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REVIEW

Effectiveness of Family Intervention Programs Based on the Interpersonal Cognitive Model of Anorexia: Systematic Review and Meta-Analysis

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ABSTRACT

Introduction: This paper aims to examine family intervention programs based on the Cognitive-Interpersonal Maintenance Model of anorexia nervosa (AN) and their impact on patients and carers.

Method: A systematic search was undertaken across several databases through 20 December 2024 in accordance with Preferred Reporting Items for Systematic reviews and Meta-Analyses.

Results: 15 studies were identified. Meta-analyses of patient outcomes revealed no significant differences in BMI, eating disorder symptomatology, or emotional well-being between intervention and control groups at post-treatment or 12-month follow-up. In contrast, carers showed significant improvements in emotional well-being and expressed emotion at post-treatment, with benefits maintained at follow-up, and enhanced caregiving skills. These family intervention programs yielded better results in the evaluated variables among carers compared to the other programs with which they were compared. Moderator analyses suggested that these interventions are more effective in improving caregiving skills if they are delivered in a face-to-face format and improve caregivers' emotional well-being and accommodation to a greater extent when patients are younger.

Conclusions: The present findings highlight the positive impact of family intervention programs based on this model on carers, particularly in enhancing their emotional well-being, expressed emotion and care skills. Future studies should continue to refine these programs to optimise benefits for all stakeholders involved.

1 | Introduction

Eating disorders (EDs) are serious clinical conditions involving persistent alterations in eating habits, along with excessive concern for weight and body image (Diagnostic and Statistical Manual of Mental Disorders, 5th ed., text rev.; American Psychiatric Association 2022). These disorders present high prevalence, mainly affecting young women and have serious physical, psychological and social consequences (Galmiche et al. 2019; Chidiac 2019; Pleplé et al. 2021). Beyond individual repercussions, EDs may cause a profound impact on the family environment and specifically on caregivers, who often experience high levels of stress due to the chronic and resistant-treatment nature of these disorders (Schmidt et al. 2007; Zabala et al. 2009). Caring for a loved one with an ED often generates feelings of guilt, anger, helplessness, and frustration

Highlights

- Family interventions based on the Cognitive-Interpersonal Maintenance Model of AN significantly improve carers' emotional well-being, reduce expressed emotion, and enhance caregiving skills, with effects persisting at 12-month follow-up, compared to control groups and other interventions.
- Patient-related outcomes (BMI, symptomatology, or emotional well-being) did not differ significantly from those in other interventions, possibly due to methodological variability and limited sample sizes.
- Face-to-face group delivery and younger patient age maximise carers' benefits, while older patient age and self-administered formats attenuate intervention effectiveness.

(Treasure et al. 2008), resulting in high expressed emotion, exacerbated emotional exhaustion, and anxious-depressive episodes (Kyriacou et al. 2008; Pérez-Pareja et al. 2014; Sepúlveda et al. 2008).

Involving the family in ED treatment has been shown to improve outcomes by providing caregivers with tools and strategies to support recovery, improve patient prognostic adherence and reduce emotional strain (Le Grange et al. 2010; Treasure et al. 2021; Treasure and Nazar 2016). In this context, several intervention programs have been developed to address both caregiver distress and their role in patient recovery (Fleming et al. 2021; Hannah et al. 2022).

One of the most influential approaches is the Cognitive-Interpersonal Maintenance Model of Anorexia Nervosa (Schmidt and Treasure 2006), which emphasises the role of dysfunctional interpersonal dynamics in maintaining the disorder. Based on this model, Professor Janet Treasure and her team developed the Collaborative Care Model, also known as the New Maudsley Approach (Treasure et al. 2003, 2012), following the Medical Research Council (MRC) framework for complex interventions (Craig et al. 2008). This model positions caregivers as active participants in treatment, equipping them with coping strategies and communication skills to improve the family environment and patient outcomes. This collaborative approach is based on the idea that family members or caregivers play an active and central role in the treatment of people with an ED. Rather than adopting an approach in which only health professionals lead the treatment, this intervention model involves an alliance between health professionals and families to improve the care and well-being of the affected person (Treasure et al. 2012).

The principles of this model were described in the manual 'Skills-based Learning for Caring for a Loved One with an Eating Disorder: The New Maudsley Method' (Treasure et al. 2007, 2012), which draws from the Caregiver Stress and Coping Model (Treasure et al. 2003, 2007) and focuses on three key components proposed to intervene with caregivers: (1) providing information to strengthen coping ability; (2) training in skills to reduce expressed emotion and accommodation to symptoms; and (3) improving communication and behavioural strategies to support recovery.

Programs derived from this model include the Collaborative Care Skills Training Workshops (CCSTW; Goddard et al. 2011; Whitney et al. 2012; J. Whitney et al. 2012), its adaptation to caregivers of adolescent patients in Austria, the Supporting Carers of Children and Adolescents with Eating Disorders in Austria (SUCCEAT; Philipp et al. 2021; Truttmann et al. 2020) and the Experienced Carers Helping Others (ECHO; Rhind et al. 2014). These interventions incorporate: psychoeducation, reduction of expressed emotion, reduction of accommodation to symptoms, improvement of communication through Motivational Interviewing principles, and development of problem-solving and coping skills. They vary primarily in their delivery format, encompassing individual or group modalities, both in-person and online, facilitated by therapists, expert caregivers, or through self-guided approaches.

The literature has shown that intervention programs developed from this model not only reduce levels of burden, anxiety, and depression in caregivers, but also improve expressed emotion and coping skills (Hodsoll et al. 2017; Magill et al. 2016; Quiles Marcos et al. 2016; Ruiz et al. 2024). Furthermore, they have been associated with a decrease in patient symptoms, a lower rate of hospital readmissions, a reduction in costs associated with health services, as well as helping to reduce isolation and loneliness—key factors in the maintenance of eating disorders (Hibbs et al. 2015; Hodsoll et al. 2017; Magill et al. 2016; Treasure et al. 2016; Treasure et al. 2021). Given the growing evidence on the importance of involving family members in the treatment of EDs, and the increasing prominence of the Cognitive-Interpersonal Maintenance Model of AN as a theoretical framework guiding carer-based interventions, it is essential to rigorously evaluate the effectiveness of such programs. Therefore, in this study we conducted a systematic review and meta-analysis to assess their impact on specific outcomes, including eating disorder (ED) symptomatology, emotional well-being, and body mass index in patients, as well as emotional well-being, expressed emotion, accommodation, and caregiving skills in carers.

2 | Method

This review was conducted following the principles outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Page et al. 2021). The protocol was pre-registered in PROSPERO on August 26, 2024 (receipt acknowledgement: CRD42024573591) and in the Open Science Framework (date: August 5, 2024; https://osf.io/w5xft/).

2.1 | Sources and Literature Search Strategy

A systematic search was conducted in 7 November 2024 in the following databases: PubMed, Scopus, the Cochrane Library, Web of Science, Ovid (which included Embase, Medline, PsychInfo, PsychArticles, and Maternity and Infant Care), CINAHL, and The ProQuest Dissertation and Theses database. Additionally, we extended the search to clinical registries, including PROSPERO and OSF, to identify ongoing and recently completed research studies. The references of all included articles were reviewed to identify potential studies for this review. The search was limited

to articles written in Spanish and English, but no time restrictions were applied. A new search was conducted in 20 December 2024 to update the results. No new study was identified.

The descriptors used in each of the databases in combination, as well as the search equation, were: (parent* OR carer* OR caregiver OR 'care giver' OR famil* OR relative*) AND (intervention OR treatment OR therap* OR education OR psychoeducation* OR 'self-help' OR 'train*' OR skills OR support) AND ('Collaborative Care' OR 'Experienced Carers Helping Others' OR 'Supporting carers' OR 'Maudsley Model' OR 'Maudsley Approach' OR 'Maudsley Method') AND (anorexia OR bulimia OR 'binge eating disorder' OR ednos OR 'eating disorder*').

2.2 | Eligibility Criteria

Studies were eligible for inclusion in this review if they met the following criteria, based on the PICOS framework:

- Population: Carers or caregivers of individuals diagnosed with an eating disorder (e.g., AN, BN, BED). Studies were only included if they provided separate outcomes for carers.
- Intervention: Structured interventions explicitly based on the Cognitive-Interpersonal Maintenance Model of Anorexia Nervosa (e.g., New Maudsley Approach, CCSTW, ECHO, SUCCEAT).
- Comparison: Inclusion of a control or comparator group (e.g., treatment as usual, psychoeducation, waitlist).
- Outcomes: Quantitative outcomes related to carers (e.g., emotional well-being, expressed emotion, caregiving skills) and/or patients (e.g., ED symptomatology, BMI).
- Study design: Randomised controlled trials (RCTs) and non-randomised prospective studies with a comparator group.
- Language: Articles published in English or Spanish.

We included randomised controlled trials and non-randomised prospective studies with a comparator group that evaluated interventions for carers based on the Cognitive-Interpersonal Maintenance Model. Studies without a comparator group were excluded from the meta-analysis but are mentioned when relevant.

2.3 | Study Selection

The initial search yielded 573 articles, which were reduced to 231 after removing duplicates. Two independent reviewers (ECP and ARM) screened titles and abstracts based on the predefined inclusion criteria. Discrepancies were resolved by a third reviewer (SPL), who also verified the final decisions at this stage. As a result, 210 articles were excluded.

The remaining 21 articles were assessed in full-text format by the same two reviewers (ECP and ARM), working independently. Again, any disagreements were resolved through consultation with the third reviewer (SPL), leading to the exclusion of 9 studies. This resulted in 12 eligible studies.

A fourth reviewer (KIK) conducted an additional check of all excluded full-text studies ($n = 219$) to ensure consistency and accuracy in the application of exclusion criteria.

Finally, one reviewer (YQM) performed a manual search of the reference lists of the included studies, identifying three additional eligible articles. After removing duplicates and confirming their eligibility, a total of 15 studies were included in the systematic review. (See PRISMA flow diagram in Figure 1).

2.4 | Data Extraction and Risk of Bias Assessment

Using the approach described by Lipsey and Wilson (2001), a coding scheme was developed in which six authors (YQM, EMLZ, ARM, SPL, KIK, and ECP) independently recorded all the relevant information from each study: authorship, year of publication, study objective, study design, sample size, population characteristics, intervention characteristics, measurement instruments, outcomes, and effect sizes. The 15 studies were initially distributed among five authors (EMLZ, ARM, SPL, KK and ECP) for independent data extraction. Subsequently, a sixth author (YQM) reviewed all extracted information to ensure consistency across studies and resolve any discrepancies. In case of discrepancies in the information among the coders, two additional team members (JALL and MJAS) moderated the discussion until consensus was reached.

To assess the risk of bias, studies were first classified according to design as either randomised controlled trials (RCTs) or non-randomised studies (non-RCTs). The RoB 2 tool (Cochrane Risk of Bias tool for RCTs; Higgins et al. 2019) was applied to all RCTs, whereas the ROBINS-I tool (Risk Of Bias In Non-randomised Studies—of Interventions; Sterne et al. 2016) was used for non-RCTs. Two investigators independently assessed each study, evaluating all domains specified in the respective tools. Discrepancies or disagreements between reviewers were discussed and resolved through consensus.

2.5 | Effect Measure

Since all outcomes were continuous and the primary studies used different psychometric tests to measure the outcome variables, standardised mean differences were used as effect measures, namely the standardised mean change (d) for within-group effects and the difference in standardised mean changes (d_g) for between-group comparisons. An exception was patient BMI, for which we used the raw mean change difference. Further details on effect size calculations can be found in the Supplementary materials.

2.6 | Data Synthesis

Beetween-group comparisons: our main analysis was restricted to randomised comparisons of programs for carers based on the

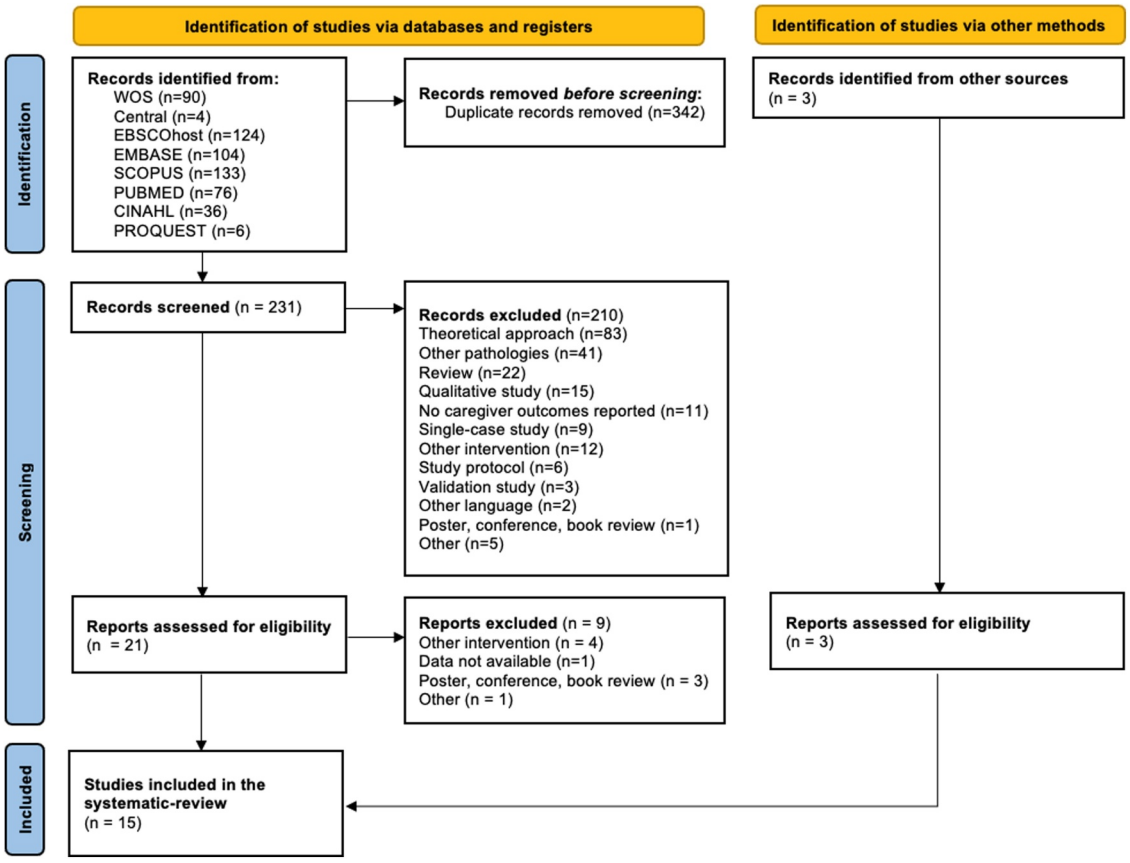

FIGURE 1 | PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources. *Source:* Page et al. (2021). This work is licenced under CC BY 4.0. To view a copy of this licence, visit https://creativecommons.org/licenses/by/4.0/.

Cognitive-Interpersonal Maintenance model of AN versus a comparator (e.g., treatment as usual), where we examined the difference in standardised mean changes from baseline to post-treatment. A separate meta-analysis was carried out for each patient-focused and carer-focused outcome using random-effects models with restricted maximum likelihood estimation of the between-study variance. Where data from at least three studies was available, we followed the same approach to examine differences in standardised mean changes from baseline to follow-up. To represent the individual effects of each study and the overall effect size, forest plots with 95% confidence intervals were used, which also provided a visual examination of heterogeneity. For each model, the Q statistic, the I^2 index, and the estimate of the between-study standard deviation (τ) are also reported. The Q statistic follows a χ^2 distribution with k—1 degrees of freedom, where k denotes the number of effect sizes.

Within-group comparisons: as an alternative analysis approach, we integrated standardised mean changes from baseline to post-treatment for intervention groups for carer-focused outcomes. Three studies (Goddard et al. 2011; Hodsoll et al. 2017; Truttmann et al. 2020) contributed two intervention groups each based on independent subjects. We fitted random-effects models with restricted maximum likelihood estimation of the between-study variance, and with the Knapp-Hartung correction (Hartung and Knapp 2001). Since these analyses included more studies, we conducted moderator analyses with the variables 'Intervention modality', 'Gender' and 'Age', by fitting mixed-effects meta-regression models with the Knapp-Hartung correction (Knapp and Hartung 2003) and estimation of pseudo-R^2 measures to assess effect size (López-López et al. 2014). Due to the small number of studies, publication bias assessments were not considered.

All statistical analysis were performed in the R statistical environment (version 4.4.2) using the *xlsx* (Dragulescu and Arendt 2020) and *metafor* (Viechtbauer 2010) packages.

3 | Results

3.1 | Descriptive Characteristics of Included Studies

Table 1 provides some key characteristics of the included studies. The studies were published between 2008 and 2024. The interventions were conducted in the United Kingdom ($n = 9$), Spain ($n = 3$), Canada ($n = 1$), and Australia ($n = 2$).

The study designs included randomised controlled trials (RCT; n = 9), quasi-experimental studies ($n = 5$), case series ($n = 1$), and a pretest-posttest study without a control group ($n = 2$).

The studies were conducted in specialised eating disorder settings, including outpatient and inpatients units, specialised hospitals and multidisciplinary mental health services. Some studies focused on caregivers of outpatients, inpatients or both. Regarding participants, sample sizes varied from small samples,

TABLE 1 | Summary of study characteristics.

Author(s), year, country	Type of study, assessments	Setting and duration	Sample size, gender, age (mean ± SD, range) patients diagnostic and age	Protocol	Variables/Instruments
Ruiz et al. (2024), Spain	RCT Baseline post-treatment and follow-ups at 3 months (T2) 6 months (T3) 12 months (T4)	Different public eating disorders units. Inpatients and outpatients. No Sessions: 8 Duration: 8 weeks Intensity: 1 h/week Magnitude: 8 h total Homework: Yes	CG: N Carers = 54, 85.2% females; age = 49 (6.08); N Patients = 51, 100% females; age = 15 (0.58), 82.35% AN EG: N Carers = 54, 85.2% females; age = 46 (6.35); N Patients = 54, 100% females; age = 14 (1), 77.78% AN	CG: TAU (usual treatment of relatives of ED patients) EG: ECHO + TAU (educational book, DVD and individual online sessions of intervention)	*Carers* Depression, anxiety, stress/ DASS-21 Expressed emotion/FQ Burden/EDSIS-S Illness accommodation/ AESED Caregiver skills/CASK
Keshen et al. (2020), Canada	RCT Baseline 4 weeks post-baseline and 3-month follow-up	Adult eating disorder clinic in Nova Scotia. Outpatients. No Sessions: 2.5 h Duration: 4 weeks Homework: Yes	EG: N Carers = 25, 52% females; age = 49.21 (12.31) N Patients = 25, 100% females; age = 28.56 (8.72), 48% AN; BMI = 21.13 (3.58) CG; N Carers = 23, 47.83% females; age = 40.70 (14.81) N Patients = 23, 100% females; age = 23.48 (4.51), 21.74% AN; BMI = 24.68 (6.64)	CG: TAU (Royal College of Psychiatrists' standards), outpatient clinic treatment (4 days/week, up to 32 weeks) with therapy groups, individual therapy, supervised meals, and optional family psychoeducation. EG: ECHO + TAU (2.5 h programme with 17 actor-portrayed vignettes on managing ED-related situations), ECHO DVD over 4 weeks.	*Carers* Depression, anxiety, stress/ DASS-21 Caregiver skills/CASK Burden/EDSIS Expressed emotion/BDSEE *Patients* Eating disorder symptom/ EDE-Q
Truttmann et al. (2020), AU	Two-arm parallel group quasi-randomised feasibility trial Baseline (T0) 3-month follow-up (T1) 12-month follow-up (T2).	Medical University of Vienna (Department of Child and adolescent Psychiatry) and two comparison clinics. Inpatients and outpatients. No sessions: 8 Duration: 8 weeks Homework: Yes	Workshop group: N Carers = 50, 42% females; age = 46.64 (5.43); N Patients = 50, 45% females; age = 14.66 (1.91), 100% AN Online group: N Carers = 52, 44% females; age = 47.72 (4.25); N Patients = 52, 48% females; age = 15.12 (1.8), 100% AN	Intervention group (SUCCEAT): Workshop group: 8 face-to-face sessions. Online group: 8 online sessions. Both included motivational interviewing, problem-solving, and behavioural management techniques.	*Carers* Emotional wellbeing/ GHQ-12 Burden/EDSIS Psychopathology/SCL-90-R Depression/BDI-II Anxiety/STAI Caregiver skills/CASK
Adamson et al. (2019), UK	Quasiexperimental design Baseline Discharge 3-month follow-up	Bethlem Royal hospital, eating disorders service. Inpatients. No Sessions: 3 Duration: 5 weeks Intensity: 3 h/week Magnitude: 12 h total Homework: Yes	N Carers = 21, 80% females; N Patients = 31, 100% females; age = 27 (8.8), 100% AN; BMI = 13.7 (1.5)	EG: TAU + ECHOMANTRA Carers: Workbooks, videos, full-day psychoeducation workshop, transition planning, and at least two guided practice meals. Patients: 5 guided self-help sessions, graduated leave planning.	*Carers* Depression, anxiety, stress/ DASS-21 Burden/EDSIS Parental self-efficacy/PVA Caregiving skills/CASK Illness accommodation/ AESED

(Continues)

TABLE 1 | (Continued)

Author(s), year, country	Type of study, assessments	Setting and duration	Sample size, gender, age (mean ± SD, range) patients diagnostic and age	Protocol	Variables/Instruments
				TAU: Nutritional, medical, and psychotherapy interventions.	*Patients* ED symptomatology/ EDE-Q Social and work adjustment/WSAS depression and anxiety/ HADS Motivation for change/MR
A. R. Sepúlveda et al. (2018), Spain	RCT Baseline 3-month follow-up 6-month follow-up	Mental health service. Outpatients No Sessions: 7 Duration: 12 weeks Intensity: 1 h/week Magnitude: 14 h total Homework: No	CG: N Carers = 26, 96.2% females; age = 55.26 (7.89); patients age = 24.46 (6.98), 46.2% AN EG: N Carers = 27, 100% females; age = 57.73 (6.51); patients age = 23.37 (6.06), 52.4% AN	CG: Psychoeducation (psychoeducation workshops + psychoeducation book in ed) EG: CCSW (collaborative care skills workshops + book of CCSW	*Carers* Expressed Emotion/FQ Illness accommodation/ AESED Emotional wellbeing/ GHQ-12 Depression and anxiety/ HADS Caregiving experience/ECI Burden/EDSIS *Patients* ED symptomatology/ EAT-26 Emotional wellbeing/ GHQ-12 Depression and anxiety/ HADS
Quiles et al. (2018), Spain	Pilot study compared 2 groups T1-baseline (before the start of the intervention T2 (post intervention) T3 (3-month follow-up)	Eating disorder unit of a public hospital in the province of Alicante. Outpatients and inpatients No Sessions: 6 Duration: 12 weeks Intensity: 2 h/week Magnitude: 12 h total Homework: Yes	CG: N Carers = 24, 66.7% females; age = 48.5 (8.89); N Patients = 14, 100% females; age = 21.35 (8.22), 92.9% AN EG: N Carers = 40, 93% females; age = 48.45 (7.54); N Patients = 23, 100% females; age = 19.17 (5.78), 65.2% AN	CG: Psychoeducational (6 workshops contents information about ED, stress, ABC model, self-esteem, problem solving). EG: CCSW (6 workshop contents of CCSTW-maudsley model, strategies basic motivational interviewing, communication skills).	*Carers* Depression and anxiety/ HADS Emotional wellbeing/ GHQ-12 Expressed emotion/FQ Expressed emotion/LEE Illness accommodation/ AESED Burden/EDSIS Illness Perception/BIPQ *Patients*

(Continues)

TABLE 1 | (Continued)

Author(s), year, country	Type of study, assessments	Setting and duration	Sample size, gender, age (mean ± SD, range) patients diagnostic and age	Protocol	Variables/Instruments
					Emotional wellbeing/ GHQ-12 Depression and anxiety/ HADS
Hodsoll et al. (2017), UK	RCT Baseline -6-month follow-up -12-month follow-up	National health service (NHS) eating disorder services from across the UK. Outpatients. No Sessions: 10 Duration: 30–60 min	CG: N Carer = 76, 68% females; age = 47.8 (7.7); N Patients = 50, 96% females; age = 16.9 (2.1), 82% AN; EG1; N Carers = 72, 72% females; age = 47.7 (8.9); N Patients = 86, 97% females; age = 16.8 (2.4), 67% AN; EG2: N Carers = 78, 65% females; age = 49.1 (5.7); N Patients = 50, 88% females; age = 16.7 (2.4); 76% AN;	CG: TAU (standard care based on Royal College of Psychiatrists' and NICE guidelines). GE1: ECHO alone (self-administered programme using book and DVDs) GE2: TAU + ECHO (ECHO (book + DVDs) + 10 telephone coaching sessions (30–60 min) shared between carers, delivered by experienced carers and postgraduate psychologists).	*Carers* Caregiver skills/CASK Depression, anxiety, stress/ DASS-21 Illness accommodation/ AESED Expressed emotion/FQ *Patients* ED symptomatology/ SEED/DAWBA Psychopathology/SDQ Psychosocial functioning/ CIA Depression, anxiety, stress/ DASS-21
Jenkins et al. (2017), UK	Pretest-postest (without control group) Baseline Postest	Local mental health services. Outpatients. Duration: 1 day Magnitude: 7h total Homework: No	EG: N Carers = 77, 74% females; age = 49.9 (8.7);	GE: Maudsley ED collaborative care workshop (A 1-day, 7-h interactive event covering the biopsychosocial model of EDs, carer responses, motivation cycles, and self-care. Includes teaching, group work, experiential learning, and discussion. The condensed version reduced discussion time, role plays, and exercises, omitting video clips but maintaining key content).	*Carers* Parental self-efficacy/PVA Carergiver skills/CASK
Salerno et al. (2016), UK	RCT Baseline 12 month follow-up post-treatment	Eating disorder units. Outpatients. Duration: 6 months	CG: N Carers = 50, 100% females; age = 48.52 (4.92); N Patients = 50, 90,5 females; age = 16.86 (2.06); 100% AN;	CG: TAU (visit general practioner or/and use self-help or telephone helplines or/and group therapy or/and dietician) EG: TAU + ECHO (book + 5	*Carers* Depression, anxiety, stress/ DASS-21 *Patients*

(Continues)

TABLE 1 | (Continued)

Author(s), year, country	Type of study, assessments	Setting and duration	Sample size, gender, age (mean ± SD, range) patients diagnostic and age	Protocol	Variables/Instruments
			EG: N Carers = 99, 93% females; age = 48.17 (5.78); N Patients = 99, 90,5 females; age = 16.90 (2.17); 100% AN;	DVDs (50% of the sample also receives 5 coaching calls).	Depression, anxiety, stress/ DASS-21
Hibbs et al. (2015), UK	RCT Baseline Discharge 6-month follow-up 12-month follow-up	Eating disorder specialist wards and psychiatric ward with eating disorder specialist staff. Inpatients. No Sessions: 5 Duration: 2 weeks Homework: Yes	CG: N Carers = 134, 60% females; age = 53.18 (19.70–78.88); N Patients = 92, 93% females; age = 23.34 (13.73–57.31), 51.69% AN BMI = 12.83 (1.88) Females = 93% EG: N Carers = 134, 60% females; age = 52.22 (22.22–78.54); N Patients = 86, 97% females; age = 23.16 (12.52–62.72), 48.32% AN;	CG: TAU (application of the Royal College of Psychiatrists' standards for the treatment of patients by carers) EG: TAU + ECHO (consisted of 5 telephone coaching sessions per caregiver (up to 10 per family, ~40 min per call, every 2 weeks), using a skills training approach with a book and 5 DVDs (3 theoretical, 2 practical with role plays). The intervention was considered complete if families attended at least 4 calls or read 75% of the book).	*Carers* Burden/EDSIS Depression, anxiety, stress/ DASS-21 Illness accommodation/ AESED Expressed emotion/FQ Quality of life/WHO-Quol *Patients* ED symptomatology/ EDE-Q Depression, anxiety, stress/ DASS-21 Quality of life/WHO-Quol
G. Pépin and King (2013), AU	Quasiexperimental design Baseline 6-week follow-up 14-week follow-up	Services of ED, private practitioners and advertisements Not specified: Outpatient or inpatients No Sessions: 6 Duration: 6 weeks Intensity: 2.5 h/week Magnitude: 15 total Homework: Yes	EG: N Carers = 15, 73.33% females; age = 51.29 (6.40); N Patients = 11, 90% female, 20.13% AN;	EG: CCSW (collaborative care skills training worksops consisted of six 210-min group sessions combining didactic presentations, small group exercises, and homework tasks. Participants received a hard copy of the slides and were encouraged to purchase a related self-help book).	*Carers* Emotional wellbeing/ GHQ-12 Coping/Brief COPE Expressed emotion/FQ Burden/EDSIS Motivation for change/Ad-hoc instrument
J. Whitney et al. (2011), UK	RCT Baseline 6-month follow-up 3-years follow-up	Specialised unit for anorexia nervosa of the South London and maudsley NHS Trust. Inpatients. EG1: 18 week EG2: 3 days	EG1: N Carers = 54; age = 47.9 (14.1); N Patients = 25, 95.65% females; 100% AN EG2: N Carers = 65; age = 43.5 (14.8); N Patients = 23, 100% females; 100% AN	EG1: IFW (individual family work, a two-phase intervention with around 18 h of sessions, focussing on engaging the family, addressing misconceptions, and enhancing	*Carers* Emotional wellbeing/ GHQ-12 Caregiving experience/ECI Expressed Emotion/LEE *Patients*

(Continues)

TABLE 1 | (Continued)

Author(s), year, country	Type of study, assessments	Setting and duration	Sample size, gender, age (mean ± SD, range) patients diagnostic and age	Protocol	Variables/Instruments
				problem-solving skills for managing symptoms at home). EG2: CCSW (family day workshops, a 3-day structured programme for families, aimed at fostering rapport and sharing strategies for managing eating disorder symptoms).	Body Mass index (kg/m^2) ED symptomatology/SEED Interpersonal problems/IIP
Goddard et al. (2011), UK	RCT Baseline Pre-intervention Post-intervention (6 weeks) Follow-up at 3 months.	EG2. Inpatients and outpatients. No Sessions: 3 Duration: 6 weeks Intensity: 0.33 h/week Magnitude: 2 total Homework: Yes	EG1: N Carers = 80, 92.5% female; age = 50.5 (6.9); N Patients = 80, 95% females; age = 20.8 (6.9), 78.75% AN; EG2: N Carers = 73, 84.93% female; age = 48.7 (9.1); N Patients = 73, 95.89% females; age = 20.9 (6.8), 80.82% AN;	EG1: ECHO (received a book and 5 DVDs (3 theoretical, 2 practical skills). EG2: ECHOc (received a book and 5 DVDs (3 theoretical, 2 practical skills) and 3 telephone coaching sessions (~40 min) plus an introductory call of 15–20 min. Coaches trained in motivational interviewing.	*Carers* Depression and anxiety/HADS Emotional wellbeing/GHQ-12 Caregiving experience/ECI Burden/EDSIS Expressed emotion/FQ Caregiving self-efficacy/CSE Illness accommodation/AESED Global ED Functioning/GEDF Eating Behaviours/EatBeh
Sepúlveda, Lopez, Todd, et al. (2008a), UK	Quasiexperimental design Baseline Post-measure (3 months after baseline) 3 month follow-up	South London & maudsley (SLaM) health service trust. Inpatients and outpatients. No Sessions: 7 Duration: 12 weeks Intensity: 1.17 h/week Magnitude: 14 h total Homework: Yes	EG: N Carers = 28, 82.1% female; age = 52.7 (7.2); N Patients = 22, 100% females; age = 22.7 (7.7), 22.7% AN;	EG: CCSW (Colaborative care skills workshops, 6, 120 min group sessions. An additional follow-up session held at 3 months post-intervention. Participants were given a written manual and a copy of the PowerPoint slides used in the sessions.	*Carers* Emotional wellbeing/GHQ-12 Caregiving experience/ECI Burden/EDSIS
Sepúlveda, Lopez, Macdonald et al. (2008b), UK	Quasiexperimental design. Baseline	South London & maudlsey (SLaM) health service. Inpatients and outpatients. No Sessions: 3	EG: N Carers = 16, 81.25% female; age = 52.1 (7.7); N Patients = 14, 93% females; 17.2% AN;	EG: CCSW + DVDs (DVD-based skills training supplemented with telephone coaching. Viewing of 5 DVDs and three	*Carers* Emotional wellbeing/GHQ-12 Depression and anxiety/

(Continues)

TABLE 1 | (Continued)

Author(s), year, country	Type of study, assessments	Setting and duration	Sample size, gender, age (mean ± SD, range) patients diagnostic and age	Protocol	Variables/Instruments
	Post-intervention (6 weeks after baseline)	Duration: 12 weeks Intensity: 0,125 h/week Magnitude: 1.5 h total Homework: Yes		telephone coaching individual sessions lasting 30 min over a period of 3 months).	HADS Caregiving experience/ECI Expressed emotion/FQ

Abbreviations: AESED = Accommodation to Illness Symptoms Scale; AN = Anorexia Nervosa; BDI-II = Beck Depression Inventory; BDSEE = Brief Dyadic Scale of Expressed Emotion; BIPQ = Brief Illness Perception Questionnaire; BMI = Body Mass Index; CASK = Caregiver Skills Scale; CCSW = Collaborative Care Skills Workshop; CG = Control Group; CIA = Clinical Impairment Assessment 3.0; CSE = Revised Scale for Caregiving Self-Efficacy; DASS-21 = Depression and Anxiety Stress Scales; DAWBA = Eating disorders section of the DAWBA; EAT-26 = Eating Attitudes Test-26; EatBeh = Eating Behaviours; ECI = Experience of Caregiving Inventory; EDE-Q = Eating Disorder Examination Questionnaire; EDSIS = Eating Disorders Symptom Impact Scale; EG = Experimental Group; FQ = Family Questionnaire; GEDF = Global Eating Disorder Functioning; GHQ-12 = General Health Questionnaire; HADS = Hospital Anxiety and Depression Scale; IIP = Inventory of Interpersonal Problems; LEE = Level of Expressed Emotion; MR = Motivation Ruler; PVA = Parent Versus Anorexia Scale; RCT = Randomised Controlled Trial; SCL-90-R = Symptom Checklist; SDQ = Strengths and Difficulties Questionnaire; SEED = Short Evaluation of Eating Disorders; STAI = State and Trait Anxiety Inventory; TAU = Treatment as Usual; WHO-Quol = World Health Organization Quality of Life; WSAS = Work and Social Adjustment Scale.

such as that of Pépin and King (2013), which only included 15 caregivers, to larger samples like Hodsoll et al. (2017) with 226 or Hibbs et al. (2015) with 268. The age range was between 19 and 78 years. The studies included both women and men, however, 73.68% of the total participants were women, and were mostly mothers of the patients. Regarding the patients they cared for, the average age ranged between 14 and 28 years, mainly diagnosed with anorexia nervosa (AN).

The interventions varied in duration and format, from short, single-day workshops such as Jenkins et al. (2017), to week or month-long programs with follow-up at three, six, and/or 12 months, as in Ruiz et al. (2024), Truttmann et al. (2020), and Salerno et al. (2016). Regarding the interventions based on this model, seven studies applied ECHO. Some studies applied ECHO as a self-administered programme with written and audiovisual material (Goddard et al. 2011; Hodsoll et al. 2017; Salerno et al. 2016), while others added telephone coaching sessions (Hibbs et al. 2015; Hodsoll et al. 2017) or video calls guided by a psychologist trained in the model (Ruiz et al. 2024). In five studies, the intervention was combined with treatment as usual (TAU), while two studies analysed its application in isolation.

Seven other studies implemented the CCSTW programme, with differences in the format and duration. In three of them, group workshops of six sessions were applied (Quiles et al. 2018; Sepúlvedaetal. 2008, 2019), while others opted for intensive versions carried out in a single day (Jenkins et al. 2017) or 3 days (J. Whitney et al. 2011). In some of the studies, complementary materials were incorporated, such as books (Sepúlveda et al. 2018) or DVDs along with telephone support (Sepúlveda, Lopez, Macdonald etal. 2008).

Last, the study by Truttmann et al. (2020) evaluated the SUCCEAT intervention which was applied in two formats, in-person and online, both with a duration of 8 weeks and guided by mental health professionals. Caregivers also received educational materials, a support manual, and a DVD with practical examples of caregiver-patient interaction.

Regarding comparison groups, most studies used TAU, which included standard medical, nutritional, and psychological care. In other studies, the control group consisted of general psychoeducational programs for caregivers or the delivery of written material without professional accompaniment (Goddard et al. 2011).

Regarding caregiver outcomes, expressed emotion was evaluated in ten studies using the Family Questionnaire (FQ), the Level of Expressed Emotion Scale (LEE) or the Brief Dyadic Scale of Expressed Emotion (BDSEE). Emotional state, a common focus, was assessed in most studies (n = 14) using a variety of instruments, including the Hospital Anxiety and Depression Scale (HADS), the Depression, Anxiety and Stress Scale-21 (DASS-21), the General Health Questionnaire-12 (GHQ-12) and the Beck Depression Inventory-II (BDI-II). Caregiver burden was measured in ten studies using the Eating Disorder Symptom Impact Scale (EDSIS). Symptom accommodation was evaluated in seven studies via the Accommodation and Enabling Scale for Eating Disorders (AESED) Caregiver skills were assessed in six studies with the Caregiver Skills Scale (CASK).

Regarding patients, most studies assessed ED symptomatology using the Eating Disorder Examination Questionnaire (EDE-Q) or the Short Evaluation of Eating Disorders (SEED). In addition, Body Mass Index (BMI) or weight was also recorded as an indicator of clinical progress. The emotional state of the patients was evaluated in six studies using instruments such as the HADS and the DASS-21.

3.2 | Risk of Bias Assessment

For the nine RCTs, the RoB 2 tool (Higgins et al. 2019) was used, while the six non-RCTs (quasi-experimental and pretest-posttest designs) were evaluated using the ROBINS-I tool (Sterne et al. 2016).

Overall, among the RCTs, two studies were judged to have low risk of bias, three studies some concerns, and four studies high risk of bias in at least one domain (see Figure 2). For the non-RCTs, two studies were rated as moderate risk, three as serious risk, and one as critical risk in at least one domain (see Figure 3).

3.3 | Between-Group Comparisons From RCTs: Change From Baseline to Post-Treatment

This section of results is based on up to 6 studies with an RCT design comparing a carer skill programme based on the Cognitive-Interpersonal Maintenance model of AN to a control group.

3.3.1 | Patient Outcomes

Only two studies reported on patient BMI both at baseline and at post-treatment. We present their individual results in Figure 4A, where the meta-analytic estimate is not displayed due to the small number of studies. The individual estimates

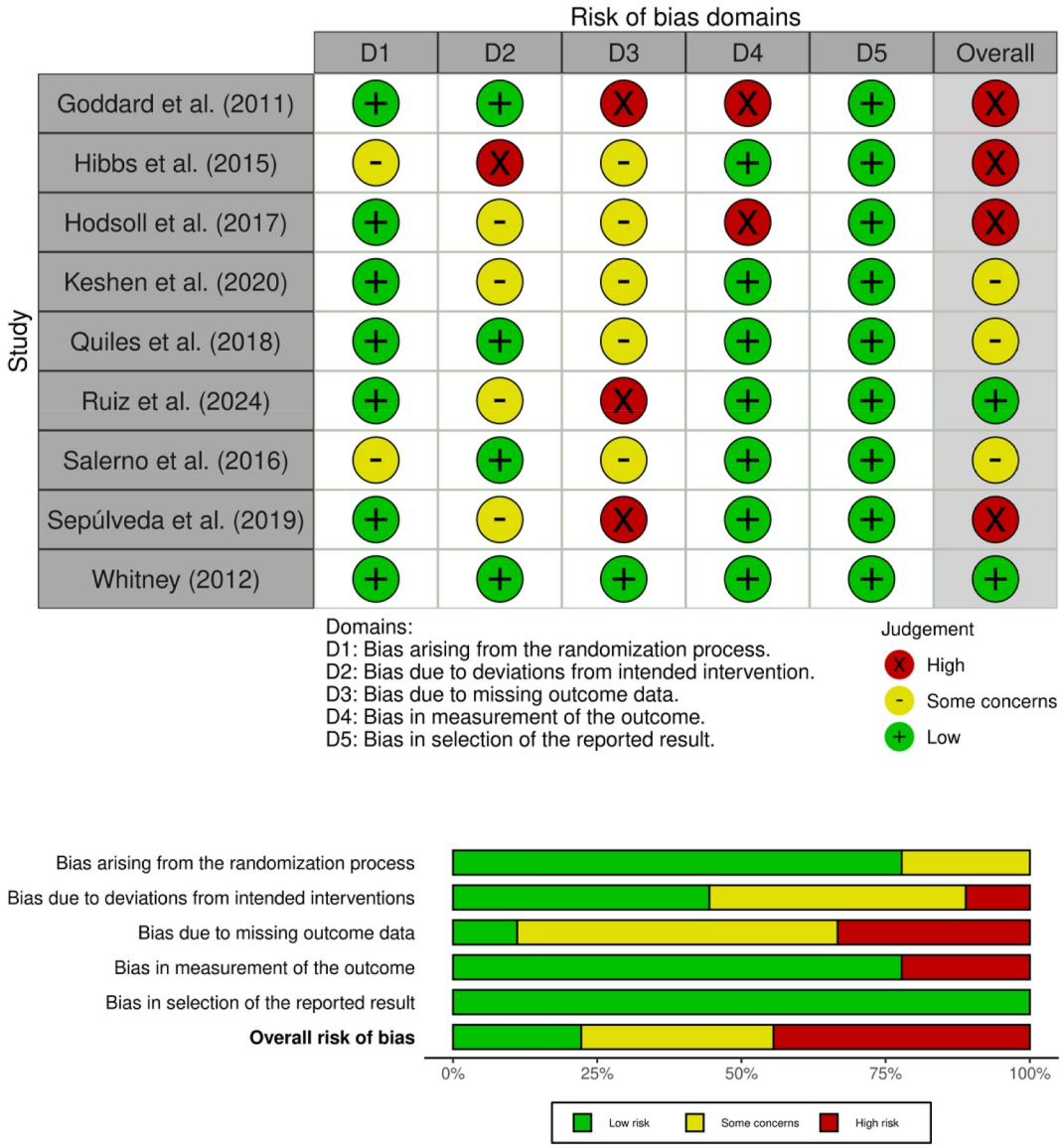

FIGURE 2 | Risk of bias within RCT studies using RoB2.

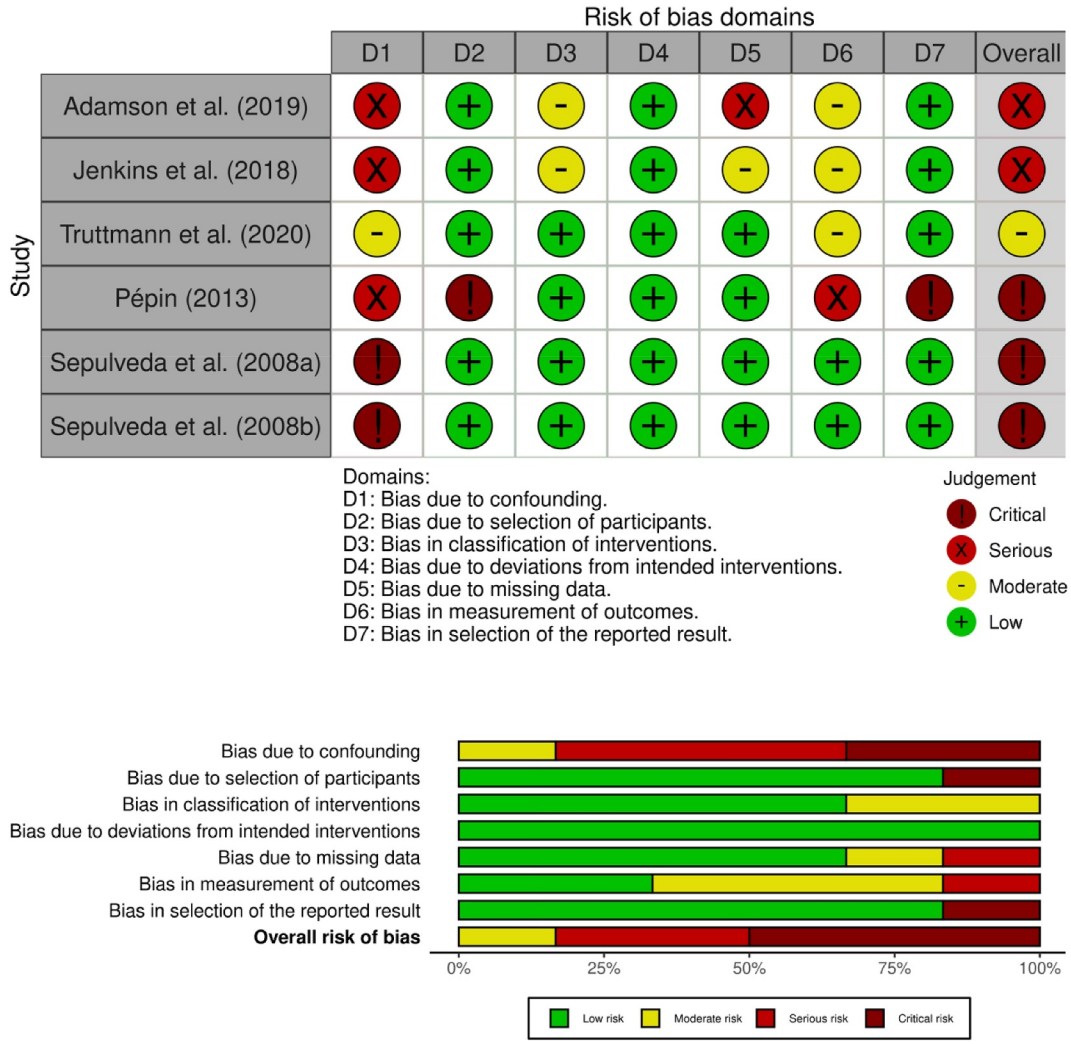

FIGURE 3 | Risk of bias within non-RCT studies using ROBINS-I.

provided by these studies suggested no evidence of an intervention effect compared to the control group.

Four studies reported on patient symptomatology, with an overall estimate of 0.17 (95% CI −0.05–0.40), suggesting no strong evidence of larger decrease in symptoms in the intervention group from baseline to post-treatment (Figure 4B). There was no evidence of heterogeneity ($Q_3 = 1.31$, $p = 0.72$, $I^2 = 0\%$, $\tau = 0$).

Three studies also examined patients' emotional well-being with an overall effect estimate of −0.01 (95% CI −0.22 to 0.20), suggesting no differences between the intervention and control groups (Figure 4C). There was no evidence of heterogeneity ($Q_2 = 0.04$, $p = 0.98$, $I^2 = 0\%$, $\tau = 0$).

3.3.2 | Carer Outcomes

Five studies reported data on carers' emotional well-being at baseline and post-treatment, with an overall estimate of −0.24 (95% CI −0.45 to −0.02), which implies that on average carers receiving a skill training programme based in this model showed larger improvements in their emotional well-being compared to those allocated to a control group (Figure 5A). The heterogeneity test yielded a value of $Q_4 = 9.37$, $p = 0.053$, whereas the I^2 index revealed that 59% of the total variability was attributed to heterogeneity ($\tau = 0.19$).

Five studies reported on carers' accommodation. The overall result of the meta-analytic model was −0.12 (95% CI −0.28 to 0.04), suggesting no evidence of an effect (Figure 5B). There was no evidence of heterogeneity ($Q_4 = 4.64$, $p = 0.33$, $I^2 = 0.01\%$, $\tau = 0.002$).

Three studies examined changes in care skills from baseline to post-treatment. The overall meta-analytic result was of 0.42 (95% CI 0.17–0.68), suggesting that those receiving a skill training programme based in this model showed a larger development compared to those receiving a comparator intervention (Figure 5C). The Q statistic showed no evidence of heterogeneity ($Q_2 = 2.62$, $p = 0.27$), whereas the I^2 index revealed that 28% of the total variability was due to heterogeneity ($\tau = 0.12$).

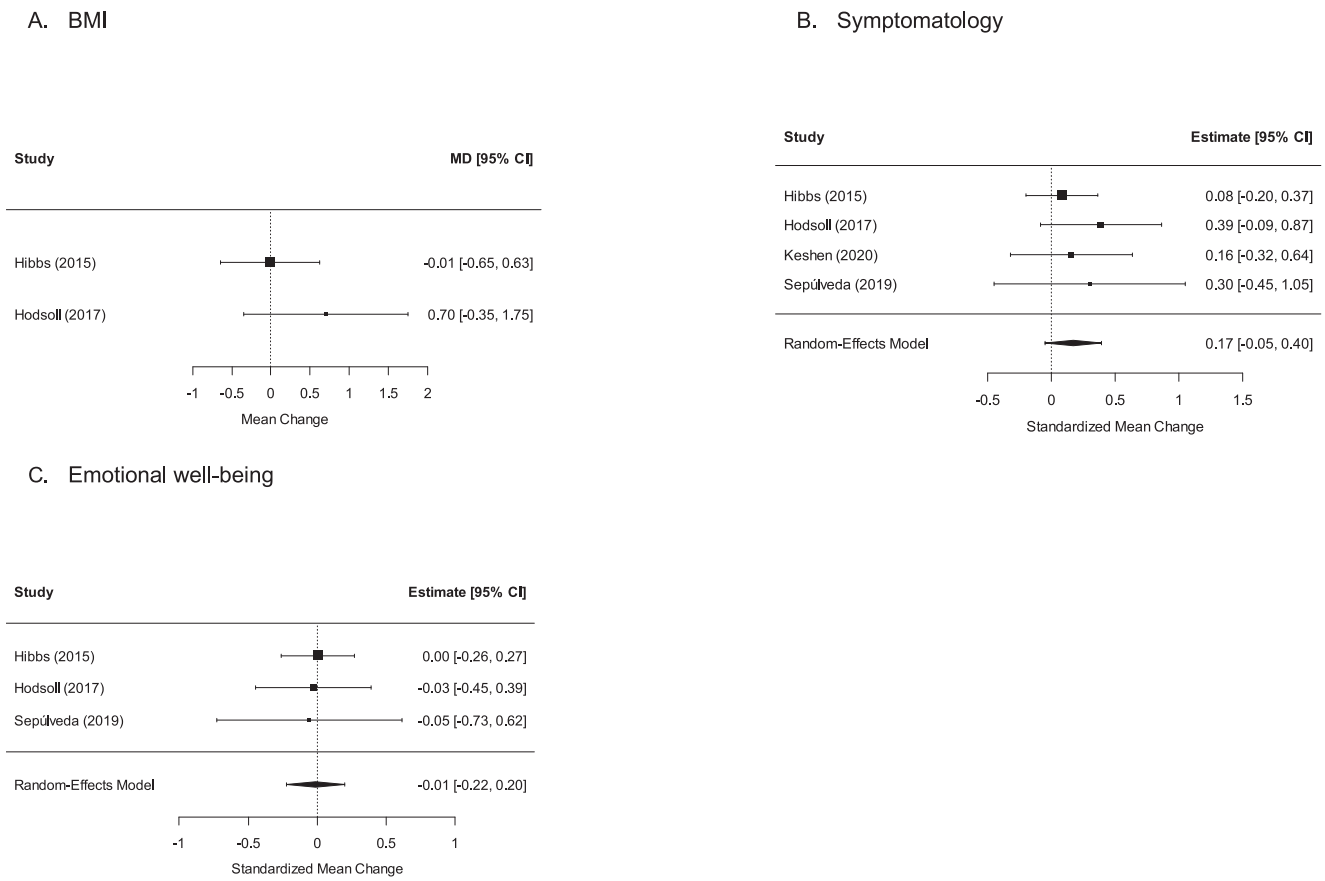

FIGURE 4 | Forest plot of BMI, symptomatology and emotional well-being in patients: changes from baseline to post-treatment.

Last, six studies examined changes in carers' expressed emotion from baseline to post-treatment. The overall estimate was −0.27 (95% CI −0.60 to 0.05), suggesting weak evidence of a beneficial effect in the intervention group (Figure 5D). The Q statistic found statistically significant evidence of heterogeneity ($Q_5 = 31.3$, $p < 0.0001$), with the I^2 index estimating that 86% of the total variability was attributable to heterogeneity ($\tau = 0.37$).

3.4 | Between-Group Comparisons From RCTs: Change From Baseline to Follow-Up

This section of results is based on up to $k = 4$ studies with an RCT design which reported results at a 12-month follow-up point. Results for patient outcomes showed no evidence of group differences for BMI or symptoms (only two studies provided follow-up data on each of these outcomes, and hence a meta-analytic estimate is not reported). Three studies reported on emotional well-being in patients at follow-up, with no evidence of an intervention effect (0.12, −0.10–0.33) or heterogeneity between the individual effect estimates ($Q_2 = 0.80$, $p = 0.67$, $I^2 = 0\%$, $\tau = 0$).

Regarding carers, there was evidence of a beneficial effect of the intervention on emotional well-being (−0.20, −0.36 to −0.04), with no evidence of heterogeneity among the three contributing studies ($Q_2 = 0.13$, $p = 0.94$, $I^2 = 0\%$, $\tau = 0$). Three studies also reported on expressed emotions at follow-up, with no evidence of an overall intervention effect (−0.34, −0.78 to 0.09) but evidence of heterogeneity among studies ($Q_2 = 8.41$, $p = 0.015$, $I^2 = 81.1\%$, $\tau = 0.34$). Last, three studies reported on accommodation, with the overall estimate showing weak evidence of a beneficial intervention effect (−0.21, −0.45 to 0.04) and no evidence of heterogeneity ($Q_2 = 0.32$, $p = 0.85$, $I^2 = 0\%$, $\tau = 0$). Forest plots displaying full results for each outcome have been included in Supporting Information S1: Figures A1 and A2 section.

3.5 | Within-Group Comparisons of Change in Carer Outcomes From Baseline to Post-Treatment

This section of results is based on up to 14 studies, including a total of 17 treatment groups, with pre-post measures. Three studies (Goddard et al. 2011; Hodsoll et al. 2017; Truttmann et al. 2020) each reported two treatment groups. For the moderator analyses we considered the following variables; intervention modality, gender, and age. Forest plots displaying full study results have been included in Supporting Information S1: Figures A3–A6 section, with model predictions displayed in grey when appropriate (e.g., in meta-regression models, with the covariate also displayed in the corresponding plot).

3.5.1 | Emotional Well-Being

Ten studies (13 treatment groups) reported on this outcome at baseline and post-treatment. A random-effects meta-analysis

yielded an overall result of 0.33 (95% CI 0.17–0.49), suggesting a significant increase in emotional well-being from baseline to post-treatment. There was also evidence of heterogeneity among the effect estimates ($Q_{12} = 61.8$, $p < 0.0001$, $I^2 = 81.2\%$, $\tau = 0.24$).

Moderator analyses suggest that neither *intervention modality* nor *gender* moderate caregivers' emotional well-being (Table 2). Conversely, results for patients' age showed some evidence of an association ($bj = -0.033$, 95% CI −0.066 to 0; $R^2 = 24.2\%$), with studies with older patients reporting smaller effects on average.

3.5.2 | Accommodation

Seven studies (9 treatment groups) reported on this outcome an overall standardised mean change of 0.30 (95% CI 0.20–0.39), suggesting beneficial effect of the intervention. There was little evidence of heterogeneity: $Q_8 = 5.64$, $p = 0.69$, $I^2 = 0\%$, $t = 0.00$.

Moderator analyses showed that neither *intervention modality* nor *gender* moderate caregivers' accommodation (see Table 3). Conversely, results for *patients' age* showed evidence of a negative association ($bj = -0.037$, 95% CI −0.053 to −0.020; $p = 0.002$), which implies that studies with older patients yielded smaller effects on average.

TABLE 3 | Results of moderator analyses on carers' accommodation.

Moderator	k	b_j	CILL	CIUL	F	*p*	R^2
Interv modality	9	0.076	−0.150	0.302	0.63	0.454	0
% female carers	9	−0.000	−0.008	0.006	0.07	0.798	0
Patients age	8	−0.037	−0.053	−0.020	29.2	0.002	0

Note: k: number of studies; b_j: slope estimate; CILL and CIUL: lower and upper limits of the 95% confidence interval around the slope estimate; F: result of the Knapp-Hartung adjusted hypothesis test; *p*: *p*-value for the hypothesis test; R^2: estimate of the model predictive power.

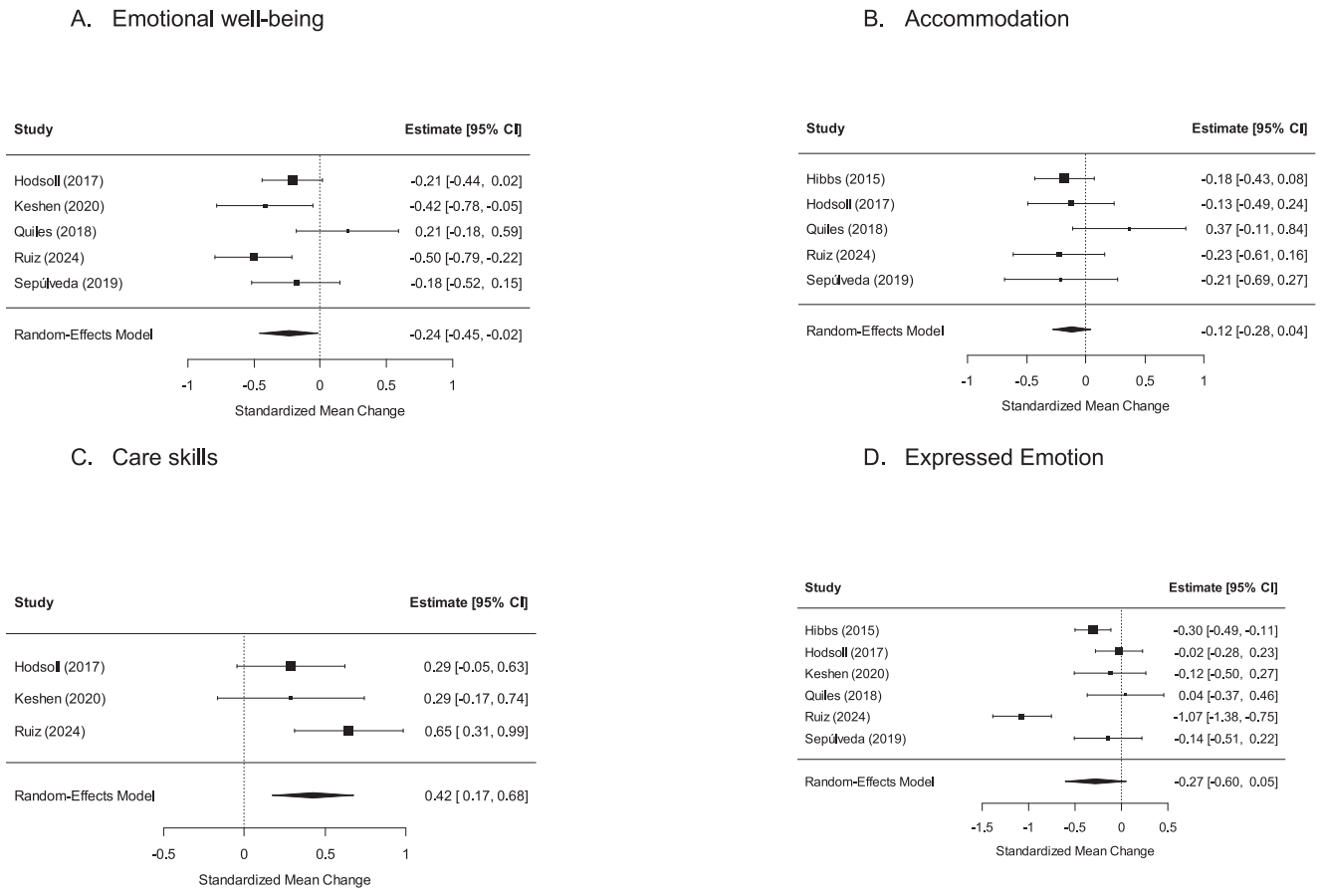

FIGURE 5 | Forest plot of emotional well-being, accommodation, care skills and expressed emotion in carers: changes from baseline to post-treatment.

TABLE 2 | Results of moderator analyses on carers' emotional well-being.

Moderator	k	b_j	CILL	CIUL	F	*p*	R^2
Interv modality	13	0.234	−0.071	0.539	2.86	0.199	16.3
% female carers	13	−0.005	−0.014	0.003	1.80	0.207	6.17
Patients age	13	−0.033	−0.066	0.000	4.60	0.055	24.2

Note: k: number of studies; b_j: slope estimate; CILL and CIUL: lower and upper limits of the 95% confidence interval around the slope estimate; F: result of the Knapp-Hartung adjusted hypothesis test; *p*: *p*-value for the hypothesis test; R^2: estimate of the model predictive power.

3.5.3 | Care Skills

Five studies (8 treatment groups) reported on this outcome at baseline and post-treatment. A random-effects meta-analysis yielded an overall result of −0.46 (95% CI −0.65 to −0.27), suggesting evidence of an increase in care skills after the intervention. There was also some evidence of heterogeneity: $Q_7 = 20.2$, $p = 0.051$, $I^2 = 65.3\%$,$\tau = 0.18$.

Regarding moderator analyses, there was evidence of an association between intervention modality and effect size magnitude ($bj = -0.364$, 95% CI −0.566 to −0.163; $R^2 = 100\%$), with interventions in workshop format reporting larger effects on average than self-administered ones. On the other hand, there was no evidence of an association for *gender* nor for *patients' age* (Table 4).

3.5.4 | Expressed Emotion

Eight studies (10 treatment groups) reported on this outcome. A random-effects meta-analysis yielded an overall effect estimate of 0.22 (95% CI 0.09–0.36), suggesting evidence of a decrease from baseline to treatment. There was also evidence of heterogeneity: $Q_9 = 21.35$, $p = 0.01$, $I^2 = 58.3\%$, $\tau = 14$.

Results of the moderator analyses provided no evidence of association of *intervention modality, caregiver gender, or patients' age* with the individual effects (Table 5).

4 | Discussion

This systematic review and meta-analysis aimed to evaluate the effectiveness of family intervention programs based on the Cognitive-Interpersonal Maintenance Model of AN on both carers and their patients.

4.1 | Meta-Analytic Review

4.1.1 | Between-Group Changes on Patients' Outcomes

The meta-analytic findings from RCTs comparing intervention programs based on this model with control groups found no differences in patients' BMI, symptomatology, or emotional well-being after examining change from baseline to post-treatment, or from baseline to 12-month follow-up. These results suggest that family involvement in programs based on this model does not yield superior effects on these patient-related outcomes when compared to other interventions. However, these conclusions should be interpreted with caution due to the limited number of studies included.

This cautious interpretation is consistent with findings from a recent systematic review (Hannah et al. 2022), which reported that various carer interventions were associated with positive outcomes—such as weight gain, improved ED psychopathology, and enhanced quality of life—but did not reveal significant differences in effectiveness between intervention types.

From a clinical perspective, interventions based on this model retain intrinsic value even when patient BMI or symptoms do not improve in the short term. Enhancing caregiver psychological well-being and competence can reduce family distress, preserve a supporting caregiving environment, and increase the sustainability of outpatient treatments. Nevertheless, if the aim is to modify patient outcomes, several considerations should guide interpretation of the available evidence. Beyond BMI and emotional well-being, caregiver interventions could plausibly affect a broader range of patient-level outcomes that have been less frequently assessed, including treatment engagement and adherence, mealtime behaviours, observed caregiver-patient interactions, relapse rates, service utilisation (hospitalisations and readmissions), and patient-reported quality of life or readiness for change. Some of these outcomes may only emerge over longer follow-up periods, which many existing studies do not provide.

Another important consideration concerns both the content of these interventions and the modality through which they are delivered. Intervention programs grounded on the Cognitive-Interpersonal Maintenance Model of AN incorporate 'active components' that aim to modify caregiver behaviours maintaining or exacerbating the ED, and to support patient behaviour change (e.g., problem solving, communication and coping-skills training). However, how these components are taught (e.g., through live role-playing practice vs. telephone sessions) may be as critical as their content. Incorporating practical

TABLE 5 | Results of moderator analyses on carers' expressed emotion.

Moderator	k	b_j	CILL	CIUL	F	*p*	R^2
Interv modality	10	0.141	−0.151	0.432	1.24	0.298	7.43
% female carers	10	0.001	−0.008	0.011	0.09	0.767	0
Patients age	9	0.002	−0.042	0.046	0.01	0.909	0

Note: k: number of studies; b_j: slope estimate; CILL and CIUL: lower and upper limits of the 95% confidence interval around the slope estimate; F: result of the Knapp-Hartung adjusted hypothesis test; *p*: *p*-value for the hypothesis test; R^2: estimate of the model predictive power.

TABLE 4 | Results of moderator analyses on care skills.

Moderator	k	b_j	CILL	CIUL	F	*p*	R^2
Interv modality	8	−0.364	−0.566	−0.163	19.7	0.004	100
% female carers	8	0.004	−0.009	0.060	0.60	0.470	0
Patients age	8	0.024	−0.011	0.060	2.79	0.146	21.0

Note: k: number of studies; b_j: slope estimate; CILL and CIUL: lower and upper limits of the 95% confidence interval around the slope estimate; F: result of the Knapp-Hartung adjusted hypothesis test; *p*: *p*-value for the hypothesis test; R^2: estimate of the model predictive power.

elements - such as practical in vivo meal-support training and joint sessions that bring caregivers and patients together to practice skills and align goals—could enhance transfer of learning. Interventions combining caregiver skill acquisition with opportunities for direct application within the caregiver–patient dyad (e.g., joint sessions, in-meal exposure, therapist-guided role-plays) are the most likely to improve observed interactions and, consequently, influence patient behaviour and symptom change.

To determine whether and how these components produce downstream effects on patients, future trials should include process measures and designs that enable causal inference—for example, mediation analyses testing whether reductions in accommodation or changes in observed caregiver behaviour mediate patient outcomes—along with extended follow-up to capture delayed effects such as relapse, readmission, or quality of life improvements. Overall, a more nuanced understanding of how caregiver-focused interventions influence patient trajectories will require both methodological rigour and broader outcome assessment.

4.1.2 | Between-Group Changes on Carers' Outcomes

In contrast, the meta-analytic findings from RCTs examining changes for carers receiving intervention programs compared to control groups showed evidence of beneficial intervention effects on a range of outcomes. In particular, there was strong evidence of positive changes in emotional well-being and expressed emotion at both post-treatment and follow-up. On the other hand, there was no evidence of an intervention effect on accommodation at post-treatment, and only weak evidence suggested improvements at follow-up. For care skills, data was only available for baseline to post-treatment comparisons, revealing a beneficial intervention effect. These findings highlight the potential effectiveness of the examined interventions in improving carers' psychological and emotional functioning.

Programs based on this model tend to focus on improving interpersonal relationships and reducing dysfunctional emotional responses among family members, which has a direct impact on caregivers' emotional well-being (Treasure et al. 2020). This approach is effective in reducing the expression of negative emotion and encouraging better communication, which could explain the benefits observed in caregivers at both treatment and follow-up. The improvement in caregiving skills, particularly between baseline and post-treatment, may be explained by the model's practical orientation towards the development of specific skills to handle difficult situations.

4.1.3 | Within-Group Changes in Carer-Focused Outcomes

There was evidence of heterogeneity among the changes from baseline to post-treatment reported for each intervention group. Regarding moderator variables, intervention modality was associated with care skills, with face-to-face group interventions yielding greater improvements compared to self-administered programs. This greater effect of the face-to-face intervention programs may be due to several key factors. For example, personalised guidance from intervention facilitators enhances adherence and reduces dropout rates, as participants receive direct support and accountability. Additionally, real-time clarification of concepts and hands-on practice of coping strategies improve understanding and application. The interactive nature of face-to-face programs fosters a sense of community and shared experience, reducing isolation. Moreover, professionals can identify and address emotional distress or difficulties that may go unnoticed in self-guided programs.

Furthermore, patients' age was found to moderate the effects of the intervention on carers' emotional well-being, accommodation, and care skills. Higher patient age was associated with lower treatment effects on these variables. However, in the case of care skills, this moderation effect may not necessarily reflect a direct relationship between age and intervention efficacy but rather differences in intervention modality. Notably, the studies by Adamson and Keshen, which included older patients on average, involved self-administered interventions, potentially confounding this relationship.

Our findings suggest that patient age moderates the effects of intervention on emotional well-being and accommodation. One possible explanation is that older patients often have eating disorders with a longer duration and more entrenched, which makes it difficult to implement changes and may generate higher levels of hopelessness in caregivers (Treasure et al. 2020). In addition, family dynamics vary according to the age of the patient. Caregivers of younger patients tend to be more involved in their treatment and decision making, which may enhance the impact of the intervention (Eisler 2005). This factor may generate frustration and decrease the benefits perceived by caregivers in terms of emotional well-being and disorder management skills.

No moderating effects were found for carers' gender. One possible explanation is that, although there are gender differences in the experience of the caregiving role, interventions based on psychoeducation and the development of coping strategies may be equally effective for men and women. Previous studies have suggested that, although women often report greater emotional involvement and higher levels of distress when caring for a family member with an eating disorder (Highet et al. 2005), men may benefit equally from structured intervention strategies, especially when specific tools to improve communication and coping skills are emphasised (Treasure et al. 2016). In addition, research has pointed out that gender differences in the impact of caregiving may be mediated by psychosocial and contextual variables rather than by gender per se (Goddard et al. 2011). For example, factors such as time spent living with the patient, perceived burden of caregiving, and access to support networks may be more effective predictors of intervention efficacy than the gender of the caregiver (Kyriacou et al. 2008).

Further research is needed to explore potential additional moderators and their role in treatment effectiveness. Identifying moderators of intervention efficacy in this context is critical to optimise their impact. Factors such as the duration and severity of the disorder, the quality of the family relationships, the level

of social support and the caregiver's mental health may influence the caregiver's response (Highet et al. 2005; Treasure et al. 2012; Treasure et al. 2020; Whitney et al. 2012; J. Whitney et al. 2012; Zabala et al. 2009).

4.2 | Strengths, Limitations and Future Directions

The current review has several important strengths. First, it addresses a gap by examining the effectiveness of family intervention programs based on the Cognitive-Interpersonal Maintenance Model of AN in a range of clinically relevant outcomes for carers and patients. To accomplish this goal, a comprehensive search was carried out and study selection, data extraction and risk of bias assessments were conducted in a systematic fashion and independently by at least two review members.

While this study provides valuable insights into the impact of family intervention programs based on the Cognitive-Interpersonal Maintenance Model of AN, it is important to acknowledge its limitations. The number of available RCTs remains relatively small, limiting statistical power and generalisability. Additionally, heterogeneity in intervention delivery methods, patient populations, and outcome measures may have influenced the observed effects. The assessment of methodological quality revealed notable variability in the risk of bias among the included studies, with several RCTs and non-RCTs showing a moderate to high risk of bias. Consequently, the overall strength of the evidence is limited, and the findings should be interpreted with caution. Moreover, the number of studies pooled in the meta-analyses was too low to assess publication bias. Furthermore, moderator analyses were based on single-group effect sizes, which are more prone to bias than the randomised group comparisons used for the main analyses. Future studies should aim to improve research methodology, increase sample sizes, standardise intervention methodologies, and examine additional moderating factors to better understand which elements contribute most to intervention success.

All studies came from high-income countries, including 9 from the UK, making our conclusions more likely to be applicable to the NHS and similar contexts. Regarding patient profiles, most samples were based on inpatients diagnosed with anorexia. This makes it hard to generalise the results to caregivers of patients with other ED diagnoses, and in other settings. Another limitation of this meta-analysis is the potential presence of allegiance bias, as many of the included studies were conducted by the original authors of the Cognitive-Interpersonal Maintenance Model of AN. This may introduce an overestimation of the effectiveness of the intervention due to the researchers' vested interest in its success. Future research should aim to include independent studies conducted by researchers without prior involvement in the development of the intervention to ensure a more objective evaluation of its efficacy.

Future research should explore the long-term impact of these interventions beyond the 12-month follow-up period. Further investigations are needed to determine whether specific subgroups of patients and carers benefit more from particular intervention modalities. Additionally, efforts should be made to compare these programs with alternative family-based interventions to establish their relative efficacy and cost-effectiveness.

5 | Conclusions

Consistent with previous research, the present findings highlight the positive impact of family intervention programs based on the Cognitive-Interpersonal Maintenance Model of AN on carers, particularly in enhancing their emotional well-being, expressed emotion, care skills, and accommodation at post-treatment. At long-term follow-up, significant effects persisted in emotional well-being and expressed emotion.

Moreover, these family intervention programs yielded better results in the evaluated variables among carers compared to the other programs with which they were compared. This may imply that interventions specifically targeting distress of caregivers and training them in skills to improve their ability to support the recovery process of their family members with ED are more effective in improving carer-related outcomes, potentially leading to a more supportive environment for patients and enhancing overall treatment efficacy. Moderator analyses also suggested that these interventions are more effective in improving caregiving skills if they are delivered in a face-to-face format and improve caregivers' emotional well-being and accommodation to a greater extent when patients are younger.

However, these interventions did not demonstrate superior effects on patients related outcomes compared to other family-based interventions. These findings emphasise the importance of considering both patient and carer outcomes in evaluating the effectiveness of family interventions for EDs. Future studies should continue to refine these programs to optimise benefits for all stakeholders involved.

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Ethics Statement

The authors have nothing to report.

Conflicts of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data Availability Statement

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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