Metacognition and Cognitive Biases in the Treatment of Psychosis

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Chapter 5

Do specific modules of the metacognitive training (MCT) package modify data gathering and belief inflexibility in patients with delusions?

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Abstract

INTRODUCTION: The Metacognitive Training package developed by Moritz and colleagues has been examined in several meta-analyses, yielding contradictory results. This study focuses specifically on the efficacy of the module aimed to reduce 'jumping to conclusions' and the module aimed to improve 'belief inflexibility'.

METHODS: Patients with delusional symptoms participated in a one-hour metacognitive training module on data gathering (jumping to conclusions; n=38) and a one-hour module on belief inflexibility (n = 23). Directly before and after the training, jumping to conclusions was evaluated with two versions of the beads task, and belief inflexibility was evaluated with the self-certainty scale of the Beck Cognitive Insight Scales.

RESULTS: The one-hour training sessions had no significant effect on jumping to conclusions as measured with the 85/15 version of the Beads task ($p = .992$) and with the 60/40 version ($p = .432$). Similarly, there was no significant effect on belief inflexibility ($p = .133$).

CONCLUSIONS: In these two small groups of patients, the modules of the Metacognitive Training package specifically designed to reduce jumping to conclusions and belief inflexibility were not effective in reducing these cognitive biases.

Introduction

Metacognitive training (MCT) shares the goal of reducing psychotic symptoms with cognitive behavioural therapy for psychosis (CBTp), but adopts a 'back door approach' by educating patients about cognitive biases associated with delusions (Moritz et al., 2014). Several cognitive biases, such as 'jumping to conclusions' (JTC) or the 'bias against disconfirmatory evidence' (BADE)/'belief inflexibility' (BI) are associated with delusions and are addressed by MCT. BI (or lack of belief flexibility) is a difficulty in appreciating that one may be mistaken of his/her delusional belief and in accommodating alternative explanations (Freeman et al., 2004). JTC is hypothesized to contribute to hasty decision making, accepting false ideas, and the inability to consider alternative explanations and, hence, the formation and maintenance of delusional ideas (Colbert & Peters, 2002; Moritz & Woodward, 2005; McKay et al., 2006, 2007).

Three meta-analyses on MCT have been published. In their analyses, Jiang et al. (2015) included four trials to measure the effects of MCT on positive symptoms in general and on delusions in particular. These studies had a pooled sample of 129 participants in the intervention group and 120 participants in the control group. The authors found a small but significant reduction of positive symptoms in the MCT group compared to the control group, but not for delusions. The meta-analysis by Eichner and Berna included 15 studies (12 randomised controlled trials; RCTs) and showed a small to moderate effect of MCT on delusions; however, this effect was lost after removing the studies with a high risk of bias (Eichner & Berna, 2016). Finally, the meta-analysis by van Oosterhout et al. (van Oosterhout et al., 2016) examined the effects of MCT on positive symptoms (9 RCTs) and delusions (7 RCTs). This analysis yielded small and non-significant effects for positive symptoms and delusions. Furthermore, the authors found no evidence for a significant effect on JTC.

In summary, studies on the effects of MCT on symptomatology have yielded contradictory results. The current study, with data obtained from a larger trial (van Oosterhout et al., 2014), focused on the effects of a single MCT module on the targeted cognitive biases JTC and BI.

Few studies have investigated the impact of an individual MCT module on JTC in patients with a schizophrenia spectrum diagnosis. Kowalski et al. (Kowalski et al., 2017) found that (on a trend level) JTC was reduced by one single module of MCT. Two other studies made alterations to the original module. Ross et al. (2011) found similar results (notable but non-significant reduction in JTC) mostly in patients who were defined as 'non-jumpers' before the intervention. Note that their training package was altered with the addition of a 'visual illusions' task to the standard MCT tasks. In a non-randomized trial, Balzan et al. (2014) found that patients with schizophrenia improved on cognitive bias tasks (including tasks associated with JTC) after an individualised one-hour MCT module on JTC and clinical insight. To our knowledge, the present study is the first to investigate the effect of a single MCT module on BI.

Methods

Data were obtained from a larger RCT (van Oosterhout et al., 2014). The main study was a multicentre, single-blind RCT conducted in the Netherlands, on the efficacy of MCT. The study was approved by the Ethics Committee of Parnassia (NL28883.097.09).

Participants

Eligible participants were adults aged 18–65 years with a psychotic disorder in the DSM-IV schizophrenia spectrum (American Psychiatric Association, 2013). Eligible for the study were patients who met the criteria for at least moderate delusional symptoms, i.e. ideas of social reference and/or persecutory ideas on the Green Paranoid Thought Scales (GPTS score ≥ 50) (Green et al., 2008). The diagnosis was established by the Schedules for Clinical Assessment in Neuropsychiatry (SCAN) (World Health Organization, 1999). Exclusion criteria were primary addiction, insufficient understanding of the Dutch language, and an IQ < 70.

Due to practical problems at specific research sites, not all patients received proper pre- and post-test measurements, which explains the differences in the numbers of participants.

Training modules

In the trial, the participants received MCT, i.e. a group intervention intended for 3–10 patients (Moritz & Woodward, 2007; Moritz, 2009). MCT encompasses eight highly structured modules using PowerPoint presentations and characterised by small in-class exercises. MCT targets cognitive biases. Exercises that demonstrate the fallibility of the human cognitive apparatus are discussed in the group. Participants are encouraged to express personal examples of these biases and discussion of ways to counter them serve to provide corrective experiences in a supportive atmosphere. Measurements were taken before and after sessions 2 (JTC) and 3 (BI).

The training on JTC (session 2) consists of a one-hour group module. In the module, fragmented pictures are shown that eventually depict objects. Hasty decisions often lead to errors and new evidence discourages certain alternatives. The disadvantage of JTC is stressed.

The training on BI (session 3) consists of a one-hour group module. In the module, cartoon sequences are shown in backward order, which increasingly disambiguate a complex scenario. After each (new) picture, the plausibility of four interpretations has to be re-rated. The aim is to teach patients to withhold strong judgements until sufficient evidence has been collected, and to consider counter-arguments and alternative views.

Measurements

Session 2 was examined using the Beads Task before and directly after the training module (Huq et al., 1988). This measures the tendency to jump to conclusions and is considered the most reliable measure of the JTC bias (Fine et al., 2007). The (mean) number of 'draws to decision' (DTD) was considered as outcome variable.

Session 3 was examined using the self-certainty scale of the Beck Cognitive Insight Scales (Beck et al., 2004) before and directly after the training module. This scale measures overconfidence in the interpretation of experiences. It is associated with delusion proneness (Warman & Martin, 2006) and delusions (Warman et al., 2007).

Baseline severity of delusions was measured with the GPTS (Green et al., 2008). This questionnaire measures ideas of social reference (part A) and persecutory ideas (part B) with 32 items rated on a 5-point Likert scale. The internal consistency is good, with a Cronbach's alpha > 0.70, and the questionnaire is considered valid and sensitive to change (Green et al., 2008).

Statistical analysis

Results were analysed using SPSS version 19 with paired-sample t-tests (normally distributed variables) or a Wilcoxon signed rank test (non-parametric testing for non-normally distributed variables).

Results

Table 5.1 presents baseline data for the study population: 38 participants finished the JTC module, while 23 participants finished the BI module. In this sample, scores of the GPTS were relatively high, indicating present delusional symptoms.

Table 5.2 presents the results of the MTC modules on the cognitive biases. Although the module of session 2 targeted JTC, there was no significant effect on performance of the Beads Task (mean DTD). If we consider two or less DTD as JTC (dichotomous measure), at baseline, our sample showed 22% (85–15 versions; eight participants) and 11% (60–40 version; four participants) jumpers. On an individual level we found that in the 85–15 version five out of eight jumpers (62.5%) and in the 60–40 version one out of four jumpers (25%) no longer jumped to conclusions after the session. On the other hand, at post-test six participants (85–15 version; 16%) and one participant (60–40 version 3%) went from non-JTC to JTC. Using Fisher's exact test, in the 85–15 version pre-module jumping was not related to post-module jumping ($p = .373$). On the other hand, in the 60–40 version, pre-module jumping was related to post-module jumping ($p < .05$).

Table 5.1 Baseline characteristics of the Jumping to conclusions (JTC) and the Belief inflexibility (BI) groups

	JTC (n = 38)	BI (n = 23)
Gender (M/F)	27/11	15/8
Age in years, M (SD)	39.5 (10.2)	39.2 (9.3)
Education in levels[a], M (SD)	3.7 (1.9)	3.7 (2.0)
PSYRATS-DRS, M (SD)	12.6 (5.3)	12.9 (4.9)
GPTS		
Total, M (SD)	100.3 (22.3)	99.8 (19.4)
GPTS A, M (SD)	51.3 (11.6)	50.4 (12.0)
GPTS B, M (SD)	49.0 (12.4)	49.5 (10.1)
Diagnosis		
Paranoid schizophrenia	25	14
Psychotic disorder NOS	6	4
Schizoaffective disorder	2	1
Others (5 categories)	5	4
Medication		
No medication	3	1
AP ≥ 4 months	22	17
AP + MS ≥ 4 months	4	2
AP + tranquilizers	9	3
Others (3 categories)	-	-

AP, antipsychotic medication; MS, mood stabilizer medication; GPTS, Green Paranoid Thought Scales; PSYRATS, Psychotic Symptom Rating Scale.
[a] 0–1: none to primary education, 2–4: low-to-medium (vocational) education, 5–7: higher education.

The module of session 3 targeted BI, but the scores on the self-certainty scale were not affected. The effect sizes were small to very small.

Discussion

This study focused on potential changes during a single session of MTC. However, no effect was found on JTC after a session aiming to change JTC and no effect was found on BI after a session aiming to change BI.

For JTC no pre- and post-test differences were found in the *mean* DTD. In the trial of Kowalski et al. (2017) a more marked difference was found, bordering on significance (p = .099). The trial of Ross et al. (2011) found that (compared to the control group) the number of beads drawn increased significantly after the intervention. In a non-randomised trial on the effect of an individualised one-hour MCT module, Balzan et al. (2014) used cognitive tasks based

Table 5.2 Effects of the metacognitive training modules on the cognitive biases

					Paired sample t-test (parametric)			Wilcoxon signed rank test (non-parametric)	
Bias Task	Number of patients	Pretest mean (SD)	Posttest mean (SD)	Within-group effect-size	t	df	Significant (2-tailed)	z-value	Significant (2-tailed)
Jumping to conclusions									
Draws to decision on Beads Task									
85/15 version	38	6.1 (5.6)	6.7 (5.8)	0.10				-0.010	0.992
60/40 version	38	8.6 (5.9)	9.1 (5.8)	0.09				-0.788	0.431
Belief inflexibility									
Self-certainty scale	23	8.3 (3.4)[n]	7.6 (3.5)[n]	0.20	1.558	22	0.133		

n Normally distributed, Shapiro-Wilk-test (p > .05).

on other biases (representativeness task and illusion of control task), making comparison with other studies difficult; nevertheless, they reported that the module had a positive significant effect.

In the present study, Fisher's exact test showed no relationship between jumping status at t0 and at t1 using the 85–15 version of the beads task (using a *dichotomous* measure of yes/no jumping). This may imply that the module has an impact on JTC; however, we found similar numbers of participants jumping before (n = 8) and after the module (n = 9). We did find a relationship between jumping status at t0 and at t1 using the 60–40 version of the beads task, which matches our first finding on the mean DTD. Similarly, Ross et al. (2011) found robust numbers of jumpers before and after intervention.

Of note, in our sample, baseline levels of DTD were higher than in the above-mentioned trials. Furthermore, the range of DTD was broad with all SDs > 5. This may have affected the results, i.e. the increase in DTD needs to be considerable to be significant. Unfortunately, no studies are available with which to compare our findings on BI.

In the present study, there may be several reasons for the absence of impact on cognitive biases. For example, the group of participants may have been too deluded. In this respect, Moritz et al. (Moritz et al., 2014) reported that the group version is not recommended for patients with very acute symptoms. More research is needed to establish whether there is a relationship between symptom severity, specific application of the module (group or individual), and an effect on cognitive biases. Secondly, the duration of the MCT modules targeting JTC and BI may have been too short, too general, and insufficiently personalised. In line with this, recent developments in MCT indicate the need for more personalised and individualised variants. Moreover, the question as to whether cognitive biases mediate treatment response is still debated (Ross et al., 2011, Garety et al., 2015, Ludtke et al., 2017). This raises the question as to whether these biases are proper targets for treatment.

This study has several weaknesses. First, there was no control group, which makes it impossible to attribute changes to the intervention. Second, the size of the two study groups was relatively small; in underpowered studies, the risk for a type 1 error is large. Furthermore, a design with more intensive training with repetition and homework might yield larger effects. Fourth, we chose the BCIS as a measure of BI, whereas a standardised interview, such as the Maudsley Assessment of Delusions Scale (MADS: (Wessely et al., 1993, Garety et al., 2005) might be more appropriate because flexibility is difficult to assess by means of self-report. However, in patients with psychosis, Liraud et al. found that ratings and self-rating of symptoms were highly correlated, independent of insight (Liraud et al., 2004). Finally, the scores on the beads task were already high at baseline and JTC was present in only a minority of the patient group. On the other hand, our sample was (in general) more deluded than other MCT samples.

In summary, this study shows that the single modules of the MCT aimed at reducing JTC and BI do not result in immediate reductions in these biases. This result is in general agreement with earlier studies that evaluated the complete MCT package on symptomatology and JTC.

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