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Metacognitive training (MCT) for psychosis: a systematic review and grade recommendations

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Review/Meta-analysis

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Abstract

Background. Recent meta-analyses support the inclusion of cognitive behavioral therapy (CBT) in schizophrenia treatment. Metacognitive Training (MCT) for psychosis is a psychoeducational program derived from CBT, with most meta-analyses showing favorable results. Although meta-analyses are commonly used in clinical practice to guide evidence-based decision-making, the grading system provides complementary results by offering a structured approach for assessing the strength and reliability of evidence and deriving grades of recommendations accordingly.

Methods. Our research applies the guidelines from the World Federation of Societies of Biological Psychiatry (WFSBP) to propose grades of recommendation for MCT for psychosis, analyzing 38 randomized controlled trials (RCTs) (n = 1942) and 10 meta-analyses. The primary outcome was positive symptoms, with secondary measures including negative symptoms, general psychopathology, self-esteem, functioning, insight, and cognitive function.

Results. Our findings are primarily based on the risks of bias attributed to RCTs (11 high, 19 moderate, 6 low) and, when necessary, on the overall confidence attributed to meta-analyses (3 low, 7 critically low). According to the WFSBP guidelines, strong recommendations should be made for using MCT for psychosis to improve post-treatment positive symptoms, delusions, and total psychotic symptoms (WFSBP-grade 1). Limited recommendations (WFSBP-grade 2) could be made for using MCT to improve post-treatment visuospatial abilities and to maintain benefits over time in psychopathology, functioning, self-esteem, episodic memory, and attention.

Conclusions. MCT for psychosis is an evidence-based program, especially for positive symptoms, with long-lasting clinical benefits. These recommendations should be interpreted with caution given potential residual biases and heterogeneity among studies.

Introduction

Schizophrenia spectrum disorder (SSD) is characterized by a heterogeneous clinical phenotype [1], with delusions and hallucinations representing core symptoms for diagnostic criteria and treatment research [2]. International guidelines recommend antipsychotic medications as first-line treatment [3, 4]. While these medications are effective in reducing positive symptoms, they have limited impact on negative symptoms and cognitive biases

involved in psychosis [5]. To address these gaps, international guidelines have recently included cognitive-behavioral therapy for psychosis (CBTp) as a recommended intervention [6]. CBTp is a structured therapy aimed at promoting personal recovery. It focuses particularly on specific cognitive biases, such as jumping to conclusions (JTC) or overweighting in causal inference, as they may be linked to the emergence and maintenance of psychotic symptoms [7, 8]. Addressing these cognitive biases is especially important as they are highly related to core symptoms of psychosis, such as delusions [9, 10].

Despite these international recommendations, access to CBTp remains very limited. Studies indicate that only 1% of individuals with SSD receive CBTp in the USA and Canada [11], and 26% in UK [12, 11]. The National Institute for Health and Care Excellence (NICE) suggests different research recommendations increase the accessibility of CBTp for individuals with SSD, including (1) focusing on brief forms of CBTp that target specific symptoms of psychosis; (2) making CBTp accessible to professionals with brief training [13]. Low-intensity CBTp interventions could address these research recommendations, potentially allowing a much larger population to benefit from CBTp. This solution is particularly compelling as low-intensity CBTp shows promising results with effect sizes comparable to those found in meta-analyses of standard CBTp [14]. In this regard, Metacognitive Training (MCT) for Psychosis [15] fulfills several of these recommendations. It is an easy-to-administer low-intensity CBTp program targeting metacognitive awareness of cognitive and emotional biases. MCT consists of 10-module structured group sessions (or individual sessions for MCT+) lasting 45–60 minutes each (Supplementary Table 1 in the Supplement).

Several meta-analyses and literature reviews have examined the efficacy of MCT for psychosis. The majority have shown results in favor of MCT (e.g., [16–19], while some meta-analyses with a smaller set of included studies failed to find significant improvements [20, 21] (for a discussion of the latter study, see [22]). Meta-analyses play a crucial role in quantifying effect sizes across studies and are often considered a cornerstone of evidence-based practice. However, their conclusions can be influenced by factors such as heterogeneity among included studies, variations in methodological quality, and publication bias, which may affect the validity of the synthesized effect sizes [23].

To complement the information provided by meta-analyses, evaluation frameworks such as GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) offer a structured approach to assessing the overall quality of evidence and deriving clinical recommendations accordingly [24]. This approach assesses the strength and reliability of the evidence supporting a given intervention by integrating multiple factors, including study quality and consistency of results. Within these frameworks, meta-analyses are integrated as a source of evidence, but when high-quality RCTs yield clear and consistent findings, they are prioritized in the grading process to ensure recommendations are based on the most robust data available [23].

Given the numerous RCTs and meta-analyses having been published on MCT, clinical recommendations on targeted outcomes are warranted, something that has never been done to date. In other words, the current study aims to propose grades of recommendation for MCT regarding positive symptoms, negative symptoms, general psychopathology, total psychotic symptoms, self-esteem, general functioning, insight, and cognitive functions. To define these grades, we relied on the World Federation of Societies of Biological Psychiatry (WFSBP) grade recommendations, which are particularly suitable for treatment intervention in psychiatry [23].

Materials and methods

Registration

This systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO) on March 31, 2024 (ID: CRD42024521044; available at https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=521044).

Search strategy

The search for relevant RCTs and meta-analyses involved the following databases: PubMed, Web of Science, EMBASE, PsycINFO, and MEDLINE. The search was conducted similarly for each database between April 1st and 5th, 2024 ((“Schizophrenia Spectrum and Other Psychotic Disorders”[MeSH]) OR (schizo* or delusion* or psychosis or psychoses or psychotic* or first episode* or first-episode* or FEP) AND (((“metacognitive” train*) OR (“meta-cognitive” train*) OR (MCT)) AND (“2007”[Date - Publication]: “3000”[Date - Publication]))). This search algorithm excludes publications prior to 2007, as the first MCT study was published at that time. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [25, 26] were followed during the writing of the manuscript (Supplementary Table 2).

Figure 1 presents the report selection flowchart. Two authors (AG, FB) independently screened titles, abstracts, and full texts, without language restrictions. Our research team could screen English, French, German, Polish, and Spanish reports. Only one report needed translation to verify its eligibility [27], and the DeepL Translator was used for this purpose.

Objectives and selection criteria

The objective was to propose grade recommendations for MCT for psychosis on target domains. The primary outcome was positive symptoms, and the secondary outcomes were negative symptoms, general psychopathology, total psychotic symptoms, self-esteem, general functioning, insight, metacognition, executive functions, language, visuospatial functions, episodic memory, working memory, attention, theory of Mind (ToM), emotion perception, jumping to conclusion (JTC), attribution style, and other cognitive biases than JTC and attribution style. All standardized tests that measure these outcomes have been analyzed (Supplementary Table 3).

Grades were established based on the WFSBP recommendations [23]. In this regard, RCTs were prioritized and initially examined, while meta-analyses were only used when the RCTs provided inconsistent results.

For this purpose, we included all RCTs and meta-analyses evaluating the effects of MCT for psychosis that met the following inclusion criteria: (i) adult participants with a DSM-IV/DSM-5/ICD-10/ICD-11 diagnosis of SDD; (ii) group or individual MCT interventions delivered all or at least one session; (iii) groups were compared before and after intervention. The exclusion criteria were: (i) RCTs with MCT in each group; (ii) other programs developed from MCT; (iii) re-analyzed data. In addition to these

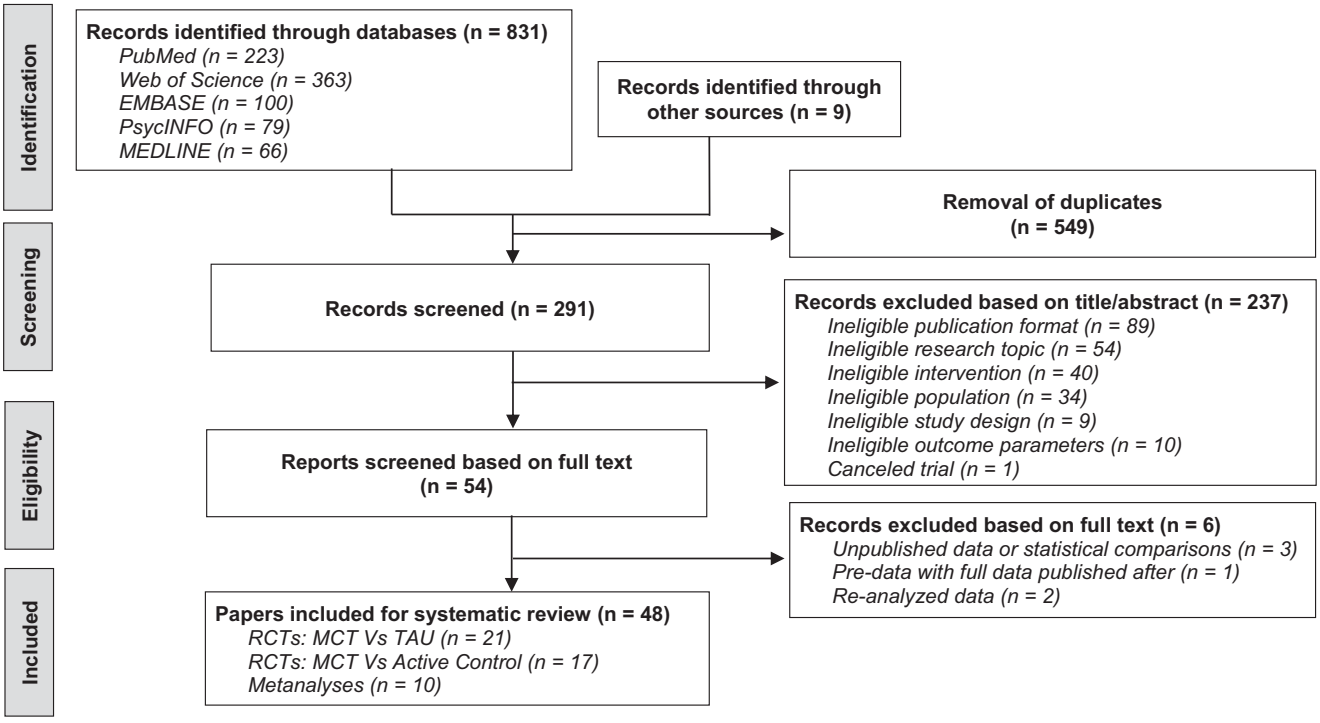

Figure 1. Flowchart.

criteria, for the meta-analyses, we included only those that focused solely on MCT for psychosis or included MCT as one of the interventions that measured clinical outcomes for people with SSD.

Data analyses: risk of bias in RCTs and overall confidence in meta-analyses

One author (AG) completed the data tab on Microsoft Excel, and another reviewer (FB) verified it. Neither was blinded during data extraction.

The overall risk of bias of RCTs was classified as "low," "moderate," or "high" (Supplementary Table 4). To determine this, we used: (1) the Scottish Intercollegiate Guidelines Network (SIGN) and the Mixed Methods Appraisal Tool (MMAT) checklists for RCTs (Supplementary Tables 5–6); (2) the potential sponsor and allegiance effect; (3) conservative sliding-scale criteria as acceptance cut-off for the number of participants after the intervention ($n \geq 40$ post-treatment; $n \geq 35$ six months follow-up; $n \geq 30$ one year follow-up; $n \geq 25$ three years follow-up). Any disagreements were discussed until a consensus was reached. When information was unclear or missing, we contacted the study"s main author (Supplementary Table 7).

We also assessed the overall confidence in the meta-analyses to address discrepant cases. All included meta-analyses were classified by four authors (AG, FB, RF, AM) into four categories ("high," "moderate," "low," and "critically low") using the Assessing the Methodological Quality of Systematic Reviews - Revised version (AMSTAR-2) checklist and the adapted AMSTAR-Plus Content score (Supplementary Tables 8–9). In line with the WFSBP guidelines, we prioritized the most recent meta-analyses (including as many RCTs as possible) with the highest level of evidence.

Levels of evidence and grades of recommendation

The level of evidence for each outcome was primarily determined based on significant RCTs results weighted by their overall risk of bias (Supplementary Table 10). To align with the WFSBP philosophy, we prioritized conclusions from RCTs over meta-analyses, as none of the available meta-analyses had a low risk of bias. In this regard, we followed the approach that *"the majority of RCTs with low risk of bias shows efficacy."*

Grades of recommendation were then assigned based on both the levels of evidence and the program"s acceptance (Supplementary Tables 11). Recommendations followed the modified Nice-Network wording ("should," "could," "may") and the PICO clinical framework [28].

Subgroup analyses

Given that studies included were heterogeneous regarding the patients included (in- or outpatients), the kind of the control groups (active or treatment as usual), or the number of MCT sessions delivered, we performed subgroup analyses by applying the WFSBP grading system to each our outcomes (Supplementary Table 11). This was thought to check the stability of our recommendation grades.

Grading recommendations validated by international experts

Five international experts not involved in any MCT studies (SR, RA, KB, TL, RB) reviewed and validated our conclusions (Supplementary Table 12). Experts were defined as active clinicians in treating patients with SSD, as well as researchers who have actively participated in RCTs or meta-analyses on psychosocial rehabilitation for psychosis, or who have experience in graded recommendations or risk of bias assessment.

Results

Based on our selection criteria, our systematic review included (Tables 1 and 2):

- 38 RCTs: 1942 participants (1014 participants for 21 RCTs versus TAU; −928 participants for 17 RCTs versus active control).
- 10 meta-analyses.

Among the total number of the included RCTs (n = 38), the proportion of studies reporting comparative results for each outcome was as follows: positive symptoms (n = 25; 65.8%), delusions (n = 18; 47.4%), hallucinations (n = 8; 21.1%), negative symptoms (n = 13; 34.2%), general psychopathology (n = 12; 31.6%), total psychotic symptoms (n = 15; 39.5%), self-esteem (n = 4; 10.5%), general functioning (n = 8; 21.0%), neurocognition (n = 10; 26.3%), language (n = 2; 5.3%), visuospatial functions (n = 2; 5.3%), ToM (n = 6; 15.8%), JTC (n = 13; 34.2%), attribution style (n = 2; 5.3%), other cognitive biases than JTC and attribution style (n = 6; 15.8%), emotion perception (n = 2; 5.3%), metacognition (n = 2; 5.3%), and insight (n = 18; 47.4%).

Furthermore, 36 RCTs reported post-treatment results (94.7%), 3 at 1 month follow-up (7.9%), 5 at 3 to 4 months follow-up (12.2%), 12 at 6 months follow-up (31.6%), and one at 3 years follow-up.

Table 1 shows the risks of bias assigned to each RCT: 6 low (15.8%), 22 moderate (57.9%), and 10 high (Supplementary Tables 13–15).

Among the outcomes of the 10 meta-analyses, comparison results were available for positive symptoms, delusions, hallucinations, negative symptoms, total psychotic symptoms, general psychopathology, general functioning, self-esteem, overall social cognition, ToM, cognitive biases, and emotion perception. All meta-analyses showed post-treatment results (100%), and only 1 reported follow-up results under 1 year (9.1%).

Table 2 shows the overall meta-analyses confidence: 3 low, 7 critically low (Supplementary Tables 16–18).

Post-treatment levels of evidence

They were determined by weighting the significance of the benefits obtained in favor of MCT, adjusted for the RCTs" risk of bias. Based on this analyses, post-treatment levels of evidence were assessed for or against the use of MCT for the following outcomes: positive symptoms, delusions, total psychotic symptoms, emotion perception, attribution style, other cognitive biases (than JTC and attribution style), self-esteem, visuospatial functions, language (Supplementary Table 19).

Given the contradictory results observed across the RCTs, meta-analyses were used to determine the post-treatment levels of evidence for the following outcomes: hallucinations, negative symptoms, general psychopathology, general functioning, insight, ToM, and JTC (Supplementary Table 20).

For five other outcomes (metacognition, executive functions, episodic memory, working memory, and attention), there was insufficient post-treatment evidence to recommend or oppose the use of MCT for psychosis, even when considering meta-analyses.

For example, the three "A" levels of evidence supporting the use of MCT were obtained because at least two independent RCTs with a low risk of bias demonstrated efficacy, and there were no negative RCTs with a low risk of bias, or the majority of RCTs with a low risk of bias showed efficacy: positive symptoms (4 low RCTs significant versus 1 low RCT non-significant); delusions (4 low RCTs significant versus 1 low RCT non-significant); total psychotic symptoms (2 low RCTs significant).

Table 3 summarizes the post-treatment levels of evidence assigned to each of our selected outcomes.

Follow-up levels of evidence

They were determined by weighting the significance of the benefits obtained in favor of MCT, adjusted for the RCTs" risk of bias. Follow-up levels of evidence were assessed for or against the use of MCT for the following outcomes: positive symptoms (6 weeks – 6w, 3 m, 3 years – 3y); hallucinations (3 m, 6 m, 3y); delusions (6w), negative symptoms (1 m, 6 m); total psychotic symptoms (1 m, 3 m); general psychopathology (1 m); general functioning (1 m, 6 m); insight (3 m); emotion perception (6 m); ToM (6 m); JTC (1 m, 3 m, 6 m); attribution style (6 m); other cognitive biases (1 m); metacognition (6 m); self-esteem (6 m, 1y, 3y); visuospatial functions (3 m, 6 m); episodic memory (3 m, 6 m, 3y); working memory (3 m, 6 m); attention (3 m); language (3 m, 6 m) (Supplementary Table 19).

Given the contradictory results observed across the RCTs, meta-analyses were used to determine the follow-up levels of evidence for the following outcomes: positive symptoms (1 m, 4 m, 6 m); delusions (1 m, 3 m, 6 m); total psychotic symptoms (6 m); general functioning (3 m); JTC (1 m); other cognitive bias (6 m) (Supplementary Table 20).

For nice other outcomes (delusions 3y; total psychotic symptoms 3y; general psychopathology 6 m; insight 4 m, 6 m; ToM 3 m; executive functions 6 m; Attention 6 m, 3y), there was insufficient follow-up evidence to recommend or oppose the use of MCT for psychosis, even when considering meta-analyses.

Table 3 represents the follow-up levels of evidence that has been assigned for each judgment criterion.

MCT acceptance

MCT for psychosis is available for free in 39 languages and can be delivered in different modalities (individual or group) for various clinical populations. A one-day online workshop is accessible at no cost for professionals seeking training. This accessibility makes MCT a highly practicable and easy-to-administer program. Additionally, it has demonstrated strong applicability within its target population, as evidenced by a low mean dropout rate across all included RCTs (11.45%) and the absence of reported adverse treatment reactions. Furthermore, high satisfaction and acceptance rates have been documented among MCT participants [68]. Regarding service users" preferences, four studies compared MCT with three other psychosocial interventions, two of which reported significantly higher satisfaction in favor of MCT [68]. Although some information is missing according to WFSBP guidelines (ethical and legal aspects; cost benefit ratio), these findings collectively support the view that MCT for psychosis has "good acceptability".

From levels of evidence to grades of recommendation

By combining this "good acceptance" with the "levels of evidence", "strong" recommendations (WFSBP-grade 1) are attributed post-treatment to MCT for psychosis to improve: (1) positive symptoms (n = 25); (2) delusions (n = 18); (3) total psychotic symptoms (n = 15). "Limited" recommendations (WFSBP-grade 2) are attributed post-treatment to improve visuo-spatial functions (n = 2).

Regarding follow-up benefits, "limited recommendations" (WFSBP-grade 2) are attributed to improve: positive symptoms (6w, 3 m, 3y);

Table 1. Overview of the characteristics of the RCTs included

RCT	MCT	Control group	Participants *(Setting)*	Participants (*n MCT*; *n* Control)	Drop out (*n MCT*; *n* Control)	Time of assessment	Outcome parameters	Risk of bias
Treatment as usual (TAU)								
Acuña et al. [29]	Group (10 sessions)	TAU	SCZ with antipsychotic drugs (outpatients)	50 (25; 25)	4 (0; 4)	PT	Positive symptoms, negative symptoms, general psychopathology, other cognitive symptoms, insight	Low
De Pinho et al. [30]	Group (8 sessions)	TAU	SCZ (NA)	56 (27; 29)	4 (1; 3)	PT, 3 m	Positive symptoms, hallucinations, delusions, general functioning, insight	Low
Erawati et al. [31]	Group (8 sessions)	TAU	SSD with delusions: PSYRATS <18 (inpatients)	52 (26; 26)	0 (0; 0)	PT	Delusions, hallucinations, metacognition	High
Favrod et al., 2014, 2015	Group (8 sessions)	TAU	SCZ, schizoaffective disorder (outpatients)	52 (26; 26)	5 (3; 2)	PT, 6 m	Positive symptoms, delusions, insight	Moderate
Fekete et al. [32]	Group (8 sessions)	TAU	SCZ (NA)	46 (23; 23)	10 (0; 10)	PT, 6 m	Positive symptoms, negative symptoms, total psychotic symptoms, neurocognition, visuospatial functions, language, ToM,	Moderate
Gawęda et al. [33]	Group (8 sessions)	TAU	Chronic SCZ with low general functioning: SCZ, paranoid SCZ, undifferentiated SCZ (NA)	50 (26; 24)	6 (3; 3)	PT	Hallucinations, delusions, total psychotic symptoms, general functioning, neurocognitive functions, ToM, JTC, other cognitive biases, insight	Moderate
Ishikawa et al. [34]	Group (10 sessions)	TAU	SCZ, schizotypal, delusional disorders (in and outpatients)	50 (24, 26)	5 (2; 3)	6w, 10w (= PT), 1 m	Positive symptoms, delusions, Self-esteem, general functioning, JTC, other cognitive biases, insight	Low
Kumar et al. [35]	Group (8 sessions)	TAU	Paranoid schizophrenia with hospitalization admission in the last 2 weeks, only man having at least 8 years of education (NA)	16 (8; 8)	NA	PT	Positive symptoms, Negative symptoms, general psychopathology, insight	High
Kuokkanen et al. [36, 37]	Group (8 sessions)	TAU	Forensic and dangerous non-forensic SCZ with a history of violence (inpatients)	20 (10; 10)	2 (2; 0)	PT, 3 m, 6 m	Positive symptoms, total psychotic symptoms, general functioning, JTC, insight)	Moderate
Lam et al. [38]	Group (8 sessions)	TAU	SSD (in and outpatients)	80 (40; 40)	3 (2; 1)	PT	Insight	Moderate
Moritz, et al., 2011	Group (8 sessions)	TAU	SSD chronic and stabilized (outpatients)	36 (18; 18)	0 (0; 0)	PT	Positive symptoms, general psychopathology, neurocognitive functions, JTC	Moderate
Naughton et al. [39]	Group (16 sessions)	WL	Primary psychotic illness, detained in forensic mental health hospital: SCZ, schizoaffective disorder, major depressive disorder with psychotic features (inpatients)	19 (11; 8)	0 (0; 0)	PT	Positive symptoms, negative symptoms, general psychopathology, total psychotic symptoms, general functioning, insight	High

Continued

Table 1. *Continued*

RCT	MCT	Control group	Participants *(Setting)*	Participants (*n MCT*; *n* Control)	Drop out (*n MCT*; *n* Control)	Time of assessment	Outcome parameters	Risk of bias
Park et al. [40]	Group (18 sessions)	TAU	SCZ Stabilized (outpatients)	72 (36; 36)	13 (6; 7)	PT	Positive symptoms, negative symptoms, general functioning, ToM,	Moderate
Simón-Expósito & Felipe-Castaño [41]	Group (16 sessions)	WL	SCZ stabilized ≥3 m (outpatients)	22 (11; 11)	1 (0; 1)	PT	Delusions, hallucinations, total psychotic symptoms, insight	High
So et al. [42]	Individual (4 delusions sessions)	TAU	SSD with current delusions: SCZ, delusional disorder, schizoaffective disorder, psychotic disorder NOS, severe depression with psychotic disorder, bipolar disorder (outpatients)	44 (23; 21)	18 (10; 8)	PT, 1 m	Positive symptoms, delusions, JTC	High
So et al. [43]	Group (4 delusions sessions)	TAU	SSD with current delusions: SCZ, delusional disorder, psychotic disorder NOS (outpatients)	56 (27; 29)	13 (3; 10)	PT, 1 m, 6 m	Positive symptoms, delusions, negative symptoms, general psychopathology, total psychotic symtoms, other cognitive bias	Low
Van Oosterhout et al. [44]	Group (8 sessions)	TAU	SSD with at least moderate delusional symptoms (NA)	154 (75; 79)	43 (24; 19)	PT, 6 m	Delusions, other cognitive biases, metacognition, insight	Moderate
Wang et al. [45]	Group (10 sessions)	TAU	SCZ (inpatients)	100 (50; 50)	8 (3; 5)	PT, 3 m	Neurocognition, visuospatial functions, language	Low
Zonp & Bilgin [46]	Group (10 sessions)	TAU	SCZ with antipsychotic medication, without concomitant psychiatric diagnosis (outpatients)	39 (20; 19)	3 (1; 2)	PT, 3 m	ToM, emotion perception, attribution style	High
Active control group								
Aghotor et al. [47]	Group (8 sessions)	Newspaper discussion group (4 sessions)	SSD with previous or active delusions (inpatients)	30 (16; 14)	0 (0; 0)	PT	Positive symptoms, total psychotic symptoims, JTC,	High
Andreou et al. [48]	Individual (12 sessions)	Cognitive remediation (12 CogPack sessions)	SCZ with past or current delusions (in and outpatients)	92 (46; 46)	10 (4; 6)	PT, 6 m	Positive symptoms, delusions, negative symptoms, general psychopathology, total psychotic symptoms, self-esteem, JTC, insight	Moderate
Balzan et al. [49]	Individual (4 sessions – 2 h)	Cognitive remediation (4 HappyNeuron Pro sessions – 2 h)	SSD with active delusions (outpatients)	54 (27; 27)	2 (1; 1)	PT, 6 m	Positive symptoms, delusion, negative symptoms, general psychopathology, neurocognitive functions, JTC, insight	Moderate
Briki et al. [50]	Group (16 sessions)	Supportive therapy (16 sessions)	SCZ or schizoaffective disorder, with persistent positive symptoms (in and outpatients)	68 (33; 35)	18 (8; 10)	PT	Positive symptoms, general psychopathology, Insight	Moderate

Continued

RCT	MCT	Control group	Participants *(Setting)*	Participants (*n MCT*; *n* Control)	Drop out (*n MCT*; *n* Control)	Time of assessment	Outcome parameters	Risk of bias
Buonocore et al. [51]	Group (16 sessions) + Cognitive remediation (48 CACR sessions)	Newspaper discussion (16 sessions) + Cognitive remediation (48 CACR sessions)	SCZ stabilized ≥3 m and responders to medication (outpatients)	57 (30; 27)	8 (5; 3)	PT	Positive symptoms, negative symptoms, general psychopathology, total psychotic symptoms, neurocognition, JTC	Moderate
Chen et al. [52]	Group (8 sessions) + Community based rehabilitation (8 weeks)	Community based rehabilitation (8 weeks)	SCZ (NA)	124 (62; 62)	4 (4; 0)	PT	Positive symptoms, delusions, hallucinations, negative symptoms, general psychopathology, total psychotic symptoms,	Low
Kowalski et al. [53]	Group (1 session: module 2 or 4)	Discussion group (1 session)	Paranoid SCZ, unspecified SCZ, acute polymorphic disorder with SCZ symptoms (NA)	38 (13 module 2; 12 module 4; 13 discussion)	7 (1 module 2; 3 module 4; 3 Discussion)	PT	Delusions, ToM, JTC	High
Moritz, et al., 2011	Group (8 sessions) + individual (8sessions)	Cognitive remediation (8 CogPack sessions)	SCZ with present or prior episode of positive symptoms (inpatients)	48 (24; 24)	4 (1; 3)	PT	Positive symptoms, delusions, hallucinations, JTC	Moderate
Moritz et al. [54] Köther et al. [55]	Group (8 sessions) + 8 possible add-on sessions	Cognitive remediation (8 CogPack sessions) + 8 possible add-on sessions	SSD with antipsychotic medication, without severe symptoms (in and outpatients)	150 (76; 74)	21 (9; 12)	PT, 6 m	Positive symptoms, delusions, hallucinations, total psychotic symptoms, self-esteem, neurocognition, JTC	Moderate
Moritz et al. [56]					58 (29; 29)	3y		Moderate
Ochoa et al. [57] Ruiz-Delgado et al. [58]	Group (8 sessions)	CBT psychoeducation (8 sessions)	SCZ, psychotic disorder NOS, delusional disorder, schizoaffective disorder, brief psychotic disorder, or schizophreniform disorder with onset of psychosis <5y (outpatients)	122 (65; 57)	41 (24; 17)	PT, 6 m	Positive symptoms, negative symptoms, general psychopathology, total psychotic symptoms, general functioning, ToM, JTC, attribution style, others cognitive biases, emotion perception, insight, neurocognition	Moderate
Pos et al. [59]	Group (8 sessions)	Occupational therapy (8 sessions)	SCZ with recent onset psychosis or related disorder, with current positive symptoms (in and outpatients)	50 (25; 25)	12 (5; 7)	PT	Delusions, JTC, insight	High
Shan et al. [60]	Group (8 sessions) + Olanzapine	Non-specific therapeutic program + Olanzapine	SCZ with illness duration <5y (NA)	41 (20; 21)	2 (1; 1)	PT	Positive symptoms, negative symptoms, general psychopathology, total psychotic symptoms, neurocognition	Moderate
Yildiz et al. [61]	Group (40 sessions)	Psychosocial skills training (40 sessions)	SCZ or schizoaffective disorder (outpatients)	20 (NA; NA)	0 (0; 0)	PT	Total psychotic symptoms, general functioning	Moderate
Zalzala et al. [62]	Group (8 sessions)	Healthy living skills	SCZ or schizoaffective disorder, with medication adherence ≥30 days) (outpatients)	34 (16; 17)	NA	PT, 4 m	Positive symptoms, negative symptoms, insight	High

Note: 6 m, 6 months; 6w, 6 weeks; 6y, 6 years; CBT, cognitive behavioral therapy; JTC, jumping to conclusion; NA, not available; NOS, not other specified; PT, post-treatment; SCZ, schizophrenia; TAU, treatment as usual; ToM, Theory of mind.; WL, waiting list

Table 2. Overview of the characteristics of the meta-analyses included to assign the level of evidence for conflict RCT cases

Meta-analyses	Intervention	Control	Outcome parameters	No. of studies (*n* MCT; *n* Control)	Time of assessment	Level of evidence
Barnicot et al. [20]	MCT	Cognitive remediation, newspaper discussion, TAU	Positive symptoms, general psychopathology	3 (48; 46)	PT	Critically low
Burlingame et al. [21] Burlingame & Rosendahl [17]	MCT	Attention control group, supportive therapy, TAU	Positive symptoms	11 (331; 315)	PT	Critically low
Eichner & Berna [63]	MCT	Cognitive remediation, newspaper discussion, TAU, waiting list	Positive symptoms, delusions	15 (408; 399)	PT	Critically low
Hotte-Meunier et al. [19]	MCT, MCT+, MCT-JTC, MCT-ToM, MCT (virtual)	Community-based rehabilitation, current events discussion, cognitive remediation healthy living group, newspaper discussion, Psychoeducation, recreational activities, social skills training, Supportive therapy, TAU, waiting list	ToM, emotion perception, overall social cognition	9 (212; 194)	PT	Low
Jiang et al. [64]	MCT	Cognitive remediation, newspaper discussion, supportive therapy, TAU	Positive symptoms, delusions, general functioning	11 (324; 322)	PT	Critically low
Liu et al. [65]	MCT	Cognitive remediation, supportive therapy, TAU, waiting list	Delusions	11 (352; 350)	PT	Critically low
Penney et al. [18]	MCT, MCT+, MCT-JTC, MCT-ToM, MCT (virtual)	Community-based rehabilitation, current events discussion, cognitive remediation healthy living group, newspaper discussion, Psychoeducation, recreational activities, social skills training, Supportive therapy, TAU, waiting list	Positive symptoms, delusions, hallucinations, negative symptoms, total psychotic symptoms, cognitive biases, self-esteem, general functioning	43 (1 272; 840)	PT, < 1y	Low
Philipp et al. [66]	MCT	Cognitive remediation, health training, supportive therapy, newspaper discussion, psychoeducation, progressive muscle relaxation, TAU, waiting list	Positive symptoms	19 (597; 522)	PT	Low
Sauvé et al. [16]	MCT, MCT+, MCTd, MCT-T, MCT + CACR, MCT + CR, MCT-JTC,	Cognitive remediation, newspaper discussion, supportive therapy, TAU, waiting list	Positive symptoms; cognitive biases, insight	25 (606; 598)	PT	Critically low
Van Oosterhout et al. [67]	MCT, MCT+, MCT + CBT, MCT-JTC, MCT-T	Cognitive remediation, Newspaper discussion, supportive therapy, TAU, waiting list	Positive symptoms, delusions, JTC	13 (375; 673)	PT	Critically low

Note: 1y, 1 years.; JTC, jumping to conclusion; MCT + CACR, MCT plus computer-assisted cognitive remediation; MCT + CBT, MCT plus cognitive behavioral therapy; MCT(+), metacognitive training (individualized); MCTd, MCT for delusions; MCT-JTC, MCT (target: jumping to conclusions); MCT-T, MCT (targeted); MCT-ToM, MCT (target: theory of mind); MSCT, MCT plus social cognition training; PT, post-treatment; TAU, treatment as usual; ToM, Theory of mind

N.B. Since some issues were identified in Burlingame et al. [21], particularly concerning the non-inclusion of RCTs that met the inclusion criteria, the authors revised their results in 2022, incorporating 19 new MCT studies.

delusions (6w); total psychotic symptoms (1 m, 3 m); general psychopathology (1 m); general functioning (1 m); self-esteem (3y); visuospatial functions (3 m); episodic memory (3 m); attention (3 m).

Table 3 represents the grade of recommendation assigned to each judgment criterion.

Subgroup analyses

Post-treatment recommendations for positive symptoms (WFSBP-grade 1), and visuospatial functions (WFSBP-grade 2) remain mainly unchanged, even when MCT"s efficacy was assessed strictly against active control groups with proven efficacy on psychotic symptoms (such as cognitive remediation or psychoeducation) [69, 70]. Similarly, most follow-up recommendation (WFSBP-grade 2) were unchanged (see Supplementary Table 21).

Effect size

To ensure transparency and comprehensiveness of our recommendations, we have reported available effect sizes (ES) for each outcome from RCTs with a low risk of bias supporting our Grade 1 recommendation (Supplementary Table 22 for more details):

Table 3. Levels of evidence for each judgment criterion

Level of evidence	Post-treatment	Follow-up	GoR
A	Positive symptoms; Delusions; Total psychotic symptoms		**1**
B	Visuospatial functions	Positive symptoms (6w, 3 m, 3y); Total psychotic symptoms (1 m, 3 m); General psychopathology (1 m); General functioning (1 m); Self-esteem (3y); Visuospatial functions (3 m); Episodic memory (3 m); Attention (3 m)	**2**
C1	Hallucinations*; Negative symptoms*; General functioning*; ToM*; JTC*; Insight*	Positive symptoms (1 m*, 4 m*, 6 m*); Delusions (1 m*, 3 m*, 6 m*); Total psychotic symptoms (6 m*); General functioning (3 m*); JTC (1 m*); Other cognitive biases (6 m*)	**3**
D	Metacognition; Executive functions; Episodic memory; Working memory; Attention	Delusions (3y); Total psychotic symptoms (3y); General psychopathology (6 m); Insight (4 m, 6 m); ToM (3 m); Executive functions (6 m); Attention (6 m, 3y)	**4**
- C1	General psychopathology*		**– 3**
- B	Emotion perception; Attribution style; Self-esteem; Language	Delusions (6w); Hallucinations (3 m, 6 m, 3y); Negative symptoms (1 m, 6 m); General functioning (6 m); Insight (3 m); Emotion perception (6 m); ToM (6 m); JTC (3 m, 6 m); Attribution style (6 m); Other cognitive biases (1 m); Metacognition (6 m); Self-esteem (6 m, 1y); Visuospatial functions (6 m); Episodic memory (6 m, 3y); Working memory 3 m, 6 m); Language (3 m, 6 m)	**– 2**
- A	Other cognitive biases (than JTC and attribution style)		**– 1**

Note: 6w, 6 weeks; 6 m, 6 months; 6y, 6 years; JTC, jumping to conclusion; ToM, Theory of mind; *, level of evidence attributed from meta-analyses; GoR, grade of recommendation

- Positive symptoms (*6 outcomes across 5 studies*): 5 outcomes showed significant effects (3 large, 2 medium ES), while 1 outcome was non-significant (missing ES).

- Delusions (*6 outcomes across 4 studies*): 5 outcomes showed significant effects (2 large, 2 medium, and 1 small ES), while 1 outcome was non-significant (missing ES).

- Total psychotic symptoms (*2 outcomes across 2 studies*): both outcomes showed significant effects (2 large ES).

Grading recommendations (PICO)

In individuals with SSD, MCT for psychosis.

- should be offered to reduce current positive symptoms, delusions, and total psychotic symptoms – Level of evidence: A (strong), Grade of recommendation: 1 (strong).

- could be offered to improve current visuospatial abilities – Level of evidence: B (limited), Grade of recommendation: 2 (limited),

- could be offered to obtain follow-up benefits on positive symptoms (6w, 3 m, 3y), delusions (6w), total psychotic symptoms (1 m, 3 m), general psychopathology (1 m), general functioning (1 m), self-esteem (3y), visuospatial functions (3 m), episodic memory (3 m), attention (3 m) – Level of evidence: B (limited), Grade of recommendation: 2 (limited), instead of treatment as usual and other active controls psychological treatments.

Discussion

Based on the present systematic review, we found sufficient quality evidence to formulate strong recommendations (WFSBP-grade 1) in favor of using MCT for psychosis to improve (a) positive symptoms; (b) delusions; (c) total psychotic symptoms, and limited recommendations (WFSBP-grade 2) to improve visuospatial functions. Regarding follow-up benefits, limited recommendations (WFSBP-grade 2) could be made in favor of using MCT for psychosis to improve: positive symptoms (6w, 3 m, 3y); delusions (6w); total psychotic symptoms (1 m, 3 m); general psychopathology (1 m); general functioning (1 m); self-esteem (3y); visuospatial functions (3 m); episodic memory (3 m); attention (3 m). In other words, these results suggest that MCT is a low-intensity CBT program with evidence-based, long-lasting clinical benefits, especially for positive symptoms in psychosis.

Our recommendations highlight the significant post-treatment effects regarding positive symptoms reported in the most recent and comprehensive meta-analyses on MCT for psychosis [18, 19]. They also emphasize the need for a nuanced interpretation of the post-treatment benefits observed for hallucinations, negative symptoms, general functioning, social cognition (WFSBP-grade 3), and self-esteem (WFSBP-grade – 2). By applying the WFSBP framework, we aimed to refine the assessment of MCT"s efficacy, considering additional dimensions which are crucial for informing clinical decisions beyond those considered in meta-analyses. Our findings emphasize the value of complementing quantitative meta-analytic syntheses with a rigorous methodological appraisal. To minimize the overall risk of bias, we applied stringent criteria regarding the number of participants included in both post-treatment and follow-up analyses. Furthermore, we conducted a descriptive examination of the effect sizes associated with our Grade 1 recommendations. Most of them were large, underscoring the clinical relevance of our recommendations. Although meta-analytic techniques are the gold standard for estimating pooled effect sizes, our descriptive approach is solely designed to highlight the magnitude of effects observed in studies that support our strong recommendations. Finally, our subgroup analyses largely confirmed the stability of our recommendation grades.

Our results indicate that the quality of evidence for positive symptoms is more robust than for the cognitive functions specifically targeted by this program (such as social cognition, memory, or metacognition). Several hypotheses can be proposed. Firstly, most studies focused on clinical symptoms, with very

few addressing cognitive functions. In this regard, caution is advised concerning the only post-treatment recommendation obtained for cognitive functions (visuospatial functions, WFSBP-grade 2), because it is based solely on two studies with a moderate risk of bias. Moreover, the strong grade of recommendations (WFSBP-grade 1) for clinical symptoms was based on RCTs, while most of the cognitive functions" recommendations required the use of meta-analyses, and none of them received a high overall level of confidence that would permit formulating strong recommendations. Beyond these methodological considerations, from a clinical perspective, most of the measures of cognition used in RCTs of MCT were not ecological [71]. In addition, the role of a supportive recovery-oriented environment holds strategic significance in efforts to restore the functions of individuals with schizophrenia [72], and none of the RCTs included in this review assessed this environment. Moreover, it seems that MCT plants seeds of doubt about how participants think about themselves and their lives, rather than directly improving cognitive bias dysfunctions by teaching specific skills to think or act in a given situation [73, 74]. More generally, there is a lack of studies focusing on identifying the mechanisms behind CBT treatment effects [75], highlighting the need for developing solutions to better understand the cognitive and neuroscientific mechanisms through which CBTp impacts psychotic symptoms [76].

Despite our extensive efforts to mitigate potential sources of bias —including allegiance bias—*residual biases remain*. We applied a more rigorous methodology than recommended by WFSBP guidelines: we incorporated both the SIGN and MMAT for risk of bias assessment, employed very conservative criteria regarding the number of participants, and systematically downgraded studies involving authors who participated in the initial validation of the MCT program. Study authors were also concealed during risk of bias assessments, which were conducted before extracting statistical significance data.

Yet, the involvement of key collaborators of MCT cannot fully rule out the risk of allegiance bias so caution is warranted in interpreting our recommendations. Another limitation is that recommendations for outcomes other than psychotic symptoms were primarily based on secondary endpoints, which are more vulnerable to bias and are not corrected for multiplicity [23]. Third, the available evidence was limited for several outcomes and the meta-analyses used to resolve inconsistent cases were of suboptimal quality. Finally, MCT"s acceptability is included in the Grading system and the current evidence strongly supports the good acceptance of MCT [29] possibly contributing to the low drop-out rates observed (11.45%). However, as psychotherapy programs are not free of side effects [77], further studies should explicitly investigate the potential adverse effects of MCT. Future research should also investigate cost–benefit ratio, and ethical or legal considerations to provide a more robust foundation for clinical and policy-level recommendations for MCT for psychosis.

Although Cochrane reviews represent excellence in guideline development [24, 78], their high-quality GRADE criteria make it difficult to obtain strong recommendations for psychotherapies (such as the requirement for double-blind studies). In this respect, the most recent Cochrane review on CBTp at the time of these analyses received mostly weak recommendations [79], despite NICE (CG178, 2014) and SIGN (131, 2013) guidelines highly recommend CBTp for psychosis (GRADE A, level 1). In this regard, we have chosen to use the WFSBP method, which is optimally suited for evidential data in mental health [23]. By following these recommendations, we prioritized the careful analyses of the quality of evidence of RCTs to guide clinicians in their therapeutic decision and bypass some limitations of clinical decisions that are sometimes unduly driven by meta-analyses. Indeed, none of the meta-analyses included received a moderate or strong overall level of confidence. This further illustrates the relevance of our recommendation, which makes it possible to assess MCT"s efficacy with methods complementary to meta-analyses.

Despite international recommendations, CBTp remains insufficiently available for individuals with psychosis, primarily due to accessibility barriers [12, 11]. Although MCT might not currently have as strong evidence as CBTp for clinical and functional outcomes, this review found strong recommendations to use MCT for psychosis. It"s an easy-to-administer program based on CBTp that could improve its accessibility (available in 39 languages and does not require a certified CBT degree to be administered). Moreover, a mobile application called "COGITO" (www.uke.de/cogito_app) has recently been developed to potentially extend the follow-up benefits obtained from MCT [80]. In view of its clinical efficacy and accessibility advantages, the World Health Organization [81] and the German Association for Psychiatry, Psychotherapy and Psychosomatics (DGPPN) have been recommending the use of MCT for reducing psychotic symptoms (strength of recommendation: B) [82]. The present systematic review thus aligns with and extends the DGPPN and WHO conclusions.

Conclusion

This systematic review provides the first grading of recommendations for MCT for psychosis, offering a rigorous and structured evaluation of its efficacy post-treatment and at various follow-up times. Our results support strong recommendations (WFSBP-grade 1) for the use of MCT in improving positive symptoms, delusions, and total psychotic symptoms. Limited recommendations (WFSBP-grade 2) can be made for its effects on visuospatial abilities, general psychopathology, functioning, self-esteem, episodic memory, and attention. While these findings highlight the clinical relevance of MCT, caution is warranted due to potential residual biases and to the heterogeneity of the included studies. Such factors underscore the need for further research to refine and strengthen these conclusions.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1192/j.eurpsy.2025.10027.

Data availability statement. The data that support the findings of this study are available in the Supplementary Material. For any additional questions, please contact the first author.

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Author contribution. AG and FB independently performed the data search and study selection. AG, FB, RF and AM had access to the dataset. AG and FB independently conducted all the risk of bias analyses for RCTs. AG, RF and AM independently conducted all the overall level of confidence analyses of meta-analyses. AG and FB contributed to the interpretation of grade of recommendation (it has never been necessary to call in a third author to obtain a consensus). AG and FB wrote the manuscript. AG conceptualized figures and

tables. All authors provided comments and feedback on the manuscript at different stages and AG had final responsibility for deciding to submit it for publication.

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Competing interests. This study is part of the PERMEPSY project, which involves SM, the main developer of MCT for psychosis. To mitigate potential conflicts of interest, SM was not involved in any activities related to study or report selection, data extraction, quality control, or data analyses. FB and SM have conducted RCTs and meta-analyses on MCT for psychosis, and RF regularly conducts paid workshops on facilitating MCT. Moreover, all grades of recommendation were validated by five independent international experts with no conflicts of interest, providing an additional safeguard. Nonetheless, we acknowledge that the involvement of key collaborators cannot fully rule out risk of allegiance bias.

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