



Metacognitive training for schizophrenia: A multicentre randomised controlled trial



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ABSTRACT

A psychotherapeutic approach for schizophrenia is now recommended as an adjuvant for psychopharmacology, since antipsychotic medications only have a partial impact especially as regards positive symptoms and insight. In addition, cognitive distortions and the lack of metacognitive skills might increase positive symptoms leading to poor social functioning. This underlines the need for specific approaches which target cognitive processes relevant for insight, and abilities in metacognition. Metacognitive training (MCT) is a structured group intervention, which enhances a patient's reflection on cognitive biases and improves problem-solving. The aim of our study was to assess MCTs' short term impact on insight, symptoms and quality of life. Fifty patients with schizophrenia or schizoaffective disorders and persistent positive symptoms (delusions or hallucinations) were enrolled in the study. After baseline assessment participants were randomised either to supportive therapy or MCT. Both groups used the same design (1 h-session twice a week during 8 weeks) although the basic knowledge given to participants was different between interventions. Participants were assessed at eight weeks based on the Scale to Assess Unawareness of Mental Disorder, Positive and Negative Syndrome Scale (PANSS), Psychotic Symptom Rating Scales, the Calgary Depression Scale for Schizophrenia and the Quality of Life Scale. Between-group differences were significant in favour of MCT on the PANSS positive scale. Between-group differences in post- and pre-test values showed a trend in favour of MCT for insight on hallucinations. Results of our study indicate that the MCT has an effect on reducing positive symptomatology, and a trend impact on insight and social functioning.

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1. Introduction

Schizophrenia is a complex condition with a wide range of clinical signs. Although more recent antipsychotic medications have lower side-effects, the size of their effect relative to placebo remains moderate, and a substantial proportion of patients relapse despite a good compliance (Stone and Pilowsky, 2006; Zink et al., 2010). The psychotherapeutic

approach for schizophrenia has been recommended as an adjuvant for psychopharmacology, but its use still remains insufficiently widespread (WHO, 1996; Favrod et al., 2011).

Despite significant inter-individual variability as regards symptomatology, from 50% to 80% patients often have a lack of insight regarding their own pathology (Amador et al., 1994; Beck et al., 2004; Pini et al., 2004). Poor insight may worsen the prognosis especially in terms of social functioning (Lysaker et al., 2003; Raffard et al., 2009), compliance to medical treatment (Fenton et al., 1997; Smith et al., 2004), and in a more moderate way, symptomatology (Mintz et al., 2003; Lincoln

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et al., 2007). More generally, patients often show difficulties in metacognitive skills, i.e. one's capacity for self-reflectivity and reflection of others as distinct individuals (Lysaker et al., 2002, 2010; Kircher et al., 2007; Metcalfe et al., 2012). Indeed, insight and metacognition might be new therapeutic targets for schizophrenia (Pijnenborg et al., 2011, 2013; David et al., 2012).

Metacognitive training (MCT) is a new group treatment programme developed for patients with schizophrenia (Moritz and Woodward, 2005, 2007a,b) to improve patient thinking regarding their biased thoughts by enhancing metacognitive skills. Seven randomised controlled trials in various languages have shown good results on positive symptomatology associated with changes in patient's reasoning (Ross et al., 2011; Aghotor et al., 2010; Kumar et al., 2010; Moritz et al., 2011a,b, 2013; Favrod et al., 2014). Only one reported study, to our knowledge, has assessed social functioning, showing better social relationships (Moritz et al., 2011b) whereas the other investigated clinical insight as a secondary outcome, demonstrating better awareness of delusion with a sustained effect at 6-month follow-up (Favrod et al., 2014). The French MCT version was administered with good compliance and acceptability in a small non-controlled study which reported a decrease in delusion and hallucinations, better insight into the need for disease treatment, with improved mood after the training (Favrod et al., 2011). We were prompted by these findings to further investigate this new approach, particularly concerning its effects on insight, symptomatology and social functioning.

The present multicentre investigation aimed to assess the short-term impact of the French version of the MCT programme in stabilized schizophrenic patients with a residual positive symptomatology. We compared the MCT group with an active verbal therapy group called "supportive therapy (ST)".

It was predicted that MCT will improve clinical and cognitive insight in psychotic symptoms (delusion, and hallucinations), compared to supportive therapy. As secondary outcome, it was predicted that positive symptomatology would be significantly improved after MCT, based on putative links between cognitive biases, insight and clinical symptoms (Moritz and Woodward, 2007a,b; Moritz et al., 2010), as well as an improvement in quality of life (QoL), particularly regarding social relationships.

2. Experimental

2.1. Participants

The study enrolled in- and out-patients, from university and psychiatric hospitals. Ninety-one participants enrolled from 7 psychiatric centres in three regions: Alsace, Burgundy and Franche-Comté (France). The CONSORT flow chart (Fig. 1) shows the initial referral rate, randomization and exclusion from main outcome assessment. Inclusion and exclusion criteria are presented in Table 1. In line with recent recommendations to include clinically representative samples for randomised

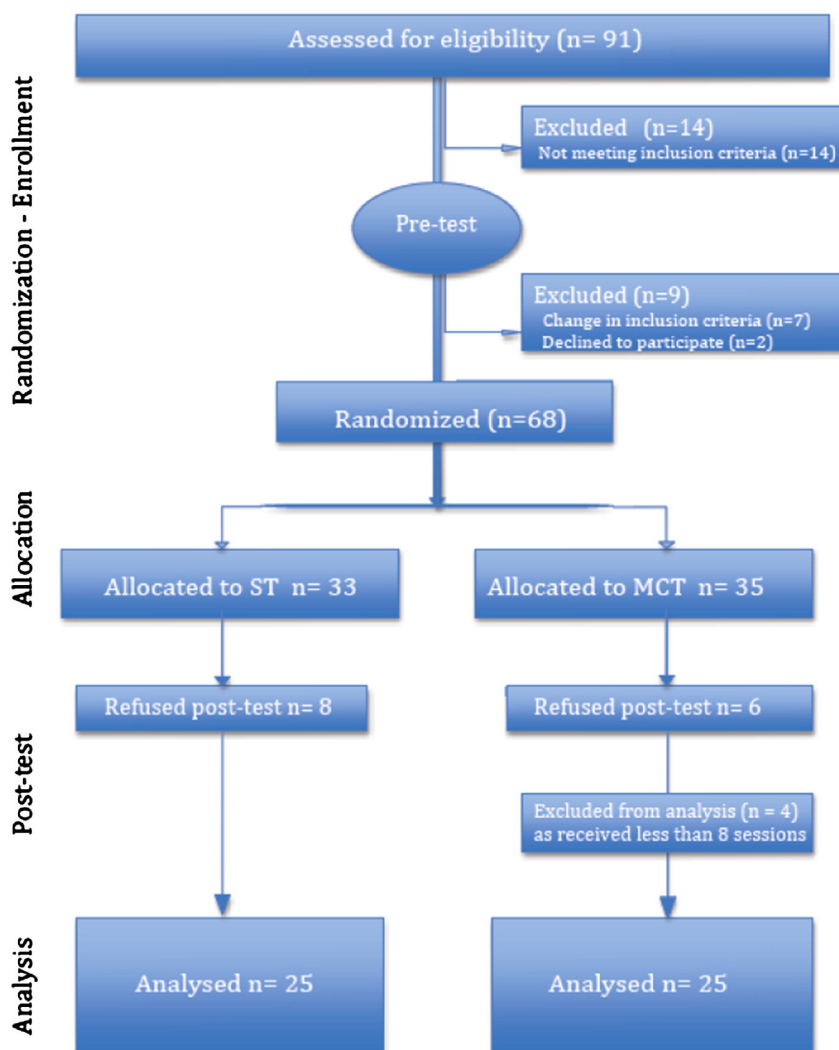


Fig. 1. CONSORT flow chart.

Table 1
Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
Age between 18 and 65 years	Intellectual disability
Diagnosis of a disorder within the schizophrenia spectrum ^a (DSM-IV TR)	Poor fluency in French
Persistent hallucinations or delusion	DSM-IV criteria for substance abuse
PANSS criteria:	Unable to give informed consent
- Delusions: $3 \leq P1 \leq 6$ (mild to severe), or	
- Hallucinations: $3 \leq P3 \leq 5$ (mild to moderate severe), and	
- Excitability: $P4 \leq 4$ (absent to moderate),	
- Hostility: $P7 \leq 3$ (absent to mild),	
- Poor attention: $G11 \leq 4$ (absent to moderate),	
- Poor impulse control: $G14 \leq 3$ (absent to mild)	

^a According to the DSM-IV TR it refers to schizophrenia, and schizoaffective disorders. No diagnosis differences emerged at baseline between schizoaffective and schizophrenia patients ($p > 0.5$).

controlled trials in order to maximize their relevance in clinical practice (Hollon and Wampold, 2009), we applied a rather broad inclusion criteria: age between 18 and 65 years, fulfilment of DSM-IV criteria for a schizophrenia spectrum disorder, in and outpatients, as well as informed consent. The four Positive and Negative Syndrome Scale (PANSS) items (i.e.: Excitability; Hostility; Poor attention; and Poor impulse control) were taken into consideration because patients with such severe symptoms are often not able to attend group sessions, and might negatively impact group coherence.

Among the ninety-one recruited participants, 50 patients (17 women) completed the study. Demographic and clinical information on gender, age, educational level, status (in- or out-patient), and duration of illness were collected (cf. Table 2). The persons included ($n = 50$) in the study were not different from those who declined to participate ($n = 27$), in terms of gender, status of hospitalization, years of education, symptoms (PANSS, CDSS), level of insight (SUMD) or social functioning (QLS). Patients who did not participate were more likely to be younger than those who were enrolled (average age of 34 vs. 41 years old).

Daily antipsychotic doses were converted to chlorpromazine-equivalents for each patient (Woods, 2003). All participants gave their informed written consent, and the Committee for the Protection of Persons (EST-II) approved the study. This study complied with the principles established in the Declaration of Helsinki.

2.2. Assessment and procedure

Investigator psychiatrists in each centre recruited participants and obtained informed consent and demographic and clinical information. Initial evaluation (T0) was before group intervention (less than 4 weeks before), and the second evaluation (T1) was at the end of training (less than 4 weeks after). The assessor was blind to group assignment. To control the disclosure risk, clinicians and assessors reminded each participant, before the evaluation not to reveal the group assignment. The assessor recorded each disclosure on the Case Report Form.

All inclusion and exclusion criteria were verified again by the assessor, i.e. demographic or clinical information. The assessor was a psychologist trained in using psychometric scales. The intra-rater reliability was verified by 3 video-tapes assessed by two university hospital psychiatrists.

Participants were assessed using the following scales:

- The Scale to Assess Unawareness of Mental Disorder (SUMD) evaluates insight into various dimensions of the disease (Amador et al., 1994; Raffard et al., 2010). Participants were requested to answer three general items evaluating insight with regard to mental disorders, and the items on awareness and attribution of hallucinations and delusions.
- PANSS, a 30-item scale developed to assess symptom severity in schizophrenia (Kay et al., 1987; Lançon et al., 1997).
- The Psychotic Symptom Rating Scales (PSYRATS) include two subscales to measure the severity of various dimensions of verbal hallucinations and delusions (Haddock et al., 1999; Favrod et al., 2012).
- The Calgary Depression Scale for Schizophrenia (CDSS) to assess depression (Addington and Addington, 1990; Reine et al., 2000).
- The Quality of Life Scale (QLS) assesses the social functioning in schizophrenia patients (Heinrichs et al., 1984). Participants were asked to answer the eight specific items evaluating QoL regarding social relationships relating to the previous four weeks.

To test the acceptability of the interventions and their subjective impacts, participants were asked to complete an anonymous self-report scale at each session end to assess their interest, its usefulness and effects on daily QoL using a 6-point scale (0–5).

2.3. Interventions

All participants followed their routine treatment (i.e. medication, and psychiatric sessions), and were requested to participate in the intervention groups. Group allocation was randomised in groups of two via an internet interface, either in MCT, or ST.

Table 2
Baseline characteristic.

	MCT (n = 25)	ST (n = 25)	F (w, t, χ^2)	df	p
Gender (F%)	36.0%	32.0%	.08	1	.77
Marital status: never married	64.0%	72.0%	2.43	4	.86
Living condition: independent living	84.0%	68.0%	2.04	3	.64
Age (years)/(mean $\pm$ sd)	41.1 $\pm$ 8.1	41.1 $\pm$ 12.4	.00	48	1.00
Educational level (years)/(mean $\pm$ sd)	9.0 $\pm$ 2.3	8.6 $\pm$ 2.1	.62	47	.54
Doses of antipsychotics (CPE equ.)/(mean $\pm$ sd)	1519 $\pm$ 1635	1359 $\pm$ 1516	.69		.49
Typical antipsychotics	62.5%	60.0%	.03	1	.86
Atypical antipsychotics	70.8%	64.0%	.03	1	.61
Length of illness (years)/(mean $\pm$ sd)	14.6 $\pm$ 8.4	17.8 $\pm$ 10.9	−1.16	48	.25
Status (Inpatient %)	4.0%	4.0%	.00	1	1.00
PANSS Positive/(mean $\pm$ sd)	20.6 $\pm$ 4.9	21.1 $\pm$ 4.5	−.36	48	.71
PANSS Negative/(mean $\pm$ sd)	19.9 $\pm$ 5.7	19.2 $\pm$ 5.3	.46	48	.64
PANSS General/(mean $\pm$ sd)	46.9 $\pm$ 8.9	45.5 $\pm$ 7.7	.66	48	.51

Basic knowledge given to participants was different between interventions and no topics on metacognition were allowed in the ST group. This last point was verified independently on video-tapes randomly filmed during ST and MCT sessions. The same format was used for both groups, in terms of frequency and duration with a 1 h-session twice a week during 8 weeks, i.e. 16 sessions per group. PowerPoint slides were included in both groups conducted by two trainers (3 to 10 participants per group). This format was chosen according to the MCT author's recommendations (Moritz et al., 2005). All trainers were instructed prior the beginning of the MCT and ST intervention and were either psychiatrists, psychiatric nurses, internship physicians, or psychologists. Each centre determined trainers according to their availability and organization. Each trainer was instructed twice by the same psychiatrist specialised in CBT and MCT (Briki et al., in press). They were the same for all the sessions for a given group therapy.

2.3.1. MCT

The aim of the MCT group was to make participants more aware regarding their cognitive distortions by theoretical notions given during the first part of each session. Numerous examples and exercises were then proposed using a well illustrated panel of slides to help the patient correct any particular cognitive bias. The MCT programme included 8 modules (cycle A) and a single cognitive bias was explored in a module. A second 8-module cycle (cycle B) was then administered, reviewing the same biases but using different examples and exercises. Table 3 shows the core material for each module.

2.3.2. ST

The ST group, as an active intervention, aimed to help participants share experiences with each other, and to promote verbal interaction. Trainers should have a helpful and judgeless attitude to facilitate the patient's participation. Participants were encouraged to express themselves and carefully listen to others. Since it was not a structured psycho-education intervention, elements of psycho-education were given, especially during sessions focusing on pathology and treatment. Table 4 shows the core material for each session.

2.4. Statistical analysis

Data were managed and analysed using *Stata Statistical Software: Release 10* (StataCorp. 2007 LP for Windows). Group differences at baseline (M0) were examined using Student's *t*-tests or Mann–Whitney tests for dimensional variables and Chi-square or Fisher's tests for dichotomous variables.

For the principal test investigating the SUMD insight scores on awareness ($\alpha = 2.5\%$) and on attribution ($\alpha = 2.5\%$) regarding delusions and hallucinations, we used a bi-variate analysis with Student's *t*-tests or Mann–Whitney tests. For the secondary aims, the appropriate tests were used regarding the dimensional or dichotomous

nature of each variable. The main results were computed using ANCOVAs in order to control for the baseline scores. Differences between pre-test and post-test scores were treated as dependent variables, treatment condition was treated as a fixed factor, and pre-treatment scores were treated as covariates. Effect sizes (Cohen's *d* or Cohen's *r* in cases of non-normal distribution) were calculated for between subjects at T1. For within-subjects effect sizes were calculated between T0 and T1 in correcting for dependence among means in order to make direct comparisons with effect sizes from other studies. At least 8 out of 16 sessions (half of the programme) had to be completed by each participant for post-test analysis. Self-rated "utility" and QoL calculations were performed on five sessions taken at regular intervals, using the Friedman test for non-parametric repeated measures.

3. Results

The rater was the same during the entire study and was blind to the treatment conditions with no allocation disclosure reported. At pre-test, no differences emerged between both groups regarding age, gender, educational level, duration of illness, status, PANSS scores and antipsychotic medication (cf. Table 2). Fifty patients were assessed at pre- and post-tests and met the DSM-IV TR criteria for schizophrenia, (average age 41.1 years). The seventeen women and thirty-three men were stabilized on their antipsychotic medication for the 2 months prior the intervention and no change in dosage was made during the study. No differences were found between the two groups on compliance with a mean of 14 (out of 16) sessions per participant (MCT group = 14.6 ± 1.6 ; ST group = 14.2 ± 2.2 ; $w = .34$, $p = .73$).

3.1. Primary outcome

Insight awareness and attribution scores regarding hallucinations on the SUMD showed an improvement at the limit of statistical significance after the MCT group, (respectively $w = 1.88$, $p = .059$, $r = .12$; and $w = -1.74$, $p = .081$, $r = .18$) and between both groups for awareness, at a small effect size in favour of the MCT condition ($F_{1,46} = 3.75$, $p = .058$, $r = -.25$). Between-group differences in post- and pre-test ANCOVAs for insight score regarding delusions on the SUMD scale were not significant.

3.2. Secondary outcomes

After MCT and comparison to control conditions, we found a statistically significant change on the PANSS concerning the Positive subscale with a medium effect size in favour of the MCT condition ($F_{1,46} = 6.15$, $p = .017$, $d = -.61$). PANSS delusion item (P1), hallucination item (P3) and persecution item (P6) were improved on a statistical level after the MCT group ($w = 2.50$, $p = .012$; $w = 2.05$, $p = .040$; and $w = 2.42$, $p = .015$ respectively). A significant difference was

Table 3
Core features of each MCT module.

Module	Training
Attribution: To blame and to take credit Jumping to conclusions: Hasty judgement (Part. I)	Positive or negative situations are presented. Participants are trained to consider various hypotheses to explain the events. Pieces of an image appear gradually and hypotheses are made by participants. They are asked to find out what the image represents, but premature decisions lead to errors.
Changing beliefs: Bias against disconfirmatory evidence	Comic book sequences are presented in reverse order, as complex scenarios are clarified. After each image, participants are asked to evaluate the plausibility of four diverse interpretations.
Empathy (Part. I) Memory	Pictures of facial expressions are shown, and the group is asked to infer the appropriate presented feeling. Complex scenes are presented (beach), missing typical elements (towel, ball) which participants frequently remember. The patients are learned to discern correct memories from false ones.
Empathy (Part. II): Theory of Mind	Comic books presenting the perspective of one of the characters are discussed. This character does not have all the information that the observers possess
Jumping to conclusions: Part. II	Masterpieces by famous painters are presented, and participants are asked to deduce their titles among four options. A superficial inspection leads to wrong answers.
Mood and self-esteem	Typical depressive cognitions in response to common events are presented. The group is asked to develop more constructive and positive cognitions than the proposed ones.

Table 4

Core features of each ST session.

Welcoming session	Work
Friendship	Alcohol and other substances
Schizophrenia	Hospitalization
Medication	False ideas on schizophrenia
Psychotherapies	Autonomy
Depression	Leisure
Anxiety	Couple relationships
Strategies to avoid relapse	Conclusive session
Family relationships	

NB: A single theme could be viewed during two or more sessions if participants so desired.

observed concerning the preoccupation PANSS item (G15), and a trend with regard to the active social avoidance item (G16) ($w = 2.07$, $p = .039$; and $w = 1.78$, $p = .074$ respectively). PSYRATS hallucination and delusion scale scores were significantly different after MCT ($t_{24} = -2.29$, $p = .031$; and $t_{24} = -2.52$, $p = .019$ respectively). Hallucination frequency factor and delusion length factor improved on a statistical level ($w = -2.22$, $p = .026$; and $w = 2.77$, $p = .005$ respectively). After the ST group, the only significant change was observed on the PSYRATS hallucination scale ($t_{24} = -2.89$, $p = .004$). No differences emerged on any of the CDSS scores in both groups. Despite a trend decrease after the ST group ($t_{24} = -1.78$, $p = .089$), evolution of CDSS between group was not statistically different ($F_{1,46} = .950$, $p = .336$, $d = .47$). The QLS social circle item showed a significant within and between decrease in the MCT group ($w = -2.04$, $p = .042$; and $F_{1,46} = 4.78$, $p = .034$, $r = -.18$ respectively). The social initiatives item on the QLS was improved after MCT, but not in a statistically significant way ($p > .05$). Main outcome measures by treatment condition (MCT vs. ST) are presented in Table 5.

Patients rated as good subjective efficacy on both groups concerning item “utility regarding sessions” (MCT group = 3.9 ± 1.1 ; ST group = 3.9 ± 1.1), and item “daily QoL after sessions” (MCT group = 4.5 ± 0.8 ; ST group = 4.2 ± 0.9). As shown in Fig. 2, Friedman’s test revealed a significant difference regarding MCT group and time interaction, on item “daily life quality after sessions” ($U_4 = 10.8$, $p = .029$).

4. Discussion

In this multicentre randomised controlled study, we attempted to compare the effects of MCT, versus a psychological support group as control assessed by an independent rater. To further add support to the results, there was no change in antipsychotic medication two months prior or during the trial.

4.1. Effects on symptomatology

Participants improved their positive symptoms on both PANSS (delusion, persecution and hallucinations) and PSYRATS (delusion and hallucinations) after MCT, and significantly in a better way when compared to the control condition, especially concerning the PANSS positive scale. These results replicate previous data regarding the efficacy of MCT on positive symptoms (Ross et al., 2011; Aghotor et al., 2010; Kumar et al., 2010; Favrod et al., 2011, 2014; Moritz et al., 2011a). The CDSS depression scores remain stable in pre- and post-tests for both conditions, and confirm that MCT is a relatively well accepted programme which is no more confronting or intrusive than a supportive therapy group, with no increase in anxiety or depression. Some studies have suggested that improving insight would be associated with more depressive symptoms, which is clearly not the case here (Startup, 1996; Moore et al., 1999). The presence of a special module concerning mood and self-esteem might be an explanation, and the “back-door approach” of this intervention might be another hypothesis for these results.

4.2. Effects on insight

A trend concerning awareness on hallucinations was observed after MCT and between both groups. MCT primarily targets not only delusions but also hallucinations as there is a module focusing especially on hallucinations (“attribution module”). Moreover, as inclusion criteria were positive symptoms we recruited many patients with hallucinations: 21/25 (84%) in the MCT group, and 19/25 (76%) in the ST group. These patients may have had more benefits regarding insight on hallucinations from the intervention than those with delusions alone. The absence of significance regarding insight was not in line with the exploratory study (Favrod et al., 2011) of the French version of MCT which found statistical and clinical improvements in awareness and attribution concerning positive symptoms. According to the SUMD baseline, scores were high (average of 3.0) in the Favrod et al. study, but lower in the present trial (average of 1.9 for the MCT group) which indicates a better insight at baseline. Thus, a lack of room for improvement might explain our results, as well as the particular inclusion criteria requiring enrolment of patients who had to know their diagnosis and to present positive symptoms. The level of insight was not controlled at baseline and was quite good despite the mild to moderate positive symptomatology.

4.3. Effects on social functioning

After the MCT intervention, we found a trend regarding the social QoL, with patients more likely to take social initiatives. Similarly, Moritz et al. found a trend in better social relationships after the MCT intervention (Moritz et al., 2011b). This trend seems coherent with the decrease in active social avoidance (G16), and, significantly, a decrease regarding preoccupation (G15), as measured on the PANSS. At the same time, participants after the MCT intervention tended to complain of having smaller social networks, especially less people who worried about them as shown by the significant decrease in the social circle item on the QLS. A metacognitive effect of MCT might be an explanation of this last point: if patients are less worried by their symptoms and reduce their social avoidance, they consequently would improve their awareness towards the need for more friends and people who care about them. Moreover, as these data were collected just after the group interventions, it seems important to note that expecting any change regarding social functioning requires time (e.g.: to make more friends) and reflection (e.g.: to become aware that people are closer).

4.4. Subjective effects

In both groups, participants showed a good compliance and in a similar way rated their satisfaction with the utility regarding sessions. If “utility” scores were similar between interventions, reasons given by participants concerning their satisfaction were very different. After the ST group, the majority of patients were happy to have been able to share experiences with their peers – “I realized I was not alone” –, and felt to have a better understanding of their problems – “Listening to others helped me to understand my problems”. After MCT, people generally felt to be more likely to propose a reflection regarding thoughts – “I have learned to be more careful with my thoughts concerning others” –, and reported to be able to cope with their symptoms in a better way – “I have learned not to believe in my voice and how to think positive”. The significant difference regarding the MCT group and time interaction, on the item “daily QoL after sessions” seems to indicate that time is needed for participants to develop and use new metacognitive skills delivered during sessions. In contrast, there was no time interaction regarding the ST group, i.e., positive effects were felt since the first session and remained stable until the end of the ST group.

Table 5

Between-group differences in post-test (T1) and pre-test (T0) ANCOVAs.

	ST (n = 25)		MCT (n = 25)		Differences T0–T1		F-test	Cohen's d or r		
	T0	T1	T0	T1	ST	MCT	Group effect	Between group	Within-ST	Within-MCT
	Mean (±)	Mean (±)	Mean (±)	Mean (±)	Mean (±)	Mean (±)				
SUMD Awareness of hallucinations	1.92 (1.55)	1.72 (1.65)	1.48 (1.50)	0.88 (0.93)	−0.20 (1.55)	−0.60 (1.55)	3.75 ^a	−0.251	0.139	0.122
SUMD Attribution of hallucinations	2.24 (1.64)	1.72 (1.65)	1.68 (1.44)	1.04 (1.10)	−0.52 (1.47)	−0.64 (1.60)	1.54 ^a	−0.202	0.239	0.180
SUMD Awareness of delusions	2.52 (1.83)	2.44 (1.92)	2.28 (1.95)	2.04 (1.84)	−0.08 (1.93)	−0.24 (2.26)	.390	−0.123	0.060	0.074
SUMD Attribution of delusions	2.60 (1.80)	2.12 (1.79)	2.20 (1.87)	1.60 (1.80)	−0.48 (1.67)	−0.60 (2.27)	.600	−0.193	0.228	0.194
PANSS Positive	21.08 (4.46)	21.04 (5.34)	20.60 (4.91)	17.88 (5.23)	−0.04 (4.25)	−2.72 (3.98)	6.15 [*]	−0.610 ^b	0.008 ^b	0.547 ^b
PANSS Delusion P1	4.28 (1.24)	4.08 (1.55)	4.16 (1.57)	3.36 (1.58)	−0.20 (1.19)	−0.80 (1.32)	3.46 ^a	−0.229	0.097	0.374
PANSS Hallucinations P3	3.64 (1.70)	3.36 (1.82)	3.92 (1.38)	3.12 (1.79)	−0.28 (1.17)	−0.80 (1.78)	1.13	−0.078	0.169	0.293
PANSS Persecution P6	3.68 (1.25)	3.76 (1.42)	4.28 (1.02)	3.72 (1.40)	0.08 (1.68)	−0.56 (1.08)	.780	−0.014	−0.080	0.327
PANSS Preoccupation G15	2.92 (0.95)	2.68 (1.14)	3.16 (1.14)	2.64 (0.99)	−0.24 (1.20)	−0.52 (1.08)	.260	−0.023	0.158	0.323
PSYRATS Hallucinations	17.12 (14.71)	12.32 (13.58)	16.92 (14.09)	11.04 (12.65)	−4.80 (9.01)	−5.88 (12.83)	.180	−0.099 ^b	0.346 ^b	0.448 ^b
PSYRATS Hallucinations frequency	1.36 (1.78)	1.24 (1.67)	1.36 (1.68)	0.84 (1.46)	−0.12 (0.78)	−0.52 (1.56)	1.68 ^a	−0.107	0.115	0.246
PSYRATS Delusion	11.84 (5.02)	10.00 (6.01)	11.44 (6.01)	8.80 (7.89)	−1.84 (5.26)	−2.64 (5.23)	.340	−0.174 ^b	0.339 ^b	0.384 ^b
PSYRATS Delusion length factor	2.40 (1.44)	1.96 (1.46)	2.48 (1.50)	1.60 (1.73)	−0.44 (1.58)	−0.88 (1.42)	1.08	−0.140	0.190	0.382
CDSS total	10.40 (5.02)	8.84 (5.34)	12.68 (6.50)	11.56 (6.42)	−1.56 (4.39)	−1.12 (6.09)	.950	0.470 ^b	0.307 ^b	0.177 ^b
PANSS Active social avoidance G16	2.72 (1.10)	2.60 (1.22)	3.36 (1.22)	3.00 (1.61)	−0.12 (1.09)	−0.36 (1.11)	.130	0.141	0.060	0.204
QLS Social circle	2.48 (1.16)	2.48 (1.04)	2.48 (1.08)	2.04 (1.43)	0.00 (0.41)	−0.44 (0.92)	4.78 [*]	−0.177	0.000	0.318
QLS Social initiatives	2.28 (1.70)	2.00 (1.66)	1.36 (1.55)	1.88 (1.61)	−0.28 (1.02)	0.52 (1.63)	1.70 ^a	−0.054	0.185	−0.227

CDSS: Calgary Depression Scale for Schizophrenia; F-test: Fisher's test; MCT: MetaCognitive training; PANSS: Positive and Negative Syndrome Scale; PSYRATS: Psychotic Symptom Rating Scales; QLS: Quality of Life Scale, ST: Supportive therapy; SUMD: Scale to Assess Unawareness of Mental Disorder.

* p < 0.05.

^a Trend differences.

^b Cohen's d size effect.

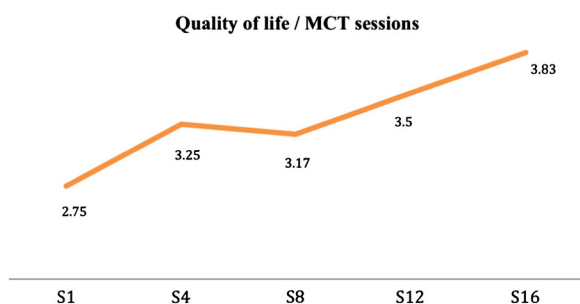


Fig. 2. Self-rated quality of life after MCT sessions by time interaction.

4.5. Limitations

Some limitations should be mentioned such as the relatively small sample sizes due to the difficulty in recruiting patients with schizophrenia and positive symptoms. Assessments were made short term which may be too short to show the full effect of the interventions. Another limitation was the amount of patients who did not complete the post-test, mostly because they forgot the schedule or had no motivation for doing it. We did not explore the impact of the intervention on each dimension independently from each other. We focused on the global clinical impact of MCT.

To conclude: this was the first reported randomised controlled study that compared the French version of the MCTs' material against an active supportive verbal therapy. As a randomised control trial with a blind evaluator, this study provides substantial proof regarding the efficacy of the MCT on positive symptomatology, with respect to mood. These results are in agreement with previous well conducted studies performed in various countries (Ross et al., 2011; Aghotor et al., 2010; Kumar et al., 2010; Favrod et al., 2011, 2014; Moritz et al., 2011a). There is also a trend of its efficacy on insight and social initiatives with patients more able to perceive their symptoms and more likely to initiate interpersonal social relationships. The ST programme did not show positive results either on insight, symptomatology, or social functioning.

More structured and focused therapies are required for improvements regarding the complex condition of schizophrenia. In our experience, recommendations should be made for MCT to be used in routine care for patients with schizophrenia. Moreover, there is a need for further studies, especially regarding the sustained long term effects (Favrod et al., 2014). It would be also be of interest to establish if the efficacy of MCT is accompanied by improvements in metacognitive abilities per se.

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Contributors

MB, JM and JF designed the study and wrote the protocol. EH, DS, YH, P. Vidailhet, FB, BB, JCCG, CN, EC, KM, SG, SL, and AZB recruited the patients. MB, JF, P. Vandel, and GT managed the manuscript preparation and wrote the first draft of the manuscript. All authors contributed to and have approved the final version of the manuscript.

Conflict of interest

None.

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