Original Investigation

Sustained and "Sleeper" Effects of Group Metacognitive Training for Schizophrenia
A Randomized Clinical Trial

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IMPORTANCE Cognitive interventions increasingly complement psychopharmacological treatment to enhance symptomatic and functional outcome in schizophrenia. Metacognitive training (MCT) is targeted at cognitive biases involved in the pathogenesis of delusions.

OBJECTIVE To examine the long-term efficacy of group MCT for schizophrenia in order to explore whether previously established effects were sustained.

DESIGN, SETTING, AND PARTICIPANTS A 2-center, randomized, controlled, assessor-blind, parallel group trial was conducted. A total of 150 inpatients or outpatients with *DSM-IV* diagnoses of schizophrenia spectrum disorders were enrolled. All patients were prescribed antipsychotic medication. The second follow-up assessment took place 3 years later after the intervention phase was terminated.

INTERVENTIONS Group MCT targeting cognitive biases vs neuropsychological training (COGPACK). Patients received a maximum of 16 sessions.

MAIN OUTCOMES AND MEASURES The primary outcome measure was a delusion score derived from the Positive and Negative Syndrome Scale (PANSS). The PANSS positive syndrome and total scores, the Psychotic Symptom Rating Scales, the jumping to conclusions bias, self-esteem, and quality of life served as secondary outcome measures.

RESULTS The intention-to-treat analyses demonstrated that patients in the MCT group had significantly greater reductions in the core PANSS delusion score, after 3 years compared with the control group ($\eta^2_{partial}$ = .037; *P* = .05). Among the secondary outcomes, the intention-to-treat analyses also demonstrated that patients in the MCT group had significantly greater reductions in the PANSS positive syndrome score ($\eta^2_{partial}$ = .055; *P* = .02) and the Psychotic Symptom Rating Scales delusion score ($\eta^2_{partial}$ = .109; *P* = .001). Significant group differences at the 3-year follow-up were also found on measures of self-esteem and quality of life, which did not distinguish groups at earlier assessment points. Attention was improved in the neuropsychological training group relative to the MCT group. The completion rate was 61.3% after 3 years.

CONCLUSIONS AND RELEVANCE Metacognitive training demonstrated sustained effects in the reduction of delusions, which were over and above the effects of antipsychotic medication. Moreover, there were some unanticipated ("sleeper") effects as both self-esteem and quality of life were improved after 3 years. Effects on self-esteem and well-being were found even in the absence of an improvement on the jumping to conclusions bias.

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The last 2 decades have witnessed substantial innovations in the treatment of schizophrenia. Meta-analyses assert that some second-generation antipsychotics are superior to first-generation drugs in efficacy and side-effect profile.[1] Still, few patients show sustained symptom recovery—even when taking the newer compounds—and poor adherence is common.[2-4] To narrow the treatment gap,[5] adjunctive interventions are therefore vital. Empirical data assert that cognitive-behavioral therapy (CBT) yields a small to medium effect on psychosis beyond the efficacy of antipsychotic medication.[6-9]

A novel direction in cognitive therapy, which has evolved from CBT, deals with cognitive biases[10-12] (eg, jumping to conclusions and overconfidence in errors). A number of studies[13-16] have linked these deviations with positive symptoms in schizophrenia.

Metacognitive training (MCT) is a manualized group training program, which is currently available in 31 languages (free download at www.uke.de/mct). The training targets cognitive biases putatively involved in the formation and maintenance of psychotic symptoms, such as attributional distortions (eg, monocausal attributions),[17,18] jumping to conclusions,[19,20] overconfidence in errors,[21] and a bias against disconfirmatory evidence (ie, maintaining beliefs even when faced with compelling counterevidence),[22-24] as well as negative cognitive schemata and dysfunctional coping styles (eg, rumination) fostering depression[25,26] and impaired social cognition/theory of mind.[27] The primary aims of MCT are to transfer knowledge about basic research on cognitive distortions to patients and to raise awareness about the dysfunctionality of these biases.[11,12] The exercises pursue the goal of providing corrective experiences and teaching patients alternative information-processing strategies in an entertaining manner. Finally, normalization, an element of CBT highlighting that cognitive biases are normal to some degree, is an essential part of each module.

A number of pilot studies[28-30] have asserted the safety and feasibility of MCT. There is some evidence that MCT may help decrease the tendency to jump to conclusions (ie, participants gather more information before arriving at decisions).[30-33] In line with the rationale of the training, most studies[30,32,34-37] converge on the conclusion that MCT decreases delusion severity. A combination of MCT with social cognition training[38] showed significant positive effects on theory of mind, social perception, emotion recognition, and social functioning.

Recently, our research group randomly assigned 150 patients to either MCT or neuropsychological training and identified changes over time.[32] Significant improvement in delusion severity was found in the MCT group compared with the control (ie, neuropsychological training) group at the 6-month follow-up. We also found a trend toward a reduction of Positive and Negative Syndrome Scale (PANSS) positive symptoms. Favrod et al[36] investigated 52 patients who were randomly assigned to either MCT or treatment as usual and found significant effects for positive symptoms both after 4 weeks and at the 6-month follow-up.

There is evidence that MCT is a feasible intervention that is enjoyed by patients. Findings for the amelioration of positive symptoms and cognitive biases are promising but not conclusive because many studies were compromised by small sample sizes and short follow-up intervals. Moreover, the long-term effects of MCT remain unknown. The present trial builds on a previously published multicenter, assessor-blind, randomized, controlled trial[32] assessing the efficacy of MCT at 4 weeks and at 6 months. In the present article, the 3-year follow-up data are reported. We investigated whether the effects of MCT on positive symptoms previously observed at the 6-month follow-up are maintained at the 3-year follow-up. We did not make strong predictions regarding whether the beneficial effects of MCT would be sustained because the treatment was not individualized to a patient's needs, and it is possible that the poor memory[39] seen in many patients may compromise the transfer of skills to daily life. On the other hand, "sleeper" (previously unseen) effects could emerge at the long-term follow-up; that is, some potential psychological effects of MCT may surface once cognitive biases and symptomatology are stabilized. In addition, we were interested in examining whether MCT would show beneficial effects beyond positive symptoms, particularly on quality of life and self-esteem, as some studies reported a detrimental effect of improved insight on mood.[40]

Methods

Recruitment

Our trial was conducted through the Departments of Psychiatry and Psychotherapy at the University Medical Center Hamburg-Eppendorf (Germany) and the University of Heidelberg (Germany). Patients were recruited by staff members who were not involved in the training.

Design

Our trial was set up as an assessor-blind, randomized, controlled trial. Following baseline assessment, patients were randomly assigned to either MCT or neuropsychological training using COGPACK,[41] and they were reassessed at 4 weeks, 6 months,[32] and 3 years later. Approval was obtained from the local ethics committees, and the trial was registered (ISRCTN95205723). Patients provided written informed consent. We applied rather broad inclusion criteria: age between 18 and 65 years and fulfillment of *DSM-IV* diagnostic criteria for a schizophrenia spectrum disorder according to a semistructured interview (Mini-International Neuropsychiatric Interview), which was conducted by trained blinded raters. A present or prior episode of delusional symptoms was also mandatory, as assessed via clinical interview. Exclusion criteria were substance dependence, an IQ of less than 70, severe organic brain damage, and scores of 5 or higher on the PANSS hostility item and of 6 or higher on PANSS suspiciousness item. (This criterion may appear contradictory because the program is targeted at delusions. However, according to our experience with earlier MCT groups, severely psychotic patients should not attend group sessions because they might distract other group members.) In order to examine whether MCT acted

prophylactically or perhaps even helped in cases with minor symptom load, no minimum symptom threshold was defined for inclusion.

Randomization was performed after baseline assessment by means of a pseudorandom and fixed procedure. Participants were informed about group allocation by a research assistant who was not involved in the assessments or in the administration of the training.

Patients were reimbursed for their participation in the assessment sessions (€15 before and after treatment, and €30 at each follow-up). Patients were recontacted for the 3-year follow-up by mail and/or telephone (depending on the information provided at enrollment).

Outcomes

Psychopathological Assessment

A diagnosis of schizophrenia was verified with the Mini-International Neuropsychiatric Interview.[42] A core delusion score derived from the PANSS served as the primary outcome measure (ie, sum score of PANSS items P1, P5, and P6). Both the PANSS and the Mini-International Neuropsychiatric Interview have good psychometric properties.[43] Raters were experienced in the administration of schizophrenia rating scales. Adherence to standard operating procedures was confirmed during a 2-day rater training session. The PANSS total score served as an additional secondary outcome measure.

Core positive symptoms were also assessed with 2 sections of the Psychosis Rating Scales on hallucinations and delusions. Ratings are aided by a semistructured interview and well-defined anchor points. The Psychosis Rating Scales yield good to excellent psychometric properties.[44,45]

We applied several precautions to keep raters blinded with respect to group allocation in order to prevent the Rosenthal effect: (1) assessors did not work at times when the training groups were performed, and (2) participants were explicitly instructed not to disclose their group assignment to the assessor.

Jumping to Conclusions

A computerized variant of the probabilistic reasoning task[19] was administered, which differs from the original task[46,47] in that a different scenario (lakes with fish instead of jars with beads) is used. Two lakes with colored fish in opposing ratios (eg, 80% orange vs 20% gray fish, and vice versa) were presented to the participant. After each "catch," the participant was required to make 2 judgments: (1) a probability judgment about the likelihood that the fish was or were being caught from lake A or lake B, and (2) a judgment as to whether the available amount of information would justify a decision or not. It was emphasized that the fish would be caught from the same lake throughout the entire experiment. The ratio of fish in each lake was shown throughout the experiment, and each new fish was displayed along with previously caught fish.[48,49] In total, 10 fish were caught; 1 lake was strongly suggested by the sequence (D = dominant color of fish; N = nondominant color of fish: D-D-D-N-D-D-D-D-N-D). Jumping to conclusions was defined as a premature decision after 1 fish. We also computed the number of draws to decisions.

Self-esteem

Self-esteem was assessed with the 10-item Rosenberg Self-Esteem Scale, which is regarded as the gold standard for the measurement of self-esteem and demonstrates high validity and reliability.[50]

Quality of Life

Quality of life was assessed using the Brief Quality of Life Questionnaire of the World Health Organization (WHOQOL-BREF).[51] The scale covers the following domains: physical health, psychological well-being, social relationships, and environment. We also analyzed data from the first (global) item "How would you rate your quality of life?" The reliability of the scale has been repeatedly confirmed for patients with schizophrenia.[52,53]

Neuropsychological Functioning

The story subtest of the Rivermead Behavioural Memory Task was administered to determine immediate and delayed recall.[54] The subtests A and B of the Trail Making Test were administered to assess speed of information processing and set shifting.[55] The letter cancellation measure "test d2"[56] was used to assess selective attention.

Other Questions

At the 4-week and 6-month assessments, we asked participants questions pertaining to the training (eg, acceptance and transfer to daily life) and whether they had received information about the other intervention.

Interventions

Metacognitive Training

The MCT group usually comprised between 4 and 8 patients. The intervention was delivered twice weekly by psychologists or psychology trainees. All MCT trainers had 1 to 3 years of experience with MCT.

Patients could participate for a maximum of 16 consecutive sessions: 8 sessions before the posttreatment assessment (4 weeks) and 8 sessions immediately after the posttreatment assessment. Missed sessions could not be made up. Metacognitive training is an open training, which means that patients can enter at any session. The modules cover the following topics: attributional style (the disadvantages of monocausal inferences are emphasized), jumping to conclusions (patients are advised to avoid hasty decision making), changing beliefs (patients are taught to be flexible and stay open to alternative interpretations), theory of mind/social cognition (patients are instructed to pay attention to multiple social cues before inferring the state of mind of another person), memory/overconfidence (patients learn to withhold strong judgments and to prevent overconfidence in false memories), and mood/self-esteem (CBT-based techniques are conveyed to raise self-esteem). Each MCT session lasts 45 to 60 minutes.

Control Condition (COGPACK)

COGPACK is a neuropsychological training program[41] that aims to improve neuropsychological functions, such as memory, that are commonly compromised in schizophrenia. Training was

Table 1. Baseline Characteristics

Characteristic	Mean (SD) MCT Group (n = 76)	Mean (SD) Control Group (n = 74)	Statistic	P Value
Demographic data				
Sex, No.				
Male	45	49	$\chi^2_1 = 0.79$	>.30
Female	31	25		
Age, y	36.82 (11.12)	32.68 (9.54)	$t_{148} = 2.44$	.02
Formal education, y	11.34 (1.65)	11.59 (1.67)	$t_{147} = 0.81$	>.30
Premorbid intelligence,[a] IQ	106.12 (13.63)	104.67 (13.84)	$t_{147} = 0.64$	>.50
Treatment-related data				
Hospitalizations (including present)	4.67 (4.69)	3.64 (4.41)	$t_{147} = 1.37$	>.10
Participants meeting Andreasen remission criteria, %	41	43	$\chi^2_1 = 0.09$	>.70
Cumulated antipsychotic dosage,[b] %	72.37 (61.59)	79.71 (63.20)	$t_{141} = 1.19$	>.20

Abbreviation: MCT, metacognitive group training.

[a] Vocabulary test.

[b] Renewed algorithm.

performed individually on personal computers in a group setting. For the present study, a fixed algorithm of tasks was administered covering a wide range of neuropsychological functions. The difficulty level is adapted automatically for each individual by the program. At the end of each task, patients received individual automated feedback on their performance. Each session lasted approximately 45 to 60 minutes. Similar to patients undergoing MCT, patients undergoing neuropsychological training could attend a maximum of 16 consecutive sessions (8 sessions within the pre-post interval and 8 sessions immediately thereafter).

Statistical Analysis

We performed the analyses by adopting both a per-protocol and an intention-to-treat (ITT) strategy. The ITT analysis considered all participants with available baseline data. The per-protocol analysis considered participants with end-point data.

The main results were computed using analyses of covariance because methodological studies suggest that controlling for baseline scores is advantageous relative to conventional pre-post comparisons and usually leads to an increase in power.[57,58] Unlike mixed analysis of variance models, this type of analysis accounts for baseline differences and regression to the mean.

Additionally, groups were compared using a constrained full-likelihood approach proposed by Liang and Zeger.[59] In brief, baseline values and follow-up values (both at 6 months and at 3 years) are modeled as dependent variables, whereby the baseline mean responses for the treatment groups are assumed to be equal (as patients were randomized). This constrained model provides flexibility in handling missing data for the ITT analyses by including all observed data, which results in more power when testing treatment differences compared with the longitudinal analysis of covariance model.[60] We conservatively applied an unstructured covariance matrix, along with the Kenward-Roger degrees of freedom approximation.[61,62]

A sample size calculation was performed with GPOWER[63] based on the assumption of a weak to medium effect size in favor of MCT ($\alpha = .05$; $1 - \beta = 0.8$). This indicated that 150 participants were needed to detect significant effects.

Results

Baseline Characteristics

Both the MCT group and the control group were comparable with respect to demographic, psychometric, and psychopathological data at baseline with the exception of age. Patients in the MCT group were older than participants in the control group (**Table 1**). At the 6-month follow-up, the completion rate was 86% (**Figure 1**). The completion rate at the 3-year follow-up was 61.3% (62% in the MCT group, and 61% in the control group). Group comparisons for participants who completed the 3-year follow-up revealed no significant differences in baseline demographic, psychopathological, or cognitive characteristics, with the exception of age, which was once again higher in the MCT group than in the control group ($t_{90} = 2.36$; $P = .02$).

Psychopathology

Table 2 shows results of the ITT and per-protocol analyses separately. For the PANSS core delusion score (primary outcome measure) at the 3-year follow-up, a significant difference was found in the ITT analysis ($P = .05$) but not in the per-protocol analysis ($P = .12$). Significant results in both types of analyses emerged for the PANSS positive score, which had previously achieved significance at posttreatment[32] (**Figure 2**; please note that Figure 2 displays the data for all participants available at the respective time point). In line with findings after treatment and at the 6-month follow-up, the Psychosis Rating Scales delusion subscale score was significantly lower in the MCT group than in the control group at the 3-year follow-up assessment. The ITT analysis, but not the per-protocol analysis, also revealed significant group differences for the PANSS total score.

Other Outcomes

In addition, some unprecedented ("sleeper") effects emerged: self-esteem significantly increased at the 3-year follow-up in the MCT group relative to the control group (in both the ITT analysis and the per-protocol analysis). Signifi-

cant increases were also found for the WHOQOL-BREF global item (in both the ITT analysis and the per-protocol analysis) and total score (in the per-protocol analysis only; for the ITT analysis, a trend emerged). The neuropsychological control group improved on selective attention (test d2) to a greater extent than the MCT group after 3 years. No other effects, including hallucinations, negative symptoms, cognitive biases, or memory, were significant. While the number of patients jumping to conclusions decreased significantly in the MCT group over time, there was no significant advantage over COGPACK on this variable at any time point. For the ITT analyses, a trend emerged in favor of the MCT group for draws to decisions. (This seems to conflict with the mean difference scores of the 2 groups shown in Table 2, which were essentially the same. Please note that analysis of covariance results consider the pairwise data, and that improvement was slightly higher for the MCT group than for the control group [0.88 vs 0.49].)

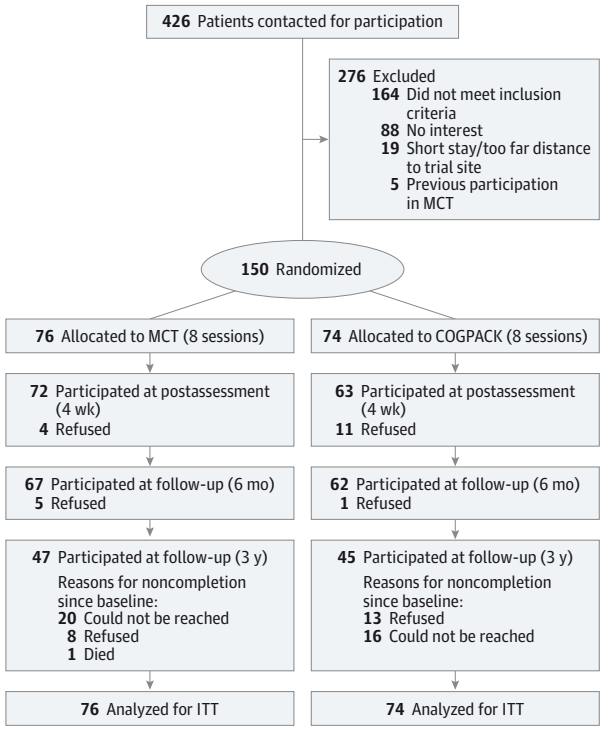
Completers

Cross-table and independent *t* test analyses revealed that completers were indistinguishable from noncompleters on all baseline parameters ($\chi^2 < 1$ or $t < 1$; $P > .20$).

Discussion

Psychotherapeutic interventions such as MCT are being increasingly introduced in psychosis treatment because only a minority of patients experience lasting recovery under psychopharmacological treatment alone.[64,65] The present trial assessed the long-term efficacy of MCT for patients with schizophrenia. The ITT analyses revealed a significant group difference in our primary measure, a delusion score derived from the PANSS. For the PANSS positive subscale, group differences became significant after 3 years. Selective improvements in the MCT group on delusion severity, as assessed with the Psychosis Rating Scales, were retained at the 3-year follow-up. The 3-year follow-up trial revealed some unexpected findings. Previously nonsignificant between-group differences in quality of life and self-esteem reached significance after 3 years. This finding is compatible with an earlier study[30] in which positive changes in quality of life emerged even earlier. The number of patients jumping to conclusions (which is thought to act as a modulator in the formation of delusions and the main target of the training) decreased in both groups similarly. Although this could reflect successful learning or practice effects, this unexpected finding may also be due to the following: (1) patients in the COGPACK control group improved in data gathering because they obtained information about the MCT goals, (2) MCT does not substantially influence data gathering but exerts its effects via other cognitive mechanisms, and (3) changes in this version of the jumping to conclusions task may be sensitive to multiple cognitive processes (greater self-awareness in the MCT group and better task comprehension in the COGPACK group[66]). Although jumping to conclusions may be considered the most important cognitive bias,[67] future studies should address other biases as well.

Figure 1. Patient Flowchart of a 2-Center, Randomized, Controlled, Assessor-Blind, Parallel Group Trial



MCT indicates metacognitive training; ITT, intention to treat.

Because we have not assessed this directly, we can only speculate that patients in the MCT group were perhaps more alert to their cognitive biases, which over time positively impacted behavior, social relationships, and self-esteem. In line with this, at the first follow-up, a significantly greater number of patients in the MCT group relative to COGPACK group affirmed that they had experienced situations in daily life[32] in which the training contents had proved helpful and that they would think more about alternative explanations before judging a situation.

The present study detected no differences in negative and disorganized symptoms, which are linked to patients' functional outcomes. Individualized treatment, such as specialized CBT or individualized metacognitive therapy (MCT+ program),[68] may be more effective at tackling these important domains.[11,69-71] Also, the trial was conducted with an older version of MCT. Since then, new exercises have been added. Future trials should ascertain whether these additions positively affect negative and depressive symptoms.

When designing the study, we had expected a double dissociation such that MCT would improve psychotic symptoms and biases, while COGPACK would improve neuropsychological faculties and perhaps negative symptoms.[70] Indeed, neuropsychological training improved attention to a greater

Table 2. Group Differences Across Time on Measures of Psychopathology, Cognitive Biases, Self-esteem, Quality of Life, and Neuropsychology

Domain, Variable	Mean (SD)[a]				Pretreatment vs Follow-up Group Comparison Controlling for Baseline (ANCOVA)			
	MCT Group (n = 76)		Control Group (n = 74)					
	Pretreatment	Follow-up	Pretreatment	Follow-up	Per-Protocol Statistics	*P* Value	ITT Statistics	*P* Value
Psychopathology								
PANSS								
Core delusion score	6.58 (3.20)	4.79 (2.46)[b]	6.26 (3.28)	5.73 (2.88)[c]	$F_{1,89} = 2.51$, $\eta^2_{partial} = .027$	.12	$\eta^2_{partial} = .037$	.05
Positive syndrome score	14.52 (7.37)	10.62 (5.29)[b]	13.78 (7.26)	12.82 (5.28)[d]	$F_{1,89} = 3.97$, $\eta^2_{partial} = .043$	.05	$\eta^2_{partial} = .055$	.02
Total score	54.64 (15.83)	45.19 (11.65)[b]	52.23 (12.96)	48.51 (12.70)[c]	$F_{1,89} = 2.04$, $\eta^2_{partial} = .022$	.16	$\eta^2_{partial} = .04$	.04
PSYRATS								
Delusion score	7.24 (7.53)	2.65 (5.53)[b]	6.40 (7.20)	5.56 (6.68)	$F_{1,89} = 7.27$, $\eta^2_{partial} = .076$	.008	$\eta^2_{partial} = .109$	.001
Hallucination score	5.72 (10.07)	3.36 (7.53)[c]	5.64 (11.40)	4.09 (9.19)	$F_{1,89} = 535$, $\eta^2_{partial} = .004$	.53	$\eta^2_{partial} = .002$	.64
RSES score (refined algorithm; range, 0-50)	32.07 (8.09)	36.66 (7.42)[b]	33.87 (8.93)	34.70 (7.76)	$F_{1,84} = 4.38$, $\eta^2_{partial} = .05$	.04	$\eta^2_{partial} = .061$	.01
Cognitive biases								
Draws to decisions	2.76 (1.98)	3.31 (2.19)[e]	2.46 (1.69)	3.00 (1.61)[c]	$F_{1,89} = 1.06$, $\eta^2_{partial} = .012$	.31	$\eta^2_{partial} = .026$	.10
JTC (decision after 1 fish), %	32	22[c]	35	17[e]	$F_{1,89} = 0.49$, $\eta^2_{partial} = .006$	.48	$\eta^2_{partial} = .005$	.61
Neuropsychology								
Trail-making test, s								
Subtest A	33.89 (12.57)	27.78 (9.90)[b]	30.53 (11.61)	25.67 (10.46)[b]	$F_{1,82} = 0.06$, $\eta^2_{partial} = .001$	.80	$\eta^2_{partial} = .009$	.38
Subtest B	86.96 (44.98)	72.58 (39.47)[c]	65.18 (28.11)	60.64 (21.23)	$F_{1,82} = 0.02$, $\eta^2_{partial} = .000$	.88	$\eta^2_{partial} = .004$	.73
Story recall								
Immediate	8.65 (2.91)	7.84 (3.24)[e]	9.31 (3.76)	9.10 (3.32)	$F_{1,82} = 2.29$, $\eta^2_{partial} = .027$	.13	$\eta^2_{partial} = .017$	.20
Delayed	7.07 (3.13)	6.93 (3.37)	7.73 (4.01)	7.55 (3.17)[d]	$F_{1,82} = 0.39$, $\eta^2_{partial} = .005$	.54	$\eta^2_{partial} = .002$	.91
Attention (test d2)	136.53 (44.16)	152.63 (39.86)[b]	144.86 (45.06)	168.29 (38.51)[b]	$F_{1,79} = 4.39$, $\eta^2_{partial} = .053$	.04	$\eta^2_{partial} = .033$	.07
Quality of Life								
Physical	54.51 (17.92)	66.67 (15.88)[b]	60.19 (17.61)	65.85 (18.90)	$F_{1,79} = 1.89$, $\eta^2_{partial} = .023$	.17	$\eta^2_{partial} = .02$	.14
Psychological	50.05 (19.20)	58.96 (20.13)[b]	51.94 (19.19)	57.23 (20.47)[d]	$F_{1,80} = 3.25$, $\eta^2_{partial} = .039$	.07	$\eta^2_{partial} = .024$	.12
Social	51.33 (20.39)	55.37 (20.11)[e]	49.14 (21.65)	50.39 (23.85)	$F_{1,80} = 1.98$, $\eta^2_{partial} = .024$	.16	$\eta^2_{partial} = .002$	.13
Environment	61.74 (13.66)	67.91 (14.50)[f]	65.98 (16.02)	71.20 (16.17)[c]	$F_{1,80} = 0.28$, $\eta^2_{partial} = .003$	.60	$\eta^2_{partial} = .014$	.25
Global	46.48 (20.61)	60.00 (23.02)[b]	52.90 (24.55)	59.09 (24.02)[c]	$F_{1,82} = 4.86$, $\eta^2_{partial} = .056$	.03	$\eta^2_{partial} = .037$	.05
Total (5 subcales)	52.86 (15.03)	61.55 (15.77)[b]	56.33 (15.83)	60.86 (17.05)[c]	$F_{1,79} = 3.95$, $\eta^2_{partial} = .045$	.05	$\eta^2_{partial} = .029$	.08

Abbreviations: ANCOVA, analysis of covariance; ITT, intention-to-treat; JTC, jumping to conclusions; MCT, metacognitive training; PANSS, Positive and Negative Syndrome scale; PSYRATS, Psychotic Symptom Rating Scales; RSES, Rosenberg Self-Esteem Scale.

[a] Data do not represent pairwise data but full data for each time point (see also comment on JTC task in the Results section).

[b] $P \leq .001$ (within-subject differences across time determined by use of pairwise *t* test).

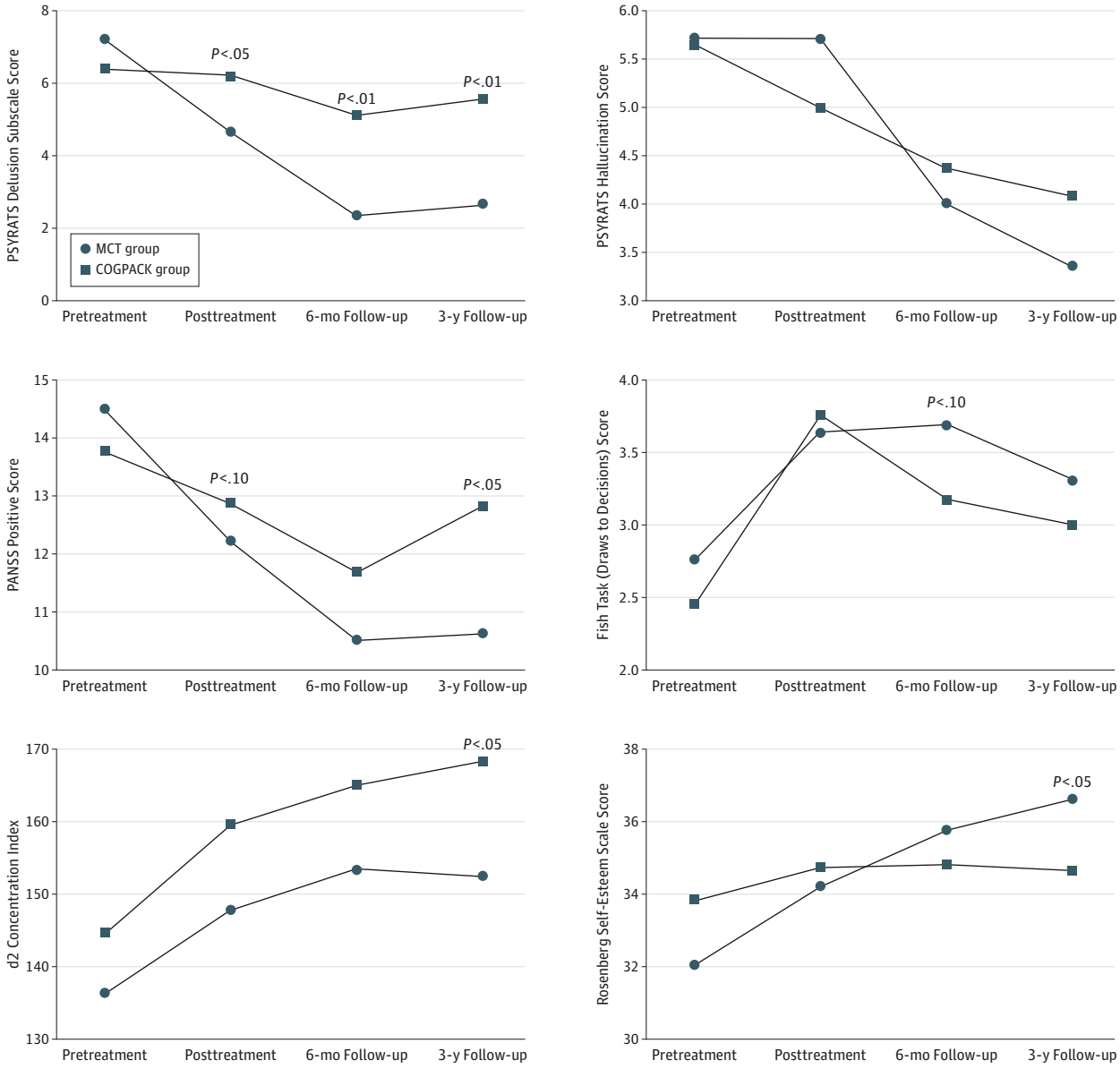
[c] $P \leq .05$ (within-subject differences across time determined by use of pairwise *t* test).

[d] $P \leq .10$ (within-subject differences across time determined by use of pairwise *t* test).

[e] $P \leq .01$ (within-subject differences across time determined by use of pairwise *t* test).

[f] $P \leq .005$ (within-subject differences across time determined by use of pairwise *t* test).

Figure 2. Group Differences Across Time (Per-Protocol Analyses)



Unless otherwise noted, group differences were $P > .10$. MCT indicates metacognitive training; PANSS, Positive and Negative Syndrome Scale; and PSYRATS, Psychotic Symptom Rating Scales.

extent than MCT, which is in line with a recent meta-analysis indicating that cognitive remediation treatment leads to some cognitive improvements.[72]

Our trial, like most psychotherapeutic investigations, must take into consideration the additional caveat that some participants were not naive about the contents of the other intervention, so that the differential effects in the experimental condition are possibly underestimated. At the 6-month follow-up, 54% of the patients endorsed that they had received information about the other training.[32] Finally, the noncompletion rate at the 3-year follow-up was relatively high, which we would like to acknowledge as a limitation.

Conclusions

To summarize, MCT, a low-threshold and low-intensity group training (up to 16 sessions), led to substantial symptom improvements (relative to a control intervention) that were sustained 3 years after training and also accompanied by a delayed improvement in quality of life and self-esteem. The destigmatizing/normalizing approach of the program, which highlights similarities to normal behavior while not downplaying psychotic symptoms,[73] may have contributed to the improvement by reducing feelings of stress, guilt, and stigmatization; however, dismantling studies are needed to verify this hypothesis.

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