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DOI:

[10.1080/09602011.2017.1301263](https://doi.org/10.1080/09602011.2017.1301263)

*Document Version*

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*Citation for published version (APA):*

Tsapekos, D., Taylor, R., & Cella, M. (2019). Feasibility and acceptability of brief cognitive remediation targeting metacognition in acute inpatients with psychosis: a case series. *Neuropsychological Rehabilitation*, 29(3), 361-375. <https://doi.org/10.1080/09602011.2017.1301263>

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## **Title page**

### Title:

Feasibility and acceptability of brief cognitive remediation targeting metacognition in acute inpatients with psychosis: a case series

### Authors:

Dimosthenis Tsapekos<sup>1</sup>, Rumina Taylor<sup>2,3</sup>, & Matteo Cella<sup>2</sup>

### Affiliations:

1. Department of Psychological Medicine, Institute of Psychiatry, Psychology, and Neuroscience, King's College London
2. Department of Psychology, Institute of Psychiatry, Psychology, and Neuroscience, King's College London
3. South London and Maudsley NHS Foundation Trust.

### Contact details:

Dimosthenis Tsapekos. Postal address: 103 Denmark Hill Road, SE5 8AZ, London.

E-mail address: [dimosthenis.tsapekos@kcl.ac.uk](mailto:dimosthenis.tsapekos@kcl.ac.uk)

Telephone: +44 (0) 207 848 5305 / +44 (0) 7511 421 705

Rumina Taylor. Postal address: Henry Wellcome building, De Crespigny Park, SE5 8AF, London.

E-mail address: [rumina.taylor@kcl.ac.uk](mailto:rumina.taylor@kcl.ac.uk)

Telephone: +44 (0) 20 7848 5001

Matteo Cella. Postal address: Henry Wellcome building, De Crespigny Park, SE5 8AF, London.

E-mail address: [matteo.cella@kcl.ac.uk](mailto:matteo.cella@kcl.ac.uk)

Telephone: +44 (0) 20 7848 5001

Corresponding author: Dimosthenis Tsapekos

### Word count:

Abstract 198; Text 4167

Tables: 3

Figures: 3

Running Title: Cognitive remediation in acute inpatients

## **Abstract**

*Background.* Cognitive remediation (CR) is an intensive intervention targeting cognitive impairment with the aim of improving functioning in people with psychotic disorders. Shorter forms of CR based on metacognition and targeting cognitive problems awareness may be more appropriate for acute inpatient settings where time is limited.

*Objectives.* To evaluate the feasibility and acceptability of a new brief course of CR targeting cognitive and metacognitive difficulties within an acute inpatient psychiatric setting.

*Method.* Thirteen male service users with psychosis received a three-week course of CR. Participants were assessed at baseline and post-treatment on cognitive measures, subjective cognitive complaints, functional impairment, and symptom severity. Feasibility was assessed based on engagement, attendance and attrition. Acceptability was evaluated through treatment satisfaction.

*Results.* Eight participants completed therapy, with 81% session attendance. Therapy was considered acceptable, with the majority of participants considering it satisfactory. Potential benefit analysis showed a significant post-treatment improvement in global cognition and memory. Subjective cognitive complaints did not change over time.

*Conclusions.* It is feasible to deliver brief CR in an acute inpatient setting. Context of delivery and engagement are challenges for optimal therapy implementation. CR protocol adaptations made to promote metacognitive competencies may compensate for lack of intensive practice.

**Keywords:** cognitive remediation; metacognition; psychosis; inpatient; acute.

## Introduction

Robust evidence has consolidated the notion that cognitive difficulties are common in people with schizophrenia and other psychotic disorders (Fioravanti, Bianchi, & Cinti, 2005; Gold & Harvey, 1993; Heinrichs & Zakzanis, 1998; Kahn & Keefe, 2013; Keefe et al., 2006; Keefe, 2014; Koren, Seidman, Goldsmith, & Harvey, 2006; Reichenberg & Harvey, 2007; Tandon, Nasrallah, & Keshavan, 2009), while also being consistent over time and across cultures (Schaefer, Giangrande, Weinberger, & Dickinson, 2013). These difficulties affect multiple domains and predate the illness onset (Gur et al., 2014; Miles et al., 2014; Seidman et al., 2013). Cognitive impairment is strongly associated with poor illness prognosis (Mohamed, et al., 2008), as well as reduced social and occupational functioning (Bowie et al., 2008; Harvey, 2013).

Cognitive remediation therapy (CR) is a psychological therapy aiming to improve functioning in people with psychosis by targeting cognitive difficulties. There is now strong evidence that CR is effective in improving global cognition, performance in specific cognitive domains (primarily working memory, executive functioning and processing speed) and functioning (McGurk, Twamley, Sitzer, McHugo, & Mueser 2007; Wykes, Huddy, Cellard, McGurk, & Czobor, 2011). Differences in delivery methods, intensity, and duration do not seem to affect cognitive outcomes significantly. However, strategy-based CR programs can induce greater functional gains compared to protocols prioritizing intense practice, possibly due to increased transferability of acquired thinking skills (Wykes et al., 2011).

Mechanisms underlying CR effects have been explored (Wykes & Spaulding, 2011). One factor hypothesized to mediate and facilitate transfer of therapeutic gains to real-life tasks is metacognition (Lysaker et al., 2010; Wykes et al., 2012), which, in this context, is defined as the process responsible for regulating information processing and new learning (Cella, Reeder, & Wykes, 2015). Metacognition is considered essential for the integration of acquired cognitive skills to daily life functioning. This integration is thought to be facilitated by two components: metacognitive knowledge (i.e. knowledge and beliefs of the person about their own cognition, their cognitive strengths and difficulties) and metacognitive regulation (i.e. ability to monitor one's own cognitive performance,

plan, and evaluate implemented strategies) (Cella et al., 2015). Recent findings suggest that these metacognitive competencies are impaired in people with psychotic disorders and may influence functioning (Koren et al., 2006; Lysaker et al., 2013; Medalia, Thysen, & Freilich, 2008).

Evidence for such metacognitive problems led to the emergence of metacognitive-oriented psychological therapies (Briki et al., 2014; Favrod, Maire, Bardy, Pernier, & Bonsack, 2011; Moritz et al., 2013; Morrison et al., 2014). CIRCuiTS (Computerized Interactive Remediation of Cognition Training for Schizophrenia; Reeder et al., 2015) is a CR program explicitly promoting metacognitive components by including strategy use and guided practice, whilst retaining the role of the therapist in supporting and targeting metacognitive processing. CIRCuiTS has been applied to different mental health settings showing good acceptability and ease of use for both service users and clinicians (Cella, Reeder, & Wykes, 2016; Cellard et al., 2016; Drake et al., 2014; Reeder et al., 2015). However, to date there are no applications of metacognitive informed CR in acute mental health services. This may be because traditional CR protocols require high and frequent session number.

### **CR in the context of acute mental health**

In spite of evidence supporting CR as an effective therapy for the improvement of cognitive symptoms in people with schizophrenia (Wykes et al., 2011) and its cost-effectiveness (Patel et al., 2010; Reeder et al., 2014), there is only limited research on CR implementation methods. It is likely that different mental health settings will require protocol adaptation. One such setting is acute wards. These services are designed for short periods of hospitalization and one challenge is offering CR in the context of a brief inpatient stay. Studies conducted in long-term inpatient settings (Lindenmayer et al., 2008), and rehabilitative centres (Vita et al., 2011) have shown promising results for CR in terms of improving neuropsychological functioning. However, it remains unclear if CR can be a viable and beneficial treatment option for acute inpatient settings.

The issue of implementing and adapting CR for acute mental health wards fits well with the need to improve the availability of psychological interventions in these settings. In the UK, health authorities have criticized the limited access to psychological therapies in acute

settings (CQC, 2014; Schizophrenia Commission, 2012). Better access to psychological therapies has also been requested by service users, carers and health professionals (MIND, 2011).

With this in mind, the current study attempted to adapt CIRCuITS to provide service users in acute settings with the opportunity to access CR. We tested a novel protocol of shorter duration, as delivering a complete CR course would not have been possible due to short-term nature of acute admissions (i.e. approximately 28 days). The new protocol attempted to compensate for the lack of intensive practice by having a specific emphasis on metacognition by promoting strategy use and increasing the awareness of cognitive difficulties.

### **Aims and hypotheses**

The primary aim of this study is therefore to assess the feasibility and acceptability of a brief CR therapy within an acute inpatient setting. The intervention potential benefits are assessed as a secondary outcome and due to the brief duration of the intervention we only expect limited cognitive benefits. However, we hope this intervention may reduce cognitive difficulties, improve the awareness of these difficulties, and potentially provide clients with some useful strategies to apply in their everyday life. To this end, this study also examines potential changes in self-reported cognitive complaints, as well as whether these changes are associated with post-therapy changes in objective cognitive measures. Changes in perceived functional impairment are also explored.

## **Methods**

### **Design**

Case series with prospective data collected over a five-month period. All eligible participants were offered the intervention. Service users who agreed to participate completed an assessment before and after treatment.

### **Participants**

Participants were recruited from an inpatient ward within an inner city National Health Service (NHS) Foundation Trust between January and June 2015. Inclusion criteria included:

aged between 18 and 65 years; an ICD-10 psychosis spectrum diagnosis (World Health Organization, 1992); experiencing cognitive difficulties; an expected admission of at least 4-weeks; a clinical status that allowed participation in the assessment and therapy; a good command of English language. Exclusion criteria were: presence or history of neurological disorders or head injuries; diagnosis of a learning disability; diagnosis of substance misuse; illiteracy or very poor educational background.

### **Procedure**

All new ward admissions with a relevant diagnosis were considered as potential participants and screened for eligibility. If eligible, potential participants were approached, provided with verbal and written information about the study, and asked to provide informed written consent. After initial assessment, each participant was assigned to a therapist and offered CR. Where participants were discharged early, they were offered the opportunity to return to the ward to complete therapy. The study received approval from the local NHS trust committee.

### **Intervention**

The CR course consisted of six sessions each lasting 45 minutes. Sessions were held twice a week for a total of three weeks. Therapy was delivered individually by a therapist and supported by CIRCuiTS software. CIRCuiTS uses a graphical representation of a village as a virtual environment where participants can practice up to 30 cognitive tasks, each one with multiple difficulty levels. During a typical session, six to eight tasks are usually completed. CIRCuiTS supports strategy use and promotes the use of metacognitive competencies in a number of ways. For example, users are actively prompted to choose from a list of available strategies when planning to complete tasks. Before starting a task, users are also required to estimate the anticipated level of difficulty and completion time. After task completion, they are asked to re-evaluate and reflect upon these elements. This way CIRCuiTS supports the uptake of metacognitive regulation by promoting planning, monitoring and revision. Metacognition was also targeted by the therapist through supporting personalized goal-setting, choosing of strategies, and tailoring therapy tasks to target specific cognitive domains. Through repeated practice, clients gradually learnt to use strategies spontaneously according to task requirements and their own strengths and difficulties. Therapists

encouraged the transfer of new skills and strategies to daily life by establishing links between CIRCuITS tasks and real-world activities. Homework was set collaboratively for the client to continue practicing in between sessions. Each participant worked with the same therapist throughout therapy to ensure the development of a good working alliance.

## **Materials**

*Cognition.* The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Gold, Waltz, Prentice, Morris, & Heerey, 1999; Hobart, Goldberg, Bartko, & Gold, 1999) was used for a global cognitive assessment. This has been extensively used in studies assessing cognition in people with schizophrenia and other psychiatric disorders (Hobart et al., 1999), showing high levels of sensitivity and reliability (Gold et al., 1999). The Key Search test from the Behavioural Assessment of the Dysexecutive Syndrome (BADS; Norris & Tate, 2010; Wilson, Evans, Emslie, Alderman, & Burgess, 1998) was used as a measure of executive functioning.

*Subjective cognitive complaints.* The Subjective Scale to Investigate Cognition in Schizophrenia (SSTICS; Strip, Caron, Renaud, Pampoulova, & Lecomte, 2003) was used to assess the participants' perception of their cognitive difficulties. It is a 21-item self-report questionnaire investigating subjective complaints on multiple cognitive domains, with higher scores indicating greater perceived difficulties. Its psychometric properties in people with psychosis have been extensively validated (Lecardeur et al., 2009a; Strip et al., 2003).

*Functioning.* Participants functioning was assessed with the Work and Social Adjustment Scale Revised (WSAS-R; Zahra et al., 2014). This measures perceived difficulties (e.g. inability to work) with higher scores indicating greater functional impairment. It has shown strong internal consistency ( $\alpha > .75$ ) and test-retest reliability (Mundt, Marks, Shear, & Greist, 2002).

*Symptoms.* The Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1962) was used to assess positive, negative, and affective symptoms. It is a clinician-rated instrument and in this study was completed by the ward treating psychiatrists. It consists of 18 items representing different symptom constructs, each one rated from

1 (not present) to 7 (extremely severe), and produces an overall score with higher scores suggesting more severe clinical symptoms (range = 18-126).

*CR feedback questionnaire.* All participants were given a satisfaction questionnaire at the end of therapy (Reeder et al., 2015). This consisted of 12 items evaluating the experience of CR. A sum of these ratings was computed (range = 10-60), with higher scores indicating greater therapy satisfaction.

*Therapy materials.* Participants' attendance, their CR goals, the tasks completed during sessions, their ratings for task difficulty and completion time, and the strategies implemented were recorded. These were referred to throughout CR by the therapist to further support the development of metacognition and collaborative working.

## **Analysis**

*Feasibility and acceptability.* The proportion of recruited service users was used as an indication of CR feasibility. Attendance and attrition rates were also recorded. In addition we assessed therapy protocol implementation through session attendance, session duration and task practice per session. Acceptability was assessed through the feedback questionnaire.

*Intervention potential benefit.* In the benefit analysis we considered only participants who attended 50% or more of therapy sessions. Preliminary analyses with one-way ANOVA were conducted to control for baseline demographic, clinical and cognitive differences among the included and dropped-out participants. Within-group differences between baseline and post-treatment were assessed using repeated measures ANOVA, controlling for the number of sessions attended. Effect sizes were estimated using partial eta-squared ( $\eta_p^2$ ). The association between changes in cognitive and metacognitive outcomes was explored with Pearson's correlation. We examined the correlation of outcome measures with therapy-related variables and illness-related characteristics. All analyses were conducted using SPSS version 21. All tests were two-tailed with a significance level set at 0.05.

## **Results**

## **Feasibility**

In total, 34 inpatients were approached and assessed for eligibility. Eighteen were found to be eligible and offered therapy, with thirteen consenting to participate (72%). Three service users denied participation due to a lack of interest in the therapy. The remaining two, although considered to be experiencing difficulties with cognition, did not report any cognitive complaints and therefore did not consider CR a useful intervention (n = 2).

Of the thirteen participants who started CR, five completed less than 50% of sessions and were considered drop-outs (38%). Reasons for this included: an early discharge (n = 3), poor engagement (n = 1) or a psychotic relapse (n = 1). These participants completed an average of 1.8 (*SD* 0.4; median = 2) sessions. The remaining eight participants met the attendance criteria, completing at least 50% of sessions. Figure 1 illustrates the recruitment process, therapy completion and drop-outs.

-- Figure 1 here --

Those who completed therapy (n = 8) attended an average of 4.9 sessions (*SD* 1.3; median = 5.5), corresponding to 81% session attendance. Sessions lasted an average of 46.1 (*SD* 10.7) minutes and an average of 7.7 (*SD* 1.1) tasks was completed per session (Table 1).

-- Table 1 here --

## **Acceptability**

The average score for the therapy satisfaction measure was 47.5 (*SD* 5.4; n=8). All participants stated they felt welcome in therapy, with 87.5% reporting they enjoyed the experience of CR and 75% stating they enjoyed coming to the sessions and practicing the cognitive tasks. Half of the participants reported CIRCuiTS tasks were difficult (50%), whilst some (37.5%) stated tasks were too easy for them. The majority thought CR demanded a lot of effort (62.5%). All participants felt they were able to ask their therapist for help and that they were improving their performance the more they practiced the tasks. The majority of

service users (62.5%) found therapy facilitating for daily tasks. Overall, seven out of eight participants stated they would recommend CR.

### **CR potential benefit analysis**

*Participant characteristics.* Thirteen service users agreed to receive CR. All were male with an average age of 34.5 years (*SD* 10.8). All were prescribed antipsychotic medication as part of their usual treatment. The majority were not in a relationship, unemployed, had approximately 10 years of contact with mental health services and multiple past admissions, and were of African Caribbean ethnicity which is representative of the population served by the trust (Table 2).

-- Table 2 here --

*Baseline comparisons.* CR completers had comparable clinical symptoms to drop-outs in BPRS ( $p < .05$ ). Completers had significantly fewer previous hospitalizations ( $M = 1.88$ ;  $SD 2.41$ ) compared to those who discontinued CR ( $M = 7.4$ ;  $SD 5.32$ ) [ $F(1, 11) = 6.706$ ,  $p = .025$ ]. Included and excluded participants were comparable in all cognitive measures except for functioning difficulties as assessed by WSAS-R [ $F(1, 11) = 9.652$ ,  $p = .010$ ]. Drop-outs reported a higher degree of subjective functional impairment ( $M = 20.7$ ;  $SD = 8.13$ ) compared to completers ( $M = 8.38$ ;  $SD = 6.18$ ).

*Data integrity.* Eight service users who were considered treatment completers were included in the intervention benefit analysis. No pre or post-therapy data were missing. All measures showed good internal consistency both at baseline (RBANS:  $\alpha = .808$ ; SSTICS:  $\alpha = .839$ ; WSAS-R:  $\alpha = .838$ ; BPRS:  $\alpha = .852$ ) and post-treatment (RBANS:  $\alpha = .811$ ; SSTICS:  $\alpha = .911$ ; WSAS-R:  $\alpha = .911$ ; BPRS:  $\alpha = .817$ ). Frequencies and boxplots were inspected for entry errors and outlier values. An outlier was detected in four measurements (WSAS-R; RBANS Immediate Memory Index; RBANS Visuospatial Index; RBANS Attention Index), each referring to a different participant. Thus, outliers were not considered results of systematic participant's behaviour or measurement error, and none of the participants were excluded. Relevant analyses were conducted both with and without the outlying value. Outlier's exclusion did not affect the significance or the direction in any of the statistical tests. Normality of

distributions was assessed and confirmed for all outcome measures using the Shapiro-Wilk test.

*Cognition.* A main effect of time was found for two cognitive measures: RBANS total index [ $F(1, 7) = 9.736, p = .017, \eta_p^2 = .58$ ] and RBANS immediate memory index [ $F(1, 7) = 7.773, p = .027, \eta_p^2 = .52$ ]. Post hoc comparisons using the Bonferroni correction indicated a significant mean improvement of 8.25 (median change = 6.5;  $SD = 7.47$ ; Interquartile range [IQR] = 15) for the RBANS total score and a significant mean increase of 14 (median change = 13.5;  $SD = 14.2$ ; IQR = 21.5) for the immediate memory score after CR. No significant changes were detected for any other cognitive domains although all but one showed changes in the expected direction after CR. Number of completed sessions was not found to have a significant effect on cognitive outcomes (all  $p > .05$ ). Pre- and post-intervention mean scores are presented in Figure 2. Mean changes, ANOVA results and effect sizes are summarized in Table 3.

-- Figure 2 here --

-- Table 3 here --

*Awareness of cognitive problems.* Subjective cognitive complaints decreased, although not significantly, after treatment (mean change = -2.25). Main effect of time remained not significant when controlling for symptom severity at baseline and change of symptom score (BPRS) from baseline to post-therapy (Figure 3). Post-treatment change in self-assessed cognitive complaints did not correlate with changes in objective cognitive outcomes. Decrease of cognitive complaints and symptom reduction in BPRS were also not associated; although post-therapy change was in the expected direction for both measures.

*Functioning and symptoms.* No differences were found among pre and post-intervention levels of functional impairment as assessed by WSAS-R. Clinical symptoms decreased after CR, however not significantly (mean change = -5.87) (Figure 3).

-- Figure 3 here --

*Therapy characteristics and outcomes.* The number of tasks completed per session was significantly associated with improvement in RBANS immediate memory index ( $r = .872$ ;  $p = .005$ ) and symptom reduction in BPRS ( $r = -.733$ ;  $p = .039$ ). The correlation with SSTICS mean change approached significance, suggesting a potential association with fewer cognitive complaints ( $r = -.633$ ;  $p = .073$ ). No associations were found for the number of completed sessions and the total time spent in therapy.

## **Discussion**

This study aimed to explore the feasibility and acceptability of a novel, brief, metacognition-focused CR delivered in an acute inpatient ward for people with psychosis. Findings showed that the adapted form of the intervention was feasible and acceptable by service users. Participants who took part in therapy showed improvements in global cognition and immediate memory. Cognitive complaints showed a reducing trend after therapy; however not statistically significant.

From the 18 eligible inpatients, 13 (72%) agreed to receive therapy, and 8 (62%) attended the minimum number of sessions. Pre-therapy aims were met for session duration (i.e. 45 minutes) and number of tasks practiced per session (i.e. 6-8). It is difficult to compare this feasibility study to large-scale randomized trials.

Nevertheless, the drop-out rate (38%) was higher than the average attrition rate of 15% reported in the most recent meta-analysis (Wykes et al., 2011). Nonetheless, only one participant in this study discontinued CR due to poor therapy engagement, whilst the rest interrupted due to unstable clinical condition or early discharge.

Our findings should be interpreted within the context of an acute inpatient psychiatric ward. One barrier to engagement was that the therapy was not delivered as part of routine clinical practice. Thus, CR occasionally “competed” with other clinical activities, such as occupational therapy, patients’ review, and recreational activities. Integrating CR into the ward services schedule will benefit treatment engagement and session attendance. Three service users were not able to complete therapy because of early discharge. This was dependent on bed pressure, resulting in

promoting discharge at the earliest possible point. Every effort was made to encourage discharged participants to return to the ward to complete therapy, but this was difficult in practice due to transport and financial issues.

Many eligible participants were in the early recovery phase from a psychotic episode. This is a challenging illness phase to engage people in psychological therapy. Symptoms such as confusion and disorganization, which are common in the context of recovery from acute psychosis, have been found to predict poor engagement and a sub-optimal response to cognitive training (Vita et al., 2013). In our study, several service users reported “mental clouding” and concentration difficulties as a reason for disengagement from therapy.

Intake functioning levels may have also impacted therapy engagement with people who dropped-out reporting higher degree of functional impairment. These participants had more hospital admissions, a possible indicator of illness chronicity. CR effects on cognition have been suggested to be smaller for chronic patients with multiple hospitalizations (Bowie, Grossman, Gupta, Oyewumi, & Harvey, 2014). Confronting this issue from the early contacts with psychiatric services may contribute to develop awareness on functioning problems and improve access to psychological therapies for acute inpatient service users.

Regarding acceptability, service users who engaged in CR found therapy helpful and satisfying. The majority reported they would recommend CR to others, while more than half felt the training could help them in future everyday activities. These results are in line with previous findings from a consumer-led survey on the experience of CR (Rose et al., 2008) and CIRCuiTS (Reeder et al., 2015).

CR was associated with moderate improvements in global cognition and immediate memory. Results are in-line with inpatients trials (d'Amato et al., 2010; Lindenmayer et al., 2008) and comparable with findings from rehabilitative settings (Vita et al., 2011). Service users who practiced more tasks per session performed better in immediate memory measures post-therapy. This possibly exemplifies how efficient use of therapy time might benefit treatment gains and is consistent with the strategy-based CR approach from which CIRCuiTS is derived (Reeder et al., 2015).

Benefits on cognition did not translate to perceived level of functioning post-treatment. Optimizing therapy gains transfer is a challenge in CR research (Dickinson et al., 2010) and this may be particularly difficult in inpatient psychiatric contexts where opportunities for generalization are limited (Medalia & Saperstein, 2013). However, receiving CR in an inpatient setting may facilitate the uptake of other psychological therapies when service users are discharged. Exploring the augmenting potential of CR in outpatients with psychosis on waiting lists for Cognitive Behavioural Therapy (CBT), Drake et al. (2014) found that a course of CR prior to CBT improved CBT efficiency. CR helped service users achieve the same progress in half the CBT sessions compared to those who received CBT alone.

In line with previous research we found a reduction, albeit non-significant, of perceived cognitive problems after CR (Cella et al., 2016; Lecardeur et al., 2009b). This can be indicative of a change in metacognitive awareness. However these changes are difficult to interpret because, unlike cognition, metacognition cannot be understood and examined on a simple “improvement-decline” basis. Changes in metacognitive awareness need to be considered in relation to cognitive performance. In this study, subjective cognitive complaints decreased over time, with objective cognitive performance presenting a general post-treatment improvement. This appears as a congruous direction of change between objective and subjective measurements following CR, and is in accordance with previous findings (Cella, Swan, Medin, Reeder, & Wykes, 2014; Medalia et al., 2008; Strip et al., 2003).

How CR affects metacognitive awareness remains unclear. One hypothesis is that metacognition-focused CR facilitates a re-examination of cognitive problems experienced by the person and promotes more awareness and better understanding of these deficits. Future research needs to explore the direction and extent of metacognitive awareness as a possible moderator of change. It is possible in fact that intake level of metacognition and readiness to acquire these skills may influence the transfer potential of individuals and with it the therapy gain potential. A model considering metacognition as a mediator of the relationship among cognitive training and completion of therapy goals has been advanced (Cella et al., 2015).

## **Limitations**

There are a number of limitations to this study. Feasibility of the CR intervention was suboptimal in relation to recruitment, session attendance, and therapy completion rates. Thus, further modifications in the adaptation and delivery of CR for acute settings should be considered to improve patient recruitment and retention rates.

CR results are limited to the restricted sample size and the uncontrolled design. A power analysis to determine the sample size was not conducted for this study as the primary aim was not to detect the intervention effect size, but its feasibility and acceptability. This study did not have a control condition as in the context of the study's primary objective it was deemed clinically inappropriate to have a waiting list control group. Future studies attempting similar analyses should also control for the moderating effects of participant and treatment characteristics.

## **Conclusion**

This study showed that our novel brief course of metacognitive-oriented computerized CR was feasible, well accepted by service users with psychosis in an acute ward and may lead to some benefits on cognition. Emphasizing metacognitive processing can be a strategy to counterbalance constraints of limited contact time and therefore limited duration and intensity. Larger pragmatic trials are required to assess the effectiveness of metacognitive-oriented CR in inpatient settings and its implications for promoting functioning and ultimately recovery.

## **Acknowledgements**

The authors wish to thank Lisa Walshe and Tina Regent for their help in data collection, as well as all the clinical staff at Gresham 2 ward, Bethlem Royal Hospital, for their support throughout the project. Lastly, but most importantly, we wish to thank all the service users who took part in this project.

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## Tables

Table 1.  
*Cognitive remediation therapy characteristics (N = 8).*

	Mean (SD)
Sessions attended	4.9 (1.3)
Sessions per week	1.76 (1.44)
Total therapy duration (hours)	3.9 (1.76)
Average session duration (min)	46.1 (10.7)
Tasks per session	7.7 (1.1)
Time between assessments (days)	30.3 (19.8)
CIRCuiTS feedback questionnaire*	47.5 (5.4)

*Note:* \*Range= 10 – 60.

Table 2.  
*Demographic and clinical characteristics (N = 13).*

	N (%)
Age, mean ( <i>SD</i> )	34.5 (10.8)
Ethnicity	
Afro-Caribbean	7 (53.7)
White	3 (23.2)
Asian	2 (15.4)
Other	1 (7.7)
Marital Status	
Single/Unmarried	11 (84.6)
Married	1 (7.7)
Separated	1 (7.7)
Accommodation status	
Private	5 (38.5)
Supported	6 (46.2)
Homeless	2 (15.4)
Employment	
Paid employment	3 (23.1)
Unemployed	9 (69.2)
Student	1 (7.7)
Diagnosis	
Schizophrenia	5 (38.5)
Schizoaffective disorder	5 (38.5)
Unspecified psychosis	3 (23.1)
Admission status	
Voluntary admission	6 (46.2)
MHA Section 2	1 (7.7)
MHA Section 3	5 (38.5)
MHA Section 37	1 (7.7)
Age at first contact with mental health services, mean ( <i>SD</i> )	25.6 (8.1)
Years in contact with mental health services, mean ( <i>SD</i> )	10.1 (9.4)
Age at first admission, mean ( <i>SD</i> )	26.9 (8.8)
Number of previous admissions, mean ( <i>SD</i> )	4 (4.5)
BPRS at baseline, mean ( <i>SD</i> )	39.1 (11.9)

*Notes:* BPRS = Brief Psychiatric Rating Scale;  
MHA = Mental Health Act.

Table 3.

*Repeated measures ANOVA, controlling for the number of sessions completed (N=8).*

	Mean change (SD)	F-test. Time effect	p	Effect size. Within group ( $\eta_p^2$ )
RBANS Total Scale	8.25 (7.47)	9.736	<b>.017</b>	.58
RBANS Immediate Memory	14 (14.02)	7.773	<b>.027</b>	.52
RBANS Visuospatial / Constructional	-5.25 (28.69)	.268	.62	.03
RBANS Language	2.75 (12.36)	.396	.54	.05
RBANS Attention	5.87 (11.65)	2.033	.19	.22
RBANS Delayed Memory	6.87 (11.55)	2.831	.13	.28
Key Search test	1.62 (3.88)	1.397	.27	.16
SSTICS Total	-2.25 (10.26)	1.953	.21	-
WSAS-R Total	.0 (6.36)	.0	1	-
BPRS Total	-5.87 (14.7)	1.394	.28	-

*Notes:* RBANS = Repeatable Battery for the Assessment of Neuropsychological Status;  
 SSTICS = Subjective Scale to Investigate Cognition in Schizophrenia; WSAS-R = Work and Social  
 Adjustment Scale Revised; BPRS = Brief Psychiatric Rating Scale.

## **Figures**

*Submitted separately*

## **Figure captions**

Figure 1. Consort diagram

Figure 2. Means of cognitive measures at baseline and post-treatment

Figure 3. Means of subjective cognitive difficulties; symptom severity; subjective functional impairment and expected improvement at baseline and post-treatment

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