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## Reducing Negative Symptoms in Schizophrenia: Feasibility and Acceptability of a Combined Cognitive-Behavioral Social Skills Training and Compensatory Cognitive Training Intervention

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### Abstract

The current study examined the feasibility and acceptability of an integrated Cognitive-Behavioral Social Skills Training and Compensatory Cognitive Training (CBSST-CCT) intervention compared with Goal-Focused Supportive Contact (SC) in a pilot randomized controlled trial for people with schizophrenia with high negative symptom severity. The sample included 55 participants from five community settings; masters-level study clinicians delivered interventions on-site. Participants completed assessments of cognitive, functional, and psychiatric symptoms at

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Zanjbeel Mahmood contributed to conceptualization, data curation, and wrote sections of the original draft. Ryan Van Patten contributed to the conceptualization, formal analyses, and wrote sections of the original draft. Amber Keller assisted with writing the original draft. Hannah Lykins assisted with writing the original draft. Dimitri Perivoliotis assisted with project administration and reviewing/editing the manuscript. Eric Granholm contributed to conceptualization, methodology, investigation, resources, writing (review and editing), supervision, project administration, and funding acquisition. Elizabeth Twamley contributed to conceptualization, methodology, investigation, resources, writing (review and editing), supervision, project administration, and funding acquisition.

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Conflict of interest

Dr. Granholm has an equity interest in Granholm Consulting, Inc., a company that may potentially benefit from the research results as he receives income from the company for CBSST workshops and consulting. The terms of this arrangement have been reviewed and approved by the University of California, San Diego in accordance with its conflict of interest policies.

baseline, mid-treatment, post-treatment (12.5 weeks), and 6-month follow-up. Enrollment goals were not initially met, necessitating the addition of a fifth site; however, all groups and assessments were completed on-site. Study procedures were acceptable, as evidenced by 100% enrollment and completion of baseline assessments following informed consent; however, over 1/3<sup>rd</sup> of participants dropped out. No modifications were necessary to the intervention procedures and CBSST-CCT fidelity ratings were acceptable. The intervention was deemed acceptable among participants who attended 1 session, as evidenced by similar attendance rates in CBSST-CCT compared to SC. Among CBSST-CCT participants, lower positive symptoms were significantly associated with better attendance. Overall, we found mixed evidence for the feasibility and acceptability of the CBSST-CCT protocol in people with schizophrenia with high negative symptoms. Challenges are highlighted and recommendations for future investigations are provided.

## Keywords

psychosis; severe mental illness; cognitive rehabilitation; psychosocial intervention

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## 1. Introduction

Schizophrenia affects more than 3 million Americans, costs more than \$155 billion annually, and leads to profound deficits in everyday functioning (Cloutier et al., 2016). Negative symptoms such as amotivation, anhedonia, and blunted affect are highly prevalent (Bobes et al., 2010; Galderisi et al., 2013) and remain an unmet treatment need in many patients due to their link to poor functioning (Fenton and Mcglashan, 1991; Rabinowitz et al., 2012; Ventura et al., 2015, 2009) and quality of life (Meltzer et al., 1990; Narvaez et al., 2008; Norman et al., 2000; Wegener et al., 2005), combined with an unresponsiveness to pharmacological treatments (Buckley and Stahl, 2007; Mucci et al., 2017). As such, the NIMH-MATRICES Consensus Statement on Negative Symptoms (Kirkpatrick et al., 2006) emphasized the need to develop and test treatments for negative symptoms. Similarly, cognitive impairment is common in schizophrenia (Gonzalez-Pablos et al., 2019; Schaefer et al., 2013; Thompson et al., 2013) and is closely tied to negative symptoms and functional deficits (Green et al., 2004; Keefe and Harvey, 2012). Accordingly, the NIMH-MATRICES initiative highlights the need for treatments of cognitive impairment to improve daily functioning (Marder and Fenton, 2004).

The overall evidence regarding the efficacy of psychosocial treatments for negative symptoms of schizophrenia is limited as most trials have not specifically targeted negative symptoms (Jauhar et al., 2014; Velthorst et al., 2015). An emerging evidence-base focused on the target population (i.e., individuals with significant negative symptoms) supports the feasibility and acceptability of behavioral treatments, such as Cognitive Behavioral Therapy (CBT) and cognitive remediation, for negative symptoms (Choi et al., 2016; Farvod et al., 2019; Li et al., 2019; Mueller et al., 2017). A recent meta-analysis found small-to-moderate effects of these behavioral interventions on negative symptoms (Riehle et al., 2020), underscoring the need for further development of high-quality trials.

A potential method for boosting CBT effects on negative symptoms would be to pair CBT with a complementary intervention such as Social Skills Training (SST; Bellack, 2004), which may reduce negative symptoms (Turner et al., 2017), and it is possible that the bundling of interventions can have a stronger, synergistic impact. Cognitive-Behavioral Social Skills Training (CBSST) and Compensatory Cognitive Training (CCT) are two interventions that have shown promise for treating negative symptoms and cognitive functioning (Granholm et al., 2002, 2005, 2007, 2013, 2014, 2018; Mahmood et al., 2018, 2020; McQuaid et al., 2000; Mendella et al., 2015; Twamley et al., 2012, 2019). CBSST integrates two evidence-based treatments for schizophrenia (CBT and SST) and has demonstrated clinically significant effect sizes in reducing negative symptoms (diminished motivation;  $d=.22$  at post-treatment,  $d=.72$  at follow up; Granholm et al., 2014). Clinically significant effect size improvements in negative symptom severity have also been demonstrated with CCT ( $d=.92$  at post-treatment,  $d=.43$  at follow-up), which uses compensatory strategy training and habit learning to improve cognition and everyday functioning (Twamley et al., 2012). Notably, both CBSST and CCT are highly driven by participants' recovery goals and some evidence suggests that both CBT and cognitive remediation improve negative symptoms to a comparable degree (Riehle et al., 2020). Another trial examined CBT paired with restorative cognitive training in comparison to a) pure CBT and b) an active control group (Kukla et al., 2018). Although the authors did not target negative symptoms specifically, they did report differential improvements in the CBT + cognitive training group in work and neuropsychological outcomes. Neither CBSST nor CCT has been used to target negative symptoms as the primary outcome; however, both approaches reduce negative symptoms, have demonstrated feasibility and acceptability (Granholm et al., 2005, 2013; Mendella et al., 2015; Twamley et al., 2012, 2017), and are likely to have different mechanisms of action, thereby allowing for additive or synergistic treatment effects.

Given the heterogeneity of symptom presentation in schizophrenia, it is unlikely that a single intervention will work equally well for all patients. The CBT components of CBSST are used to target defeatist attitudes (e.g., "Why try, I'll just fail again"), which have been linked to negative symptoms (Avery et al., 2009; Campellone et al., 2016; Grant and Beck, 2009; Horan et al., 2010; Rector et al., 2005), and the SST components promote social engagement and behavioral activation. CCT may also reduce defeatist attitudes and promote self-efficacy as participants learn that they can acquire new skills and succeed at tasks. Additionally, CCT may help participants learn and remember the CBSST skills. Research also demonstrates stronger effects of cognitive remediation interventions within a psychosocial rehabilitation context (Wykes et al., 2011) such as CBSST provides. Therefore, a combined CBSST-CCT approach may lead to greater reductions in negative symptoms than have been reported in prior psychosocial intervention trials.

We conducted a pilot randomized controlled trial of an integrated CBSST-CCT intervention compared with Goal-Focused Supportive Contact (SC) to target negative symptoms within a high-negative-symptom sample. Two novel intervention features - i.e., treatment in community environments (e.g., board-and-care homes, clubhouses) and use of masters-level clinicians - were expected to (1) improve session attendance in participants with high negative symptoms (e.g., amotivation) by bringing the intervention to a highly convenient

place, (2) improve the transfer of new skills to the natural environment, and (3) increase the likelihood of intervention uptake in typical community mental health settings, which often rely on group treatments and masters-level clinicians. As such, the purpose of the current study is to report on the feasibility and acceptability of the trial procedures and the CBSST-CCT intervention. Evidence for feasibility and acceptability is particularly important in interventions for people with schizophrenia and high negative symptom severity, as amotivation and defeatist attitudes have the potential to interfere with study participation. Feasibility markers for the current study were those indicating that procedures could be completed, whereas acceptability markers were those indicating that participants would complete them. We hypothesized that 64 participants at four community sites would be enrolled in the trial, and at least 80% would complete the trial. Because the current study represents a pilot RCT, examining initial feasibility/acceptability of the intervention in order to inform future studies, we sought a sample size of 64 in order to achieve statistical power of .80 to detect a Cohen's *d* effect size of at least 0.5. Additionally, predictors of treatment session attendance were explored. Primary outcome results from the current study will be described in a separate paper.

## 2. Methods

### 2.1 Participant characteristics

Study procedures were approved by the University of California San Diego Institutional Review Board (Clinical Trial registration number [NCT02170051](#)); all participants provided written informed consent after being informed that all sessions would be conducted in a group format. Participants were paid \$30 for participating in each assessment and they were given a \$20 bonus payment for completing all four assessments (\$140 maximum). They were not paid for attending treatment sessions.

The sample included 55 participants (see Table 1 for demographic and clinical characteristics). Inclusion criteria were: (1) ability to provide voluntary informed consent, (2) Age 18 to 65, (3) DSM-IV diagnosis of schizophrenia or schizoaffective disorder based on Structured Clinical Interview for DSM-IV (First et al., 2002), (4) Moderate-to-severe negative symptoms on the Clinical Assessment Interview for Negative Symptoms (CAINS; total score >19; (Kring et al., 2013), (5) 6th grade reading level on the WRAT-4 Reading subtest, and (6) Stable on psychiatric medications for the past three months. Exclusion criteria were: (1) Prior CBT, SST, or CCT in the past 5 years, (2) Severe depression on the Calgary Depression Scale for Schizophrenia (CDSS >8), (3) Ocular damage/disease/surgery/medications that affect pupil dilation, (4) DSM-IV alcohol or substance dependence diagnosis in past 6 months, and (5) Level of care required precluded outpatient therapy (e.g., hospitalized; severe medical illness). The CONSORT diagram is presented in Figure 1.2.1

### 2.2 CBSST-CCT

The CBSST-CCT intervention involved 25 twice-weekly 1-hour sessions (12.5 weeks total duration) of manualized group treatment. Table 2 details the integration of CBSST and CCT by content area. Briefly, CBSST (Granholm et al., 2016) was modified to strengthen its impact on negative symptoms as follows: (1) more extensive focus on challenging defeatist

beliefs; (2) on-site therapy model and motivational interviewing techniques (e.g., using decisional balance sheets to facilitate discussion of the pros and cons of coming to group or working on goals); (3) more extensive targeting of affect expression and recognition in behavioral role plays in the SST module; and (4) inclusion of behavioral activation activities (e.g., scheduling pleasant activities; behavioral day scheduling) to the problem solving module. The three CBSST modules (i.e., cognitive skills, social skills, and problem-solving skills) were retained in their original order; however, an additional introductory module on cognitive training was added to the protocol. The purpose of beginning the intervention with this module was to introduce CCT strategies to bolster impaired functions in prospective memory, attention, and learning and memory, thereby enhancing attention to CBSST content, learning of content, and memory for content. CCT content was also integrated within the social skills module (conversational attention strategies) and problem-solving skills module (cognitive flexibility and planning strategies).

### 2.3 Goal-focused supportive contact (SC)

SC was used as a robust control condition, providing the same frequency and amount of contact with therapists and other group members as CBSST-CCT. The primary focus of the SC intervention was to help participants set and achieve recovery goals (e.g., living, learning, working, and socializing) to enhance motivation for treatment and reduce dropout in this population with high negative symptoms. Sessions were semi-structured and consisted of checkins about symptoms and potential crisis management, followed by a flexible discussion about setting and working toward recovery goals, with minimal therapist guidance. Sessions typically included therapist empathy and non-directive reinforcement of goal setting and planning to achieve goals. In order to ensure that SC did not overlap with CBSST-CCT, no specific training was provided in cognitive-behavioral coping strategies, social skills, problem solving, or cognitive strategies.

### 2.4 Therapists

The CBSST-CCT and SC interventions were delivered by two grant-funded masters-level clinicians in five community settings (a large board and care facility, a clubhouse, and three San Diego County-funded outpatient biopsychosocial rehabilitation mental health clinics). All CBSST and SC groups had two co-therapists and the same therapists delivered both interventions. Three therapists participated in the trial (two had master's degrees in counseling and one had a master's degree in psychology; all were unlicensed). One therapist co-facilitated groups at all five sites; another therapist co-facilitated the interventions at the first two locations, but had to leave the position due to family care responsibilities; and the third therapist co-facilitated at the last three locations. Following a one-day training workshop, the therapists received weekly supervision from authors EG and EWT.

### 2.5 Assessment protocol

Participants completed a 3-hour comprehensive assessment battery including diagnostic assessment, measures of neurocognitive and functional performance, psychiatric symptom severity, and pupillometry at baseline, mid-treatment, post-treatment, and 6-month follow-up (see Table 3 for a detailed list of measures and assessment timeline). Examiners

administering the assessment battery were trained to a high degree of interrater reliability (.80 or higher) and were blinded to randomization status.

### 3. Results

#### 3.1 Feasibility of study procedures

We operationalized feasibility of study procedures as the degree to which enrollment goals were met for each site and the ability to complete all assessments and groups on-site. Our initial target enrollment goal was 16 participants at each of four sites (a board and care facility, a clubhouse, and two outpatient biopsychosocial rehabilitation mental health clinics); we did not meet this target for any of the four sites, necessitating the addition of a fifth site (an additional San Diego County-funded outpatient mental health clinic). However, in support of feasibility, the providers who referred participants to the study understood the need for high negative symptom severity participants and most referred participants (86%) did indeed meet criteria for high negative symptom severity. All assessments and groups took place at the five sites, although study therapists reported space shortages and excessive noise at the board and care facility. Participants did not differ by site in terms of demographic characteristics. Overall, our findings provide mixed support for the feasibility of the study procedures.

#### 3.2 Acceptability of study procedures

We defined acceptability of study procedures as a) the proportion of participants who elected to enroll in the study following consent procedures, b) the proportion of enrolled participants who completed baseline assessment procedures, and c) the number of participants who dropped out of the study across both intervention groups (defined as participants missing both post-treatment and follow-up assessments). All participants who met inclusion/exclusion criteria agreed to consent to the study (100% consent rate), and 100% of consented participants (55/55) completed baseline assessments. A similar proportion of participants dropped out of the study across both intervention groups (see Figure 1; dropout rate across both groups was 23/55; 41.8%). Overall, individuals who participated in the informed consent process enrolled in the study and completed their baseline assessments; however, a substantial subset of those participants did not complete the entire treatment protocol due to a variety of reasons, the most common of which was an unwillingness to participate in group treatment (see Figure 1). Out of the 220 possible assessment sessions, 148 (67.3%) were attended.

#### 3.3 Feasibility and acceptability of the CBSST-CCT intervention

We defined intervention feasibility and acceptability as a) the degree to which the CBSST-CCT groups were delivered as planned at each of the five study locations, b) CBSST-CCT fidelity ratings, and c) treatment session attendance in CBSST-CCT compared to SC. No modifications to the CBSST-CCT manual, session length, or group duration were necessary, study costs met a priori expectations, and study therapists delivered 100% of sessions at all five sites. With regard to fidelity ratings, all CBSST-CCT and SC sessions were audio recorded, and a random 20% of the sessions were selected for fidelity rating by author DP, who was not involved with therapist supervision or assessment procedures. Fidelity was

assessed with a measure adapted from the Cognitive Therapy Scale for Psychosis (CTS-Psy) (Haddock, Gillian, 2001) and the Social Skills Training Fidelity Scale (Bellack, 2004), and modified to include items specifically related to CCT and CBSST content, including maintaining focus on participants' goals. Fidelity ratings for CBSST-CCT ranged from 73% to 82% across the five settings ( $M=77\%$ ). A score of 50% or more on the CTS-Psy has been viewed as indicating fidelity to cognitive behavior therapy for psychosis (Turkington et al., 2002). Fidelity ratings for SC ranged from 7% to 10% ( $M=9\%$ ), indicating that the treatments delivered in the two conditions were sufficiently distinct, as intended. Overall, CBSST-CCT was feasible to deliver as planned, with good fidelity.

Attendance did not differ by group assignment; CBSST-CCT participants attended 42.9% ( $SD=31.0\%$ ) of sessions, whereas SC participants attended 54.9% ( $SD=32.9\%$ ) of sessions,  $t(41)=1.23$ ,  $p=.22$ . There were also no significant differences in attendance rates based on participant characteristics such as sex  $t(41)=1.23$ ,  $p=.23$ , race (white vs non-white;  $t(41)=1.50$ ,  $p=.14$ ), and ethnicity (Hispanic vs non-Hispanic;  $t(41)=0.16$ ,  $p=.88$ ). Among study completers (those who completed 3 assessments), attendance rates were 56.5% in CBSST-CCT and 68% in SC,  $t(30)=1.29$ ,  $p=.21$ . Duration of illness did not differ in study completers compared to non-completers,  $t(50)=0.35$ ,  $p=.73$ .

Within each treatment group, Pearson and point biserial correlations were conducted to explore predictors of session attendance for participants who attended at least one treatment session ( $n=43$ ). Less severe positive symptoms at baseline were associated with greater session attendance within the CBSST-CCT group ( $r=-.48$ ,  $p=.029$ ), whereas less severe depressive symptoms were associated with greater session attendance within the SC group ( $r=-.43$ ,  $p=.048$ ). No other significant associations were found (see Table 4 for correlation coefficients).

#### 4. Discussion

The goals of the integrated CBSST-CCT intervention are to facilitate recovery goal attainment by improving cognition and skill learning, decreasing severity of defeatist beliefs, and strengthening the impact of CBSST and CCT on negative symptoms (particularly amotivation and asociality). The current study specifically aimed to examine the feasibility and acceptability of this novel CBSST-CCT intervention in comparison to a Goal-Focused SC control condition in the context of a pilot randomized controlled trial conducted in individuals with schizophrenia and high negative symptom severity. Due to the difficulty in facilitating engagement and participation in the current study population, findings may inform planning (e.g., target sample size) and design (e.g., choice of real-world environments) of future RCTs in negative symptom-enriched samples.

Overall, our results provide mixed evidence regarding the feasibility and acceptability of study procedures and the CBSST-CCT intervention and highlight some of the challenges associated with conducting research in people with schizophrenia with high levels of negative symptoms. For example, we added a fifth community site due to failure to meet initial enrollment goals; however, 100% of those who participated in the informed consent process elected to enroll. Noise and space challenges occurred during interventions in the



board and care setting, underscoring the need to strategize logistics and board and care operator buy-in prior to study procedures. These issues did not occur at the mental health clinics and clubhouse.

Across groups, 41.8% of participants dropped out of the study; the most common reason provided for dropout was a lack of desire to participate in group treatment. A systematic review evaluating studies that assessed the impact of psychosocial interventions on negative symptoms of schizophrenia reported that over three-quarters of the papers reviewed had dropout rates less than 20% (Elis et al., 2013). However, dropout was inconsistently defined across studies. Moreover, the interventions were not specifically designed to treat negative symptoms, with one exception (Klingberg et al., 2011), and only two required the presence of moderate negative symptom severity or higher for study enrollment (e.g., Grant et al., 2012; Klingberg et al., 2011). Consequently, the high severity of negative symptoms in the current study sample is unique, and this may partially explain our dropout rate. Importantly, several other randomized controlled trials in schizophrenia have reported similar dropout rates to the current study (46% in Granholm et al., 2014; 35% in Grant et al., 2012; 32% in Rector et al., 2003; 32% in Valmaggia et al., 2005), although treatments and follow-up periods were longer in these studies compared to the current study. With regard to community-based mental health settings specifically, Carrion and colleagues (1993) found that forgetting appointments, needing to work, and transportation-related difficulties most impacted retention rates in a study of outpatients with schizophrenia. It is possible that suboptimal public transportation also contributed to our dropout rate, given evidence for better session attendance in prior CBSST trials when transportation was provided (Granholm et al., 2013), compared to when it was not (Granholm et al., 2014). Overall, our rates of dropout and attendance align with high rates of nonadherence (17–64%) found in general community mental health clinic populations, including patients with psychosis (Cullen 2018; Dworkin et al., 1986; Üçok et al., 2007).

Session attendance did not differ statistically between CBSST-CCT (42.9% [31.0%]) and SC (54.9% [32.9%]), but this could have been due to a lack of power, as participants in the SC group attended an average of three more sessions (13.7/25) than did participants in the CBSST-CCT group (10.7/25). To the extent that this difference is clinically meaningful, it is not clear why attendance would be lower in CBSST-CCT participants. It is possible that greater cognitive demand in the CBSST-CCT group relative to the SC group influenced attendance rates.

Future studies of interventions for individuals with schizophrenia and elevated negative symptoms may benefit from including tasks measuring reward processing deficits as they relate to motivational impairments, intervention adherence, and study retention (Strauss et al., 2014). In addition to linking intervention strategies to personal goals, it is possible that motivational interviewing techniques could be used to boost treatment adherence (Rüsch & Corrigan, 2002; Steinberg et al., 2004). Future community-based intervention studies in people with schizophrenia may also enhance retention by taking financial and transportation barriers into consideration (Carrion et al., 1993).

We were able to deliver all sessions of CBSST-CCT as planned with high fidelity, lending support for the use of masters-level clinicians in such treatments, which could result in more accessible care in this population. Exploratory analyses determined that less severe positive symptoms and depressive symptoms at baseline were associated with higher treatment session attendance in CBSST-CCT and SC, respectively, with moderate to large effect sizes ( $r = -.48$  and  $-.43$ , respectively). These results are consistent with those of prior studies (Nosé et al., 2003); but see also (Ruggeri et al., 2007). Concurrently targeting these psychiatric symptoms in future negative symptom trials may lead to direct health benefits, as well as treatment-associated improvements in outcomes via improved treatment adherence. Although it may appear surprising that negative symptoms did not correlate with session attendance, low variability in negative symptom severity in this sample (CAINS total score >19) may have artificially attenuated the relationship with session attendance.

In summary, our findings reflect the challenges of retaining participants and providing interventions to people with schizophrenia and severe negative symptoms in the community. Dropout rates may be minimized in future research by individualizing treatment and by using motivational interviewing techniques or other incentives. Overall, our preliminary results still provide some support for the feasibility and acceptability of the CBSST-CCT intervention itself, which may be integrated into existing services and delivered by masters-level providers. If the CBSST-CCT trial leads to positive outcomes, it could pave the way for a transformation in treatment of negative symptoms in schizophrenia. Due to the unmet need for negative symptom treatments and the potential for CBSST-CCT to reduce negative symptoms and improve everyday functioning in individuals with schizophrenia, future research implementing CBSST-CCT on a larger scale may be warranted.

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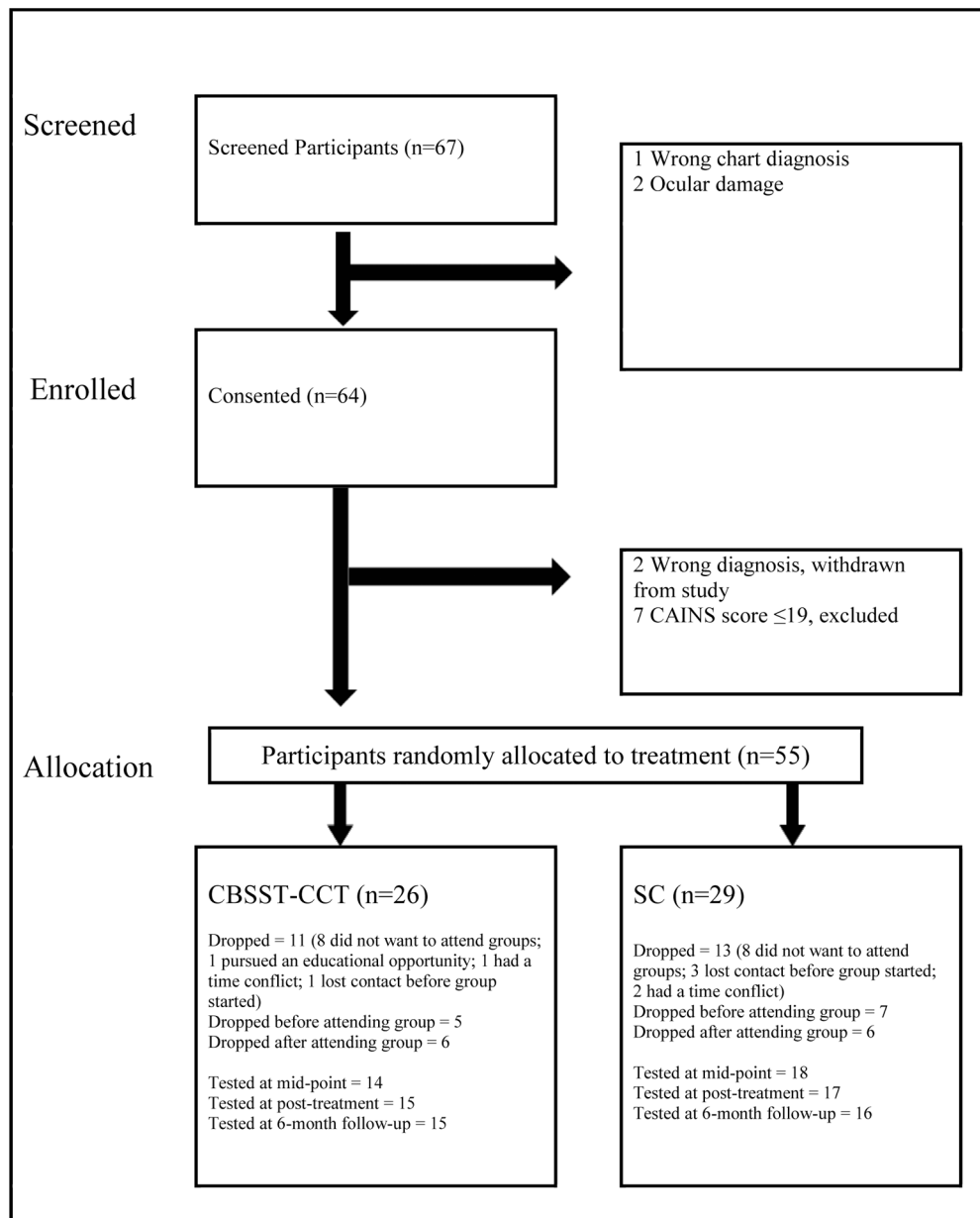
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### Highlights

- New treatments are needed for the disabling negative symptoms of schizophrenia
- We report on a pilot trial of CBSST-CCT, a new treatment for negative symptoms
- CBSST-CCT was able to be delivered at community sites by masters-level clinicians
- Study dropout rates were high, but CBSST-CCT adherence did not differ from controls
- Lower positive symptom severity was associated with better CBSST-CCT attendance





**Figure 1.**  
CONSORT Flow Diagram

**Table 1.**

## Participant Characteristics

Baseline characteristic	CBSST-CCT n=26		SC n=29		Full sample N=55	
	M±SD	Range	M±SD	Range	M±SD	Range
Age, years	47.73±11.36	22–63	53.24±7.35	28–65	50.64±9.77	22–65
Education, years	12.04±1.69	8–16	11.72±2.63	2–18	11.87±2.22	2–18
Duration of illness (years)	28.61±14.44	3–54	31.59±10.39	11–60	30.27±12.31	3–60
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Female	9	34.6	13	44.8	22	40
Male	17	65.4	16	55.2	33	60
Ethnicity						
Hispanic	8	30.8	10	34.5	18	32.7
Non-Hispanic	18	69.2	19	65.5	37	67.3
Race						
African American	11	42.3	4	13.8	15	27.3
American Indian/Alaskan	0	0	1	3.4	1	1.8
Asian	1	3.8	0	0	1	1.8
Native Hawaiian/Pacific Islander	2	7.7	0	0	2	3.6
White	12	46.2	24	82.8	36	65.5
Never married	16	61.5	17	58.6	33	60
Living independently	17	65.4	17	58.6	34	61.8
Diagnosis						
Schizoaffective	10	38.5	9	31	19	34.5
Schizophrenia	16	61.5	20	69	36	65.5
Medication class						
No atypical antipsychotics	4	15.4	3	10.3	7	12.7
Atypical antipsychotics	17	65.4	18	62.1	35	63.6

**Table 2.**

Integration of CBSST and CCT by Content Area

CBSST	CCT						
<b>Cognitive Training Module: 8 sessions</b>							
	<p>CCT domains and strategies:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Prospective memory</td> <td style="width: 50%; padding: 5px;">Calendar use; to-do lists; prioritizing tasks; linking tasks by using planned cues; automatic places; using routines to automate tasks</td> </tr> <tr> <td style="padding: 5px;">Attention and vigilance</td> <td style="padding: 5px;">Eye contact, paraphrasing, asking questions during conversations; taking breaks to refocus</td> </tr> <tr> <td style="padding: 5px;">Learning and memory</td> <td style="padding: 5px;">Taking notes; paraphrasing and association; chunking; categorization; acronyms; visual imagery; overlearning</td> </tr> </table>	Prospective memory	Calendar use; to-do lists; prioritizing tasks; linking tasks by using planned cues; automatic places; using routines to automate tasks	Attention and vigilance	Eye contact, paraphrasing, asking questions during conversations; taking breaks to refocus	Learning and memory	Taking notes; paraphrasing and association; chunking; categorization; acronyms; visual imagery; overlearning
Prospective memory	Calendar use; to-do lists; prioritizing tasks; linking tasks by using planned cues; automatic places; using routines to automate tasks						
Attention and vigilance	Eye contact, paraphrasing, asking questions during conversations; taking breaks to refocus						
Learning and memory	Taking notes; paraphrasing and association; chunking; categorization; acronyms; visual imagery; overlearning						
<b>Cognitive Skills Module: 5 sessions</b>							
<p>Introduce the general concepts of CBT, including the relationship between thoughts, actions and feelings, automatic thoughts, thought challenging by examining evidence for beliefs, and mistakes in thinking; Address symptoms and challenge defeatist beliefs that interfere with real-world skills execution; Help participants learn and remember to use their CBT skills</p>							
<b>Social Skills Module: 6 sessions</b>							
<p>Improve: (1) communication skills and psychosocial interactions (e.g., asking someone for support) via behavioral role plays; (2) expression of positive and negative feelings, making requests, comfort with sharing feelings, and communicating assertively; and (3) self-efficacy and defeatist performance beliefs</p>	<p>Teach and reinforce conversational attention skills (e.g., listening actively, eliminating distractions, asking questions, and paraphrasing [LEAP]) to improve cognitive aspects of communication and social communication</p>						
<b>Problem Solving Skills Module: 6 sessions</b>							
<p>Improve basic problem-solving skills; Help participants develop plans to solve real-world problems and improve illness self-management; Behavioral activation to improve negative symptoms; Develop confidence in effective problem-solving</p>	<p>Teach cognitive flexibility and planning strategies in addition to problem-solving (CBSST and CCT use a very similar problem-solving strategy already); Using self-talk and self-monitoring while problem-solving; Hypothesis testing using pro and con evidence; Reinforce cognitive flexibility strategies to help participants realize when they should try a different strategy to achieve their goals; Use repetition and practice of executive skills to increase confidence</p>						

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**Table 3.**

## Assessment Protocol and Timeline

Domain	Measure	Baseline	Midway	Post	6-mo f/u
Diagnosis	Structured Clinical Interview for DSM-IV (First et al., 2002)	X			
Premorbid IQ estimate	Wide Range Achievement Test-4 Reading (Wilkinson and Robertson, 2006)	X			
Neurocognition	MATRICES Consensus Cognitive Battery (no MSCEIT) (Nuechterlein et al., 2008)	X		X	X
Performance-based functional capacity	UCSD Performance-Based Skills Assessment - Brief (Mausbach et al., 2007)	X		X	X
Performance-based social competence	Social Skills Performance Assessment (Patterson et al., 2001)	X		X	X
Negative symptom severity	Clinical Assessment Interview for Negative Symptoms (Kring et al., 2013)	X	X	X	X
	Scale for the Assessment of Negative Symptoms (Andreasen, 1984)	X	X	X	X
Positive symptom severity	Brief Psychiatric Rating Scale - positive subscale (Overall and Gorham, 1962)	X	X	X	X
Depressive symptom severity	Calgary Depression Scale for Schizophrenia (Addington et al., 1990)	X	X	X	X
Insight	Birchwood Insight Scale (Birchwood et al., 1994)	X	X	X	X
Rehabilitation goals/ milestones	Psychosocial Rehabilitation (PSR) Toolkit (Arns et al., 2001)	X		X	X
Self-reported living skills	Specific Levels of Functioning Scale (Schneider and Struening, 1983)	X	X	X	X
	Independent Living Skills Survey (Wallace et al., 2000)	X	X	X	X
CBSST-CCT Skill Knowledge	Comprehensive Modules Test (Lieberman et al., 1993)	X	X	X	X
Defeatist Attitudes	Defeatist Performance Attitudes Scale (15-item subscale of the Defeatist Attitude Scale; (Cane et al., 1986)	X	X	X	X
	Asocial Belief Scale (Grant and Beck, 2010)	X	X	X	X
	Self-Efficacy Scale (19-item social factor)	X	X	X	X
	QLS (3 items on Intrinsic Motivation; (Fervaha et al., 2014)	X	X	X	X
Pupil response, digit span recall	6 <sup>th</sup> -digit dilation amplitude	X	X	X	X
Pupil response	Light reflex task	X	X	X	X

**Table 4.**

Pearson/Point Biseiral Correlations Examining Predictors of Treatment Attendance (n=43)

	Session Attendance			
	CBSST-CCT		SC	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Age	.05	.837	.24	.278
Sex	-.40	.072	-.04	.857
Race/ethnicity	.08	.737	-.11	.625
Education (years)	.02	.946	.06	.798
WRAT reading	-.27	.237	-.29	.191
CAINS	-.22	.333	-.16	.489
SANS	-.28	.219	.17	.440
BPRS positive subscale	<b>-.48</b>	<b>.029</b>	.01	.958
CDSS	-.15	.517	<b>-.43</b>	<b>.048</b>
BIS	.27	.235	-.15	.497
UPSA-B	.02	.926	-.06	.787
SSPA	.29	.206	.13	.557
SLOF	.17	.454	.19	.392
ILSS	.10	.652	-.09	.707
MCCB global	.05	.836	-.07	.749
Intrinsic motivation	.29	.202	-.15	.504
DPAS	-.09	.701	.15	.499

*Note.* Bold font denotes  $p < .05$ . BIS=Birchwood Insight Scale; BPRS=Brief Psychiatric Rating Scale; CAINS=Clinical Assessment Interview for Negative Symptoms; CDSS=Calgary Depression Scale for Schizophrenia; DPAS=Defeatist Performance Attitude Scale; ILSS=Independent Living Skills Survey; MCCB=MATRICES Consensus Cognitive Battery; SANS=Scale for the Assessment of Negative Symptoms; SLOF=Specific Level of Functioning; SSPA=Social Skills Performance Assessment; UPSA-B=UCSD Performance-based Skills Assessment; WRAT=Wide Range Achievement Test -Fourth Edition;.