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ORIGINAL ARTICLE

Antipsychotic treatment beyond antipsychotics: metacognitive intervention for schizophrenia patients improves delusional symptoms

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Background. Although antipsychotic medication still represents the treatment of choice for schizophrenia, its objective impact on symptoms is only in the medium-effect size range and at least 50% of patients discontinue medication in the course of treatment. Hence, clinical researchers are intensively looking for complementary therapeutic options. Metacognitive training for schizophrenia patients (MCT) is a group intervention that seeks to sharpen the awareness of schizophrenia patients on cognitive biases (e.g. jumping to conclusions) that seem to underlie delusion formation and maintenance. The present trial combined group MCT with an individualized cognitive-behavioural therapy-oriented approach entitled individualized metacognitive therapy for psychosis (MCT+) and compared it against an active control.

Method. A total of 48 patients fulfilling criteria of schizophrenia were randomly allocated to either MCT+ or cognitive remediation (clinical trial NCT01029067). Blind to intervention, both groups were assessed at baseline and 4 weeks later. Psychopathology was assessed using the Positive and Negative Syndrome Scale (PANSS) and the Psychotic Symptom Rating Scales (PSYRATS). Jumping to conclusions was measured using a variant of the beads task.

Results. PANSS delusion severity declined significantly in the combined MCT treatment compared with the control condition. PSYRATS delusion conviction as well as jumping to conclusions showed significantly greater improvement in the MCT group. In line with prior studies, treatment adherence and subjective efficacy was excellent for the MCT.

Conclusions. The results suggest that the combination of a cognition-oriented and a symptom-oriented approach ameliorate psychotic symptoms and cognitive biases and represents a promising complementary treatment for schizophrenia.

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Key words: Cognition, cognitive biases, metacognitive, psychotherapy, schizophrenia.

Introduction

Schizophrenia is a severe and disabling psychiatric disorder. While antipsychotic medication still represents the treatment of choice for schizophrenia, the objective impact on symptoms achieves only a medium-effect size in comparison with placebo (Leucht *et al*. 2009). Moreover, approximately 20–30% of patients are resistant to antipsychotics (Elkis, 2007) and medication compliance remains low, even in the era of atypical antipsychotic medication (Byerly *et al*. 2007; Voruganti *et al*. 2008). The 1-year relapse rate under atypical neuroleptics is 15% compared with 23% under conventional agents and 33% under placebo (Leucht *et al*. 2003).

Hence, clinical researchers are intensively looking for complementary treatment options. Cognitive-behavioural therapy (CBT) is currently regarded as today's most well-established psychological intervention for psychosis (Wykes *et al*. 2008; Tai & Turkington, 2009). CBT for psychosis is a problem-oriented treatment that seeks to identify and change maladaptive beliefs and behaviours fostering emotional distress and psychotic symptoms. Effect sizes for CBT are in the small to medium range and CBT is deemed especially favourable for medication-resistant schizophrenia patients (Pilling *et al*. 2002; Rathod *et al*. 2008).

Recently, our group has developed a new treatment programme entitled metacognitive training (MCT)

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for schizophrenia patients (Moritz *et al*. 2005, 2007). MCT is grounded on the principles of CBT (Fowler *et al*. 1995) and basic research on cognitive biases in schizophrenia (for reviews, see Garety & Freeman, 1999; Freeman *et al*. 2007), as well as deficits in social cognition/theory of mind (Frith, 1994; Frith & Corcoran, 1996). MCT addresses cognitive biases in schizophrenia that, according to a wealth of literature, contribute to the formation and/or maintenance of the disorder, particularly to delusions (Garety & Freeman, 1999; Bell *et al*. 2006; van der Gaag, 2006). Since insight into cognitive biases seems to be related to symptomatic outcome (Perivoliotis *et al*. 2010), teaching patients how to circumvent cognitive biases and impairment, for which they usually lack full awareness (Freeman *et al*. 2006; Medalia *et al*. 2008), may reduce delusions and block the progression from false appraisals and delusion-prone (i.e. 'as if') experiences to fixed false beliefs (i.e. delusions). Psychopathological symptoms, especially delusional ideas and conviction herein, are targeted at a later point ('backdoor approach'), as an overly confrontational approach may undermine the therapeutic alliance. Although MCT can be considered as a variant of CBT, a main difference is the approach to raise awareness about cognitive biases via cognitive exercises and tasks. Patients should personally experience their cognitive biases rather than just being informed about their dysfunctionality. The programme has a low threshold, as patients are often willing to work on cognitive biases and coping strategies before addressing symptoms.

Several treatment trials have explored the feasibility, safety and efficacy of MCT. A preliminary trial confirmed that treatment adherence was excellent (Moritz & Woodward, 2007*a*). Patients rated subjective efficacy and daily relevance as significantly higher relative to patients undergoing an active control condition. A recent German trial (Aghotor *et al*. 2010) reported a medium-effect size for the improvement of positive symptoms over and above an active control in the course of 4 weeks. Using a single session that included the two jumping to conclusions modules of the MCT (modules 2 and 7), a British study found that patients were more cautious in their decision-making after the MCT session compared with the control group (Ross *et al*. in press). This finding is remarkable as jumping to conclusions was previously thought to be a trait rather than a state variable (Peters & Garety, 2006). Furthermore, MCT impacted positively on several parameters relating to delusion conviction and belief flexibility. Kumar *et al*. (2010) reported a significant decline of positive symptoms during MCT treatment relative to a wait-list control group. In the most recent trial, MCT participants improved significantly on delusional distress, quality of life and memory over an 8-week period relative to a wait-list control group (Moritz *et al*., in press).

Although these results are encouraging, we currently do not know if the short-term effects are maintained in the long term. An inherent problem of the group approach is that, for reasons relating to time and privacy, MCT does not allow targeting individual delusions. Moreover, from our experience, some patients actively deny the presence of cognitive biases even if these have been verified by tests and are also evident during sessions. In this case, an individualized approach seems favourable. To meet this goal, we developed an individualized metacognitive programme entitled metacognitive therapy for patients with psychosis (MCT+; Moritz *et al*. 2010). MCT+ modules match the topics of the group programme, but are tailored to individual worries, symptoms and daily life problems. MCT+ involves a session on relapse prevention as well as the elaboration of an illness model and closely follows CBT guidelines.

The present study assessed whether a combination of metacognitive group training and individual metacognitive therapy exerts a surplus effect over an active control. Cognitive remediation (CogPack®; Marker Software, Germany) was chosen as a comparison intervention as it is widely applied and there is some evidence for its effectiveness for cognitive but less for psychopathological symptoms (McGurk *et al*. 2007). Since our metacognitive approach is particularly concerned with cognitive biases subserving delusional ideas and tries to seed doubt for false beliefs (Moritz *et al*. 2006, p. 6), we hypothesized that MCT would ameliorate delusional symptoms, especially delusion conviction.

Methods

Participants

Patients were drawn from the Department of Psychiatry and Psychotherapy of the University Medical Center Hamburg-Eppendorf (Germany). To make the results as generalizable as possible to a typical in-patient population, we chose rather broad inclusion criteria. Patients were excluded if aged <18 or >65 years and the diagnostic criteria of a schizophrenia spectrum disorder were not fulfilled. A present or prior episode of positive symptoms was also mandatory. Further, an IQ <70, as determined by the Multiple Choice Vocabulary Test (Lehrl, 1995), led to exclusion. As can be seen from the CONSORT chart in Fig. 1, almost half of the screened population eventually participated. Completion was excellent in both groups. Only one patient in the MCT and three in the CogPack group did not complete reassessment.

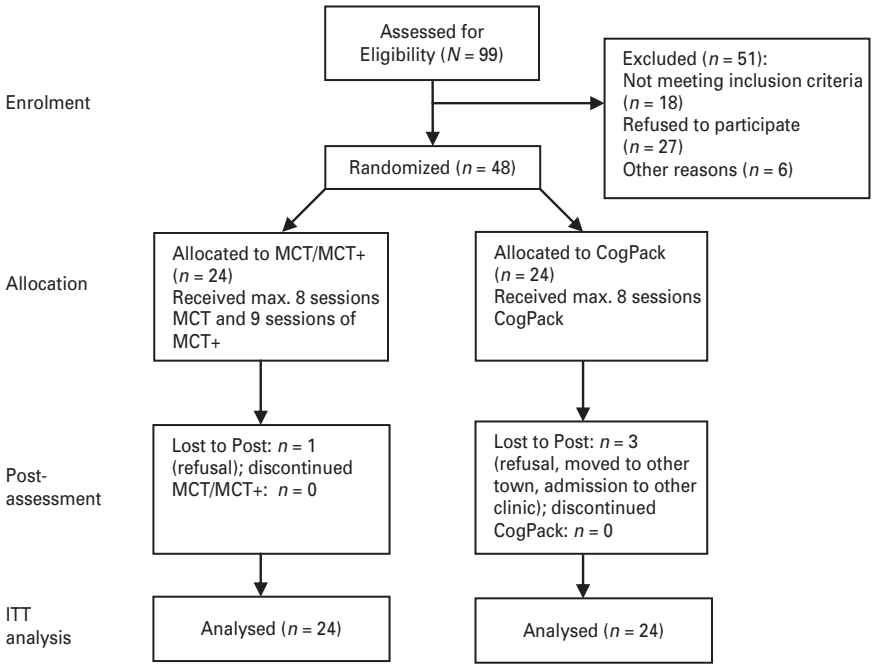

Fig. 1. Consort flow chart. MCT, metacognitive training; MCT+, metacognitive therapy for schizophrenia.

Patients were reimbursed for the assessments with €30 but received no compensation for the treatment sessions. All participants gave written informed consent. Approval was obtained from the local ethics committee and the trial was registered at clinicaltrials.gov (NCT01029067). Patients from both interventions were drawn from the same therapeutic environment, which, in addition to psychopharmacological treatment, also included occupational therapy, social competence training, psycho-educational groups and physical therapy.

Measures

All tasks were administered blind to group status (assessor blindness). At the end of the training and before the post-assessment, patients were reminded by trainers not to disclose group allocation. Moreover, assessors and trainers were not permitted to speak about patients during the trial phase.

Psychopathological assessment

The main psychopathological parameters were the Positive and Negative Syndrome Scale (PANSS; Kay *et al*. 1989) and the Psychotic Symptom Rating Scales (PSYRATS; Haddock *et al*. 1999). PANSS and PSYRATS were administered by trained raters along with the MINI Neuropsychiatric Interview (Sheehan *et al*. 1998) to secure diagnoses. Ratings followed semi-structured interviews and adhered to standard operating procedures. Raters were blind to treatment allocation to prevent a Rosenthal effect. PANSS and PSYRATS share good psychometric properties and are sensitive to change (Kay *et al*. 1989; Peralta & Cuesta, 1994; Haddock *et al*. 1999; Drake *et al*. 2007; Santor *et al*. 2007). The PANSS represents the gold standard for the assessment of the current severity of schizophrenia symptomatology. Since metacognitive intervention primarily targets delusions, a delusional score was computed from the sum of all core PANSS delusion items: delusions (p1); grandiosity (p5); suspiciousness (p6); unusual thought content (g9). The PSYRATS consists of two subscales measuring hallucination and delusions. Psychopathological scores are displayed in Table 1.

Jumping to conclusions

To assess the jumping to conclusions bias, a computerized variant of the beads task (Moritz & Woodward, 2005) was administered. The experiment adopted a more concrete scenario to increase task comprehension (Woodward *et al*. 2009; Speechley *et al*. 2010), which provides similar results as the original beads task (Moritz *et al*. 2010*a*).

In the modified version, two lakes with coloured fish in opposing ratios (e.g. 80% orange:20% grey fish and vice versa) are presented to the participant. The participant is asked to deduce from which of the two lakes a string of fish is caught. Conversation between participant and experimenter was kept at a minimum during the task.

Table 1. *Socio-demographic and psychopathological characteristics at baseline*

Variable	MCT ($n=24$)	CogPack ($n=24$)	Statistics
Background variables			
Gender (male/female)	17/7	14/10	$\chi^2(1)=0.82$, $p>0.3$
Age	32.63 (12.48)	35.46 (9.10)	$t(46)=0.90$, $p>0.3$
Years of formal school education	11.25 (1.48)	11.35 (1.53)	$t(46)=0.22$, $p>0.8$
Psychopathology and treatment			
PANSS total	56.12 (12.60)	60.87 (14.93)	$t(46)=1.19$, $p>0.2$
PANSS delusions	9.04 (3.47)	10.04 (3.86)	$t(46)=0.94$, $p>0.3$
PSYRATS hallucinations	6.46 (10.46)	9.04 (13.89)	$t(46)=0.72$, $p>0.4$
PSYRATS delusions	8.71 (6.31)	10.57 (7.18)	$t(46)=0.94$, $p>0.3$
% maximal antipsychotic dosage	52.36 (36.89)	60.20 (35.03)	$t(46)=0.76$, $p>0.4$
Number of prior admissions	2.96 (2.87)	3.59 (3.06)	$t(46)=0.72$, $p>0.4$
Years since first admission	2.96 (2.87)	3.59 (3.06)	$t(46)=0.89$, $p>0.3$
Cognitive variables			
Draws to decision	2.87 (1.75)	2.87 (2.71)	$t(46)=0.00$, $p>0.9$

MCT, Metacognitive training; PANSS, Positive and Negative Syndrome Scale; PSYRATS, Psychotic Symptom Rating Scales.

It was explained that the fisherman would catch fish from one lake only throughout the entire experiment and that the fish would then be thrown back into the lake. A graded estimates procedure with simulated decisions and probability estimates was adopted. After each 'catch', the participant was required to make two judgements: (1) a probability judgement (0–100%) about the likelihood that the fish were being caught from lake A or lake B; (2) a judgement whether the available amount of information would justify a decision in the participant's view. Plausibility judgements and decisions could be altered after each item (i.e. caught fish) and the participant was told beforehand that the task would continue regardless of whether or not a (simulated) decision was made.

Each new fish was shown along with the previous fish, connected by a string to reduce memory load, a possible confound (Moritz & Woodward, 2005; Menon *et al*. 2006). In total, 10 fish were caught, whereby one lake was strongly suggested by the chain of events (pre-treatment version, O = orange; G = grey: O-O-O-G-O-O-O-O-G-O; post-treatment version, R = red; G = green: R-R-R-G-R-R-R-R-G-R). Jumping to conclusions was defined as a (premature) decision after one or two fish (Freeman *et al*. 2004).

Post-assessment questionnaire

To assess the acceptance and feasibility of the interventions, participants were asked to anonymously appraise the training at the end of the intervention. The questionnaire (Moritz & Woodward, 2007*a*) consisted of 10 questions that had to be responded to on a 5-point Likert scale (1 = fully agree to 5 = fully disagree). The items are displayed in Table 2.

Intervention

Patients were randomly allocated to either treatment by means of a randomization plan with no further stratification and constraints after baseline assessment and informed consent were obtained. The randomization plan was developed by a statistician. The patients were informed about the allocation by a person who was not involved in the assessments or the training.

Experimental intervention (group and individualized intervention)

The metacognitive group training programme is fully documented (Moritz *et al*. 2005, 2007; Moritz & Woodward, 2007*b*) and can be obtained online cost-free at www.uke.de/mkt (currently available in 23 languages). The treatment should be delivered in groups of 3–10 patients by trained clinicians addressing delusion-related metacognitive biases. While jumping to conclusions is a special focus of the intervention (modules 2 and 7), MCT also deals with one-sided attributions (module 1), changing beliefs/incorrigibility (module 3), impairments in theory of mind (modules 4 and 6), overconfidence in errors (module 5), and affective cognitive biases (module 8). The eight modules are presented via a video projector. Each group session lasts approximately 45–60 min. For an in-depth description of the modules, the reader is referred to the manual and previous articles (Moritz *et al*. 2005; Moritz & Woodward, 2007*b*).

Individualized metacognitive therapy (MCT+) followed group sessions according to the general guidelines for CBT (e.g. Fowler *et al*. 1995). For each patient,

Table 2. *Subjective appraisal of the training*

Item	Metacognitive Intervention	CogPack	Statistics
1. The training was useful and sensible.	1.41 (0.50)	2.45 (1.10)	$t(40) = 3.88$, $p = 0.001$
2. I had to force myself to go to the training regularly.	3.85 (1.14)	3.50 (1.43)	$t(38) = 0.86$, $p > 0.3$
3. In everyday life, I do not apply the lessons learned.	3.81 (1.21)	2.26 (1.33)	$t(38) = 3.86$, $p < 0.001$
4. The training was an important part of my treatment programme.	1.68 (1.06)	2.75 (1.25)	$t(37) = 2.87$, $p = 0.007$
5. I would have liked to spend the time doing something else.	4.10 (1.18)	3.95 (1.23)	$t(39) = 0.39$, $p > 0.7$
6. The training was fun.	1.81 (0.87)	2.45 (1.23)	$t(39) = 1.92$, $p = 0.06$
7. A lot of what I learned during training is useful to my daily routine.	1.65 (0.59)	3.68 (1.16)	$t(37) = 6.87$, $p < 0.001$
8. The goals and rationale of the training were clear to me.	1.68 (1.06)	2.10 (1.29)	$t(37) = 1.10$, $p > 0.2$
9. I would recommend the training to others.	1.40 (0.68)	2.40 (1.19)	$t(38) = 3.27$, $p = 0.003$
10. I found it beneficial that the training was administered in a group.	1.75 (0.97)	3.00 (1.45)	$t(37) = 3.18$, $p = 0.003$

1 = fully agree; 2 = agree; 3 = not sure; 4 = disagree; 5 = fully disagree.

eight one-to-one sessions were carried out, in addition to one session relating to the medical history (while we combined the group and individualized metacognitive intervention for the present study, both treatments can be administered separately, i.e. group without individualized treatment and vice versa).

In the course of the eight modules, an individual illness model was elaborated. In a standardized fashion, MCT+ uses exercises introduced during group MCT and applies them to the individual problems, symptoms and the daily hassles of the patient. For an in-depth description of the MCT+ (Moritz *et al*. 2010) the reader is referred to the material that can be obtained cost-free as a beta version from www.uke.de/mkt_plus. The following descriptions only serve to orient the reader to the therapeutic contents.

For each module, therapist and patient cooperatively review slides and discuss and reapprais events from the patient's daily life. For example, after MCT module 1, which addresses the topic of casting blame and taking credit for negative and positive events, the patient is encouraged to contemplate multiple reasons for recent personal events and to avoid converging on to single causes. Also, the possible role of attributional style in prior psychotic experiences is discussed. After the MCT modules 2 and 7, dealing with jumping to conclusions, therapist and patient generate a list of pros and cons for the patient's core delusional belief after having used this procedure to falsify 'modern legends'. It is not the primary aim that patients fully abandon their delusional beliefs. Rather, the purpose is to counter overconfidence in false beliefs by introducing counter-evidence or alternative views. In the individualized session following module 3 (i.e. changing beliefs/incorrigibility), the patient's attention is directed to events where he/she held on to a belief despite conclusive counter-evidence. The pros and cons of maintaining one's belief in the face of counter-evidence are discussed and the importance of being flexible in one's opinions and updating, as well as exchanging information with significant others is emphasized. The individualized sessions following modules 4 and 6 (theory of mind and social cognition) underscore that negative mood and stress can cloud and distort perceptions and decision-making. Patients are confronted with examples where false responses were biased by underlying emotions. Patient and therapist specifically discuss incidences where the patient may have been overly confident and perhaps incorrect about the intentions of others. After module 5, memory aids are introduced and means for reducing stress are discussed. Overconfidence in memories as a thinking bias is also discussed. After module 8 on affective biases, therapist and patient turn to specific misperceptions of the patient and personal incidents and dysfunctional coping styles (e.g. thought suppression, rumination) giving rise to depressive feelings. Patients are encouraged to generate alternative appraisals for typical negative biases (e.g. overgeneralization). While group sessions were performed by a psychologist and an intern, the MCT+ sessions were performed by a single psychologist.

Active control (*CogPack*®)

CogPack training was employed as an active control intervention. It is a computerized cognitive remediation programme, designed specifically for schizophrenia patients (Marker, 2003), which is available in English, French, and German. Treatment was performed individually on personal computers. For the present study, the so-called Olbrich series was administered, which covers a wide range of neuropsychological exercises involving memory, reasoning, selective attention, and psychomotor speed. The difficulty level for each patient is adapted automatically.

At the end of each session, the patient receives individual feedback on the performance. To match with individual sessions, eight sessions were administered. During the group treatment, patients in the control group were free to attend other treatment options. Each session lasted approximately 45–60 min.

Data analysis strategy

Recent statistical studies suggest that analysis of covariance with the difference score of the assessment parameter (pre *versus* post) as the dependent variable and the baseline score as covariate is superior to simple pre-post comparisons and in most instances requires fewer participants (Vickers & Altman, 2001; Borm *et al*. 2007). By including the baseline score as a covariate, baseline differences and regression to the mean (higher scores usually yield greater improvement) are corrected, which is not accounted for by simple *t* tests or mixed analysis of variance. MCT *versus* CogPack served as steps of the between-subject factor.

An intention to treat (ITT) analysis was performed, whereby we conservatively assumed that non-completers did not improve (non-completion due to non-random reasons) so that missing data at the post-assessment were estimated by baseline scores. Although we feel that the last observation carried forward (LOCF) method is acceptable for our data, especially in view of the reasons for non-completion (e.g. refusal, re-admission), we additionally used multiple imputation (MI), which is increasingly adopted in clinical trials. Results from MI will, however, only be described if the corresponding *p* values differ by >0.05 points between LOCF and MI. The primary outcome was the sum score of the PANSS delusion items (p1, p5, p6, and g9). For subsidiary analyses, we also analysed the positive syndrome score, for which different algorithms have been proposed (von Knorring & Lindstrom, 1995; Mass *et al*. 2000; van der Gaag *et al*. 2006). All comparisons were made two-tailed. Effect size estimates are provided: small: $\eta^2 \leqslant 0.01$; medium: $\eta^2 \geqslant 0.06$ <0.14; large: $\eta^2 \geqslant 0.14$ (Kinnear & Gray, 2009).

Results

Table 1 shows the socio-demographic and psychopathological background variables. Patients had subacute symptoms and 13 (27%) met consensus criteria for remission (Andreasen *et al*. 2005). The CogPack group scored non-significantly higher on the PANSS. Four out of five patients (78%) had been receiving antipsychotic medication for >2 weeks before participating in the study.

Psychopathology

As can be seen in Table 3, PANSS delusion severity, the primary outcome parameter, declined significantly stronger under MCT than under CogPack. While the PSYRATS delusion subscale did not significantly discriminate between groups, one of its core parameters did. Delusion conviction declined more under MCT than CogPack. Irrespective whether the analyses were performed based on the positive subscores proposed by von Knorring & Lindstrom (1995), Mass *et al*. (2000) and van der Gaag *et al*. (2006), a medium-to-strong effect size in favour of the MCT was found (see Table 3). On all measures relating to positive symptoms and delusions, we found significant pre-post differences for the MCT treatment group (see Table 3; only for the hallucinations total score no significant difference was detected); whereas for CogPack, four out of eight parameters failed to reach significance. The MCT patients also showed greater change on several PSYRATS hallucinations scores (i.e. loudness of voices, amount of negative content of voices, degree of negative content of voices, disruption to life caused by voices), which reached borderline significance ($p<0.10$).

Decision-making

At baseline, 46% of the MCT and 61% of the CogPack patients showed a jumping to conclusions bias, as assessed with the beads task variant. This reasoning bias was ameliorated to a significantly greater extent under MCT than CogPack (see Fig. 2).

Subjective appraisal

As can be derived from Table 2, patients judged the MCT as significantly more beneficial on six out of 10 parameters relative to CogPack.

Adherence

Adherence was not significantly different between both groups [$\chi^2(1)=1.73$, $p<0.1$]. MCT patients missed 22% of the maximum number of sessions, while the rate in the CogPack group was 35%.

Discussion

The present investigation was concerned with metacognitive treatment for schizophrenia patients, a variant of CBT for psychosis. MCT mirrors a novel trend in research that ascribes the changeability of cognitive biases an important role for symptom outcome in psychosis (Brakoulias *et al*. 2008; Menon *et al*. 2008; Lincoln *et al*. 2010). A combination of group and

Table 3. *Pre-post comparisons and analysis of covariance (ANCOVA), intention-to-treat*

Variable	MCT ($n=24$) Pre	MCT ($n=24$) Post	Paired t test difference	CogPack ($n=24$) Pre	CogPack ($n=24$) Post	Paired t test difference	Statistics (df = 1,45) ANCOVA
PANSS							
Delusion subscore	9.04	6.58	$t=4.38$	10.04	8.79	$t=2.77$	$F=4.97$, $p=0.03$, $\eta^2=0.10$
	(3.47)	(2.26)	$p<0.001$	(3.86)	(4.36)	$p=0.01$	
Positive score	6.83	4.96	$t=4.08$	7.79	7.04	$t=1.69$	$F=4.85$, $p=0.03$, $\eta^2=0.10$
(algorithm Mass)	(3.17)	(2.65)	$p<0.001$	(3.73)	(3.08)	$p=0.10$	
Positive score	14.92	11.29	$t=4.26$	16.75	14.54	$t=3.16$	$F=3.81$, $p=0.06$, $\eta^2=0.08$
(algorithm van der Gaag)	(5.86)	(4.19)	$p<0.001$	(6.37)	(6.57)	$p=0.004$	
Positive score	8.17	6.00	$t=4.44$	9.21	8.46	$t=1.69$	$F=6.55$, $p=0.01$, $\eta^2=0.13$
(algorithm Korring)	(3.23)	(2.62)	$p<0.001$	(4.23)	(4.53)	$p=0.10$	
Total score	56.13	47.67	$t=3.44$	60.88	54.04	$t=3.68$	$F=1.04$, $p=0.31$, $\eta^2=0.02$
	(12.60)	(10.24)	$p=0.002$	(14.93)	(16.88)	$p=0.001$	
PSYRATS							
Hallucinations total	6.46	4.17	$t=1.14$	9.04	9.09	$t=0.02$	$F=1.60$, $p=0.21$, $\eta^2=0.04$*
	(10.46)	(8.52)	$p=0.27$	(13.89)	(14.21)	$p=0.98$	
Delusions total	8.71	5.54	$t=2.40$	10.57	8.74	$t=2.17$	$F=1.90$, $p=0.18$, $\eta^2=0.04$
	(6.31)	(5.50)	$p=0.03$	(7.18)	(7.47)	$p=0.04$	
Delusional conviction	1.75	0.83	$t=3.05$	1.74	1.48	$t=1.19$	$F=4.18$, $p=0.05$, $\eta^2=0.09$
	(1.48)	(1.31)	$p=0.01$	(1.45)	(1.34)	$p=0.25$	

PANSS, Positive and Negative Syndrome Scale; PSYRATS, Psychotic Symptom Rating Scales.

* Using multiple imputation, the ANCOVA revealed a trend in favour of metacognitive training (MCT).

individualized MCT was superior to an active control (CogPack) regarding the amelioration of delusional symptoms as assessed with the PANSS. Perhaps owing to floor effects – approximately one-quarter of the patients fulfilled remission criteria at baseline (Andreasen *et al*. 2005) – the difference on the PSYRATS delusion score did not achieve significance. However, one of its core items, delusion conviction, declined to a significantly greater extent in the MCT intervention group compared with the CogPack group. Accordingly, findings confirm that a fundamental aim of the MCT was met: to seed doubt and to make patients contemplate alternative solutions for delusional beliefs. As expected, MCT but not CogPack positively influenced jumping to conclusions. Further, patients undergoing MCT appraised the training as more useful, relevant to daily life and important to their treatment relative to CogPack (see also Aghotor *et al*. 2010). Significant group differences occurred on six of the 10 parameters. This finding is encouraging in view of the notoriously poor treatment motivation and medication adherence displayed by many patients (Manschreck & Boshes, 2007). Moreover, it has been recently pointed out that subjective effectiveness is an important and non-redundant outcome measure complementing clinician-rated psychopathology (Kupper & Tschacher, 2008).

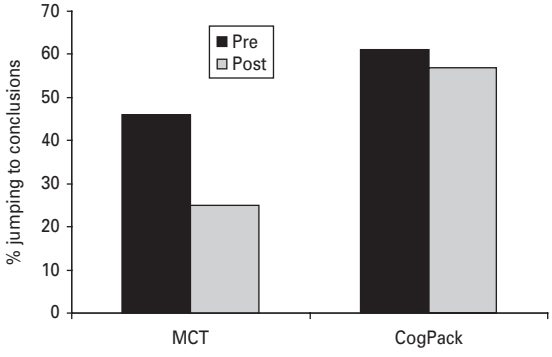

Fig. 2. Jumping to conclusions (decisions after one or two items on the beads task variant) declined significantly more in the metacognitive training (MCT) relative to the CogPack group ($F=3.96$, $p=0.05$, $\eta^2=0.08$).

The effect size was medium-to-strong on delusional symptoms and thus exceeds values achieved by the MCT group training alone (Aghotor *et al*. 2010) and is in the upper range of the effect sizes found for CBT (Wykes *et al*. 2008). In sum, the present study is in line with prior studies showing that cognitive intervention, in the form of CBT (Zimmermann *et al*. 2005; Wykes *et al*. 2008) or (social) cognition training (Couture *et al*. 2006; Müller & Roder, 2010) is beneficial for patients over and above the effects of medication. While MCT

was superior to CogPack on several outcome variables, it needs to be highlighted that some (symptom) improvement also occurred in the control condition (see Table 3).

Assessors were kept blind to group allocation as knowledge about group allocation has emerged as a major moderator of effect sizes. Non-blind assessments tend to inflate observed effects (Wykes *et al*. 2008). Moreover, assessors were carefully trained in all assessment procedures and made their ratings on the basis of extensive semi-structured interviews. Additionally, while such biases may influence scores on instruments where ratings allow raters some freedom as for the PANSS, they are less potent for explaining group differences on instruments such as the PSYRATS, which can be largely considered as 'expert-delivered' questionnaires.

Before turning to implications and future directions, several limitations of the present clinical trial should be brought to the readers' attention. A rather small sample was recruited, limiting the generalizability of the findings. Further, we have not obtained follow-up data and thus cannot say whether treatment success persists in the long term. The design may also be called an add-on study. Almost all patients took antipsychotic medication, usually for >2 weeks. However, neuroleptic dosage (% maximum dosage) was similar between groups. Further, the potential of CogPack may have been understated by the choice of instruments since the number of sessions for CogPack was limited to eight. Future studies should be matched on the therapeutic setting (i.e. group and/or individualized). We acknowledge that some items of the retrospective assessment (especially 'I found it beneficial that the training was administered in a group') disadvantaged the active control group. However, a beneficial effect of MCT was also detected for other items that are unaffected by this concern (e.g. 'I would recommend the training to others.'). Finally, although delusion symptom severity was a primary outcome, not all patients displayed delusional symptoms at baseline. Future studies should recruit subjects with at least mild delusional symptoms.

Despite these limitations, we think that our prior claim (Moritz & Woodward, 2007*b*) was confirmed, recommending a combination of MCT and CBT-based individualized psychotherapy. The MCT is fully manualized, simplifying administration, even for inexperienced therapists. Multiple slides and homework sheets keep time costs for preparation low.

Despite their undisputed status as the treatment of choice, antipychotics should routinely be complemented by psychotherapeutic interventions. In addition to severe metabolic and neurological side-effects of many compounds, their primary action mechanism, the blockade of the mesolimbic dopamine system, may reduce psychopathological symptoms at the cost of well-being in many patients (de Haan *et al*. 2004; Mizrahi *et al*. 2007; Moritz *et al*. 2010*b*), which possibly compromises the treatment compliance (Moritz *et al*. 2009). Since antipsychotic medication per se does not ameliorate the underlying vulnerability but rather dampens symptoms and the behavioural impact of delusions, sustained treatment adherence necessitates psychological intervention (van Os & Kapur, 2009). In view of the efficacy of psychological interventions in schizophrenia, established national treatment guidelines recommending such interventions for psychosis will hopefully be set in action as well as interventions focusing on cognitive biases such as MCT (see also Landa *et al*. 2006) and social cognition programmes such as the Social Cognition and Interaction Training (Penn *et al*. 2007).

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Declaration of Interest

None.

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