Development and preliminary evaluation of a social cognition intervention for outpatients with schizophrenia spectrum disorders

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Abstract

Social functioning deficits (e.g., social skill, community functioning) are a core feature of schizophrenia. These deficits are only minimally improved via the frontline treatments for schizophrenia (e.g. medication, social skills training, cognitive-behavioral therapy). The current project addresses this limitation with the development of a psychosocial treatment for schizophrenia that targets social cognition. Social cognition is a set of cognitive processes applied to the recognition, adaptive processing, and effective use of social cues in real-world situations. This is a promising treatment target as social cognition may be more strongly related to social functioning outcomes than traditional neurocognitive domains (Couture, Penn, & Roberts, 2006). Consistent with expert consensus, Social Cognition and Interaction Training (SCIT) is being developed based on a four-stage model of treatment. This dissertation focuses on the first two stages of this model: Treatment conceputalization and manual development, followed by pilot testing with outpatients with schizophrenia spectrum disorders. Two pilot trials were conducted, with the primary outcome of interest being social cognition (i.e., emotion perception, Theory of Mind, and attributional style). Secondary outcomes included social skill and need for closure. Study #1 used a quasi-experimental design to assess efficacy in a North Carolina (NC) sample, and Study #2 used an uncontrolled, pre-post design to assess effectiveness in a New York (NY) sample. Results were generally promising, as SCIT participants in both studies showed evidence of improvement in most outcome domains. Results and implications are discussed.

Table of Contents

List of Tables

Table

List of Figures

Figure

Introduction

Social Functioning in Schizophrenia

Deficits in social functioning are among the hallmark features of schizophrenia (DSM-IV; APA, 1994). Across studies, the term "social functioning" has been operationalized in a broad array of ways, including self- and other-report of interpersonal behaviors, ratings of social skill based on laboratory role-plays, social problem solving performance, and effectiveness in community functioning (e.g. shopping, independent living, etc.). Despite this conceptual inconsistency, consensus agreement is that social dysfunction is more pronounced in schizophrenia than in any other major psychiatric disorder (Mueser & Bellack, 1998). This is borne out in research showing that over 85% of individuals with schizophrenia are unemployed (Blyler, 2003; Lehman, 1995; Melle, Hauf, & Vaglum, 2000) and that most individuals with schizophrenia (almost 90%) show consistent deficits in social skill over one year (Mueser et al. 1991). Deficits in social functioning precede illness onset (Davidson, et al., 1999; Marenco & Weinberger, 2000; Pinkham, et al., 2007), persist following an initial psychotic episode despite remission of symptoms (e.g., Robinson et al., 2004), are present in the first degree relatives of individuals with schizophrenia (Hans et al., 2000), and represent a dimension of functioning relatively independent of positive and negative symptoms (Lenzenweger & Dworkin, 1996; McClellan et al., 2002). Importantly, impairments in social functioning are significant predictors of outcome, such as relapse, poor illness course, and unemployment (Perlick et al. 1992; Sullivan et al. 1990). In addition, there is a strong association between social functioning and both mental and physical health

(Rhodes & Lakey, 1999; Uchino et al. 1999; reviewed in Penn et al., 2004). Thus, social functioning deficits are a key feature in the development, course, and long-term outcome of schizophrenia.

The role of social dysfunction in schizophrenia goes beyond solely understanding the psychopathology of the disorder but has implications for individuals' quality of life. In particular, the majority of outpatients report having few, if any, close friends (Breier et al. 1991; Randolph, 1998). Moreover, individuals with schizophrenia consistently identify improved social functioning as a high priority (Bengtsson-Tops & Hansson, 1999; Wiersma et al. 1998). For example, only 37% of a sample of clients with schizophrenia rated management of psychotic symptoms as a current need; instrumental support was rated higher (Slade et al., 1996). In another study, individuals with schizophrenia rated social functioning as their area of greatest unmet need, and indicated that they were not receiving professional assistance in this domain (Middelboe et al., 2001). Coursey et al. (1995) found that clients with schizophrenia rated "human concerns" as more important to their progress in therapy than illness-specific symptoms. These findings are consistent with qualitative research showing that a goal for many individuals with schizophrenia is to find ways to connect with others and reduce social isolation (Corin, 1990; Corin & Lauzon, 1992, 1994; Davidson, Stayner, & Haglund, 1998), a need that may not be addressed by common psychosocial interventions such as Cognitive-Behavioral Therapy (Curtis, 1999; Tarrier et al., 1998). Thus, focusing on social impairments may directly address a fundamental human need (Baumeister & Leary, 1995; Ryff & Singer, 1998), which in turn, may impact long-term recovery (Mueser et al. 2002).

Social Functioning and Neurocognition

Given the importance of social dysfunction in schizophrenia, an emerging goal has been to elucidate the factors that underlie it, ostensibly for the purpose of informing treatments aimed at improving social functioning. Neurocognitive functioning has been a prominent factor in this regard. Reviews of the literature support a significant relationship between various indices of neurocognition (e.g., attention, executive functioning) and functional outcome, although the amount of variance accounted for is typically rather modest (Green, 1996; Green et al., 2000; McGurk & Mueser, 2004; Penn et al., 1997). In fact, although Green et al. (2000) reported that 20-60% of the variance in functional outcome could be explained by composite measures of neurocognition, closer inspection of that review reveals that the variance accounted for by most of the studies was in the 20-40% range. Thus, anywhere from 60-80% of the variance in functional outcome is unaccounted for by traditional neurocognitive measures.

One rationale for identifying factors that relate to functional outcome is that they may prove to be sound targets for interventions (both pharmacological and psychosocial). Thus, remediation of neurocognitive deficits should result in improvements in various indices of social functional outcome. Unfortunately, this has not always been the case. Although research has shown that deficits on particular neurocognitive tasks can indeed be significantly improved by cognitive training, there is inconsistent evidence of a significant impact on social outcomes (Kurtz et al., 2001; Pilling et al., 2002; Twamley et al., 2003), unless coupled with other psychosocial interventions such as vocational rehabilitation (McGurk et al., 2005; Wexler & Bell, 2005). This suggests that other factors underlie social impairments in schizophrenia and may be appropriate targets for psychosocial interventions.

Therefore, due to the modest associations between neurocognition and social functioning outcome, and limited generalizability of neurocognitive remediation, investigators have sought to identify domains of cognition that are relatively distinct from traditional neurocognitive domains, but that may have an independent link to social functioning (Penn, 1991; Penn et al., 1997) or serve as a potential mediator between neurocognition and social functioning (Green et al., 2000). This has led to recent enthusiasm for the role of social cognition in schizophrenia (Green et al., 2005; Penn et al., 1997).

Social Cognition

Social cognition has been described as the "mental operations underlying social interactions, which include the human ability and capacity to perceive the intentions and dispositions of others" (Brothers, 1990, p.28). A similar definition has been proposed by Adolphs (2001), who identified social cognition as "the ability to construct representations of the relation between oneself and others and to use those representations flexibly to guide social behavior" (p.231). These definitions share the idea that social cognition is a set of related neurocognitive processes applied to the recognition, understanding, accurate processing, and effective use of social cues and information in real-world situations (Penn et al., 1997).

Domains of social cognition

The study of social cognition in schizophrenia has generally focused on three primary domains: Theory of Mind, attributional style, and emotion perception (Penn, Addington, & Pinkham, 2006; Green et al., 2005).

Theory of Mind (ToM) refers to the ability to represent human mental states and/or to make inferences about another's intentions. Skills that fall under the rubric of ToM include

understanding false beliefs, hints, intentions, deception, metaphor, irony, faux pas, and, regarding one's own mental states, metacognition. In general, individuals with schizophrenia have deficits in both other-oriented ToM abilities (i.e., knowing what others are thinking) (reviewed in Brune, 2005a), and self-oriented or metacognitive ToM abilities (i.e., knowing one's own thoughts or thinking about one's own thinking; reviewed in Koren and Harvey, 2006). Across most studies, these impairments are present regardless of whether individuals are acutely ill or in a period of symptom remission, although evidence of state-dependent variation exists (reviewed in Brune, 2005b). In addition, ToM deficits are present across both inpatient and outpatient samples (Brunet et al. 2003; Langdon et al. 2002; Langdon et al., 1997; Sarfati, et al, 1999). Whereas ToM deficits are not uniquely associated with any specific symptom type (e.g., paranoia; Brune, 2005b), they may have different etiologies across disease subtypes (Bentall, 2001).

Attributional style refers to explanations people give regarding the causes of positive and negative events in their lives. The majority of work in schizophrenia has focused on attributional style in individuals with paranoia or persecutory delusions. Research shows that individuals with persecutory delusions tend to blame others, rather than situations, for negative events, an attributional style known as a "personalizing bias" (Bentall et al., 2001; Garety & Freeman, 1999). This bias initially may stem from the tendency of deluded individuals to "jump to conclusions" or to make decisions based on limited information (reviewed in Garety & Freeman, 1999). Jumping to conclusions is most prominent in individuals with persecutory delusions, but is also present among schizophrenia sufferers with other delusions (Dudley et al., 1997a; 1997b; Moritz & Woodward, 2005), and among individuals with delusional disorder (Conway et al., 2002).

Emotion perception research in schizophrenia (reviewed by Edwards et al. 2002; Hellewell & Whittaker, 1998; Kohler & Brennan, 2004; Mandal et al. 1998) suggests the following conclusions. First, individuals with schizophrenia display abnormalities in facial affect perception compared to non-clinical control participants. Second, these abnormalities are present relative to individuals with other psychiatric disorders such as depressive disorder; however, results are inconsistent when compared to disorders that include psychotic features, such as bipolar disorder. Third, the greatest abnormalities are evident for the perception of negative emotional displays compared to positive displays, with abnormalities being most pronounced for the perception of fear**.** Fourth, longitudinal studies support a stable abnormality in emotion perception, although there is some evidence that individuals whose symptoms are in remission may perform more normatively on affect perception tasks than individuals in an acute phase of the disorder (Gessler, et al, 1989; Penn et al., 2000). Fifth, individuals with schizophrenia perform more abnormally in identifying abstract social cues (e.g., what a given individual is thinking or feeling) than concrete social cues (e.g., what a person is wearing or doing). Finally, individuals with schizophrenia display restricted visual scan paths and spend less time examining salient features of the face during emotion perception tasks (Green & Phillips, 2004), which may contribute to poor performance (Loughland et al., 2002a; 2002b; Williams et al., 1999).

Differentiation of social cognition from neurocognition

Social cognition has been distinguished theoretically from non-social cognition, or neurocognition, in several ways (reviewed in Fiske and Taylor, 1984; Jones, 1990). First, social cognitive stimuli more often include an affective charge (e.g. through facial expressions or vocal prosody) whereas nonsocial stimuli are typically affectively neutral (e.g.

numbers). Second, intangible or unobservable stimulus qualities are crucial to social cognition (e.g. an individual's unspoken preferences or intentions in a situation) but are less important in nonsocial cognition. Third, the relationship between subject and object in social cognition is bidirectional, mutable, and mutually influencing. Over the course of a conversation, one continually reevaluates and reacts to one's interlocutor, and both parties change as a function of the interaction. Thus, social cognitive processes are influenced substantially both by the external social context and by the internal emotional reactions of the subject to the context. In contrast, the subject's relationship to objects in nonsocial cognition tends to be unidirectional and static, and the objects generally do not change as a result of being observed. Finally, whereas cognitive abnormalities are typically conceptualized in terms of incorrect or deficient processes, social cognitive abnormalities can be conceptualized as biases, or exaggerations of idiosyncratic response tendencies that vary across individuals in both normal and pathological populations (Penn et al., 1997).

A number of lines of empirical evidence support the view that social cognition is relatively independent of traditional neurocogntive domains. First, performance on neurocognitive and social cognitive tasks is dissociable. Specifically, Brunet et al. (2003) demonstrated that individuals with schizophrenia were able to complete cartoon sequences depicting physical causality, but not causality that required inferences about characters' intentions. Similarly, Cutting and Murphy (1990) asked participants questions about social information (i.e., social knowledge) and general knowledge, and discovered those with schizophrenia demonstrated the greatest impairment on the social knowledge task. Similar dissociations can be found in individuals with brain damage and other neuropsychiatric disorders. For example, individuals with frontal lobe damage (Anderson, et al., 1999; Blair

& Cipolotti, 2000; Fine et al. 2001) or prosopagnosia (Kanwisher, 2000) show significantly impaired performance in varying areas of social cognition such as ToM and facial processing, but have intact discrimination of non-social stimuli. In contrast, individuals with Williams' syndrome tend to show a relative strength in social cognitive abilities, such as the detection of basic emotions from faces and normal performance on first-order ToM tasks, but tend to have below normal intelligence and have deficits in other aspects of neurocognition (Jones et al. 2000; Tager-Flusberg et al., 1998).

Second, there is evidence in support of differentiation on a neural level. One line of research supports the presence of a "social cognitive neural circuit," incorporating the amygdala, fusiform gyrus, superior temporal sulcus, and prefrontal cortices (Adolphs, 2003; Blakemore & Frith, 2004; Lee et al., 2004; Phillips et al., 2003; Pinkham, Penn et al., 2003). For example, the amygdala has been found to play an important role in responses to emotional stimuli, particularly in the identification of the emotional significance of stimuli in general (Adolphs et al., 1999; Adolphs et al. 2002; Green & Phillips, 2004; Winston et al., 2002), and negatively-valenced emotions in particular (Adolphs & Tranel, 2003). Another line of research suggests that the human mirror neuron system (MNS) uniquely subserves the social cognitive tasks of interpreting others' emotions, intentions, and states of mind (see below). Such specificity in neural circuitry might be one reason why individuals with WS show preserved social cognitive skills, despite sub-normal general intelligence. Reiss et al. (2004) found that as compared to healthy persons, individuals with Williams syndrome showed decreased volume and gray matter densities in several regions comprising the visual-spatial system, and increased volume and gray matter density in regions thought to subserve face and emotion processing, including the amygdala and superior temporal gyrus. These

findings provide striking evidence for the relative independence of social and nonsocial cognitive neural systems.

Finally, performance on social cognitive tasks tends to be only moderately associated with neurocognitive performance (e.g., Penn et al., 1993). This issue was originally framed within the context of whether deficits in social cognition reflect a specific impairment in facial emotion perception or a generalized performance deficit. However, the typical "control" task in the majority of studies in this area was a face recognition test, which arguably falls under the rubric of social cognition (e.g., Kerr & Neale, 1993; Mueser et al., 1996; Penn et al., 2000; Salem et al., 1996). A more relevant way to address this issue is to examine the relationship between social cognition and traditional neurocognitive skills. In general, the correlations between emotion perception and attention, memory, and executive processing range from .20 to .60 (Bozikas et al., 2004; Bryson et al., 1997; Kee, Kern, & Green, 1998; Kohler et al., 2000; Sachs et al., 2004; Schneider et al., 1995; Sergi & Green, 2002; Sergi et al., 2006; Silver & Shlomo, 2001). Composite measures of cognition have shown a significant association with social perception in one study (Lancaster et al., 2003), but not in others (Penn et al., 1996; Silver & Shlomo, 2001). In addition, it appears that ToM is relatively independent of IQ (Brune, 2005b), except among individuals with severe negative symptoms (Bentall, 2001). Therefore, neurcognition and social cognition appear to represent related, but non-redundant constructs.

Functional significance of social cognition

There is growing evidence that social cognition, particularly emotion perception and ToM, has a consistent relationship with functional outcomes (Appelo et al., 1992; Brune, 2005a; Hooker & Park; 2002; Kee, et al., 2003; Mueser et al., 1996; Penn, et al., 2002;

Pinkham & Penn, 2006; Schenkel et al., 2005; Toomey, et al., 1997; reviewed in Couture et al., 2006). In fact, some studies have shown that social cognition has a stronger relationship with functional outcome than neurocognition (Penn et al., 1996; Pinkham & Penn, 2006; Pollice et al., 2002; Vauth et al., 2004). Other studies have shown that the relationship between social cognition and functional outcome cannot be explained by neurocognitive factors (Corrigan & Toomey, 1995; Ihnen et al., 1998; Poole et al. 2000), and that both domains appear to make independent contributions to functional outcomes (Addington et al. 2005; Brune, 2005a; Roncone et al., 2002). Recently, two studies have shown that social cognition (particularly social perception) may mediate the relationship between neurocognition (i.e., early visual perception) and community functioning (Brekke et al. 2005; Sergi et al., 2006). Taken as a whole, this body of research strongly supports the role of social cognition in functional outcomes, thus underscoring its viability as an important treatment target (Couture et al., 2006).

Can social cognition be improved?

The importance of social cognition to social functioning has led to interventions that seek to improve this domain of functioning. To date, pharmacological intervention studies on social cognition have been rather limited. Littrell et al. (2004) and Kee et al. (1998) found that Olanzapine and Risperidone, respectively, were associated with improved social perception relative to conventional antipsychotic medication. However, both studies suffer from signfiicant limitations. First, sample sizes were small, particularly for Kee et al. (N=18). And second, Littrell et al. did not utilize random assignment. Thus, these exploratory findings, although promising, require replication before confident conclusions can be drawn.

Greater attention has been given to psychosocial interventions. These interventions can be conceptualized as either "targeted" or "broad-based" approaches. Targeted interventions focus on a single social cognitive ability (e.g. emotion perception), whereas broad-based interventions typically comprise a variety of psychosocial approaches, including cognitive remediation and social skills training, in addition to utilizing strategies for improving social cognitive skills.

Targeted social cognitive interventions

Targeted interventions have not been developed to improve Theory of Mind or attributional bias in schizophrenia. However, numerous studies have evaluated the effectiveness of targeted emotion perception interventions (Choi & Kwon, 2006; Frommann, et al., 2003; Penn & Combs, 2000; Russell, et al., 2006; Silver et al., 2004; Wolwer et al. 2005). The majority of these interventions share a common approach. Based on the evidence of truncated and abnormal visual face scanning processes in schizophrenia (described above), they are guided by the hypothesis that abnormal emotion perception results from individuals' looking too briefly at faces and looking at the wrong parts of faces. Correspondingly, these interventions consists of training individuals to focus on key facial features (i.e. eyes and mouth) while identifying posed expressions of emotion in static photographs. Reinforcement and corrective feedback are provided over a series of training trials. These studies have consistently yielded improved performance on standard emotion perception measures among individuals with schizophrenia.

Limitations of targeted interventions. Despite promising results, these studies have several limitations. First, although their approach is consistent with the above-mentioned scan-path studies, and with principles of behavioral training, it lacks a theoretical framework

to explain *why* abnormal scanning occurs. Second, the empirical basis, stimuli, and training techniques are more consistent with neurocognitive remediation than social cognitive remediation. Specifically, training is designed to modify visual scanning of stimuli that are static, objective, and not mutually-observing. Additionally, facial stimuli in these paradigms are decontextualized, which threatens their internal validity (Kring & Stuart, 2005) because situational factors are known to strongly influence judgments of others' emotion (reviewed in Jones, 1990). Finally, the majority of these studies did not evaluate whether improvements in emotion perception generalized to improvements in other social cognitive domains or, more importantly, to social functioning. Thus, these studies are also limited by substantial threats to external validity.

Broad-based social cognitive interventions

The two primary broad-based social cognitive interventions for schizophrenia are Integrated Psychological Therapy (IPT; Brenner et al., 1992) and Cognitive Enhancement Therapy (CET; Hogarty & Flesher, 1999). IPT and CET have different theoretical premises, but overlap in conceptualizing social cognition as a higher order function that is subserved by basic neurocognition. Thus, both interventions are hierarchically structured to provide neurocognitive triaining (i.e. cognitive remediation) prior to, and as a basis for, social cognitive improvement. These interventions have demonstrated improvements in several cognitive domains (Brenner, Kraemer, Hermanutz, & Hodel, 1990; Hodel, Merlo, Brenner, & Roder, 1989; Hogarty et al., 2004; Spaulding et al., 1999), as well as more limited improvements in social cognition and social functioning (Hogarty et al., 2004).

Limitations of broad-based interventions. IPT and CET share several key limitations. First, the foundational status of neurocognition relative to social cognition has not been

empirically established (Penn et al., 2005). Thus, the question remains as to whether it is necessary to provide cognitive remediation in order to improve social cognition. Cognitive remediation is a time-, resource-, and labor-intensive process that involves multiple sessions per week for six months or more (Brenner et al., 1992; Hogarty & Flesher, 1999; Wykes, 2001). If a stand-alone social cognitive intervention is sufficient to improve social cognition, then valuable clinician and client time may be spared. And as with the emotion perception interventions reviewed above, the intervention techniques used by IPT and CET are more consistent with the principles of cognitive remediation than with social cognitive theory. Additionally, neither IPT nor CET explicitly addresses the three major social cognitive domains that are known to be abnormal in schizophrenia—emotion perception, attributional style, and Theory of Mind—or the underlying processes that have been linked empirically with these domains (reviewed below).

Social Cognition and Interaction Training (SCIT) was developed to address the limitations of existing social cognitive interventions. The following section summarizes the development of SCIT to date.

Development of SCIT

The stage model of psychosocial treatment development

The stage approach to treatment development is a relatively recent innovation that is intended to facilitate the rapid and systematic progression of treatments from mere ideas to validated interventions with clear guidelines for client selection, and a well articulated range of applicability (Onken et al., 1997). Traditionally, Stage I entails conceptualization of the intervention and manual writing; Stage II entails feasability and pilot testing; Stage III entails controlled efficacy trials using manualized materials that showed promise in Stage II, as well

as research on mechanisms of therapeutic action (e.g. dismantling trials); and Stage IV entails research on the transportability of efficacious treatments to diverse populations, provider groups, and treatment settings (Onken et al., 1997). The logic of this ordering of Stages II and III stems from the view that evidence of a treatment's efficacy, or internal validity, should be established in a controlled research environment prior to releasing the intervention for community use. Whereas this approach is logical from a scientific standpoint, in practice, bridging the gap between research findings and clinical practice has proven difficult, and many interventions that demonstrate efficacy fail to receive appropriate effectiveness evaluation (Dobson & Hamilton, 2002; Westen, 2002). There are multiple reasons for this gap, including limited incentives for community stakeholders to participate in effectiveness research (Addis & Krasnow, 2000), the difficulty of modifying established treatment programming in community and hospital clinics, and the favoring of internal validity research over external validity research by funding agencies and academic publishing houses (Dobson & Hamilton, 2002). Thus, the traditional stage model is a boon to the development of internally valid interventions, but has done little to overcome obstacles to the development of ecologically valid, transportable interventions.

Modifying the stage model. Evaluation of SCIT began with an uncontrolled open pilot trial for inpatients with schizophrenia (Penn et al., 2005; described below). The promising results of this pilot study with inpatients motivated us to examine the feasibility and potential clincial benefits of SCIT for outpatients with schizophrenia (who are more clinically stable than inpatients). This dissertation describes the development and initial evaluation of SCIT among outpatients in North Carolina and New York. The NC trial was a controlled, quasi-experimental trial funded by the Foundation of Hope (NC). The NY trial represents a slight

deviation from the stage model, in that it gave us an opportunity to evaluate SCIT in treatment settings not directly associated with our research group. This collaboration came about after we shared the preliminary results of the Penn et al. (2005) study at a professional meeting. Our research group was approached by several treatment providers in New York City who were interested in implementing SCIT. Mindful of the ethical and scientific pitfalls associated with disseminating unproven treatments, we developed agreements with these providers whereby they would implement open pilot trials of SCIT and collect outcome data, and our group would provide training, supervision, and analysis of collected data. Essentially, we elected to postpone randomized, controlled Stage III research pending further uncontrolled evidence of SCIT's effectiveness and preliminary evidence of its feasability as a transportabile intervention.

This model of collaboration presented several benefits. First, it enabled our collaborating providers to respond to the increasing pressures on treatment agencies to find ways to measure and evaluate their treatment programming without receiving additional funds or staffing to do so (Addis, Wade, & Hatgis, 1999). Second, it enabled our group to continue preliminary evaluation of SCIT while avoiding the pitfalls associated with narrowly focused efficacy research—specifically, the uncertain applicability of highly internally valid interventions to the complexities of real-world clinical practice (Abrahamson, 1999; Elliot, 1998; Foxhall, 2000; Henry, 1998; Norcross; 1999). Thus, this approach enabled us to evaluate the feasibility of transporting SCIT into diverse settings, to receive feedback from these settings, and to modify the intervention accordingly before finalizing the techniques for tightly controlled efficacy trials.

The Stage I and II development of SCIT that preceded the currently proposed study is described below.

Stage I: Therapy conceptualization and manual writing

The first step in developing SCIT was to translate the empirical literature into a model of social cognitive dysfunction, change process, and corresponding treatment techniques (Rounsaville et al., 2001). Our aims were to improve upon existing social cognitive interventions by: 1) establishing a sound basis in established social cognitive bias processes; 2) incorporating emerging research on social cognitive dysfunction (i.e. mirror neuron simulation and metacognition research); 3) utilizing ecologically valid social cognitive stimuli, and; 4) explicitly linking social cognition to social functioning. We review each of these aims below.

1) Basis in established social cognitive bias processes

Despite evidence of the relative independence of social cognition from traditional neurocognitive domains, existing interventions are rooted in a cognitive remediation framework. Targeted interventions employ an attention shaping paradigm, whereas broad-based interventions treat social cognition as epiphenomenal to neurocognition. Moreover, neither intervention approach incorporates the unique characteristics of social cognitive stimuli.

Research on normative social cognitive processes provides a more appropriate framework for modeling bias in schizophrenia than cognitive remediation research does. Social psychologists have known for decades that social cognitive biases are commonplace among individuals without cognitive deficits. This is evidenced by the robustness of the correspondence bias (a.k.a. the fundamental attribution error; Gilbert & Malone, 1995; Jones

& Harris, 1967), a foundational concept in the field of social psychology. Moreover, growing empirical evidence suggests that there is a high degree of continuity between psychological processes underlying psychotic and non-psychotic disorders (reviewed in Freeman & Garety, 2003). Specifically, emotional and motivational factors affect the onset of symptoms across diagnostic categories. And last, many social cognitive tendencies in schizophrenia, such as the personalizing bias, are more consistent with psychological bias than with a neurocognitive deficit. Thus, the SCIT intervention is based on a psychological model of social cognitive dysfunction that is continuous with normative social cognitive bias processes. These normative processes and their implications for SCIT are summarized below.

Affect-as-information research has demonstrated that a person's mood state affects how s/he processes information in the environment (Clore, Schwarz, & Conway, 1994). Positive mood typically leads one to interpret the environment as harmless, and is associated with use of creative and heuristic information processing, whereas negative mood is interpreted as a signal that something in the environment is problematic, and results in cautious, analytical and constrained interpretive processing (Bless, Bohner, Schwarz, & Strack, 1990; Bodenhausen et al., 1994). This effect may be mediated by an automatic evaluation mechanism whereby a positive or negative valence is quickly assigned to environmental stimuli, prior to higher order, conscious interpretation (reviewed in Chartrand, van Baaren, & Bargh, 2006).

Importantly, the impact of affect-as-information effects hinges on the individual being unaware of the cause of his or her mood (Chartrand & Bargh, 2002; Schwarz & Clore; 1983). Individuals with schizophrenia may be at greater risk for affect-as-information effects because this disorder is associated with cognitive disorganization and alexithymia (i.e.

difficulty identifying and describing one's emotions; Cedro et al., 2001; Stanghellini & Ricca, 1995; Kring & Werner, 2004), as well as greater frequency of negative emotional experience (Kring, 1999). Thus, this effect is incorporated into the SCIT model.

Attributional bias. As in schizophrenia, non-ill individuals demonstrate the tendency to automatically make dispositional attributions to explain apparently negative behaviors by others. For example, if you meet someone and he is not friendly, you might initially infer that he is a rude person. This is consistent with affect-as-information research in linking negative experience with simplified interpretation processes. However, non-ill individuals often subsequently correct for situational factors (Gilbert et al. 1988). If you subsequently learn that the rude person had just received bad news (e.g., someone in his family had died), you are likely to correct your initial personalizing impression in light of this contextual information. Nonetheless, even in non-ill individuals, this corrective mechanism often fails due to situational, motivational, and affective factors. Examples include expectancy effects (reviewed in Jones, 1990), cognitive dissonance (Festinger, 1957), and the self-serving bias (Miller & Ross, 1975).

Bentall and colleagues (Bentall, Kinderman, & Kaney, 1994) use this attribution research as the foundation for their model of social cognitive dysfunction in paranoid-type schizophrenia. Their "attribution – self-representation cycle" model posits that paranoid individuals are motivated to employ biased causal attributions of events in order to support an unrealistic self image, on which they draw to make further biased attributions. This theory is contextualized within a range of experimental findings that link paranoid delusions to implicit low self-esteem (Lyon, Kaney, & Bentall, 1994), jumping to conclusions (Garety, Helmsley, & Wessely, 1991; Huq, Garety, & Helmsley, 1988), externalizing (Kaney &

Bentall, 1989) and personalizing attributional biases (Kinderman & Bentall, 1997), and attentional bias towards threatening cues in the environment (Bentall & Kaney, 1989; Fear Sharp, & Healy, 1996), especially cues that are threatening to one's self image (e.g., indications of judgment by others; Bentall, Kinderman, & Kaney, 1994; Kinderman & Bentall, 1996b). This cycle enables threatening social cues to be quickly identified and categorized, thereby minimizing dissonance and distress.

Need for Closure (NFC) is a motivational construct that has been found to contribute to social cognitive bias in both non-ill and schizophrenia-spectrum populations. NFC refers to the strong desire for an answer, even if it is incorrect, and a corresponding aversion to ambiguity or uncertainty (Kruglanski, Webster, & Klem, 1993). Studied as a lay epistemic construct in social psychology, high NFC has been linked to increased correspondence bias in person perception (Webster, 1993), increased reliance on stereotypes (Fiske & Neuberg, 1990; Jamieson & Zanna, 1989; Kruglanski & Freund, 1983), and decreased willingness to be persuaded by others in interpersonal situations (Kruglanski et al., 1993). As a possible motivational mechanism underlying delusions, two independent research groups have found a relationship between NFC and delusion-proneness in non-psychotic samples (Colbert & Peters, 2002; McKay, Langdon, & Coltheart, 2006), while Bentall and Swarbrick (2003) found that individuals with delusions exhibited elevated NFC independent of symptom severity.

These processes (affect-as-information, attributional bias, and NFC), which have been observed in both non-ill and schizophrenia-spectrum populations, are central to the SCIT model.

2) Emerging research on social cognitive dysfunction

The biases discussed above are one route by which maladaptive social cogntive processes may emerge and maintain. However, a limitation of this literature is its relative neglect of ToM and emotion perception abnormalities in schizophrenia. It was important to address these domains in SCIT because they are not appropriately addressed in existing social cognitive intervetions (as discussed above). We found that we were able to incorporate ToM and emotion perception into our model by drawing on emerging research in two areas: mirror neuron simulation and metacognition.

Mirror neuron simulation

Neural simulation research provides a framework that compliments our bias-based model, specifies etiological mechanisms that are distinct from traditional neurocognitive functions, and has clear implications for intervention. This framework and its treatment implications for SCIT are summarized below.

The ability to mentally simulate other people's internal states has been theorized to be the key mechnism underlying both emotion perception (summarized in Adolphs, 2002) and ToM (reviewed in Carruthers & Smith, 1996; Davies & Stone, 1995). Emerging neuroimaging research on the mirror neuron system (MNS) provides empirical support and an integrative framework for these theories (Gallese et al., 1996; Gallese & Goldman, 1999). The MNS is a specialized neural circuit involved in representations of bodily movement (Rizzolatti & Craighero, 2004). It is activated both when an individual performs a specific motor task (e.g. nodding one's head) and when the individual observes a conspecific performing that same task. In the latter case, this circuit activates both a neural simulation of the action (nodding) as well as collateral representations relating to the meaning and goal of the action (e.g., "Yes" or "I agree"). Because this function enables individuals to represent

mental states that are inconsistent with their own (e.g., if you did not agree with whatever the conspicific was nodding about), it provides a basic mechanism for ToM (Davies & Stone, 1995; Gallese & Goldman, 1998).

Simulation theories of emotion perception include other-oriented as well as self-oriented versions. These posit that a viewer identifies another's emotion by automatically simulating the motor movements associated with the perceived facial expression, thereby triggering in the viewer the emotional state that typically accompanies that facial expression. This emotional state is then used to generate corresponding conceptual knowledge about the state. The self-oriented "facial feedback" theory (Thompkins, 1962) posits that one derives conceptual understanding of one's own emotional state by proprioceptive reference to one's facial expression of emotion. Several lines of empirical research support these thoeries, and suggest that they are complimentary. Emotion expression and experience are correlated (Rosenberg & Ekman, 1994); alexithymia (the ability to identify and describe one's one emotions) and facial emotion recognition ability are correlated (Parker, Taylor, & Bagby, 1993); producing emotional facial expressions can influence emotional experience (Adelman & Zajonc, 1989) as well as autonomic (Levenson, Ekman, & Friesen, 1990) and EEG correlates of that emotion (Ekman & Davidson, 1993); and viewing facial expressions of emotion causes corresponding changes in emotion (Schneider, Gur, Gur, & Muenz, 1994; Wild, Erb, & Bartles, 2001), as well as subtlely detectable facial mimicry of the viewed emotion (Dimberg, 1982; Jaencke, 1994; Hess & Blairy, 2001).

Findings from MNS research are consistent with both other- and self-oriented emotion perception thoeries. MNS research has demonstrated that when a facial expression is either enacted or observed, the motor correlate is activated in the observer's MNS, and

collateral projections extend from the MNS into the limbic system, where they elicit emotional reactions associated with the represented facial expression (Carr et al., 2003). For example, if you either smile or see a person smile, the MNS automatically represents the action of smiling in your brain, followed by the limbic correlate, that is, happiness.

Finally, the MNS may also play a role in how people make attributions of intentionality in others (Fogassi et al., 2005). As in emotion perception, when perceived motor movements from a conspecific are coupled with a simulation of these movements within the viewer, they generate collateral neural activation. Whereas emotion perception draws on collateral limbic activation, intentionality attributions appear to draw on self-behavior expectancies associated with the observed movement. For example, if you see a person pick up a baseball bat, whether your MNS activates the expectancy that the person is preparing to play or preparing to fight will depend on your behavioral tendencies and past experiences. In either case, the intentionality representation is generated automatically by the MNS, without conscious consideration.

Mirror simulation in clinical populations. Direct empirical support linking MNS functioning to social-cognitive abnormality comes mostly from autism research. Like schizophrenia, autism is charcterized by social conitive deficits (Travis & Sigman, 1998). In autism, MNS underactivation has been associated with ToM abnormalities (Williams, Waiter, & Gilchrist, 2006), as well as emotion perception abnormalities and, most importantly, social functioning deficits (Dapretto et al., 2006).

Support for the role of simulation abnormalities in schizophrenia derives from disparate sources. First, schizophrenia is associated with deficits across the various domains of the putative emotion simulation circuit, including emotion perception, recognition of

emotion in one's self (i.e. alexithymia), and behavioral expression of emotion (i.e. flattened affect; DSM-IV; APA, 1994). Second, Penn and Combs (2000) have demonstrated the effectiveness of a simulation theory-based emotion perception intervention. Prompting participants to mimic the facial expressions of pictured individuals led to improved emotion perception performance that was on par with non-clinical controls. Unfortunately, this study did not measure MNS activation or social functioning.

Simulation and social behavior. Automatic neural simulation is a mechanism by which initial emotional and evaluative reactions to the social environment may take place. This likely primes early affective valencing, as indicated in affect-as-information research (discussed above), and may contribute to the initial personalizing attributional biases seen across clinical and non-clinical populations, setting the stage for negatively-valenced behavioral reactions. Research on the so-called "chameleon effect," has shown that individuals who engage in greater automatic behavioral mimicry of interlocutors' behavior score higher on trait-empathy measures (Chartrand & Bargh, 1999). Additionally, in an experimental setting, confederates' subtle mimicry of their interlocutors' posture and movements improved interpersonal meshing and led to their being liked more by participants (Chartrand & Bargh, 1999). These findings suggest that an intervention designed to increase cognitive and behavioral simulation behaviors may improve both one's ability to "feel into" the experience of others and to behave in a way that increases social desireability. This implication is consistent with the literature on relationship formation, which suggests that reciprocity is one of the most important contributors to the establishment of adult friendships (Curtis & Miller, 1986; Fehr & Baldwin, 1996).

Among individuals with schizophrenia, those who exhibit less behavioral expressiveness and reciprocity in social interactions experience poorer marital (Hooley et al., 1987), family, and communty relationships (Bellack et al., 1990). In holding with the chameleon effect, healthy individuals interacting with individuals with schizophrenia exhibit less expressiveness themselves, and report experiencing heightened sadness and fear (Krause et al., 1992). More broadly, individuals with schizophrenia have a dearth of friendships (reviewed in the introduction), and their social relationships are typically characterized by lack of reciprocity, in that they receive care and succorance, but fail to provide it in return (Cohen & Kochanowics, 1989; Cohen & Sokolovsky, 1978; Dailey et al., 2000; Wallace, 1984), leaving primary social contacts feeling over-burdened (Tolsdorf, 1976). This occurs despite substantial evidence that individuals with schizophrenia desire emotionally intimate relationships (reviewed above, and in Davidson et al., 1998). Whereas relational reciprocity on the level of resources and time allocation have been recorded in social relationships among individuals with severe mental illnesses (Dunn et al., 1990; Lovell, 1992), these individuals nonetheless fail to provide the kind of immediate empathic reciprocity that enables deep, lasting, healthy relationships.

In sum, the literature in this section suggests that a form of mimicry training (e.g. Penn & Combs, 2000) may enhance both social cognition and empathic reciprocity behaviors among individuals with schizophrenia.

Metacognition

Metacognition refers to one's ability to evaluate and monitor one's state of mind, cognitive abilities, and performance, and to use this insight to regulate activity in these domains (Nelson & Narens, 1990). As indicated above, metacognition has been

conceptualized as a subcomponent of Theory of Mind (Wellman, 1990), as it entails recognizing and labeling one's own mental states. It has also been conceptualized as a more sophisticated ability than ToM, because it involves actively using this self-knowledge to achieve personal goals (Bartsch & Estes, 1996). Metacognition varies independent of cognitive ability (Schneider, 1999), and has been implicated in the maintenance of symptoms in various mental disorders, including anxiety (Wells, 1995) and schizophrenia (Morrison, Haddock, & Tarrier, 1995).

Recently, Koren and colleagues have demonstrated that metacognition is a stronger predictor of insight (Koren et al., 2004) and of competence (Koren et al., 2005) in schizophrenia than is executive functioning. (Note: executive functioning is a particularly robust predictor of community outcomes in schizophrenia; Green, 1996; Green, Kern, Braff, & Mintz, (2000), and thus has received a great deal of attention, particularly from cognitive rehabilitation programs, e.g., Bellack, Gold, & Buchanan, 1999). In their studies, Koren et al. used a metacognitive version of the Wisconsin Card Sorting Test (WCST), a frequently used measure of executive functioning that requires participants to sort a series of picture cards into one of four piles. Participants learn after each card whether their decision was correct or incorrect. Koren and colleagues inserted two probes between participants' answer for each card, and their receipt of feedback. First, they were asked to judge how confident they were in the correctness of their answer, and second they were asked whether they would like their answer to count towards their total score on the task. Responses to these probes more strongly predicted insight and competence scores than did traditional WCST performance indices. These findings have led to metacognition being held up as a likely mediator of functional outcome in schizophrenia.

From an intervention standpoint, Koren and Harvey (2006) have suggested that metacognitive monitoring may be used to decrease social-cognitive bias by making oneself aware of factors affecting one's thinking, such as affective states, goals, and biases.

Treatment application

Based on the literature above, specific SCIT intervention techniques have been developed to address attributional bias, ToM abnormalities, and emotion perception abnormalities.

Individuals with schizophrenia are vulnerable to making hasty attributions based on incomplete information and limited metacognitive awareness. Because these judgments may be automatic, preceding conscious processing of a situation, SCIT teaches clients to pause before reacting, to identify their initial cognitive and emotional reaction to the situation, and to frame it as only the first of several possible guesses. Several strategies are then used to generate additional personal and situational attributions, and to differentiate facts from guesses, prior to responding behaviorally. The goal in these exercises is *not* to identify the optimal response using an explicit, logical approach, as recent research and theory suggests that holistic, implicit reasoning is more effective in making complex judgments (Dijksterhuis & Nordgren, 2006), including in social situations (Hogarty & Flesher, 1999). Instead, the goal is to slow the formulation of a final judgment, to expose individuals to salient alternative perspectives, and to maximize the information to which individuals have access in making their judgments. Essentially, they are helped to answer the relatively simple, metacognitive questions, "Do I have enough information to be sure that my first guess is right?", "Are my emotions affecting my guess?", and "Could I gather more information that would help me be more confident in my guess?"

Regarding emotion perception and ToM, simulation research posits that these domains may be improved by exercising clients' use of the various nodes of the emotion processing circuit: behavioral expression, internal simulation, and conceptual identification. This is attempted in SCIT in several ways. Over the course of the intervention, clients are prompted to monitor, identify, and describe their own emotional states with greater specificity and frequency. Clients mimic the facial expressions, utterances, and actions of others while making judgments about the others' thoughts, emotions, and intentions (as in Penn & Combs, 2000). And various techniques are used to help clients take the perspective of characters in video-taped vignettes or of peers in the treatment group.

3) Ecologically valid social cognitive stimuli

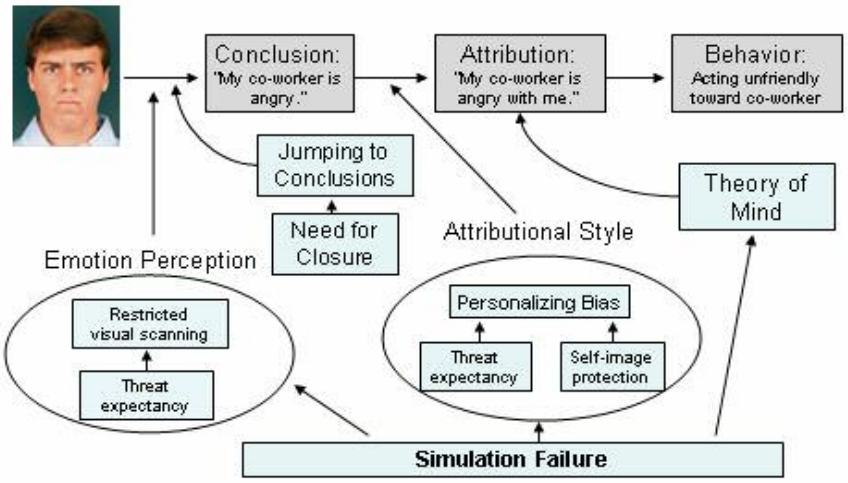
As summarized in an earlier section, social cognitive stimuli are theoretically distinguished from traditional neurocognitive stimuli in several key respects. These stimulus characteristics were incorporated into SCIT in several ways. First, to address dynamism and affective charge in social stimuli, SCIT bolsters the used of static social photographs with dynamic photographs (i.e. "morphs") that progress from neutral expressions into strongly expressed emotions, and video-taped social interactions that include emotional expression. Participants are also socialized to describe, and ultimately role-play, interactions from their own lives that led to emotional arousal. Second, the unobservable qualities of social stimuli are addressed by using various techniques to illustrate and reinforce the distinction between social appearances and social facts. For example, video vignettes are viewed and discussed which depict dissociations between what is stated and what is meant (e.g. lying). Third, the influence of situational and emotional factors on social cognitive processing is normalized throughout the intervention. Therapists frame social cognitive missteps, including jumping to

conclusions and paranoia, on a continuum, and normalize them through self-disclosure and video depictions. And finally, therapists reinforce the perspective that ambiguity is the rule and black-and-white clarity the exception in understanding social situations.

4) Linking social cognition to social functioning

A conceptual framework for understanding the interplay of social cognitive impairment and social dysfunction in schizophrenia is depicted in Figure 1. This figure depicts the reaction of a person with paranoid schizophrenia (PD) to a co-worker who has rushed past him without saying hello. Prior to the event PD has negative expectancies and data gathering biases. He is hyper-attentive to threatening social cues, especially to negative cues regarding his self-image. These biases are initially manifest in his briefly scanning the passing co-worker's face and not focusing on key features. PD quickly concludes that the co-worker is angry (emotion perception), which he does based on limited information (jumping to conclusions) and without imagining what he himself feels like when he has a similar expression on his face (mirror simulation failure). After this initial conclusion, PD briefly considers why the co-worker is angry. Due to problems in putting himself in the co-worker's position (ToM, simulation impairment), and ongoing negative expectancies, PD

Figure 1. Conceptual framework for understanding the interplay between social cognition and social functioning



quickly concludes that the co-worker must be an ill-willed person who is unjustly angry at him (personalizing bias). Because PD does not entertain other reasons for the co-worker's behavior (Need for Closure), his certainty in this conclusion grows. This results in PD feeling angry and resentful toward the co-worker, which causes PD to act in an unfriendly and avoidant manner toward the co-worker in the future, who in turn, avoids PD. This culminates in an increase in PD's general discomfort at work, thus affecting life satisfaction, and reinforcing a vicious cycle whereby PD anticipates negative interactions in the future, but doesn't seek information that may contradict these expectations (Woodward et al., 2006). Thus, his relationships at work become increasingly strained.

Summary of the SCIT intervention

SCIT was developed based on the conceptualization outlined above. Early iterations of SCIT modules were tested during the spring of 2003 in an inpatient social skills training group at John Umstead Hospital. Based on this clinical experience, we further developed the intervention and wrote the first draft of the treatment manual in the summer of 2003. We used seed funds to hire university actors to portray various social-cognitive difficulties (e.g., jumping to conclusions) in video vignettes which could be used throughout the SCIT protocol.

SCIT was developed as a group-based intervention for individuals with schizophrenia spectrum disorders. It is comprised of three phases: Emotion Training, Figuring out Situations, and Integration (a.k.a. "Checking it out"), which are summarized below. SCIT is delivered by two therapists over 20-24 weekly sessions, with each session lasting approximately one hour. The total number of sessions can be varied to match the rate at which clients work through the material. Materials include a trainer's manual, laminated

photographs of social scenes, computerized images of faces, and film clips of social encounters.

Outline of SCIT

Phase	Number of sessions
Emotion training	7-8
Figuring out situations	8-9
Integration – Checking it out	5-7

Phase 1. Emotion training. The primary goals of Phase 1 are to provide information about emotions and their relationship to thoughts and situations, define the basic emotions, improve emotion perception, and teach clients to distinguish between justified and unjustified suspiciousness. Additionally, clients begin to practice describing and monitoring emotions in themselves, a skill that is reinforced throughout the entirety of the intervention.

We begin this phase by discussing how thoughts and feelings affect behavior in social situations. Clients are asked to provide examples of times when they may have gotten a social situation "wrong," and/or jumped to a conclusion. To help clients identify such situations, a video vignette is shown in which a young woman interprets a friend's irritation as being directed toward her rather than being the result of something that she wasn't aware of (i.e., the friend spilling a drink on her term paper). The use of video vignettes throughout SCIT serves three primary purposes: First, they provide relatively ecologically valid models of how social cognitive errors can occur; second, they strengthen ToM and simulation abilities, as we prompt clients to put themselves in the place of the actors; and third, they

heighten engagement in the group by providing a familiar form of entertainment (watching television).

In sessions 2-3, clients discuss how feelings affect perception of situations, and how situations can affect feelings. Clients are asked to identify emotions that they have felt recently and how they relate to situations that have occurred. This helps clients appreciate that emotions are not random, but context-specific. This exercise is the basis for "check-ins" that will occur briefly at the beginning of each remaining SCIT session. The difficulty, detail, and amount of self-disclosure associated with emotional check-ins are increased over the course of the intervention.

Sessions 4-6 involve emotion training. This begins with a conceptual-level exercise in which clients use brainstorming to generate a list of all the emotions they can think of. This list is summarized on a flip chart, which is coined "the emotion poster." The therapists then ask clients to see if any themes cut across the emotion list, which ultimately leads to grouping emotions into the following categories: Happy, angry, sad, afraid, surprised, ashamed, and suspicion.

Once the emotion poster is created, clients complete the Emotion Trainer, which is a computer program that has been shown to improve emotion perception in schizophrenia (Silver et al., 2004). The Emotion Trainer presents 20 faces to participants, whose task is to identify the emotion that the target face is expressing. We have found that administering the emotion trainer in the context of a game improves engagement. For example, clients might be asked to write down their answer and then "vote" on the correct response. We also encourage clients to mimic the target facial expressions to enhance emotion simulation abilities. When clients make guesses about the target's emotional expression, they are asked

to identify the behavioral cues they are using to make their guesses. For example, a face might be identified as happy if the eyes are wide and the mouth grinning. These behavioral cues are added to the list of primary emotions on the emotion poster and they are referred to throughout SCIT (not just in this phase). Also, by forcing clients to focus on behavioral cues, we believe that we are strengthening their data gathering (i.e., gaze) strategies and diminishing possible avoidance of emotionally salient features (e.g., eyes and mouth).

One limitation of the emotion trainer is that the target faces are static. Therefore, we supplement the emotion trainer with an exercise called "Updating Emotion Guesses," which includes dynamic facial expressions. In this exercise, we seek to teach clients that facial expressions are subtle and changeable, thus, one needs to focus on key aspects of the face, and be willing to withhold firm judgment and be willing change ones guesses in response to changing social information (we return to this issue in Phase 2). This exercise is comprised of 4 different target faces. Each target face, in turn, is presented over six trials, which vary in how expressive the face is (from neutral to very expressive). As in the emotion trainer, clients can vote in their response. However, this time, they comment on how the facial expression changes, which may lead them to change their minds, thus encouraging willingness to modify initial guesses based on new information.

In the final two sessions of this phase, we frame suspiciousness/paranoia as one of the primary emotions. This is meant to normalize suspicious feelings, as varying degrees of suspiciousness occur in the general population (Johns & van Os, 2001). This also provides rationale for emotional self-monitoring, helping clients to see the role that their internal states can have on their interpretation of their environment (Schwarz & Clore, 1983). We distinguish between justified suspiciousness and unjustified suspiciousness and point out that

unjustified suspiciousness can get us in trouble or cause distress, and may be activated in vague or ambiguous situations (Green & Phillips, 2004). To achieve these goals, we show video-clips of characters acting suspicious across a variety of situations that vary in whether or not their feelings are justified, which then leads to group discussion of why the suspiciousness may or may not be appropriate, and the possible interpersonal repercussions of unjustified paranoia.

Emotion Training

Goals	Techniques
• Provide information about emotions and their relationship to thoughts and situations • Define basic emotions, including paranoia • Improve emotion perception and emotional guesses • Normalize paranoia • Distinguish between justified and unjustified suspiciousness	• Psychoeducation • Within session and homework assignments requiring clients to identify their feelings and the feelings of others in different situations • Making an "emotion poster," that links emotions to specific facial expressions • Use of the emotion trainer and the modified micro-expression task to improve emotion perception • Imitation of facial expressions • Video-clips of individuals making social cognitive mistakes while interacting with other people.

Phase 2. Figuring out situations. The primary goals of Phase 2 are to help clients appreciate the potential pitfalls of jumping to conclusions, and to teach and practice several strategies to decrease the tendency to jump to conclusions in social situations. These strategies are: 1) Practice generating both personal and situational attributions for negative events; 2) Distinguish between social "facts" and social "guesses," and; 3) Gather more information before making judgments.

We begin phase two by introducing the notion of jumping to conclusions. To facilitate discussion, we show video-clips of actors jumping to conclusions and also encourage clinicians to share experiences in which they jumped to a wrong conclusion. We then discuss factors that are associated with jumping to conclusions, including the tendency to blame others (i.e., a personal attribution) rather than situations for negative outcomes (Freeman et al., 2004; Garety et al., 2005). Clients are presented with a series of fictional vignettes (e.g., a friend was supposed to come to your house but they didn't show up) and they are asked to brainstorm the various reasons why the friend didn't call back. In collaboration with group members, we distinguish between personal attributions (e.g., the friend was angry at you) and situational attributions (e.g., a family emergency came up), and how these attributions can lead to different feelings.

Clients' personal attributions are often prefaced by statements such as "I feel that my friend did…" or "I felt that she meant…," which reflect emotional reasoning. In other words, clients' are using their affect as a source of information (Clore et al., 1994), thus basing their conclusions on feelings rather than facts. This is compounded by the fact that individuals with schizophrenia have particular difficulty with abstract social cues (Corrigan & Green, 1993). To address this issue, we spend a few sessions teaching clients to be better "social detectives." Clients view a series of photographs and are taught to distinguish between facts (i.e., tangible physical characteristics, such as who is in the photograph, what they are wearing, what is in the room, etc.) and guesses (i.e., what the characters are feeling, thinking, intending, etc). Several exercises are used to help clients distinguish facts from guesses, For example, clients independently generate facts and guesses about a photograph and then compare answers. Typically, there is high agreement on facts (e.g., there are three people in

the picture) but lower agreement on guesses (e.g., they are friends). The ultimate goal is to draw conclusions from situations based on facts and to refrain from interpretations based on "feelings" and guesses.

In the final two sessions of phase two, we play a variation of the game, 20 Questions, designed to strengthen clients' ability to tolerate ambiguity and to make judgments in a socially charged context. Each client is given 10 points and a target person (initially one of the therapists) thinks of a simple object such as a fruit or vegetable. Taking turns, clients receive one point for asking a yes-no question about the object (e.g., "is it green?"), after which they can choose to make a guess about the identity of the object and bet points, or refrain from betting until they have more information. Once clients have learned the rules of the game, we shift the target object from fruits and vegetables to client likes and dislikes (e.g., hobbies). This increases the personal relevance of the activity and also taps into ToM skills.

Throughout Phase 2 we continue to reinforce simulation skills by prompting clients to articulate and mimic from a first-person perspective the thoughts, experiences, emotions, body language, and facial expressions of characters depicted in video vignettes. Increasingly, clients are also prompted to try to simulate the internal states of group therapists and fellow clients, as in the likes/dislikes version of 20 Questions.

Figuring out Situations

Goals	Techniques
• Teach clients not to jump to conclusions • Decrease need for closure in social situations • Learn distinction between personal and situational attributions	• Video-clips of actors/actresses jumping to conclusions and making personal rather than situational attributions • Brainstorming of causes for social situations/outcomes • Use of photographs to teach clients how

• Learn how to distinguish "facts" from "guesses"	to distinguish facts from guesses • Playing a modified version of 20 Questions to strengthen data gathering and help clients better tolerate ambiguity

Phase 3. Integration: Checking it out. The primary goals of Phase 3 are to assess facts and guesses surrounding events in clients' personal lives, recognize that it is sometimes necessary to obtain more information about social situations, and to teach effective social skills for checking out guesses. The purpose of the final phase is to put into practice what clients have learned in SCIT. One can view the phases of SCIT as moving from "cold" social cognition in phase one (i.e. social cognition for non-personal events) to "hot" social cognition in phase three (i.e., application of social cognitive skills to personally-relevant situations; Brenner et al., 1992). We have done this intentionally, so as to allow clients to learn social cognitive skills without becoming over-aroused or defensive.

We begin this last phase by showing clients video-clips of actors "checking out" their impressions or interpretations with other people. The purpose is to emphasize that even when going through the process of sorting out facts from guesses, we might not feel better about the situation unless we obtain more information. For example, one client was upset because his psychologist didn't show up for his team meetings. His guesses about why this happened included: 1) the psychologist doesn't care about him; 2) she is too busy, or 3) that she has a scheduling conflict. The client had less confidence in the first guess, because the psychologist was always friendly to him when they saw each other on the unit. Thus, he thought that the other two guesses might be true. However, he continued to have the nagging feeling that the psychologist didn't like him. Therefore, the client was asked to generate a

variety of "checking it out strategies" (e.g., confronting the psychologist; asking another team member why the psychologist wasn't at the meetings, etc) and then, with assistance from the group, to choose one and role play it. This exercise is meant to strengthen both metacognitive skills (Koren et al. 2005), that is, knowing when one needs more information, as well as social skills, by following well-established guidelines for role playing (Bellack, Mueser, & Gingerich 2004).

Integration: Checking it out

Goals	Techniques
• Collaboratively (with the group) assess the facts/guesses surrounding events in different members' lives • Recognize that it is sometimes not possible to make good guesses without getting more information • Teach effective social skills for checking out guesses	• Video-clips of actors/actresses checking out their impressions • Use the "check-in" procedure for eliciting personal situations • Integrate facts/guesses exercise with social skills training

Stage II: Feasibility and pilot testing of SCIT

Inpatient pilot study #1

Once the SCIT intervention was conceptualized and an initial draft of the manual was written, we conducted an initial uncontrolled pilot trial of the intervention. Our goals with this trial were: 1) Evaluate the feasibility of the intervention; 2) Evaluate the clinical benefits of SCIT, and; 3) Collect feedback from clients and providers to be used in refining the treatment manual (Rounsaville, et al., 2001).

The pilot study was conducted among seven individuals who were inpatients at Dorothea Dix Hospital, had chronic psychotic illnesses (mean = 12.6 years of illness, SD =

5.3), and had difficulties interacting with peers (as judged by their treatment team). Participants were an average of 39.5 years old (SD=8.0) and were predominantly male (n = 5), Caucasian (n = 5), and diagnosed with schizophrenia (n = 4).

SCIT groups were led by the primary author (DLR) and a master's level psychologist (Penn rotated in to observe on a regular basis). Assessments were conducted at baseline and post-treatment and included symptoms (i.e., the Brief Symptom Inventory, BSI; Derogatis, 1993), emotion perception (i.e., the Face Emotion Identifcation Task, FEIT; Kerr & Neale, 1993), ToM (i.e., the Hinting task; Corcoran, Mercer, & Frith, 1995), and attributional style (i.e., the Ambiguous Intentions Hostility Questionnaire, AIHQ; Combs et al., 2007). The AIHQ is a new measure of attributional stlye comprised of scenarios with negative outcomes that vary in intentionality (i.e., ambiguous, purposeful, and accidental; e.g., you are supposed to meet a new friend at a restaurant but she never shows up). The participant's task is to judge why the person likely acted the way s/he did. An independent rater, blind to assessment status (pre or post-test), rated particpant responses on Likert-type scales for computing a hostility index; higher numbers reflect a greater tendency to attribute hostile intent to the story's protagonist.

Inspection of the table below reveals that SCIT was associated with a significant improvement in ToM, and trend-level improvements symptoms (including paranoid ideation) and attributional style (Penn et al., 2005), with effect sizes in the moderate to large range (Cohen, 1988). There was no impact of SCIT on emotion perception. Changes in social cognition could not be accounted for by a reduction in symptoms. These results indicate that SCIT is feasible and provide promising preliminary evidence that it is associated with improvement in specific aspects of social cognition.

Baseline and Post-Treatment Assessments for SCIT – Pilot study #1

	n	Baseline M	Baseline SD	Post-Treatment M	Post-Treatment SD	F	p	d
BSI Total Score	6	61.3	49.8	38.6	12.5	2.73	0.16	0.54
BSI Paranoia	6	1.3	1.0	0.7	0.6	1.48	0.28	0.61
FEIT	7	11.3	2.6	11.3	2.6	0.00	1.00	0.00
Hinting Task	7	12.1	4.8	15.3	3.4	14.60*	0.009	1.56
AIHQ-Hostility	7	8.8	4.2	6.7	1.8	5.94	0.059	0.49

Five of the seven clients participated in a post-treatment focus group, and completed a survey rating the helpfulness of SCIT on a three-point scale. The results of this survey, summarized below, reveal that participants found SCIT to be beneficial.

Participant Feedback (n = 5)

	No (%)	Yes (%)	Very Much (%)
Were the materials understandable?	0	100	0
Was the group useful?	20	60	20
Did SCIT help you to think about social situations?	0	80	20
Did SCIT help you to relate to other people?	20	20	60

Data and participant feedback from this first trial were used to guide modification of the treatment manual. Specific changes addressed the lack of participant improvement on

emotion perception measures and several client and practitioner comments about the clarity of specific instructions and exercises. It was determined that the focused emotion perception intervention was too short. Additionally, because emotion perception training was provided at the beginning of the intervention, but was not reinforced over the final two-thirds of the protocol, we suspected that gains in this domain may have degraded by the post-test intervention. To address these issues, we added an additional session of emotion training to the protocol, and we built-in additional rehearsal of emotion perception skills throughout all three phases of the intervention. We also enhanced protocol instructions for eliciting facial mimicry from participants.

Additionally, we observed that clients' whose illness presentation varied in terms of the prominence of positive symptoms (e.g. hallucinations and paranoid delusions) versus negative symptoms (e.g. cognitive impairment and affective flattening) benefited differentially from the various interventions. For example, individuals with prominent positive symptoms reported greater benefit from work on jumping to conclusions. Thus, we modified the manual to include suggestions based on the literature, client feedback, and our clinical experience for addressing the differing needs of clients who vary on this dimension.

Inpatient pilot study #2

After updating the intervention based on data from pilot study #1, we collaborated with our partner research lab at the University of Tulsa to conduct a second inpatient pilot trial. Our goals with this trial were: 1) Evaluate the efficacy of the intervention in comparison to a control condition; 2) Evaluate the transportability of the intervention; 3) Further assess the clarity and acceptability of the intervention and treatment materials to clients and providers; and; 4) Explore whether SCIT also improves social functioning.

In this quasi-experimental trial (Combs et al., under review), eighteen inpatients with schizophrenia spectrum disorders completed SCIT and were compared with 10 inpatients who completed a coping skills group. Participants were assessed at pre-test and post-test on measures of emotion perception, ToM, attributional style, cognitive flexibility, and social functioning. To examine the effect of SCIT on real world behaviors, Combs et al. also recorded the frequency of aggressive incidents on the treatment ward. As summarized in the table below, SCIT participants, as compared to the control group, improved significantly on all of the social cognitive measures. Participants also showed significantly better social functioning and fewer aggressive incidents on the treatment unit at post-test. Importantly, these changes were independent of changes in clinical symptoms over time, and support the unique role of SCIT in remediating social cognitive deficits in schizophrenia.

Baseline and Post-Treatment Assessments for SCIT – Pilot study #2

Variable	SCIT (n = 18)		Control (n = 10)	
	Pre-Test	Post-Test	Pre-Test	Post-Test
Face Emotion Identification	11.5 (2.6)	15.9 (1.5)*	9.3 (3.4)	10.3 (3.0)
Hinting Task	13.6 (2.3)	19.8 (0.32)*	14.8 (3.3)	12.4 (3.7)
AIHQ Hostility Ambiguous	2.0 (0.57)	1.3 (0.34)*	1.5 (0.56)	2.1 (0.44)
Social Functioning	-	-	-	-
SFS Engagement	10.7 (1.6)	13.7 (1.0)*	10.6 (2.1)	10.4 (2.5)
SFS Interpersonal	6.8 (1.4)	8.6 (0.48)*	7.5 (1.3)	6.8 (1.8)

Incidents on Ward	2.9 (2.0)	1.0 (1.3)*	2.0 (1.4)	2.3 (1.7)

* p <.01 (Group X Time Interaction; ANOVA); AIHQ = Ambiguous Intentions Hostility Questionnaire; SFS = Social Functioning Scale

Following this trial, we made several additional modifications to the manual prior to outpatient testing. First, we further enhanced instructions for using facial mimicry during Phase 1 based on the experiences of the treatment providers in Tulsa. Second, we expanded instructions for eliciting disclosure of problematic interpersonal situations from clients in Phase 3.

Finally, we modified instructions for generating alternative attributions during Phases 2 and 3. Generating alternatives to a biased cognition is a foundational technique in cognitive therapy. However, research among non-ill individuals suggests that experiencing alternative-generation as difficult may actually serve to reinforce an unwanted cognition (Sanna, Schwarz, & Stocker, 2002; Schwarz et al., 1991). This effect may have particular importance in schizophrenia where executive dysfunction and cognitive inflexibility make more difficult the process of generating alternative explanations. Thus, traditional alternative-generating techniques may be counter-productive in this population.

We made two modifications to enable SCIT participants to flexibly consider alternative explanations while minimizing the risk described above. First, we now encourage the target person (i.e. the client with the identified interpersonal problem) to describe his or her initial conclusion (which is typically distressing, and often maladaptive). We then encourage *other group members* to generate alternative interpretations. It often is easier for others, who are not invested in the situation or target person's initial conclusion, to generate alternatives. Moreover, to the extent that generating alternatives may be difficult for others,

we are not concerned about their subjective accessibility experiences, only those of the target person. Thus, theoretically it may be easier for the target person to appreciate alternative guesses when they are generated by others and the process is not experienced as effortful for him. A drawback of this method is that it requires a group, and therefore does not generalize as a technique that can be used *in vivo* by clients.

We also use a second technique in which we attenuate the difficulty of generating alternatives by providing clients with an easy-to-remember framework that jump-starts their ability to generate three formally distinct attributions. Specifically, in situations in which the target person has drawn a externalizing-personalizing conclusion, we encourage him to generate a situation-based alternative conclusion, and an internalizing-personalizing conclusion. For example, if he has concluded that a coworker passed him without saying "Hi," because the coworker is an ill-willed person, we would help the client to generate a situational attribution, such as that the coworker was upset because he had learned of the death of a relative, as well as an internal attribution, such as that the client himself may have played a role by not greeting the coworker. Learning and retention of this technique is facilitated by illustration and reinforcement of three ideal types: "Easy Eddie," who always makes situational attributions, "Blaming Bill," who always makes external personalizing attributions, and "My-fault Mary," who always makes internal personalizing attributions. These characters are described in colorful, personal detail to facilitate their being committed to memory, and their function is reinforced throughout the latter half of the intervention. While discussing fictional vignettes or personal problems, clients are asked frequently, "What would Easy Eddie (or Blaming Bill or My-fault Mary) make of this situation?" After these changes, SCIT was finalized for use in the current project.

The Current Project: Evaluation of SCIT among Outpatients

Preliminary evidence supports SCIT's efficacy among inpatients (Combs et al., 2007; Penn et al., 2005). However, the majority of individuals receiving treatment for schizophrenia do so in an outpatient environment, and increasing the proportion of outpatient versus inpatient services is a goal of many service systems. Therefore, the current project extended evaluation of SCIT to the outpatient context, with an initial, small-scale efficacy study (Study #1), followed by a small-scale effectiveness study (Study #2). Below, Study #1 is presented, followed by a short discussion/summary of the findings, and then Study #2, also followed by a short discussion/summary. The dissertation concludes with a larger general discussion that will synthesize the findings and implications across the studies.

Study #1

The goal of Study #1 was to conduct a preliminary investigation of SCIT's efficacy in the outpatient setting. This was a quasi-experimental trial comparing SCIT to treatment-as-usual (TAU) among individuals with schizophrenia-spectrum disorders. Consistent with the inpatient findings, we predicted that SCIT would be associated with improved emotion perception and Theory of Mind, as well as reduced attributional bias, relative to the treatment as usual (TAU) condition. Secondary predictions were that SCIT-related changes would generalize to reduced Need for Closure and improved social skill performance.

Method

Treatment setting

Participants were recruited from the Schizophrenia Treatment and Evaluation Program (STEP) at The University of North Carolina Neurosciences Hospital. STEP is an outpatient clinic that provides specialty care to adults with schizophrenia and other psychotic disorders. It has a multidisciplinary focus and provides psychiatric assessment, medication management, individual and group psychotherapy, case management, family education and support, and occupational therapy. STEP treats 250 individuals with psychotic disorders annually (95% with diagnoses of schizophrenia or schizoaffective disorder), of which 36% are female, and 24% African-American. The SCIT treatment was provided at the STEP clinic for two of the three psychotherapy group cohorts included in this study. For the third cohort, the treatment was provided at Caramore Community, Inc. in Carrboro, NC.

Caramore is a rehabilitation-oriented transitional residential and vocational training program for individuals with mental illnesses. The third group was held at this site because all members of this cohort were Caramore clients, and this site was more convenient for them.

All three groups were led by two clinicians, one of the authors of the treatment manual (D. Roberts) and a Master's-level student in clinical psychology or social work. The clinicians had an average of 2.0 years of experience (SD = 1.4) working with clients with severe mental illness.

Participants were recruited who met the following inclusion/exclusion criteria: (1) Diagnosis of schizophrenia or schizoaffective disorder; (2) Reading ability above third grade level; (3) No diagnosis of current substance abuse or dependence; (4) Difficulty with social cognition or paranoia, as indicated by clinician or staff consensus of difficulty with social interactions and/or PANSS Paranoia/Suspiciousness score in the clinical range (i.e. 2 or above), and (5) Aged between 18 and 65. All participants were receiving regular psychiatric treatment at STEP, including antipsychotic medication.

Participants were recruited into the SCIT treatment condition based on clinician- or self-referral. Participants were recruited into the TAU condition who either (1) were referred for SCIT participation and declined, but agreed to the TAU condition, (2) self-referred based on posted flyers at the STEP clinic, or (3) had participated in previous research with our laboratory, had agreed to be contacted for future research participation, and met study criteria.

Measures

The assessment battery comprised three types of measures: Screening, primary outcomes, and secondary outcomes. Assessments were conducted by trained assessors who were not blind to treatment condition or pre/post status.

Screening measures

Diagnosis was obtained from participants' medical charts, and confirmed by administration of an enhanced administration of the Positive and Negative Syndrome Scale (Kay, Fiszbein, & Opler, 1987). The PANSS is a commonly used 30-item interview measure that captures severity of positive and negative schizophrenia symptoms, as well as general, mood, and behavioral symptoms. Items are rated on a scale of 1 (absent) to 7 (severe), and yield three scaled scores: Positive symptoms, negative symptoms, and general symptoms. The PANSS is a valid and reliable instrument for use with this population (Kay, Opler, & Lindenmayer, 1988). It was administered by assessors trained to reliability to a gold standard criterion (ICC $\geq$.70). The PANSS was enhanced with symptom duration items from the psychotic disorders section of the Structured Clinical Interview for DSM-IV- Patient Edition (SCID-P; First et al., 2001).

Reading level and IQ estimates were determined using the Wide Range Achievement Test-Revised: Reading *(*WRAT-R; Wilkinson, 1993), a brief test designed to assess reading ability. The WRAT-R consists of a list of words of increasing difficulty that the participant must read aloud to the examiner. Higher scores signify stronger reading ability. The WRAT-R has been normed and validated using a large, diverse sample (Jastak & Wilkinson, 1984). Reading ability has been found to function as an estimate of premorbid cognitive ability in schizophrenia (Dalby & Williams, 1986; Goldberg et al., 1995), and the WRAT-R has been used specifically for this purpose (Weickert et al., 2000).

Additional *demographic and clinical information* that was collected included: age, educational attainment, gender, and ethnic background, and current medications.

Primary outcomes

In holding with the inpatient studies of SCIT, and with recommendations for early-stage treatment development (Rounsaville et al., 2001), only a small set of primary outcome variables were assessed. These included emotion perception, Theory of Mind, and attributional bias—the three primary targets of the intervention.

Emotion perception was measured with the Face Emotion Identification Task (FEIT; Kerr & Neale, 1993). The FEIT is comprised of 19 photographs of faces expressing one of six basic emotions (happy, sad, angry, afraid, surprised, and ashamed). The participant's task is to determine which of the six emotions is being expressed by each face. Performance is indexed as the number of correct responses. The FEIT has been widely used in emotion perception studies in schizophrenia (Mueser et al., 1996; Penn and Combs, 2000; Penn et al., 2000; Pinkham & Penn, 2006; Salem, Kring, & Kerr, 1996).

Reliability (Cronbach's alpha) for the FEIT was .51. Although low, this is consistent with previous research that has used this measure (Kerr & Neale, 1993; Mueser et al., 1996; Penn et al., 2000). Additionally, the widespread use of this measure and ease of comparability with other studies supports the use of this measure here despite its moderate reliability.

Theory of Mind was measured primarily with the Hinting task (Corcoran, Mercer, & Frith, 1995). The Hinting task consists of ten brief, written vignettes describing a social interaction between two characters that ends with one uttering a hint (e.g. "Gosh, these suitcases are heavy!"). The participant must infer what the character really meant by the

hint (e.g., "Will you help me carry them?"). A correct inference receives 2 points. If the respondent is incorrect, a second, more obvious hint is provided (e.g., "I don't know if I can carry all three!") and, if correct at this point, the respondent receives 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 the desires of others. The Hinting task has been used in a variety of studies assessing ToM abilities in schizophrenia and has good psychometric properties (Corcoran, 2001; Marjoram et al., 2005; Tamasine, Bryson, & Bell, 2004). Reliability (Cronbach's alpha) for the Hinting task was .65. Exploration of the scale by deleting items yielded no acceptable subset of items with reliability in the acceptable range. Therefore the full scale was used in analyses.

Attributional style was measured with the Ambiguous Intentions Hostility Questionnaire (AIHQ; Combs et al., 2006). The AIHQ is comprised of 15 short, written vignettes describing negative interpersonal events that vary in the intentionality of the characters (i.e., obviously intentional, ambiguous, and obviously accidental). The participant is asked to read each vignette, to imagine the scenario happening to her or him (e.g., "You walk past a bunch of teenagers at a mall and you hear them start to laugh."), and to write down the reason why they think the other person(s) acted that way toward them. Two independent raters subsequently code this written response for the purpose of computing a "hostility bias" (described below). The participant then rates, on Likert scales, whether the other person(s) performed the action on purpose (anchored by [1], *definitely no*, and [5], *definitely yes*), how angry it would make them feel (anchored by [1], *not at all angry*, and [5], *very angry*), and how much they would blame the other person(s) (anchored by [1], *not at all*, and [5], *very much*). Finally, the participant is asked to write down how s/he would

respond to the situation, which is later coded by two independent raters to compute an "aggression index" (described below). Thus, each of 15 items yields a Hostility score, an Intentionality score, an Anger score, a Blame score, and an Aggression score. The Intentionality, Anger, and Blame scores can be averaged to generate a "Blame composite" score that ranges from 1 to 5. The AIHQ has demonstrated good reliability and validity properties in two studies (Combs et al., 2007; Combs et al., 2006).

In the current study, only the Blame composite, Hostility, and Aggression scores for ambiguous situations were analyzed. These scores show the strongest relationship with paranoia (Combs et al., 2007) and inpatient social behavior (Waldheter et al. 2005) as compared to a well-validated measure of attributional style, the Internal-Personal-Situational Attributions Questionnaire (IPSAQ; Kinderman & Bentall, 1996a). Hostility and Aggression bias scores were independently rated by two research assistants on a 5-point Likert-type scale anchored by 1 (*not at all hostile*) to 5 (*very hostile*) and 1 (*not aggressive*) to 5 (*physically aggressive*), respectively. Raters were blind to study condition and pre/post status. Agreement between raters (Intraclass Correlation Coefficient, ICC) was good, at .85. The reliability (Cronbach's alpha) of the Likert-rated Blame scores was .92.

Secondary Outcomes

The assessment battery was reviewed after completion of the first treatment cohort. At this time, four secondary outcome variables were added to the protocol to strengthen the measurement of key domains specified in our treatment model (Figure 1, page 29). These are described below, along with the rationale for adding each one.

The Bell & Lysaker Emotion Recognition Task (BLERT) was added as a secondary measure of emotion perception in order to enhance the ecological validity of measurement in

this domain. The BLERT consists of 21 brief video scenes in which an actor utters an emotionally neutral phrase using emotionally salient facial expressions and vocal prosody. The participant must select which of six emotions the actor is expressing for each scene. Performance is indexed as the total number of correct responses, with a range from 0 to 21. Reliability (Cronbach's alpha) of the BLERT was .77.

The Awareness of Social Inference Test (TASIT; McDonald, Flanagan, Rollins, & Kinch, 2003) was added as a secondary measure of Theory of Mind. The TASIT was chosen because it is the most face-valid measure of real-world ToM, is robust against ceiling effects in this population (Robert Kern, personal communication), and is associated with social functioning among individuals with traumatic brain injury (McDonald, Flanagan, Martin, & Saunders, 2004) and schizophrenia (Robert Kern, unpublished data).

The TASIT presents participants with ten brief video-taped social vignettes depicting dissociation between a character's words and his or her beliefs, intentions, or emotions (specifically in the form of sarcasm and "white lies"). After each vignette the participant is asked four questions about the characters' beliefs, intentions, and emotions, which must be answered with "Yes" or "No." Performance is indexed as the total number of correct responses, ranging from 0 to 40. Reliability (Cronbach's alpha) for the TASIT was .81.

The Need for Closure Scale-Abbreviated (NCS-A; Kruglanski et al. 1993) was added to assess SCIT-related changes in Need for Closure. The NCS-A replaced the full-scale NCS, a similar, but considerably longer measure that had been used in Cohort 1. The NCS was discontinued because participants in the first cohort exhibited poor attention on the longer measure, and its reliability was low (Cronbach's alpha = .62). The NCS-A is a 16-item self-report questionnaire. Each item consists of a statement that the respondent rates on a 6-point

Likert-type scale (anchored by [1], *strongly disagree*, and [6], *strongly agree*) according to the criterion, "How much would you agree with the statement according to your attitudes, beliefs, and experiences?" A representative item is, "When I need to solve a problem, I do not waste time by considering diverse points of view." Performance is indexed as the sum of 14 items. Two items comprise a "lie scale" and are not included in the total score.) The NCS-A has a range from 14 to 84, with higher scores representing greater Need for Closure. This measure has shown good internal consistency and validity properties in previous research (Webster & Kruglanski, 1994). Reliability for the NCS-A in cohorts 2 and 3 was good (Cronbach's alpha = .85).

The Social Skills Performance Assessment (SSPA; Patterson et al., 2001) was added to the assessment battery in order to evaluate whether changes in social cognition generalize to changes in interpersonal functioning. The SSPA is a verbal role-play assessment in which the subject participates in two 3-minute role-play conversations ("scenes") with the assessor on pre-determined 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."). Role-plays are tape-recorded and rated by independent coders. The SSPA has good face validity as a social skill measure, and has shown excellent inter-rater reliability, good test-retest reliability, and good convergent validity with a measure of activities of daily living (Patterson et al., 2001).

The SSPA was administered by assessors who were trained by reading the manual, conferring with a psychologist (DP), and discussing and establishing agreement on administration standards with assessors using the instrument in other studies with this population. Two coders, trained to reliability and blind to participants' study condition, pre/post status, and performance on other measures, rated participants' performance in the

audio-taped role-plays. Ratings were made of the following domains: interest/disinterest, speech fluency, clarity (logic and intelligibility of phrasing), focus (staying on topic), affect (appropriateness of paralinguistic behavior), social appropriateness (politeness, manners), submissiveness-versus-persistence (in one scene only), negotiation ability (in one scene only), and overall conversational effectiveness. Each domain was rated on a 5-point Likert-type scale with higher scores signifying greater social skill. Domains were summed to yield total scores for each scene.

A random sub-set of role-plays from three studies were used to train raters to adequate reliability (ICC>.70) on all social skill variables. Inter-rater reliability was assessed again after all ratings had been made. On both scene 1 and scene 2, raters achieved an ICC of .82. Therefore the two scenes were collapsed into an overall composite social skill scale (overall ICC = .79), with a range from 16 to 80. The use of an overall composite social skill score is consistent with previous research in the area (Patterson et al., 2001), and is also appropriate given the small number of participants in this study.

Overview of analytic techniques

Efficacy-subset & intent-to-treat analyses

In an ideal study, all individuals would receive an optimal dose of treatment. In reality, the dosage clients receive varies widely due to treatment non-adherence, drop-out, and other factors (Peduzzi, Wittes, Detre, & Holford, 1993). A central problem in treatment outcome research is minimizing the bias introduced by this phenomenon. One approach has been to analyze only the data of those participants who receive an optimal dose of the intervention. This approach has been called “efficacy subset analysis,” because it provides a test of the efficacy of an intervention among the subset of individuals who receive the

intervention as it is designed to be delivered. While common, efficacy subset analysis typically increases Type I error because it conflates treatment assignment with treatment compliance, a factor that is related to treatment outcome independent of intervention type, and therefore confounds causal conclusions (Lee, Ellenberg, Hirtz, & Nelson, 1991). To prevent this bias, intent-to-treat (ITT) analysis is advocated wherein data from all participants who are initially assigned to a treatment condition are included in post-intervention analysis regardless of the amount of treatment they actually receive (Lachin, 2000; Newell, 1992). This approach requires that post-treatment data be collected from all participants, regardless of whether they remained in treatment. ITT prevents Type I error inflation by eliminating self-selection bias, and has been advocated by NIH as the most appropriate technique for evaluating new therapies (Friedman, Furberg, & DeMets, 1998). However, a drawback to ITT is that it is particularly conservative and typically increases Type II error. This is because some individuals who do not receive the intervention, and thus show no change, are evaluated as if they had received the treatment (Gross & Fogg, 2004). In contrast to efficacy subset analysis, ITT analysis is considered an evaluation of a treatment's *effectiveness*, because it assesses a treatment's effects in the real-world context of partial compliance.

Because neither efficacy-subset nor ITT analysis provides an unbiased estimate of an intervention's effects, both may be used within a single study (August et al., 2000). This approach enables evaluation of both the efficacy and the effectiveness of an intervention (Lachin, 2000). The current study's hypotheses will be evaluated using both techniques, first studying the efficacy subset (i.e. "Completers"), and then the broader ITT sample.

Criteria for defining treatment completion in efficacy subset analysis depend on the characteristics of the intervention being studied. We operationalized the minimum acceptable

dose of SCIT as attending at least ten sessions (of 20 to 24 possible sessions), with at least two sessions in each of SCIT's three phases. We required attendance at sessions in all three phases because the skills taught in SCIT are cumulative, with higher-level skills and real-world application not being addressed until the second half of the intervention. Individuals who attended a minimum of ten sessions were categorized as "Completers," and those who did not were categorized as "non-Completers."

Missing data

There is no clearly-optimal method for imputing missing data in a longitudinal database (Little & Yau, 1996). Last Observation Carried Forward (LOCF) is one of several common imputation techniques used in treatment outcome research (Heyting, Tolboom, & Essers, 1992). Using LOCF, each missing observation is replaced with the most recent previous observation available for the variable and subject in question. LOCF has three key limitations. First, in studies such as the current one in which an active treatment is being compared to a control condition, LOCF is a particularly conservative approach because treatment participants with missing data are assumed not to improve after their final assessment. Second, because LOCF assumes that a subject's last observed value on a given variable is the best estimate of his/her status on that variable at any future point in time, LOCF is a poor data imputation choice for the study of conditions that follow a predictable course (such as Alzheimer's disease). Third, LOCF decreases variance on the variable in question. In databases with a high proportion of missing data and/or variables with naturally higher variance, this can have numerous negative effects, including inflation of Type I error.

LOCF was used for ITT analyses in the present study because each of these limitations is considered acceptable in the current context. First, LOCF's conservative effect

is acceptable because the ITT analyses are complimented in this study by Completer analyses, which are more liberally-biased. Regarding the second limitation, chronic schizophrenia does not follow a predictable downward course, and previous longitudinal studies with STEP clients suggest that this population is fairly stable (David Penn & Piper Meyer, personal communication). Third, there was a low rate of missing data in this study, minimizing the risks associated with decreased variance.

There were no data missing from treatment Completers in this study, and therefore no data imputation was necessary in the efficacy-subset sample.

Effect size estimates

Within-group effect sizes were calculated to estimate the magnitude of change from pre- to posttest within the treatment condition. These effect sizes complement the inferential statistics, given the relatively small sample size in this study.

Cohen's *d* (Cohen, 1988) was calculated using Dunlap and colleagues' conservative calculation, which corrects for effect size inflation due to within-variable correlation in paired samples (Dunlap, Cortina, Vaslow, and Burke, 1996). The formula is

$$d = t_c[2(1 - r)/n]^{1/2}$$

where t_c is the *t* statistic for paired groups and *r* is the correlation across pairs of measures. The magnitude of effect sizes were evaluated according to Cohen's recommended conventions: small ($d = .20$), medium ($d = .50$), and large ($d = .80$).

Data analysis overview

In order to minimize experiment-wise error, group differences on the primary social cognitive variables were first explored using repeated-measures multivariate analyses of variance (MANOVAs). Group differences on the secondary outcome variables were tested

using mixed, repeated-measures ANOVAs. All significant interactions were probed with follow-up mean comparisons. Because of the small sample size and preliminary nature of this study, interactions that approached statistical significance ($p < .15$) were also probed (although conclusions regarding these findings will be tempered).

Results

Demographic and baseline clinical analyses

Table 1 summarizes the demographic and baseline clinical characteristics of the SCIT and TAU groups. ANOVA and χ^2 tests revealed that the groups differed significantly in diagnostic make-up and baseline symptom levels. The potential impact of these differences on study hypotheses was probed. Within the full sample, bivariate correlations between baseline PANSS total symptoms and baseline social cognitive performance was non-significant (r's ranged from -.05 to .27) for all variables. Similarly, ANOVAs comparing baseline performance on the social cognitive variables across diagnostic categories were all non-significant (*F*'s ranged from .165 to 2.02). Therefore, these baseline differences were not addressed in further analyses of the social cognitive data.

At baseline, PANSS total symptoms was significantly correlated with social skill performance ($r = .678$; $p = .003$). Therefore, following previous research in this area (Combs et al., 2007), a symptom change score ([pretest PANSS total – posttest PANSS total]/pretest PANSS total) was entered as a fixed covariate in analyses of social skill data.

Comparison of the SCIT and TAU groups at baseline revealed no differences on any of the social cognitive or social skill measures.

Finally, recall that three different therapy cohorts received SCIT. These cohorts did not differ significantly from one another on any baseline clinical, social cognitive, or social skill measures. Therefore, they were combined for all subsequent analyses.

Intent-to-treat (ITT) and Completer samples. Twenty individuals agreed to participate in SCIT therapy. They constituted the ITT sample. Of these 20, 14 (70%) were categorized as Completers. Chi-square and *t*-tests revealed that they did not differ significantly from the six (30%) non-Completers on any of the demographic or baseline clinical measures. The attendance rates for the ITT and Completer samples were 64% and 82%, respectively.

All 11 participants in the TAU sample completed baseline and posttest assessments. A subset of TAU participants did not complete several of the secondary measures because the measures were added to the battery after these participants' baseline assessments were completed.

Treatment findings

Completer sample[1]

The effects of SCIT on social cognition were examined with an omnibus 2 (time: pretest versus posttest) X 2 (group: TAU versus SCIT treatment completers) mixed model multivariate analysis of variance (MANOVA) conducted on the primary social cognitive measures (FEIT, AIHQ hostility bias, and Hinting task). The time x group interaction was statistically significant (Wilk's $\lambda = .592$; $F = 4.82$; $p = .010$). To probe this interaction, follow-up 2 (time) X 2 (group) ANOVAs were conducted on each of the three dependent

[1] The FEIT and Hinting task variable distributions were found to violate parametric statistics' assumptions of normality. Therefore, the significance tests in this section were replicated using non-parametric Mann-Whitney and Wilcoxon change-score tests. Significance findings mirrored parametric results to an acceptable degree for both the FEIT (Mann-Whitney U = 24.00; Wilcoxon W = 90.00; p = .003) and the Hinting task (Mann-Whitney U = 74.50; Wilcoxon W = 140.50; p = .887). Thus, it was determined that assumption violations did not distort findings on these measures.

variables, and the two additional AIHQ variables (summarized in Table 2). For the FEIT (emotion perception task), neither of the main effects for time or treatment group was statistically significant. However, there was a significant time x group interaction ($F = 13.27$; $p = .001$); SCIT completers improved significantly from pre- to posttest ($F = 9.52$; $p = .009$), whereas TAU participants' performance declined at a trend level of statistical significance *(F* = 4.57; p = .06). The improved performance in the SCIT group corresponded to a medium within-group effect size.

Neither the main effects nor the interaction for the Hinting (ToM) nor AIHQ (attributional) tasks was statistically significant.

Intent-to-treat sample[2]

The above analyses were repeated with the larger ITT sample. The results were generally unchanged. The omnibus MANOVA conducted on the three primary social-cognitive variables yielded a time x group interaction that reached a trend level of statistical significance (Wilk's $\lambda = .772$; $F = 2.66$; $p = .069$). As summarized in Table 3, this overall effect was a result of the significant time x group interaction on the FEIT ($F = 7.04$; $p = .013$). Follow-up analyses revealed that the SCIT group improved from pre- to posttest at a trend level of statistical significance ($F = 3.00$; $p = .100$), whereas the TAU group showed the same trend-level performance decrement on the FEIT observed in the Completer sample. The SCIT group improvement corresponded to a small within group effect size. No other main effects or interactions were statistically significant.

Secondary treatment findings

[2] As in the Completer sample, FEIT and Hinting task distributions were found to violate parametric statistics' assumptions of normality. However, again, comparison of the parametric analyses in this section to analogous non-parametric analyses revealed that these violations did not distort findings on the FEIT (Mann-Whitney U = 50.50; Wilcoxon W = 116.50; p = .013) or the Hinting task (Mann-Whitney U = 102.50; Wilcoxon W = 168.50; p = .742).

Completer Sample

Results from a series of 2 X 2 ANOVAs on the secondary outcome variables are summarized in Table 4. On the BLERT, neither of the main effects for time or group was statistically significant. However, the time x group interaction approached a trend level of statistical significance ($F = 3.27$; $p = .092$); participants who received SCIT had (trend-level) higher performance on the BLERT at post-test relative to participants in the TAU group ($t = 1.69$; $p = .11$).

On the TASIT, the time x group interaction approached statistical significance ($F = 2.58$; $p = .128$). Probing of this interaction revealed trend-level improvement in the SCIT group ($F = 4.24$; $p = .070$), and no improvement in the TAU group. The SCIT group's improvement corresponded to a moderate effect size.

Neither the main effects nor the interaction on the Need for Closure scale was statistically significant.

A 2 (time) X 2 (group) analysis of covariance (ANCOVA) was conducted on the SSPA (social skill test) with PANSS symptom change score entered as a covariate. This yielded a statistically significant time x group interaction ($F = 6.49$; $p = .024$; depicted in Figure 2). Follow-up analyses revealed that participants who received SCIT improved significantly in social skill from pre- to posttest ($F = 30.13$; $p = .001$) whereas individuals who received TAU did not. The SCIT group's improvement corresponded to a large effect size.

ITT Sample

Table 5 summarizes results from the secondary outcome measures in the full ITT sample. These results are consistent with those from the Completer sample. The 2 X 2

ANOVA on the BLERT revealed a time-by-group interaction that reached a trend level of statistical significance ($F = 3.91$; $p = .067$). Follow-up analyses revealed that participants who received SCIT showed a pre to post-test improvement that reached a trend-level of statistical significance ($F = 3.37$; $p = .096$), corresponding to a small effect size (no significant improvement was observed in the TAU group).

The ANCOVA conducted on the SSPA with symptom change score as a covariate produced a time x group interaction that approached statistical significance ($F = 2.71$; $p = .121$). Follow-up analyses revealed that the SCIT group improved significantly from pre- to posttest ($F = 11.86$; $p = .006$), whereas the TAU group did not.

None of the main effects or interactions for the TASIT or NCS-A was statistically significant.

Discussion

Following promising findings from preliminary inpatient studies of SCIT, the current study compared SCIT to TAU among outpatients with schizophrenia-spectrum disorders. It was hypothesized that SCIT would be associated with improved emotion perception, Theory of Mind, and social skill, as well as reduced attributional bias and Need for Closure. In general, most, but not all, hypotheses were supported, and the pattern of findings was consistent across both completer and intent-to-treat samples. Results are discussed in more detail below.

Individuals who received SCIT showed significant improvement in emotion perception relative to TAU. This finding replicates the recent inpatient study of SCIT (Combs et al., 2007), and is consistent with previous research demonstrating that it is possible to modify performance in this domain among outpatients (reviewed in Couture et

al., 2006). SCIT differs from previous, "targeted" interventions, however, in that it addresses emotion perception as the first of three treatment phases (instead of as a stand-alone treatment). One result of this is that post-test assessment in SCIT does not occur until approximately four months after completion of targeted emotion perception training. Thus, the positive results in the current study suggest that emotion training effects in SCIT are fairly durable.

The impact of SCIT on ToM varied depending on the nature of the task. Specifically, SCIT was not associated with improvement on the primary ToM measure, the Hinting task. This is a notable deviation from previous research with inpatient samples, which showed large improvement on this measure following SCIT (Penn et al., 2005; Combs et al., 2007). To better understand this null result, I examined the frequency distributions on this measure. This revealed that most (57%) SCIT treatment completers performed in the normative range at pretest (i.e. 17 or above, out of 20; Corcoran et al, 1995; Pinkham & Penn, 2006). Thus, the null impact of SCIT on Hinting task performance may be due to ceiling effects.

In contrast, SCIT was associated with trend-level improvements in ToM as measured by the TASIT. These results are consistent with previous research showing that social cognitive training programs can improve ToM among individuals with schizophrenia (Roncone et al., 2004). It is also encouraging in that SCIT does not train clients in the ability to identify white lies and sarcasm, abilities assessed by the TASIT. Thus, SCIT may have promise in improving "real-world" ToM, although this conclusion is tempered by the small sample in this study.

SCIT did not reduce the hostile and aggressive attributional biases typically associated with paranoia. This finding was unexpected and not consistent with our previous

work with inpatients (Combs et al., 2007). A comprehensive discussion of the likely reasons for this null effect will be presented in the General Discussion following Study #2.

In general, SCIT did not impact Need for Closure, although the results were in the expected direction. Several factors may account for this null finding. First, SCIT interventions designed to increase cognitive flexibility and the ability to generate alternatives may not generalize to NFC. As an epistemological construct, NFC reflects peoples' deeply held assumptions about the construction of truth and knowledge. Therefore, changes in this domain may occur more slowly than can be effected within the 5-month timeframe of SCIT. And second, the measure of NFC used in this study, the NCS-A, is face valid, and relies on the ability to reflect accurately on one's mental tendencies. This level of metacognition may not be possible for many individuals with schizophrenia (Frith, 1992), which could have decreased the validity of reporting on this measure.

Perhaps the most promising finding in Study #1 was the impact of SCIT on social skill. This finding is quite encouraging given that the primary goal of SCIT is to improve social functioning by way of improved social cognition. This provides preliminary support both for the theoretical model underlying SCIT and for SCIT's real-world utility, as it suggests that treatment effects generalize to actual behavior.

Overall, the generally promising findings from this study are tempered by several limitations. The small sample size underscores the need for replication in a larger sample. The use of a quasi-experimental design prevents full confidence in attributing the observed effects solely to SCIT. And last, the use of non-blinded assessors may have increased effect sizes (Tarrier & Wykes, 2004).

Study #2

Study #1 demonstrated that SCIT is associated with improvement in social cognition and social functioning in outpatients with schizophrenia when implemented by individuals who developed the treatment. In Study #2, we conducted a preliminary evaluation of SCIT's real-world effectiveness when implemented at sites, and by clinicians, not affiliated with the SCIT development team. As noted in the introduction, research on a treatment's effectiveness and transportability is traditionally reserved until after randomized, controlled study of its efficacy. However, more recent models have highlighted the benefits of integrating effectiveness studies earlier in the development process (e.g. Weisz et al., 2004). To this end, the purpose of Study #2 was to conduct an initial evaluation of SCIT's effectiveness using a pre/post, open-trial design. Recruitment, implementation, and outcome assessment were designed to maximize research rigor within the resource limitations of community mental health settings. It was predicted that SCIT would be associated with improvements in the three domains of social cognition targeted by the intervention: emotion perception, ToM, and attributional style, with effect sizes likely smaller than in study #1.

Method

Treatment setting

SCIT groups were conducted in New York City in collaboration with Federation Employment and Guidance Services (FEGS) and The Bridge, Inc. Groups were conducted at three rehabilitation-oriented treatment centers for individuals with severe and persistent

mental illnesses: (1) FEGS Intensive Psychiatric Rehabilitation Program (IPRT), a five-day-a-week program with the mission of enhancing clients' functioning in working, living, learning, and socializing; (2) the FEGS Onsite Rehabilitation Program at Riverdale Manor Home for Adults, a supported living facility that offers a spectrum of psychotherapeutic and case-management services to its residents, and; (3) The Bridge Continuing Day Treatment (CDT) program, which provides a spectrum of rehabilitation-oriented outpatient services with the mission of promoting independent living and self-sufficiency for its clients.

Across sites, SCIT was offered as an adjunct to routine care, and followed the manual-specified schedule of 20 to 24 sessions over approximately five months. Each group was led by two clinicians (three with bachelor's degrees and three with master's degrees). The clinicians had an average of 8.1 years of experience (SD = 7.3) working with clients with severe mental illness.

Participants

Treatment participants were recruited by agency clinicians using the inclusion criteria from Study #1 as a guideline, in combination with the clinical goals of the program and the perceived treatment needs of individual clients. Clients who agreed to participate provided informed consent. There was no control condition, and all participants were receiving regular psychiatric treatment and were taking antipsychotic medications (Table 6).

Measures

Demographic and clinical information. Treating clinicians collected baseline data on age, gender, ethnicity, diagnosis, years of education, medications, and living status from participants' medical charts.

Outcome measures. Resources were not available to conduct extensive, one-on-one assessments with all participants. Thus, only the primary social cognitive measures from Study #1 were used, including the FEIT, Hinting task, and AIHQ (described above). These measures were modified in order to enable them to be administered by treating clinicians in group format. They were administered during the first three and final three meetings of the SCIT treatment groups. Because SCIT calls for groups to be co-facilitated by two clinicians, during assessment sessions, one clinician presented assessment instructions and testing stimuli while the other clinician ensured that participants understood the directions and assisted those with special needs (e.g. language deficits).

Fidelity and supervision. Group facilitators read the SCIT treatment manual, attended a half-day workshop (conducted by D. Penn), and consulted with Penn and Roberts prior to initiating treatment. Facilitators participated in weekly supervision calls with Penn and Roberts. No formal measure of treatment fidelity was administered.

Data analytic plan

As in Study #1, the ITT sample was comprised of all participants who agreed to treatment. Those who attended at least ten sessions (with at least two in each phase) were categorized as Completers. Separate analyses were conducted on the ITT and Completer samples[3].

An initial repeated-measures MANOVA was conducted on the primary social cognitive variables (FEIT, Hinting task, and AIHQ hostility bias). Follow-up paired-samples *t*-tests were used to explore the statistical significance of pre-to-posttest change on these

[3] Because all assessments were conducted in group format, it was not possible to collect post-test data from individuals who dropped out of the SCIT group. In this sample, all non-Completers were drop-outs. Thus, all post-test data for non-Completers in this study were imputed, using LOCF, by carrying forward pretest scores. As a result, the ITT sample represents a particularly conservative effectiveness estimate because no treatment gain from any non-Completers was captured in post-test data.

three variables individually, as well as on the other two AIHQ variables (aggression bias and blame score). Within-group effect sizes (Cohen's *d*) were calculated using the same method as was used in Study #1 (described above).

Results

Demographic characteristics of the sample are summarized in Table 6. The three therapy cohorts did not differ significantly from one another on any demographic or baseline social-cognitive variables. Therefore, they were combined for all subsequent analyses.

Intent-to-treat (ITT) and Completer samples. Twenty-nine individuals agreed to participate in SCIT. They constituted the ITT sample. Of these 29, 20 (69%) were categorized as Completers. Attendance rates for the ITT and Completer samples were 67% and 83%, respectively. Chi-square and *t*-tests revealed that Completers did not differ significantly from non-Completers on any of the demographic or baseline social-cognitive measures.

Treatment findings

Completer sample

The omnibus repeated measures MANOVA conducted on the primary social cognitive variables was statistically significant ($F = 6.23$; $p = .006$), indicating an overall change in social cognition from pre- to posttest. Participants showed a trend level improvement in FEIT (emotion perception) performance ($t = 1.73$; $p = .101$), and a significant improvement in Hinting task (ToM) performance ($t = 3.24$; $p = .004$), both of which correspond to a small effect size. No other significant effects were observed.

ITT Sample

Results from the ITT sample (summarized in Table 8) were consistent with those from the Completer sample. The omnibus MANOVA was statistically significant ($F = 4.64$; $p = .010$) and within group improvement again approached statistical significance for the FEIT ($t= 1.70$; $p=.101$), and was statistically significant for the Hinting task ($t = 3.02$; $p=.005$).

Discussion

This study was designed to test SCIT's effectiveness at improving targeted social cognitive domains within the real-world context of community mental health clinics. It was predicted that SCIT participants would exhibit improvements in emotion perception and ToM, and a reduction in attributional bias. As in Study #1, the majority of results were positive, and effects were similar across the intent-to-treat and Completer samples. Findings are discussed in more detail below.

SCIT was associated with an improvement in emotion perception that approached statistical significance. As expected, the effect sizes were attenuated relative to Study #1. This may be due to differences in how community clinicians implemented the emotion training phase of SCIT (compared to those in Study #1) and/or differences in sample characteristics across the two studies[4], or some combination thereof. In future research on the transportability of SCIT to community settings, a measure of treatment fidelity may help disentangle these issues.

Participants in both the Completer and ITT samples improved significantly in Theory of Mind performance, replicating findings from the two inpatient studies of SCIT (Combs et al., 2007; Penn et al., 2005). This finding contrasted with Study #1, in which no improvement

[4] Compared to participants in Study #1, those in Study #2 exhibited significantly lower pretest FEIT scores ($p < .001$), were significantly older ($p < .05$), and were more likely to be living in group homes ($p < .01$).

was observed on the Hinting task. Participants in Study #2 were more impaired at pre-test relative to participants in Study #1 on this task ($p = .012$), which strengthens the conclusion that the findings from Study #1 were confounded by a ceiling effect. ToM findings from Study #2 are promising from the standpoint of transportability. In contrast to emotion perception, ToM is addressed in a relatively diffuse manner within SCIT. Whereas the manual does include numerous specific prompts for group leaders to ask perspective-taking questions, clinicians also are encouraged to cultivate a perspective-taking environment throughout the treatment, and to find opportunities to help clients link perspective-taking to the more concrete emotion-perception and alternative-generating skills that they develop. Thus, the current finding suggests that the SCIT treatment manual (and weekly supervision) effectively communicated these non-specific aspects of ToM training to clinicians.

As in Study #1, participants' pre- and posttest attributional bias appeared to be in the low-normal range, rendering moot the possibility of meaningful decrease in this domain. This finding is addressed in the General Discussion, below.

Study #2 had several notable limitations. This was a small, uncontrolled study that used a convenience sample. Additionally, assessments were administered (1) by the treating clinicians, (2) in group format, and (3) using modified measures. All three of these factors threaten the validity of assessment results, and the first two could have inflated the study's findings (Tarrier & Wykes, 2004). These threats are an artifact of limited agency resources, and were recognized prior to data collection. We sought to offset their effects by conducting both ITT and Completer analyses, the former of which was a highly conservative estimate of treatment effectiveness. The general consistency of findings across these analyses strengthens our confidence in the conclusions we have drawn. Nonetheless, this analytic

method is imperfect, and as the emphasis on effectiveness research in mental health grows, there is continued need for novel methods of maximizing assessment validity while minimizing agency cost and client burden.

General Discussion

Following a treatment-development phase, and evaluation of SCIT among inpatients, the current project was a preliminary evaluation of SCIT among outpatients. Study #1 used a quasi-experimental design to assess efficacy in a North Carolina (NC) sample, and Study #2 used an uncontrolled, pre-post design to assess effectiveness in a New York (NY) sample. Results were generally promising, as SCIT participants in both studies showed evidence of improvement in most outcome domains. Results are discussed in more detail below.

Emotion perception. In general, there was relative convergence across studies on the impact of SCIT on emotion perception; SCIT participants in both studies showed improvement in this domain that reached small to medium effect sizes. Thus, these findings lend preliminary support to the ability of SCIT to improve emotion perception among outpatients with schizophrenia spectrum disorders.

In the future, the kind of cross-sample performance variability observed in this study may be explored by conducting assessments both immediately after the emotion training module, and at treatment posttest. Combs and colleagues piloted this data-collection approach in their inpatient study of SCIT, and found that gains achieved during targeted emotion training had not decayed by the time of post-intervention assessment (Dennis Combs, personal communication). This finding lends support to the effectiveness of both the targeted emotion training and the subsequent rehearsal and reinforcement techniques used in

SCIT. Research in this vein can help to explain discrepant treatment findings across study groups and to clarify how emotion perception gains are achieved and maintained over time.

Despite strong evidence that emotion perception can be improved, the literature remains unclear about whether improvements generalize to improvements in social functioning (Couture et al., 2006). Study #1 provided tentative evidence toward this link, as concomitant improvements were recorded in emotion perception and social skill. To provide more direct evidence, future research on SCIT should also assess social functioning immediately following emotion training. To the extent that generalization to social functioning involves delayed effects, more complex methodologies may be necessary to disentangle the effects of emotion training from attributional and ToM training. For example, multiple-baseline or other dismantling methodologies may be necessary.

A final issue regards the ecological validity of emotion perception training. Does improvement in identifying facial expressions of emotion in static, posed, black-and-white photographs correspond to improvement in identifying human emotion in real-world settings? This issue poses a Hobson's choice to treatment researchers. "Teaching to the test" will yield greater effect sizes but may not generalize to social functioning**.** On the other hand, using more ecologically valid intervention methods may enhance "real-world" emotion perception, but these gains may not be captured by current assessment measures. The emergence of more ecologically valid instruments, such as the BLERT, may help to resolve this tension. In Study #1, we added the BLERT to the assessment battery, and found evidence that SCIT participants did not improve as much on this measure as on the FEIT. Thus, it may be necessary for future iterations of SCIT to target more explicitly participants' processing of vocal prosody, dynamically changing facial cues, and other real-world indicators of emotion.

Theory of Mind. There was mixed support for the impact of SCIT on ToM, with stronger evidence emerging from the NY sample than from the NC sample. This finding was unexpected in light of the consistently strong ToM results observed in the inpatient studies of SCIT (Combs et al., 2007; Penn et al., 2005).

A likely explanation for this discrepancy is a ceiling effect among NC participants on the primary ToM measure, the Hinting task. This ceiling effect is consistent with previous research on ToM in high-functioning samples (Hogarty et al., 2004; Robert Kern, personal communication), and with the fact that ToM deficits may be episode-dependent in schizophrenia (Brune, 2005b). If the ceiling effect observed in the current study is indeed valid, it begs the question of whether ToM training is either possible or necessary among higher functioning individuals. Results from the TASIT, our secondary measure of ToM, suggest that there is in fact room for ToM improvement in this population, and that SCIT may hold promise in this regard, as improvement on the TASIT corresponded to a medium effect size. However, this conclusion is tempered by the small sample size and the lack of random assignment in the current study. At this point, all that can be concluded is that SCIT may improve ToM in a higher functioning sample (if one uses the TASIT), and that the TASIT may be sensitive to change.

Attributional bias. SCIT did not have an impact on attributional bias in either study. This null effect may be understood by examining the descriptive statistics for the AIHQ. Specifically, means at both pre- and posttest on all three attributional bias scales (hostility, aggression, and blame) were lower than means produced by a normative sample of college students (Combs et al., 2007). This suggests a floor effect such that SCIT participants were actually *less* biased than non-ill controls, and therefore had little room for improvement.

Several factors may explain this floor effect. First, participants may in fact be elevated in attributional biases, but may have underreported them due to the desire to not appear paranoid or blaming. As an explicit measure, the AIHQ does not protect against this possibility. This problem could possibly be addressed through use of an implicit measure of attributional style, such as the Pragmatic Inference Test (Winters and Neale, 1985). A second possibility is that participants in this sample actually experienced low levels of attributional bias. This bias is strongly associated with persecutory delusions and paranoia (Bentall et al., 2001; Garety & Freeman, 1999), both of which were low among NC participants. In contrast, inpatient samples whose attributional biases have improved following SCIT exhibited relatively high baseline scores in these domains (Combs et al., 2007). A final possibility is that low scores on the aggression scale of the AIHQ may reflect hesitance to engage other people, or passivity. Low scores correspond to statements such as "I would do nothing" in responses to a negative interpersonal event (such as being stood-up for an appointment). High levels of self-isolation and interpersonal passivity have been associated with schizophrenia (Rector, Beck, & Stolar, 2005), and may represent a stronger and more disabling bias than the aggressive response bias among some individuals with this illness. Thus, it might be necessary to reconceptualize this "aggression" scale so that moderate scores are viewed as optimal, and low scores are viewed as maladaptively passive. For some SCIT clients, the goal might be to increase assertiveness, rather than reduce aggression.

The *social skill* improvement observed in Study #2 is particularly promising as we are aware of only one other study that has shown social functioning improvement following a purely social cognitive intervention (Roncone et al., 2004). SCIT participants' social skill improvement corresponded to the largest effect size observed across all domains, which is

clinically promising because the social skill measure is both the most ecologically valid instrument that we used and the measure that best captures SCIT's ultimate outcome goal. Future research is necessary to replicate this finding and to evaluate its generalization to more distal domains of social functioning, such as vocational achievement and social satisfaction.

The current project had several methodological limitations in addition to the potential measurement limitations described above. First, although the raters of social cognitive bias and social skill measures were blind to treatment and pre/post status, the assessors were not. This is an important limitation, as Tarrier and Wykes (2004) have identified non-blinded assessment as a key source of treatment-effect inflation among studies of CBT for psychosis. Second, neither study used a fully randomized-controlled design. Therefore inferences of causality are not possible. Third, small sample size limited power to detect change across variables. These limitations are being addressed in an NIMH-funded randomized, controlled trial scheduled to begin later this year.

Looking toward the future, the current findings suggest that measurement may be a rate-limiting factor in the development of social cognitive interventions. More basic research is needed to ensure that social cognitive instruments are valid, maximally correlated with social functioning, and sensitive to change. Additionally, there is need for increased measurement of theoretically important domains that have not been assessed in this or other intervention studies, including metacognition and mirror neuron activity. In the meantime, treatment developers should resist the temptation to develop interventions that "teach to the test" without establishing a sound theoretical basis linking intervention techniques to putative etiological factors.

Last, in order to maximize the clinical efficiency of social cognition training, measurement approaches are needed that can discriminate clients who are appropriate for social cognitive- versus neurocognitive intervention. As reviewed in the introduction, social cognition and neurocognition appear to contribute independent variance to social functioning. However, current measures of social cognition lack the specificity to discriminate at the client level which of these domains is contributing to abnormal performance. Thus, a client with relatively intact social cognition may perform poorly on a ToM task because of cognitive deficits. Screening instruments that employ discrimination methods, such as signal detection (cf. Banaji & Greenwald, 1995; Belezza, & Bower, 1981) or process dissociation (Jacoby, 1991) may differentiate clients' needs and thereby maximize treatment effects as well as client satisfaction.

In closing, this study showed that SCIT is a feasible and promising method for improving social cognition among outpatients. It is hoped that upcoming research will yield further evidence of its benefit to social functioning, and that SCIT will become an effective tool to help individuals with schizophrenia to build satisfying, socially integrated lives.

Table 1

Study 1 Demographic and Clinical Information

	SCIT (n = 20)		Control (n = 11)	
	Mean / %	SD	Mean / %	SD
Age	36.8	12.3	41.4	12.3
Female (%)	45.0		36.0	
Ethnicity (%)				
African Am.	25.0		18.2	
Caucasian	75.0		72.7	
Other	0.0		9.1	
Diagnosis (%) *				
Schizophrenia	35.0		81.8	
Schizoaffective	65.0		18.2	
Yrs education	13.9	3.6	14.0	1.8
WRAT – Reading	44.4	8.3	47.7	6.0
Living status (%)				
Independent	35.0		54.5	
Family home	15.0		9.1	
MH supported	30.0		18.2	
Group home	20.0		18.2	
PANSS Symptoms†	67.9	11.7	51.3	10.0

MH supported = Apartment with functional supports from a mental health provider
* Diagnosis: $\chi^2 = 6.23$; $p = .013$
† Symptoms: $t = 3.97$; $p < .001$

Table 2

Study 1 Completer sample, primary social cognitive outcomes

	SCIT (n = 14)		Within SCIT effect size (*d*)	TAU (n = 11)		Within TAU effect size (*d*)
	Pretest M (SD)	Posttest M (SD)		Pretest M (SD)	Posttest M (SD)	
FEIT*	12.21 (2.39)	13.57 (2.82)	.50	13.73 (2.05)	12.54 (2.21)	- .55
Hinting task	16.14 (2.66)	15.92 (2.59)	- .08	15.45 (2.94)	15.27 (3.38)	- .06
AIHQ Hostility	1.97 (0.61)	2.11 (0.70)	.22	1.70 (0.48)	1.51 (0.60)	- .35
AIHQ Aggression	1.79 (0.33)	1.89 (0.27)	.31	1.95 (0.33)	1.98 (0.52)	.05
AIHQ Blame	2.90 (1.04)	2.93 (0.95)	.03	2.50 (1.01)	2.26 (0.73)	- .22

* Significant time X group interaction (p = .001)
SCIT = Social Cognition and Interaction Training; TAU = Treatment as usual; FEIT = Face Emotion Identification Task; AIHQ = Ambiguous Intentions Hostility Questionnaire

Table 3

Study 1 Intent-to-treat sample, primary social cognitive outcomes

	SCIT (n = 20)		Within SCIT effect size (*d*)	TAU (n = 11)		Within TAU effect size (*d*)
	Pretest M (SD)	Posttest M (SD)		Pretest M (SD)	Posttest M (SD)	
FEIT*	12.15 (2.78)	12.95 (3.02)	.28	13.73 (2.05)	12.54 (2.21)	- .55
Hinting task	15.90 (2.77)	15.80 (2.73)	- .08	15.45 (2.94)	15.27 (3.38)	- .06
AIHQ Hostility	1.94 (0.56)	2.06 (0.71)	.19	1.70 (0.48)	1.51 (0.60)	- .35
AIHQ Aggression	1.91 (0.36)	1.94 (0.27)	.11	1.95 (0.33)	1.98 (0.52)	.05
AIHQ Blame	2.77 (0.93)	2.75 (0.87)	- .02	2.50 (1.01)	2.26 (0.73)	- .22

* Significant time X group interaction (p = .013)

SCIT = Social Cognition and Interaction Training; TAU = Treatment as usual; FEIT = Face Emotion Identification Task; AIHQ = Ambiguous Intentions Hostility Questionnaire

Table 4

Study 1, Completer sample, secondary outcomes

	SCIT		N	Within SCIT effect size (*d*)	TAU		N	Within TAU effect size (*d*)
	Pretest M (SD)	Posttest M (SD)			Pretest M (SD)	Posttest M (SD)		
BLERT	15.57 (3.26)	16.50 (2.22)	10	.29	14.12 (5.52)	13.00 (5.93)	7	- .19
TASIT	26.30 (6.90)	29.50 (5.72)	10	.50	27.38 (5.42)	27.50 (5.73)	8	.02
SSPA*	55.33 (5.17)	62.61 (6.56)	9	1.17	58.64 (4.10)	59.00 (6.46)	7	.06
NCS-A	50.44 (10.36)	47.78 (11.56)	9	- .24	46.13 (15.11)	50.13 (8.82)	8	.15

* Significant time X group interaction (p = .024)

BLERT = Bell & Lysaker Emotion Recognition Task; TASIT = The Awareness of Social Inference Test; SSPA = Social Skill Performance Assessment; NCS-A = Need for Closure Scale – Abbreviated

Figure 2
Study 1, treatment group X time interaction effects for the Social Skill Performance Assessment

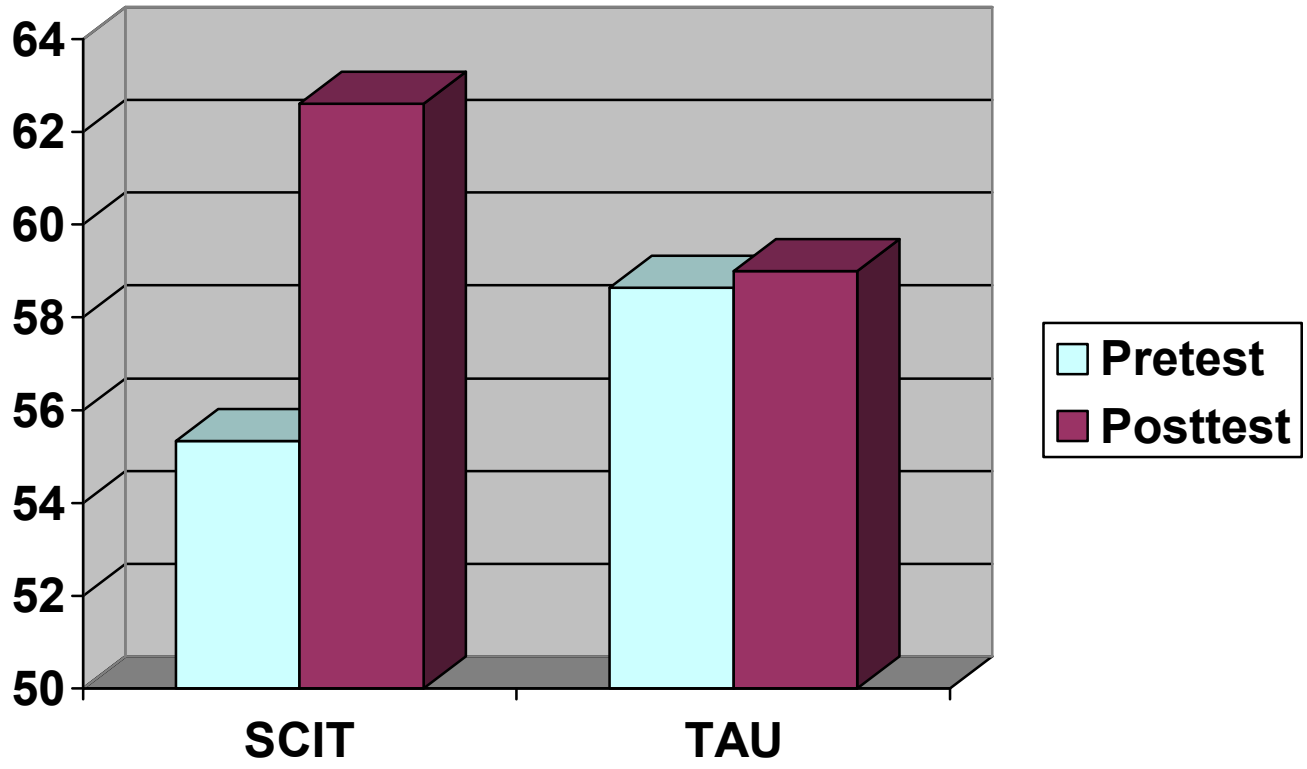


Table 5

Study 1, Intent-to-treat sample, secondary outcomes

	SCIT		N	Within SCIT effect size (*d*)	TAU		N	Within TAU effect size (*d*)
	Pretest M (SD)	Posttest M (SD)			Pretest M (SD)	Posttest M (SD)		
BLERT	15.60 (3.26)	16.64 (2.16)	11	.35	14.12 (5.52)	13.00 (5.93)	7	- .19
TASIT	27.08 (6.49)	29.46 (5.19)	13	.39	27.38 (5.42)	27.50 (5.73)	8	.02
SSPA	55.50 (5.30)	61.05 (7.71)	11	.79	58.64 (4.10)	59.00 (6.46)	7	.06
NCS-A	49.38 (11.03)	48.31 (12.34)	13	- .09	46.13 (15.11)	50.13 (8.82)	8	.15

BLERT = Bell & Lysaker Emotion Recognition Task; TASIT = The Awareness of Social Inference Test; SSPA = Social Skill Performance Assessment; NCS-A = Need for Closure Scale - Abbreviated

Table 6

Study 2, Demographic information

	SCIT (n = 30)	
	Mean / %	SD
Age (years)	53.4	12.2
Female (%)	53.0	
Ethnicity (%)		
African Am.	43.3	
Caucasian	36.7	
Hispanic	20.0	
Diagnosis (%)		
Schizophrenia	43.3	
Schizoaffective	20.0	
Psychosis NOS	3.3	
Bipolar d/o	1.3	
MDD with psychotic feat.	1.0	
Other	1.0	
Yrs education	13.2	3.3
Living status (%)		
Independent	13.3	
MH supported	26.7	
Group home	60.0	

MH supported = Apartment with functional supports from a mental health provider

Table 7

Study 2, Completer sample, treatment outcomes

Variable	SCIT (N = 20)		*d*
	Pretest M (SD)	Posttest M (SD)	
FEIT*	9.56 (3.28)	10.72 (3.10)	.37
Hinting task	13.60 (4.11)	15.40 (4.49)	.44
AIHQ Hostility	1.83 (0.71)	1.80 (0.14)	.06
AIHQ Aggression	1.79 (0.35)	1.80 (0.07)	.02
AIHQ Blame	2.77 (0.90)	2.67 (0.61)	.10

* The N for this test was 18 instead of 20 because one treatment completer did not attend the session at which the pretest FEIT was conducted and one did not attend the session at which the posttest was conducted.

Table 8

Study 2, Intent-to-treat sample, treatment outcomes

Variable	SCIT (N = 29)		*d*
	Pretest M (SD)	Posttest M (SD)	
FEIT*	10.28 (2.91)	11.00 (2.66)	.25
Hinting task	13.62 (3.60)	14.86 (3.98)	.32
AIHQ Hostility	1.81 (0.70)	1.79 (0.65)	.04
AIHQ Aggression	1.81 (0.33)	1.82 (0.30)	.03
AIHQ Blame	2.76 (0.99)	2.69 (0.83)	.08

* N = 27, per note in Table 7

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