

Psychosocial Treatments to Promote Functional Recovery in Schizophrenia

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A number of psychosocial treatments are available for persons with schizophrenia that include social skills training, cognitive behavioral therapy, cognitive remediation, and social cognition training. These treatments are reviewed and discussed in terms of how they address key components of functional recovery such as symptom stability, independent living, work functioning, and social functioning. We also review findings on the interaction between pharmacological and psychosocial treatments and discuss future directions in pharmacological treatment of schizophrenia. Overall, these treatments provide a range of promising approaches to helping patients achieve better outcomes far beyond symptom stabilization.

Key words: recovery/social skills training/cognitive behavioral therapy/cognitive remediation/social cognition/schizophrenia

Introduction

Despite advances in antipsychotic medication for schizophrenia that have alleviated side-effect burden, it has become clear that medications alone are not sufficient for recovery and adaptive adjustment. Psychosocial treatments that enable persons with schizophrenia to cope with the disabling aspects of their illness and achieve personal goals are a necessary complement.

Psychosocial treatments for schizophrenia include social skills training, cognitive behavioral therapy (CBT), cognitive remediation, and social cognition training among others. We purposefully limited the selection to these 4 to present an overview of well-established (social

skills training) and more recent efforts (CBT, cognitive remediation, and social cognition training) that illustrate differing approaches to facilitating recovery. Importantly, these treatments differ in their selection of treatment targets. Social skills training targets social and independent living skills, CBT targets symptoms that may lead to improvements in social functioning and quality of life, cognitive remediation (in general) targets cognitive impairments that may lead to improvements in work and social functioning, and social cognition training targets components of social cognition such as emotion perception, social perception, theory of mind, and attributional bias that may lead to improvements in social functioning.

A recovery orientation to psychiatric illness holds that individuals are more than the sum of their symptoms and that recovery involves “a redefinition of one’s illness as only one aspect of a multi-dimensional sense of self, capable of identifying, choosing, and pursuing personally meaningful goals and aspirations.”¹ All formal definitions of recovery include criteria to address symptom stability or freedom from psychiatric hospitalization plus some criteria for normalization of social and work/school functioning over a prescribed period of time (eg, 2–5 years^{2–5}). The definition offered by Liberman et al³ provides the most specific measurement guidelines. They prescribe Brief Psychiatric Rating Scale score of 4 or less (clinically nonsignificant) on all positive and negative symptom items, at least half-time work or school, independent management of funds and medications, and once weekly socializing with peers for a period of 2 years.

Few persons with schizophrenia meet definitions of recovery, and paradoxically, few treatment studies include “recovery” as a study aim. The paucity of studies in this area may be due to the breadth of the definition of recovery, the length of follow-up required of such studies, and the unlikelihood that any single psychosocial treatment would yield a positive effect given the multiple factors that influence recovery. Albeit ambitious, efforts toward promoting recovery warrant consideration given the absence of movement in this area over the past 100 years.⁶ In this article, we review 4 distinctive psychosocial treatments for use with persons with schizophrenia. For each, we discuss the rationale for the approach, describe the intervention methods, and summarize results because they relate to components of recovery. This article is

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not intended to be a comprehensive review of the extant literature for these 4 treatments because many others exist. Rather, we see this article as providing an overview of select psychosocial treatments with a particular focus on those studies relevant to functional recovery. We begin with the most established of the psychosocial treatments, social skills training.

Social Skills Training

The positive symptoms of schizophrenia have long been recognized as primary clinical features of the disorder. Grounded in the medical model of schizophrenia, the somatic and pharmacological treatments developed for the illness during much of the last century were most often targeted at reduction of positive symptoms. Nevertheless, the social impairments associated with the illness have also long been noted. Many persons with schizophrenia exhibit profound deficits in social and instrumental role functioning that severely impact the quality of their lives.⁷ In the 1960s and 1970s, the rise of learning-based paradigms highlighted the role of the environment in influencing both animal and human behavior,⁸ and many creative, forward-thinking mental health professionals^{9–11} began to adapt learning principles to the treatment of social deficits in persons experiencing significant psychopathology, including psychosis.

Influence of Social Learning Theory

Four overarching tenets drove the translation of social learning principles into psychiatry. The first was that psychiatric patients, including those with psychotic disorders like schizophrenia, exhibited behavioral excesses and deficits, as well as inappropriate behaviors, which could be defined and measured. Second, these aberrations in social behavior resulted in difficulties in adapting to the larger social world and inhibited persons with these illnesses from achieving personally desirable goals. Third, even if the etiology of a psychiatric illness and its concomitant problems proved to be biological, humans experiencing these illnesses are still social beings and their environment plays a role in shaping their behavior. Thus, their behavior is amenable to change using learning principles. The fourth tenet was that although symptoms such as hallucinations, delusions, and formal thought disorder were important aspects of the illness, social skills could be taught even in persons experiencing these symptoms. These tenets formed the foundation of the interventions that have evolved as “social skills training” and are now manualized^{12,13} and widely disseminated.

Social Skills Training Methods

The early applications of learning principles in psychiatric treatment relied on direct tangible rewards and punishers as the primary learning tools—these programs were often known as token economies.^{14–16} However,

as the administration of these techniques evolved, it became clear that many persons could also learn from observation and direct instruction, even if they suffered from psychoses. This observation greatly expanded the range of possible social skills training interventions to include not only immediate primary reinforcement but also behavioral demonstrations, role-playing, prompting, coaching, modeling, shaping, secondary reinforcement, and planned generalization training through out-of-session assignments. These techniques are all critical components of any effective social skills training program.¹⁷

While much of the early social skills work focused on changing behavior on inpatient units^{18,19} or day hospitals,²⁰ as more and more persons with schizophrenia began to reside in the community, many social skills training programs for outpatients were also implemented.^{21,22} Social skills training can be conducted individually²³ or in groups.²⁴ Groups, of course, have the added advantages of offering more opportunities for observational learning as well as providing a variety of persons with whom to practice the skills. Groups can also provide opportunities to bolster social support. Consistent with its foundation in the social learning literature, many of the early empirical investigations in the field were small case studies using multiple baseline designs,²⁵ but now many controlled trials incorporating the gold standards²⁶ of experimental design^{24,27} (eg, randomization, blind assessors, manualized interventions, fidelity ratings, intent-to-treat analyses, etc) have been published.

The content of the earliest applications of social skills training programs tended to be formulaic and driven by the clinicians’ agendas, but more recent implementations highlight the importance of teaching unique social skills that can be used in the service of meeting the specific goals of the participant. Thus, if one person wants to find a romantic partner, many of the social skills taught will concern dating skills, while if another person wants to get or keep a job the social skill curriculum will be focused on the skills necessary for that enterprise.

Summary of Findings

Several reviews and meta-analyses evaluating the benefits of social skills training in schizophrenia have been published, with varying conclusions. While some have been very positive,^{28,29} others have been less enthusiastic.³⁰ In interpreting these conflicting results, 2 observations are paramount. First, the included studies vary in design rigor, which may color the interpretation of results.³¹ As noted above, more recent studies tend to be more rigorous. Second, and more importantly, the outcome domain that would be expected to change as a result of participation in social skills training programs has been a topic of some debate.^{29,32} Though the focus of treatment in social skills training programs is developing social and independent living skills, the body of literature examining the efficacy of social skills training has

typically examined 2 primary outcome domains—symptoms and relapses.

The issue of the potential impact of social skills training on symptom exacerbation and psychotic relapse is complicated. Extrapolations of the stress-vulnerability model of psychiatric illness³³ might predict that improved coping and competence resulting from enhanced social skills would reduce risk for relapse. However, many other variables can impact psychotic relapse, including medication nonadherence, use of alcohol or drugs, and increases in life stress. Thus, it is not immediately apparent that reductions in relapse would be a likely outcome of social skills training programs although this has been evaluated in some studies.^{24,27}

Presumably, social skills training programs should, at a minimum, alter the knowledge of social behavior and the actual social and instrumental behavior exhibited in the skills training classroom. But should these specific behavioral changes also be observable in other settings? ... with other people? These questions, of course, highlight the issue of generalization of training effects, and this has been the topic of much discussion in the social skills literature over the years.³⁴ An even more important issue is whether the teaching of specific skills should impact broader aspects of community functioning such as making and keeping a friend, developing or maintaining a romantic partnership, living independently, or holding down a job?

Kurtz and Mueser³¹ have recently published a meta-analysis evaluating the impact of 22 social skills training programs in schizophrenia, with the most careful attention to date being paid to the issue of expected domains of beneficial outcomes. They found a large weighted mean effect size for social skills knowledge tests ($d = 1.20$), a moderate mean effect size on social and daily living skills performance-based assessments in the clinic ($d = 0.52$), a moderate mean effect size on functioning in the community ($d = 0.52$), and a small effect size on relapse ($d = 0.23$). Though social skills training has a well-established history, findings from earlier studies are difficult to interpret because the outcome domains defined in these studies (eg, relapse) are affected by multiple variables. More recent efforts suggest that participation in social skills training programs affects a number of dimensions important to recovery in persons with schizophrenia and can have broader effects on community functioning as well. These findings underscore the importance of planning generalization of skills to strengthen benefits in community settings.

Cognitive Behavioral Therapy

While the symptoms of schizophrenia can be distressing in and of themselves,³⁵ they also often interfere with social functioning, both in the short and long term.³⁶ For example, Angell and Test³⁷ reported that a worsening of

psychotic symptoms over a 6-month period significantly reduced social functioning. Norman et al³⁸ found that psychotic symptoms were more predictive of social functioning (assessed an average of 10 months later) than was cognitive functioning. Hallucinations and delusions were especially predictive of low levels of later social contact (eg, friendships, interpersonal interests, and activities). Robinson et al³⁹ observed that duration of psychotic symptoms prior to study entry significantly predicted symptom and social functioning recovery 5 years later. Torgalsboen⁴⁰ noted that positive symptoms at initial admission were strongly related to recovery in schizophrenia over 20 years later. Racenstein et al⁴¹ found that persistence of psychotic symptoms was strongly associated with work functioning at a 10-year follow-up of first-episode psychosis. Thus, better treatments to reduce psychotic symptoms in schizophrenia are needed, both to reduce the subjective distress and functional impairment associated with these symptoms.

Cognitive Model of Psychopathology

CBT is based on a cognitive model of psychopathology^{42,43} that proposes that biological factors are understood to be the cause of the initial diathesis or vulnerability to develop symptoms under stress, but faulty appraisals of these experiences are hypothesized to result in the development of the complete illness syndrome.⁴⁴ With more severe disorders such as psychoses, medication is seen as a necessary but insufficient treatment, in so far as it is not expected to fully correct faulty appraisals of internal experiences. These need to be targeted directly.

Perceptions of events, rather than the events themselves, are seen as the key to emotional states and are selected as targets of treatment in the cognitive therapy model of psychotic symptoms. Faulty cognitive appraisals, grounded in early learning experiences, are thought to create negative mood states, which can perpetuate initial misattributions. These faulty appraisals are conceptualized as being maintained, in part, by consistent errors in cognitive processes, such as selective attention and memory bias as well as a tendency to “jump to conclusions” and personalize experiences.^{43,45} Current symptoms are seen as resulting from misattributions of experience prompted by viewing them through the prism of a faulty developmental belief structure, exacerbated by ongoing logical errors. Within this framework, initial experiences that might be labeled as “psychotic” (eg, hearing voices when no one is around, feeling overly threatened) are seen as “normal,” in so far as surveys indicate that they are experienced by a wide range of the general population^{46,47} under specific circumstances (eg, when sleep deprived, under extreme stress, when using excessive amounts of drugs or alcohol, when sensory deprived, etc). The psychiatric illness develops because of the initial misattributions made of these “unusual but

within the realm of normal” experiences and the errors in logic used to maintain these first faulty attributions.⁴⁸

While the original work in CBT for psychosis targeted positive symptoms, greater attention has been recently paid to applying the cognitive model of psychosis to negative symptoms. The cognitive model of negative symptoms not only acknowledges the importance of biology in the etiology of many types of negative symptoms but also postulates psychological causes for the phenomenon.^{49,50} In schizophrenia, the development of positive symptoms and underlying cognitive deficits result in many experiences that might be considered “failures.” Persons with the illness may be unable to attend in school, follow conversations with friends, succeed at a job, or manage their hygiene. Negative symptoms are conceptualized as understandable, but maladaptive, responses to these circumstances. For example, the person with the illness may isolate (asociality), so as not to be overwhelmed or shamed, may not have any expectation for success and thus not engage in goal-directed behavior (avolition), and may so withdraw from the world as a protective coping technique that he/she limits any experience of pleasure (anhedonia). Within the CBT for psychosis framework, the behaviors and attitudes that are operationalized as negative symptoms likely reflect, at least in part, negative self-beliefs (eg, “Nothing will ever work out for me,” “I am no good at anything,” “The future is bleak,” “No one can understand or care for me,” etc).

Therapy Methods

Typically, CBT has targeted treatment of persistent positive symptoms, most particularly delusions and hallucinations. A number of CBT manuals are now available that include applications for individual or group therapy.^{51–55} Although these approaches to CBT for psychosis differ somewhat, Garety *et al.*⁵⁶ note that all include the following core components: (a) engagement and assessment; (b) coping enhancement; (c) developing a shared understanding of the experience of psychosis (ie, case formulation); (d) working on delusions and hallucinations, often using gentle challenging; (e) addressing mood and negative self-evaluations; and (f) managing the risk of relapse and social disability. A strong therapeutic alliance that supports the cognitive work is seen as the sine qua non of CBT.⁵⁷ Treatment of negative symptoms uses the same techniques as those employed for positive symptoms because the symptoms are conceptualized as negative self-beliefs.

Summary of Findings

Beck⁵⁸ reported a promising application of CBT with a psychotic individual in 1952, but the bulk of the early theoretical and empirical work on cognitive models of psychopathology developed in the context of depression and anxiety. Not until the late 1980s, did the systematic

application of CBT extend to schizophrenia with efforts initiated by researchers in England. Investigators began with small controlled trials,⁵⁹ which evolved to full randomized controlled trials (RCTs) comparing CBT to either treatment-as-usual (TAU)⁶⁰ and/or a supportive therapy/befriending condition⁶¹.

Some might be skeptical of the application of an intervention so heavily reliant on logical reasoning as CBT for this population. Nevertheless, over the past 15 years, data have been accruing to suggest that CBT can be used with persons with schizophrenia with good results. Wykes *et al.*⁶² conducted a recent meta-analysis of all RCTs comparing CBT to a control group that included a majority of persons with schizophrenia. Of the 34 studies included, most looked at chronic outpatient ($n = 25$) or acutely ill ($n = 7$) samples; the majority were conducted in the United Kingdom ($n = 25$), and used an individual ($n = 27$) rather than group ($n = 7$) format. Across studies, these researchers found the following weighted mean effect sizes for CBT’s impact on different symptom outcomes where n equals number of studies: positive symptoms ($d = -0.372$, $n = 32$), negative symptoms ($d = 0.437$, $n = 23$), community functioning ($d = 0.378$, $n = 15$), mood ($d = 0.363$, $n = 15$), hopelessness ($d = -0.190$, $n = 4$), and social anxiety ($d = 0.353$, $n = 2$). It is important to note that most studies ($n = 32$) provided data on positive symptoms, while fewer studies explored other outcomes.

The investigators also reported some interesting corollary findings. The studies conducted with the most rigor tended to have lower effect sizes. For example, studies with raters naive to experimental conditions had about half the average effect size than those that did not. Studies including more behavioral interventions had higher effect sizes, but whether the intervention was provided in a group or individual treatment format did not affect the magnitude of change. In a separate analysis on clinically significant change, Gaudiano⁶³ noted that 42% of the studies using CBT pre-post comparisons reported at least a 2 SD improvement on at least 1 measure, while only 14% of the control conditions met this criterion.

The findings on CBT indicate small to medium effect sizes on treatment of positive symptoms, negative symptoms, mood, and community functioning. Importantly, interpretation of this literature warrants consideration of blinding procedures for administration of symptom rating scales where subjective impression can impose bias. Still, the findings, in general, are positive and suggest that CBT is effective at reducing the severity of positive and negative symptoms as well as some aspects of community functioning and quality of life.

Cognitive Remediation

Interest in targeting the neurocognitive deficits of schizophrenia as a means to promote functional recovery stems

from 2 observations: (a) advances in the treatment of psychiatric symptoms, while noteworthy, have done little to improve functional recovery and (b) a vast literature now substantiates a relationship between neurocognition and community functioning.

Cognitive Dysfunction in Schizophrenia

Cognitive deficits are now recognized as a core feature of schizophrenia⁶⁴ and include deficits in attention, learning and memory, working memory, speed of processing, and reasoning and problem solving among others. The literature is replete with studies documenting the cognitive deficits associated with schizophrenia. It is estimated that 90% of persons with schizophrenia have clinically meaningful deficits in at least 1 cognitive domain and that 75% have deficits in at least 2.⁶⁵ Even these high rates may be underestimates of the actual prevalence. When considering estimated premorbid levels of cognitive functioning, it is likely that almost all schizophrenia patients are performing at a level below that expected of them in the absence of illness.⁶⁶

Relationship Between Neurocognition and Functional Recovery

Across studies, cognitive deficits show consistent relationships with community functioning, social problem-solving ability, and rehabilitation success. Green⁶⁷ and Green et al⁶⁸ in previous reviews identified learning and memory, attention, working memory, and reasoning and problem-solving abilities as individual cognitive domains yielding the strongest relationship with functional outcome. This relationship was particularly robust for learning and memory, showing links to all 3 functional outcome areas across numerous independent studies. The size of the relationships for learning and memory domains was medium to large, though even larger effects were found when multiple cognitive domains were considered (eg, explaining approximately 30% of the variance in outcome). The latest review⁶⁹ showed that these findings extend beyond cross-sectional relationships and are present in longitudinal studies as well. Hence, the neurocognitive impairments of schizophrenia showing links to key components of recovery are a logical treatment target.

Efforts to treat the cognitive deficits of schizophrenia or develop training approaches that attempt to compensate or bypass their effects on functioning have grown substantially over the past 20 years. The majority of these efforts can be characterized as either “cognition-enhancing” or “compensatory” approaches and are described in the following sections.

Cognition-Enhancing Approaches

Cognition-enhancing approaches aim to improve cognitive functioning through stimulation of impaired areas of

cognition, eg, memory. This approach grows out of a neuroplasticity model of brain development, referring to the brain’s lifelong capacity for physical and functional change,⁷⁰ and is supported by evidence from studies in adult, nonhuman primates that neural changes occur within the brain consequent to the intensity and frequency of sensory input.^{71–73} For example, in one study where monkeys were trained to detect a specific pattern of stimulation to the fingers, it was found that neural reorganization occurred within the somatosensory cortex in response to the specific pattern of sensory input.⁷⁴ In cognitive rehabilitation, it is believed that engaging in exercises that challenge particular neural processes will enhance those functions.

In schizophrenia, training is often conducted using computer-based programs,⁷⁵ though training can be performed with paper-and-pencil exercises as well. Training involves brief exercises designed to tap into the processes central to a particular cognitive function. The parameters of the training exercises can be manipulated by the trainer to make the task easier or harder so that the individual is provided a challenging but realistic goal (eg, maintaining performance accuracy at 85%–90%). “Dosing” or the number and length of training sessions over time varies considerably across studies but is typically lengthy and may extend up to 6 months with 1-hour sessions conducted 2–5 times per week.

As reported in previous reviews, the results from computer-based programs of cognitive remediation in schizophrenia have generally been encouraging for improving cognitive function.^{76–79} Significant pre-post training gains have been noted in attention, memory, problem-solving ability, and global cognition^{80–83} (see⁸⁴ for exception). Because the first priority of this approach is to improve cognition, fewer studies have extended study aims to examine generalization of training effects to social and work functioning. These are reviewed below.

Social Functioning. Improvements in social functioning have been noted in follow-up reports by Hogarty et al⁸¹ and Wykes et al⁸⁵ respective to their training programs, as well as a recent report using neuropsychological educational approach to remediation (NEAR^{86,87}). Hogarty’s cognitive enhancement therapy (CET) includes cognitive training plus group therapy. Following a building block approach, treatment begins with computer-based cognitive exercises that focus on attention, memory, and problem solving, which progressively increase in complexity throughout treatment. Additional group-based training exercises are then phased in that focus on various aspects of social cognition including formation of gistful messages, solving of real-life social dilemmas, and appraisal of affect and social contexts. In a 2-year randomized trial of CET,⁸¹ participants in the CET group received 75 hours of computerized cognitive training combined with 56 sessions (1.5 h/wk) of

group therapy aimed at improving social cognition and social functioning. At 1 year, CET showed improvements in neurocognition and marginal differences in cognitive style, social cognition, and social adjustment compared with a control group that received supportive therapy. At 2 years, CET showed significant training effects on neurocognition, social cognition, and social functioning.

Wykes *et al.*⁸⁸ found support for cognitive remediation therapy (CRT) at improving executive functioning and social functioning. The training program targets deficits in executive processes and consists of 3 modules: cognitive flexibility, working memory, and planning. In contrast to computer-based programs, CRT involves one-on-one instruction with a strong emphasis on teaching methods that incorporate procedural learning, principles of errorless learning, targeted reinforcement, and massed practice using paper-and-pencil exercises. Though the teaching methods of CRT use ones also used in compensatory approaches (eg, errorless learning), the aim here is to enhance an impaired area of cognition via these training procedures rather than improve a targeted skill by bypassing or compensating for them. In an RCT,⁸⁸ CRT was compared with a control group that received occupational therapy. Training was conducted 1 h/d, 3–5 d/wk, over 40 sessions. The CRT group showed differential improvement on measures of executive functioning. Interestingly, participants who met criteria for reaching a specified threshold for improvement in cognitive flexibility showed improvements in social functioning at a 3-month follow-up.

Hodge *et al.*⁸⁶ conducted a study using the NEAR approach in Australia. The teaching methods involved in NEAR are drawn from principles established in the educational psychology literature and promote intrinsic motivation and task engagement through computer-based cognitive exercises that are designed to be engaging and enjoyable for the user. In contrast to other computer-based cognitive remediation programs, NEAR uses a top-down teaching approach emphasizing higher order, strategy-based methods over drill-and-practice exercises that focus on learning more basic, elementary cognitive skills (bottom-up approach). Using a randomized waitlist control design, 40 individuals with schizophrenia received NEAR training in two 1-h sessions per week for 10–15 weeks. Improvements were noted in verbal and visual memory, sustained attention, and executive functioning that persisted 4 months after completion of training. Partial support was found for generalization as indicated by improvement in social and occupational functioning as measured using the Social and Occupational Function Scale but not other measures of community functioning, quality of life, self-esteem, or symptoms.

Work Functioning. Bell *et al.*⁸⁹ and McGurk *et al.*^{90,91} examined the effects of computer-based cognitive remediation training on work outcome in schizophrenia. Both

these RCTs included cognitive remediation training in conjunction with other treatments. The study of Bell *et al.* included a work support group that focused on work-related issues and a lifestyles group that focused on social concerns associated with new employment. The study of McGurk *et al.* included assessment, job search planning, remediative and compensatory cognitive strategies to address on-the-job performance difficulties, and consultation involving the supported employment specialist and cognition specialist. The 2 studies also differed in the type of work rehabilitation models used. The study of Bell *et al.* included a hybrid transitional and supported employment program; the study of McGurk *et al.* included supported employment following the evidence-based individual placement and support model.⁹² Despite methodological differences, work outcome data examining total number of hours worked and percent employed favored the group receiving cognitive remediation training in the context of other work rehabilitation treatments vs a comparison group during the studies' respective follow-up periods (12 mo for Bell *et al.*, up to 3 y for McGurk *et al.*).

In an interesting extension of computer-based cognitive remediation training, Lindenmeyer *et al.*⁹³ examined the efficacy of cognitive training in an inpatient setting. Participants were persons with a chart diagnosis of schizophrenia, schizoaffective disorder, or bipolar disorder who were randomly assigned to cognitive training or a control condition that involved using the computer. Participants in the cognitive training group received approximately 24 hours of computer-based cognitive exercises from COGPACK version 6.0 (2 h/wk over 12 wk). Participants in the cognitive training group also received group therapy 1 h/wk that focused on importance of cognitive skills, activities of daily living and work skills, and development of compensatory strategies for managing cognitive difficulties. The results revealed improvements in verbal learning, psychomotor speed, and an overall composite of cognition. In addition, participants who received cognitive training worked more hours at jobs within the hospital provided through a hospital work program than participants in the control group over a 12-month follow-up period.

Attributing training effects to cognitive training alone is not possible in many of these studies because training occurred with other rehabilitation treatments used to bridge cognitive gains to real-world problems. It is unclear whether some form of "talking" therapy is necessary or simply optimizes the translation of gains from computer and paper-and-pencil training exercises to real-world problems. Regardless, the few studies in this area are quite consistent in their findings. In a meta-analysis of 26 RCTs of cognitive remediation in schizophrenia, McGurk *et al.*⁷⁹ reported a medium effect size (0.41) for cognitive remediation training on cognitive performance, slightly lower levels for psychosocial

functioning (0.36), and a small effect size for symptoms (0.28). Interestingly, the effects of cognitive remediation training on psychosocial functioning were significantly greater in studies that included participation in adjunctive rehabilitation programs than those with cognitive remediation alone. Overall, these hybrid approaches seem consistent with a recovery model in that they integrate dimension specific treatments in an effort to improve multiple treatment targets (eg, cognition and work).

Compensatory Approaches

In contrast to cognition-enhancing approaches, compensatory approaches aim to bypass or “compensate” for cognitive impairments by devising training methods to emphasize recruitment of relatively intact cognitive processes or by establishing supports or prosthetic devices in the environment to promote functioning. In contrast to cognition-enhancing approaches, compensatory ones directly target functional deficits but with consideration of the cognitive impairments that may impede or restrict training success.

Compensatory approaches to cognitive remediation can be found in the work of Velligan et al and her work with cognitive adaptation training (CAT) and Kern et al with his work on errorless learning. Arguably, the work of Silverstein et al could also be classified within this approach given its close behavioral learning ties to errorless learning. Compensatory approaches are well suited to test the effects of training on recovery in that they are specifically designed to target real-world behaviors (eg, aspects of social and work functioning, independent living); however, little data exist.

Errorless Learning. Errorless learning has its origins in the early behavioral learning studies conducted by Terrace,^{94,95} though recognition should probably be given to earlier efforts by Skinner as well. In Terrace’s study of errorless discrimination training, pigeons were trained to learn a new discrimination task without committing any errors or at least very, very few (less than 1%). This rather remarkable feat was accomplished by modifying the stimulus features of the to-be-learned task. Training began with a 2-choice discrimination in which it was known which selection the pigeon would make (ie, pigeons will peck at a dark color but not a light one). By very gradually changing the stimulus features (eg, light intensity) of the to-be-trained target, the pigeons could learn a new discrimination and commit almost no errors. It should be noted that the training took considerable time and required hundreds of trials. Still, the results were impressive.

Most work and social situations do not allow the type of stimulus manipulations that Terrace conducted with pigeons. Rehabilitative applications of errorless learning are based on carrying the desired response through a se-

ries of incremental changes in task demands. New learning is guided by the execution and mastery of training exercises arranged hierarchically in difficulty. Learning is based on forming stimulus-response connections that are carried forward from simple to more complex exercises.^{96,97} The key principles underlying this approach are elimination of errors during learning and automation of response. The emphasis on error elimination is the cornerstone of this approach. Training stops at the occurrence of an error and procedures inserted to prevent future occurrence. Repetitive practice only occurs after establishing an error-free training curriculum. This procedure stands in marked contrast to the types of teaching methods used in most work or school settings that rely heavily on the conscious, effortful processing of new information and the integrity of explicit memory abilities. Such teaching methods assume that the ability to self-correct is intact. However, for persons with schizophrenia and traumatic brain injury, this process is often compromised. In errorless learning, the need to self-correct is bypassed, and processing burden is believed to predominantly shift from explicit to implicit memory processes.^{98,99}

According to Baddeley,⁹⁸ one of the crucial roles of explicit memory is to allow errors to be eradicated. This memory system allows individuals to recall the commission of an error, retrieve previously learned “correct” solutions or generate new alternative ones, and thus avoid making the same error again. In the absence of such abilities, previously committed errors will have a strong likelihood of being repeated again.¹⁰⁰ Implicit memory, in contrast to explicit memory, is influenced primarily by response strength. Factors that were present at the original occurrence of the response will trigger that same response if present later. Such behavior is strongly guided by the degree to which certain stimuli can elicit a given response. Procedures that are highly overlearned fall under this domain (eg, driving home from work).

Kern et al have applied errorless learning procedures primarily in laboratory-based studies but more recently have extended efforts to community settings. Errorless learning-associated improvements have been shown in studies of schizophrenia patients on selected outcome areas including entry-level job tasks, social problem-solving ability, and assigned job tasks at a community mental health setting offering part-time, time-limited work experience with gains maintained up to 3 months later without further intervention on selected targets.^{101–103} These studies have implemented training in individual and group formats with training lasting from 1 to 6 hours. For the study conducted at a community mental health setting, participants were randomly assigned to errorless learning or conventional instruction for training on their assigned job duties at a thrift-type clothing store. Results showed errorless learning training to be superior to conventional instruction on a measure

of work quality over the 12-week period participants worked at the thrift-type clothing store. Across studies, effect sizes using Cohen *d* have ranged from 0.75 immediately after training to 0.50 at 3-month follow-ups.

Cognitive Adaptation Training. CAT is a compensatory cognitive remediation program that uses in-home environmental supports (eg, alarms, signs, and checklists) and structure (eg, reorganizing placement of belongings) to facilitate independent living in the home environment. CAT has been used to improve medication and appointment adherence, grooming and hygiene, care of living space, and leisure and social activities. Treatment is individualized based on assessment of cognitive and behavioral functioning and the person's living environment. CAT strategies for promoting independent living focus on impairments in executive functioning that may lead to problems in initiating or inhibiting appropriate behaviors. Behavioral learning principles are used to cue appropriate behaviors, discourage distraction, and maintain goal-directed activity. Consideration is also given to impairments in attention, memory, and fine motor skills in designing and implementing training. Results from a series of randomized studies in schizophrenia samples show that CAT is effective at improving adherence to medication and community functioning, and decreasing rates of relapse.^{104,105} Improvements in medication adherence and community functioning have been large (Cohen *d* > 1.0).^{105,106}

Overall, the findings for compensatory approaches, like the ones using cognition-enhancing ones, are consistently positive though few in number. One interesting contrast between these 2 cognitive rehabilitation approaches is that compensatory approaches target specific behaviors with little, if any, expectation for generalization outside the trained-on behavior. In contrast, cognition-enhancing approaches target a range of cognitive abilities with the aim of improving a wide range of behaviors central for independent living and community functioning.

Social Cognition Training

Growing evidence indicates that impairments in the domain of social cognition are important, unique determinants of poor functional outcome in schizophrenia. These findings have generated considerable excitement about the possibility of targeting social cognitive abilities as a means of resolving functional disability. An emerging body of research suggests that social cognitive impairments are indeed amenable to a range of psychosocial interventions.

Definition and Functional Significance of Social Cognition

Social cognition is a multifaceted construct that refers to the mental operations underlying social interactions,

which include perceiving, interpreting, and generating responses to the intentions, dispositions, and emotions of others.^{107–109} It has been defined as “the ability to construct representations of the relations between oneself and others, and to use those representations flexibly to guide social behavior.”¹¹⁰ Schizophrenia patients show substantial deficits in several aspects of social cognition,¹¹¹ with impairments most frequently documented in the following 4 areas: (a) *affect perception*, such as perceiving facial and vocal expressions of emotion; (b) *social perception*, including the ability to judge social cues from contextual information and nonverbal communicative gestures; (c) *attributional style*, which refers to biases in how individuals characteristically explain the causes for positive and negative events in their lives (eg, personalizing bias, “jumping to conclusions”); and (d) *theory of mind*, the ability to understand that others have mental states that differ from one's own and the capacity to make correct inferences about the content of those mental states (eg, understanding false beliefs and hints).

There is a general consensus that social cognition is distinct from, though related to, basic neurocognition and other clinical features of schizophrenia.^{112–114} Furthermore, social cognition shows *unique* relationships to functional outcome, above and beyond basic neurocognition, and thus appears to have “added value” in explaining variance in community functioning.¹¹⁵ In addition, several studies indicate that social cognition mediates the relationship between basic neurocognition and functional outcome.^{116–119} Hence, social cognition appears to be more proximal to functional outcome than basic cognition, making it an attractive candidate for interventions that generalize to improvements in social functioning.

Modifiability of Social Cognitive Impairments

The modifiability of social cognitive impairments in schizophrenia is supported by 2 general types of studies.¹²⁰ First, several “broad treatment” studies have embedded social cognitive training exercises within multicomponent treatment packages aimed at improving multiple treatment targets. These studies are often grounded in basic neurocognitive remediation, with additional training components designed to help generalize the benefits of improved neurocognition to different aspects of functioning and/or psychopathology. Several such studies that included training in the area of social cognition have demonstrated improvements in psychosocial functioning or on specialized measures of social cognition.^{80,81,121–123}

The second type of study refers to “targeted treatment” studies that specifically employ social cognitive training, without other intervention components, to target performance on measures of social cognition. The feasibility of conducting this type of research is supported by several

small “proof concept studies” that used brief experimental manipulations to evaluate malleability of performance on social cognitive tests. For example, performance on facial affect recognition or theory of mind tests has been enhanced through brief (eg, an hour or less) intervention probes such as attentional manipulations, facial mimicry, or practice with commercially available computerized training exercises.^{124–129}

These studies set the stage for a series of longer term treatment studies, primarily of inpatients, that have used a variety of training methods to improve performance on social cognitive tests. Some studies have targeted a single social cognitive domain.^{130,131} For example, Wolwer and colleagues developed the 12-session training in affect recognition (TAR) program to remediate facial emotion perception deficits in schizophrenia. The training, which is administered to pairs of patients at a time, uses specially developed computerized facial emotion perception training exercises as well as a set of pictures of emotional faces for use in interactive exercises. Following an encouraging initial uncontrolled feasibility study,¹³² this research group¹³⁰ studied 77 inpatients who were randomized to 1 of 3 conditions: (a) TAR, (b) a time-matched neurocognitive remediation targeting attention, memory, and executive functioning, or (c) TAU, which enabled the authors to assess the specificity of treatment effects. Results suggested (but were not fully supportive of) a double dissociation; the TAR group showed improved facial affect perception (and verbal working memory) but not improved verbal learning and long-term memory. In contrast, the neurocognitive remediation group showed improved verbal learning and long-term memory but not affect perception. These findings suggest that standard neurocognitive training alone is neither necessary nor sufficient to improve facial emotion perception.

Other targeted treatment studies have attempted to address multiple social cognitive domains.^{131,133–135} For example, Penn et al¹³³ in the United States developed another targeted treatment, social cognitive and interpersonal training (SCIT). This is a 3-phase, 18-session intervention that addresses emotion perception, attributional bias, and theory of mind in a small group (6–8 patients) format. Phase 1 focuses on defining basic emotions and linking them to facial expressions through the use of a commercially available software program. The second phase focuses on identifying and modifying interpersonal attributions (eg, avoiding “jumping to conclusions” and making hostile attributions based on insufficient evidence) and improving theory of mind skills (eg, distinguishing “facts” about social contexts from “guesses” about what others are thinking and feeling). The final phase involves integrating and generalizing these skills by applying them to increasingly realistic social situations. The authors developed a set of still photos and video clips of social interactions as well as a series of en-

gaging training exercises, such as playing a modified version of “20 questions” to analyze social situations. Two uncontrolled studies of SCIT in inpatients with psychotic disorders demonstrated significant, medium to large improvements in the 3 targeted domains of social cognition.^{136,137} Notably, one of these studies found that forensic inpatients who received SCIT reported greater improvements in their social networks and fewer aggressive incidents on the treatment ward than subjects receiving TAU, supporting the functional relevance of this intervention.

Because social cognitive interventions will most likely benefit stabilized patients who are living in the community, demonstrating their efficacy in community-dwelling outpatients is of particular importance. Two recent studies of outpatients provide encouraging initial support for benefits in this population. In a quasi-experimental study, Roberts and Penn¹³⁸ evaluated 31 outpatients who received either SCIT plus TAU or TAU only (without random assignment to condition). The SCIT group showed significant medium improvements in the area of facial affect perception, as well as improved performance on a role-play measure of social competence.

Using a randomized controlled design, Horan et al¹³⁵ tested whether 31 outpatients who received an integrative 12-session social cognitive skills training intervention demonstrated greater improvements in social cognition than controls who received traditional symptom management skills training. This program uses a highly structured skills training-based approach that grows out of psychiatric rehabilitation methods¹⁷ to target 4 aspects of social cognition, including affect perception, social perception, attributional style, and theory of mind. It combines successful elements from the TAR and SCIT programs^{130,133} with a variety of novel training exercises and materials that go beyond the content of these programs to address social perception (eg, nonverbal cue recognition) and particular aspects of theory of mind, including training in identifying various forms of sarcasm and deception. The social cognition group demonstrated a large, significant improvement in facial affect perception, which was not present in the control group. Furthermore, this improvement was independent of changes in basic neurocognitive functioning or symptoms. In conjunction with findings from Roberts and Penn, results support the feasibility and efficacy of applying a targeted treatment approach to stabilized patients in the community.

Although psychosocial treatment of social cognitive deficits in schizophrenia is currently in its infancy, the initial efficacy results are encouraging. Using a variety of treatment approaches, existing studies indicate that individuals with schizophrenia are capable of improving their performance on tasks measuring a range of social cognitive processes (particularly affect perception) that have been linked to successful social functioning. Thus, continued development of interventions for social cognitive

deficits appears to be worth pursuing in efforts to promote functional recovery.

Interaction of Psychopharmacology With Psychosocial Treatments

We would be remiss without addressing the essential contribution of pharmacological treatment in enabling persons with schizophrenia to more fully benefit from participation in psychosocial treatment programs. Antipsychotic medications are effective for attenuating or eliminating psychotic symptoms in acutely psychotic patients with schizophrenia (and other related psychotic illnesses) and preventing relapse in individuals who are stable. In showing the importance of continued, ongoing antipsychotic medication treatment, a typical study design compares the risk of psychotic relapse between patients who continue to take an antipsychotic and those who stop medications or are changed to a placebo. These studies demonstrate that those who remain on an antipsychotic have substantially lower risk of relapse.¹³⁹ The magnitude of the effect was demonstrated in a meta-analysis which showed that approximately 72% of patients will relapse in a year on a placebo compared with only 23% on an antipsychotic.¹⁴⁰ These effects on stable patients are most relevant to psychosocial rehabilitation because there is a substantial evidence base indicating that psychotic symptoms can interfere with participation in psychosocial programs. For example, studies have found that patients with schizophrenia who are not treated with antipsychotic medications can actually worsen when they were stressed with psychosocial treatments.¹⁴¹ Another study found that guaranteeing drug delivery with a long-acting antipsychotic improved the outcomes of psychosocial treatments.¹⁴²

Other studies indicate that the interactions between antipsychotic medications and psychosocial treatments can be more complex. Marder *et al.*²⁷ followed patients who were randomized to receive 2 pharmacological strategies as well as behavioral skills training and a control psychosocial condition. The more effective pharmacological treatment improved relapse rates but did not affect social adjustment. However, patients who received the more effective pharmacological treatment and behavioral skills training had the greatest improvements in social adjustment. In a subsequent study, this same group found that patients who experienced akathisia as a medication side effect were less likely to show improvements in social adjustment.¹⁴³ These findings indicate that the effects of medications are confined to controlling psychosis, and there is no evidence that drugs independently improve functioning. On the other hand, drug side effects may have negative effects on social functioning, perhaps due to medication side effects.

Other studies reinforce the notion that better symptom control affects participation in psychosocial treatments.

Rosenheck *et al.*¹⁴⁴ monitored the use of different levels of psychosocial treatments and rehabilitation in patients assigned to a comparison of clozapine or haloperidol. Patients receiving clozapine were more likely to utilize higher levels of psychosocial treatment. Moreover, the use of these higher levels was associated with greater improvements in quality of life. This suggests that patients who experience more improvement in symptoms on a better pharmacotherapy have a greater potential to benefit from psychosocial interventions. It also suggests that one of the long-term goals of pharmacotherapy is to facilitate participation in psychosocial treatments. This is a goal that extends beyond just sustaining a remission.

New Pharmacological Approaches

It is not surprising that antipsychotic medications do not appear to have direct effects on functional recovery. This group of drugs appears to attenuate the severity of psychotic symptoms and has little effect on symptom domains such as negative symptoms and cognitive impairment that are more related to functioning.^{67,145} An appreciation of this limitation has led to a search for drugs with more robust effects on these other domains. Most of the current drug development activities have focused on drugs to improve cognition. This has been aided by an initiative from the National Institute of Mental Health (NIMH) known as Measurement and Treatment Research to Improve Cognition in Schizophrenia (www.matrics.ucla.edu). This collaboration among academia, industry, and government led to the development of a consensus battery for measuring cognition in clinical trials; an NIMH-Food and Drug Administration (FDA) consensus on trial design; advice from FDA regarding a path to drug approval; and recommendations for promising molecular targets. A number of drugs are currently in different stages of development. The hope is that these agents could directly improve functioning by improving cognition. Alternatively, a cognition-enhancing drug could improve functioning by improving an individual's ability to participate in psychosocial treatments such as social skills training, CBT, cognitive remediation, or social cognition training.

Conclusions

In this article, we reviewed 4 psychosocial treatments for schizophrenia with differing histories. Social skills training is a well-established behavioral treatment that is effective at improving the knowledge base and skills of persons with schizophrenia in clinic teaching settings. Generalization to community functioning is also evident when efforts have been used to bridge skills taught in the clinic classroom to specific community activities. The ties to relapse prevention are equivocal. CBT is effective at reducing positive and negative symptoms, and there are a number of

independent studies that have shown improvements in mood and community functioning as well, perhaps providing suggestive evidence that improvement in the ability to cope with symptoms can lead to improvements in quality of life and community behavior. Cognitive remediation is a somewhat newer enterprise that is an outgrowth of the treatment efforts with persons with traumatic brain injury. There are far fewer studies relevant to testing effects on recovery with this approach; however, those available are promising for both cognition-enhancing and compensatory approaches. Social cognition training is the newest approach. It has a sound conceptual basis with support from studies that have shown measures of social cognition to be mediators of the relationship between neurocognition and community functioning. The few studies in this area are innovative, and the results thus far are promising.

We began by addressing the importance of introducing efforts to improve “recovery” as an aim. To date, most studies in this literature target components of functional recovery. All reviewed have merit but are seldom used in conjunction with one another. If traction is to be made at facilitating recovery in persons with schizophrenia, a greater number of studies need to evaluate the effects of combined treatment approaches. It is clearly evident from this review that no one psychosocial treatment leads to improvement in all components of recovery as measured using formal definitions that require evidence of prolonged symptom stability, freedom from relapse, normalized work and social functioning, and independent living. Social skills training would appear to be a logical starting point for planning such efforts with adjunctive treatments added to address other components of recovery. Such efforts are obviously expensive in cost and time given the number of resources needed to carry them out and the length of time needed to measure recovery. Unfortunately, without such efforts, we are left examining the effects of individual psychosocial treatments on selected areas of functioning that fall somewhat short of recovery definitions.

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