

# 1 Randomized control trial to assess the efficacy of 2 metacognitive training compared with a psycho- 3 educational group in people with a recent-onset 4 of psychosis

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21 **Background.** Aims were to assess the efficacy of metacognitive training (MCT) in people with a recent onset of psychosis  
22 in terms of symptoms as a primary outcome and metacognitive variables as a secondary outcome.

23 **Method.** A multicenter, randomized, controlled clinical trial was performed. A total of 126 patients were randomized to  
24 an MCT or a psycho-educational intervention. The sample was composed of people with a recent onset of psychosis,  
25 recruited from nine public centers in Spain. The treatment consisted of eight weekly sessions for both groups.  
26 Patients were assessed at three time-points: baseline, post-treatment, and at 6 months follow-up. The evaluator was  
27 blinded to the condition of the patient. Symptoms were assessed with the PANSS and metacognition was assessed  
28 with a battery of questionnaires of cognitive biases and social cognition.

29 **Results.** Both MCT and psycho-educational groups had improved symptoms post-treatment and at follow-up, with  
30 greater improvements in the MCT group. The MCT group was superior to the psycho-educational group on the Beck  
31 Cognitive Insight Scale (BCIS) total ( $p=0.026$ ) and self-certainty ( $p=0.035$ ) and dependence self-subscale of irrational  
32 beliefs, comparing baseline and post-treatment. Moreover, comparing baseline and follow-up, the MCT group was better  
33 than the psycho-educational group in self-reflectiveness on the BCIS ( $p=0.047$ ), total BCIS ( $p=0.045$ ), and intolerance to  
34 frustration ( $p=0.02$ ). Jumping to Conclusions (JTC) improved more in the MCT group than the psycho-educational  
35 group ( $p=0.021$ ). Regarding the comparison within each group, Theory of Mind (ToM), Personalizing Bias, and other  
36 subscales of irrational beliefs improved in the MCT group but not the psycho-educational group ( $p<0.001-0.032$ ).

37 **Conclusions.** MCT could be an effective psychological intervention for people with recent onset of psychosis in order to  
38 improve cognitive insight, JTC, and tolerance to frustration. It seems that MCT could be useful to improve symptoms,  
39 ToM, and personalizing bias.

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41 **Key words:** Metacognition, metacognitive training, psychological intervention, psychosis, recent onset of psychosis,  
42 schizophrenia.

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## 43 Introduction

44 Schizophrenia is a disorder that causes a great burden  
45 (Rössler *et al.* 2005; Gustavsson *et al.* 2011). For years  
46 antipsychotic medication has been the only option in  
47 the treatment of schizophrenia. However, over the  
48 last decades great interest has emerged in the effective-  
49 ness of psychological interventions (Wykes *et al.* 2008;  
50 Morrison *et al.* 2014).

51 Psychological interventions based on cognitive ther-  
52 apy are mainly addressed at modifying cognitive  
53 biases. Several cognitive biases are more prevalent in  
54 people with schizophrenia, and some of them are pre-  
55 sent from the early onset of the disease. Jumping to  
56 conclusions (JTC), consisting of acceptance of a situ-  
57 ation without sufficient evidence, has been shown to  
58 be more prevalent in people with delusions and with  
59 first-episode psychosis than in healthy controls or peo-  
60 ple with other mental disorders, with differences of up  
61 to 73% *v.* 10% (Garety *et al.* 1991, 2005; Bentham *et al.*  
62 1996; Conway *et al.* 2002; Falcone *et al.* 2015a, b;  
63 Dudley *et al.* 2016). Regarding attributional style, a  
64 personalized bias has been described in people with  
65 psychosis, both in chronic and first-episode psychosis,  
66 in which patients blame others rather than themselves  
67 for negative situations (Bentall *et al.* 1991; Martin &  
68 Penn, 2002; Fornells-Ambrojo & Garety, 2009). Other  
69 cognitive biases such as overconfidence in errors and  
70 bias against disconfirmatory evidence have been  
71 described as being more prevalent in people with per-  
72 secutory delusion (Kaney & Bentall, 1992; Moritz *et al.*  
73 2005; Moritz & Woodward, 2006), who show higher  
74 levels of self-certainty in their decisions. Moreover,  
75 irrational beliefs that include demands, catastrophic  
76 thinking, low frustration tolerance, and conditional  
77 self-acceptance, are more frequent in people with  
78 schizophrenia (Newmark & Whitt, 1983). In addition,  
79 social cognition is highly affected in people with  
80 schizophrenia and first-episode psychosis (Green  
81 *et al.* 2012; Bora & Pantelis, 2013; Pinkham *et al.* 2003,  
82 Pousa *et al.* 2008). These cognitive biases, as social  
83 cognition impairment, are important features in the  
84 creation and maintenance of delusions and contribute  
85 negatively to the functioning of the patient.

86 Metacognitive training (MCT) is a group therapeutic  
87 approach to the treatment of psychotic symptoms  
88 based on a cognitive-behavioural model of schizophre-  
89 nia with a psychoeducational approach addressed to  
90 reducing all the aforementioned cognitive biases  
91 (Moritz *et al.* 2013a). MCT has demonstrated its efficacy  
92 in the reduction of positive symptoms in people with  
93 schizophrenia (Moritz *et al.* 2011, 2013b, 2014a, b;  
94 Balzan *et al.* 2014; Erawati *et al.* 2014). A recent  
95 meta-analysis shows that MCT is useful for the reduc-  
96 tion of positive symptoms and delusions, and

acceptance of the intervention is greater than it is for 97  
other models (Eichner & Berna 2016). Moreover, 98  
other variables such as JTC, quality of life, cognitive 99  
insight, and memory also show improvement with 100  
MCT (Aghotor *et al.* 2010; Gawęda *et al.* 2015). 101

102 However, to our knowledge no study has tested the  
103 efficacy of MCT in people with a recent-onset of psy-  
104 chosis. Effective psychological intervention in recent-  
105 onset of psychosis is needed due to the importance  
106 of early intervention in reducing chronicity and  
107 improving the prognosis of the illness. Moreover,  
108 aspects related to metacognitive variables have to  
109 date scarcely been assessed, if at all.

110 Therefore, the aim of the present study was to assess  
111 the efficacy of group MCT in people with recent-onset of  
112 psychosis in terms of symptoms as a primary objective  
113 and metacognitive variables as a secondary objective.

## 114 Method

### 115 Design

116 A parallel multicenter randomized clinical trial was  
117 performed, in which one group received MCT while  
118 the other, a psycho-educational group, received ses-  
119 sions of equal frequency and duration. Patients were  
120 randomized for inclusion in the study in blocks of  
121 four from a list of random numbers in each center pro-  
122 vided by the coordinator of the study. The person  
123 responsible of the study in each center was the person  
124 who assigned participants to each group.

### 125 Sample

126 The sample size needed, based on the results reported  
127 by Moritz *et al.* (2011), was 92, considering a 20% drop-  
128 out rate in the follow-up. In the end, our recruitment  
129 effort achieved a total sample of 126 patients. Four of  
130 them left the study after enrollment (see Fig. 1). The  
131 sample was composed of patients with recent-onset  
132 of psychosis (Breitborde *et al.* 2009) treated at one of  
133 the nine participating mental health centers: Servicio  
134 Andaluz de Salud of Jaén, Málaga and Motril  
135 (Granada), Salut Mental Parc Taulí (Sabadell),  
136 Hospital de Santa Creu i Sant Pau (Barcelona),  
137 Centro de Higiene Mental Les Corts (Barcelona),  
138 Institut d'Assistència Sanitària Girona, Hospital  
139 Clínic Universitari de Valencia, and Parc Sanitari  
140 Sant Joan de Déu (Coordinating center). Patients  
141 were enrolled by their clinical therapist. Inclusion cri-  
142 teria were (1) a diagnosis of schizophrenia, psychotic  
143 disorder not otherwise specified, delusional disorder,  
144 schizoaffective disorder, brief psychotic disorder,  
145 or schizophreniform disorder (according to DSM-  
146 IV-TR); (2) <5 years from the onset of symptoms; (3)  
147 a score during the previous year of  $\geq 3$  in item

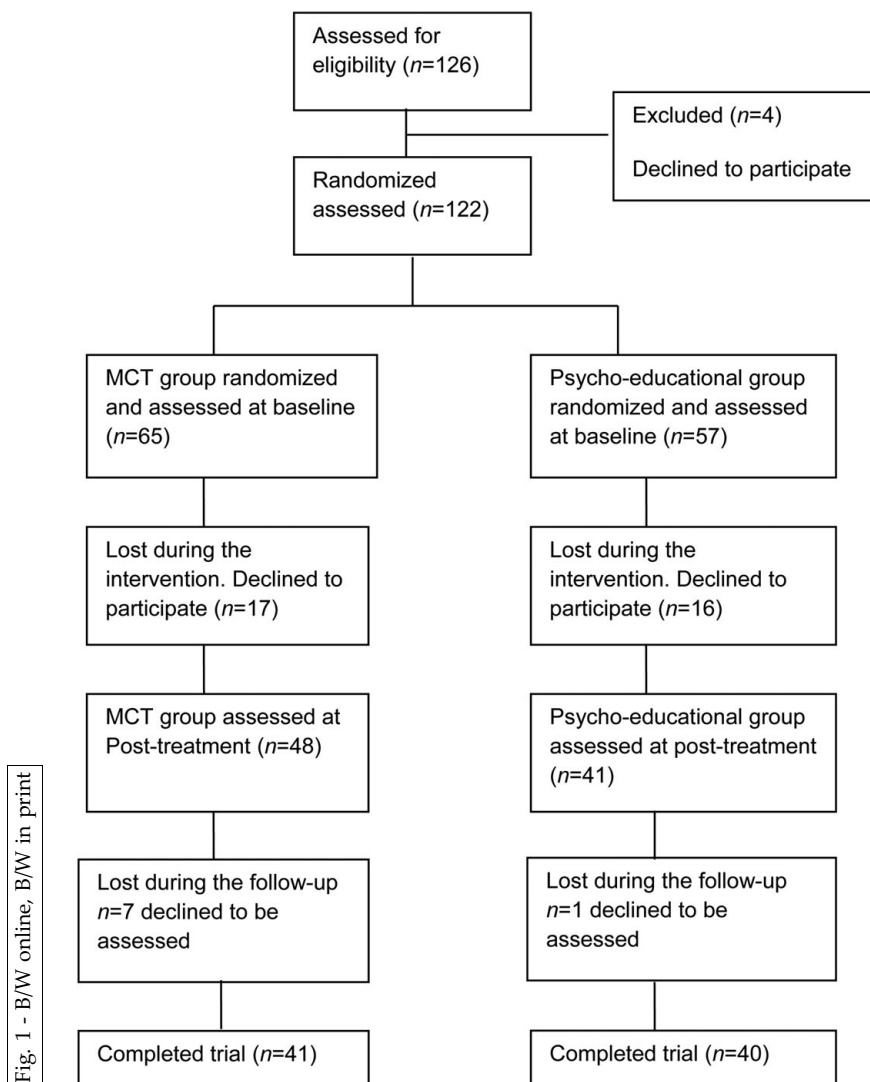


Fig. 1. Trial profile.

148 delusions, grandiosity, or suspicions of PANSS  
 149 (according to Moritz *et al.* 2011); and (4) age between  
 150 17 and 45 years. Exclusion criteria were (1) traumatic  
 151 brain injury, dementia, or intellectual disability (pre-  
 152 morbid IQ  $\leq 70$ ); (2) substance dependence; and (3)  
 153 PANSS  $\geq 5$  in hostile and uncooperative and  $\geq 6$  in  
 154 suspiciousness, to avoid altering the dynamics of the  
 155 group.

### 156 Interventions

157 The interventions consisted of eight weekly group ses-  
 158 sions of MCT (experimental group) or psycho-  
 159 educational (control group). The therapists were  
 160 trained during a 2-day workshop by Steffen Moritz,  
 161 author of MCT, and Lisa Schilling.

162 The MCT program included eight modules:  
 163 Attributional style (1), Jumping to conclusions (2, 7),  
 164 Changing beliefs (3), Empathy (4, 6), Memory (5),

and Depression and self-esteem (8), worked through 165  
 with PowerPoint presentations with different examples 166  
 and material on all these topics. 167

In the psycho-educational group the modules 168  
 were: Healthy habits (1); Risk Behaviors (2), Prevention 169  
 of relapse (3), Video forum (4, 5), Resources of work 170  
 (6), Leisure activities (7), and Resources available in the 171  
 community (8). Material for each weekly module was 172  
 previously agreed upon by all participating centers to 173  
 unify interventions. Both interventions were performed 174  
 in the patients' habitual center of care. 175

### 176 Outcomes

177 Patients were assessed at baseline, post-treatment, and 178  
 6 months follow-up. The evaluator was blinded to the 179  
 condition of the patients. The evaluators were trained 180  
 in the scales of the study, scoring  $>0.70$  in inter-rater 181  
 reliability.

182 Symptoms were the primary outcome and were  
183 assessed with the Positive and Negative Syndrome  
184 Scale (PANSS; Kay *et al.* 1987; Peralta & Cuesta, 1994).

185 Global Assessment of Functioning (GAF; Endicott,  
186 1976) was used to assess symptoms and social  
187 adaptation.

188 A battery of questionnaires regarding cognitive  
189 biases and social cognition was included in order to  
190 assess the secondary outcomes:

- 191 • Beck Cognitive Insight Scale (BCIS; Beck *et al.* 2004;  
192 Gutiérrez-Zotes *et al.* 2012) consists of a self-  
193 administered scale assessing cognitive insight,  
194 containing self-reflectiveness and self-certainty sub-  
195 scales, and a composite index. Cronbach's alpha in  
196 the Spanish validation for self-reflectiveness was  
197 0.59 and 0.62 for self-certainty.
- 198 • Jumping to Conclusions (JTC) was assessed with the  
199 balls tasks in which the subject must take a decision  
200 regarding the probability of the extracted ball  
201 belonging to one of two jars. In task 1 the probability  
202 is 85:15 and in task 2 it is 60:40. JTC was considered  
203 as taking a decision after extracting one or two balls  
204 (Brett-Jones *et al.* 1987).
- 205 • Irrational beliefs were assessed with the Irrational  
206 Belief Test (TCI; Calvete & Cardeñoso, 2001). The  
207 scale is composed of ten subscales: needing accept-  
208 ance from others, high expectations, guilt, intoler-  
209 ance to frustration, worry and anxiety, emotional  
210 irresponsibility, avoidance of problems, depend-  
211 ence, helplessness, and perfectionism. Cronbach's  
212 alpha in the Spanish validation for the subscales  
213 oscilated between 0.63 and 0.79.
- 214 • Attributional style was assessed with the Internal,  
215 Personal and Situational Attributions Questionnaire  
216 (IPSAQ; Kinderman & Bentall, 1996), including two  
217 subscales: Externalizing and Personalizing Bias.
- 218 • The Hinting Task was used to assess Theory of Mind  
219 (ToM; Corcoran *et al.* 1995; Gil *et al.* 2012). In order to  
220 avoid learning, three different stories were used in  
221 each assessment taking into account their validity  
222 and the level of difficulty according to the scores  
223 obtained in the Spanish validation of the question-  
224 naire. Cronbach's alpha of the Spanish version of  
225 the instrument was 0.64.
- 226 • Emotional perception was assessed with the  
227 Emotional Recognition Test Faces (Baron-Cohen  
228 *et al.* 1997), composed of 20 photographs that  
229 express ten basic and ten complex emotions.

#### 230 *Ethical aspects*

231 The project was evaluated by the research and ethics  
232 committees of the coordinating center and each  
233 center included in the study. The participants signed

informed consent for participation in the study. The 234  
study was recorded in Clinical Trials (Identifier: 235  
NCT02340559). 236

#### *Statistical analysis* 237

The differences between each assessment were com- 238  
pared by group with Student's *t* test and ANCOVA. 239  
McNemar association was used to compare JTC 240  
between each assessment. A general linear model for 241  
repeated measures was performed in order to compare 242  
the longitudinal effect of the intervention. A comple- 243  
mentary analysis was performed in order to assess 244  
the intra-group differences using a comparison 245  
means for repeated measures. The analyses were per- 246  
formed imputing data from the last evaluation in 247  
follow-up and without imputation. The results 248  
shown corresponded to those with no imputed data. 249  
All the analyses were controlled for number of ses- 250  
sions, not a significant variable. Effect sizes of the com- 251  
parison were analyzed with the Cohen's *d*. 252

#### **Results** 253

Fig. 1 is the flowchart of participants in each of the 254  
three assessments. The analyses were performed with 255  
the total number of patients that completed the base- 256  
line and post-treatment assessment ( $n=89$ ) and 257  
follow-up ( $n=81$ ). Percentage of drop-outs in the post- 258  
treatment assessment was 27% in the MCT group and 259  
28.1% in the psycho-educational group. Mean number 260  
of sessions attended was 4.95 (s.d.=2.98) for the 261  
psycho-educational group and 5.53 (s.d.=2.46) for the 262  
MCT group. No statistical differences were found. 263  
The best attended sessions of the MCT group were: 264  
attributional style (1), jumping to conclusions (2), 265  
memory (5) and depression and self-esteem (8); while 266  
changing beliefs session had lower adherence (3). 267

The study started in June 2011 and inclusion of 268  
patients was closed by December 2013. The study 269  
with the follow-up was closed in August 2014. 270

Table 1 indicates the sociodemographic characteris- 271  
tics of the two groups, MCT and psycho-educational. 272  
No statistical differences were found regarding any 273  
sociodemographic or clinical characteristics between 274  
the two groups at baseline. 275

Table 2 shows that there was no difference in PANSS 276  
assessment at baseline and post-treatment, and base- 277  
line and follow-up, between the two groups. 278

Table 3 shows that BCIS self-certainty, BCIS compos- 279  
ite index, and dependence of the TCI improved in the 280  
MCT group *v.* the psycho-educational group between 281  
baseline and post-treatment. Between baseline and 282  
follow-up there are differences in the groups in BCIS 283

**Table 1.** Sociodemographic characteristics of the sample

	Psycho-educational group		MCT group	
	N	%	N	%
Gender				
Men	41	71.9	44	67.7
Women	16	28.1	21	32.3
Marital status				
Single	47	82.4	53	81.5
Married	5	8.8	8	12.3
Divorced	5	8.8	4	6.2
Level of education				
Primary	18	31.6	26	40.0
Secondary	25	43.8	25	38.5
University	14	24.6	14	21.5
Employment status				
Work	6	10.5	14	21.5
Student	8	14.0	12	18.5
Incapacity	10	17.5	13	20.0
Unemployed	23	40.5	19	29.3
Others	10	17.5	7	10.7
	Mean	S.D.	Mean	S.D.
Age	28.21	6.73	27.05	7.94
Age at onset	26.03	6.57	25.16	7.79
Years of psychosis duration	2.46	2.07	2.15	2.01
Number of hospitalizations	1.34	1.21	1.16	1.54
Antipsychotic dose, mg/d <sup>a</sup>	519.49	534.58	472.53	703.89

MCT, Metacognitive Training.

<sup>a</sup> Antipsychotic drug doses are expressed as chlorpromazine equivalence.

284 self-reflectiveness, BCIS composite index, and intoler-  
285 ance to frustration of the TCI.

286 Regarding the effect of the intervention taking into  
287 account three assessments (baseline, post-treatment,  
288 and follow-up) together, a general linear model for  
289 repeated measures was performed. The PANSS posi-  
290 tive was significant for time effect ( $p=0.001$ ) but not  
291 for the time  $\times$  group interaction ( $p=0.316$ ). The  
292 PANSS negative had a significant effect of time ( $p=$   
293  $0.005$ ), but no effect for time  $\times$  group interaction was  
294 found ( $p=0.651$ ). Regarding the PANSS general, a  
295 clear effect of time was found ( $p<0.001$ ), but no effect  
296 for time  $\times$  group interaction was detected ( $p=0.107$ ).  
297 Finally, the PANSS total was significant for time  
298 ( $p<0.001$ ) but not for the time  $\times$  group interaction  
299 ( $p=0.193$ ). Regarding general functioning, GAF score  
300 indicated that there was an effect of time ( $p=0.004$ )  
301 but not of group ( $p=.54$ ). On the self-reflectiveness

subscale of the BCIS, there was an effect of time ( $p=$   
0.027) and a trend in the time  $\times$  group interaction ( $p=$   
0.067). The self-certainty subscale of the BCIS showed  
no effect of time ( $p=0.182$ ) but a trend in time  $\times$   
group interaction was detected ( $p=0.081$ ). Finally, the  
Composite Index of the BCIS showed that the MCT  
group improved more than the psycho-educational  
group over time, with  $p=0.042$  for the time  $\times$  group  
interaction, and  $p=0.038$  the effect of time. The  
IPSAQ personalized bias showed no effect of time  
( $p=0.395$ ) but a trend for time  $\times$  group interaction  
was seen ( $p=0.087$ ). As to irrational beliefs, intolerance  
to frustration showed an improvement in the MCT  
group compared to the psycho-educational group  
over time ( $p=0.016$ ).

The number of patients who jumped to conclusions  
in each assessment by group is shown in Fig. 2.  
Regarding the MCT group, significant differences  
were found between baseline and post-treatment  
regarding the 85:15 task of JTC ( $p=0.021$ ) and a  
trend toward significance at follow-up ( $p=0.057$ ).

A supplementary analysis was performed compar-  
ing differences between baseline and post-treatment  
and baseline and follow-up in each group, independ-  
ently. The results are presented in Table 4, indicating  
more significant values and greater effect in the com-  
parison of PANSS subscales in the MCT group than  
in the psycho-educational group. Moreover, significant  
values were found in the MCT group for GAF,  
Personalizing bias, Hinting task, and some subscales  
of the TCI that were not found in the psycho-  
educational group.

## Discussion

The results are unique in that this is the first study to  
observe the effectiveness of MCT in people with  
recent onset of psychosis, which is of clinical rele-  
vance, given early intervention is important in redu-  
cing chronicity and improving prognosis. Both the  
MCT and the psycho-educational groups showed  
reduced clinical symptoms. Moreover, MCT pre-  
sented greater improvements than the psycho-  
educational group in cognitive insight, irrational  
beliefs, and JTC.

Symptoms improved considerably in both treatment  
groups. However, the complementary analyses show  
that the MCT group presented greater improvements  
with greater effect size, especially in the follow-up  
(some of them superior to 0.8). Although other studies  
performed in people with schizophrenia have found a  
clear improvement in symptoms in MCT groups, com-  
pared with control and cognitive remediation, our  
results indicated a slight improvement when com-  
pared to a psycho-educational group (Favrod *et al.*

Table 2. Differences in clinical outcomes between MCT and psycho-educational groups

	Psycho-educational group			MCT group			Comparison between groups		
	Baseline	Post-treatment	Follow-up	Baseline	Post-treatment	Follow-up	Difference baseline v. post-treatment	Difference baseline v. follow-up	<i>p</i> value (effect size)
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Difference (effect size)	Difference (effect size)	<i>p</i> value (effect size)
PANSS positive	12.28 (4.07)	10.87 (3.53)	10.75 (3.45)	12.16 (4.24)	10.73 (3.48)	9.78 (3.18)	0.733 (0.074)	0.281 (0.241)	
PANSS negative	15.12 (5.41)	14.23 (4.82)	13.48 (5.51)	14.20 (6.49)	13.75 (6.51)	12.51 (6.09)	0.729 (0.074)	0.584 (0.122)	
PANSS general	27.36 (6.24)	25.48 (6.82)	24.23 (4.94)	27.50 (7.27)	25.63 (6.04)	23.95 (6.01)	0.196 (0.279)	0.152 (0.326)	
PANSS total	54.86 (12.81)	50.36 (13.01)	48.41 (11.42)	53.86 (15.59)	50.10 (13.82)	46.33 (13.71)	0.498 (0.147)	0.206 (0.287)	

MCT, Metacognitive Training; PANSS, Positive and Negative Syndrome Scale.

2014; Windell *et al.* 2015). However, it is important to note the greater improvements of MCT in the follow-up, coinciding with the results of Moritz *et al.* (2014a, b) after 3 years of follow-up, suggesting a 'sleeper' effect of MCT, implying that work in the sessions could have an important effect in the future. Moreover, MCT had a clear effect in follow-up not only on positive symptoms but also negative and general symptoms as well, suggesting more improvement in functionality (Windell *et al.* 2015). It is likely that the strategies worked on in the group were indirectly related to symptoms and could be useful in preventing future relapses. In our study, people with psychosis of recent onset showed improvement in positive symptoms with both interventions. It should be taken into account that levels of symptoms at baseline were very low, indicating a possible floor effect that made it difficult to detect the superiority of one intervention over the other due to the restriction in range. In contrast, people with schizophrenia in other studies scored higher in symptoms (Moritz *et al.* 2011) suggested that in order to avoid the floor effect future studies should recruit subjects with at least mild delusional symptoms.

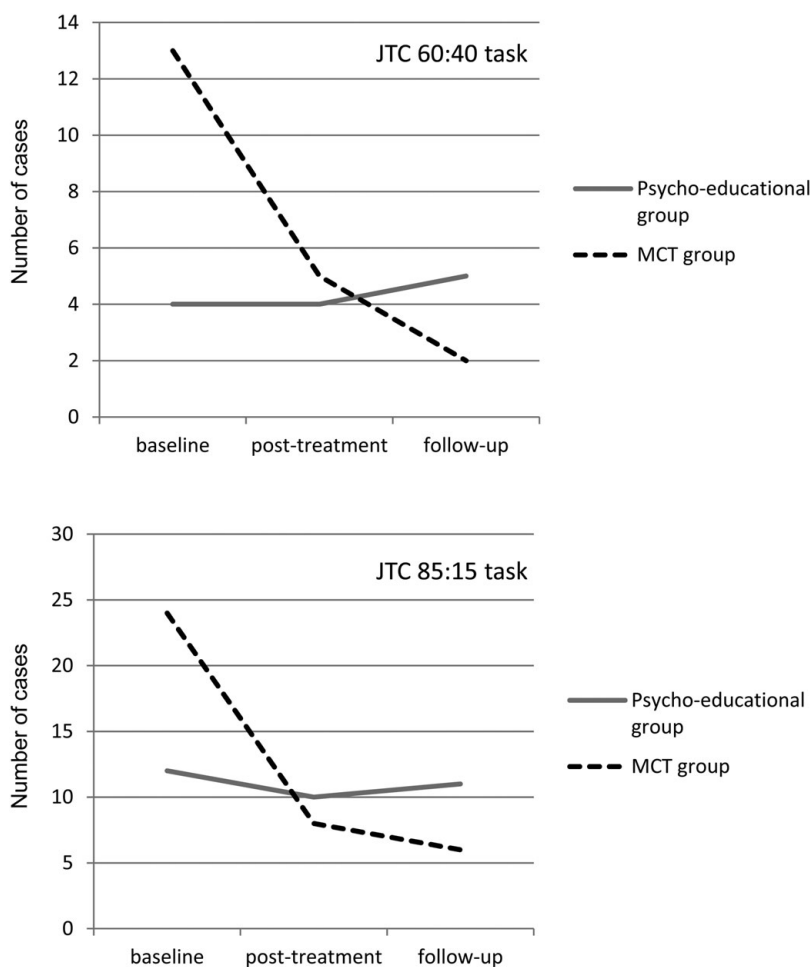
The MCT group had a clear effect in cognitive insight, in the post-treatment and follow-up, according to (Lam *et al.* 2015) and contrary to (van Oosterhout *et al.* 2014). The psycho-educational group scored worse on the self-reflectiveness subscale at all time points while the MCT group showed a reduction in their scores on the self-certainty subscale, indicating better scores for the composite index for people who attended the MCT intervention. The reduction of levels of self-certainty is relevant because in reducing this bias, patients achieve a lower confidence in the interpretation of their own ideas (Beck *et al.* 2004) and possibly prevent these ideas from becoming delusions. Moreover, MCT acts as a preventive intervention regarding self-reflectiveness, because patients from the psycho-educational group scored worse throughout the clinical trial, obtaining similar scores to chronic patients with schizophrenia (Beck *et al.* 2004). Improvement in insight, which is one of the core results found, has been associated with treatment adherence, higher metacognition, and fewer symptoms in people with first episode of psychosis and schizophrenia (Myers *et al.* 2014; Lysaker *et al.* 2015; Vohs *et al.* 2015).

People from the MCT group decreased in intolerance to frustration and in dependence compared with people from the psycho-educational group. Intolerance to frustration may cause the patient to be over-concerned and manifest early appearance of negative emotional responses such as irritability, guilt, anger, and lower cognitive flexibility (Stanković & Vukosavljević-

**Table 3.** Differences in functioning and metacognitive variables between MCT and psycho-educational groups at baseline compared to post-treatment, and baseline compared to follow-up

	Psychoeducational group			MCT group			Comparison between groups	
	Baseline	Post-treatment	Follow-up	Baseline	Post-treatment	Follow-up	Differences between baseline and post-treatment	Differences between baseline and follow-up
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	<i>p</i> value (effect size)	<i>p</i> value (effect size)
GAF	59.26 (11.08)	62.73 (12.26)	63.68 (11.67)	63.05 (13.97)	66.69 (12.03)	69.41 (11.35)	0.482 (−0.151)	0.55 (−0.133)
Self-reflectiveness BCIS	16.46 (4.71)	15.95 (4.36)	14.63 (4.51)	15.36 (5.15)	16.04 (5.13)	16.29 (7.07)	0.164 (−0.298)	0.047 (−0.449)
Self-certainty BCIS	8.51 (3.49)	8.07 (3.67)	7.63 (2.88)	8.66 (3.63)	6.96 (3.23)	7.39 (3.59)	0.035 (0.456)	0.489 (0.155)
Composite index BCIS	7.95 (5.44)	7.88 (5.92)	7.00 (5.38)	6.70 (6.52)	9.08 (7.03)	8.90 (8.49)	0.026 (−0.488)	0.045 (−0.452)
Externalizing bias IPSAQ	1.11 (3.98)	1.44 (4.08)	1.84 (3.47)	0.46 (3.62)	0.43 (2.71)	1.46 (3.31)	0.751 (0.068)	0.723 (−0.081)
Personalizing bias IPSAQ	1.23 (0.64)	1.27 (0.67)	1.19 (0.96)	1.31 (0.72)	1.19 (0.68)	1.01 (0.51)	0.271 (0.238)	0.056 (0.559)
Hinting task	4.63 (1.19)	4.80 (1.50)	4.65 (1.17)	4.85 (1.05)	5.12 (1.26)	5.14 (1.01)	0.577 (−0.119)	0.127 (−0.343)
Emotional recognition faces	17.54 (1.89)	17.63 (2.08)	17.38 (2.27)	17.68 (1.60)	17.63 (1.81)	18.05 (1.56)	0.300 (0.222)	0.458 (−0.166)
Need of acceptance from others TCI	23.91 (5.52)	22.37 (5.03)	23.20 (4.79)	24.30 (6.13)	23.68 (4.96)	23.15 (5.38)	0.628 (−0.104)	0.822 (0.051)
High expectations TCI	16.46 (4.38)	17.00 (3.73)	16.45 (4.49)	17.86 (3.86)	17.04 (3.46)	15.51 (3.91)	0.149 (0.313)	0.121 (0.351)
Guilt TCI	22.91 (6.29)	22.05 (5.85)	21.60 (5.58)	24.98 (6.14)	24.45 (5.43)	23.73 (5.80)	0.77 (−0.063)	0.65 (0.102)
Intolerance to frustration TCI	21.54 (3.89)	21.29 (3.81)	22.55 (2.98)	22.27 (3.59)	21.09 (3.23)	20.71 (4.03)	0.466 (0.157)	0.014 (0.562)
Worry and anxiety TCI	16.72 (4.16)	16.39 (3.24)	16.33 (3.08)	16.94 (3.82)	16.17 (3.38)	15.49 (3.91)	0.412 (0.177)	0.401 (0.189)
Emotional irresponsibility TCI	20.79 (6.65)	20.37 (6.02)	20.53 (5.62)	19.88 (7.32)	19.45 (6.28)	19.05 (6.62)	0.823 (0.048)	0.743 (0.073)
Avoidance problems TCI	9.04 (3.12)	9.37 (2.49)	9.18 (2.92)	8.80 (7.32)	8.87 (2.94)	8.24 (2.52)	0.897 (−0.028)	0.892 (0.03)
Dependence TCI	20.46 (4.62)	21.29 (5.22)	21.48 (4.58)	21.50 (4.72)	19.94 (4.47)	21.20 (4.94)	0.020 (0.508)	0.196 (0.292)
Helplessness TCI	23.58 (7.12)	21.85 (7.61)	22.53 (5.42)	22.28 (6.49)	22.77 (5.99)	21.41 (4.94)	0.250 (−0.249)	0.906 (−0.027)
Perfectionism TCI	16.72 (4.57)	16.80 (5.27)	16.83 (4.89)	18.66 (4.01)	17.45 (4.26)	17.93 (3.82)	0.350 (0.202)	0.814 (0.053)

MCT, Metacognitive Training; GAF, Global assessment of functioning; BCIS, Beck Cognitive Insight Scale; IPSAQ, Internal, Personal and Situational Attributions Questionnaire; TCI; Irrational Belief Test.



**Fig. 2.** Number of patients jumping to conclusions in each task (85:15 and 60:40) between the two groups in the three assessments.

410 Gvozden, 2011). Both variables could be related to  
 411 depression and self-esteem (Xu *et al.* 2013). In this  
 412 line, MCT may act as a protective intervention for  
 413 depressive symptoms and as an elicitor of improved  
 414 self-esteem.

415 JTC improved in the MCT group but not in the  
 416 psycho-educational group; however, the changes  
 417 were produced only in the 85:15 task, and were clearly  
 418 significant only in post-treatment. Curiously, despite  
 419 randomization, the psycho-educational group pre-  
 420 sented less JTC at baseline than the MCT group.  
 421 These results suggest that JTC could be reduced by  
 422 MCT training (Menon *et al.* 2008), although the pos-  
 423 sible floor effect in the psycho-educational group  
 424 should be considered. Our results are in accordance  
 425 with previous studies that found that MCT is useful  
 426 in reducing JTC in people with schizophrenia  
 427 (Aghotor *et al.* 2010), and taking into account the theo-  
 428 retical model of Salvatore *et al.* (2012), it could therefore  
 429 help prevent the emergence of delusions.

430 Although no differences were found in the compari- 430  
 431 son between groups, in the intergroup comparison per- 431  
 432 sonalizing bias presented an improvement in the MCT 432  
 433 group but not in psycho-educational group in the 433  
 434 follow-up, with a high effect size (up to 0.9). This is 434  
 435 an interesting result because higher scores on this sub- 435  
 436 scale are associated with higher levels of paranoid 436  
 437 ideation and persecutory delusions (Kinderman & 437  
 438 Bentall, 1996; Mehl *et al.* 2014). In the same line, ToM 438  
 439 improved in the MCT group but not in the 439  
 440 psycho-educational group in the follow-up, and with 440  
 441 a mild effect size. It did not improve in the analysis 441  
 442 between groups. However, scores on the ToM task 442  
 443 were high even at baseline, suggesting that the patients 443  
 444 included were not sufficiently impaired in this area, 444  
 445 contrary to a previous meta-analysis (Bora & Pantelis, 445  
 446 2013). Another possibility might be that the test used 446  
 447 did not detect deficits in ToM, as suggested by 447  
 448 Langdon *et al.* (2014). Regarding emotional recognition 448  
 449 there was no improvement in either of the two groups, 449



**Table 4.** Differences in each group between baseline and post-treatment and baseline and follow-up

	Psycho-educational group		MCT group	
	Differences baseline <i>v.</i> post-treatment	Differences baseline <i>v.</i> follow-up	Differences baseline <i>v.</i> post-treatment	Differences baseline <i>v.</i> follow-up
	Difference mean <i>p</i> value (effect size)	Difference mean <i>p</i> value (effect size)	Difference mean <i>p</i> value (effect size)	Difference mean <i>p</i> value (effect size)
PANSS positive	-1.41 0.04 (-0.333)	-1.53 0.04 (-0.337)	-1.43 0.011 (-0.382)	-2.38 0.001 (-0.533)
PANSS negative	-0.90 0.22 (-0.195)	-1.65 0.133 (-0.242)	-0.45 0.218 (-0.18)	-1.69 0.001 (-0.578)
PANSS general	-1.88 0.78 (-0.044)	-3.13 0.113 (-0.26)	-1.88 0.008 (-0.403)	-3.55 <0.001 (-0.845)
PANSS total	-4.50 0.25 (-0.187)	-6.45 0.045 (-0.332)	-3.76 0.005 (-0.429)	-7.53 <0.001 (-0.897)
GAF	3.46 0.096 (0.27)	4.41 0.063 (0.302)	3.64 0.03 (0.317)	6.37 0.016 (0.394)
Self-reflectiveness BCIS	-0.51 0.076 (-0.285)	-1.83 <0.001 (-0.66)	0.68 0.727 (0.051)	0.93 0.88 (0.024)
Self-certainty BCIS	-0.44 0.675 (0.066)	-0.88 0.63 (-0.077)	-1.69 0.004 (-0.436)	-1.27 0.244 (-0.185)
Composite Index BCIS	-0.07 0.146 (-0.232)	-0.95 0.003 (-0.51)	2.38 0.088 (0.252)	2.20 0.516 (0.102)
Personalizing Bias IPSAQ	0.04 0.46 (0.118)	-0.04 0.75 (-0.078)	-0.12 0.397 (-0.125)	-0.30 <0.001 (-0.905)
Hinting Task	0.17 0.509 (0.104)	0.02 0.891 (0.022)	0.28 0.125 (0.225)	0.30 0.032 (0.347)
High expectations TCI	0.54 0.485 (0.11)	-0.01 0.907 (0.019)	-0.82 0.144 (-0.219)	-2.35 0.013 (-0.413)
Emotional irresponsibility TCI	-0.42 0.22 (-0.194)	-0.26 0.428 (-0.127)	-0.43 0.03 (-0.331)	-0.83 0.138 (-0.239)
Dependence TCI	0.84 0.412 (0.129)	-0.26 0.304 (0.165)	-1.56 0.007 (-0.416)	-0.31 0.429 (-0.126)

PANSS, Positive and Negative Syndrome Scale; GAF, Global assessment of functioning; BCIS, Beck Cognitive Insight Scale; IPSAQ, Internal, Personal and Situational Attributions Questionnaire; TCI; Irrational Belief Test.

450 contrary to previous research (Ussorio *et al.* 2016). Both  
451 groups had good scores in emotional recognition at  
452 baseline assessment, so perhaps at this stage of the ill-  
453 nesses there is not a clear deficit, in contrast to chronic  
454 samples (Besche-Richard *et al.* 2012). Moreover, the  
455 MCT does not target better emotion recognition but  
456 rather modulates confidence for social judgments.

457 However, some considerations should be taken into  
458 account. Regarding the characteristics of the 'control'  
459 group for comparison, an active intervention was  
460 used in order to control the effect of the group.  
461 However, this group was not really 'control' because  
462 in two sessions patients were receiving and sharing  
463 information regarding risk behaviors and prevention  
464 of relapses. The other clinical trials performed with  
465 the MCT have used other characteristics in the

comparison groups such as waiting lists and cognitive 466  
rehabilitation (Moritz *et al.* 2014b), and this could 467  
account for the discrepancies in findings. Another 468  
point to take into account is that both groups received 469  
an extra intervention (MCT or psycho-education) not 470  
considered treatment as usual, which probably helped 471  
both groups improve in several areas. Perhaps the 472  
MCT group might have improved more if the compari- 473  
son group had been with treatment as usual. Second, 474  
the frequency of sessions in our study was once a 475  
week while in other studies it was twice a week. This 476  
divergence in the methodology could have influenced 477  
the results in some way, producing slower changes in 478  
the MCT intervention. Another consideration arises 479  
from the setting of the patients; in our study we 480  
included only outpatients while in other studies 481

482 inpatients were also included (Moritz *et al.* 2013a, b).  
 483 Another limitation is that the patients were not asked  
 484 to complete homework in the MCT group and this  
 485 could be a cause of the lower integration of the areas  
 486 worked up in the sessions. MCT has been demon-  
 487 strated to be effective in people with schizophrenia  
 488 with eight sessions included in the program (Eichner  
 489 & Berna, 2016). However, in order to further improve  
 490 the results other interventions could be provided to  
 491 these patients, such as joint implementation of MCT  
 492 in group and individualized (Moritz *et al.* 2011), as  
 493 well as other kinds of interventions addressed to cover-  
 494 ing similar aspects (Penn *et al.* 2005). Finally, the train-  
 495 ing has been recently complemented with two  
 496 modules on self-esteem and dealing with stigma as  
 497 these domains may also contribute to the formation  
 498 and maintenance of positive symptoms. Whether  
 499 these modules augment effects awaits to be estab-  
 500 lished, however.

501 The strengths of the study include an adequate sam-  
 502 ple size, the novelty of the characteristics of the sample  
 503 in terms of early stages and community settings, and  
 504 its multi-site implementation.

505 In conclusion, MCT is an effective psychological inter-  
 506 vention for people with a recent onset of psychosis, in  
 507 order to improve psychotic symptoms and cognitive  
 508 insight, and to reduce irrational beliefs. MCT could be  
 509 a good treatment choice in clinical practice taking into  
 510 account the positive results in insight improvement  
 511 that may act to prevent further psychotic episodes.  
 512 More studies should be done with this population in  
 513 order to assess the cost-effectiveness of MCT and the  
 514 combination of this treatment with others.

#### 515 Appendix. Spanish Metacognition Study Group

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None.

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