EUROPEAN JOURNAL OF PSYCHOTRAUMATOLOGY
2025, VOL. 16, NO. 1, 2508548
https://doi.org/10.1080/20008066.2025.2508548

STUDY PROTOCOL

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Efficacy of psychosocial interventions on social functioning in individuals with childhood maltreatment experiences: a protocol for a systematic review and network meta-analysis

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ABSTRACT

Background: Several psychosocial interventions have shown promising effects in treating people affected by childhood maltreatment (CM); however, their comparative efficacy on social functioning remains largely unknown. To address this issue, a systematic review and network meta-analysis (NMA) will be conducted to investigate the comparative efficacy of different psychosocial interventions on global social functioning and specific domains of social functioning, including behavioural, emotional, cognitive and physiological processes. We aim to develop a hierarchical ranking of existing psychosocial interventions concerning their efficacy and acceptability which could inform treatment guidelines.

Methods: Randomised controlled trials (RCTs) investigating psychosocial interventions for individuals with exposure to CM when they were younger than age 18 will be included. Primary outcomes will be global and domains of social functioning (measured up to 3, 6, 12 months and at the longest follow-up). Study drop-out will be a secondary outcome that will serve as a measure of acceptability. Study selection and data extraction will be performed by at least two independent reviewers. We will assess the risk of bias for each study using the Cochrane Risk of Bias tool 2 (RoB2) and evaluate the confidence in the results using Confidence in Network Meta-Analysis (CINeMA). The effects of potential moderators, such as age (children/adolescents *vs.* adults), population type (clinical *vs.* non-clinical samples), or sex (% males), socioeconomic status (low-income *vs.* middle-high-income countries), and intervention characteristics (individual *vs.* group training, number of sessions) will be analysed using subgroup-analyses or meta-regressions. Other candidate moderators/mediators (personality, post-traumatic symptoms, brain structure/function, cognitive reserve) will also be explored and narratively summarised. Sensitivity analyses will be conducted to explore further heterogeneity and assess the robustness of our findings.

Discussion: This systematic review and NMA aims to compare multiple existing psychosocial interventions in individuals affected by CM and establish the relative rankings of these interventions for social functioning. Our results may provide practical guidance concerning the most effective psychosocial interventions to reduce the societal burden associated with CM.

Protocol registration: PROSPERO CRD42022347034.

Eficacia de las intervenciones psicosociales en el funcionamiento social de personas con experiencias de maltrato infantil: protocolo para una revisión sistemática y metaanálisis en red

Antecedentes: Diversas intervenciones psicosociales han demostrado efectos prometedores en el tratamiento de personas afectadas por el maltrato infantil (MI); sin embargo, su

ARTICLE HISTORY

Received 14 January 2025
Revised 28 April 2025
Accepted 12 May 2025

KEYWORDS

Childhood trauma; social behaviour; social cognition; PTSD; depression; treatment; mental healthcare; psychotherapy; trauma-focused CBT; meta-analytic evidence

PALABRAS CLAVE

Trauma infantil; conducta social; cognición social; TEPT; depresión; tratamiento; atención en salud mental; psicoterapia; TCC centrada en el trauma; metaanálisis en red

HIGHLIGHTS

- We seek to summarise existing literature on the efficacy of psychosocial interventions for individuals with child maltreatment histories.
- We will further determine the comparative efficacy of different psychosocial interventions on social functioning, as well as their acceptability.
- The resulting synthesis could enhance our understanding and may provide practical guidance concerning the most

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Supplemental data for this article can be accessed online at https://doi.org/10.1080/20008066.2025.2508548.

eficacia comparativa en el funcionamiento social sigue siendo en gran medida desconocida. Para abordar esta cuestión, se llevará a cabo una revisión sistemática y un metaanálisis en red (NMA, por sus siglas en inglés) con el fin de investigar la eficacia comparativa de diferentes intervenciones psicosociales sobre el funcionamiento social global y en dominios específicos del mismo, incluyendo procesos conductuales, emocionales, cognitivos y fisiológicos. Nuestro objetivo es desarrollar un ranking jerárquico de las intervenciones psicosociales existentes en función de su eficacia y aceptabilidad, lo cual podría orientar futuras guías clínicas.

Métodos: Se incluirán ensayos controlados aleatorizados (RCTs, por sus siglas en inglés) que investiguen intervenciones psicosociales en personas expuestas a MI antes de los 18 años. Los resultados primarios serán el funcionamiento social global y sus dominios (medidos hasta los 3, 6 y 12 meses, así como en el seguimiento más prolongado disponible). El abandono del estudio será un resultado secundario que se utilizará como medida de aceptabilidad. La selección de estudios y extracción de datos será realizada por al menos dos revisores independientes. Se evaluará el riesgo de sesgo de cada estudio utilizando la herramienta Cochrane de Riesgo de Sesgo 2 (RoB2, por sus siglas en inglés), y se evaluará la confianza en los resultados mediante *Confidence in Network Meta-Analysis* (CINeMA, instrumento que evalúa la confianza de metaanálisis en red). Se analizarán los efectos de moderadores potenciales, como la edad (niños/adolescentes vs. adultos), el tipo de población (muestras clínicas vs. no clínicas), el sexo (% hombres), el nivel socioeconómico (países de bajos vs. medianos-altos ingresos), y características de la intervención (individual vs. grupal, número de sesiones) a través de análisis de subgrupos o metarregresiones. También se explorarán otros moderadores/mediadores potenciales (personalidad, síntomas postraumáticos, estructura/función cerebral, reserva cognitiva), los cuales se resumirán de forma narrativa. Se realizarán análisis de sensibilidad para explorar más a fondo la heterogeneidad y evaluar la solidez de los hallazgos.

Discusión: Esta revisión sistemática y NMA tiene como objetivo comparar múltiples intervenciones psicosociales existentes en personas afectadas por MI y establecer un ranking relativo de estas intervenciones en relación con el funcionamiento social. Nuestros resultados podrían ofrecer una guía práctica sobre las intervenciones psicosociales más eficaces para reducir la carga social asociada al MI.

Registro del protocolo: PROSPERO CRD42022347034.

effective psychosocial interventions to improve well-being and social functioning in those affected by CM.

Abbreviations: **CBT**: Cognitive Behavioural Therapy; **CI**: Confidence Interval; **CINeMA**: Confidence in Network Meta-Analysis; **CM**: Childhood maltreatment; **CTQ**: Childhood Trauma Questionnaire; **GAF**: Global Assessment of Functioning; **GRADE**: Grading of Recommendations, Assessment, Development and Evaluation; **EVST**: Emotional Visual Search Task; **ITT**: Intention to treat; **LOCF**: Last observation carried forward; **MMRM**: Mixed models of repeated measurement; **NMA**: Network meta-analysis; **OR**: Odds ratio; **PPS**: Psychosocial Performance Scale; **PRISMA**: Preferred Reporting Items of Systematic Reviews and Meta-Analyses for Systematic; **PTSD**: Post-traumatic stress disorder; **PRISMA-P**: Preferred Reporting Items for Systematic review and Meta-Analysis Protocols; **PROSPERO**: International Prospective Register of Systematic Reviews; **QoL**: Quality of life; **RCT**: Randomised controlled trial; **RoB**: Risk of Bias; **SAS-SR**: Social Adjustment Scale-Self Report; **SD**: Standard deviation; **SE**: Standard error; **SIDE**: Separating indirect evidence from direct evidence; **SMD**: Standardised mean difference; **SOFAS**: Social and Occupational Functioning Assessment Scale; **TAU**: Treatment as usual; WL: Waiting list or wait-list

1. Introduction

Childhood maltreatment (CM) is a robust risk factor for physical and mental health conditions across the life course (Hughes et al., 2017; McKay et al., 2021). CM includes physical, emotional, and/or sexual abuse and/or physical or emotional neglect, and intimate partner or domestic violence, and bullying exposure before the age of 18 years (Cowley et al., 2025; Fares-Otero & Seedat, 2024). Furthermore, evidence highlights associations between CM and impairments in social functioning in both non-clinical (Pfaltz et al., 2022) and clinical populations (Fares-Otero, Alameda, et al., 2023; Fares-Otero, De Prisco, et al., 2023). However, social functioning domains vary widely and not all individuals affected by CM experience the same level or range of improvement in social functioning with treatment (McCrory et al., 2022). There is, therefore, a need to investigate the efficacy (i.e. the potential benefits under ideal and highly controlled conditions) of psychosocial interventions on global and specific domains of social functioning in those with CM exposure.

Impairments in social functioning in individuals with CM experiences are present across the lifespan leading to mental health problems, poorer daily functioning and quality of life (QoL) (Lo et al., 2021; Tzouvara et al., 2023). Social functioning refers to: (1) global/overall functioning in any social setting or role and broader aspects of social functioning such as social support or loneliness, which are known to be strong predictors of mental and physical health (Holt-Lunstad, 2024); (2) socially relevant behavioural, emotional, cognitive and/or physiological

processes, which are narrower and might underlie and/or maintain impaired social functioning, encompassing how individuals behave, feel, think, and how bodies react within social contexts. These processes include behavioural aspects like social skills and interactions during daily work or leisure-related activities with family members, colleagues, friends, and partners in social and/or vocational contexts (Sun et al., 2025), emotional experiences like empathy, social cognition and theory of mind (Schurz et al., 2021), and physiological responses like heart rate changes in social situations (Oskarsson et al., 2024).

Given the substantial individual, societal, and economic costs of CM (Bellis et al., 2019; Gilbert et al., 2009; Grummitt et al., 2024), improving social functioning in the context of CM by identifying modifiable mechanisms is relevant not only for an individual's personal health and well-being, but also from a public health perspective, i.e. through informing communities and raising awareness of CM, and for a thriving economy. Effective and acceptable psychosocial interventions targeting social functioning in those affected by CM is an imperative (Pfaltz et al., 2022). Knowledge of the psychosocial interventions that are most efficacious in improving social functioning can inform treatment planning and resource allocation.

Several psychosocial interventions have shown promising effects on social functioning in those affected by CM (Pfaltz et al., 2022); although no one specific treatment is favoured over others and their comparative efficacy remains largely unknown. Trauma-focused psychological interventions, e.g. cognitive behavioural therapy (CBT), are perceived as first-line treatments for individuals with trauma exposure, including CM (Thielemann et al., 2022), with the main focus being on trauma symptoms in those with post-traumatic stress disorder (PTSD) and (complex) PTSD (Coventry et al., 2020; Hoppen et al., 2024; Karatzias et al., 2019). There is still an ongoing debate about the comparative efficacy of different types of psychosocial treatments specifically for those affected by CM (Goerigk et al., 2024; Macdonald et al., 2016).

To date, no meta-analysis has been conducted on the efficacy of psychosocial interventions on social functioning for individuals with CM exposure. Evidence for psychosocial interventions for mental disorders and symptoms (depression, PTSD, anxiety symptoms and behaviour) in individuals with CM, previously synthesised in systematic reviews, indicates that the most effective interventions are CBT and Exposure Therapy for youth with broader experiences of violence (Lindert et al., 2020) or sexual abused children (Macdonald et al., 2012; McTavish et al., 2021), and Dialectical Behavioural Therapy for adults who have been sexually abused during childhood (Sousa-Gomes et al., 2024).

Two recent pairwise meta-analyses examined single psychosocial interventions. Bergsund et al. examined relationship-based interventions for maltreated children and adolescents and found large improvements in observed parent interactive behaviour and smaller improvements in child attachment, and child interactive behaviour. The effect on parent interactive behaviour was larger in interventions addressing middle childhood (Bergsund et al., 2023). Allen et al. examined family focused interventions addressing parental domestic violence and abuse, mental ill-health and substance misuse in combination, highlighting the distinct lack of evidence for, and no 'best bet', family focused interventions targeting these often-clustered risks (Allen et al., 2022).

Despite the fact that these meta-analyses converge on interventions for CM, they differ in aims and scope, methodological approach, population, types of CM and outcomes, and the trials that were included. They also do not directly answer the question of whether one type of psychosocial intervention modality is more effective in CM compared to others on social functioning as there are very few trials that compare two or more treatment types directly. Long-term social functioning has also not yet been examined.

Furthermore, analyses of potential moderating factors, e.g. age, sex/gender (Fares-Otero, Schäfer, et al., 2025), country/region, mental condition (Fares-Otero, Sharp, et al., 2024) or mediating factors, e.g. personality traits, post-traumatic symptoms, brain structure/function, cognitive reserve (Fares-Otero, Borràs, et al., 2025; Fares-Otero, Verdolini, et al., 2024) have seldom been undertaken. We also have limited understanding of what elements of social functioning are most responsive to interventions among those exposed to CM. For example, some questions to be addressed are the number of treatment sessions, or whether processes related to social functioning should be worked in the form of group training and/or whether such processes can also be changed individually, e.g. through establishing a positive relationship with the therapist or by working on maladaptive relational schemas.

Network meta-analysis (NMA) is a useful method to enhance the application of evidence-based medicine and facilitate clinical or policy decision-making. Some benefits of NMA are that it summarises all the evidence for multiple comparisons, identifies research gaps, allows the estimation of indirect evidence when no direct evidence exists, and when it exists, NMA may provide more precise results. NMA primarily relies on randomised controlled trials (RCTs) because RCTs offer the strongest evidence for causal relationships between interventions and outcomes. The randomisation process in RCTs helps minimise bias, ensuring that groups being compared are as similar as possible before treatment, leading to more

reliable relative treatment effect estimates. NMA is therefore a powerful approach for a comprehensive synthesis of all randomised evidence focusing on this particular population, and a better approach than conventional meta-analyses as it utilises rank ordering of the selected interventions (Florez et al., 2024; Rouse et al., 2017).

Only one prior NMA has been carried out to compare the effectiveness of psychological interventions for treating the psychological consequences of sexual abuse in children and adolescents (Caro et al., 2023) and found weak evidence that both Child Centred Therapy (delivered to child and carer) and CBT (delivered to the child) might reduce PTSD symptoms at post-treatment. There was no clear evidence of an effect of any therapy relative to management as usual for other primary outcomes or at any other time point. NMA was possible for measures of psychological distress and behaviour, but not for social functioning. Weaknesses in the evidence base included the dearth of evidence from low- and middle-income countries. The efficacy of psychosocial interventions compared to control conditions, such as treatment/care/management as usual (TAU) or wait-list (WL), and the question of differential intervention effects on social functioning (overall and domains) in those with CM, therefore, remain unclear.

Consequently, to address these research gaps, the goal of this systematic review and NMA is to synthesise the relative efficacy of all available psychosocial interventions in a single analysis of RCTs and elucidate their comparative efficacy on social functioning in individuals exposed to CM. We aim to combine both direct and indirect evidence to create effect estimates, even for treatments that have never been directly compared in a trial. Furthermore, we will examine treatment effects on global and multiple social functioning domains as primary outcomes, study drop-out as a secondary outcome and measure of acceptability, and also examine moderating or mediating factors that may influence/modify or explain the efficacy of psychosocial interventions on social functioning in those with CM.

2. Methods

2.1. Protocol and registration

This protocol followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline (Page et al., 2021), the Preferred Reporting Items for Systematic review and Meta-Analysis Protocols (PRISMA-P) statement, and PRISMA-NMA extension for conducting and reporting this systematic review and NMA (Hutton et al., 2015). Appendix 1 provides the PRISMA-P checklist. This protocol was registered in PROSPERO (CRD42022347034).

2.2. Study questions

1. Which psychosocial intervention is most effective in addressing social functioning in individuals with CM exposure?
2. How does the efficacy of psychosocial interventions to improve social functioning compare to no psychosocial intervention, e.g. TAU or WL control and/or to other psychosocial intervention?
3. Which psychosocial intervention is most acceptable in the treatment of adults affected by CM?
4. What moderating/mediating variables are associated with treatment efficacy in studies of psychosocial interventions for individuals with CM?

2.3. Search strategy

To date, we have systematically searched, from inception to 11 January 2024, 9 electronic databases: EMBASE, CINAHL, Cochrane CENTRAL, PubMed (MEDLINE), PsycINFO, PILOTS, Scopus, Web of Science (Core Collection), and Clinicaltrials.gov. for relevant peer-reviewed publications written in any language. The reference lists of studies included in the full-text review will be also searched for relevant studies. Additionally, we will search previous reviews, statements of guidelines, and specific relevant journals concerning psychosocial treatments in CM to retrieve other studies. We will contact the corresponding authors of the included studies in case of missing information. The search string for PubMed is provided in the Appendix 2.

2.4. Identification and selection of studies

The records will be imported into the online tool Rayyan (Ouzzani et al., 2016) for the screening process. After removal of duplicates, at least two independent assessors screen the titles and abstracts. Both assessors conduct a full-text review of the remaining studies. The reference lists of studies included in the full-text review are also searched for relevant articles. Disagreements will be resolved through consensus.

2.5. Eligibility criteria

2.5.1. Study characteristics

Studies will be eligible for inclusion if they used a (i) randomised controlled trial (RCT) design (as the gold standard of whether an intervention works and/or whether it is better than another) (ii) testing the efficacy of psychosocial intervention, comparing a psychosocial intervention to a control group (TAU, WL, or other psychosocial treatments); (iii) if the study population consisted of individuals with CM, i.e. emotional/physical/sexual abuse, emotional/physical

neglect, domestic violence, and bullying exposure occurring before 18 years of age (Cowley et al., 2025; Fares-Otero & Seedat, 2024); and (iv) if a minimum of one post-treatment assessment have been reported.

Study selection will differentiate experimental interventions compared with active intervention(s) and experimental interventions compared to TAU/WL. Follow-up data of more than 2 years from treatment termination or the period of time where the control group also received the experimental intervention will not be included.

2.5.2. Participants characteristics

We will consider RCTs in non-clinical and clinical populations, involving participants with a diagnosis of mental disorder as defined by the inclusion criteria of specific studies. We will include human individuals exposed to CM measured by validated questionnaires such as the Childhood Trauma Questionnaire (CTQ) (Bernstein et al., 2003), as well as clinical interviews and case records. There will be no restrictions on sex, ethnicity, or setting.

We expect that in the majority of studies in patients with mental disorders, psychosocial intervention will be provided in addition to standard care, which usually includes pharmacological intervention. If we find studies in which a psychosocial intervention is administered without concomitant pharmacotherapy, we will consider these studies as well.

2.6. Psychosocial interventions

Psychosocial interventions are defined broadly as any non-pharmacological, psychological, social or physical intervention, including educational components, and comprise structured psychotherapies, or alternative therapies (De Silva et al. 2013). We will consider interventions such as trauma-focused or 'third-wave' CBT (Hayes & Hofmann, 2021), psychodynamic therapy, social skills training, and psychoeducation. Newly developed treatments, e.g. virtual reality therapy, will be also considered for inclusion. We will define nodes (circles representing each intervention included in the NMA) by grouping same/similar types of interventions (psychodynamic, CBT). Treatment may be delivered in person or online (web-based interventions), may comprise an individual or dyadic/family/group format, and a multi-session treatment protocol.

2.7. Outcomes

2.7.1. Primary outcomes

Included RCTs assess the effect of psychosocial interventions on:

1. Social functioning, i.e. global, or broader aspects of social functioning such as social support or loneliness, measured by published rating scales such as the Social Adjustment Scale-Self Report (SAS-SR) (Gameroff et al., 2011), the Global Assessment of Functioning (GAF) (Aas, 2011);
2. Social domains, i.e. socially relevant behavioural, emotional, cognitive, and physiological processes, including work/occupational or education/vocational functioning measured by the Social and Occupational Functioning Assessment Scale (SOFAS) (Morosini et al., 2000), interpersonal functioning, measured with the Inventory of Interpersonal Problems (Horowitz et al., 1988), leisure and recreational activities as well as an individuals' satisfaction with their ability to meet social roles, measured by the social QoL scale (social-QoL) (Burckhardt & Anderson, 2003), socio-emotional and cognitive processes (including social knowledge/processing, and attributional bias) measured by validated questionnaires (Coccaro et al., 2009), behavioural or physiological data (Fares-Otero, Halligan, et al., 2024).

To correct for differences in the direction of the scales, the mean values from one set of studies will be multiplied by –1 to ensure that all the scales point in the same direction.

2.7.2. Secondary outcome

Study drop-out will be measured as a secondary outcome and operationalised as study drop-out or discontinuation for any reason, and not as a treatment drop-out, given that the latter is often defined differently across trials, making it difficult to statistically pool and interpret the results. All-cause discontinuation ('dropping out') due to any reason combines efficacy, tolerability, and other factors and can therefore been considered as a measure of 'acceptability of treatment' (Varker et al., 2021).

2.8. Data extraction

At least two reviewers will independently extract data from all selected trials using Microsoft Excel. The following data will be extracted from each included study: (i) general study information (first author, publication year, country/region) (ii) information on methodology (population, intervention, control group, follow-up period), (iii) characteristics of study participants (mean age, sex % male, education in years), (iv) characteristics of psychosocial interventions, (v) outcome measures, effect estimates, and key findings. If reported, we extract the data from the intention-to-treat analysis (ITT) in each included study, (vi) moderators/mediators, confounders/covariates (if reported).

2.9. Risk of bias assessment

At least two reviewers will independently assess the risk of bias of the primary outcomes using the Cochrane Risk of Bias tool, version 2 (RoB 2.0) (Sterne et al., 2019) which assesses sources of bias in RCTs. The four rated domains include (1) adequate generation of allocation sequence, (2) concealment of allocation to conditions, (3) prevention of knowledge of the allocated intervention to assessors of outcome (masking of assessors), and (4) dealing with incomplete data. The quality of included studies will be rated as of high risk, some concerns, or low risk related to the selection, performance, and outcome reporting procedures used. Disagreements will be resolved through consensus. We will not include studies whose sequence generation was judged to show a high risk of bias in the data analyses. The impact of the risk of bias will be analysed using a sensitivity analysis.

2.10. Data analysis

2.10.1. Measurement of treatment effect

For continuous outcomes, we will calculate the standardised mean difference (SMD) as the effect measure, since we expect studies to use different rating scales for the measurement of outcomes. We will prefer results obtained with imputation methods to handle missing data over complete data; results from mixed models of repeated measurement (MMRM) or multiple imputations will be preferred over last observation carried forward (LOCF). In case of missing summary statistics data, we will contact the authors of the primary study. When standard errors (*SEs*) are presented instead of standard deviations (*SDs*), the former will be converted to *SDs*. If both are missing, we estimate SDs from confidence intervals (CIs), *t*-values, or *p*-values, as described in the Cochrane Handbook for Systematic Reviews. If none of these options is viable, we will contact the study authors. When no information could be obtained, we derive *SDs* from those of the other studies using a validated imputation technique (Furukawa et al., 2006).

Odds ratios (OR) will be used to calculate dichotomous outcomes. Everyone allocated to the intervention will be counted to determine whether they have completed the follow-up (up to 3 or 6 months, 12 months or at the longest follow-up). For beneficial outcomes, individuals (e.g. responses) with missing outcome data will be assumed to be non-cases. All effect sizes are presented with 95% CIs.

The primary time point of interest is 12 months, which, according to Cochrane, can be considered a medium-term. The primary outcomes will also be collected and analysed for up to 3 and 6 months (short-term) and more than 12 months (long-term).

2.10.2. Conventional pairwise meta-analyses

First, we will perform conventional pairwise meta-analyses for specific comparisons covered by the included trials. If the requirements for an NMA are not met, we present only the findings from pairwise syntheses. Pairwise meta-analyses will be based on a random-effects model with τ^2 quantified using the restricted maximum likelihood estimator (REML) (Viechtbauer, 2005). The CIs of the pooled effect will be adjusted using the method described by Hartung and Knapp (Hartung & Knapp, 2001b, 2001a).

2.10.3. Assessment of heterogeneity

Heterogeneity will be quantified using the estimated between-study heterogeneity variance (τ^2) and will be presented using 95% prediction intervals. In the NMA model, heterogeneity variance is assumed to be common across the various treatment comparisons, and the empirical distributions are used to characterise the amount of heterogeneity as low, moderate, or high using the first and third quantiles (Turner et al., 2012). Potential reasons for heterogeneity will be explored using subgroup analysis and meta-regressions.

2.10.4. Network meta-analysis

NMA allows the combination of direct and indirect evidence for all relative treatment effects, and can therefore provide effect estimates with maximum power and increased precision (Salanti et al., 2008). The NMA models will be implemented using the frequentist graph-theoretical framework developed by Rücker (Rücker, 2012).

NMA models are based on the transitivity assumption, which is checked by investigating whether potential clinical and methodological effect modifiers (see subgroup analysis) are similarly distributed across studies. We will use the design-by-treatment interaction test that evaluates inconsistency from all possible sources in the network jointly (Higgins et al., 2012), as well as the SIDE test (separating indirect evidence from direct evidence) (Dias et al., 2010), assessing the agreement of indirect and direct evidence for every possible comparison in the network.

In the case of evidence of inconsistency or intransitivity, we will investigate possible sources. Small or moderate amounts of inconsistency will be further explored by network meta-regression and subgroup analyses, using the potential effect modifiers listed below. We estimated the probability for each intervention to be ranked at each possible place, given the relative effect sizes estimated in the NMA. We obtain a hierarchy of competing interventions using a frequentist extension of the surface under the cumulative ranking curve (*P*-score), as well as the mean ranks (Salanti et al., 2011).

2.10.5. Subgroup analysis and meta-regression

We plan to conduct the following subgroup analyses (for categorical variables) and network meta-regressions (for continuous variables) of the primary outcomes to investigate the impact of potential effect modifiers: a) sex/gender (males *vs.* females), b) samples from low-income *vs.* middle-high-income countries, c) mental health condition (e.g. clinical *vs.* non-clinical samples, with *vs.* without PTSD), d) number of sessions, e) intervention format/content (individual *vs.* group sessions, manualised *vs.* non-manualised interventions, in person *vs.* online/app/digital or web-based interventions).

2.10.6. Sensitivity analyses

We plan to conduct the following sensitivity analyses of the primary outcomes by excluding (a) studies that did not use a blind outcome assessor (open studies); (b) studies presenting only completer analyses; and (c) overall high risk of bias studies.

2.10.7. Small study effects and publication bias

We will explore the association between study size and effect size using a comparison-adjusted funnel plot method (Chaimani & Salanti, 2012). A comparison of more than 10 studies will be plotted in a contour-enhanced funnel plot. Any asymmetry observed can be attributed to systematic differences between small and large studies (e.g. differences in the risk of bias or recruitment), true heterogeneity, or publication bias. If significant small trial effects are identified, we will account for them via network meta-regression using a measure of study uncertainty (e.g. variance) as a covariate (Chaimani & Salanti, 2012). The possibility of reporting bias across the entire network will be assessed using the RoB-MEN framework (Chiocchia et al., 2021).

2.10.8. Evaluating the confidence in estimates

The confidence in estimates of the main outcomes will be evaluated with the framework Confidence in Network Meta-Analysis (CINeMA) (Nikolakopoulou et al., 2020), an adaptation of the Grading of Recommendations Assessment, Development, and Evaluation framework (GRADE) specifically developed for NMA. The margin of equivalence for continuous endpoints will be an SMD of 0.2 and an OR of 0.8 (1.25) for dichotomous outcomes.

2.10.9. Statistical software

Analyses will be conducted in R (Harrer et al., 2022; Viechtbauer, 2010). A pairwise meta-analysis will be performed using the '*meta*' package (Balduzzi et al., 2019). The frequentist NMA model will be fitted using the '*netmeta*' package. Network meta-regression will be performed in a Bayesian framework using models implemented in JAGS, assuming a weakly informative prior for the between-study heterogeneity variance τ^2.

3. Discussion

This NMA will examine the efficacy of psychosocial interventions in the treatment of individuals with CM experiences. We will maximise statistical power by combining direct and indirect comparisons and measuring the relative effects of different psychosocial interventions with regard to social functioning outcomes. Based on these findings, it is possible to identify the most effective therapy. Thus, the results have great potential to improve practice guidelines and the treatment of those with CM.

NMA currently presents the most advanced way to summarise evidence from multiple (in theory, interchangeable) treatments, and the results obtained are highly dependent on the quality of the included studies. We expect different definitions for CM (Fares-Otero & Seedat, 2024) and a lack of information on its duration and timing (Fares-Otero & Schalinski, 2024). We also expect studies to use different psychosocial interventions and rating scales for the measurement of social functioning outcomes in different populations (children/adolescents and adults; clinical and non-clinical). Considering the variability, we select broad inclusion criteria regarding the definition of CM and psychosocial interventions to identify a wide range of eligible studies and carefully scrutinise the specific definitions from each study. To investigate the potential resulting heterogeneity, corresponding meta-regression and subgroup analyses will be conducted.

Evidence-based information on effective psychosocial treatments to improve social functioning in those affected by CM may contribute to globally develop and refine interventions that prevent CM and foster resilience (Fares-Otero, O, et al., 2023). This evidence-based information is important for the choice of individual treatment plans from a shared decision-making perspective. Our results will show how well various psychosocial interventions have been studied so far and the limitations of the current evidence base, allowing meaningful planning of future trials. Overall, this should result in a major step forward in terms of individualised treatment of CM, which can lead to changes in the international guidelines.

Open Scholarship

This article has earned the Center for Open Science badge for Preregistered. The materials are openly accessible at https://www.crd.york.ac.uk/PROSPERO/view/CRD42022347034.

Acknowledgements

We thank Dr. Jose-Manuel Estrada-Lorenzo, who assisted in the string design and databases search.

Authors' contributions

NEF-O registered the protocol on PROSPERO, designed the study, and drafted the manuscript with input from SS and SLH. NEF-O, SA, BS conducted preliminary literature screening and quality assessment. MH provided methodological and statistical advice. NEF-O, SL, and MH supervised this work. Visualisation: NEF-O; Project administration: NEF-O, MH. Funding acquisition: NEF-O; Resources: MH, SL. All authors critically reviewed the manuscript for important intellectual content and approved the final version.

Disclosure statement

EV has received grants and served as consultant, advisor, or CME speaker for the following entities: AB-Biotics, AbbVie, Angelini, Biogen, Boehringer-Ingelheim, Celon Pharma, Dainippon Sumitomo Pharma, Ferrer, Gedeon Richter, GH Research, Glaxo-Smith Kline, Janssen, Lundbeck, Novartis, Orion Corporation, Organon, Otsuka, Sage, Sanofi-Aventis, Sunovion, Takeda, and Viatris, outside the submitted work. The other authors report no financial relationships with commercial interests.

Funding

This study is supported by DAAD [No. 57740018]. The funder has no role in the study design or writing of the protocol.

Data availability statement

The search string and the PRISMA-P checklist are included in the supplementary information files. The datasets used and/or analysed during the current study will be available from the first author on reasonable request.

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