

Detecting and defusing cognitive traps: metacognitive intervention in schizophrenia

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Purpose of review

Until recently, psychological therapy for schizophrenia was considered harmful or inefficient by many clinicians. The reservation against psychotherapy is partly rooted in the assumption that delusions in particular and schizophrenia in general are not amenable to psychological understanding and represent 'utter madness'. However, meta-analyses suggest that cognitive intervention is effective in ameliorating schizophrenia symptoms. In addition, evidence has accumulated that cognitive biases, such as jumping to conclusions, are involved in the pathogenesis of schizophrenia positive symptoms, particularly delusions. A recently developed group program, called metacognitive training (MCT), is presented targeting these biases. MCT is a hybrid of psychoeducation, cognitive remediation and cognitive-behavioural therapy.

Recent findings

This review introduces new evidence on cognitive biases involved in the pathogenesis of schizophrenia and demonstrates how the MCT raises the patients' (metacognitive) awareness to detect and defuse such 'cognitive traps'. At the end, a new individualized variant entitled MCT+ is presented targeting individual delusional ideas. Finally, empirical results are summarized that speak in favour of the feasibility and efficacy of MCT.

Summary

Recent studies assert marked cognitive biases in schizophrenia. MCT has evolved as a feasible and effective complement of standard psychiatric treatment.

Keywords

cognition, cognitive bias, metacognition, metacognitive training, schizophrenia

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Introduction

The psychological treatment of schizophrenia has been neglected and sometimes even refuted until recently. For decades the attitude prevailed that delusions, a core symptom of schizophrenia, can be understood but not readily treated (see [1]), or be treated but not psychologically understood (see [2]). Psychotherapy was considered, at best, naive. This situation has somewhat changed in view of the success of some psychological interventions [3], particularly cognitive-behavioural therapy (CBT; [4,5]). In addition, psychoeducation involving families [6], cognitive remediation [7] and social cognition programs [8^{*}] improve symptoms and/or core functional aspects of the disorder. Still, dissemination of psychotherapeutic programs is poor, even in countries like England and Germany that have incorporated such approaches into their treatment recommendations [9^{**}].

The renewed interest in psychotherapy for this disorder is partly due to sobering reviews suggesting that antipsycho-

tic medication brings lasting symptom relief and recovery to a subgroup of patients. According to most authors, 20–30% of patients are nonresponders to neuroleptics [10]. Even in the modern era of atypical neuroleptics at least every second patient withdraws from medication [11,12], often due to side-effects, lack of insight, poor therapeutic alliance and forgetfulness [13^{*}]. Despite their perceived efficacy, the effect size of neuroleptics against placebo is only in the medium effect size according to Leucht and coworkers [14^{**}]. Psychotherapy has been shown to add a small-to-medium effect size to medication and is an especially viable strategy for patients who are medication-resistant [5]. Psychotherapy and psychopharmacology should not be considered 'rivals' but should be seen as complementary approaches: psychotherapy on the one hand is aimed at raising illness insight and decreasing interpersonal suspiciousness, which in turn improves medication adherence. Psychopharmacology, on the other hand, can be considered a prerequisite for psychotherapy in many cases, as disorganization and agitation may undermine a good therapeutic relationship.

Metacognitive training for schizophrenia patients

Numerous reviews assert that cognitive biases, such as jumping to conclusions (JTC), are putatively involved in the formation and maintenance of delusions in schizophrenia [15,16]. There is emerging evidence that schizophrenia patients lack metacognitive awareness not only for neuropsychological dysfunctions [17–19] but also for cognitive biases [20**]. For example, despite objective JTC they deem themselves indecisive [21] (R. Kuepper, R. Klinge, S. Randjbar, B. Hottenrott, J. van Os, S. Moritz, unpublished manuscript). A training approach, which has been made available since 2005, entitled metacognitive training for schizophrenia (MCT; from metacognition = ‘thinking about one’s thinking’), targets these specific biases [22**]. MCT incorporates elements of psychoeducation, cognitive remediation and CBT. Further, it also focuses on social cognitive aspects in the tradition of social cognition programs [23**]. Interestingly, there is some recent evidence that the severity of cognitive biases is linked to symptomatic [20**] as well as functional outcome [24] but that CBT has no major impact on cognitive biases or insight thereof [20**].

MCT is delivered by a healthcare specialist in a group of 3–10 schizophrenia (spectrum) patients. This program is available in over 15 languages and can be downloaded free of charge from the Internet: www.uke.de/mkt. It comprises eight modules (two cycles exist for some language versions) consisting of pdf-converted PowerPoint slides. Each module first familiarizes group members with the respective topic (e.g. JTC) and then multiple exercises are administered, aimed at challenging the functionality of biased thinking styles and providing corrective experiences. The main objective of the training is to raise the patients’ awareness of these cognitive distortions and to prompt them to critically reflect on, complement and alter their current repertoire of problem solving skills. The modules are concluded with learning goals and a case example to show participants how cognitive biases can escalate to psychotic symptoms.

Although the training is highly structured, lively discussions are encouraged and participants are granted sufficient time to exchange their views. Each module contains more exercises than can possibly be performed in one session, thus allowing the trainer to pick the most relevant exercises for the group. While most exercises are delusion-neutral, some address paranoid themes, offering an opportunity for further individual reflections on personal psychotic experiences (e.g. module 1, scenario ‘A friend is talking behind your back’; all modules: ‘What does this have to do with psychosis?’), which introduces the relationship between the cognitive bias dealt with during the session and psychosis).

The next chapters are organized as double sections. We first familiarize the reader with a particular cognitive bias and then briefly describe how this is dealt with in the MCT. In the final chapter, we will summarize recent evidence for the feasibility and effectiveness of this approach.

Cognitive biases in schizophrenia

Since the late 1980s cognitive research has increasingly investigated cognitive biases in schizophrenia. Unlike (‘cold’) cognitive deficits, such as impairment in speed and accuracy [25*], cognitive biases relate to the appraisal, processing and selection of information. Cognitive biases are normal and even functional to some degree (e.g. a certain degree of mental rigidity is helpful to maintain long-term goals) but can morph into cognitive traps when exaggerated (e.g. incorrigibility even in the face of contradictory evidence). Some recent studies show that the different cognitive biases in schizophrenia are rather independent and there does not seem to be one superordinate bias that can account for all other biases [26**].

Jumping to conclusions in schizophrenia: findings from basic research

An extensive literature investigated decision-making in schizophrenia (for a review see [27]). Most studies agree that approximately 40–70% of patients with schizophrenia gather very little information before arriving at strong conclusions. This response pattern, termed JTC, has been predominantly verified with the so-called beads tasks [28]. Importantly, this response pattern is active in both delusional and delusion-neutral scenarios [29*]. Moreover, while more prominent in acute patients (e.g. [30,31]), there is some evidence that JTC survives the psychotic episode [32,33] and is also detectable in remitted patients (however, see [29*]) as well as in nonpsychotic subjects with subclinical features of the disorder [34]. Mounting evidence confirms that JTC is aggravated under stress and in an emotional context [30,35]. As mentioned before, patients seem to be largely unaware of their hastiness and often view themselves as rather hesitant and indecisive [21] (R. Kuepper, R. Klinge, S. Randjbar, B. Hottenrott, J. van Os, S. Moritz, unpublished manuscript). In addition, it seems that patients do not only select fewer but also less reliable cues [36*]. The association between JTC and cognitive deficits is still under debate [29*,37*].

Treatment of jumping to conclusions with the metacognitive training (modules 2 and 7)

Modules 2 and 7 of the MCT are concerned with jumping to conclusions. Participants first discuss advantages (e.g. saving time) and especially disadvantages of JTC (e.g. momentous errors). Examples are provided regarding how JTC may cause problems in everyday life. Later, false and falsifiable ‘urban legends’ are presented that serve as miniature models for delusions (e.g. some people suspect

that the US \$1 bill contains symbols indicating that the US government is in fact ruled by secret societies), whereby arguments for and against this belief should be collected, exchanged and evaluated regarding their plausibility. It is made clear to the participants how biased information selection, presentation of pseudo-evidence and JTC contribute to these legends.

The exercises of the first task set of module 2 show common objects displayed in decreasing degrees of fragmentation: new features are added in eight successive stages, until the entire object is eventually revealed. Response alternatives should be contemplated, and decisions should be withheld until sufficient evidence is offered. Premature decisions often result in errors, serving to emphasize the dysfunctional consequences of the bias ('seeing is believing'). Other exercises deal with complex pictures showing at least two different objects (module 2) and paintings with different title options, whereby the correct title has to be deduced (module 7). These exercises demonstrate that a JTC bias can either lure one into false conclusions or lead one to overlook important pieces of information.

Attributional style and self-esteem in schizophrenia: findings from basic research

Patients with schizophrenia often cast blame for negative events onto other people (e.g. neighbours) and/or institutions (e.g. the secret service) rather than spreading blame over multiple sources. As with JTC, this style is not confined to delusional scenarios but manifests itself in neutral situations. While there is consensus that patients display attributional biases, its exact signature is subject of an ongoing controversy. Whereas early research found evidence for a self-serving bias in the disorder (attribution of success to oneself, attribution of failure to others or circumstances), some newer findings point to a tendency to externalize both personal positive and negative events, which may foster subjective powerlessness and could give rise to feelings of alien control [38,39]. More recently, an excess of monocausal inferences was detected in schizophrenia patients, that is, patients did not contemplate multiple sources but converged onto single explanations more often than healthy persons [40*].

The underlying mechanisms of this cognitive style are not fully uncovered. Initially, it has been proposed that the externalization of blame helps to raise a deep-rooted lack of self-esteem [41]. Approximately two [42] to three [43] out of four patients display low self-esteem, and half of the schizophrenia population suffers from comorbid affective disorders [44*].

Treatment of attributional biases and poor self-esteem with the metacognitive training (modules 1 and 8)

In module 1 (attribution), participants are familiarized with the idea that three basic sources may alone, or (more

commonly) in concert, promote a certain social attribution (myself, others, circumstances). The social consequences and especially disadvantages of extreme and monocausal attributional styles are highlighted (e.g. blaming others for failure may lead to social rejection). Then, possible causes for briefly described events should be discussed, whereby situational as well as personal factors should be taken into account. Participants are encouraged to find and combine different possible explanations (e.g. 'Someone says that you don't look good'; possible explanations: illness; sleep; insulting remark; expression of true concern; skin looks pale under neon light).

Module 8 mainly builds upon the CBT approach for the treatment of depression and is concerned with self-esteem and coping with mood problems. It also critically reflects on the short-lived gain from illness that delusional ideas bring for some patients. Cognitive biases such as overgeneralization, catastrophizing and selective abstraction are brought to the awareness of participants as mediators of depression in conjunction with life events and genetic liability. Dysfunctional coping strategies such as thought suppression [45*,46] are another central topic, and participants are recommended to, for example, perform detached mindfulness [47*] instead of actively suppressing negative thoughts, which often prompts paradoxical enhancement. Techniques for raising self-esteem are conveyed to patients (e.g. taking notes of positive events).

Metamemory in schizophrenia: findings from basic research

Memory problems are a core problem in schizophrenia [25*], which in turn comprise both functional outcome [48] and adherence [13*]. In addition, schizophrenia patients display reduced memory vividness: often they only vaguely remember autobiographical episodes. There is increasing evidence for overconfidence in memories [49–51]. Many studies revealed that this overconfidence was especially present for incorrect or false memories [51], while confidence for correct responses was often found to be lower than that of controls (for a review see [51]). Again, overconfidence in errors is not restricted to delusional themes (e.g. alien abduction) and thus likely represents a risk factor rather than a consequence of paranoid symptoms. Overconfidence in errors, along with enhanced error-proneness, can result in knowledge corruption: a large part of what the patient holds as fact is actually incorrect. Recent evidence has accumulated that this pattern of overconfidence also manifests itself in other cognitive domains [52].

Treatment of metamemory problems with the metacognitive training (module 5)

The MCT module 5 first teaches participants ways to enhance memory retention via mnemonic strategies. The

ubiquity of memory problems and false memories is emphasized by means of various examples. The core exercises consist of visual stimuli from the so-called *false memory paradigm*. Prototypical scenes are presented, luring participants to believe that plausible but in fact unrepresented items have been previously shown (e.g. towels in a beach scene). The exercises demonstrate the fallibility of human memory. It is highlighted that our memory is constructive and error-prone under certain conditions. Participants are encouraged to express doubt in their memories and to collect further proof, if their recollection is vague.

Bias against disconfirmatory evidence in schizophrenia: findings from basic research

Incorrigibility is a central delusion criterion, but again has been verified beyond delusional content in schizophrenia patients [53,54,55–57]. Using visual and verbal material, it was demonstrated that schizophrenia patients are far more easily ‘led up the garden path’ for initially strongly suggested interpretations, which, however, are later discouraged by accumulating evidence. Speaking for the ubiquity of the effect, a bias against disconfirmatory evidence (BADE) has been demonstrated in both first episode [55] and chronic patients [58], as well as in healthy participants scoring high on delusional symptoms [59].

Treatment of the bias against disconfirmatory evidence with the metacognitive training (module 3)

The introductory examples demonstrate that persistence and stubbornness is to some degree normal and even helpful. Then, historical and case examples are shown explaining how exaggerated incorrigibility has led to major problems. Participants are familiarized with the so-called confirmation bias, which is regarded as a major maintenance factor for false beliefs (selective attention to information in accordance with one’s beliefs and expectations). The subsequent exercises show the dysfunctional consequences and fallibility of a strong BADE: three successively presented pictures gradually reveal an ambiguous plot, whereby the correct interpretation is highlighted at the end of each trial. Participants have to weigh and discuss the evidence for and against different interpretations at each of the three stages. In the majority of trials, two of the interpretations seem plausible upon presentation of the first picture but are eventually proven wrong. Participants are encouraged to remain open-minded, and incorporate disconfirmatory evidence into their judgments.

Theory of mind in schizophrenia: findings from basic research

Deficits in theory of mind are present in multiple psychiatric disorders, for example affective disorders and some disorders at the border of neurology and psychiatry (e.g. autism and dementia). Beginning with research by Christopher Frith, multiple studies have confirmed

severe deficits in social cognition or theory of mind (ToM) in psychosis [60,61]. ToM is an umbrella term and encompasses a wide range of functions, including social knowledge and competence, emotion and social reasoning, and has been linked with circumscribed brain activation patterns [62]. While ToM impairments are undisputed, their specific contribution to delusions is not fully understood. While some authors have found ties with positive symptoms such as delusions [63,64], others have reported stronger relationships with formal thought disorder. There is evidence that ToM deficits are related to some cognitive dysfunctions [60,65]. While these may explain impairments in tasks scored according to speed and accuracy, they are less potent to explain specific biases like overconfidence in wrong social judgments or mistaking neutral for negative affect. Cognitive biases such as JTC, attributional style and BADE may become most problematic in combination with deficits in social reasoning [26**].

Treatment of deficits in theory of mind with the metacognitive training (modules 4 and 6)

Different cues for social cognition (e.g. language) are discussed regarding their strength and fallibility. Participants are encouraged to gather a bundle of different cues for social inferences rather than to ‘judge a book by its cover’, or to decrease judgment confidence if multiple cues are not available.

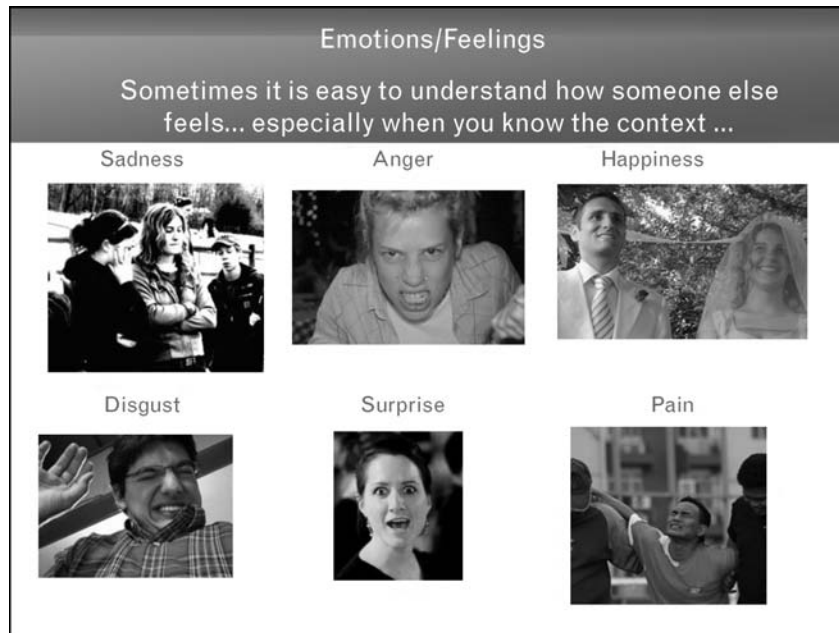
In the exercises, subjects are asked to identify facial expressions and underlying emotional states. Then, the solutions are presented. While pictures in Fig. 1 provide contextual information facilitating correct identification, subsequent exercises like the one in Fig. 2a only show faces that can easily mislead to wrong inferences (the solution is presented in the subsequent slide, Fig. 2b). Participants are taught to collect information from various sources or attenuate their level of confidence in case information is incomplete or ambiguous.

The second ToM module (module 6) deals with theory of mind second order, which requires participants to socially ‘think around corners’: the perspective of one protagonist must be taken, and what this character may think about another person should be inferred. For the majority of items, several interpretations remain possible until the end, which is unsatisfactory for patients with an excessive need for closure. The exercises teach participants to stay open-minded and to tolerate ambiguity. For an example see Fig. 3.

Metacognitive training: data on feasibility, subjective and objective effectiveness

The initial study was conducted using a preliminary version of the MCT and aimed to assess feasibility, safety

Figure 1 Exercise from module 4



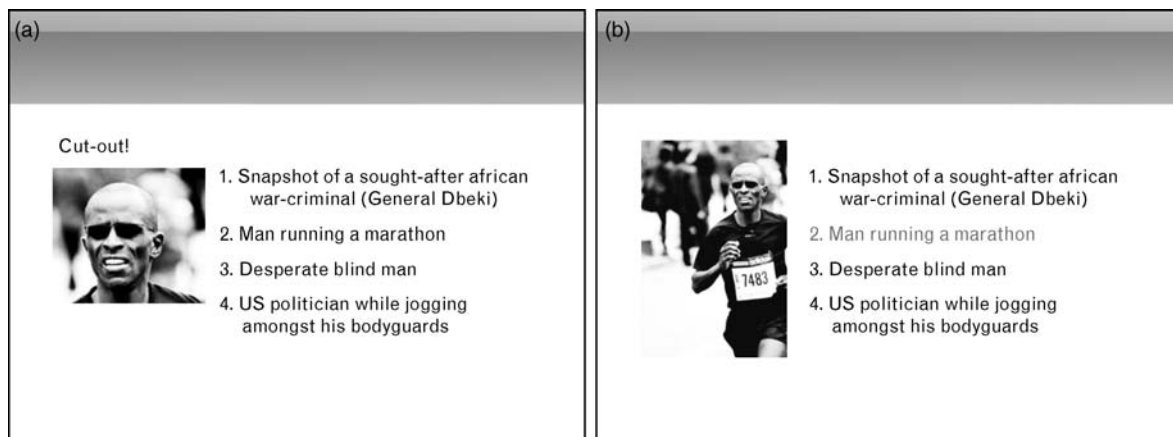
Detection of facial expressions with content information (photographers are acknowledged on the MCT website, www.uke.de/mkt).

and subjective acceptance of the program. A total of 40 patients with schizophrenia were randomly assigned to either MCT or a cognitive remediation program entitled CogPack [66]. Patients rated the MCT superior on all outcome criteria, and for four out of ten parameters a significant difference was obtained: fun, recommendation to others, not being bored and usefulness to daily life. Similar experiences have been asserted with other language versions [67,68]. While objective effectiveness is usually preferred over subjective effectiveness ratings, there is evidence that subjective variables are important

predictors for outcome and only partially match with objective information, and are thus nonredundant outcome indicators [69].

A second study [70] compared the same forerunner version of the MCT with an active control (group discussion about newspaper articles). A sample of 30 inpatients with schizophrenia were randomly assigned to either group and blindly assessed on psychopathology and several (meta-)cognitive parameters before the intervention and after 4 weeks. A greater decline in Positive and

Figure 2 Exercise from module 4



(a and b) Detection of facial expression/situation without content information easily prompts errors (photographer is acknowledged on the MCT website, www.uke.de/mkt).

Figure 3 Exercise from module 6



Multiple responses are possible, which is unsatisfactory for patients with a need for closure (e.g. the woman may take the man's words as a mere comment, patronizing behaviour or a command). ('untitled' by Martin Armbruster).

Negative Syndrome Scale (PANSS)-rated positive symptomatology was observed in the MCT group relative to the active control condition at a weak to medium effect size ($d=0.43$). JTC was also reduced significantly for the MCT group. Again, the MCT received a more favourable subjective appraisal than the active control ($d=0.51$). The small sample size and similarities between the programs (the control intervention partly involved metacognitive judgments) with regard to content may have prevented stronger differences.

Ross *et al.* [71] randomly assigned 34 patients with schizophrenia to an active control or a single MCT session using several exercises from the MCT JTC modules along with new ones (now incorporated into the training). Data gathering was significantly improved in the MCT relative to the control group, and there was tentative evidence for a decrease in delusion conviction in some of the MCT participants. The authors conclude that 'although only preliminary, this is an indication both of a causal role and of the potential benefits for delusions of reasoning training, suggesting that change in data gathering and reasoning strategies might indeed mediate change in delusional thinking.'

Another recent trial in India [72[•]] compared MCT against a treatment as usual group. The PANSS and the Psychotic Symptom Rating Scales (PSYRATS) served as symptomatic outcome measures, whereby only PANSS scores are reported in the article. The decline in PANSS positive symptoms was greater compared with the control

group and reached a medium-to-strong effect size ($d=0.68$ for the difference over time).

Another study [73] compared 18 patients undergoing MCT with a wait list group of similar size. Pre-assessment and post-assessment (2 months apart) were performed blind to group allocation. Since patients were mostly remitted, symptom reduction was not the primary outcome measure. Nevertheless, compared with the controls, the MCT group members showed significant improvement in delusional distress (PSYRATS), memory and social quality of life. Further, JTC improved in the medium effect size range relative to the wait list condition.

For some time, an individualized metacognitive therapy program (MCT+) has been available [74[•]], which combines the MCT 'backdoor' approach (focus on cognitive biases) with a CBT-oriented approach (focused discussion on individuals' delusions). In the initial trial, 48 patients were randomized to either CogPack training or a combination of group MCT and individualized MCT+. Ratings were made blind to allocation before intervention and 4 weeks thereafter. The MCT/MCT+ group significantly improved delusion severity (PANSS), especially ideas of grandiosity ($d=0.82$) and induced a decline of delusion conviction (PSYRATS) relative to the control intervention ($d=0.78$). The training also significantly improved JTC. Since no follow-up was conducted, results cannot argue for the stability of the effect over time.

A Dutch trial (for a summary see [75]) investigated 29 patients with schizophrenia. The specific value of single sessions was investigated by applying a variety of instruments before and after a particular module. Significant improvement on the two subscales of the Green *et al.* Paranoid Thought Scales (GPTS) was found. The score on the delusional rating scale of the PSYRATS was also significantly reduced after the MCT ($P=0.01$), indicating a decrease in conviction, which is not usually seen with neuroleptics [76].

Conclusion

The last two decades have witnessed increasing support for psychological models of schizophrenia suggesting that cognitive impairments and biases as well as dysfunctional coping styles, along with, for example, traumatic experiences [77], play an important role in the pathogenesis of the disorder. CBT [4,5], psychoeducation [6], cognitive and social remediation [8[•]] and more recently metacognitive training in group as well as individualized settings have proven to be important complementary interventions in addition to psychopharmacotherapy, particularly in cases where neuroleptics fail to exert an effect. MCT is

a hybrid of the aforementioned approaches, as it aims to sharpen participants' (metacognitive) awareness of cognitive biases (psychoeducational aspect) via numerous cognitive tasks (cognitive remediation aspect) providing insight and corrective experiences and then to apply the learning goals to daily life and symptoms (CBT aspect). Psychological intervention should not only be recommended by guidelines but should ultimately be integrated into standard care for schizophrenia, especially in view of tempered enthusiasm regarding the benefits of psychopharmacological mono therapy.

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- of special interest
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Additional references related to this topic can also be found in the Current World Literature section in this issue (pp. 612–613).

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- 45 Moritz S, Peters MJV, Larøi F, Lincoln TM. Metacognitive beliefs in obsessive-compulsive patients: a comparison with healthy and schizophrenia participants. *Cogn Neuropsychiatry* (in press).
- The article underscores claims that the need to control unwanted and negative thoughts represents a frequent dysfunctional metacognitive belief in psychological disorders, often resulting in counter-productive thought suppression. The 'need to control thoughts' subscale from the Metacognitions Questionnaire (MCQ-30) was elevated in both obsessive-compulsive disorder and schizophrenia patients and was tied to both obsessions and hallucinations. Teaching patients emotion regulation techniques may prove helpful to ameliorate negative thoughts and decrease symptoms.
- 46 Morrison AP, Baker CA. Intrusive thoughts and auditory hallucinations: a comparative study of intrusions in psychosis. *Behav Res Ther* 2000; 38:1097–1106.
- 47 Fisher P, Wells A. *Metacognitive therapy*. East Sussex: Routledge; 2009.
- Despite similar names, which have already led to some confusion, metacognitive therapy by Fisher and Wells has a different focus than metacognitive training in schizophrenia. While the former is generic and especially concerned with replacing dysfunctional coping styles in different anxiety disorders, the latter is devoted to specific cognitive biases, like JTC, linked to paranoia. However, some of the exercises by Fisher and Wells (e.g. detached mindfulness) have been incorporated into recent versions of MCT module 8, dealing with mood and self-esteem.
- 48 Brekke JS, Nakagami E. The relevance of neurocognition and social cognition for outcome and recovery in schizophrenia. In: Roder V, Medalia A, editors. *Neurocognition and social cognition in schizophrenia patients. Basic concepts and treatment*. Karger; 2010. pp. 23–36.
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- 59 Buchy L, Woodward TS, Liotti M. A cognitive bias against disconfirmatory evidence (BADE) is associated with schizotypy. *Schizophr Res* 2007; 90:334–337.
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