European Psychiatry 30 (2015) 615–621

Contents lists available at ScienceDirect

European Psychiatry

journal homepage: http://www.europsy-journal.com

Original article

# Combined neurocognitive and metacognitive rehabilitation in schizophrenia: Effects on bias against disconfirmatory evidence

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ARTICLE INFO

*Article history:*
Received 16 October 2014
Received in revised form 30 January 2015
Accepted 2 February 2015
Available online 8 March 2015

*Keywords:*
Schizophrenia
Metacognitive training
Rehabilitation
Cognitive biases
Neurocognition

ABSTRACT

*Background:* A Metacognitive Training for Schizophrenia patients (MCT) was developed to target the cognitive biases that characterize the illness. Results suggest positive MCT effects encompassing several aspects of psychopathology and subjective well-being. There are still open questions concerning the effect on different cognitive biases and the interplay between them and both psychopathology and neurocognition. Specifically, the bias against disconfirmatory evidence (BADE) has never been tested in previous trials on MCT. In this study we evaluated the feasibility of MCT combined with a cognitive remediation therapy (CACR) in schizophrenia and its effect on BADE. Moreover, we investigated the relationships between BADE and both neuropsychology and psychopathology, taking into account mutual influences on the degree of improvement.
*Methods:* Fifty-seven schizophrenia outpatients were randomly assigned to CACR + control group or MCT+CACR and assessed at baseline and after treatment for psychopathology, neurocognition and BADE.
*Results:* After MCT+CACR patients showed significantly greater improvements on BADE. Although BADE baseline performances correlated with several cognitive domains, no association was found between BADE improvement and neurocognitive nor psychopathological measures.
*Conclusions:* This study enlightened for the first time the efficacy of MCT+CACR on BADE in schizophrenia, suggesting the importance to develop a more specific intervention tailored on individual needs of patients.


## 1. Introduction

Patients with schizophrenia show biased reasoning processes, contributing to core positive symptoms and to functional disability, thus representing an ultimate target for treatment. Interestingly, targeted rehabilitative interventions seem able to improve cognitive biases in a variety of patients with psychotic features [1,27].

Woodward introduced a new neuropsychological paradigm aimed to investigate the possibility of a failure in integrating disconfirmatory evidence (bias against disconfirmatory evidence-BADE). This bias consists in the reduced tendency to disconfirm own answers, when these are found to be less reasonable, based on the integrated evidence. The BADE could be involved in the formation and/or persistence of delusions in schizophrenia and it probably plays a role in the etiopathogenesis of the illness [31,40]. However, there are still open questions about the relationship between BADE and both psychopathology and neurocognition. Some studies found this bias only in deluded patients [39,40], whereas others found an association with the diagnosis of schizophrenia, irrespective of current presence of delusions [22,38]. Finally, the interplay between BADE and cognitive performances is not yet clarified as well. So far, some studies suggested a correlation between measures of BADE and cognitive domains that are typically impaired in schizophrenia [35], while others reported no association between neuropsychological variables and BADE [23].

Given the evidence of a role of cognitive biases in triggering or maintaining delusions, as mentioned above, Moritz and Woodward introduced a new line of therapeutic intervention, named

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http://dx.doi.org/10.1016/j.eurpsy.2015.02.006
0924-9338/

Metacognitive Training for Schizophrenia Patients (MCT) [23]. MCT addresses several cognitive biases, including BADE, Jumping to Conclusion (JTC), Theory of Mind and Overconfidence in Memory. The primary target of MCT is to change the cognitive infrastructure of delusional ideation, raising the patients' awareness of both the presence and dysfunctionality of cognitive distortions [23,24]. The enhancement of this awareness may lead patients to reflect more on automatic cognitive traps and to find alternative strategies to deal with them, with the help of real life and practical exercises.

Several studies have been conducted to assess the effectiveness of MCT [27]. Randomized controlled trials showed significant improvements in psychopathological measures (especially delusions) [1,5,17,26], awareness of delusions [9], cognitive biases (especially reduction of JTC) [23], data gathering, cognitive flexibility [33], subjective well-being [4], and conceptual disorganization [17]. These results seem to be relevant not only in patients with schizophrenia but also in patients with a co-morbid diagnosis of psychosis and addiction [24]. MCT has been found to be effective in reducing persecutory and referential delusions in resistant schizophrenia patients. Moreover, the improvement in psychotic symptoms seemed to have positive impact on psychosocial functioning [18]. A multicentre randomised controlled trail on MCT, in addition to the confirmed effect on positive symptomatology, showed also a trend impact on insight and social functioning [5]. After the training, patients were more able to recognize their symptoms and to have social initiatives. All these data define MCT as a valuable supplement to pharmacotherapy and suggest the need to examine if other cognitive biases may be affected by MCT training [27].

Recently, two trails assessed the long-term efficacy of MCT showing that effects on delusions persisted over time after training. Moreover, a "sleeper" improvement in subjective well-being and self-esteem was also reported, independently from an improvement on the jumping to conclusions bias [27,29].

In sum, a number of studies highlighted the feasibility of MCT and suggested a clear effectiveness in improving different cognitive and psychopathological domains. Furthermore, these improvements seem to be maintained over the time. However, further efforts in this direction are needed to overcome some limits that currently make these results difficult to compare. Main concerns are related to sample size, absence of time-matched active control group and sample groups including broad diagnostic criteria within the psychotic spectrum [29]. Another major issue refers to the targeted cognitive biases: most studies have explored the efficacy of the MCT on JTC, while no research evaluated the effect of the group treatment on BADE, which might be considered more specific for schizophrenia.

In the current study, we evaluated, through a randomized controlled design, the feasibility and effectiveness of the adapted Italian version of MCT combined with a cognitive remediation therapy, in a sample of clinically stabilized outpatients with diagnosis of schizophrenia. In line with a recent meta-analysis indicating that cognitive remediation treatment is associated with improvements in cognitive deficits, representing a core feature of schizophrenia, we decided to integrate MCT with Cognitive Remediation [42].

With the idea of catching an innovative point of view, our primary goal was specifically to investigate the effect of the combined intervention on BADE index, a measure previously associated with schizophrenia and also related to both psychopathology and neurocognition [8]. On the other hand, our secondary goal was to examine the possible relationships between BADE performances and both neuropsychological and psychopathological measures, also taking into account mutual influences on the degree of improvement after treatment.

## 2. Methods

### 2.1. Participants

Fifty-seven outpatients from the Department of Clinical Neurosciences, IRCCS San Raffaele Hospital of Milan, were enrolled in the study. They all met DSM IV-R criteria for schizophrenia, as determined by trained psychiatrists by using medical records and DSM IV-R Structured Clinical Interview. Patients were all clinically stabilized since at least 3 months and responders to psychopharmacological treatments, as defined by a reduction $\geq$ 30% of PANSS Total score. Exclusion criteria were: substance dependence or abuse, co-morbid diagnosis on Axis I or II, major neurological illness, perinatal trauma and mental retardation. Patients had been treated with a stable dose of the same antipsychotic therapy for at least 3 months and remained on the same medication throughout the study. All subjects provided informed consent to a protocol approved by the local Ethical Committee, following the principles of the Declaration of Helsinki.

### 2.2. Design

This study was performed as a randomized controlled clinical trial. We compared 2 groups of patients who were following a standard rehabilitation program (SRT), which is composed by 1-hour sessions once a week for 3 months and includes the integrated psychological therapy (IPT) [3], social skills training programs for residential, vocational and recreational functioning [32], and psychoeducation.

Following baseline assessments, patients were assigned 1:1, by means of a random number table, to:

- Domain-specific Cognitive Remediation Therapy (CACR, $n = 27$) + Control Newspaper discussion Group (CNG);
- CACR + Metacognitive Training (MCT, $n = 30$).

Both groups lasted 16 weeks and provided the same number of hours of rehabilitation treatment to all the patients, specifically 3 hours every week of CACR plus 1 hour of MCT or (CNG).

All patients were re-assessed within 1 week after the end of training.

All interventions were conducted by trained psychologists with at least 5 years of experience in cognitive-behavioural therapy with patients affected by schizophrenia.

Psychologists who administered the neuropsychological assessment were blind to the treatment condition (MCT + CACR vs CACR + CNG).

### 2.3. Interventions

#### 2.3.1. MCT training

The metacognitive group training programme is fully documented [21], and can be obtained online cost-free at www.uke.de/mkt (currently available in 31 languages). It consists of eight modules dealing with monocausal and unbalanced attributions (module 1), jumping to conclusions (modules 2 and 7), belief inflexibility (module 3), deficits in theory of mind and social cognition (modules 4 and 6), memory (overconfidence in errors) (module 5), depression and low self-esteem (module 8).

The modules are presented by means of a video projector. Each group session lasts approximately 45–60 min. Slide presentation format has been used to increase communicative effectiveness and patients' understanding, which may represent a problem in psychological interventions [34]. For an in-depth description of the modules, the reader is referred to the manual and previous articles [21,23].