

SYSTEMATIC REVIEW

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Metacognitive interventions for adolescents with mental disorders: a scoping review

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INTRODUCTION: Mental disorders among adolescents are increasing globally, yet access to tailored, evidence-based treatments remains limited. Metacognitive interventions, which target thinking processes influencing emotional regulation and behaviour, have shown promise in adults but remain underexplored in adolescents. This scoping review aimed to map and summarise metacognitive interventions for adolescents (aged 10–19) with mental disorders, examining intervention types, targeted disorders, delivery methods, and reported outcomes.

METHODS: Following JBI methodology for scoping reviews, comprehensive searches of published and grey literature were conducted across multiple databases. Reference lists of included full-text articles and relevant reviews were also screened.

RESULTS: Twenty-three studies published between 2004 and 2024 were included, most from Europe. Interventions identified included Metacognitive Therapy, Metacognitive Training, Metacognitive Interpersonal Therapy, Metacognitive Reflection and Insight Therapy, Virtual Environment Training with metacognitive components, and the Teen Cognitive-Functional Intervention. These were primarily applied to anxiety, depressive, psychotic, and personality disorders. Delivery formats varied (individual, group, family-inclusive), with most interventions delivered face-to-face in outpatient settings.

CONCLUSIONS: Findings demonstrate the acceptability and feasibility of metacognitive interventions for adolescents, but also highlight gaps, including limited research on certain disorders, inconsistent outcome measures, scarce exploration of digital formats and underexamined contextual factors such as family and school involvement.

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IMPACT:

- This is the first scoping review to map metacognitive interventions for adolescents with mental disorders, addressing a gap in literature predominantly focused on adults.
- It synthesizes evidence on metacognitive intervention types, delivery formats, clinical contexts, and outcomes, indicating that these interventions are feasible, acceptable, and safe for adolescents.
- The review identifies important research gaps, including under-studied disorders, methodological limitations, limited investigation of digital delivery formats, and insufficient examination of contextual factors such as family and school involvement, guiding future research and practice.

INTRODUCTION

Adolescent mental health is an urgent global concern. Around 1 in 7 individuals aged 10–19 experiences a mental disorder, representing 15% of the disease burden in this group.¹ Up to 50% of all mental disorders begin before age 14.² Depression, anxiety, and behavioural disorders are leading causes of disability, and suicide is the third leading cause of death among those aged 15–29.¹ Untreated conditions in adolescence can impair long-term health and limit life opportunities.^{1,2} Despite this, psychological

interventions for adolescents have received less attention than those for adults and often rely on adapted adult models.³

Metacognition, commonly referred to as ‘thinking about thinking’, refers to awareness and regulation of one’s cognitive processes,^{4,5} and has gained relevance in clinical contexts. Metacognitive interventions are receiving growing attention as promising approaches for treating a range of mental disorders, supported by an expanding evidence base. This is reflected in a systematic review and meta-analysis of metacognitive

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interventions for mental disorders in adults conducted by Philipp et al., 2019. However, that review highlighted that the term “metacognitive intervention” is often poorly defined and used to describe a wide range of psychotherapeutic approaches that do not necessarily share the same objectives. This has led to a recognised need to define metacognitive interventions more precisely. Metacognitive interventions focus on the distorted metacognitive processes that underlie mental disorders. Their goal is not to alter cognitive content directly, but to use indirect strategies to modify specific metacognitions or how they function.⁶ These approaches highlight the importance of thinking about thinking in addressing cognitive distortions. Rather than targeting thoughts themselves, they concentrate on dysfunctional processes involved in the development, persistence, and treatment of mental disorders.^{6–8} They also involve awareness and understanding of one’s own thoughts and feelings, as well as those of others.⁶ These interventions are goal-oriented and aim to reduce individual and disorder-specific symptoms by enhancing metacognitive capacities such as monitoring and control of thought processes.⁶ According to Flavell, metacognition, understood as thinking about one’s own thinking, refers to an individual’s awareness and understanding of their cognitive abilities, strategies, and tasks. Based on this definition, several types of metacognitive interventions can be identified, such as Metacognitive Training, first developed for patients with schizophrenia⁹; Metacognitive Therapy, first developed for patients with generalised anxiety disorder (GAD)¹⁰; and metacognitively oriented integrative psychotherapies, including Metacognitive Reflection and Insight Therapy (MERIT)¹¹ and Metacognitive Interpersonal Therapy (MIT).¹²

During adolescence, cognitive development involves a transition from concrete to more abstract and complex thinking.¹³ At this stage, young people start reflecting on their thought patterns and develop the ability to monitor their own thinking as it happens. They can understand their own thoughts and those of others. Metacognitive skills enable adolescents to plan, anticipate the potential outcomes of their actions, and consider alternative explanations for various situations.¹³ At the same time, important neurocognitive and emotional changes take place during adolescence that may increase vulnerability to negative cognitive biases, such as attentional or interpretational biases toward threat or failure.¹⁴ Age has been found to moderate the relation between cognitive biases and psychopathology, yet little is known about normative developmental changes in these biases. Adolescence might therefore represent a critical window for changes in negatively biased information-processing.¹⁵ Furthermore, research suggests that metacognitive beliefs are significantly associated with anxiety and depression in young people,^{16–18} underscoring the importance of targeting these cognitive mechanisms in early interventions. Against this backdrop, metacognitive interventions may hold significant promise for adolescents, as they support the identification, monitoring, and modification of dysfunctional thinking patterns during a critical stage of development. However, there is limited information available regarding metacognitive interventions implemented for adolescents with mental disorders.

Therefore, an overview of existing knowledge on this topic may be valuable in summarising current findings. An initial search of PubMed, Cochrane Database of Systematic Reviews, and PROSPERO was conducted, and no existing or ongoing systematic reviews, scoping reviews, or review protocols on the topic were identified.

The aim of this scoping review is to map and summarise metacognitive interventions for adolescents with mental disorders. Specifically, it seeks to identify the types of metacognitive interventions, the mental disorders targeted, and the characteristics of the interventions, including the number of sessions, frequency and duration, delivery method (face-to-face, remote, individual, or group), the professionals delivering them, and the

settings in which they are implemented. It also aims to identify the outcomes measured and the assessment tools used.

METHODS

This scoping review was conducted in line with the JBI methodology for scoping reviews,¹⁹ and it was consistent with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).²⁰ This review was conducted in accordance with an a priori protocol.²¹ The protocol was registered in the Open Science Framework (OSF): <https://osf.io/kh2bc>.

Inclusion criteria

Participants. This review included studies involving adolescents aged 10–19 years with a diagnosed mental disorder, based on any formal classification system, in any edition, such as the International Classification of Diseases,^{22,23} the Diagnostic and Statistical Manual of Mental Disorders,^{24,25} or a doctor’s clinical diagnosis. There were no restrictions regarding gender or other population characteristics. Studies including broader age ranges (e.g., children and adolescents, or adolescents and young adults) were considered if adolescent-specific data could be extracted or if adolescents represented over 80% of the sample. Studies lacking age information were excluded.

Concept. Included metacognitive intervention aligned with Flavell’s concept of metacognition and considered studies that implemented directly with adolescents diagnosed with mental disorders. These interventions specifically focused on the distorted and central metacognitive processes underlying these disorders. Therefore, metacognitive interventions were understood as therapeutic approaches designed to foster changes in metacognitive functioning by directly addressing metacognitive content – that is, an individual’s ability to recognise and make sense of their own thoughts and emotions, as well as those of others.^{6,26} These interventions were structured around specific therapeutic goals and aimed to reduce both disorder specific and individual symptoms by strengthening metacognitive capacities. In doing so, they sought to improve flexibility in the attention, monitoring, control, and regulation of cognitive processes.^{6,26} Accordingly, the interventions included were assessed based on their clinical aim to address mental disorders in adolescents were required to be delivered by healthcare professionals. To be eligible, interventions were required to meet both this clinical and conceptual criterion, although they could be complemented by other psychological or pharmacological treatments.

Context. Studies from any country, setting, or delivery format were eligible, provided interventions were administered by healthcare professionals in a clinical intervention context.

Types of sources. Quantitative, qualitative, and mixed methods studies were included. It included peer-reviewed experimental and quasi-experimental designs as well as observational studies. Unpublished and grey literature were also considered. All types of reviews were excluded, but their reference lists were hand-searched for potentially relevant studies.

Search strategy

The search strategy followed a three-step process described in the review protocol.²¹ Searches were conducted between 20–21 November 2024 across the following databases and platforms: CINAHL Complete, Psychology & Behavioral Sciences Collection, Academic Search Complete, PsycINFO, Cochrane Central Register of Controlled Trials (CENTRAL) (all via EBSCOhost); PubMed, Scopus, and Web of Science Core Collection. A grey literature search was carried out using OpenGrey (DANS EASY Archive) and

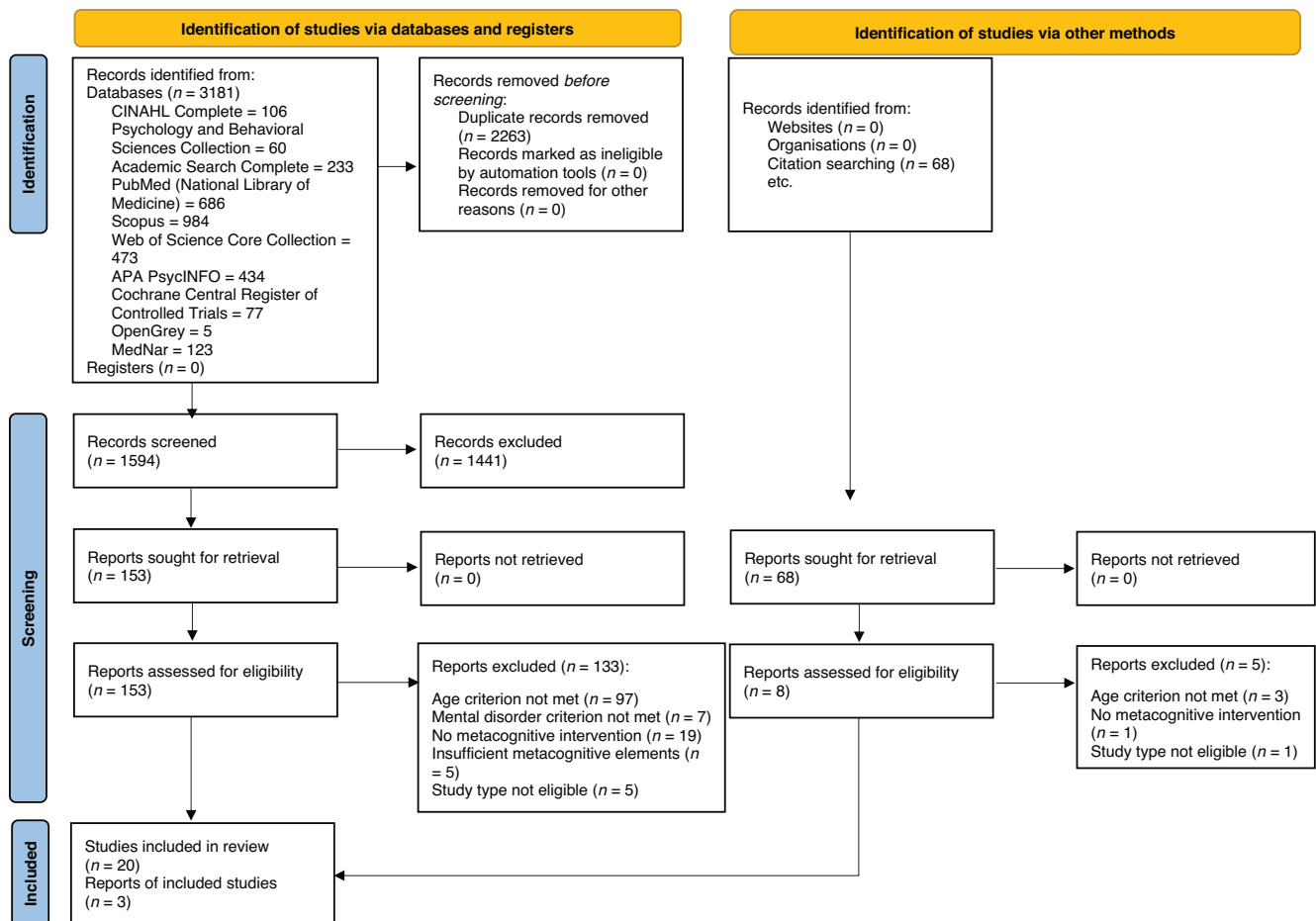


Fig. 1 Search results and study selection and inclusion process.

MedNar. Reference lists of included studies and relevant reviews were manually screened for additional studies. Clinical trial registries and protocol papers identified during the search, and initially excluded, were manually checked to determine whether they had been completed or published as full studies by 24–25 May 2025. No restrictions were applied regarding publication date or language. Non-English documents were translated using the automated translators Deepl and ChatGPT, resulting in a total of 9 translations (5 in French, 2 in Italian, and 2 in Persian). To ensure greater accuracy and avoid misinterpretation, the translations were carried out simultaneously by both tools and then carefully compared.

Following completion of the review process, the search strategies were peer-reviewed by an independent librarian. Based on this feedback, refinements were suggested to harmonize index terms and to ensure full coverage of the adolescent age range (10–19 years). To assess the potential impact of these refinements, the revised search strategies were re-run in four major databases (PsycINFO, Web of Science, CINAHL, and PubMed), which represent the primary sources of literature in psychology and health sciences relevant to this topic. The updated searches retrieved additional records, which were imported into Rayyan, duplicates were removed, and title and abstract screening was conducted to identify potentially relevant studies. Full-text articles identified through this process were subsequently compared with the databases of studies previously included or excluded to verify whether any eligible studies had been missed in the original search. This process identified one additional full-text article that had not been retrieved in the original search; however, it was excluded during full-text assessment because it did not meet the

predefined age inclusion criteria. Therefore, no additional studies were eligible for inclusion, and the results and conclusions of the review remained unchanged. The final database-specific search strategies are available in Supplementary Information (SI) 1.

Study selection

All records were imported into Mendeley (v.2.114.0) and then into Rayyan. Duplicates were automatically identified using Rayyan and manually verified before exclusion. A pilot screening of 5 titles and abstracts tested the screening tool (SI 2). Two reviewers (AES and JM) independently screened titles and abstracts and then full texts. A second pilot with 10 articles confirmed the clarity of the revised tool (SI 2). Reasons for full-text exclusion are documented in SI 3. Any disagreements were resolved through discussion or consultation with a third reviewer (LGP). The overall process is reported in the PRISMA flow diagram²⁷ in Fig. 1.

Data extraction

Data were independently extracted by 2 reviewers (AES and JM) using a tool developed and piloted by the study team on 3 papers, with no revisions required. Extracted data included population, intervention type, delivery, and outcomes. Disagreements were resolved through discussion or consultation with other authors. Twelve authors were contacted to clarify missing details on intervention delivery, setting, and assessment tools; two did not respond.

Data analysis and presentation

Results are presented in tables and figures, with a narrative synthesis, aligned with the review objectives. Data from the

extraction process required categorising metacognitive interventions by type, reflecting the diversity of study objectives. Although not initially planned in the protocol, the outcomes were later organised according to the FAME framework (Feasibility, Appropriateness, Meaningfulness, and Effectiveness), as defined by the Joanna Briggs Institute Model for Evidence-Based Healthcare.^{28,29} This post hoc decision provided a clearer and more systematic structure for interpreting how interventions align with key dimensions of evidence-based healthcare.

RESULTS

Study inclusion

As shown in the PRISMA 2020 flow chart (Fig. 1), a total of 3181 records were identified through systematic searches.

After removing 2263 duplicates, 1594 records remained for title and abstract screening, resulting in the exclusion of 1441 articles. A total of 153 full-text articles were assessed, which 133 excluded. The most common reasons for paper exclusion were that the age criterion was not met and the absence of a metacognitive intervention. Only one exclusion reason was assigned per paper, prioritising age when applicable (see SI 3).

In total, 20 studies met the inclusion criteria. Citation searching identified 68 references through the screening of reference lists from relevant review articles and selected full-text studies. From these, 8 articles were assessed in full text and 3 met the criteria. Thus, 23 studies were included in the final review.

Study characteristics

The included studies were published between 2004–2024, with nearly half (48%) appearing after 2020. Most were conducted in Europe ($n = 16$), followed by Australia ($n = 2$), Israel ($n = 2$), India ($n = 1$), Canada ($n = 1$), and the United States ($n = 1$). Descriptive observational designs predominated ($n = 9$), including case studies,^{30–34} case series,^{35–37} and multiple case study.³⁸ These were followed by quasi-experimental studies ($n = 9$),^{39–47} experimental studies ($n = 3$),^{48–50} one additional observational study with a comparative design⁵¹ and one theoretical-descriptive article including a clinical vignette.⁵² For more details, see SI 4.

Around 78% of studies had fewer than 30 participants, with sample sizes ranging from single case reports,^{30–33,52} to 97 in a pilot study.⁴⁶ Metacognitive interventions were primarily implemented in adolescents with various mental disorders. The most frequently addressed diagnoses were anxiety disorders,^{46,47,51} with particular focus on subtypes GAD,³⁶ and social anxiety disorder (SAD).^{31,32,48} Depressive disorder^{46,51} was also common, especially its subtype major depressive disorder.^{37,47} Interventions were also applied to adolescents with psychosis,^{38,40,41} more specifically schizophrenia.³³ Additional conditions addressed included personality disorders (PD),^{44,52} specifically schizoid PD³⁵ and avoidant PD.³⁰ Other diagnostics identified were obsessive-compulsive disorder (OCD);^{45,50} bipolar disorders;⁵¹ autism spectrum disorder (ASD);⁴² attention deficit hyperactivity disorder (ADHD);⁴³ Asperger's disorder;³⁹ anorexia nervosa (AN);⁴⁹ and post-traumatic stress disorder (PTSD).³⁷ For more details, see SI 4.

Review findings

Intervention characteristics. The included studies encompassed 6 types of metacognitive interventions: Metacognitive Therapy, Metacognitive Training, MIT, MERIT, Metacognitive Intervention combined with Virtual Environment Training, and Teen Cognitive-Functional Intervention (Cog-Fun). Results are organised by intervention type in Table 1, which details the main characteristics and associated mental disorder.

Metacognitive Therapy: Nine studies investigated Metacognitive Therapy.^{32,34,36,37,45–48,50} All were delivered face-to-face, except one, which included 2 sessions conducted online.⁴⁶ Four studies used

group formats,^{36,45–47} and 5 individual formats.^{32,34,37,48,50} Four included family sessions,^{36,45,46,50} either separately or integrated into adolescent sessions.⁵⁰ All interventions were conducted in outpatient clinical setting, and were delivered by clinical psychologists, with one led by a neuropsychologist.³⁷ Three studies reported that the therapist was under expert or senior clinical supervision.^{36,46,47} Individual interventions ranged from 8–12 weekly sessions, lasting between 30–60 minutes. Group interventions ranged from 6–10 weekly sessions (75–90 minutes). Parent-directed sessions were incorporated into the group intervention in most cases, ranging from two 60-minute to eight 30-minute sessions. In another study, the parent component included 2 individual sessions and 2 group sessions. Metacognitive therapy was primarily applied to anxiety disorders,^{32,36,46–48} and depressive disorders,^{46,47} followed by OCD,^{45,50} PTSD,³⁷ and emetophobia.³⁴ For more detailed information, see Table 1 and SI 5.

Metacognitive Training: Four studies investigated Metacognitive Training.^{38,39,41,49} All were delivered face-to-face, except one, which was conducted online.⁴⁹ The intervention was delivered in groups in all studies, and individually in one.⁴⁹ None included family involvement. All were implemented in an outpatient clinical setting, by various healthcare professionals: provisional psychologists⁴⁹; a team consisting of a social worker and a psychiatrist for adolescents³⁸; and, in another study, a team comprising educators and a clinical psychologist.⁴¹ One study only referred to a “therapist” without specifying the professional background, and no clarification was obtained from the author.³⁹ Only 1 study reported that the therapist (a provisional psychologist) was under expert or senior clinical supervision.⁴⁹ The individual intervention lasted 4 weeks and included 6 weekly modules, each lasting 30 minutes.⁴⁹ Group interventions ranged from 7–21 weekly sessions, each lasting between 45–90 minutes. Metacognitive training was predominantly implemented to psychosis,^{38,41} AN⁴⁹ and ASD.³⁹ For more detailed information, see Table 1 and SI 5.

Metacognitive Interpersonal Therapy: Six studies referred to MIT.^{30,33,40,44,51,52} All interventions were delivered face-to-face and conducted in outpatient clinical setting. Four studies used an individual format,^{33,40,51,52} while 2 combined individual and group sessions.^{30,44} Two studies also included sessions for family members.^{30,40} Therapists were mainly clinical psychologists, except in 1 study, a psychiatrist delivered the intervention.³³ Three studies specified that the therapist was under expert or senior clinical supervision.^{40,41,44} Individual interventions ranged from 12–40 sessions over a 12-month period, with an additional 4 booster sessions delivered over the following 6 months in 1 study⁴⁰; in another, the intervention ranged from 8–24 weekly sessions, each lasting 50 minutes, over a period of 2–6 months⁵¹; and in a third study, weekly sessions lasting 30–40 minutes were delivered over an 18-month period.³³ In the mixed-format interventions,^{30,44} individual sessions ranged from 2–3, while group sessions comprised 16 weekly meetings. One study also included 2 psychoeducation group sessions.³⁰ In 1 study, the duration of group sessions was reported to be 120 minutes.⁴⁴ Two studies included a family component as part of the intervention: in 1, up to 6 optional sessions were offered over a 6-month period⁴⁰; in the other, 5 group sessions were provided for parents or caregivers.³⁰ The mental disorders in which MIT was predominantly implemented were PD,^{30,44,52} psychosis,^{33,40} and mood or anxiety disorders.⁵¹ For more detailed information, see Table 1 and SI 5.

Metacognitive Reflection and Insight Therapy: Two studies referred to MERIT,^{31,35} with 1 identifying the intervention as an integrative psychotherapy combining MERIT and Compassion Focused Therapy.³⁵ The interventions were delivered face-to-face, individually, and in outpatient clinical setting. None of the studies reported family involvement. One study was delivered by a clinical

Table 1. Classification of interventions for mental disorders

Type of Intervention	Author(s)/ Year	Characteristics	Mental disorder
Metacognitive Therapy	(Thingbak et al., 2024b)	OCS; F2F; G; F; 2 G sessions online	Anxiety or depressive disorder
	(Thorslund et al., 2020)	OCS; F2F; G	GAD, MDD, SAD
	(Simons and Vloet, 2018)	OCS; F2F; I	Emetophobia
	(Principe et al., 2016)	OCS; F2F; I	GAD
	(Simons et al., 2006)	OCS; F2F; I; parental presence in most sessions	OCD
	(Reinholdt-Dunne et al., 2024)	OCS; F2F; G; F	OCD
	(Akhouri and Madiha, 2022)	OCS; F2F; I	SAD
	(Esbjörn et al., 2015)	OCS; F2F; G; F	GAD
	(Wells and Sembi, 2004)	OCS; F2F; I	PTSD
Metacognitive Training	(Balzan et al., 2023)	OCS; I; online	AN
	(Goodman et al., 2017)	OCS; F2F; G	ASD
	(Jauguey et al., 2012)	OCS; F2F; G	Psychosis
	(Orcel et al., 2013)	OCS; F2F; G	Psychosis
Metacognitive Interpersonal Therapy	(Inchausti et al., 2023)	OCS; F2F; I; F (optional)	Psychosis
	(Marconi et al., 2023)	OCS; F2F; I	Mood disorder (depressive disorder; bipolar disorder); anxiety disorder; adjustment disorder; disruptive, impulse-control, and conduct disorder; non-underweight eating disorders; OCD
	(Inchausti et al., 2022)	OCS; F2F; G; I; F	AvD
	(Popolo et al., 2018)	OCS; F2F; I; G	PD
	(Salvatore et al., 2016)	OCS; F2F; I	Schizophrenia
	(Dimaggio et al., 2013)	OCS; F2F; I	PD
Metacognitive Reflection and Insight Therapy	(Leonhardt et al., 2024)	OCS; F2F; I	SAD
	(Cheli et al., 2023)	OCS; F2F; I	SZPD
Metacognitive Intervention combined with Virtual Environment Training	(Lamash and Josman, 2021)	EE; F2F; G	ASD
Teen Cognitive-Functional Intervention	(Levanon-Erez et al., 2019)	OCS; F2F; I; F	ADHD

GAD Generalised anxiety disorder, MDD Major depressive disorder, SAD Social anxiety disorder, OCD Obsessive-compulsive disorder, PTSD Post traumatic stress disorder, AN Anorexia nervosa, ASD Autism spectrum disorder, AvD Avoidant personality disorder, PD Personality disorders, SZPD Schizoid personality disorder, ASD Autism spectrum disorder, ADHD Attention deficit hyperactivity disorder, OCS Outpatient clinical setting, EE Educational environment, F2F Face-to-face, G Group, I Individual, F Family

psychologist under expert or senior clinical supervision,³⁵ while the other was delivered by a therapist identified as a licensed master's level social worker.³¹ Session duration varied: in 1 study, the intervention lasted 4 years, with weekly 1-hour sessions during the first 2 years and biweekly sessions over the following 2 years³¹; in the other, the intervention lasted 10 months and consisted of 40 weekly sessions.³⁵ MERIT was implemented for SAD³¹ and schizoid PD.³⁵ For more detailed information, see Table 1 and SI 5.

Metacognitive Intervention combined with Virtual Environment Training: One study implemented a metacognitive intervention combined with virtual environment training (Virtual Action

Planning Supermarket – VAP-S – software).⁴² The intervention comprised 8 weekly sessions of approximately 45 minutes each, delivered in a group format, face-to-face, within an educational setting. It was delivered by occupational therapists under expert or senior clinical supervision. The intervention was implemented in adolescents with ASD. For more detailed information, see Table 1 and SI 5.

Teen Cognitive-Functional Intervention: One study implemented the Cog-Fun.⁴³ It comprised 17 weekly 1-hour sessions: 13 with adolescents, 3 with parents, and 1 joint session. The intervention was delivered individually, face-to-face, in an outpatient clinical

Table 2. Summary of outcomes according to FAME framework across included studies

Assessed Domains	No. of Studies	FAME Category
Treatment adherence, dropout, attendance, safety, participant and parent satisfaction, engagement, and family-related variables	n = 14 (Balzan et al., 2023; Cheli et al., 2023; Esbjörn et al., 2015; Inchausti et al., 2022, 2023; Jaugey et al., 2012; Levanon-Erez et al., 2019; Marconi et al., 2023; Orcel et al., 2013; Popolo et al., 2018; Reinholdt-Dunne et al., 2024; Simons and Vloet, 2018; Thingbak et al., 2024b; Thorslund et al., 2020)	Feasibility
Addressing barriers to recovery, relevance of content/format, and clinical adaptation process	n = 3 (Balzan et al., 2023; Esbjörn et al., 2015; Leonhardt et al., 2024)	Appropriateness
Participant and caregiver satisfaction, emotional regulation, recovery meaning, therapeutic alliance, personal narratives	n = 7 (Balzan et al., 2023; Dimaggio et al., 2013; Goodman et al., 2017; Inchausti et al., 2023; Principe et al., 2016; Salvatore et al., 2016; Simons et al., 2006)	Meaningfulness
Symptom reduction (anxiety, depression, psychosis, OCD, PTSD), improvements in metacognition, social/emotional/occupational functioning, coping, self-esteem	n = 23 All studies	Effectiveness

setting by occupational therapists. The intervention was implemented in individuals with ADHD. For more detailed information, see Table 1 and SI 5.

Intervention outcomes. Outcomes were analysed using the FAME framework,^{28,29} as described in the Methods. Main findings are summarised in Table 2. Effectiveness as the most explored domain, featuring in all studies, with particular emphasis on the reduction of symptoms such as anxiety and depression, as well as improvements in metacognition. Feasibility was also widely assessed, especially in relation to treatment adherence, safety, and satisfaction. In contrast, appropriateness and meaningfulness were less frequently addressed, appearing in a smaller number of studies and primarily through qualitative data and subjective reports, highlighting the relevance of clinical adaptation and personal experience within the therapeutic process.

Outcomes are grouped according to the FAME framework, allowing for the identification of studies contributing evidence to each domain. They are summarised in Figs. 2 and 3. Additionally, SI 6 provides the outcomes for each study, evaluated across all four categories.

All 23 studies described the assessment tools used for outcome evaluation. The most frequently used tools are summarised below, by evaluation domain and frequency (see Fig. 4). A full list of tools by domain is available in SI 7. Only instruments used for outcome assessment were included. Tools used solely for clinical diagnosis as part of the inclusion criteria were excluded.

A wide range of assessment tools was used across studies, with metacognition emerging as a particularly prominent domain. The most frequently employed instruments included various versions of the Metacognitions Questionnaire (e.g., MCQ-A, MCQ-C, MCQ-C30)^{32,34,45–47} and the Metacognition Assessment Scale – Abbreviated or Adapted (MAS-A).^{31,33,35,40,44,48} Anxiety was frequently assessed using tools such as the Revised Child Anxiety and Depression Scale (RCADS),^{36,45–47} the Beck Anxiety Inventory (BAI),^{32,37} the Penn State Worry Questionnaire (PSWQ),^{45,47} and structured diagnostic interviews like the Anxiety Disorders Interview Schedule (ADIS).^{36,46} For depression, commonly used measures included the Beck Depression Inventory (BDI),^{34,37} the Children's Depression Inventory (CDI),^{39,50} and the Calgary Depression Scale.^{38,41} In studies involving psychosis, the Positive and Negative Syndrome Scale (PANSS)^{38,40,41} was used to evaluate symptom severity. Obsessive-compulsive symptoms were assessed primarily with the Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS).^{45,50} Global and social/occupational functioning was typically measured using the Social and Occupational Functioning Assessment Scale (SOFAS)^{38,41} and the Health

of the Nation Outcome Scale for Children and Adolescents (HoNOSCA).^{38,41} General psychopathology was assessed using broader symptom checklists such as the Symptom Checklist-90-Revised (SCL-90-R).^{30,35} Additionally, self-esteem and self-concept were evaluated using the Rosenberg Self-Esteem Scale,^{38,41,48} while alexithymia was measured with the Toronto Alexithymia Scale (TAS-20).^{30,44} Clinical monitoring, including treatment adherence and dropout tracking, was frequently reported, alongside qualitative clinical observations in several studies.

DISCUSSION

All studies were published in the last 20 years (post-2004), with 18 since 2014, reflecting growing interest in metacognitive interventions, following the development of Metacognitive Training and Metacognitive Therapy, validated in adults for depression, anxiety, and psychosis.^{9,53–58} The efficacy of these models in adults has led to adaptations for adolescents, considering developmental, cognitive, and emotional factors. Since 2014, research on metacognitive interventions has increased, reflecting knowledge translation from adult to youth populations,^{36,59,60} and emphasising early, tailored interventions to mitigate long-term consequences.^{3,61} Geographically, most of the studies are European, especially from Italy,^{32,33,35,44,51,52} reflecting the development and implementation of MIT,^{12,62} a recognised model for treating PD¹² and has more recently been adapted for adolescents.^{33,44,51} Most studies were observational, reflecting the early stage of adolescent metacognitive research. Such designs assess feasibility and acceptability before larger trials,^{63–66} particularly in youth, where ethical and logistical challenges limit large-scale controlled studies.^{67,68}

Metacognitive interventions implemented for adolescents with mental disorders

The metacognitive interventions identified - Metacognitive Therapy, Metacognitive Training, MIT, MERIT - align closely with the approaches used in adult populations with mental disorders.^{6,56,57,69–72} Virtual Environment Training has mainly targeted children and adolescents in educational contexts, focusing on social skills, self-regulation, and executive functioning in neurodevelopmental disorders,^{73,74} while in adults it has been applied for cognitive rehabilitation or enhancement, addressing attention, memory, and executive function in mild cognitive impairment, depression, and other neuropsychiatric conditions.^{75–79} Cog-Fun, originally developed for children,⁸⁰ has shown improvements in executive function, self-perception, and daily participation.^{81,82} Adaptations for adults with ADHD exist,⁸³ but they are not yet structured or widely implemented.

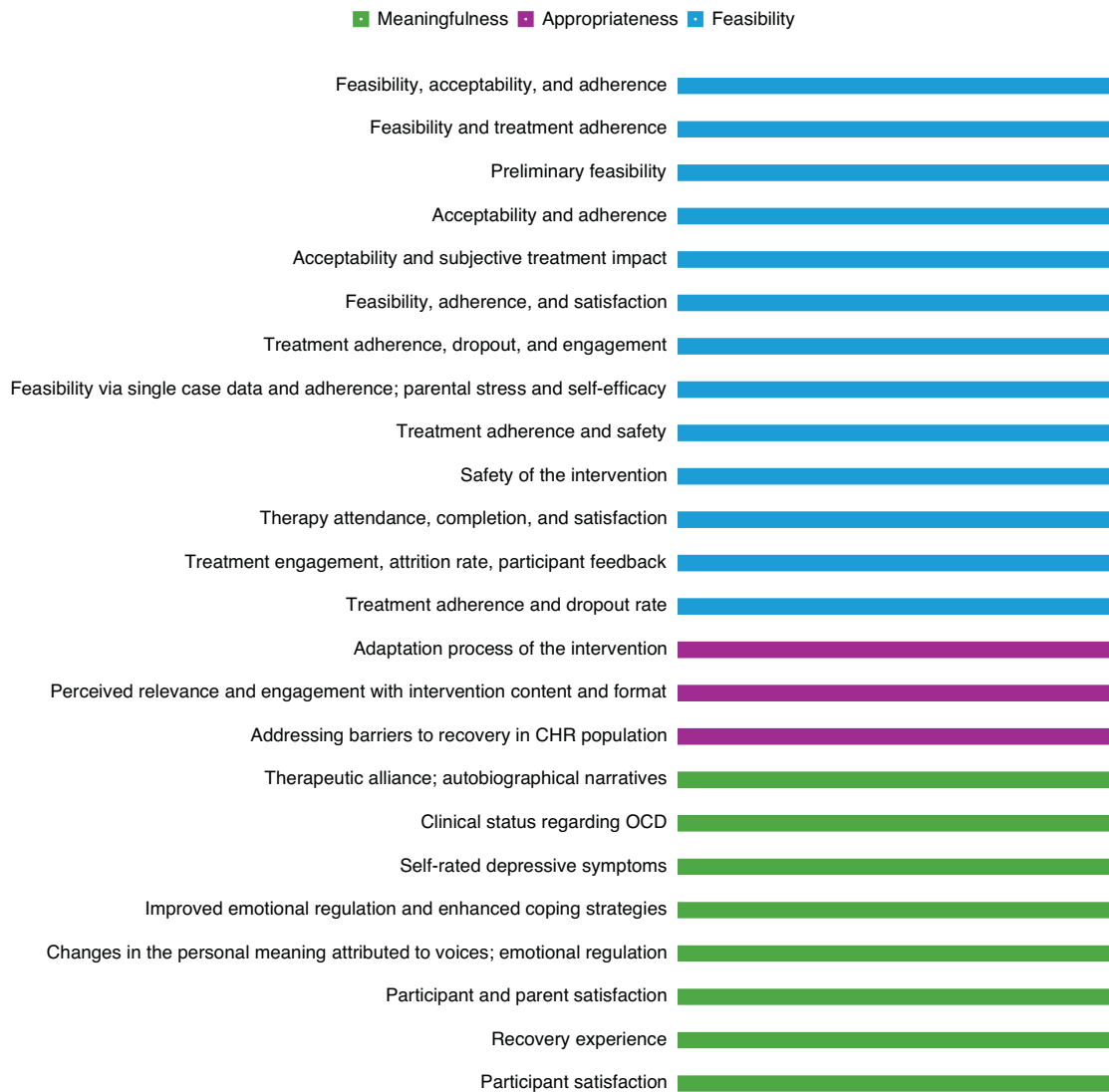


Fig. 2 Detailed reports outcomes by FAME category (Feasibility, Appropriateness, Meaningfulness).

Mental disorders targeted by metacognitive interventions

This review found anxiety (including GAD and SAD), and depressive disorders (including major depressive disorder) were the most frequently addressed adolescent diagnoses, consistent with epidemiological evidence of their prevalence in youth.^{84–87} Other diagnoses included psychotic disorders and schizophrenia, PD, OCD, bipolar disorder, ASD, ADHD, AN, and PTSD. Inclusion reflects clinical relevance and the growing recognition that early identification and intervention are crucial during adolescence, a developmental period marked by increased vulnerability to mental disorders onset.⁸⁸ Comparison with adult metacognitive intervention targets shows conceptual alignment and developmental distinctions. The most frequent adolescent conditions mirror those treated in adults,^{57,89} suggesting theoretical continuity through shared transdiagnostic features central to metacognitive models, such as the cognitive-attentional syndrome, characterised by worry, rumination, threat monitoring, and dysfunctional metacognitive beliefs.^{90,91} However, the inclusion of neurodevelopmental disorders (ADHD, ASD) represents a divergence from adult literature, where these conditions are less commonly addressed,⁹² possibly due to their early onset and the recognised role of metacognitive deficits in executive and social functioning.^{93,94} The inclusion of psychosis and PD, typically adult conditions, suggests a growing emphasis on early intervention,

supported by evidence that metacognitive impairments can be identified and modified during adolescence.^{95–97}

Characteristics of metacognitive interventions

Metacognitive interventions for adolescents show substantial variability in session number, frequency, and duration, reflecting developmental adaptations and clinical complexity. Generally, briefer protocols are observed in Metacognitive Therapy, typically comprising 6–12 weekly sessions lasting 30–90 minutes,^{34,37,46} closely mirroring adult protocols,^{98,99} and supporting the feasibility of brief formats in youth. Metacognitive Training, also brief and modular, comprises 4–21 weekly sessions of 45–60 minutes,^{38,41} with similar structures in adults,^{100,101} but greater variability in duration among adolescents.^{38,49} More intensive and longer-term interventions, such as MIT and MERIT, extend over months or years, with weekly sessions,^{35,40} paralleling adult treatments.^{102–104} Most interventions are delivered in outpatient clinical settings, primarily through individual or group face-to-face sessions, occasionally including family components.^{36,46} Although face-to-face delivery remains predominant, digital formats are emerging to enhance accessibility.^{49,105} This trend aligns with developments in adults, where face-to-face individual therapy continues to be standard,^{106,107} alongside group formats that provide peer support and shared experiences.^{108–111} Choosing



Fig. 3 Detailed reports outcomes by FAME category (Effectiveness).

between individual and group formats for adolescents involves trade-offs. Group approaches foster peer support, social skills, and cost-effectiveness³⁶ but may limit personalization and challenge socially anxious or low self-esteem adolescents.¹¹² Individual interventions allow for tailored, developmentally attuned work and stronger therapeutic alliance.³⁵ Format selection should balance efficiency with developmental and interpersonal needs. Family involvement, common in adolescent protocols, reflects developmental sensitivity often absent in adult interventions. Examples include joint sessions or parent workshops such as Metacognitive Therapy,^{36,45,46} MIT^{30,40} and Cog-Fun.⁴³ In adults, family participation is rare or optional. In adolescence, it supports engagement, generalising of metacognitive skills across environments, and addresses family dynamics that may reinforce maladaptive beliefs or behaviours.^{18,113} Thus, incorporating family components into adolescent metacognitive interventions not only reflects clinical innovation but also developmental appropriateness, potentially enhancing long-term outcomes by fostering a supportive and consistent change environment. Adult interventions occur in outpatient and inpatient settings, with the latter

reserved for severe conditions like psychosis and PD to manage acute symptoms and ensure safety.^{114,115} Adolescent metacognitive therapies mainly take place outpatient to reduce educational disruption and maintain family involvement.^{36,46}

Measuring outcomes and assessment tools used

This review suggests most adolescent studies prioritised feasibility, acceptability, adherence, and satisfaction, reflecting a field still in early development.¹¹⁶ In contrast, adult research on Metacognitive Therapy and Metacognitive Training demonstrates robust efficacy across anxiety, depression, psychosis, and OCD.^{53,56,70,117,118} Outcome measures varied considerably. Studies used metacognition-specific tools, particularly versions of MCQ and MAS-A. Instruments specifically designed for adolescents have only been available since the development of the MCQ-A in 2004.¹¹⁹ Adult trials typically employ repeated standardised assessments and process measures to examine mediators and mechanisms of change.^{91,120} Adolescent studies used validated symptom scales (RCADS, BDI, CDI, PANSS, CY-BOCS), and functional measures (SOFAS and HoNOSCA), but rarely assessed real-life functioning,

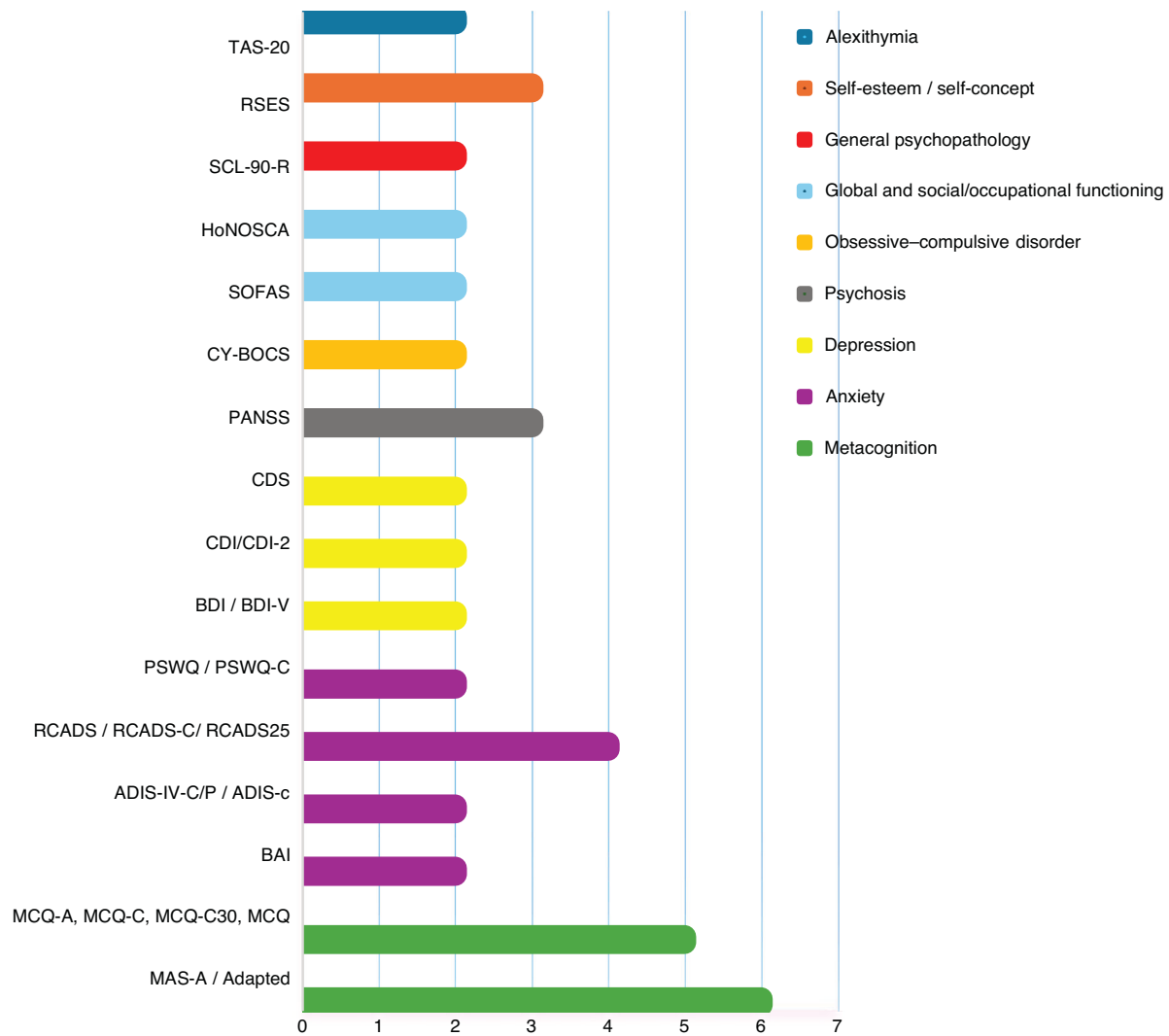


Fig. 4 Summary of assessment tools by outcome domain. TAS Toronto Alexithymia Scale, RSES Rosenberg Self-Esteem Scale, SCL-90-R Symptom Checklist-90-Revised, HoNOSCA Health of Nation Outcome Scale for Children and Adolescents, SOFAS Social and Occupational Functioning Assessment Scale, CY-BOCS Children's Yale-Brown Obsessive Compulsive Scale, PANSS Positive and Negative Syndrome Scale, CDS Calgary Depression Scale, CDI Children's Depression Inventory, BDI Beck Depression Inventory, PSWQ Penn State Worry Questionnaire, RCADS Revised Child Anxiety and Depression Scale, ADIS Anxiety Disorders Interview Schedule, BAI Beck Anxiety Inventory, MCQ Metacognitions Questionnaire, MAS Metacognition Assessment Scale

such as school engagement, peer relationships, or family functioning, key indicators of therapeutic success.¹²¹ Mediators like self-esteem, alexithymia, and insight were seldom examined, unlike in adult research, where these domains are studied more systematically.^{122–125}

LIMITATIONS

This scoping review has several limitations that should be acknowledged. First, 2 included articles were published in Persian and translated using automated tools. Although these provide high-quality translations, full accuracy and contextual nuance cannot be guaranteed, as no certified human translator was involved. Second, some studies had missing data regarding intervention characteristics. Attempts to contact corresponding authors for clarification were not always successful, limiting data completeness. Another key limitation concerns the absence of a consensual definition of “metacognitive intervention”. In this scoping review, we adopted a broader conceptualisation to include diverse approaches targeting metacognitive processes.

This contrasts with the narrower, clinically oriented definition proposed by Philipp et al.,^{6,26} which restricts the scope to psychotherapeutic interventions and excludes those addressing functional outcomes related to mental disorders. Our broader approach enabled the inclusion of 2 studies that would have been excluded under a more restrictive framework. Additionally, although the search strategies were subsequently peer-reviewed by an independent librarian and refined accordingly, this review occurred after the completion of the initial study selection and analysis process. While the revised searches were re-run in key databases and did not identify any additional eligible studies, it remains possible that the original search strategy may have been less sensitive than it could have been.

CONCLUSIONS

This scoping review mapped metacognitive interventions for adolescents with mental disorders. These interventions were mainly applied to anxiety disorders, followed by depressive disorder, psychosis, PD, OCD, ASD, ADHD, AN, emetophobia, and

PTSD. Interventions were delivered individually, in groups, or in combined formats, and some studies also included sessions for family members. All were conducted in outpatient clinical settings, predominantly face-to-face, and most were provided by clinical psychologists. Session number and duration varied by intervention type, though weekly delivery was typical. Because the included studies largely comprised case studies, pilot studies, and feasibility designs, their primary focus was on assessing acceptability, feasibility, and preliminary implementation rather than efficacy. Still, some studies reported improvements in metacognitive functioning, reductions in anxiety or depressive symptoms, and occasional diagnostic change. Correspondingly, outcome measures centred on metacognitive assessment tools, alongside instruments for anxiety and psychotic symptoms. Overall, metacognitive interventions demonstrated acceptability and feasibility for adolescents with mental disorders. Ensuring developmental appropriateness and responsiveness to adolescents' psychological and contextual needs remains essential for advancing research and clinical practice.

Implications for research

The findings of this scoping review highlight several important directions for future research. First, more rigorous studies, particularly randomised controlled trials, are needed to establish the effectiveness of metacognitive interventions for adolescents. Second, greater conceptual clarity regarding what qualifies as a metacognitive intervention is required to enable meaningful comparison across studies. Many studies also lacked sufficient detail when reporting intervention characteristics, underscoring the need for clearer and more consistent protocol descriptions to support replication. Family involvement and contextual factors, including school and community settings, warrant further investigation due to their potential impact on outcomes. Future research should also examine metacognitive interventions for conditions highly relevant in adolescence, such as substance use and disruptive, impulse-control, and conduct disorders. Finally, little attention has been given to adapting or delivering metacognitive interventions through online or digital formats, despite the growing relevance of remote and hybrid care models in adolescent mental health.

DATA AVAILABILITY

All data generated or analysed during this study are included in this published article [and its supplementary information files].

REFERENCES

- World Health Organization. Mental Health of Adolescents (World Health Organization, Geneva, 2021).
- World Health Organization. Guidelines on Mental Health Promotive and Preventive Interventions for Adolescents: Helping Adolescents Thrive (World Health Organization, Geneva, 2020).
- Gálvez-Lara, M. et al. Psychological Treatments for Mental Disorders in Children and Adolescents: A Review of the Evidence of Leading International Organizations. *Clin. Child Fam. Psychol. Rev.* **21**, 366–387 (2018).
- Flavell, J. Metacognition and cognitive monitoring: a new area of cognitive-developmental inquiry. *Am. Psychol.* **34**, 906–911 (1979).
- Rhodes, M. G. Metacognition. *Teach. Psychol.* **46**, 168–175 (2019).
- Philipp, R. et al. Effectiveness of metacognitive interventions for mental disorders in adults - A systematic review and meta-analysis (METACOG). *Clin. Psychol. Psychother.* **26**, 227–240 (2019).
- Moritz, S., Menon, M., Balzan, R. & Woodward, T. S. Metacognitive training for psychosis (MCT): past, present, and future. *Eur. Arch. Psychiatry Clin. Neurosci.* **273**, 811–817 (2023).
- Moritz, S. & Woodward, T. S. Metacognitive training in schizophrenia: from basic research to knowledge translation and intervention. *Curr. Opin. Psychiatry* **20**, 619–625 (2007b).
- Moritz, S. & Woodward, T. S. Metacognitive training for schizophrenia patients (MCT): A pilot study on feasibility, treatment adherence, and subjective efficacy. *Ger. J. Psychiatry* **10**, 69–78 (2007a).
- Wells, A. & Matthews, G. *Attention and Emotion*. (Psychology Press, Hove, UK, 2016).
- Lysaker, P. H. & Klion, R. E. *Recovery, Meaning-Making, and Severe Mental Illness* (Routledge, New York, 2017).
- Dimaggio, G. et al. Metacognitive Interpersonal Therapy for Personality Disorders: A Case Study Series. *J. Contemp. Psychother.* **47**, 11–21 (2017).
- Lumen Learning. Cognitive Development during Adolescence. Lumen Learning (2024).
- Platt, B., Kadosh, K. C. & Lau, J. Y. F. The Role of Peer Rejection in Adolescent Depression. *Depress Anxiety* **30**, 809–821 (2013).
- Dickson, H. et al. Trajectories of cognitive development during adolescence among youth at-risk for schizophrenia. *J. Child Psychol. Psychiatry* **59**, 1215–1224 (2018).
- Ellis, D. & Hudson, J. The Metacognitive Model of Generalized Anxiety Disorder in Children and Adolescents. *Clin. Child Fam. Psychol. Rev.* **13**, 151–163 (2010).
- Sicouri, G. et al. Cognitive bias modification of interpretations for anxiety and depression in children and adolescents: A meta-analysis. *JCPP Adv.* **4** (2024).
- Thingbak, A., Capobianco, L., Wells, A. & O'Toole, M. S. Relationships between metacognitive beliefs and anxiety and depression in children and adolescents: A meta-analysis. *J. Affect. Disord.* **361**, 36–50 (2024a).
- Peters, M. D. et al. Scoping reviews. In *JBIM Manual for Evidence Synthesis*. (JBI, Adelaide, Australia, 2024).
- Tricco, A. C. et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann. Intern. Med.* **169**, 467–473 (2018).
- Espírito Santo, A., Silva, R., Balzan, R., Pinho, L. G. & Sampaio, F. Metacognitive interventions for mental health disorders in adolescents: a scoping review protocol. *JBIM Evid. Synth.* **23**, 1257–1265 (2025).
- World Health Organization. *The ICD-10 Classification of Mental and Behavioural Disorders: clinical descriptions and diagnostic guidelines*. (World Health Organization, Geneva, 1992).
- World Health Organization. *International Classification of Diseases 11th Revision (ICD-11): The global standard for diagnostic health information*. (World Health Organization, Geneva, 2022).
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV*, 4th ed. (American Psychiatric Association, Washington, DC, 1994).
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*, 5th ed. (American Psychiatric Association, Washington, DC, 2014).
- Philipp, R., Kriston, L., Kühne, F., Härter, M. & Meister, R. Concepts of Metacognition in the Treatment of Patients with Mental Disorders. *J. Ration. Emot. Cogn. Behav. Ther.* **38**, 173–183 (2020).
- Page, M. J. et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* **71** (2021).
- Jordan, Z., Lockwood, C., Munn, Z. & Aromataris, E. The updated Joanna Briggs Institute Model of Evidence-Based Healthcare. *Int. J. Evid. Based Healthc.* **17**, 58–71 (2019).
- Pearson, A., Wiechula, R., Court, A. & Lockwood, C. The JBI model of evidence-based healthcare. *Int. J. Evid. Based Healthc.* **3**, 207–215 (2005).
- Inchausti, F. et al. Metacognitive interpersonal group therapy for adolescents with avoidant personality disorder: The case of Sofia. *J. Clin. Psychol.* **78**, 1579–1589 (2022).
- Leonhardt, B. L., Visco, A. C., Hamm, J. A. & Vohs, J. L. A Recovery-Oriented Approach: Application of Metacognitive Reflection and Insight Therapy (MERIT) for Youth with Clinical High Risk (CHR) for Psychosis. *Behav. Sci.* **14**, 325 (2024).
- Principe, E., Vincelli, F. & Capoderose, G. Terapia metacognitiva in un caso di Disturbo d'Ansia Generalizzata. *Psicoter. Cogn. Comport.* **22**, 215–228 (2016).
- Salvatore, G., Ottavi, P., Popolo, R. & Dimaggio, G. Metacognitive Interpersonal Therapy for Treating Auditory Verbal Hallucinations in First-onset Schizophrenia. *J. Contemp. Psychother.* **46**, 235–243 (2016).
- Simons, M. & Vloet, T. D. Emetophobia – A Metacognitive Therapeutic Approach for an Overlooked Disorder. *Z. Kinder Jugendpsychiatr. Psychother.* **46**, 57–66 (2018).
- Cheli, S., Chiarello, F. & Cavalletti, V. A Psychotherapy Oriented by Compassion and Metacognition for Schizoid Personality Disorder: A Two Cases Series. *J. Contemp. Psychother.* **53**, 61–70 (2023).
- Esbjörn, B. H., Normann, N. & Reinholdt-Dunne, M. L. Adapting Metacognitive Therapy to Children with Generalised Anxiety Disorder: Suggestions for a Manual. *J. Contemp. Psychother.* **45**, 159–166 (2015).
- Wells, A. & Sembi, S. Metacognitive therapy for PTSD: a preliminary investigation of a new brief treatment. *J. Behav. Ther. Exp. Psychiatry* **35**, 307–318 (2004).

38. Orcel, S. et al. Entrainement métacognitif en groupe chez des adolescents souffrant de psychose: étude de cas multiples. *Rev. Fr. de Clin. Comport. Cogn.* **18**, 6–19 (2013).
39. Goodman, L. R., Corkum, P. & Johnson, S. A. A metacognitive training pilot study for adolescents with autism spectrum disorder: Lessons learned from the preliminary stages of intervention development. *J. Intellect. Dev. Disabil.* **42**, 204–210 (2017).
40. Inchausti, F. et al. Recovery-Focused Metacognitive Interpersonal Therapy (MIT) for Adolescents with First-Episode Psychosis. *J. Contemp. Psychother.* **53**, 9–17 (2023).
41. Jaugey, L., Urben, S., Lambelet, F., Halfon, O. & Holzer, L. Metacognitive training for adolescents with psychosis: A multiple case study. *Early Interv. Psychiatry* **6**, 92–92 (2012).
42. Lamash, L. & Josman, N. A metacognitive intervention model to promote independence among individuals with autism spectrum disorder: Implementation on a shopping task in the community. *Neuropsychol. Rehabil.* **31**, 189–210 (2021).
43. Levanon-Erez, N., Kampf-Sherf, O. & Maeir, A. Occupational therapy metacognitive intervention for adolescents with ADHD: Teen Cognitive-Functional (Cog-Fun) feasibility study. *Br. J. Occup. Ther.* **82**, 618–629 (2019).
44. Popolo, R. et al. Metacognitive interpersonal therapy in group: A feasibility study. *Res. Psychother.: Psychopathol., Process Outcome* **21**, 155–163 (2018).
45. Reinholdt-Dunne, M. L., Tolstrup, M., Svenstrup, K., Hjemdal, O. & Nordahl, H. Group metacognitive therapy for pediatric obsessive-compulsive disorder: A pilot study. *J. Obsessive Compuls. Relat. Disord.* **43** (2024).
46. Thingbak, A., Wells, A. & O'Toole, M. S. Group metacognitive therapy for children and adolescents with anxiety and depression: A preliminary trial and test of proposed mechanisms. *J. Anxiety Disord.* **107**, (2024b).
47. Thorslund, J., McEvoy, P. M. & Anderson, R. A. Group metacognitive therapy for adolescents with anxiety and depressive disorders: A pilot study. *J. Clin. Psychol.* **76**, 625–645 (2020).
48. Akhouri, D. & Madiha, M. Efficacy of meta-cognitive therapy on adolescents with social anxiety disorder. *Indian J. Psychiatr. Soc. Work* **13**, 39–44 (2022).
49. Balzan, R. P., Gilder, M., Thompson, M. & Wade, T. D. A randomized controlled feasibility trial of metacognitive training with adolescents receiving treatment for anorexia nervosa. *Int. J. Eat. Disord.* **56**, 1820–1825 (2023).
50. Simons, M., Schneider, S. & Herpertz-Dahlmann, B. Metacognitive Therapy versus Exposure and Response Prevention for Pediatric Obsessive-Compulsive Disorder. *Psychother. Psychosom.* **75**, 257–264 (2006).
51. Marconi, E. et al. Outpatient care for adolescents' and young adults' mental health: promoting self- and others' understanding through a metacognitive interpersonal therapy-informed psychological intervention. *Front. Psychiatry* **14**, (2023).
52. Dimaggio, G., Carabelli, P., Buonocore, L., Popolo, R. & Salvatore, G. Promuovere le Narrazioni Autobiografiche e le abilità Metacognitive nella Terapia Metacognitiva Interpersonale dei Disturbi di Personalità. *Psichiatri. Psicoter.* **32**, 303–315 (2013).
53. Eichner, C. & Berna, F. Acceptance and Efficacy of Metacognitive Training (MCT) on Positive Symptoms and Delusions in Patients With Schizophrenia: A Meta-analysis Taking Into Account Important Moderators. *Schizophr. Bull.* **42**, 952–962 (2016).
54. Liu, Y., Tang, C., Hung, T., Tsai, P. & Lin, M. The Efficacy of Metacognitive Training for Delusions in Patients With Schizophrenia: A Meta-Analysis of Randomized Controlled Trials Informs Evidence-Based Practice. *Worldviews Evid. Based Nurs.* **15**, 130–139 (2018).
55. Moritz, S. et al. Sowing the seeds of doubt: a narrative review on metacognitive training in schizophrenia. *Clin. Psychol. Rev.* **34**, 358–366 (2014).
56. Normann, N., van Emmerik, A. A. P. & Morina, N. The Efficacy of Metacognitive Therapy for Anxiety and Depression: a Meta-analytic Review. *Depress Anxiety* **31**, 402–411 (2014).
57. Normann, N. & Morina, N. The Efficacy of Metacognitive Therapy: A Systematic Review and Meta-Analysis. *Front. Psychol.* **9**, (2018).
58. Wells, A. Advances in Metacognitive Therapy. *Int. J. Cogn. Ther.* **6**, 186–201 (2013).
59. Simons, M. & Kursawe, A.-L. Metacognitive Therapy for Posttraumatic Stress Disorder in Youth: A Feasibility Study. *Front. Psychol.* **10**, (2019).
60. Wells, A. et al. Youth Metacognitive Therapy (YoMeta): protocol for a single-blind randomised feasibility trial of a transdiagnostic intervention versus treatment as usual in 11–16-year-olds with common mental health problems. *Pilot Feasibility Stud.* **8**, 207 (2022).
61. Blakemore, S.-J. Adolescence and mental health. *Lancet* **393**, 2030–2031 (2019).
62. Dimaggio, G., Montano, A., Popolo, R. & Salvatore, G. *Metacognitive Interpersonal Therapy for Personality Disorders A treatment manual*. 1st ed. (Routledge, 2015).
63. Craig, P. et al. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ* **337**, a1655 (2008).
64. Craig, P. et al. Developing and evaluating complex interventions: The new Medical Research Council guidance. *Int. J. Nurs. Stud.* **50**, 587–592 (2013).
65. Skivington, K. et al. A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ* **374**, n2061 (2021).
66. Thabane, L. et al. A tutorial on pilot studies: the what, why and how. *BMC Med. Res. Methodol.* **10**, 1 (2010).
67. Askari, G., Vajdi, M., Jafari-Nasab, S. & Golpour-Hamedani, S. Ethical guidelines for human research on children and adolescents: A narrative review study. *J. Res. Med. Sci.* **29**, (2024).
68. Hoop, J. G., Smyth, A. C. & Roberts, L. W. Ethical Issues in Psychiatric Research on Children and Adolescents. *Child Adolesc. Psychiatr. Clin. N. Am.* **17**, 127–148 (2008).
69. Jun, S., Miao, D. & Ying, J. A Systematic Review and Meta-Analysis on Effect of Metacognitive Training on Cognitive Biases in Patients With Schizophrenia: Implications for Psychiatric Nursing Care. *Early Interv. Psychiatry* **19**, (2025).
70. Meinhardt, A. et al. Metacognitive training for psychosis (MCT): a systematic meta-review of its effectiveness. *Transl. Psychiatry* **15**, 156 (2025).
71. Pankowski, D. & Kowalski, J. & Gawęda, Ł. The effectiveness of metacognitive training for patients with schizophrenia: a narrative systematic review of studies published between 2009 and 2015. *Psychiat. Pol.* **50**, 787–803 (2016).
72. Sadeghi, R., Mokhber, N., Mahmoudi, L., Asgharipour, N. & Seyfi, H. A systematic review and meta-analysis on controlled treatment trials of metacognitive therapy for anxiety disorders. *J. Res. Med. Sci.* **20**, 901 (2015).
73. Arts, E., De Castro, B. O., Luteijn, E., Elsendoorn, B. & Vissers, C. T. Interactive virtual reality training to improve socio-emotional functioning in adolescents with developmental language disorders: A feasibility study. *Clin. Child Psychol. Psychiatry* **29**, 1100–1120 (2024).
74. Parsons, S. & Cobb, S. State-of-the-art of virtual reality technologies for children on the autism spectrum. *Eur. J. Spec. Needs Educ.* **26**, 355–366 (2011).
75. Kim, S. et al. Effectiveness of group metacognitive training and cognitive-behavioural therapy in a transdiagnostic manner for young patients with psychotic and non-psychotic disorders. *Early Interv. Psychiatry* **17**, 29–38 (2023).
76. Kourtesis, P. et al. Virtual Reality Training of Social Skills in Adults with Autism Spectrum Disorder: An Examination of Acceptability, Usability, User Experience, Social Skills, and Executive Functions. *Behav. Sci.* **13**, 336 (2023).
77. Lyu, S. et al. Effects of virtual reality-based cognitive training for adolescents with depressive episodes: A pilot randomized controlled study. *Psychiatry Res* **340**, 116144 (2024).
78. Primavera, D. et al. Virtual Reality Cognitive Remediation in Older Adults with Bipolar Disorder: The Effects on Cognitive Performance and Depression in a Feasibility Randomized Controlled Trial. *Healthcare* **12**, 1753 (2024).
79. Romero-Ayuso, D. et al. Effectiveness of Virtual Reality-Based Interventions for Children and Adolescents with ADHD: A Systematic Review and Meta-Analysis. *Children* **8**, 70 (2021).
80. Hahn-Markowitz, J., Manor, I. & Maeir, A. Effectiveness of Cognitive-Functional (Cog-Fun) Intervention With Children With Attention Deficit Hyperactivity Disorder: A Pilot Study. *Am. J. Occup. Ther.* **65**, 384–392 (2011).
81. Hahn-Markowitz, J., Berger, I., Manor, I. & Maeir, A. Impact of the Cognitive-Functional (Cog-Fun) Intervention on Executive Functions and Participation Among Children With Attention Deficit Hyperactivity Disorder: A Randomized Controlled Trial. *Am. J. Occup. Ther.* **71** (2017).
82. Maeir, A. et al. Effectiveness of Cognitive-Functional (Cog-Fun) Occupational Therapy Intervention for Young Children With Attention Deficit Hyperactivity Disorder: A Controlled Study. *Am. J. Occup. Ther.* **68**, 260–267 (2014).
83. Kastner, L., Velder-Shukrun, Y., Bonne, O., Bar-Ilan, R. T. & Maeir, A. Pilot Study of the Cognitive-Functional Intervention for Adults (Cog-Fun A): A Metacognitive-Functional Tool for Adults With Attention Deficit Hyperactivity Disorder. *Am. J. Occup. Ther.* **76** (2022).
84. Liu, Y. et al. Global burden of mental disorders in children and adolescents before and during the COVID-19 pandemic: evidence from the Global Burden of Disease Study 2021. *Psychol. Med.* **55**, e90 (2025).
85. Piao, J. et al. Alarming changes in the global burden of mental disorders in children and adolescents from 1990 to 2019: a systematic analysis for the Global Burden of Disease study. *Eur. Child Adolesc. Psychiatry* **31**, 1827–1845 (2022).
86. Polanczyk, G. V., Salum, G. A., Sugaya, L. S., Caye, A. & Rohde, L. A. Annual Research Review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *J. Child Psychol. Psychiatry* **56**, 345–365 (2015).

87. Shorey, S., Ng, E. D. & Wong, C. H. J. Global prevalence of depression and elevated depressive symptoms among adolescents: A systematic review and meta-analysis. *Br. J. Clin. Psychol.* **61**, 287–305 (2022).
88. Paus, T., Keshavan, M. & Giedd, J. N. Why do many psychiatric disorders emerge during adolescence? *Nat. Rev. Neurosci.* **9**, 947–957 (2008).
89. Zanini, C. et al. Assessing the efficacy of metacognitive therapy as monotherapy or adjunctive treatment in patient suffering from major depression and dysthymia: A comprehensive review of clinical trials. *J. Affect. Disord.* **371**, 333–343 (2025).
90. Wells, A. *Emotional Disorders and Metacognition*. Wiley (2002).
91. Wells, A. Metacognitive therapy for anxiety and depression. Guilford Press (2009).
92. Carpenter, K. L. & Williams, D. M. A meta-analysis and critical review of metacognitive accuracy in autism. *Autism* **27**, 512–525 (2023).
93. Ayano, G., Demelash, S., Gizachew, Y., Tsegay, L. & Alati, R. The global prevalence of attention deficit hyperactivity disorder in children and adolescents: An umbrella review of meta-analyses. *J. Affect. Disord.* **339**, 860–866 (2023).
94. Lai, M.-C. & Lombardo, M. V. & Baron-Cohen, S. Autism. *Lancet* **383**, 896–910 (2014).
95. Lysaker, P. H. et al. Metacognitive Deficits Predict Impaired Insight in Schizophrenia Across Symptom Profiles: A Latent Class Analysis. *Schizophr. Bull.* **45**, 48–56 (2019).
96. Parker, S. K., Mulligan, L. D., Milner, P., Bowe, S. & Palmier-Claus, J. E. Metacognitive Therapy for Individuals at High Risk of Developing Psychosis: A Pilot Study. *Front. Psychol.* **10**, (2020).
97. Sharp, C. & Wall, K. Personality pathology grows up: adolescence as a sensitive period. *Curr. Opin. Psychol.* **21**, 111–116 (2018).
98. Nordahl, J., Hjemdal, O., Johnson, S. U. & Nordahl, H. M. Metacognitive Therapy Versus Exposure-Based Treatments of Posttraumatic Stress Disorder: A Preliminary Comparative Trial in an Ordinary Clinical Practice. *Int. J. Cogn. Ther.* **17**, 685–699 (2024).
99. Wells, A. et al. A pilot randomized trial of metacognitive therapy vs applied relaxation in the treatment of adults with generalized anxiety disorder. *Behav. Res. Ther.* **48**, 429–434 (2010).
100. Aghotor, J., Pfueller, U., Moritz, S., Weisbrod, M. & Roesch-Ely, D. Metacognitive training for patients with schizophrenia (MCT): Feasibility and preliminary evidence for its efficacy. *J. Behav. Ther. Exp. Psychiatry* **41**, 207–211 (2010).
101. Moritz, S., Dietrichkeit, M., Schmueser, A., Hagemann-Goebel, M. & Jelinek, L. Metacognitive Training for Depression (D-MCT) compared to computerized cognitive remediation in outpatient care: A randomized controlled trial. *J. Affect. Disord.* **373**, 175–183 (2025).
102. Dimaggio, G. & Attinà, G. Metacognitive Interpersonal Therapy for Narcissistic Personality Disorder and Associated Perfectionism. *J. Clin. Psychol.* **68**, 922–934 (2012).
103. Musket, C. W. et al. Group-Based Metacognitive Reflection and Insight Therapy (MERITg) and Its Relationship to Recovery-Oriented Beliefs in Serious Mental Illness. *Behav. Sci.* **14**, 520 (2024).
104. Vohs, J. L. et al. Metacognitive Reflection and Insight Therapy for Early Psychosis: A preliminary study of a novel integrative psychotherapy. *Schizophr. Res.* **195**, 428–433 (2018).
105. Mazza, S. et al. Online Group Metacognitive Therapy for Repetitive Negative Thinking: A Pilot Study. *Behav. Ther.* **56**, 1041–1054 (2025).
106. Vitzthum, F. B., Veckenstedt, R. & Moritz, S. Individualized Metacognitive Therapy Program for Patients with Psychosis (MCT +): Introduction of a Novel Approach for Psychotic Symptoms. *Behav. Cogn. Psychother.* **42**, 105–110 (2014).
107. Wells, A. et al. Metacognitive therapy in treatment-resistant depression: A platform trial. *Behav. Res. Ther.* **50**, 367–373 (2012).
108. Dammen, T. & da, A. An open trial of group metacognitive therapy for depression in Norway. *Nord. J. Psychiatry* **69**, 126–131 (2015).
109. Papageorgiou, C. & Wells, A. Group Metacognitive Therapy for Severe Anti-depressant and CBT Resistant Depression: A Baseline-Controlled Trial. *Cogn. Ther. Res.* **39**, 14–22 (2015).
110. Schilling, L., Moritz, S., Kriston, L., Krieger, M. & Nagel, M. Efficacy of metacognitive training for patients with borderline personality disorder: Preliminary results. *Psychiatry Res* **262**, 459–464 (2018).
111. Schneider, B. C. et al. Negative cognitive beliefs, positive metacognitive beliefs, and rumination as mediators of metacognitive training for depression in older adults (MCT-Silver). *Front. Psychol.* **14**, (2023).
112. Beesdo, K., Knappe, S. & Pine, D. S. Anxiety and Anxiety Disorders in Children and Adolescents: Developmental Issues and Implications for DSM-V. *Psychiatr. Clin. N. Am.* **32**, 483–524.b (2009).
113. Laird, R. & Kuhn, E. Family support programs and adolescent mental health: review of evidence. *Adolesc. Health Med. Ther.* **5**, 127–142 (2014).
114. Cohen-Chazani, Y., Lysaker, P. H., Roe, D. & Hasson-Ohayon, I. Metacognitive reflection and insight therapy in an inpatient setting: Transforming messianism to a coherent mission. *J. Clin. Psychol.* **77**, 1836–1850 (2021).
115. Fischer, R. et al. Metacognitive training in the acute psychiatric care setting: feasibility, acceptability, and safety. *Front. Psychol.* **14**, (2023).
116. Bowen, D. J. et al. How We Design Feasibility Studies. *Am. J. Prev. Med.* **36**, 452–457 (2009).
117. Melchior, K., Franken, I., Deen, M. & van der Heiden, C. Metacognitive therapy versus exposure and response prevention for obsessive-compulsive disorder: Study protocol for a randomized controlled trial. *Trials* **20**, (2019).
118. Melchior, K., van der Heiden, C., Deen, M., Mayer, B. & Franken, I. H. A. The effectiveness of metacognitive therapy in comparison to exposure and response prevention for obsessive-compulsive disorder: A randomized controlled trial. *J. Obsessive-Compuls. Relat. Disord.* **36**, 100780 (2023).
119. Cartwright-Hatton, S. et al. Development and preliminary validation of the Metacognitions Questionnaire-Adolescent Version. *J. Anxiety Disord.* **18**, 411–422 (2004).
120. Morrison, A. P. et al. Cognitive therapy for people with schizophrenia spectrum disorders not taking antipsychotic drugs: a single-blind randomised controlled trial. *Lancet* **383**, 1395–1403 (2014).
121. Weisz, J. R. et al. What five decades of research tells us about the effects of youth psychological therapy: A multilevel meta-analysis and implications for science and practice. *Am. Psychol.* **72**, 79–117 (2017).
122. Farahmand, V., Hassanzadeh, R., Mirzaian, B., Fayyazi Bordbar, M. R. & Feizi, J. The efficacy of group metacognitive therapy on self-esteem and mental health of patients suffering from major depressive disorder. *Iran. J. Psychiatry Behav. Sci.* **8**, 4–10 (2014).
123. Hjemdal, O. et al. A Randomized controlled trial of metacognitive therapy for depression: analysis of 1-year follow-up. *Front. Psychol.* **10**, (2019).
124. Lopez-Morinigo, J. D. et al. Can metacognitive interventions improve insight in schizophrenia spectrum disorders? A systematic review and meta-analysis. *Psychol. Med.* **50**, 2289–2301 (2020).
125. Lopez-Morinigo, J. D. et al. S.41. Randomised controlled trial of metacognitive training compared with psychoeducation in patients with schizophrenia spectrum disorders: effects on insight. *Schizophr. Bull.* **46**, S47–S48 (2020).

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AUTHOR CONTRIBUTIONS

Conceptualisation: AES; Methodology: AES, RS, FS, LGP; Investigation: AES, JM, LGP; Writing - original draft preparation: AES; Writing - review and editing: AES, JM, RS, RB, FS, LGP; Visualisation: AES, JM, RS, RB, FS, LGP; Supervision: FS, RS and LGP. Funding acquisition: AES, RB. All authors read and approved the final manuscript.

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COMPETING INTERESTS

RB has developed one of the metacognitive interventions evaluated in one of the studies included in this scoping review. The other authors declare no conflicts of interest.

ETHICS

The current study used publicly available data and therefore was exempt from ethics approval or written informed consent procedures.

ADDITIONAL INFORMATION

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