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A randomized controlled trial of group cognitive-behavioral therapy vs. enhanced supportive therapy for auditory hallucinations

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ABSTRACT

There has been little research examining group cognitive-behavioral therapy (CBT) for schizophrenia, especially compared to an active control treatment. The purpose of this study was to investigate the effectiveness of group CBT for auditory hallucinations compared to an enhanced supportive therapy (ST). Sixty five participants with schizophrenia spectrum disorders and persistent hallucinations were randomly assigned to group CBT or enhanced group ST. Primary outcomes focused on beliefs about voices and global auditory hallucinations severity. Secondary outcomes included psychotic symptoms, self-esteem, social functioning, insight, depression, and hospitalization. Controlling for baseline levels, these outcomes were evaluated across post-treatment, 3 month and 12 month follow-ups. Participants who received enhanced ST were less likely to both resist voices and to rate them as less malevolent through 12-month follow-up relative to participants who received CBT. Group CBT was associated with lower general and total symptom scores on the PANSS through 12-month-followup relative to participants who received enhanced ST. Outcomes improved through 12-month follow-up in both therapy groups, with enhanced ST having more specific impact on auditory hallucinations, and CBT impacting general psychotic symptoms.

1. Introduction

Hallucinations are a common feature in schizophrenia. In fact, over 60% of people with a diagnosis of schizophrenia experience a hallucination at some time over the course of their illness (Slade and Bentall, 1988). Although pharmacological treatments remain the front-line treatment for schizophrenia (Lehman et al., 2004), limitations such as non-compliance and persistent residual positive symptoms have led researchers to seek out ancillary treatments (Fenton et al., 1997; Pantelis and Barnes, 1996). In this regard, individual cognitive-behavioral therapy (CBT) has proven to be an effective strategy in the treatment of positive and negative symptoms of schizophrenia (Farhall et al., 2007; Pilling et al., 2002; Rector and Beck, 2002; Wykes et al., 2008).

Unfortunately, CBT is not widely accessible to persons with schizophrenia (particularly in the United States). This has prompted researchers to examine more efficient ways of delivering this intervention, such as group therapy (Mueser and Noordsy, 2005), which has comparable effect sizes to individual CBT for psychosis (Wykes et al., 2008). Group CBT for auditory hallucinations has been shown to reduce negative beliefs about voices (and voice severity) in a pilot open trial (Pinkham et al., 2004), to reduce the distress associated with auditory hallucinations in individuals early in their psychotic illness relative to wait-list controls (Newton et al., 2005), and to reduce overall symptoms and auditory hallucinations, and increase insight in a chronically ill sample (Wykes et al., 1999). However, these findings were not replicated in a follow-up study that compared group CBT to treatment as usual, instead finding that CBT was associated with improved social functioning (Wykes et al., 2005). In

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addition, the effectiveness of group CBT for auditory hallucinations has not been examined in the context of an active comparison treatment condition. Thus, the aim of this study was to evaluate the effectiveness of group CBT for auditory hallucinations compared to an enhanced supportive therapy (Penn, 2004). Our primary hypothesis was that group CBT would have a stronger impact on auditory hallucinations than group ST (i.e., on distress and negative beliefs surrounding auditory hallucinations). A secondary hypothesis is that group CBT would be superior to group ST in reducing psychotic and general symptoms (due to the teaching of cognitive behavioral coping strategies), improving insight, and reducing hospital readmission rates. There were no a priori hypotheses concerning social functioning or self-esteem.

2. Method

2.1. Participants

The participants in this assessor blind RCT comparing group CBT to group ST were recruited from an outpatient clinic at a local hospital and local community mental health centers in central North Carolina (USA) (resulting in five study "cohorts," with each cohort comprising a group receiving CBT and one receiving ST). Individuals were referred to the study by their primary clinician based on potential eligibility. Participants (from this convenience sample) needed to meet the following criteria: 1) a diagnosis of schizophrenia or schizoaffective disorder; 2) between the ages 18 and 65 years old; and 3) presence of current persistent auditory hallucinations of at least moderate severity (i.e., had a rating of at least 4 on the Positive and Negative Syndrome Scale) (PANSS); (Kay et al., 1987); 4) participants must have undergone at least two pharmacological trials, one of which being an atypical neuroleptic or clozapine for 8 weeks prior to randomization (Conley et al., 1997). Participants were excluded if they met criteria for mental retardation (based on both IQ and functional impairment criteria) or current substance dependence (Fig. 1).

2.2. Treatment groups

2.2.1. Group CBT for auditory hallucinations

The group CBT intervention for auditory hallucinations is a manual-based treatment that comprises 12 one-hour weekly sessions based on the work of Wykes et al. (Wykes, 2004; Wykes

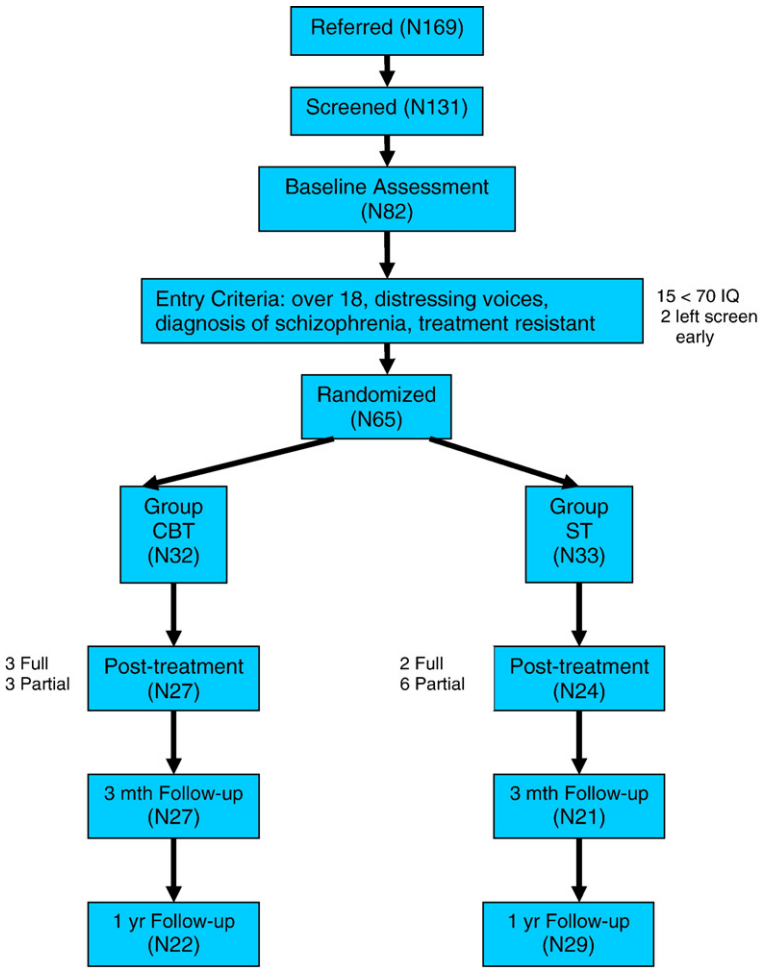

Fig. 1. CONSORT diagram.

et al., 1999, 2005). The sessions covered the following themes: Session #1) introduction to treatment, Sessions #2–3) psychoeducation, Sessions #4–5) content of auditory hallucinations (i.e., what is the theme of clients' voices, such as whether they are benevolent or malevolent), Sessions #6–7) behavioral analysis of auditory hallucinations, Sessions #8–9) increasing and decreasing strategies for auditory hallucinations (i.e., identifying situations that increase and decrease hallucination severity), Sessions #10–12) coping strategies for auditory hallucinations. We modified the Wykes et al. (1999) manual in the following ways: 1) emphasizing coping skills rather than cognitive restructuring; 2) deemphasizing self-esteem work; and 3) expanding the protocol from 6–12 sessions so that more time can be spent on each of the above themes.

The initial sessions focused on building rapport among the group members and the therapists, and on pointing out to participants that many other individuals have experiences similar to their own. Time was spent teaching current theories of psychosis and explaining commonly used treatments. CBT techniques, such as self-monitoring and coping strategies, were at the heart of the intervention. Self-monitoring was employed by asking participants to monitor their thoughts and actions prior to, during, and after auditory hallucinations. This allowed for the identification of any patterns that may be present and encouraged a functional analytic approach to their experiences. After completing these exercises, individuals began to utilize coping strategies when they experienced auditory hallucinations and were asked to monitor the effectiveness of these coping strategies. Over the course of treatment, multiple coping strategies were tried, and participants were encouraged to continue using the strategies that allowed them to feel more control over their auditory hallucinations and that reduced the amount of distress they experienced.

2.2.2. Group ST

Enhanced ST is a 12-week manual-based intervention which comprises emotional support and counseling of non-symptom related problems, such as improving social relations with others (Penn et al., 2004). The primary goal of enhanced ST is to improve social integration into the community by providing a supportive environment for the client and helping the client become more satisfied with their level of social functioning and integration (Penn, 2004). We chose an enhanced ST approach for two reasons: 1) we felt that this would provide a more stringent test of the effectiveness of CBT for auditory hallucinations; and 2) it would more closely approximate the type of supportive therapy intervention used in the community, then an attention control intervention that has little explicit therapeutic elements (e.g., Befriending; Sensky et al., 2000).

Enhanced ST was divided into three phases: 1) establishing a therapeutic alliance, 2) agreeing on interpersonal goals (for each group member), and 3) focusing on social integration (i.e. identifying steps to achieve those interpersonal goals). The group took a direct approach to solving problems often relying on advice from the therapists and other group members. Thus, unlike CBT, the group leaders provided direct advice for client questions/problems, and solicited advice and suggestions from group members. Each session lasted about 1 h and involved a brief check-in with group members to discuss any recent events, a review of homework if assigned, a discussion of interpersonal goals, and any progress or obstacles related to goals.

2.2.3. Therapists and fidelity

The therapists included a clinical psychologist, a psychiatrist, a social work graduate student, and doctoral students in clinical psychology with the equivalent of at least a Master's degree in psychology. Therapists were trained in the intervention via didactic presentations, directed readings, and role-playing prior to the first group session (and listening to CBT or ST tapes from other competent therapists in previous cohorts). The PI (who served as clinical supervisor) further evaluated competence via listening to every therapy session and providing detailed feedback/comments to therapists during weekly supervision meetings.

A check on treatment adherence was performed by having two raters code all 120 audiotaped group sessions. The two raters, who were blind to treatment type, correctly coded 92% of the group sessions as either CBT or ST (Note: if Session #12, which was often devoted to wrapping up and an end-of-treatment celebration, was excluded from the analyses, then classification accuracy increased to 95%).

2.3. Procedures

All recruitment procedures and research evaluations were conducted by two research assistants (RAs) who were blind to treatment assignment and received ongoing supervision from the primary investigator (DP). Experimental blindness was maintained by asking participants not to talk to the RAs about their treatment. In addition, the RAs had minimal contact with the study therapists. Finally, RAs were kept blind to the coding system used to denote group membership. Once potential participants were identified by their primary clinician and agreed to be contacted, they were screened for auditory hallucinations and interest in the study. These individuals were then interviewed to assess eligibility and obtain consent, and if they were deemed eligible, the participants were assessed on the outcome measures.

Participants who completed the screening and baseline interviews were randomly assigned to one of two conditions that both lasted 12 weeks: 1) group CBT or 2) group ST. Randomization was stratified by gender to ensure equal numbers across groups using a computer randomization generator. Randomization to treatment condition (with condition being designated by a random number), was conducted by a RA blind to the correspondence between random number and treatment group. Both the CBT and ST groups had 2 therapists and 4 to 7 participants in each group. Following the completion of group therapy, participants were evaluated post-treatment and again, 3 and 12 months later.

3. Measures

Participants were assessed at baseline, post-treatment, 3 month, and 12-month follow-up on measures of symptoms, mood, self-esteem, insight, social functioning, and hospitalizations by research assistants blind to treatment group. Below, the battery is summarized in terms of screening measures (prior to baseline) and primary and secondary outcomes.

3.1. Screening measures

Diagnosis was verified by the Structured Clinical Interview for DSM-IV (SCID-P) (First et al., 1996) and a chart review.

IQ was estimated using the Wechsler Abbreviated Scales for Intelligence (WASI) (The Psychological Corporation, 1999), which is comprised of Matrix Reasoning, Vocabulary, Similarities, and the Block Design subtests. The Wide Range Achievement Test—Revised (WRAT-R) (Jastak and Wilkinson, 1984) reading subtest was used to evaluate reading level and as a general measure of premorbid cognitive functioning.

3.2. Primary outcomes

The Psychotic Symptom Rating Scales for auditory hallucinations (PSYRATS) (Haddock et al., 1999) consists of 11 items that measure the severity of auditory hallucinations over the past week. The items measure the frequency, intensity, and interference of auditory hallucinations on a 4-point scale. Items are summed for a total score as well as subscales. For this study, we focus only on total scores (higher scores reflect more severe auditory hallucinations).

The Belief about Voices Questionnaire—Revised (BAVQ-R) (Chadwick et al., 2000) is a 35-item measure of beliefs about auditory hallucinations and the emotional and behavioral reactions to them. Performance is indexed based on the five BAVQ-R subscales: malevolence, benevolence, resistance, engagement, and omnipotence.

3.3. Secondary outcomes

Interviewer-rated secondary outcome measures included the three subscales (i.e., positive, negative, and general symptoms) and total score from the PANSS (Kay et al., 1987). Raters were trained using a series of "gold standard" videotapes (i.e., ICCs $\geq$ .80) and conducted consensus ratings with 6 participants.

The PSYRATS for delusions scale consists of 6 items that measure the severity of delusions over the past week. The items measure the frequency, intensity, and interference of delusions on a 4-point scale. Items are summed for a total score.

Self-report outcome measures included the Social Functioning Scale (SFS) (Birchwood et al., 1990); the Beck Depression Inventory II (BDI-II) (Beck et al., 1996); the Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 1965); and the Beck Cognitive Insight Scale (BCIS) (Beck et al., 2004). A composite index of insight was computed from the BCIS; higher scores reflect greater cognitive insight.

Frequency and duration of readmission to the hospital were measured using participant self-report that was verified by chart review. Both the number and duration of hospitalizations were recorded.

3.4. Data analysis overview

Statistical power was calculated prior to the study. It was based on pilot data from an open trial of group CBT for voices which showed large effect sizes for beliefs and distress associated with voices (Pinkham et al., 2004). With a sample size of 65, the power to detect a significant difference following treatment was estimated to be approximately .80.

Analyses using the general linear model were conducted to compare outcomes (continuous variables) across time for the two treatment groups; generalized linear models were also used for categorical outcomes (we categorized some outcomes due to their extreme skew in distributions). We analyzed data on all participants irrespective of treatment adherence (i.e., intent-to-treat analyses) and number of post treatment assessments. These models can accommodate repeated measures of outcomes with compound symmetry assumptions on covariance patterns. The general linear models also allow different variation of outcomes for different cohorts. Time, treatment group, and time $\times$ treatment group were the primary predictors and retained in all primary analyses regardless of statistical significance. A significant treatment $\times$ time interaction indicates that the difference between CBT and ST groups changes over the post-treatment assessments. If significant interactions were present, we analyzed group differences separately at each time point (i.e., post-test through the one year follow-up). A significant treatment effect, in the absence of a significant interaction, indicates that the difference between the CBT and ST groups is consistent over time (i.e., post-test through 12-month follow-up).

4. Results

4.1. Preliminary analyses

There were very few study drop-outs: 63/65 participants completed the post-test assessments (96.9%) and 59 participants completed the 3 month follow-up assessment (90.7%) (i.e. attrition: CBT = 5/32; ST = 1/33; *ns*). Fifty one participants completed the one-year follow-up assessment (78.5%) (attrition: CBT = 10/32; ST = 4/33; $p = .061$).

Compared to study drop-outs, participants who completed the one-year follow-up had more years of education (12.88 vs. 11.86), a greater number of hospitalizations (8.59 vs. 4.79), and lower baseline social functioning (as measured by the SFS) (120.75 vs. 137.42). We also compared the participants in the CBT group who dropped out prior to one year relative to those who did not (given the marginally significant difference in drop-out rates between CBT and ST at one-year follow-up). The results showed that compared to drop-outs, participants who completed the one-year follow-up had more years of education (13.27 vs. 11.90). This suggests that group CBT may be especially tolerable for more educated clients with schizophrenia/schizoaffective disorder with persistent auditory hallucinations.

Participants attended an average of 8.3 sessions of CBT and 7.9 sessions of ST. We defined therapy completion as attendance to at least 6 therapy sessions. Fifty-one participants (78%) completed six or more sessions (CBT = 26; ST = 25). The only significant difference between the completers and non-completers was on baseline education level. The completers had significantly more years of education (mean = 12.9, SD = 1.5 vs. mean = 11.9, SD = 1.5; $t(63) = 2.04$, $p = .045$) than the non-completers.

Demographic and clinical characteristics of the 65 participants randomized to treatment are listed in Table 1. Among the 63 participants who had post-treatment data, there were no significant group differences on any demographic or

baseline clinical characteristics other than living status, IQ score, and age of first hospitalization; individuals in the CBT group were more likely to live alone, have a higher IQ and have their initial hospitalization at a younger age than participants in the ST group. The analyses described below controlled for these differences.

4.2. Primary analyses

The primary outcomes, the PSYRATS voices scale and the BAVQ-R subscales (malevolence, resistance, omnipotence, benevolence, and engagement), were analyzed for treatment differences at each assessment (post-test, 3 month follow up, one-year follow up). Time of assessment was incorporated into these models as a discrete variable whereby effect codes were used to differentiate the post-treatment, 3 month, and one year follow-ups. This was done, in part, to control for the differences in the amount of time that had elapsed between assessments (Table 2).

To control for pre-treatment (i.e., baseline) levels of the outcomes, the baseline measure was included as a covariate. The inclusion of the baseline measure as a covariate allowed the post-test, 3 month, and 12-month follow-ups to be interpreted as change in the outcome relative to an individual's pre-treatment level on that outcome. If the treatment × time interaction was not significant (i.e., there was no significant changes in the effect of treatment from post-test to the one-year follow-up), we calculated the adjusted means for CBT and ST groups across time (i.e., the treatment main effect). IQ and age of initial hospitalization were also included as covariates. Cohort membership was included as compound symmetric covariance parameters unless otherwise stated.

Table 1
Baseline characteristics of the sample.

	CBT	ST
	$N=32$	$N=33$
	N (%)	N (%)
Gender (male)	17 (53)	16 (49)
Ethnicity		
Caucasian	19 (59)	17 (52)
African-American	13 (41)	15 (46)
Diagnosis		
Schizophrenia	17 (53)	15 (45)
Schizoaffective disorder	15 (47)	18 (55)
Employment	16 (50)	12 (36)
Living status		
Living Status With parents	7 (22)	8 (24)
Group home	9 (28)	12 (36)
Residential	3 (9)	9 (27)
Extended family	3 (9)	2 (6)
Other (including alone)	10 (31)	2 (6)
Medication—atypical	31 (97)	29 (88)
	M (SD)	M (SD)
Age	41.7 (11.8)	39.6 (15.7)
Education	12.8 (1.6)	12.7 (1.5)
IQ	98.2 (14.4)	89.0 (17.7)
WRAT	97.7 (14.3)	92.8 (14.9)
Age of first hospitalization	27.7 (9.1)	22.8 (8.7)
Psychiatric hospitalizations	7.6 (6.6)	7.9 (5.6)

There were no significant treatment × time interactions for any the BAVQ-R subscales: malevolence ($F(2,105)=.82$, $p=.442$), resistance ($F(2,105)=.33$, $p=.721$), omnipotence ($F(2,105)=.45$, $p=.641$), benevolence (X^2 (2) $=.44$, $p=.804$), and engagement (X^2 (2) $=.30$, $p=.861$) or the PSYRATS voices scale ($F(2,105)=.30$, $p=.743$). Analyses revealed a significant treatment effect for the BAVQ-R malevolence ($F(1,58)=4.26$, $p=.044$, $d=.54$) and a marginally significant effect for the BAVQ-R resistance subscale ($F(1,58)=2.93$, $p=.09$, $d=.45$), but not for the PSYRATS voices scale: $F(1,58)=.70$, $p=.406$). Given the non-significant treatment × time interactions, the data suggest that the treatment effect was essentially stable over all post-treatment assessment periods. The ST group rated their auditory hallucinations as less malevolent and was less likely to resist the voices relative to the CBT group after controlling for baseline scores, IQ, and age of initial hospitalization. This effect was maintained regardless of the post-treatment assessment period.

Consistent with previous work in this area (Wykes et al., 2005), we examined whether cohort interacted with the intervention. Treating cohort as a fixed effect found no evidence of interactions between treatment and cohort for the BAVQ-R subscales or PSYRATS voices scale.

4.3. Secondary analyses

As with the primary outcomes, secondary outcomes were examined for treatment and treatment × time effects. If the treatment × time interaction was not significant, adjusted means for CBT and ST groups across time were estimated. Baseline score, IQ, and age of initial hospitalization were included as covariates. Cohort membership was included as compound symmetric covariance parameters unless otherwise stated.

There were no significant treatment × time interactions for any of the secondary outcomes. A significant treatment effect was found for PANSS total scores. The CBT group had lower total symptoms than the ST group ($F(1,57)=5.80$, $p=.019$, $d=-.64$) through 12-month follow-up. A significant treatment effect was also observed for the PANSS general symptoms ($F(1,58)=5.74$, $p=.02$, $d=-.63$), and a marginally significant treatment effect was observed for positive symptoms ($F(1,58)=3.30$, $p=.074$, $d=-.48$); participants in the CBT group had lower general and positive symptoms than the ST group through 12-month follow-up. In addition, a non-significant treatment effect was observed for the BCIS composite score; $F(1,58)=2.63$, $p=.11$, $d=.43$; individuals who received CBT had, on average, (non-significantly) higher insight over 12-month follow-up compared to participants in the ST group.

Analyses of hospitalization data revealed that the two groups did not significantly differ in number of hospitalizations across time ($X^2(1)=.14$, $p=.706$) (although the ST group had twice the number of hospitalizations as the CBT group at post-test), or days hospitalized across time ($X^2(1)=.05$, $p=.818$).

Treating cohort as a fixed effect found only one of the secondary outcome variables (BCIS) interacted with cohort ($F(4,50)=5.36$, $p=.001$); CBT was associated with higher insight than ST for cohorts #1, #2 and #4, while an opposite pattern was observed for cohorts #3 and #5. However, given that a significant treatment × cohort interaction was not

Table 2
Primary and secondary outcomes (means, SDs, *F* tests).

	CBT	ST	Treatment	Treatment × time
	M (SD)	*M* (SD)	*F*(1,58)	*F*(2,105)
Primary outcomes				
PSYRATS-voices			.70	.30
Baseline	26.5 (5.5)	28.8 (5.1)		
Post-treatment	25.4 (7.4)	26.3 (6.8)		
3-month follow-up	25.6 (6.9)	25.7 (8.4)		
1 year follow-up	23.0 (9.6)	23.0 (10.0)		
BAVQ-R malevolence			4.26*	.82
Baseline	7.3 (5.5)	9.5 (4.9)		
Post-treatment	8.0 (5.8)	7.6 (5.1)		
3-month follow-up	7.8 (5.1)	8.1 (5.4)		
1 year follow-up	6.3 (5.4)	6.7 (4.9)		
BAVQ-R benevolence			X^2 (1) = .11	X^2 (2) = .44
Baseline	6.2 (5.3)	5.8 (5.2)		
Post-treatment	4.5 (4.9)	4.5 (4.7)		
3-month follow-up	4.4 (5.3)	5.7 (5.5)		
1 year follow-up	5.3 (5.2)	6.2 (5.4)		
BAVQ-R resistance			2.93#	.33
Baseline	14.2 (7.2)	18.1 (5.9)		
Post-treatment	15.5 (6.9)	16.8 (6.2)		
3-month follow-up	15.0 (7.3)	16.3 (6.6)		
1 year follow-up	13.9 (7.8)	15.3 (7.3)		
BAVQ-R engagement			X^2 (1) = .04	X^2 (2) = .30
Baseline	6.6 (6.4)	6.9 (6.3)		
Post-treatment	6.2 (6.8)	5.5 (5.5)		
3-month follow-up	5.4 (5.7)	7.8 (7.4)		
1 year follow-up	6.4 (7.2)	7.3 (6.8)		
BAVQ-R omnipotence			1.73	.45
Baseline	8.3 (4.3)	9.3 (3.6)		
Post-treatment	7.1 (3.7)	6.9 (4.3)		
3-month follow-up	8.0 (4.2)	8.6 (5.0)		
1 year follow-up	7.3 (3.3)	7.7 (4.3)		
Secondary outcomes				
PANSS total			5.80*	1.97
Baseline	59.6 (10.8)	63.9 (9.7)		
Post-treatment	55.0 (8.8)	59.1 (9.6)		
3-month follow-up	52.2 (10.7)	59.9 (10.5)		
1 year follow-up	52.7 (10.1)	58.4 (11.2)		
PANSS positive			3.30#	1.52
Baseline	16.6 (4.5)	18.5 (3.8)		
Post-treatment	14.5 (3.7)	15.9 (4.4)		
3-month follow-up	14.2 (4.0)	16.5 (4.0)		
1 year follow-up	13.6 (3.4)	15.9 (3.6)		
PANSS negative			.74	.15
Baseline	13.8 (4.2)	14.0 (3.8)		
Post-treatment	13.5 (3.3)	13.4 (2.9)		
3-month follow-up	12.4 (3.9)	12.7 (3.7)		
1 year follow-up	12.9 (4.4)	13.2 (4.9)		
PANSS general			5.74*	1.93
Baseline	29.2 (6.4)	31.4 (5.1)		
Post-treatment	27.0 (4.9)	29.0 (6.3)		
3-month follow-up	25.6 (5.3)	30.0 (7.1)		
1 year follow-up	26.0 (5.1)	29.6 (6.2)		
PSYRATS-delusions			X^2 (1) = .00	X^2 (2) = 2.94
Baseline	9.6 (6.8)	12.0 (5.8)		
Post-treatment	8.6 (7.0)	10.0 (6.3)		
3-month follow-up	8.0 (7.7)	10.4 (5.9)		
1 year follow-up	6.9 (7.0)	9.0 (6.8)		
BCIS (composite)			2.63##	.92
Baseline	5.5 (6.9)	5.0 (4.6)		
Post-treatment	6.7 (6.3)	6.0 (5.8)		
3-month follow-up	4.2 (6.6)	4.7 (5.4)		
1 year follow-up	4.4 (5.6)	3.7 (4.4)		
SFS			.00	.16
Baseline	125.3 (22.6)	120.5 (23.2)		
Post-treatment	129.6 (21.1)	124.2 (22.4)		
3-month follow-up	129.1 (20.5)	121.9 (23.3)		
1 year follow-up	128.5 (28.5)	119.7 (24.2)		
BDI-II			.65	1.21
Baseline	14.6 (10.0)	18.1 (10.0)		
Post-treatment	11.4 (7.6)	12.6 (10.2)		
3-month follow-up	10.5 (8.5)	13.9 (10.7)		
1 year follow-up	11.5 (9.4)	17.9 (13.6)		
RSES			.73	.46
Baseline	29.5 (6.6)	27.1 (5.0)		
Post-treatment	29.8 (5.4)	28.2 (5.0)		
3-month follow-up	29.4 (6.0)	28.6 (6.2)		
1 year follow-up	29.3 (7.6)	27.6 (6.7)		
Hospitalizations (1 or more)			X^2(1) = .14	X^2(2) = 3.18
During treatment	3 (10%)	7 (21%)		
3-month follow-up	3 (10%)	5 (15%)		
1 year follow-up	4 (18%)	3 (11%)		
Days hospitalized			X^2(1) = .05	X^2(2) = 1.55
During treatment (>4 days)	3 (10%)	5 (15%)		
3-month follow-up (>4 days)	2 (7%)	4 (12%)		
1 year follow-up (>4 days)	4 (18%)	3 (11%)		

*p<.05; #p<.10; ##p = .11.

observed for any of the other fifteen primary or secondary outcomes, it is likely that this finding was due to chance rather than systematic cohort effects.

5. Discussion

The purpose of this study was to compare the effectiveness of group CBT for auditory hallucinations to enhanced group ST for outpatients with medication-resistant auditory hallucinations. In terms of our primary outcome, only the ST group showed a reduction in negative beliefs through 12-month follow-up, while CBT was associated with a reduction in psychotic symptoms through 12-month follow-up. These results are discussed in more detail below.

Enhanced ST was specifically associated with a reduction in negative beliefs about voices through the one year follow-up. As mentioned earlier, the goals of enhanced ST are to increase social integration in the community and improve clients' satisfaction with their social support. By focusing on increasing social integration (via increasing activity levels), our ST may have increased clients' sense of self-efficacy and social potency, which could have generalized to their relationship to their voices, as posited by social rank theory and practice (Birchwood et al., 2002, 2000; Trower et al., 2004). These conclusions are tempered, however, by the fact that the reduction in negative beliefs about voices did not translate into changes in self-esteem or social functioning. Thus, the mechanisms underlying enhanced ST are not clear at this time. Thus, at this point, it does appear that enhanced ST may be effective in reducing negative reactions to auditory hallucinations, which is consistent with research showing that supportive therapies have non-trivial effects on a variety of outcomes (Penn et al., 2004).

Group CBT was not associated with a reduction in voice distress or intensity (as measured by the BAVQ-R and PSYRATS), contrary to our expectations. This might have

been due to the fact that our group CBT protocol did not focus on cognitive restructuring (belief modification) but on coping with voices. Rather, we found that group CBT resulted in a reduction in general and total symptoms on the PANSS through 12-month follow-up. Perhaps clients used CBT strategies to manage the consequences of persistent auditory hallucinations (i.e. general symptoms) rather than the voice themselves. Of course, this is merely speculation, but it does suggest that client who received group CBT group learned skills to manage persistent symptoms, which they were able to use even after treatment had ended. In this regard, the findings are somewhat consistent with Sensky et al. (2000), who found an advantage for CBT over Befriending therapy at 9-month follow-up (but not at post-treatment).

These results are not consistent with other recent group CBT studies for psychotic symptoms. Specifically, neither Barrowclough et al. (2006), Bechdolf et al. (2004) nor Wykes et al. (2005) found that group CBT significantly reduced psychotic symptoms (although the Wykes study found that CBT was more effective for some cohorts more than others in impacting symptoms and social functioning). However, our study differs from these others in a number of ways. First, our study was conducted with outpatients (in contrast to Bechdolf et al., 2004), who were less symptomatic and higher functioning than Barrowclough et al. (2006), and had higher self-esteem than Wykes et al. (2005). Second, a greater proportion of our participants had schizoaffective disorder than in Barrowclough et al. or Wykes et al. Third, our U.S. sample likely differed from the European samples in terms of prior exposure to CBT-type interventions and in health care systems. And finally, CBT for psychosis is not homogeneous. Therefore, our intervention may have differed from previous studies in a number of ways (e.g., emphasis on cognitive restructuring vs. coping, session length, etc.). Thus, any of these variables might have accounted for the different findings across these studies.

This study has a number of strengths and weaknesses which should be acknowledged. Strengths include the use of raters blind to treatment assignment, utilization of psychometrically sound outcome measures, characterization of the participants, and clearly differentiated treatments. In addition, the tolerability of group CBT (i.e., drop-out and attendance rates) was comparable to other recent studies of group CBT for psychosis (Barrowclough et al., 2006; Bechdolf et al., 2004).

The study also had a number of weaknesses. Specifically, the sample size was modest, allowing us to detect only moderate or large differences between the two treatments. Our initial power analysis was based on our previous uncontrolled pilot trial (Pinkham et al., 2004) which may have over-estimated the expected treatment effects. Other weaknesses include the brevity of the CBT protocol (i.e., 12 sessions), the lack of independent ratings of therapist competence (in addition to the weekly supervision that the PI provided to study clinicians), the lack of periodic blindness checks, and the omission of a treatment as usual (TAU) only comparison group. The absence of a TAU group prevents us from confidently concluding that the symptom reduction observed from the CBT and ST groups was not due solely to the passage of time. However, the fact that CBT has shown to be more effective than TAU in previous research (Farhall et al., 2007; Pilling et al., 2002; Rector and Beck, 2002) and that our participants had stable yet persistent psychotic symptoms, partially militates against this potential limitation.

In closing, the results of this study indicate that both group CBT and group ST have beneficial effects, although on different outcomes. Both interventions appear to be feasible and well-tolerated by participants as drop-out rates were low. And, the positive impact of enhanced ST on beliefs about voices suggests that interventions that combine CBT and ST elements might be particularly promising for treatment of medication resistant psychotic symptoms.

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Contributors

DLP designed the study and wrote the protocol. PSM wrote the first draft of the manuscript. EE managed the study and contributed to the manuscript. KC and MB undertook the statistical analyses. All authors contributed to and have approved the final manuscript.

Conflict of interest

There were no conflicts of interest in this study or in preparing this manuscript.

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