenia or schizoaffective disorder as determined by medical records and consultation with treating psychiatrists. Subjects were clinically stable (no psychiatric hospitalizations in the past 6 months, same antipsychotic medication for past 3 months). Exclusion criteria were evidence of current or past neurological disorder (e.g., epilepsy), mental retardation, or substance use disorder within the past month.

There were no significant differences between the groups in years since first psychiatric hospitalization (Social Cognition: $M = 20.23$, $SD = 12.3$; Control: $M = 18.03$, $SD = 7.4$), $t(29) = .60$, $p > .05$; education (Social Cognition: $M = 12.5$, $SD = 1.1$; Control: $M = 12.1$, $SD = 0.6$), $t(29) = .89$, $p > .05$; ethnicity (Social Cognition: 60% African American, 27% Caucasian, 13% Other; Control: 50% African American, 31% Caucasian, 29% Other), or sex (Social Cognition: 87% male; Control = 100% male). Patients in the Social Cognition group tended to be older ($M = 50.7$, $SD = 5.8$) than those in the Control group (Control: $M = 45.9$, $SD = 7.5$), $t(29) = 1.98$, $p = .06$.

Antipsychotic medication type and dose were not controlled in the study but were left to the discretion of the subjects' treating physician. In the Social Cognition group, 13 patients were taking atypical antipsychotics, 1 was taking both typical and atypical antipsychotics, and 1 was not taking any antipsychotic medication. In the Control group, 13 patients were taking atypical antipsychotics, 2 were taking both typical and atypical antipsychotics, and 1 was not taking any antipsychotic medication. The proportions of patients in each group in these medication categories did not significantly differ, $\chi^2 (N = 31) = .30$, $p > .05$.

Interventions

Social Cognitive intervention—The training approach incorporated several skill-building strategies that are widely used in psychiatric rehabilitation including: 1) breaking down complex social cognitive processes into their component skills, 2) initially teaching/training skills at the most fundamental level and gradually increasing complexity of skill acquisition, and 3) automating these skills through repetition and practice. All sessions were accompanied by Powerpoint slide presentations and were structured to begin with a brief review of previously covered material, didactic presentation of new material, and group-based practice and training exercises. The sequence of sessions was designed so that the didactic presentations and training materials gradually increase in complexity and in real world relevance, sharing the ultimate goal of the SCIT program of enabling participants to become better “social detectives”.

The training consisted of two six-session phases: 1) Emotion and social perception (understanding what others are feeling), and 2) Social attribution and Theory of Mind (understanding what others are thinking). The first phase initially focused on identifying six basic emotions on the face and in the voice using newly developed didactic presentations that incorporated: a) digitized still photos, audio clips, dynamic film clips of faces expressing emotions from various sources (e.g., (Baron-Cohen et al 2004; Tottenham 2002); computerized facial affect perception training exercises developed by (Wolwer et al 2005); and facial mimicry exercises (Penn and Combs 2000). Training then progressed into social cue perception skills and social context appreciation. Sessions consisted of newly developed presentations that covered recognizing non-verbal gestures and social norms (e.g., posture, proxemics, eye contact, status differences between interaction partners, emotional intensity, sounds that convey understanding, how people are likely to feel in different social situations). Drawing on

exercises from the SCIT program (Penn et al 2007a), the training also included understanding how emotions affect one's own thoughts and behaviors in social situations. Training materials consisted of digitized still photos and film clips drawn from existing sources (Baron-Cohen et al 2004; Tottenham 2002) as well as a newly assembled set of still photos of social situations and brief social vignettes.

The second training phase began by conceptualizing paranoia as an emotion and discussing how suspiciousness can affect beliefs about others' intentions. These sessions were based on didactic exercises and film clips from the SCIT program (Penn et al 2007b), and focused on distinguishing between useful suspiciousness versus harmful suspiciousness; distinguishing among facts, guesses, and feelings; and avoiding "jumping to conclusions" about others' intentions by "checking out" the evidence for one's beliefs. Finally, training focused on integrating various social clues (e.g., putting together the "5-W's" of social situations: who, what, when, where, and why) to evaluate whether others are using non-literal speech (sarcasm, humor) or deception (social lies, blatant lies) in different social contexts. Training consisted of newly developed didactic presentations and exercises that incorporated digitized still photos, film clips, and sets of written vignettes that describe different social situations. Throughout the training, patients are encouraged to discuss and apply the concepts to relevant emotional and social experiences from their own lives.

Control intervention: Illness Self-Management and Relapse Prevention Skills Training

—As an active control condition, we used a modified version of the Symptom Management Module of the UCLA Social and Independent Living Skills Program (Lieberman et al 1993; Wallace et al 1992). This is a structured, fully manualized training program that includes specific session agendas, scripted didactic exercises, videotapes, and handouts. The purpose is to teach participants how to prevent symptom relapses or minimize their severity by focusing on four skill areas: Identifying Warning Signs of Relapse, Managing Warning Signs, Coping with Persistent Symptoms, Avoiding Alcohol and Street Drugs. The format for training each skill involves a didactic introduction, videotape demonstrations, resource problem solving, and outcome problem solving. At this early stage of testing the Social Cognitive intervention, we were primarily interested in a time- and format-matched active control condition rather than a competitive comparison condition. We therefore excluded role play exercises from the Symptom Management module due to concerns that the social skill building nature of these exercises could influence social cognitive test performance. Thus, we felt that this control condition would be engaging and useful for patients, but would not likely influence the central variables under study. Patients in this condition completed a brief 15-item pre- and post-intervention symptom management knowledge quiz. Scores significantly improved from pre- ($M = 12.6$, $SD = 2.4$) to post-treatment ($M = 14.3$, $SD = 1.0$), $t(29) = 4.09$, $p < .001$), suggesting that participants were engaged in this condition.

Measures

Social cognition assessment—Four measures were used that correspond to four domains of social cognition affected in schizophrenia: 1) A *Facial Emotion Identification Test* included 8 digitized photos of facial expressions of the 6 different emotions in the training program (happy, sad, angry, afraid, surprised, disgusted) plus neutral expressions, for a total of 56 images from the Ekman picture set (Ekman 2004). Subjects view each face and then select the label they think is correct from a card that lists the possible answers. 2) The *Half-Profile of Nonverbal Sensitivity (PONS)* assesses social perception (Ambady et al 1995; Rosenthal et al 1979). The 110 scenes in this videotape-based measure last two seconds and contain facial expressions, voice intonations, and/or bodily gestures of a Caucasian female. After watching each scene, participants select which of two labels (e.g., saying a prayer; talking to a lost child) better describes a situation that would generate the social cue(s). 3) The *Ambiguous Intentions*

Hostility Questionnaire (AIHQ) was used to assess attributional style. Subjects read a series of vignettes describing social situations and answer questions about the intentions of the characters and how subjects themselves would respond to the situation. Following (Combs et al 2007), we examined scores for ambiguous situations only. The AIHQ contains Hostility and Aggression bias scores, which were independently scored by two blinded raters (ICC's for both bias scores were .85+), along with a composite "Blame" score (average of Intentionality, Anger, and Blame item ratings). 4) *The Awareness of Social Inference Test (TASIT) – Part 3* is a videotape measure of Theory of Mind that contains 16 scenes with two or three method actors appearing in each one. After presentation of each scene, subjects respond to questions about the characters' communicative intentions, whether they want the literal or non-literal meaning of their message to be believed, their beliefs and knowledge about the situation, and their emotional state, which were summed to create a composite score.

Neurocognitive assessment—The MATRICS Consensus Cognitive Battery (MCCB) (Nuechterlein and Green 2006) was used to assess general cognitive performance. The MCCB has gone through extensive review and a detailed selection process and provides normed scores (Kern et al 2008; Nuechterlein et al 2008). It includes tests that assess seven domains of neurocognition including speed of processing, attention/vigilance, working memory, verbal learning, visual learning, reasoning and problem solving, and social cognition. Because the goal of the study was to look at specialized measures of social cognition and basic cognition separately, we excluded the social cognition domain from the composite score, which was based on the average of t-scores from the six remaining domains.

Symptom assessment—Psychiatric symptoms were assessed pre- and post-intervention using the 24-item Brief Psychiatric Rating Scale (Ventura et al 1993). All interviewers were trained to a minimum intraclass correlation coefficient of 0.80 by the Treatment Unit of the Veterans Integrated Service Network 22, MIRECC and participated in an on-going quality assurance program throughout the project.

Qualitative ratings—At the completion of the interventions, all participants provided ratings of their perceptions of the group facilitators, satisfaction with treatment, and relevance to daily life. Ratings were provided on Likert scales ranging from 1 (not at all) to 10 (very much) to obtain information about information about the participants' perceptions of the interventions.

Data analysis

Preliminary analyses evaluated the comparability of the treatment groups on overall attendance levels and on pre-treatment levels on the social cognitive tasks, neurocognitive tasks, and clinical symptom ratings. The Social Cognition ($M = 9.9$, $SD = 1.7$) and Control ($M = 9.5$, $SD = 1.8$) groups did not significantly differ in the number of sessions attended, $t(29) = .55$, $p > .05$. At pre-treatment (see Table 1 for descriptives), none of the mean differences between groups achieved statistical significance. However, the Social Cognition group demonstrated nearly significantly lower scores than Controls on the PONS, $t(29) = -2.03$, $p = .051$, and a trend toward lower scores on AIHQ hostility subscale scores, $t(29) = -1.80$, $p = .08$.

To account for any between-group differences at pre-treatment, an ANCOVA approach was used in the primary data analyses. For each variable, post-treatment scores were used as the dependent variables with group entered as a fixed variable and pre-treatment scores entered as covariates. To characterize the magnitude of treatment effects, effect size estimates are presented for both between-group differences using Cohen's partial eta squared (η_p^2) and within-group pre- to post-treatment changes using Cohen's d (Cohen 1998). Effect sizes presented as η_p^2 correspond to the following conventions: small (.01), medium (.06), and large (.14). Effect sizes presented as d correspond to the following conventions: small (.20), medium

(.50), and large (.80). The patients' qualitative ratings of the treatment conditions were evaluated with independent-samples t-tests. All statistical tests are 2-tailed, using a significance level of $p < .05$.

Results

Descriptive data and results of ANCOVA's for each variable are presented in Table 1. Out of the four social cognitive domains, there was a significant group effect in the predicted direction for facial affect perception. The magnitude of the between-groups effect was large, while the within-group effect was medium to large for the Social Cognition group and small for the Control group. There were no other notable trends toward improvement on the social cognitive tests within the Social Cognition group though, unexpectedly, scores within the control group showed medium effect size improvements on several tests.

For neurocognition, there was not a significant between-group effect, with both groups showing medium improvements in their composite scores¹. Out of the five symptom domains, there was a significant group effect only for Anergia (comprised of the items Disorientation, Blunted Affect, Emotional Withdrawal, and Motor Retardation), which indicated higher ratings in the Social Cognition group. This unexpected effect reflected a medium increase within the Social Cognition group accompanied by a medium decrease in Controls.

In a supplemental analysis, we evaluated whether the predicted treatment effect found for facial affect recognition could be accounted for by any between-group differences on the neurocognitive and symptom variables. A series of ANCOVA's for affect perception (as described above) were re-run with neurocognition change scores ([pre-treatment score – post-test score] / [pre test score]) and similarly computed symptom rating change scores each entered separately as additional covariates. In each analysis the group effect for facial affect recognition remained significant (all $df = 3,27$; all F 's > 6.62).

Finally, post-treatment ratings provided by all the patients about their perceptions of the treatment conditions were evaluated (possible range of ratings: 1 [not at all] to 10 [very much]). Ratings were uniformly high for both treatment conditions. There were no significant differences in mean ratings of facilitator enthusiasm (Social cognition: 9.6 [SD = .9] vs. Skills training: 9.7 [SD = .6]) or knowledge (Social cognition: 9.6 [SD = .7] vs. Skills training: 9.7 [SD = .6]) ($t(29)$'s $< .50$, p 's $> .05$), suggesting that facilitator behavior was comparable across treatment conditions. In addition, both groups reported high levels of enjoyment/satisfaction (Social cognition: 8.7 [SD = 2.4] vs. Skills training: 9.5 [SD = 1.0]) and perceived relevance to daily life (Social cognition: 8.6 [SD = 2.5] vs. Skills training: 7.9 [SD = 2.1]) ($t(29)$'s < 1.0 , p 's $> .05$).

Discussion

This study provides initial support for the feasibility and efficacy of a new social cognitive skills training program for outpatients with psychotic disorders. Using a randomized controlled trial design, individuals who received the social cognitive intervention demonstrated significant improvements in facial affect perception, one of the four targeted social cognitive domains. These improvements were not attributable to changes in neurocognitive functioning or clinical symptoms. They also cannot be attributed to non-specific effects of regular participation in a psychosocial treatment program, as facial affect perception did not improve for patients in the active control condition. Furthermore, attendance levels in the social

¹An ANCOVA for the social cognition domain of the MCCB, which is comprised of the Managing Emotions subtest of the Mayer-Salovey-Caruso Emotional Intelligence test (Mayer et al 2002), indicated no significant group effect, $F(2,28) = 1.53$, $p > .05$.

cognitive intervention were very good (83% mean session attendance) and participants reported that training was engaging, enjoyable, and relevant to their daily lives. In conjunction with a recent quasi-experimental study of the SCIT program in outpatients that demonstrated improvements in facial affect perception (Roberts and Penn in press), these findings replicate and extend preliminary studies that evaluated targeted social cognitive interventions in inpatient samples. This extension to outpatients is an important step in this new area of treatment development, since social cognitive interventions are most likely to be applied to clinically stable patients who are living in the community. These findings point toward several areas that would benefit from expansion and refinement.

This new social cognitive intervention builds on strengths and successes of two previously developed intervention programs. For example, the facial affect perception training component incorporates some of the computerized exercises developed by Wolwer and colleagues but applies them in a less resource-intensive group format (rather than pairs of patients at a time), includes step-by-step didactics in identifying muscular changes in different regions of the face, and incorporates a variety of additional, developmentally appropriate training stimuli. Our intervention incorporates the general goal of the SCIT program to train participants to become better “social detectives”. In addition, the sections on social attributions and theory of mind draw directly from innovative SCIT exercises that focus on suspiciousness/paranoia and evaluating beliefs about others’ intentions. Our program is distinctive in using a highly structured, skills-training based approach that grows out of traditional psychiatric rehabilitation methods. It also goes beyond the content of the SCIT program in its coverage of social perception (e.g., non-verbal cue perception) and Theory of Mind, including training in identifying various forms of sarcasm and deception.

Although the results of this initial clinical trial are encouraging, the 12-session treatment protocol led to beneficial effects for only one of the four targeted aspects of aspect of social cognition. Facial affect perception received the greatest amount of training time and attention; it was the first skill area covered and a key component of the intervention was beginning each session with a brief review of previously covered material. Facial affect perception is the most extensively studied aspect of social cognition in schizophrenia and has also received the greatest attention in prior treatment studies that addressed social cognition (Edwards et al 2002; Kohler and Martin 2006). Training in facial emotion perception is amenable to highly structured skills training approaches that have a long history of use in schizophrenia treatment research.

Other aspects of social cognition are considerably more challenging treatment targets. For example, Theory of Mind-related concepts, such as appreciation of sarcasm, humor, and deception are difficult to concisely define and translate into brief structured training exercises. A number of innovative approaches to training in skills related to these complex aspects of communication are emerging and promising (e.g., (Kayser et al 2006; Moritz and Woodward 2007; Penn et al 2007b). However, larger treatment dosages will likely be required in outpatient samples to effectively address these more complex aspects of social cognition.

An open question for treatment development in this area concerns the relationship between basic neurocognition and social cognition. It is unclear whether improvements in basic neurocognition are prerequisite “building blocks” for improvements in social cognition (e.g., (Bell et al 2001; Hogarty et al 2006). The current study suggests that gains in social cognition are not necessarily dependent on improvements in basic neurocognition because controlling for neurocognition performance did not change the treatment effect in facial affect perception. These results are consistent with a randomized trial that pitted the Training in Affect Recognition program against a pure, time-matched neurocognitive remediation program and found that improvements in social cognition (facial emotion perception) and basic

neurocognition followed relatively distinct trajectories (Wolwer et al 2005). It remains to be determined whether social cognitive interventions can be used as efficient “stand alone” treatments, or whether there is a synergistic effect in treatment packages that also include interventions to enhance basic neurocognition.

Given the early phase testing of this new psychosocial intervention, the aims of this study focused on evaluating feasibility/tolerability and efficacy. Limitations include the small sample size and the relatively brief period of training. Minor symptom fluctuations in the small patient groups may have contributed to the unexpectedly higher Anergia ratings in the Social Cognitive group, which have not been reported in prior studies of social cognitive treatment. In addition, the patients were predominantly males who were receiving psychiatric services at a Veteran’s Administration facility, which limits the generalizability of the findings. Finally, we did not test durability and generalization to actual social functioning; the value of social cognitive interventions will ultimately depend on their ability to improve functioning in patients’ daily lives.

Based on the encouraging initial findings, our group has recently expanded the curriculum and is currently evaluating a 24-session version of the social cognitive skills training program. Our efforts are consonant with others aimed at seeking new treatments to facilitate functional recovery for people with schizophrenia. In the past five years, there has been an expansion of interest in developing new pharmacological treatments that move beyond psychotic symptom control and target the functional deficits associated with schizophrenia (Marder and Fenton 2004). We believe that concomitant psychosocial interventions will be essential to achieve optimal improvements in functional outcome. Recently, there have been several psychosocial treatment innovations informed by developments in rehabilitation technology and cognitive neuroscience (see (Velligan et al 2006). Social cognitive training interventions represent another promising new approach to helping patients build richer, more satisfying lives in the community.

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Table 1

Outcome and Clinical Measures by Treatment Condition

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	Pre-treatment		Post-treatment		F-test	Effect Sizes		
	Social Cognition	Control	Social Cognition	Control		Between-Group (η_p^2)	Within-Social Cognition Group (d)	Within-Control Group (d)
					Group Effect (F)			
<u>Social cognition</u>								
Facial affect perception	41.88 (7.62)	42.47 (7.86)	47.00 (6.25)	43.67 (7.74)	7.55*	.21	-.73	-.15
PONS	76.44 (6.1)	81.24 (4.68)	78.13 (6.28)	78.69 (6.1)	2.24	-.07	-.27	.46
AIHQ: Hostility	1.80 (0.43)	2.16 (0.62)	1.77 (0.37)	1.95 (0.60)	.09	.003	.07	.34
Intention	3.11 (1.04)	3.56 (1.06)	2.92 (1.03)	3.22 (0.96)	1.27	.05	.18	.33
Blame	6.53 (2.11)	7.41 (2.48)	6.16 (1.96)	5.97 (1.85)	.02	.001	.18	.66
TASIT	48.88 (6.51)	48.24 (6.26)	47.67 (6.09)	46.93 (7.85)	.13	.005	.19	.18
<u>Neurocognition</u>								
MCCB Composite score	35.17 (6.01)	38.32 (7.94)	38.13 (7.62)	41.44 (7.63)	.09	.003	-.43	-.40
<u>Symptoms</u>								
BPRS: Thought Disturbance	2.35 (.99)	3.00 (1.16)	2.20 (1.43)	2.93 (.91)	.57	.02	.12	.07
BPRS: Anxiety/Depression	2.69 (1.14)	2.45 (.94)	2.28 (1.08)	2.78 (1.18)	1.87	.07	.36	-.30
BPRS: Activation	1.23 (.40)	1.42 (.46)	1.20 (.35)	1.55 (.64)	2.26	.08	.08	-.23
BPRS: Hostility	1.96 (.75)	1.89 (.80)	1.76 (.84)	2.12 (.73)	2.44	.09	.25	-.30
BPRS: Anergia	1.49 (.45)	1.81 (.72)	1.72 (.72)	1.54 (.50)	5.34*	.18	-.40	.43

Notes: Standard deviations appear in parentheses. F-tests (df = 2,28) are based on ANCOVA's using post-treatment scores as dependent variables, group as a fixed factor, and pre-treatment scores as covariates. PONS: Profile of Non-Verbal Sensitivity; AIHQ: Ambiguous Intentions Hostility Scale; TASIT: The Awareness of Social Inference Test; MCCB: MATRICS Consensus Cognitive Battery; BPRS: Brief Psychiatric Rating Scale.

* p < .05