

# ■ Effectiveness of psychological interventions for eating disorders in adolescence: An overview of systematic reviews

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## Abstract

Eating disorders (EDs) are high prevalent among adolescents with serious consequences. Evidence of effectiveness of psychological interventions for eating disorders in adolescents lacks a systematic synthesis of systematic reviews. The goal of this umbrella review is to summarize evidence from systematic reviews examining effects of psychological interventions for eating disorders targeting adolescents. Web of Science, PsycINFO and Cochrane Database of Systematic Reviews were searched for systematic reviews on effectiveness and/or efficacy of any psychological intervention aiming to treat eating disorders in terms of outcomes in adolescents (improvement of eating-disorder symptoms, weight restoration and treatment retention). The methodological quality of each study was assessed using AMSTAR 2. The original search identified 831 reviews, 9 of which were included in the overview of systematic reviews rated as having a low methodological quality. Predominant psychological interventions for EDs in adolescents are family-based interventions. The efficacy of cognitive behavioral therapy and third-wave treatments has been less researched. Anorexia nervosa and bulimia nervosa are the EDs that have been studied the most. This study provides evidence supporting the positive impact of psychological interventions on eating disorders in adolescents. Family based treatment is the most evidence-based psychological intervention. There is a need for high-quality systematic reviews as well as systematic reviews to examine if psychological interventions are effective for different eating disorders.

*Keywords:* ED; efficacy; evidence-based psychology; umbrella review.

## Resumen

*Eficacia de las Intervenciones Psicológicas en el Tratamiento de los Trastornos Alimentarios en Adolescentes: Una Meta-Revisión.* La prevalencia de los trastornos alimentarios es elevada entre los adolescentes con consecuencias graves. La evidencia de la eficacia de las intervenciones psicológicas para los trastornos alimentarios en adolescentes carece de una meta-revisión de revisiones sistemáticas. El objetivo de esta revisión paraguas es resumir la evidencia de las revisiones sistemáticas que examinan los efectos de las intervenciones psicológicas para los trastornos alimentarios en adolescentes. Se realizaron búsquedas en Web of Science, PsycINFO y Cochrane Database of Systematic Reviews de revisiones sistemáticas sobre la efectividad y/o eficacia de las intervenciones psicológicas para trastornos alimentarios en adolescentes (reducción de síntomas, restauración del peso y retención en el tratamiento). La calidad metodológica de cada estudio se evaluó mediante AMSTAR 2. En la búsqueda inicial se identificaron 831 registros, y 9 revisiones sistemáticas se incluyeron en la meta-revisión con una valoración de calidad metodológica baja. Las intervenciones psicológicas predominantes para los trastornos alimentarios en adolescentes fueron las intervenciones basadas en la familia. La eficacia de la terapia cognitivo-conductual y los tratamientos de tercera generación está menos estudiada. La anorexia nerviosa y la bulimia nerviosa son los trastornos alimentarios con mayor número de estudios. Hay evidencia del impacto positivo de las intervenciones psicológicas para los trastornos alimentarios en adolescentes. El tratamiento basado en la familia es la intervención psicológica con mayor evidencia. Se necesitan revisiones sistemáticas de mayor calidad, así como revisiones sistemáticas para examinar la eficacia de las intervenciones psicológicas para los distintos trastornos alimentarios.

*Palabras clave:* TCA; eficacia; psicología basada en la evidencia; revisión paraguas.

Eating disorders (EDs) such as anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), avoidant/restrictive food intake disorder (ARFID), other specified feeding or eating disorders (OSFED) and unspecified feeding or eating disorder (UFED) are mul-

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tifactorial serious psychopathological disorders characterized by significant alterations in eating behaviors and/or body weight (American Psychiatric Association, 2013). These disorders are associated with significant medical, psychopathological, and psychosocial complications and with an increased risk of disability, reduced quality of life, mortality and increased costs (Arcelus et al., 2011; Erskine et al., 2016; Hambleton et al., 2022; van Hoeken & Hoek, 2020).

EDs among adolescents are prevalent and the onset occurs typically in adolescence (Hoek, 2016; Keski-Rahkonen, 2021; Mitchison et al., 2020; Smink et al., 2012; Solmi et al., 2021; van Eeden et al., 2021). Moreover, disordered eating behaviors (e.g., overeating, restriction and purging) and significant shape/weight concerns are common in youth mental health primary care services (Burton et al., 2022). EDs are particularly prevalent among females (Martínez-González et al., 2020). Lifetime prevalence rates of AN are up to 4% among females and 0.3% among males, and regarding BN, up to 3% of females and more than 1% of males (van Eeden et al., 2021). Rates of BED range from 1% to 5% (Marzilli et al., 2018) and prevalence rates of ARFID in the general population remain largely unknown (Bryant-Waugh, 2019). It is crucial to provide prevention (Torres-Castaño et al., 2022), early detection (Bryant et al., 2022), early intervention (Nicula et al., 2022), specialized evidence-based effective treatments (Hornberger & Lane, 2021) and to involve patients, clinicians and researchers input to drive better outcomes (Babb et al., 2022; Wade et al., 2021).

International guidelines recommend psychological interventions as first-line treatment for EDs among adolescents. For example, the National Institute for Health and Care Excellence (NICE, 2020) recommends AN-focused family therapy (FT-AN) and if this therapy is unacceptable, contraindicated, or ineffective, individual eating-disorder-focused cognitive behavioral therapy (CBT-ED) or adolescent-focused psychotherapy for AN (AFP-AN) are suggested. For BN, BN-focused family therapy (FT-BN) is recommended and if it is unacceptable, contraindicated or ineffective, CBT-ED is recommended instead. For adolescents with BED the same treatments for adults are recommended (i.e., guided self-help, group CBT-ED or individual CBT-ED). Finally, for individuals with OSFED, it is suggested to use the treatments for the ED it most closely resembles. In the same line, the Canadian Practice Guidelines (Couturier et al., 2020) included strong recommendations for Family-Based Treatment (FBT), as well as care in a least intensive environment. Weak recommendations were determined for Multi-Family Therapy, CBT, AFP and adjunctive Yoga. In the United States, practice parameters have also been published (Lock & la Via, 2015) as well as in Australia/New Zealand (Hay et al., 2014) and Spain (Fonseca-Pedrero et al., 2021) supporting a family-based approach in an outpatient setting as the first-line treatment.

Research has yielded a significant increase in systematic reviews (SRs). To our knowledge, a synthesis of SRs of psychological treatments for EDs in adolescents has not been published. A previous overview of Cochrane systematic reviews of effectiveness of psychosocial interventions in EDs (Costa & Melnik, 2016) concluded that CBT was the most effective treatment, especially for BN, BED, and the night eating syndrome and the family approach for AN. However, this overview included participants of any age and was not focused on adolescents. Recently, a systematic meta-review of meta-analysis (MA) for the treatment of EDs (Monteleone et al., 2022) concluded that FBT is effective in adolescents with AN and BN. This umbrella review included exclusively MAs and did not focus on assessing the effectiveness of psychological treatments in adolescents with all ED diagnosis.

It is also important to note that previous general umbrella reviews on mental health in adolescents were published. Das et al. (2016) identified SRs on mental health interventions among adolescents and, recently, Correll et al. (2021) published an umbrella review of MA, on the efficacy and acceptability of pharmacological, psychosocial and brain stimulation treatments for mental disorders in children and adolescents. Results of this umbrella review indicated that family therapy outperformed other psychological interventions in AN regarding body weight. However, both umbrella reviews did not target exclusively the psychological treatment of EDs.

Therefore, the goal of this study is to summarize evidence from SRs examining effects of psychological interventions for adolescents with EDs. Particularly we aim (1) to identify which psychological interventions are being used for adolescents with EDs; (2) to examine if psychological interventions are effective on primary outcomes in adolescents (i.e., improvement of ED symptoms, weight restoration and treatment retention); and (3) to examine if psychological interventions are effective for different EDs.

## Method

### *Design and registration*

This overview of systematic reviews was conducted following the Preferred Reporting Items for Overviews of Reviews (PRIOR) (Pollock et al., 2021) and overview of reviews guidelines (Aromataris et al., 2020; López-López et al., 2022; Pollock et al., 2021). The protocol study was registered in PROSPERO database (ref: CRD42022349008).

### *Search procedures and eligibility criteria*

Publications (from inception up to 22 July 2022) were searched in Web of Science (which includes MEDLINE), PsycINFO and the Cochrane Database of Systematic Reviews (CDSR) to identify published SRs examining effects of psychological interventions for the treatment of EDs in adolescent population. There were no limitations on the start search date. The database searches were conducted independently by two authors and the reference lists of all included SRs were manually examined to identify other relevant articles.

The following search terms were combined (“adolesc\*”) OR (“teen\*”) OR (“youth”) OR (“child\*”) AND (“eating disorder\*”) OR (“disordered eating”) OR (“anorexi\*”) OR (“bulimi\*”) OR (“bing\*”) OR (“BED”) OR (“ARFID”) OR (“avoidant restrictive food intake disorder”) OR (“other specified feeding or eating disorders”) OR (“OSFED”) OR (“unspecified feeding or eating disorder”) OR (“UFED”) OR (“EDNOS”) OR (“eating disorder not otherwise specified”) AND (“treatment\*”) OR (“intervention\*”) OR (“therap\*”) OR (“psychotherap\*”) OR (“counsel\*ing”) AND (“systematic review”) OR (“systematic\*review”) OR (“meta analys\*”) OR (“meta\*analysis\*”).

Studies had to meet the following inclusion criteria: (1) articles clearly defined as a SR with or without meta-analysis. The publication needed to include a systematic literature search and a systematic study selection strategy; (2) published in peer-reviewed academic journals; (3) in English or Spanish; (4) that assessed the effectiveness and/or efficacy of any psychological intervention aiming to treat EDs in adolescents. If a SR extended beyond psychological interventions for EDs, the publication needed to report results separately; (5) in adolescents (age range must be up to 21 years old) with a diagnosis of ED (i.e., AN, BN, BED, EDNOS, ARFID, OSFED/UFED). If a SR extended beyond that age range, the publication needed to report results separately and; (6) outcomes of the SR must include a measure of improvement of eating disorders symptoms, weight restoration, and/or treatment retention.

The following exclusion criteria were used: (1) non-systematic reviews (e.g., narrative reviews, literature reviews, reviews with systematic literature search but without a systematic inclusion process, overviews, review protocols), guidelines and studies that involved primary data collection; (2) studies not published in peer-reviewed academic journals (e.g., grey literature); (3) published in other languages different from English or Spanish; (4) that did not evaluate psychological interventions (e.g. pharmacological, nutritional, exercise, surgery/deep brain stimulation, chiropractic, friluftsliv, etc.). SRs were also excluded if they focused mainly on topics different from effectiveness of psychological interventions on EDs (e.g. moderators, processes) or on preventive interventions; (5) if they did not target adolescents (e.g. other than participants up to 21 years old) with a diagnosis of AN, BN, BED, EDNOS, ARFID, OSFED/UFED (e.g. feeding problems, pica, rumination, adolescents at risk of EDs) and; (6) not reporting mainly on key outcomes on adolescents related to ED symptoms (e.g., secondary psychopathology, caregivers, etc.)

**Study selection and data extraction**

Titles and abstracts were independently screened by two reviewers for eligibility. Any disagreements on selection of SRs were resolved via discussion. Potentially eligible SRs were, then, extracted, and the two authors independently reviewed the full text. Any disagreement was resolved by discussion.

Data extraction involved two independent reviewers to avoid biases. Missing information was not obtained from the original

authors. Summary tables were made to synthesize the extracted information of included SRs. Information was extracted on: (a) Basic information; (b) Population(s) characteristics; (c) Interventions characteristics; (e) Primary outcome measures; (g) Risk of bias assessment for primary studies contained in each SR and; (h) Psychological treatment effects.

**Quality assessment**

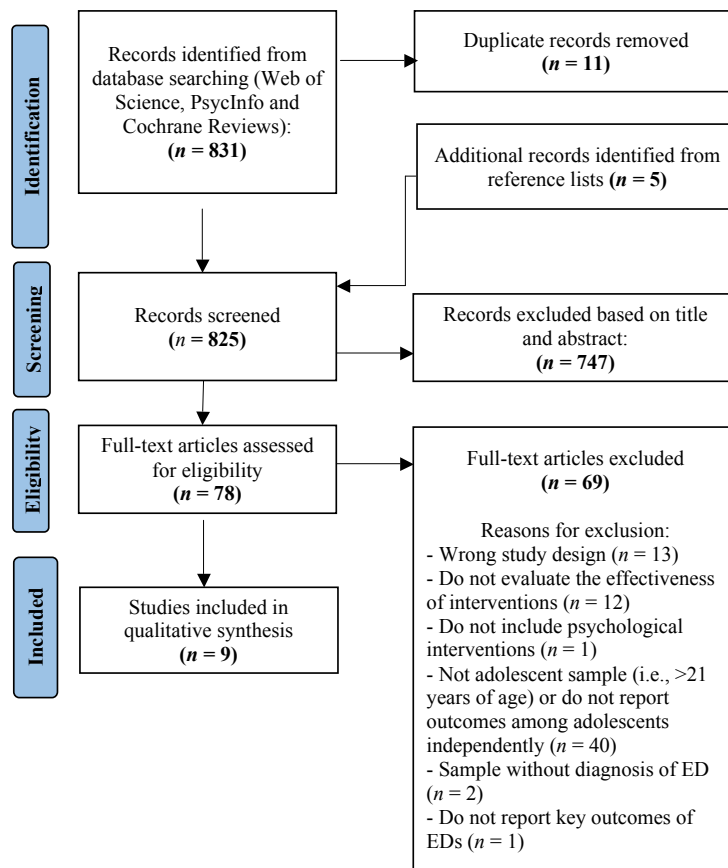
The methodological quality of each included SR was assessed using AMSTAR 2 tool (Shea et al., 2017) independently by two reviewers and disagreements were discussed. The tool includes different domains and provides guidance to rate the overall confidence of a review (high, moderate, low, or critically low depending on the number of critical flaws and/or non-critical weaknesses).

**Results**

**Identification of systematic reviews**

Search results are summarized in the PRISMA flowchart (Figure 1). The initial search identified a total of 831 records and 5 additional records from reference lists of included SRs. After duplicates were removed, a total of 825 records were screened based on title and abstract, and 747 studies were excluded. The remaining 78 were full-text reviewed, which resulted in the exclusion of 69 records and the inclusion of a total of 9 eligible SRs.

Figure 1. PRISMA flow chart



## Study characteristics

Table 1 describes the characteristics of each included SR. The 9 SRs were published between 2005 and 2021, and report findings from 207 studies (including 50 randomized clinical trials [RCTs]). Two of the SRs included contained only RCTs (Couturier et al., 2013; Tierney & Wyatt, 2005) and three included MA (Buerger et

al., 2021; Couturier et al., 2013; Zeeck et al., 2018).

Four SRs focused on AN (Alckmin-Carvalho et al., 2018; Strobel et al., 2018; Tierney & Wyatt, 2005; Zeeck et al., 2018) and one on AN or EDNOS/OSFED with a restrictive type (Richards et al., 2017). The remaining four included samples with different EDs (i.e., AN, BN, BED, EDNOS, OSFED, ARFID) (Buerger et al., 2021; Couturier et al., 2013; Isserlin et al., 2020; Vogel et al., 2021).

Table 1. Characteristics of systematic reviews included

Authors (year)	Aims	Search strategy: Names of databases; date ranges of databases searched	Number and type of studies included.	Participants' characteristics: Total number of participants ( <i>N</i> ); population criteria; ED diagnosis; mean age ( <i>M</i> ); sex (% female); country	Interventions characteristics: a) Type (e.g., FBT, CBT...); b) Setting (e.g., outpatient, day-care, inpatient); c) Duration range	Outcome measures
Buerger et al. (2021)	To estimate the efficacy of third-wave interventions to reduce ED symptoms in adolescents in RCTs and uncontrolled studies	PubMed (1976-January 2021), PsycINFO (1943-January 2021), and Cochrane database (1995-January 2021)	<i>N</i> = 12 RCTs ( <i>n</i> = 2) and uncontrolled pre-post studies ( <i>n</i> = 10)	<i>N</i> = 487 Participants aged 11-21 years old with EDs Transdiagnostic ( <i>n</i> = 10) BN ( <i>n</i> = 1) and EDNOS ( <i>n</i> = 1) <i>M</i> years = 15.6 Female = 97.3% Country = NR	a) Combination of ACT+FBT = ( <i>n</i> = 1) and DBT ( <i>n</i> = 11) b) Outpatient ( <i>n</i> = 8), day-care + outpatient ( <i>n</i> = 1), day-care ( <i>n</i> = 1) and inpatient ( <i>n</i> = 2) c) From 8-12 sessions over 3 months, to 77 sessions of combined day-care/ outpatient	ED symptoms
Vogel et al. (2021)	To summarize and analyze the current literature on the feasibility, acceptability, effectiveness, and efficacy of CBT and DBT for EDs in adolescents	PsycINFO and PubMed through December 2020.	<i>N</i> = 50 10 RCTs ( <i>n</i> = 10), secondary analysis of RCT ( <i>n</i> = 9), cohort study ( <i>n</i> = 23), case study ( <i>n</i> = 7) and observational cross-sectional study ( <i>n</i> = 1)	<i>N</i> = 2806 Participants aged 11-23 years old with EDs AN ( <i>n</i> = 18), BN ( <i>n</i> = 14), BED ( <i>n</i> = 4), Transdiagnostic ( <i>n</i> = 10), ARFID ( <i>n</i> = 3) and restrictive EDs ( <i>n</i> = 1) <i>M</i> years = 16.04 Females = NR Country = NR	a) CBT ( <i>n</i> = 40) and DBT ( <i>n</i> = 10) b) Outpatient ( <i>n</i> = 35), guided self-help ( <i>n</i> = 5), inpatient ( <i>n</i> = 5) and partial hospitalization ( <i>n</i> = 5) c) 2-12 months	ED psychopathology ( <i>n</i> = 22), and /or behaviors ( <i>n</i> = 15) and weight ( <i>n</i> = 12)
Isserlin et al. (2020)	To explore the scope and benefits of psychological treatments provided to children and adolescents with EDs in inpatient settings at the time of hospital discharge	Medline, PsycINFO, EMBASE, Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials and CINAHL up to March 2017. From March 2017 up until November 2018 a forward citation chaining process was completed to search if each article included had been cited by additional articles	<i>N</i> = 66 Case series ( <i>n</i> = 26), case control ( <i>n</i> = 17), case report ( <i>n</i> = 22) and RCTs ( <i>n</i> = 1).	<i>N</i> = 2684 Participants up to 18 years old with EDs AN ( <i>n</i> = 57), mixed EDs ( <i>n</i> = 3), BN ( <i>n</i> = 1), ARFID ( <i>n</i> = 3) and restrictive EDs ( <i>n</i> = 2). <i>M</i> years = NR Females = NR Country = NR	a/b) Inpatient ( <i>n</i> = 51): integrative ( <i>n</i> = 20), FBT or CBT ( <i>n</i> = 6), BT ( <i>n</i> = 14), PD ( <i>n</i> = 2), pediatric unit ( <i>n</i> = 2), mixed EDs ( <i>n</i> = 3), specifically BN ( <i>n</i> = 1) and FBT or CBT or BT for ARFID ( <i>n</i> = 3). Combined inpatient/day treatment ( <i>n</i> = 5). Adjunctive treatments ( <i>n</i> = 10): CRT ( <i>n</i> = 4), multifamily/parent group ( <i>n</i> = 1), bright light ( <i>n</i> = 1), meal support ( <i>n</i> = 3), selective versus non-selective menus ( <i>n</i> = 1) c) 6-240 days	Weight, symptom change and change in motivation
Alckmin-Carvalho et al. (2018)	To describe the evidence-based psychological interventions in the literature for the treatment of AN in childhood and adolescence	PubMed, PsycINFO and Cochrane between 1990 and 2015.	<i>N</i> = 14 Open trial ( <i>n</i> = 4), RCTs ( <i>n</i> = 9) and open trial + RCT ( <i>n</i> = 1).	<i>N</i> = 892 Participants from 11 to 20 years old with diagnosis of AN <i>M</i> years = 13.9-18.45 Females: NR United States ( <i>n</i> = 7), England ( <i>n</i> = 3), Brazil ( <i>n</i> = 1).	a) PD ( <i>n</i> = 3), systemic ( <i>n</i> = 1), CBT ( <i>n</i> = 3) and FBT ( <i>n</i> = 7) b) NR c) 9-48 sessions	Symptoms of AN and family functioning

Authors (year)	Aims	Search strategy: Names of databases; date ranges of databases searched	Number and type of studies included.	Participants' characteristics: Total number of participants ( <i>N</i> ); population criteria; ED diagnosis; mean age ( <i>M</i> ); sex (% female); country	Interventions characteristics: a) Type (e.g., FBT, CBT...); b) Setting (e.g., outpatient, day-care, inpatient); c) Duration range	Outcome measures
Strobel et al. (2018)	To give an overview of existing studies on the short- and long-term outcome for males treated for AN	PubMed, PsycINFO and PSYINDEX until May 22, 2018	<i>N</i> = 7 (adolescents)	<i>N</i> = 119 Males with AN <i>Myears</i> = 15.2 Country: NR	a) NR b) Inpatient ( <i>n</i> = 6) and mixed in/outpatients ( <i>n</i> = 1) c) 0.5 weeks-6.5 months	Weight, ED symptoms and mortality
Zeeck et al. (2018)	To review studies evaluating psychotherapeutic treatment approaches in AN and to compare their efficacy.	PubMed, Cochrane Library, Web of Science, Cinahl, PsycINFO, ClinicalTrials.gov and ICTRP until February 2017.	<i>N</i> = 14 (adolescents) RCTs ( <i>n</i> = 10) and naturalistic studies ( <i>n</i> = 4)	<i>N</i> = 1513 Participants with AN <i>Myears</i> = 15.2 Females = NR Country: NR	a) Treatment arms: FT-AN ( <i>n</i> = 11), FST ( <i>n</i> = 1), MFT ( <i>n</i> = 1), complex treatments ( <i>n</i> = 9), PD ( <i>n</i> = 2), CBTE ( <i>n</i> = 1) b) Outpatient ( <i>n</i> = 8), inpatient ( <i>n</i> = 3), outpatient vs inpatient ( <i>n</i> = 1), inpatient vs in/outpatient ( <i>n</i> = 1) and inpatient vs day hospital ( <i>n</i> = 1). c) nr	Weight gain
Richards et al. (2017)	To systematically review the literature reporting outcomes of augmentative FBT interventions for adolescents with restrictive EDs	PsycINFO, EMBASE, MEDLINE, CINAHL and Cochrane Database of Randomized Controlled Trials since inception to 21 March 2017	<i>N</i> = 30 RCTs or controlled clinical trials ( <i>n</i> = 10), cohort analytic studies ( <i>n</i> = 4), single cohort studies ( <i>n</i> = 14) and case series ( <i>n</i> = 2)	<i>N</i> = 1372 Adolescents aged <19 years old diagnosed with AN or EDNOS/OSFED with a restrictive type <i>Myears</i> = 12.8-17.7 Females = 87%-100% Country = NR	a/b) IOP ( <i>n</i> = 2), modified MFT ( <i>n</i> = 1), FBT-day program ( <i>n</i> = 3), FBT-E ( <i>n</i> = 1), FBT + individual therapy and Maudsley MFT ( <i>n</i> = 1), FBT,PHP and IOP ( <i>n</i> = 2), FBT + CBT for perfectionism ( <i>n</i> = 1), parents act now online FBT ( <i>n</i> = 1), Maudsley MFT for AN (modified structure) ( <i>n</i> = 1), FBT partial hospitalization ( <i>n</i> = 2), combination separated/conjoint FBT ( <i>n</i> = 1), short-term intensive FBT ( <i>n</i> = 1), separated FT ( <i>n</i> = 3), Maudsley MFT for AN ( <i>n</i> = 3), short-term FBT ( <i>n</i> = 3), adaptive FBT with intensive family coaching ( <i>n</i> = 1), parent-focused FBT ( <i>n</i> = 1), single/multi-family short-term intensive FBT ( <i>n</i> = 1) and parent-to-parent consultation ( <i>n</i> = 1) c) 7-8 weeks to 12 months	Weight, ED symptomatology, recovery and remission rates
Couturier et al. (2013)	To systematically review and quantitatively evaluate the efficacy of FBT compared with individual treatment among adolescents with EDs	Cochrane Database of Systematic Reviews, MEDLINE, Cochrane database of controlled trials and the meta Register of Controlled Trials Date ranges: nr	<i>N</i> = 6 RCTs	<i>N</i> = 369 Adolescents aged 11–20 years old diagnosed with EDs AN ( <i>n</i> = 4), BN/EDNOS ( <i>n</i> = 2) <i>Myears</i> = NR Females = NR Country = NR	a) FBT vs individual therapy ( <i>n</i> = 6): individual therapy, EOIT, CBT, supportive psychotherapy, self-guided CBT, and AFT. b) Outpatient c) 9-12 months	Remission defined in several ways: absence of ED criteria, weight attainment, abstinence from binge eating and purging.



Authors (year)	Aims	Search strategy: Names of databases; date ranges of databases searched	Number and type of studies included.	Participants' characteristics: Total number of participants ( <i>N</i> ); population criteria; ED diagnosis; mean age ( <i>M</i> ); sex (% female); country	Interventions characteristics: a) Type (e.g., FBT, CBT...); b) Setting (e. g., outpatient, day-care, inpatient); c) Duration range	Outcome measures
Tierney & Wyatt (2005)	To determine the effectiveness of psychosocial interventions for adolescents with AN	PubMed, ASSIA, Caredata, The Cochrane Library, Web of Science, PsycINFO, EMBASE, CINAHL, the British Nursing Index and SIGLE pre 2004.	<i>N</i> = 8 RCTs	<i>N</i> = 217 Adolescents (11-18 years of age) with AN All female ( <i>n</i> = 5), female/male ( <i>n</i> = 2) and unclear ( <i>n</i> = 1). Country: NR	a) CFT vs SFT ( <i>n</i> = 1), FT vs FGT ( <i>n</i> = 1), relaxation vs desensitization vs standard care ( <i>n</i> = 1), FT vs FC ( <i>n</i> = 1), BFST vs EOIT ( <i>n</i> = 1), FT vs IST ( <i>n</i> = 1), Videofeedback vs no videofeedback ( <i>n</i> = 1) and BAT+FT vs FT only ( <i>n</i> = 1) b) NR c) NR	Psychosocial outcomes and weight

Note. ACT: acceptance and commitment therapy; AFT: focused individual therapy; AN: anorexia nervosa; ARFID: avoidant/restrictive food intake disorder; BED: binge eating disorder; BFST: behavioral family systems therapy; BN: bulimia nervosa; BT: behavior therapy; CBT: cognitive behavior therapy; CBTE: cognitive-behavior therapy enhanced; CFT: conjoint family therapy; CRT: cognitive remediation therapy; DBT: dialectical behavior therapy; ED: eating disorder; EDNOS: eating disorder not otherwise specified; EOIT: ego orientated individual therapy; FBT: family-based therapy; FBT-E: exposure-based family therapy; FC: family counseling; FGT: family group psychoeducation; FST: family systems therapy; FT: family therapy; FT-AN: family-based treatment for anorexia nervosa; ICTRP: International Clinical Trials Registry Platform of the World Health Organization; IMT: inpatient multimodal treatment; IOP: intensive outpatient program IST: individual supportive therapy; MFT: Multi family therapy; NR: not reported; OSFED: other specified feeding or eating disorders; PD: psychodynamic therapy; PHP: partial hospitalization program; RCTs: randomized controlled trials; SFT; separate family therapy.

### Characteristics of psychological interventions

Among the four SRs with mixed ED samples, one evaluated the effectiveness of third-wave interventions (Buerger et al., 2021) in which eleven studies implemented DBT and just one study included a combination of acceptance based family treatment. One SR analyzed CBT and DBT (Vogel et al., 2021) while another evaluated FBT (Couturier et al., 2013). Finally, one SR exclusively explored the efficacy of inpatient psychological treatments with a considerably heterogeneity in the types, goals of treatment, outcome measures and duration of the stay (Isserlin et al., 2020).

Among AN/restrictive type SRs, all concluded that the predominant interventions were family-based. Alckmin-Carvalho et al. (2018) included psychodynamic, systemic and cognitive-behavioral approaches (FBT is included in this group) and the CBT approach was the most common approach (10 out of 14 of the studies included). In

the same line, Zeeck et al. (2018) included different psychotherapeutic treatment approaches though the type of treatment most tested was FBT. Richards et al. (2017) reported FBT augmentative approaches featuring adjunctive treatment components, modified treatment structure and/or content and delivery adaptations. Finally, Tierney & Wyatt (2005) concluded that the majority of studies focused on family-related interventions and Strobel et al. (2018) found that knowledge on the outcome of males treated for AN is scarce and inconclusive.

The duration of treatment reported varied considerably from 2-12 months. One SR reported that length varied from 9 to 48 sessions, and more than half of the interventions were structured with 20 or more sessions (Alckmin-Carvalho et al., 2018). Mean length of inpatient stay duration ranged from 6-240 days (Isserlin et al., 2020). To assess the effects of psychological interventions, the outcome measures most frequently reported were weight restoration and ED symptom improvements.

Table 2. Summary of results

Authors (year)	Risk of bias	Main Findings	Meta-analysis
Buerger et al. -2021	Moderate ( <i>n</i> = 1) and weak quality ( <i>n</i> = 11).	Treatments focused strongly on DBT and resulted in moderate to large improvements in ED symptoms in all but two studies. Drop-out rates ranged 3.2-36.3%.	Seven studies met inclusion criteria for MA. An overall moderate effect size of third-wave therapies on ED symptoms was found ( $d = -0.67$ ; $z = -6.99$ $C95\%I = -0.87$ to $-0.47$ ). Significant heterogeneity emerged (Cochran's $Q$ = $17.56$ $df = 6$ , critical value = $12.592$ ; $I^2 = 0.65$ ) and results were likely influenced by differences between studies.
Vogel et al. (2021)	Good ( <i>n</i> = 18), fair ( <i>n</i> = 23) and poor quality ( <i>n</i> = 2). Case reports: include ( <i>n</i> = 7), exclude ( <i>n</i> = 0), seek further information ( <i>n</i> = 0)	CBT and DBT interventions have good feasibility and acceptability, but data establishing effectiveness and efficacy compared to other approaches were mixed or incomplete.	Not performed

Authors (year)	Risk of bias	Main Findings	Meta-analysis
Isserlin et al., (2020)	High risk of bias for all included studies	The most consistently reported positive outcome of inpatient treatment was weight gain. Results related to symptom change and motivation varied between studies. The significant heterogeneity between studies makes it not possible to carry out a meta-analysis. High-quality studies in an inpatient setting are needed.	Not performed
Alckmin-Carvalho et al. (2018)	No tool of risk of bias performed. Methodological limitations were identified: lack of description regarding inclusion/exclusion criteria, loss of a significant number of participants (> 25%), lack of clarity regarding the remission criteria, difficulty in randomization, confounding variables and non-probabilistic samples. Only in one study were no methodological limitations found.	The type of treatment most tested was FBT and most of the studies were conducted in the United States and England. RCTs were the most frequent design. Half of the interventions structured in 20 or more sessions. Interventions involving the family members seem to be more effective. Modest rates for complete remission.	Not performed
Strobel et al. (2018)	Not reported	Outcome and mortality differed widely across studies with no firm evidence for gender differences. Studies rarely compared the genders statistically, and non-significant results were found when compared.	Not performed
Zeeck et al. (2018)	High ( $n = 3$ ), moderate ( $n = 7$ ) and low quality ( $n = 4$ )	Predominant interventions for adolescents are family-based in outpatient settings and individual interventions for adults. Hospital treatment in adolescents includes also family-oriented interventions. There was no superiority of a specific psychotherapeutic approach. Weight gains are larger in adolescents.	Network meta-analysis was performed comprising five studies. The test of inconsistency between designs was significant ( $Q = 13.9$ , $df = 3$ , $p = 0.0031$ ). The maximum distance between nodes (indirect comparisons) was $maxD = 4$ . Only two connections were investigated more than once. This network comprised two weakly connected subnets (family treatment studies vs. studies on complex settings). The forest plot of effect sizes showed insignificant differences among different psychological treatments. Heterogeneity of effect sizes was not significant ( $Q = 2.797$ ; $df = 2$ ; $p = 0.247$ ). SMC analysis was performed to know the expected amount of weight gain among adolescents (four studies). The SMC statistics were integrated by study type (RCT vs naturalistic study) and age of the sample (adult vs. adolescent). The estimated mean effect sizes were higher in adolescent samples (SMC RCTadults = 1.02 [CI95: 0.91;1.13], [Q = 81.2; $df = 25$ ; $p < 0.0001$ ] vs. SMC RCTadolesc = 1.97 [CI95: 1.85;2.10],[Q = 69.58; $df = 18$ ; $p < 0.0001$ ] and SMCnatur_adults = 1.42[CI95: 1.30;1.55], [Q = 92.83; $df = 13$ ; $p < 0.0001$ ] vs. SMCnatur_adolesc = 1.84 [CI95: 1.64;2.05], [Q = 19.02; $df = 3$ ; $p < 0.0003$ ])

Authors (year)	Risk of bias	Main Findings	Meta-analysis
Richards et al. (2017)	Strong ( $n = 2$ ), moderate ( $n = 14$ ) and weak quality ( $n = 14$ ).	All the studies reported on there being early evidence for the effectiveness of FBT augmentations in facilitating weight and/or ED symptom improvements for adolescents with restrictive EDs but there is a lack of robust evidence demonstrating superior effects of such approaches over standard FBT, and further controlled studies are required.	Not performed
Couturier et al. (2013)	Not reported	FBT does not appear to be superior to individual treatment at end of treatment, but FBT was superior to individual treatment at 6–12-month follow-up.	Three studies met inclusion criteria for MA. Remission was the outcome of choice. FBT was not significantly different from individual treatment at the end of treatment ( $z = 1.62, p = 0.11$ ). FBT was superior to individual treatment from 6 to 12-month follow-up ( $z = 2.94, p < 0.003$ ), and heterogeneity was not significant ( $p = 0.59$ ).
Note.; CBT: cognitive behavior therapy; DBT: dialectical behavior therapy; ED: eating disorder; FBT: family-based therapy; MA: meta-analysis; SMC: standardized mean change; RCTs: randomized controlled trials. Tierney & Wyatt (2005)	Not reported	The majority of studies focused on family-based interventions. Clear recommendations could not be made because of a lack of robust primary research. More good quality research is required (range of interventions and larger samples)	Not performed

Note.; CBT: cognitive behavior therapy; DBT: dialectical behavior therapy; ED: eating disorder; FBT: family-based therapy; MA: meta-analysis; SMC: standardized mean change; RCTs: randomized controlled trials.

### Efficacy of psychological interventions

All SRs presented a narrative synthesis of findings and three performed MA (Buerger et al., 2021; Couturier et al., 2013; Zeeck et al., 2018) (see Table 2).

In general, the SRs reported effectiveness of psychological interventions for EDs among adolescents though the majority of studies included had low or moderate quality. The type of treatment most tested was FBT (Alckmin-Carvalho et al., 2018; Couturier et al., 2013; Tierney & Wyatt, 2005; Zeeck et al., 2018). Family approach was found superior in comparison with individual treatment at follow up (Couturier et al., 2013) and there is a lack of robust evidence demonstrating superior effects of FBT augmentations over standard FBT (Richards et al., 2017). Among third-wave interventions, studies focused strongly on DBT, with a moderate improvement in ED symptoms though results were likely influenced by differences between studies (Buerger et al., 2021). Both CBT and DBT approaches show rates of attrition similar to FBT trials but there is no data to establish effectiveness and efficacy compared to leading approaches (Vogel et al., 2021). In an inpatient setting (Isserlin et al., 2020) the most consistently reported outcome was weight gain, there was heterogeneity among studies and high-quality studies are needed to carry out a meta-analysis.

### Quality of systematic reviews included

The methodological quality of SRs included is presented in Table 3. All were classified with critically low-quality using AMSTAR-2 mainly due to the inexistence of a pre-registration, the lack of an exhaustive bibliographic search and the inexistence of a list of studies excluded.

### Discussion

This meta-review synthesized the results of SRs on the efficacy of psychological interventions for EDs in adolescents. The initial review questions were: (1) which psychological interventions are being used for adolescents with EDs?, (2) what is the evidence from SRs examining effects of psychological interventions for reducing ED symptoms?, and (3) what is the reported effectiveness of psychological interventions for different EDs?.

First, the predominant psychological interventions for adolescents with EDs are family-based interventions. In fact, FBT is recommended in international guidelines as a first-line treatment for AN and BN (Couturier et al., 2020; NICE, 2020). In the same line, a recent overview for the treatment of EDs (Monteleone et al., 2022) concluded that FBT is effective in adolescents with AN and BN, and in a recent umbrella review for mental disorders in adolescents (Correll



Table 3. Risk of bias of systematic reviews included

Study	AMSTAR-2 items																Quality rating
	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Item 15	Item 16	
Buerger et al. (2021)	+	+	-	+/-	+	+	-	+	+	-	+	+	+	+	+	+	Critically Low
Vogel et al. (2021)	+	-	-	+/-	+	-	-	+	+	-	NM	NM	+	+	NM	+	Critically low
Isserlin et al. (2020)	+	+/-	-	+/-	+	-	-	+	+	-	NM	NM	+	+	NM	+	Critically low
Alckmin-Carvalho et al. (2018)	+	-	-	+/-	+	-	-	+	-	-	NM	NM	-	+	NM	+	Critically low
Strobel et al. (2018)	+	-	-	+/-	-	-	-	+	-	-	NM	NM	-	+	NM	+	Critically low
Zeeck et al. (2018)	+	-	+	+/-	+	+	+	+	+	-	+	+	+	+	+	+	Critically Low
Richards et al. (2017)	+	-	-	+/-	+	+	-	+	+	-	NM	NM	+	+	NM	-	Critically low
Couturier et al. (2013)	+	-	-	+/-	+	+	+	+	+	-	+	+	+	+	+	-	Critically low
Tierney and Wyatt (2005)	+	-	-	+/-	+	-	-	+	-	-	NM	NM	-	+	NM	-	Critically low

Note. Yes: +; Partial Yes: +/-; No: -; No meta-analysis: NM

et al., 2021), family therapy was found to outperform other interventions in AN regarding body weight.

The effectiveness of CBT in the treatment of EDs among adolescents is less well-studied. The SR published by Vogel et al. (2021) supports the feasibility and acceptability of CBT and it is considered to be possibly effective across diagnoses and levels of care, but evidence is still preliminary and efficacy studies that systematically compare CBT to other evidence-based approaches are needed. In fact, NICE guidelines for EDs among adolescents (NICE, 2020) recommend CBT for AN and BN (if FBT is unacceptable, contraindicated or ineffective) and BED. In the Canadian Practice Guidelines (Couturier et al., 2020), weak recommendations were determined for CBT.

Although there are a variety of third-wave therapies, DBT has been the most widely studied for adolescents with EDs and nowadays it is not possible to assess the overall efficacy of third-wave interventions. Buerger et al. (2021) found a total of 12 studies, 11 of which assessed the effectiveness of DBT elements. An overall moderate effect size on ED symptoms was found and the effects appeared to be stronger in adolescents with BN and BED. However, studies were predominantly uncontrolled pre-post trials of low quality.

It is important to note that there is a difference between the number of studies investigating the efficacy and effectiveness of CBT and third-wave treatments for EDs in adolescents compared to adults. For example, three MA have analyzed the efficacy of third-wave therapies for EDs among patients over 18 years (Godfrey et al., 2015; Lenz et al., 2014; Linardon et al., 2017) versus one MA in adolescence (Buerger et al., 2021) and the study quality is higher in the adult studies while in adolescence a weak quality is predominant. There is a lack of SRs and MA on the efficacy of third-wave therapies different from DBT, as well as other emerging treatments such as neurocognitive treatments or technology based psychological interventions. Regarding EDs, BN is less studied than AN and there is a lack of SRs for BED, ARFID or ORFED/OSFED and the efficacy for this diagnosis could not be synthesized. Finally, SRs mainly focused on females and there is a need to address the treatment outcome of EDs in males and across specific populations.

The use of different treatment settings (i.e. inpatient, outpatient, day-care) is also highlighted. Family-based approach per definition is delivered in an outpatient setting and a previous SR concluded that in the absence of medical instability, there is no benefit of inpatient and day treatment over outpatient care (Madden et al., 2015). However, many adolescent require inpatient treatment during the course of the ED (Isserlin et al., 2020). A recent review (Haas et al., 2021) compared RCTs of outpatient family-based or inpatient multimodal treatment followed by outpatient care in youths with AN, but the comparison of studies was of limited scientific validity due to differences in participants and methodology (Haas et al., 2022).

This overview presents some limitations. First, grey literature was not searched. Second, reviews with a systematic literature search but without a systematic selection and data collection processes were excluded (e.g. Brockmeyer et al., 2017; le Grange et al., 2005; Lock et al., 2015) as well as SRs that included participants of any age (e.g. Fisher et al., 2019). Third, requests to review authors to retrieve missing information were not made. Fourth, the SRs and meta-analysis included, in some cases, have included the same studies and have been considered more than once. Finally, the SRs included were of critically low quality, which weakens the evidence of the results reported. Therefore, SRs of higher quality are required to improve the quality of evidence-based psychological treatments for EDs among adolescents.

To conclude, this study offers an overview to appraise the quality of research synthesis in the field of psychological treatments for EDs in adolescents. Three questions have been examined that benefit from the use of SRs as analysis units. Family based interventions are the most studied psychological interventions for adolescents with AN and BN while other approaches like CBT or DBT show preliminary efficacy. While AN is the most studied, there are less studies evaluating the efficacy of psychological treatments for BN in adolescence. Moreover, further research is needed to analyze the effectiveness of psychological interventions for other EDs among adolescents (e.g., BED, ORFID, OSFED) and for males and specific youth. Finally, the methodological quality of SRs is low, which weakens the evidence, and future high-quality studies and SRs are needed.

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## Conflict of interests

The authors of this study declare that there is no conflict of interest.

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