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Increasing social and community participation in veterans living with schizophrenia: A treatment outcome study

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ABSTRACT

People living with schizophrenia often face challenges engaging in social and community activities. A critical barrier is negative symptoms that reflect diminished feelings and thoughts that support social interaction. Several years ago, we began a process of specifying an intervention for individuals with schizophrenia and clinically meaningful negative symptoms that could be delivered in an integrated fashion with mental health services offered in VA medical centers with the primary focus of improving social and community engagement. In the present study, we examined the impact of a multi-component intervention to improve social and community participation in a group of Veterans living with schizophrenia and negative symptoms. We compared an intervention called Engaging in Community Roles and Experiences (EnCoRE) - a 12-week program of individual and group meetings that support learning *and* implementing skills with the goal of helping participants increase engagement in personally-relevant social and community activities – to an active wellness education control condition. Participants in both conditions attended on average of at least half of the groups that were offered, indicating that many individuals living with negative symptoms are willing to participate in an intervention to improve social and community participation. Although there were no significant differences on the two primary outcomes, those in EnCoRE showed better social and general functioning at post treatment and improved social motivational negative symptoms and decreases in perceived limitations at a 3-month follow-up. EnCoRE may be especially beneficial for participants who endorsed more dysfunctional attitudes about their abilities.

1. Introduction

People living with schizophrenia often face challenges engaging in social and community activities. A critical barrier is negative symptoms that reflect diminished feelings and thoughts that support social interaction. Negative symptoms include having low interest in seeking out and participating in social interactions (asociality), decreased motivation to pursue meaningful activities (amotivation), and difficulty finding activities rewarding and fulfilling (anhedonia). Negative symptoms are associated with poor long-term outcomes (Okada et al., 2020; Patel et al., 2015) and have a greater impact on functional outcomes than positive symptoms (Rabinowitz et al., 2012). There is consensus that negative symptoms represent an unmet therapeutic need (Aleman et al., 2017; Correll and Schooler, 2020; Fusar-Poli et al., 2015). While there is interest in identifying efficacious pharmacological interventions, there is agreement that psychosocial interventions for negative symptoms are an essential component of comprehensive, recovery-oriented services (Correll and Schooler, 2020).

Meta-analyses of psychosocial interventions show small to moderate reductions in negative symptoms as measured by clinical rating scales (Elis et al., 2013; Turner et al., 2018). However, limitations complicate the interpretation and application of these findings. Studies that find reduced negative symptoms often do not show changes in symptom domains such as avolition and asociality that have strong relationships with social and community involvement (Horan et al., 2011; Kring et al., 2013). Many studies have broad inclusion criteria and do not select

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participants with clinically meaningful levels of negative symptoms (Rabinowitz et al., 2013) and do not measure negative symptoms as a primary outcome (Elis et al., 2013). Another important limitation is not including measures of functional outcomes (Elis et al., 2013; Fusar-Poli et al., 2015; Rabinowitz et al., 2013). A narrow focus on symptom improvement limits what we can say about whether interventions help individuals with schizophrenia achieve their personal goals and live meaningful lives, outcomes which are more highly valued than symptom reduction (Sterk et al., 2013; Van Eck et al., 2018). The critical question is how to support engaging in meaningful social and community activities.

The most widely studied psychosocial interventions for negative symptoms are social skills training (SST; Bellack et al., 2004) and cognitive behavioral therapy (CBT; Beck et al., 2009). SST approaches teach and practice behavioral skills to improve social knowledge and competence in social situations. SST approaches have the most positive findings for improving social skills, negative symptoms, and social functioning, showing small but consistent effect sizes in the most recent meta-analysis (Granholm et al., 2018; Turner et al., 2018). In SST, learning occurs through group skill review and role play practice; while groups include goal setting and participants are encouraged to practice skills between group meetings, generalization of skills to the community has been challenging (Glynn et al., 2002; Dixon et al., 2010). CBT, and its protocols specifically for negative symptoms (Klingberg et al., 2011; Staring et al., 2013; Turkington and Morrison, 2012) and psychosis (CBTp; Wykes et al., 2008), focus on changing maladaptive thoughts and expectations as the mechanism of change (Perivoliotis and Cather, 2009). CBT approaches emphasize using skills between sessions to provide evidence supporting new ways of thinking; CBTp places additional emphasis on supporting recovery (Brabban et al., 2016). Support for CBT for negative symptoms is mixed (Aleman et al., 2017; Sitko et al., 2020; Velthorst et al., 2015). Velthorst and colleagues (Velthorst et al., 2015) reviewed 30 randomized controlled trials published between 1993 and 2013 reporting on the impact of CBT interventions on negative symptoms and found that reductions in negative symptoms seen in early studies have not been replicated in more recent ones. They suggest that earlier studies focused more on behavioral rather than cognitive change, were less rigorously designed, and more often included individual rather than group intervention. They and others also suggest testing interventions that incorporate behavioral activation (Cuijpers et al., 2007), support of significant others, or practice in community settings, especially for those with negative dysfunctional beliefs (Dixon et al., 2010; Moriana et al., 2006; Velthorst et al., 2015).

Several years ago, we began a process of specifying an intervention for people with schizophrenia and negative symptoms to improve social and community engagement. Our conceptual framework integrated findings of Horan et al. (2010), Ventura et al. (2009), and Leifker et al. (2009) regarding connections between a set of antecedents (behavioral skills deficits, negative expectancies), mediators (negative symptoms), and outcomes (social/community functioning). We included affective-motivational constructs described by Kring (Kring and Caponigro, 2010) and Medalia (Medalia and Brekke, 2010) (deficits in anticipatory pleasure and intrinsic motivation) as additional antecedents to the development and manifestation of negative symptoms. Engaging in Community Roles and Experiences (EnCoRE) is a 12-week program that supports learning *and* implementing skills to increase engagement in personally relevant social and community activities. EnCoRE includes education about negative symptoms, motivational enhancement to increase intrinsic motivation for goal-directed activities, CBT strategies to address negative expectancies for failure, SST for performing skillfully in social situations, and behavioral activation (Lejuez et al., 2011; activity scheduling, monitoring activity completion, engaging social supports to assist with overcoming barriers, and problem-solving challenges) to translate learning into real-life application.

In this randomized controlled trial, we examined the impact of EnCoRE to improve social and community participation in people living with schizophrenia and negative symptoms. To control for nonspecific factors including social contact, we utilized a Health and Wellness education condition for comparison. We hypothesized that participants exposed to EnCoRE, compared to control, would show greater reductions in affective-motivational negative symptoms and greater increases on measures of social and role functioning.

2. Methods

2.1. Participants

The trial took place at three Mid-Atlantic VA Medical Centers; participants were recruited between 12/10/2015 and 7/25/2019. In line with recommendations for negative symptom clinical trials[35], participants met a minimum level of persistent negative symptoms and were clinically stable with respect to positive symptoms for prior to study entry (confirmed by the mental health treatment team during the recruitment process). Inclusion criteria were: (1) DSM 5 diagnosis of schizophrenia or schizoaffective disorder as assessed by the Structured Clinical Interview for DSM (SCID-5; First et al., 2015); (2) a minimum rating on the Clinical Assessment Interview for Negative Symptoms (CAINS; Kring et al., 2013) of a "moderately severe deficit" ($\geq$3 on a 0–4 scale) on one or more of any symptom domain within the motivation-pleasure factor (i.e., symptoms of asociality, avolition, and anhedonia) or a minimum rating of a "moderate deficit" ($\geq$2 on a 0–4 scale) on two or more of any motivation-pleasure symptom domain; (3) Age between 18 and 75 years; (4) Seen by a service provider at least twice in the last 6 months or at least once in the last 6 months consistently for two years, in line with the recorded treatment plan (to demonstrate stable engagement in mental health care); (5) Competent to sign consent. Exclusion criteria were: Documented history of serious neurological disorder; intellectual disability (defined as a total score $<$ 70 on the Wechsler Test of Adult Reading (Wechsler, 2001) or as indicated by chart review); inability to complete the baseline assessment due to psychiatric symptoms on two appointments; and current problem substance use (score $\geq$ 5 on the Michigan Alcoholism Screening Test (Selzer, 1971) or $\geq$ 6 on the Drug Abuse Screening Test (Skinner, 1982). Participants were prescribed antipsychotic medications and remained on these medications throughout the trial.

Fig. 1 shows the consort diagram. Overall, 105 participants signed consent, completed baseline, and were randomized with a 1:1 allocation to condition. There were no differences on demographic or baseline clinical variables between participants who completed no groups ($n = 9$) and those who completed any groups ($n = 96$). Of the total sample, 84 (80 %) completed the post-treatment assessment and 83 (79 %) completed a follow-up assessment three months later. The study was designed to have 80 % power to detect a standardized difference in mean change from baseline (Cohen's d) of 0.50 between conditions at post-treatment on the primary outcomes with a total sample size equal to 108.

2.2. Interventions

Interventions were delivered in small (7 participants enrolled) groups. Interventionist training - orientation to manuals/materials, fidelity expectations, practice facilitation - used modeling, role-play, and feedback. Interventionists led and recorded mock groups; recordings were viewed weekly and detailed feedback provided. New interventionists were "certified" by achieving 90 % on the Adherence scale and above 1.75 on the Competence scale (see below). Both conditions offered two individual and twenty-four twice-weekly group meetings. Interventionists facilitated both conditions but not for the same cohort.

EnCoRE incorporates traditional SST and cognitive restructuring, enhanced with psychoeducation about negative symptoms and their impact plus detailed activity planning and review at each meeting. It begins with two individual meetings to explore the impact of low

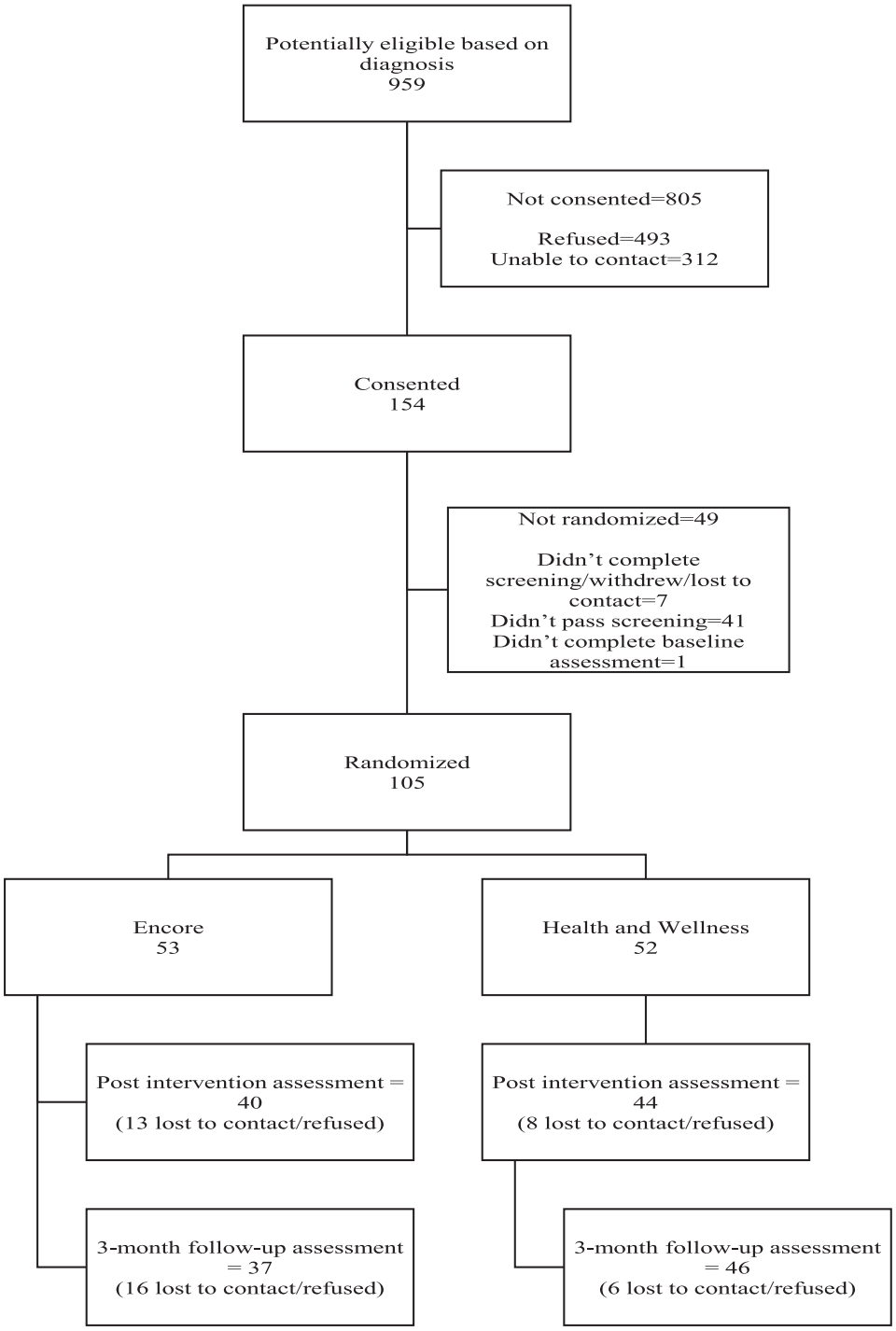

Fig. 1. Consort diagram.

engagement on one's life and to identify social and community activities with high personal relevance. Group meetings allowed participants to interact, offer support, and learn from others' experiences within a standard format: review content and activity plans from the previous session; learn a new topic, skill, or strategy; practice; and complete planning of a social or community activity assignment. The first group includes psychoeducation about negative symptoms as barriers to participation in social/community activities. Participants set a social/community participation goal at each meeting and learn a structured format for activity planning that incorporates support from others and problem-solving barriers in line with behavioral activation (Lejuez et al., 2011). Several meetings focus on SST (Bellack et al., 2004): starting conversations with a new/unfamiliar person; making plans with a friend; finding common interests; and compromise and negotiation. Participants learn to identify and challenge dysfunctional attitudes and negative expectancies through the CBT skill of cognitive restructuring (Klingberg et al., 2011; Perivoliotis and Cather, 2009; Staring et al., 2013; Turkington and Morrison, 2012). The program includes frequent practice via role-playing during meetings and implementing activity plans between meetings.

Health and Wellness is a manualized curriculum with sessions on physical activity, nutrition, managing medication side effects, coping with stress, and tobacco use. Meetings include education about the benefits and challenges to improving health in these areas and

brainstorming strategies to improve wellness. There is no in-session skills practice or development of any home assignments.

Groups were video recorded for weekly supervision and fidelity. Fidelity was evaluated by blind raters who independently rated randomly selected meetings to assess adherence to intervention manuals (EnCoRE–16 yes/no items; Health and Wellness–10 yes/no items) and competence in delivering the interventions (EnCoRE–11 items; Health and Wellness-10 items; items rated on 3-point Likert scales: 0 = unacceptable, 1 = acceptable, 2 = excellent). For EnCoRE, mean (SD) adherence (proportion of adherent items) and competence ratings were 0.9824 (0.06; range = 0.73–1.00) and 1.98 (0.08; range = 1.64–2.00) respectively. For Health and Wellness, mean (SD) adherence and competence ratings were 0.9861 (0.04; range = 0.89–1.00) and 1.98 (0.04; range = 1.90–2.00) respectively.

2.3. Measures

2.3.1. Demographic, diagnostic, and clinical assessments

Demographic information included age, gender, race, marital status, years of education, and employment status. Psychiatric diagnosis was assessed with the *SCID-5* (First et al., 2015). Psychiatric symptoms were assessed with the 24-item version of the *Brief Psychiatric Rating Scale* (BPRS; Ventura et al., 1993), a reliable and valid interviewer-rated scale to assess change in severity of psychopathology with an emphasis on symptoms of psychotic illnesses. Items are rated on a 7-point scale from not present to extremely severe. Negative symptoms were measured with the *CAINS* (Blanchard et al., 2017; Kring et al., 2013), a 13-item, validated interview with two subscales: expression (4 items) and motivation and pleasure (9 items). The CAINS Motivation and Pleasure Scale (CAINS-MAP) was a primary outcome of the trial. The CAINS Social Motivation and Pleasure Scale (CAINS-SMAP) was a secondary outcome.

2.3.2. Use of intervention variables

Completion of meetings was tracked to examine uptake of intervention components.

2.3.3. Measures of social and community functioning

The *Social Functioning Scale* (SFS; Birchwood et al., 1990) measures engagement in social activities through assessment of seven domains: Social Engagement/Withdrawal, Interpersonal Communication, Prosocial, Independence-Performance, Recreation, Independence–Competence, and Employment. SFS total score including all subscales except the employment subscale was a primary outcome.

The *Role Functioning Scale* (RFS; Goodman et al., 1993) assesses Working Productivity, Independent Living/Self Care, Family Network Relationships, and Immediate Social Network Relationships (Edmondson et al., 2012; Yamada et al., 2010). We summed ratings of Independent Living/Self Care, Family Network Relationships, and Immediate Social Network Relationships as a measure of role functioning. We excluded Working Productivity because most participants were retired or not working. The *Brief University of California San Diego Performance-based Skills Assessment* (UPSA; Mausbach et al., 2007) assesses the respondent's capacity to perform tasks like those encountered in daily life in two domains: financial skills (make change, write a check), and communication skills (calling emergency services, call to reschedule an appointment). For each domain, the total percent correct is calculated and converted to a standardized score ranging from 0 to 50. A summary score is calculated by summing the two domain scores (range = 0–100); higher scores indicate better functional capacity. The *Community Reintegration of Injured Service Members-Computer Adapted-Test* (CRIS-CAT; Resnik et al., 2012) assesses Veterans' community reintegration with 9 scales (Learning/Applying Knowledge, General Tasks/Demands, Communication, Mobility, Self-care, Domestic Life, Interpersonal Relationships, Major Life Areas, Community, Social/Civic Life) across three dimensions: Extent of Participation (how often the respondent participates in specific activities), the respondent's Perceived Limitations in Participation, and he respondent's degree of Satisfaction with Participation. Items are rated on a 1–7 scale; higher scores indicate better participation/satisfaction. The 25-item *Maryland Assessment of Recovery Survey* (MARS; Drapalski et al., 2012) assesses personal recovery (e.g., having strength to solve challenges and belief in one's abilities).

2.3.4. Measures of attitudes and beliefs

The 40-item *Dysfunctional Attitudes Scale* (DAS; Weissman and Beck, 1978) assesses generalized negative attitudes of a person towards the self, the world, and the future. Statements are rated on a 7-point Likert scale ranging from 1 (agree completely) to 7 (disagree completely). Sample items include "People will think less of me if I make a mistake" and "If I do not do well all the time, people will not respect me". The 25-item *Success and Resource Appraisals Questionnaire* (SARA-Q; Couture et al., 2007) assesses beliefs regarding low expectations for success and perception of limited cognitive resources. Respondents rate their level of agreement using a 7-point Likert scale ranging from agree totally to disagree totally. Sample items include: "I can't think as well as other people", and "My condition prevents me from doing things". These measures have been widely used with persons with schizophrenia (Couture et al., 2011; Grant and Beck, 2009; Mahmood et al., 2022).

2.4. Procedures

The study was approved and monitored by the VA Central Institutional Review Board. Participants were recruited via screening the electronic health record with partial HIPAA waiver to evaluate basic eligibility criteria plus confirmation from the treatment team that the individual could understand the elements of study participation; referral by the treatment team; and flyers posted. Individuals were mailed a letter informing them that they may be eligible to participate in a study and requesting that they call to learn more. The study team followed up by telephone after one week to provide details. Those interested in participating were scheduled for an in-person visit to complete informed consent and eligibility screening. If eligible, they completed the baseline assessment and were randomized to condition. The study team assisted with arranging transportation including accessing VA transportation resources, providing vouchers for no-cost bus rides, and scheduling groups on days when participants were already coming to the facility if possible. Participants were assigned to condition using permuted block randomization. When at least 7 participants were randomized, the interventions were launched as a cohort. Groups started once the cohort of participants completed baseline and individual meetings.

Participants completed post-treatment and follow-up assessments 3 and 6 months after the date they completed baseline regardless of their degree of participation in their assigned intervention. These assessments included all measures from baseline except for the SCID and were administered by raters blind to condition. Participants continued their regular mental health services including use of psychoactive medications during the study period.

2.5. Analysis plan

The CAINS-MAP and the SFS total score were the two primary outcomes. Secondary outcomes were the RFS (sum of Independent Living/Self Care, Family Network Relationships, and Immediate Social Network Relationships subscales), UPSA (total score), CAINS-SMAP, CRIS-CAT (Extent of Participation; Perceived Limitations in Participation), and MARS (total score).

Linear mixed-effects models were used to test the effectiveness of EnCoRE compared with Health and Wellness. A random effect for therapy group accounted for an intraclass correlation resulting from common group membership. Within-individual correlation among measurements over time was accounted for with an unstructured error correlation matrix. Regression terms in the model included time and

intervention-by-time interactions. Group means were assumed to be equal at baseline due to random assignment and therefore the group indicator (EnCoRE = 1, control = 0) was not included in the regression model (Fitzmaurice et al., 2011). Time was entered into the model by using two dummy variables - one for the post-treatment time point and one for the follow-up time point - to compare group mean change from baseline to post-treatment separately from baseline to follow-up. The interaction terms estimated mean change in the EnCoRE condition minus mean change in the control condition. We also examined mean change in the whole sample (collapsing across treatment groups) which is performed using the same model but removing the groupxtime interaction terms. All available outcome measure data from baseline, post-treatment, and follow-up time points were included (intention-to-treat). All continuous outcome scales were checked for skew, and an appropriate transformation was applied as needed. Statistical significance was defined as $p \leq 0.05$. Analyses were performed using SAS version 9.4.

In moderator analyses we examined whether treatment effects on the primary outcomes (CAINS MAP, SFS) differed according to baseline dysfunctional attitudes measured by the DAS and SARA-Q. We also examined whether baseline negative symptoms (CAINS MAP) modified treatment effects for the SFS. Each moderator variable was dichotomized at the median. In separate models, the moderator and interaction terms with the moderator were added to the primary linear mixed effects models to test whether treatment effects at post-treatment and follow-up time points differed for those above versus below the median.

3. Results

3.1. Characteristics of the sample

Demographic characteristics for the total sample and by condition are displayed in Table 1. The sample was 91 % male, and 74 % African American with a mean age of 55.6 (sd = 10.6). Few (12.38 %) were currently married, and the majority (94 %) reported 12 or more years of education. All were diagnosed with a schizophrenia spectrum disorder (48 % schizophrenia, 52 % schizoaffective disorder).

Participants in the EnCoRE condition were younger (mean age = 53.6, sd = 11.7) than those in the control condition (mean age = 57.6, sd = 9.1) and were more likely to have a diagnosis of schizoaffective disorder (EnCoRE = 62.3 %, control = 42.3 %). Participants in the EnCoRE condition scored higher on the CAINS MAP at baseline (mean = 19.8; sd = 5.2) than those in the control condition (mean = 17.3; sd = 4.8), reflecting a higher degree of negative symptoms in the EnCoRE condition.

Table 1
Demographic characteristics of the sample.

Variable	Full sample	EnCoRE	Control
	(*N* = 105)	(*n* = 53)	(*N* = 52)
Age in years*	55.6 ± 10.6	53.6 ± 11.7	57.6 ± 9.1
Male gender	96 (91.4 %)	47 (88.7 %)	49 (94.2 %)
Race			
Black	78 (74.29 %)	42 (79.25 %)	36 (69.23 %)
White	18 (17.14 %)	8 (15.09 %)	10 (19.23 %)
Other	9 (8.57)	3 (5.66 %)	6 (11.54 %)
Hispanic ethnicity	2 (1.90 %)	0 (0 %)	2 (3.85 %)
Currently married	13 (12.38 %)	7 (13.2 %)	6 (11.5 %)
12+ years of education	96 (94.12 %)	50 (96.2 %)	46 (92.0 %)
Diagnosis*			
Schizophrenia	50 (47.6 %)	20 (37.7 %)	30 (57.7 %)
Schizoaffective Disorder	55 (52.4 %)	33 (62.3 %)	22 (42.3 %)
CAINS MAP*	18.6 ± 5.1	19.8 ± 5.2	17.3 ± 4.8
SFS Pro-Social subscale	14.7 ± 9.9	14.5 ± 10.3	14.9 ± 9.5
BPRS Positive Average Scores	2.1 ± 0.8	2.1 ± 0.8	2.1 ± 0.8

* $p < .05$.

3.2. Use of intervention components

Table 2 lists use of intervention components for the full sample and by condition. Most participants completed 2 individual meetings and 10 group meetings (EnCoRE mean = 10.6, sd = 8.5; control mean = 12.3, sd = 8.3).

3.3. Analysis of primary and secondary outcomes

Means and standard deviations for the primary and secondary outcome variables are presented in Table 3. Results of mixed effects model analyses of the primary and secondary outcomes are presented in Table 4 and Fig. 2. There were no differences in mean change on the primary outcomes at post-treatment or at follow-up.

There were differences between conditions in mean change from baseline to post-treatment on two secondary outcome variables. Participants in EnCoRE showed significantly greater improvement in RFS Social Functioning than participants in the control condition (ES = 0.43, $p = 0.010$). In addition, there was a significant difference in mean change favoring EnCoRE on the UPSA-3 (ES = 0.39, $p = 0.018$) owing substantially to worsening in the control condition.

There were differences in mean change between conditions from baseline to follow-up on two secondary outcome variables. Participants in EnCoRE showed greater improvement on the CRIS-CAT Perceived Limitations subscale (ES = -0.42, $p = 0.036$) than those in the control condition. In addition, participants in EnCoRE showed a trend towards a greater decrease in scores in the CAINS SMAP (ES = -0.37, $p = 0.079$) than those in the control condition. Because the conditions significantly differed on the CAINS MAP scale at baseline, we reran the mixed model analyses for all primary and secondary outcomes adjusting for CAINS MAP scores at baseline. The results for the adjusted analyses remained the same except for the difference in mean change on the CAINS SMAP at follow-up was significant (difference in mean change = −1.74, $t = -2.33$, df = 103, $p = 0.022$, ES = -0.49).

For the total sample, there were significant reductions on the CAINS MAP from baseline to post-treatment (b = −1.20, $t = -2.16$, df = 104, $p = 0.0330$) and follow-up (b = −1.70, $t = -2.97$, df = 104, $p = 0.0037$). There were significant reductions on the RFS from baseline to post-treatment (b = 1.10, $t = 3.87$, df = 104, $p = 0.0002$) and follow-up (b = 0.86, $t = 2.91$, df = 104, $p = 0.0045$). There was a significant reduction from baseline to post-treatment on the CAINS SMAP (b = −0.80, $t = -2.32$, df = 104, $p = 0.0222$).

3.4. Moderator analyses

There were no significant treatment effect differences between those above versus below the median on the dichotomized CAINS MAP or the SARA-Q. There was a marginally significant treatment effect difference between those above versus below the median on the DAS (b = 12.3, $t = 1.96$, df = 94, $p = 0.0526$) indicating possible efficacy of EnCoRE at post-treatment among those with greater dysfunctional attitudes at baseline. There was a similar moderating effect at follow-up with attenuated significance ($p = 0.0877$).

Table 2
Use of intervention components.

Variable	Full sample	EnCoRE	Control
	(N = 105)	(n = 53)	(N = 52)
Individual Meetings			
0 attended	9 (8.6 %)	3 (5.7 %)	6 (11.5 %)
1 attended	6 (5.7 %)	2 (3.8 %)	4 (7.7 %)
2 attended	90 (85.7 %)	48 (90.6 %)	42 (80.8 %)
Group Meetings (mean ± sd)	11.4 ± 8.4	10.6 ± 8.5	12.3 ± 8.3

Table 3
Raw means and standard deviations for primary and secondary outcomes.

	ENCORE						Control (Health and Wellness)					
	Baseline (N = 53)		Post (*N* = 40)		FU (*N* = 37)		Baseline (N = 52)		Post (*N* = 44)		FU (*N* = 46)	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Primary outcomes												
Social Function Scale	110.3	20.8	111.1	19.5	116.8	26.5	114.0	19.5	112.1	21.3	112.7	20.4
CAINS MAP	19.8	5.1	17.4	5.8	16.2	6.1	17.3	4.8	17.1	4.9	17.2	5.3
Secondary outcomes												
RFS Social Function	9.0	2.8	11.0	2.7	10.4	2.7	8.9	3.1	9.5	2.6	9.7	2.8
UPSA-3	8.5	1.0	8.7	0.8	8.6	0.8	8.4	1.2	8.1	1.3	8.6	0.9
CAINS SMAP	8.6	3.4	6.9	3.7	6.4	3.7	7.1	3.7	6.8	3.4	7.6	3.6
CRIS-CAT Extent of Participation	41.9	10.1	43.7	9.8	45.2	12.1	44.3	7.9	44.0	8.5	45.0	8.0
CRIS-CAT Perceived Limitation	6.7	0.8	6.6	0.5	6.8	1.0	6.5	0.3	6.6	0.6	6.7	0.7
MARS (Recovery)	95.5	16.0	95.0	18.2	95.8	17.9	96.7	17.7	96.1	19.4	95.5	19.2

Table 4
Mixed effects model analyses of primary and secondary outcomes.

	Baseline to post-treatment					Baseline to follow-up				
	Difference in mean change	t	df	p	ES	Difference in mean change	t	df	p	ES
Primary outcomes										
Social Function Scale	4.13	1.35	96	0.182	0.20	5.47	1.23	96	0.220	0.27
CAINS MAP	−1.07	−1.05	104	0.295	−0.22	−1.68	−1.59	104	0.114	−0.34
Secondary outcomes										
RFS Social Function	1.27	2.63	104	0.010	0.43	0.32	0.62	104	0.539	0.11
UPSA-3[a]	0.43	2.40	104	0.018	0.39	−0.07	−0.40	104	0.692	−0.06
CAINS SMAP Unadjusted	−0.39	−0.62	104	0.535	−0.11	−1.31	−1.78	104	0.079	−0.37
CAINS SMAP Adjusted[b]	−0.77	−1.23	103	0.222	−0.22	−1.74	−2.33	103	0.022	−0.49
CRIS-CAT Extent of Participation	1.31	0.83	236	0.407	0.14	0.51	0.26	236	0.794	0.06
CRIS-CAT Perceived Limitation[a]	0.01	0.05	104	0.957	0.01	−0.25	−2.13	104	0.036	−0.42
MARS	0.31	0.12	237	0.903	0.02	−1.96	−0.68	237	0.498	−0.12

[a] Square-root transformed.
[b] Adjusted for baseline CAINS MAP score.

4. Discussion

We compared EnCoRE, a multi-component intervention with an emphasis on activity planning and real-world implementation, to a wellness control on measures of negative symptoms and social/community functioning in a sample of people with schizophrenia and negative symptoms. Participants in both conditions attended half of the groups that were offered, indicating that many individuals living with negative symptoms are interested in improving social/community participation. Participants were positive about twice weekly meetings but had practical reasons - getting a job, securing new housing farther from the hospital – for missing meetings.

There were no differences on the primary outcomes: motivation and pleasure negative symptoms and social functioning as measured by the SFS. On secondary outcome measures, EnCoRE participants showed better social and general functioning on the RFS at post treatment and both improved social motivational negative symptoms and fewer perceived limitations at the 3-month follow up. EnCoRE may be especially beneficial for participants who endorsed more dysfunctional attitudes about their abilities.

Other psychosocial intervention studies have found no change in negative symptoms (Elis et al., 2013; Horan et al., 2011; Kring et al., 2013). The lack of a differences in the primary functioning outcome (SFS) is surprising considering the finding of a difference on the secondary functional outcome (RFS). The RFS is a broader measure of role functioning; perhaps EnCoRE supports changes in social activities that are more subtle (e.g., being more involved in fewer activities) rather than yielding a greater number of activities. The difference on the secondary outcome of social motivational negative symptoms suggests that EnCoRE may have a focused benefit in helping participants feel more comfortable in social situations. The fact that EnCoRE focuses on improving communication and supporting more flexible thinking about social situations supports this interpretation. EnCoRE's targets - social skill, cognitive biases, and activity sampling – may not be the best or only targets for yielding changes in overall negative symptoms and social/community functioning, although they may be appropriate for improving social motivational negative symptoms and some aspects of social functioning.

While modest, these findings fit with other studies that find benefits of skills-based interventions for people with schizophrenia delivered in outpatient mental health treatment settings (Granholm et al., 2014; Grant et al., 2012). They build on this literature by incorporating activity planning and skills implementation, including a sample with meaningful negative symptoms, testing negative symptoms as a primary outcome, including measures of functioning, and including an active control. These findings also support others finding that skills-based interventions may be especially useful for people with negative beliefs about themselves and their abilities (Campellone et al., 2016; Granholm et al., 2018).

Focusing on implementation outside of the treatment setting and on functioning in the specific community in which one lives are becoming features of this work. Recently, protocols that incorporate strategies for utilizing skills in real-world settings have demonstrated benefit for people living with more chronic manifestations of the illness (Nibbio et al., 2020; Stiekema et al., 2020). Others are finding that SST, CBT, and combined approaches may contribute to improved living skills in older patients with schizophrenia (Rajji et al., 2022). Combining SST and CBT approaches with cognitive training protocols may also show promise for

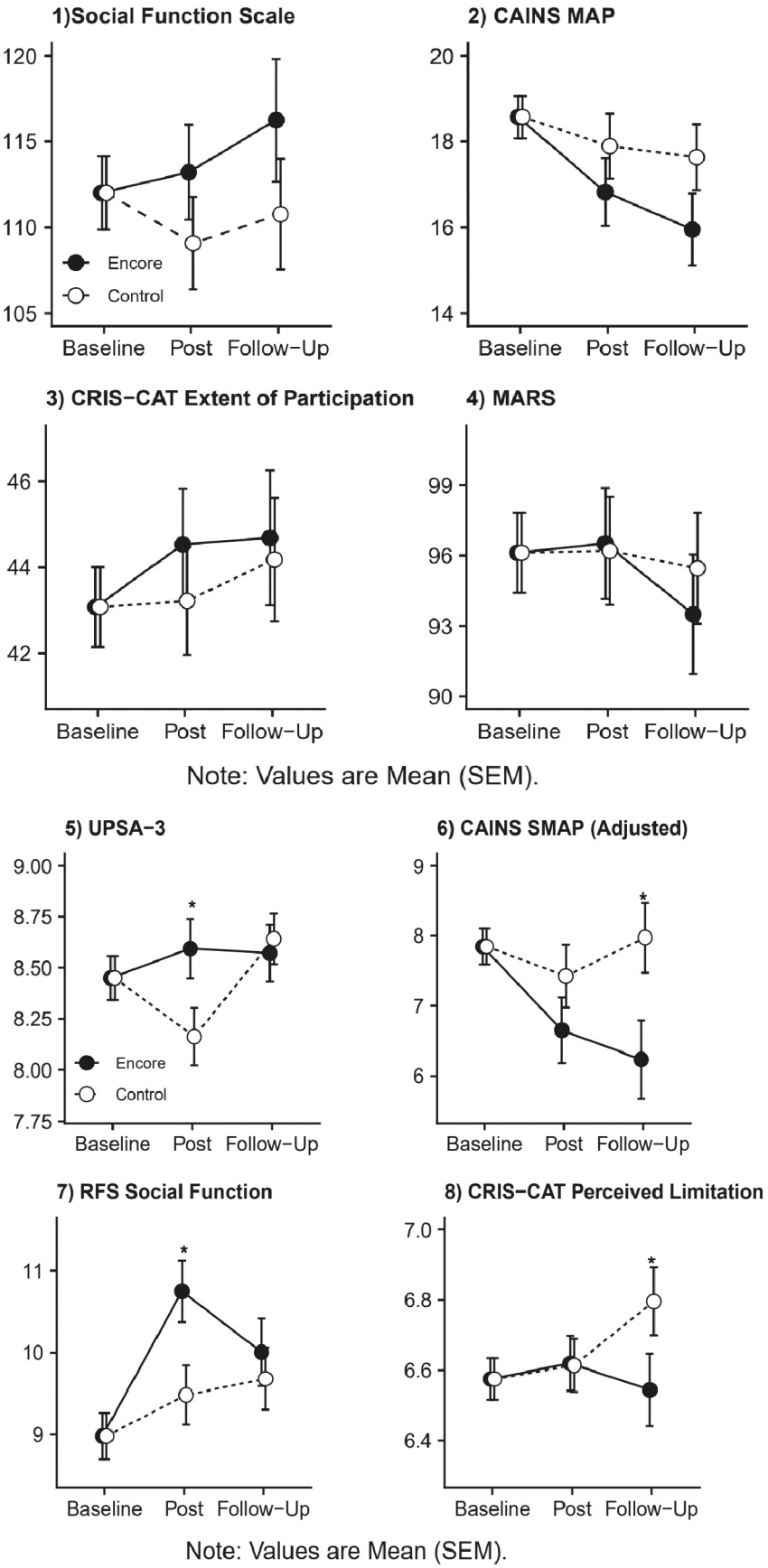

Fig. 2. Intervention effects on primary and secondary outcomes.

people living with negative symptoms (Granholm et al., 2022).

Our emphasis on implementation did not support a large change in our objective outcomes relative to an active control. Discussing the benefits of improved health/wellness may have motivated participants to make lifestyle changes that inspired increased activity. In addition, this trial was designed to have power equal to 0.80 to detect a Cohen's d effect size equal to 0.50. Because of the active control condition, the effect size may have been too optimistic, causing the trial to be underpowered. It is also possible that the objective measures were not sensitive enough to capture the types of changes that were made. We collected qualitative interviews from 36 participants randomized to EnCoRE to explore acceptability of the intervention and if participants applied what they learned in their lives (Bennett, et al., in pressM.E. Bennett L. Kuykendall K. Harvey A. Lucksted Increasing community engagement: Skills used by adults with schizophrenia engaged in a psychosocial intervention, In press). Participants reported that practicing skills and developing activity plans were key components of doing more activities during the trial. Participants related many occasions during the study period of engaging in new activities and increasing participation in existing social relationships. Participants reported that learning skills led to increased comfort talking to people and planning activities; this greater comfort led to increased confidence to try new things. However, engaging in several new activities over three months may not have been sufficient to yield changes on rating scales and objective measures of functioning. The fact that social motivational negative symptoms decreased three months after study participation suggests that the benefits of EnCoRE may accumulate past the end of treatment. Improvement in social motivational negative symptoms is of clinical importance given the robust relationship between this negative symptom domain and functional impairment (Blanchard et al., 2017; Kring et al., 2013).

There are several limitations. People who declined participation may experience more severe negative symptoms than those in the sample; if so, our sample may not represent the population of people living with negative symptoms. Participants were U.S. military Veterans, most were African American, and the study intervention was delivered within the context of VA mental health services. These factors may limit generalizability. We examined treatment effects immediately after treatment and three months later. Although the improvement in social and motivational symptoms at follow-up is encouraging, a longer interval is necessary to determine the durability of these gains. As noted, the trial may have been underpowered due to the inclusion of an active control.

5. Conclusions

Many people living with schizophrenia have trouble engaging in and enjoying personally meaningful social and community activities due to negative symptoms of the illness. This is an under-addressed facet of treatment. The components of EnCoRE can be delivered by different professionals and integrate well with outpatient mental health services. Our findings, along with others in the literature, offer support for EnCoRE, and similar skills-based interventions, as a framework for addressing this area of clinical need.

Declaration of competing interest

None.

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