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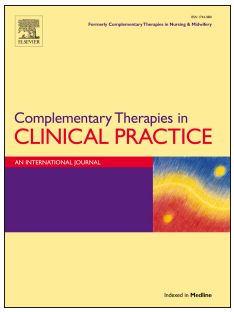

Body-oriented therapies for the treatment of eating disorders: A systematic review

Grace Lucas, Jacqueline Sin, Erica Cini, Frank Röhricht

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Body-oriented therapies for the treatment of eating disorders: A systematic review

Grace Lucas[a] (corresponding author)

Grace.lucas@citystgeorges.ac.uk

0000-0001-5941-5233

Jacqueline Sin[a]

Jacqueline.sin@citystgeorges.ac.uk

ORCID ID: 0000-0003-0590-7165

Erica Cini [bcd]

ecini@nhs.net

ORCID ID: 0000-0003-0999-2379

Frank Röhricht[b]

frank.rohricht@nhs.net

ORCID ID: 0000-0001-7487-7970

[a] City St George's, University of London, Northampton Square, London, EC1V 0HB, UK

[b] East London NHS Foundation Trust, Robert Dolan House, Trust Headquarters, 9 Alie Street, London, E1 8DE, UK

[c] King's College London, Strand, London, WC2R 2LS

[d] University College London, Gower Street, London WC1E 6BT, UK

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Body-oriented therapies for the treatment of eating disorders: A systematic review

Abstract

Background and Purpose

People with eating disorders often experience disturbances of body experience across the domains of cognition, affect and perception. Some body-oriented therapies (BOT) – body-oriented psychological therapies (BOPT) and holistic body-oriented therapies (HBOT) – aim to improve mind-body connection and body experience and help people feel differently about managing their eating behaviours. This review aimed to identify and describe these BOT for eating disorders, investigate their effects and explore patients' experiences.

Methods

A systematic review following PRISMA guidelines was conducted. Nine databases were systematically searched. Included studies focused on BOT used to treat people with an ED diagnosis. Joanna Briggs Institute's (JBI) Critical Appraisal Checklists were used to assess quality of included studies. Qualitative data on participants' experiences of BOT were synthesised using thematic synthesis and heterogeneous quantitative data synthesised narratively.

Results

21 BOT studies were included. Three out of four RCTs showed some reduction in eating disorder symptoms, improved attitude towards the body and emotional regulation. Other quantitative studies reported improvements including emotional regulation, interoceptive awareness, body perception, and ED symptomatology. Qualitative data found positive impact on participants' subjective body experience. Variable study quality means caution is needed to interpret the impact of BOT on any outcomes.

Conclusion

BOT involve practice which takes time and requires repetition to make a longer term or meaningful difference to participants' bodily experience and mind-body connection. Measures designed with a 'top-down' approach to understanding mental health might miss out on some of the embodied experiences that BOT are able to positively influence.

Keywords

eating disorders; anorexia nervosa; bulimia nervosa; binge eating disorder; other specified feeding or eating disorder; body-oriented therapy

1. Introduction

1.1 Background and rationale

Eating disorders (ED) are a major public health concern with significant psychological, socio-economical, and physical health consequences [1]. In England, NICE guidelines for children (aged ≤12), young people (13-17), and adults with eating disorders identify the core eating disorder types as Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge Eating Disorder (BED) and Other Specified Feeding or Eating Disorder (OSFED) [2].

For any of the four core disorders, recommended therapeutic approaches include guided self-help, cognitive behavioural therapy, and family therapy. The quality of the research evidence supporting recommended therapies is mixed [2] and poor treatment response is common [3]. ED remission rates are low, particularly in adults (BN: 30%; AN: 25%- 33% [adolescents], 0–25% [adults]) [4-6]. People with an ED are often trapped in a long-term cycle of treatment, symptom remission and relapse [7]. New treatment approaches are urgently required [3, 8].

Eating disorders often involve profound disturbances of body experiences across the domains of cognition, affect and perception [9]. Significant body dissatisfaction is one of the core psychopathological symptoms [10, 11]. Body image disturbances (BID) which affect body size perception [12-14] are diagnostically significant features in AN, BN and OSFED [15, 16] and their presence is associated with worse prognosis [17, 18]. Malighetti et al. [19] found 'deficits' in interoception (perceptions of sensations in the body) [20] – and proprioception (perception of where the body is in terms of its location and movement) [21] – in people with AN and BN. Gaudio et. al [22] described that AN patients had a multisensory impairment of body perception involving, ‘tactile and proprioceptive sensory components’ (p.1). Theoretically, the concept of embodiment, which focuses on the body as the centre of experiencing the world, considers the broader sense of how it feels and what it means to be and have a body [13, 23-25]. This concept has been useful to those offering interdisciplinary perspectives on the problem patients have with their own body in ED [25, 26]. Indeed, AN has been conceived as a possible disturbance or 'conflict' of embodiment [27] (p.109), with particular reference towards taking an objectifying stance towards one’s own bodily existence (body as object versus ‘first-person experience of oneself as a spatiotemporal embodied agent’ [28] (p. 364)). Accordingly, clinically validated scales have been designed to examine disordered embodied experiences [29, 30].

There are a range of therapies that focus on improving body experience in people with eating disorders. These have interchangeable definitions in the literature [31] but, in the broadest sense, 'body-oriented approaches… aim to provide opportunities to become aware of the body, the body in relation to others, and the connection between body and emotions' [32] (p.2). Whilst all these interventions are 'oriented' to the body there are distinct differences in their theoretical underpinnings and aims and therefore how they might impact or address disordered embodiment as a result. Some of these therapies that work cognitively or top-down on body perceptions include mirror exposure therapy [33, 34] and virtual reality interventions [35] and these have potential to be helpful for improving body image in people with eating disorders [36] [37]. Body-oriented Psychological Therapies (BOPT), which are mostly within a psychodynamic understanding of development and therapy [38] and include body psychotherapy, [39] dance movement psychotherapy [40], and sensorimotor therapy [41], specifically address emotion regulation, perceptual body awareness, psychophysiological processes and self-expression (nonverbal communication, gestures, etc.) in the context of an intervention strategy aiming at psychological change process. BOPT have been used successfully in treating other mental illnesses [42-44]. Other body-oriented therapies, use physical modalities such as aerobic exercise, the Alexander Technique, the Feldenkrais Method, osteopathy, massage work or yoga [45, 46] and are applied either to and with the body [31] with the aim of 'improv[ing] the person's physical and psychological well-being' [47] (p.2). Within this category of interventions some of these therapies have the specific goal of promoting integration of psyche and soma [48] and, in effect, share a 'stated purpose' of mind-body integration [48] with BOPT, but do not include a psychological component. These interventions, which we define here as holistic body-oriented therapies (HBOT), are conceptualised or theorised within a holistic rather than purely cognitive or physical/physiological framework – for example embodiment or phenomenology – and their defined purpose is to help people with eating disorders feel more at-ease and connected with their bodies, and, as a result, feel differently about managing their eating behaviours [49]. A focus on mind-body integration is crucial given that recovery from eating disorders from a subjective perspective has been defined by those with an eating disorder as being 'whole again'[50].

Previous systematic reviews have looked at movement, body techniques and yoga for eating disorders [51, 52], body-experience and therapeutic approaches for anorexia [53], and BOPT in the prevention of eating disorders [54]. However, to our knowledge, no recent comprehensive and inclusive review of BOPT and body-oriented interventions with the shared intention of mind-body integration in treating eating disorders has been conducted, nor is there a comprehensive review on

how people with eating disorders subjectively feel about their mind-body connection and bodily experience because of these therapies. Given the growing evidence about the importance of disturbance in body experience, it is important to evaluate the relevant body-oriented therapeutic approaches that intend to address this. Indeed, with the acknowledged importance of the affective and perceptual elements of body experience, and a lack of research in this area [55], a qualitative review of lived experience is essential as part of a review on how these therapies work.

1.2 Objectives

This study aimed to conduct a comprehensive systematic review of studies of BOT for young people and adults with eating disorders. The review aimed to establish the effects of body-oriented interventions (BOPT or HBOT) on individuals affected by ED. Using a comprehensive research method we also aimed to review the intervention content, theoretical underpinning, design and features of body-oriented therapies targeting eating disorders; the tools and outcome measures used to assess their impact and explore subjective acceptability and the experiences of body-oriented interventions from the service users/patients' perspectives.

2. Materials and Methods

We published this systematic review protocol [56] in PROSPERO (International Prospective Register of Systematic Reviews)[57]. The review process followed PRISMA guidelines [58].

2.1 Eligibility criteria

The inclusion and exclusion criteria for the review are detailed in Table 1. Our criteria included primary research, from any date, published in English, Spanish, German or Chinese (as fitting with the team's ability). Participants in the studies had to been diagnosed (present or former diagnosis) with one of the 'core' eating disorders NICE [2]. Studies had to be specifically implemented to treat ED, include use of BOT (as fitting with our definition) in any setting, with or without additional treatment modalities.

Table 1: Eligibility criteria

	Inclusion	Exclusion
Study design and characteristics	• Primary research studies (that include primary data) using any design (e.g. qualitative, quantitative or mixed methods)	• Articles reporting no primary data, e.g. Protocols, editorial, commentaries • Secondary research, e.g. reviews • (Clinical) case reports from where it is unclear that it is an empirical study

	• Articles, book chapters, conference abstracts where primary data is included • Any country • Language: English, German, Spanish, and Chinese (as allowed by our team member capacity) • Any year	• Article doesn't provide detailed information on BOT intervention design, features, content and therefore doesn't allow for extraction • If the abstract is not a standalone study (I.e. there are multiple abstracts) • Dissertations/theses
Population/ participants	• Participants have been diagnosed (present or former diagnosis) with a core eating disorder (ED) (as defined by NICE, 2017) of anorexia nervosa OR bulimia nervosa OR binge-eating disorder OR "Other specified feeding or eating disorder" (OSFED) previously categorised as eating disorder not otherwise specified (EDNOS) • Participants of any age or gender • The population being studied may involve participants with other primary conditions/needs, but data on those with EDs regarding body-oriented therapies must be specifically demarcated in the results	• Participants that don't have one of the core eating disorders
Intervention/ exposure	• Use of body-oriented therapies (with or without a psychotherapeutic component, and with or without a movement component) that are specifically implemented to treat EDs • Body-oriented therapies (BOT) included are those that work with people's emotions, body perceptions and self-awareness, with the aim of building awareness of the connection between the mind and the body. These approaches are conceptualised or theorised within a holistic rather than purely cognitive or physical/physiological framework – examples might include embodiment or	• Use of BOT are not specifically designed for treating EDs, but instead other mental health diagnoses e.g. anxiety, depression etc, or for unspecified treatment targets

	phenomenology and include BOPT and HBOT. • Use of BOT in any setting • Use of BOT with or without an additional treatment modality • Use of BOT as a group or individual therapy	
Comparator/ Control	• If available, BOT will be compared with non-exposed control groups or other interventions that did not include BOT (e.g. cognitive behavioural therapy)	

2.2 Information sources

We searched for published studies through searching key peer-reviewed healthcare and social sciences literature databases: AMED (via Ovid); CINAHL complete (via EBSCO); Cochrane Register of Controlled Trials (via Ovid); Embase (via Ovid); MEDLINE (via EBSCO); PsycINFO (via EBSCO); Web of Science; Scopus; LILACS (Latin American and Caribbean Health Sciences Literature), from inception to 28.09.22. We also searched OpenGrey for unpublished studies. Citation and reference tracking were used for all included studies to identify all relevant studies. The search was re-run on 09.01.24.

2.3 Search strategy

All the databases were searched with the keywords in the fields of Title and Abstract (as shown in Supplementary Table 1) combining population (Eating Disorder* or EDNOS or OSFED or UFED or Bul?mi* or Anorexi* or Binge eat* or Binge-eat*) and intervention (e.g. Ai Chi therap* or 'Alexander Technique' or 'applied kinesiology' or 'Aquatic Exercise Therap*' or 'Aquatic Therap*' or 'Authentic movement*' or Balneotherap* or 'Biodynamic psychology' or 'Biodynamic Psychotherap*' or 'Bioenergetic Analys*' or 'Body awareness therap*' or 'Body image therap*' or 'Body Mind Medicine' or 'Body Mind Therap*' or 'Body oriented psychological therap*' or 'Body oriented psychotherap*') terms. In addition, relevant SUBHEADINGS/MeSH specific terms specific for each database were incorporated in the search strategies (see Supplementary table 2 for an example). No limits were applied.

2.4 Selection process

Retrieved records were downloaded into the Covidence (web-based collaboration software platform) [59] and duplicates were removed. Four reviewers initially reviewed 200 title/abstracts against the eligibility criteria to pilot the process. Following this, 20% of all titles and abstracts were checked by

two reviewers, with a third reviewer to resolve any disagreements. The remaining records were then checked by one reviewer, with another reviewer to check any uncertainties. Full texts studies appearing to meet the inclusion criteria were obtained and screened independently by two reviewers from the team, to ensure reliable and consistent selection. Any disagreements were resolved with the input of a third team member and wider review team discussion.

2.5 Data collection process

Relevant data of included studies was extracted into a data extraction form in Microsoft Excel, which had been developed and piloted by two members of the review team. One team member collected data from each report, and this was checked by a second member. Data collected in the extraction form included the study characteristics including the author names and date of publication, title of the study, country in which the study took place and study aims. The form also included the study methods including the type/design of the study, the eating disorder type being investigated, and the tool used to diagnose it, the setting of the study and the recruitment methods used. In addition, we extracted data on the number and demographic characteristics of participants and whether they were receiving concurrent therapies or had any comorbidities. Finally, we extracted detail on the intervention/therapy type, the theoretical basis for the therapy, whether the therapy involved active or passive movement or was motionless; its duration, frequency, intensity, format of therapy (i.e. group or individual) and what it consisted of. In terms of the study results, we also extracted data on the control description (where appropriate), outcomes and measures/tools used, type of analysis used, and results.

2.6 Study risk of bias assessment

To assess the quality (including risk of bias) in the included studies we used the various Joanna Briggs Institute's (JBI) critical appraisal tools [60], specific to the stated study design used by each of the included studies, or to the most appropriate tool where this was not clearly indicated. The tools consist of 13 criteria (for RCTs) to 8 criteria (for case reports) and include items such as congruity between the research methodology and the research questions and specific procedures used in studies (such as randomisation sequence generation in RCTs, analysis validation in qualitative studies). Each criterion was rated 'Yes', 'No', 'Unsure' or 'Not applicable'. Furthermore, we used an additional set of questions, developed and piloted in a published systematic review to assess additional important aspects of quality assessment [61]. The six additional questions added explored considerations over: (1) Intersectionality; (2) relevancy of research; (3) background literature; (4) equal opportunity of participation; (5) local settings and conditions in shaping the study; and (6)

involvement of expertise through experience. Again, we assessed these 6 items using the 4 ratings. Two reviewers assessed each study and then discussed and agreed their decisions. We did not exclude studies based on our assessment of study quality, as limited reporting does not necessarily equate to unreliable findings (see supplementary table 3).

2.7 Synthesis methods

Data synthesis began with an overview of study and intervention characteristics followed by tabulation of extracted data. A descriptive approach was used to synthesise data collected, including the theoretical underpinning of the therapy, type/modality of therapy, format (e.g. in group or individual), mode of delivery (e.g. stand-alone or adjunct to other treatment), psychotherapeutic component, movement component, treatment duration and intensity. We also descriptively summarised the demographic details and ED and mental health related details of participants.

For the studies with a qualitative component, and to synthesise the qualitative data on participants' experiences and perception of body-oriented therapies, we used the 3-stage thematic synthesis approach [62]. Line by line coding of the findings from primary studies was conducted by author one, this was done in a tabulated form using Microsoft Word. It followed by inductive analysis, involving comparison, re-examination, and grouping of codes to develop descriptive themes. Analytical themes were then developed through an iterative process of reflection on, and interpretation of, the descriptive themes within and across studies to add a new level of understanding.

The quantitative data across studies were analysed narratively as a meta-analysis was not possible due to the heterogeneous nature of the data across clinical, methodological and intervention domains. This process involved a descriptive analysis of the outcomes related to the key ED symptoms and related health outcomes (e.g. ED-psychopathological symptoms, quality of life, and somatic outcomes) measured with named measures or scales (including non-validated ones and sub-scales as reported by the studies) across studies. Where therapies versus control group was available, data was analysed and presented comparing these approaches. As no meta-synthesis on RCT outcomes was conducted, we did not employ GRADE to further rate the evidence synthesised.

Across evidence from studies using various designs and investigating different intervention approaches (HBOT and BOPT), where possible, a thematic review was conducted of common implementation and delivery considerations such as staff training, qualification, and attendance.

3. Results

3.1 Study selection

The search retrieved 7766 records (see Figure 1) [58]. After screening titles and abstracts against our eligibility criteria, we read 82 full text papers identified from our database searches and 11 full texts from citation tracking and contacts with authors, leading to a final set of 21 primary studies. There were several studies that we reviewed that had used a body-oriented method to treat eating disorders, but did not articulate a holistic mind-body approach. This included studies that addressed body image or body perception through cognitive means, or included movement practice but did not report on how the practice related to embodiment or mind-body connection, and so these were excluded from this review.

Figure 1: PRISMA Flow chart

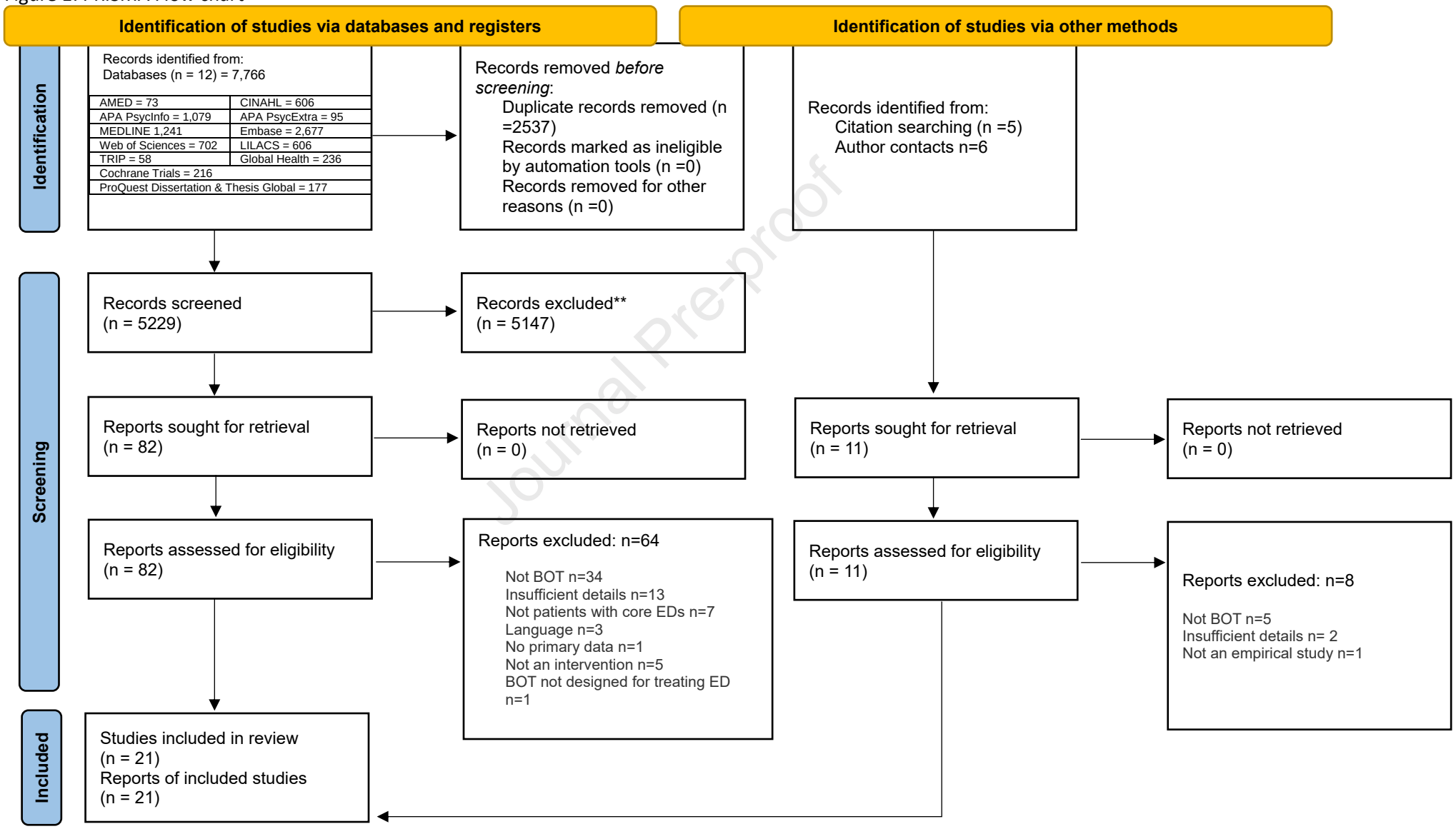

Table 2: **Study characteristics table**

First author and country	**Aims**	**Setting**	**Participant details - - ED diagnosis - sex, age, ethnicity**	**Study method**	**BOT (comparator if used)**	**Outcomes of interest**	**Measures**	**Results/findings**
Albertsen, Natvik [63], Norway	To explore how patients with BED experience the BOT from their own perspective	Inpatient Unit for Eating Disorders	n=2 BED (DSM V); n=2 female Age - 1 in 20's; 1 in 40s Ethnicity - NR	Phenomenological qualitative study	Basic Body Awareness Therapy (BBAT)	Subjective impacts of BBAT on body experience	Interviews, Video observation, Patient written logs	A 'meaning structure' was identified: "On the way from the body as a problem to the body as a possibility" - BBAT helped participants get to know own bodies – with changes in way they related to bodies and ways of being.
Alexandridis [64], Germany	To evaluate the effectiveness of a movement therapy intervention on bulimia nervosa	Inpatient care specific hospital for eating disorder patients	N=80 BN (DSM-IV) Co-morbid: 57 patients comorbid depressive symptoms (31 fulfilling criteria for major depression according to DSM IV) N=80 female - N=40, aged 27 (7.1) in intervention group; and - N=40, aged 27.7 (7.8) in control group Ethnicity - NR	Nonrandomized controlled clinical trial	Specific movement therapy intervention (with a control condition of leisure activities)	Body acceptance (image), therapy effect; BMI; physical work capacity	Body weight. BMI. Body fat percentage EDI psychopathology subscale	No significant change in BW, BMI and body fat percentage in both groups (no p-value reported). Comparisons were conducted across time points, from baseline to 4-weeks, then to 6-months post discharge - 78 participants included across intervention and control arms. However, results reported that BOT has specific benefits in addition to a multimodal and multi-disciplinary settings

Artoni, Chierici [65], Italy	To verify additional effects of BPT added to a standard inpatient protocol for eating disorders	An ED inpatient ward, Italy including all patients admitted from end of 2009 to mid-2017	n=182 (BPT - 15 AN + 29 BN + 7 BED + 39 OSFED + 1NR; 32.97% had unspecified psychiatric morbidities Control - 10 AN + 20 BN + 2 BED + 59 EDNOS. 32.97% have unspecified psychiatric morbidities) n= 168 female + 14 male Age - mean 30.80 ± 13.21(BPT); 32.29 ± 12.55 (control) Ethnicity - NR	Case control: Treatment as Usual + BPT v Treatment as usual	Body perception treatment (BPT) using repeated egocentric exercises on proprioceptive, interoceptive, and tactile bodily self-perception + usual care (N=91) (Control – usual care, n=91)	- ED personality traits - Body uneasiness - - General psychopathological state	- GPM component of EDI-3 - B-GSI - Global Severity Index of SCL-90 at admission and discharge (mean duration = 89.2 days ± 33.77)	Both groups showed statistically significant improvement in general psychopathological state and ED personality traits (p<0.001). Improvement in body uneasiness among BPT group (not significant changes)
Bastoni, Guerrini Usubini [66], Italy	To investigate effects of a brief DMT intervention in patients with ED in multidisciplinary inpatient rehabilitation program for ED	Inpatient centre for obesity and ED,	n= 34 AN n= 8 = BN n= 7 = BED. n=49 female Age – 18-34 Ethnicity - NR	Pre to post evaluation	Dance Movement Therapy (DMT)	- Emotion dysregulation, - alexithymia, - interoceptive awareness	-The Difficulties in Emotion Regulation Scale (DERS); --The Toronto Alexithymia Scale (TAS); - The Multidimensional Assessment of Interoceptive Awareness scale (MAIA;	Over the study duration (4-weeks), significant reduction in means of all of the subscales of DERS (p = 0.016) was reported, except difficulties in awareness increased. Significant reduction in alexithymia - significant differences in difficulties in modulating and identifying feelings (Factor 1; p < 0.001); difficulties in describing one's feelings to others (Factor 2; p = 0.006); difficulties in externally oriented thinking (Factor 3; p = 0.037) and total score of TAS (p < 0.001)

								Significant improvements in interoceptive awareness: increased scores of the noticing (p = 0.043), emotional awareness (p < 0.001), body listening (p < 0.001), and trusting (p < 0.001) subscales of MAIA
Brennan, Whelton [67], Canada	To investigate effects of Kripalu yoga on BN and BED symptoms, self-compassion, self-criticism and emotional regulation	Outpatient in university campus	n= 40 BED + 13 BN (DSM-5/IV-R) n=53 female Age - NR Ethnicity – 38 Caucasian, 4 Asian Canadian, 3 Aboriginal/Metis, 2 East Indian, 1 Hispanic, 1 Chinese, 1 South East Asian, 3 Other	RCT	Kripalu yoga following a pre-determined, structured format (n=26) (Control - Waitlist group, n=27)	- Frequency and duration of binge eating and compensatory behaviours - Number of times binge eating and number of binge days - Emotional processing - Self-criticism and self-reassurance - Self-compassion - Self-report mindfulness - Attitude toward seeking help -	- EDE-Q – 2 specific items - DERS - FSCRS - SCS-SF - TMS - ATSPPH-SF - Pre and post BOT (8 weeks), and 12-week FU	n=72 ppt randomised, n=53 (74%) completed study. Compared to waitlist group and at week 12, BOT ppt participants experienced decreases in: •binge eating frequency (p=0.001), •emotional regulation difficulties (p=0.002) and criticism (p=0.004); and increases in: •self-compassion (p=0.002) and state mindfulness
Catalan-Matamoros, Helvik-Skjaerven [68], Spain	To evaluate the feasibility and effects of Basic Body Awareness Therapy in people with eating disorders	Outpatient ED treatment in the Outpatient Andalusian Health Services	n= 8 AN, 3 atypical AN, 10 BN, 1 atypical BN n=20 female, 2 male Age - mean 28 (SD NR) ethnicity - NR	RCT	Basic Body Awareness Therapy (BBAT, n=14) (Control - standard outpatient treatment, n=8)	- Quality of life physical and mental component - ED psychological and behavioural traits	- SF-36 - EDI - EAT-40 - Body Attitude Test Pre and post BOPT (7 weeks)	6 out of 8 control group ppt did not attend post-test. BOPT participants had better ED traits (p=0.015) and subjective body attitude (p=0.012), ED symptoms (p=0.039), compared with usual care alone.

						- ED symptoms and concerns characteristic Subjective body experience and attitudes		
Concha Mirauda, Cruzat-Mandich [69], Mexico	To describe the experiences of participants in receipt of Kundalini yoga practice	Kundalini Yoga International School and primary care institution	n=5 AN + 4 BN n=9 female Age – Mean 23.2 (SD NR) Ethnicity - NR	Qualitative grounded theory	Kundalini yoga	Subjective experience and impacts	Semi-structured interview	Themes included: Increased positive attitude, self-valorisation – increased self-worth, body acceptance; openness to experience of emotions
Cook-Cottone, Beck [70], USA	To describe the attunement in mind, body and relationship (AMBR) programme to eating disorder treatment, and to evaluate its feasibility and impacts	An outpatient ED treatment clinic in Western New York	n=29 with AN or BN (DSM non-specified version) n=29 females age = 14-35, mean 20 (SD NR) with Ethnicity - 24 Caucasian, other NR	Pre-post evaluation (case series)	Yoga and Wellness group comprising body-focused yoga and mind-focused content session of reading and journal response	- Drive for Thinness (DT) - Body Dissatisfaction (BD) -Bulimia (BU) symptoms	- EDI-2 subscales of DT, BD, and BU - Pre and post BOT over 8 weeks	24 participants completed pre- and post AMBR data collection. Significant decrease found in DT (p=0.009) and BD (p=0.0005), but not BU, over 8 weeks
Diers, Rydell [71], USA	To describe and evaluate the integration of an innovative therapeutic yoga approach into an existing treatment program	Outpatient ED program	n=67 various ED diagnoses. n=1 male, n=66 females Age – NR Ethnicity - NR	Questionnaire (quantitative and qualitative) feasibility study	Therapeutic yoga and body image program (YBI)	Body image concerns Participants' experiences and perceived impact of YBU	Author-designed questionnaire: 10 quantitative questions (rated on 0–4-point scale) and 5 open-ended qualitative questions. Pre and post YBI over 8 weeks	91 took up the BOT, 67 completed pre-and post-questionnaires. Significant improvement in majority of items on un-validated questionnaire. Qualitative feedback: positive change in participants' perception of their bodies, and body image; some reported such extended to relationships with others, emotional benefits and self-acceptance.

Dor-Haim, Yaroslavsy [72], Israel	To report and to describe the therapy developed	Inpatient unit	n=8 diagnosed with AN, BN (DSM 5) n=8 adolescent girls Ethnicity - NR	Qualitative descriptive case studies	Multi-dyad (staff member-patient) movement group therapy	Therapy development and delivery	Observations and reflection	Findings: Discrepancies between 'obsessive movement (to burn calories) and authentic movement (expressing emotion); reveals ''complexities' of taking up space in the world and participants' sense of need for individuality
Fendel, Sandler [73], Germany	To explore subjective experiences of inpatients of BoMo treatment	Inpatient setting	n=20 AN or atypical AN (ICD-10) 5/20 had one or more additional psychiatric diagnosis (unspecified); 18/20 had one or more additional somatic diagnosis n=20 female n=14 19-30, n=1 41-50, n=1 >50 Ethnicity – NR	Grounded theory interview study	Body Monochord (BoMo), a body sound treatment instrument	Subjective experiences, bodily perceptions and feelings in relation to BoMo	In-depth individual interviews	Main 'categories': 'differentiated perception, focussed attention, emergence of body related feelings, emergence of emotions, emergence of thoughts, emergence of inner images, relaxation, spatial and temporal experience, new bodily experiences and self-reflection.'(p.7)
Gueguen, Piot [74], France	To understand patients' experiences of qigong	Inpatient Adolescent and Young Adult psychiatric wards	n=16 AN n=16 female age - 13-19 (median 17) Ethnicity - NR	Interpretative Phenomenological analysis	Qigong	Patients' experiences of qigong, incentives and barriers to adherence to treatment	Face to face semi-structured interviews	Eleven themes with 3 superordinate themes identified: (individual, relational and organisational). Individual factors may curb adherence and relational and organizational dimensions provide incentives to join activity. Once barriers overcome, experiences of relaxation and mind-body integration reported
Hall, Ofei-Tenkorang [75], USA	To examine use of yoga practice and its impact on anxiety, depression	Outpatient Yoga studio	N=20 – 15 OSFED, 3 AN, 1	'Pilot study'/ case series	Let's Yoga hatha yoga	- BMI - State of mind combining	- BMI - SMQ - STAI	9 out of 20 discontinued BOT; remainders took on average 20 weeks to complete BOT – 5 (25%) attended all 12 classes, 6 attended 7-11 classes. 14

	and body image disturbance in adolescents with ED		BN, 1 ARFID (DSM-5) n= 20 female Age - 15.9 ± 1.8 Ethnicity – 12 White, 8 Other including 5 Hispanic		classes of 12 sessions ranged between 60-90 min	depression and anorexia - Anxiety - ED symptoms - Eating pathology	- EAT-26 - EDE-Q - At pre, during (6 week) and post-BOT (12 week):	completed 6-week FU. SOM and anxiety improved after 7-12 classes; but no change in EDE subscales.
Karlsen, Vrabel [76], Norway	To examine the effect of yoga in the treatment of ED	Outpatient with participants recruited through hospitals, physicians, university and nonprofit interest organization for ED.	n=30 BN and EDNOS (DSM- IV) n=30 female Age - mean=35.2 (10.8 SD) Ethnicity - NR	RCT	Hatha yoga (n=18) (Control – 2 x 90-min group meetings on nutrition, physical activity, and ED, yoga offered after FU period, n=12)	- Overall, ED psychopathology and 4 subscales on restraint, eating concern, weight concern, and shape concern - ED symptomatology	- EDE global and 4 subscales scores - EDI-2 measured at baseline, post-BOT (11 week) and 6 months follow-up	19 out of 30 ppts completed all data timepoints. Mean attendance of BOT was 13.75 of 21 sessions. No adverse events. BOT group showed reductions in EDE global score ($P < 0.01$), the EDE subscale restraint ($P < 0.05$), and eating concern ($P < 0.01$) compared to the control group. The differences between the groups increased at 6-month follow-up. No differences between the groups in the EDI-2 score.
Konzag, Klose [77], Germany	To evaluate inpatient body-oriented psychological therapy to address body image disorders and related structural deficits (perception, affective)	Inpatient unit with all consecutively admitted for hospital ED treatment within 12-mth	N=43 – 15 AN + 28 BN (DSM-IV) (co-morbid: 28 with personality disorders, 7 with affective disorder, 3 with somatoform disorder, 1 with alcohol abuse) N=43 females Age – NR Ethnicity - NR	Longitudinal cohort study	Body perception therapy in an individual setting and communicative movement therapy in the group setting (based	- Symptom level Complaints list BBS -Global evaluation of therapeutic success -	- SCL-90 -BBS complaints list - -REE categories	43 out of 52 ppts completed data collection. No statistically significant results were reported in any measures used.

					upon principles from Concentrative Movement Therapy / KBT)			
Laumer, Bauer [78], Germany	To assess effect of a Feldenkrais-group on the patients' relationship as part of multimodal therapy program	In-patient hospital eating disorders clinic (BOT ppts were new admission within 3 weeks of study recruitment)	n=30 - 18 BN + 2 AN + 2 AN&BN + 6 Adipositas +2 AD&BN (DSM-III-R) n=27 females + 3 males Age - Mean 29 (SD-NR) ethnicity - NR	Case control study	BOT – Feldenkrais Method "Awareness through Movement" group + current treatment (n=15) Control – current treatment (n=15)	- Body cathexis - Body parts satisfaction - Body perception - Psychic condition - AN symptom severity - ED symptomatology	- 34 items drawn from BCS and BPSS - FKE - EMI-B - ANIS - EDI-2 - Pre and post 5-week treatment time	BOT participants had significant improved satisfaction in body areas and a more positive attitude on own health ($p<0.05$); other outcomes showed no significant difference compared with the control. Only subscales or selected items were used.
López-Túnez, Catalán-Matamoros [79], Spain	To evaluate the effectiveness of "Basic Body Awareness Therapy" in patients with ED	Outpatient clinics	n= 10 - 6 AN + 4 BN (ICD-10) n=10 female Age - Mean 27.2 (SD 7.2) Ethnicity - NR	Nonrandomized controlled clinical trial using parallel groups	Basic Body Awareness Therapy (BBAT) + usual care (n=5) (Control – usual care, n=5)	- ED symptomatology - Subjective body experience - ED severity level - Health-related QoL - Perception of dimensions and body shape dissatisfaction	- EDI - BAT - EAT-40 - SF-36 - Gardner scale - Pre- and post-BOT (5 weeks)	No significant difference in any outcomes including the therapeutic effect of the EAT-40 scores in the between-subjects factor analysis ($p=0.053$)

Pacanowski, Diers [80], USA	To investigate the effect of yoga on mealtime negative affect and eating disorder symptoms, during residential eating disorder treatment	Inpatient in a residential ED treatment programme	n=38 - 22 AN + 8 BN + 8 EDNOS n=37 female + 1 male Age - mean 26.8 (SD 10.3) Ethnicity - NR	RCT	Yoga prior to evening meal for 5 days (n=20) (Control – usual residential care, n=18)	- Emotional avoidance - Eating disordered cognitions and behaviour - Negative mood before and after evening meal - Mealtime anxiety	- EAQ - EDE-Q - 10-items negative mood subscale from PANAS - modified HAS 2 days prior to BOT and post-5 days of intervention	1ppt withdrew from each group. EAQ and EDE-Q scores did not differ significantly between groups over time. Other outcome measures also had no significant difference.
Padrão and Coimbra [81], Portugal	To explore experiential and semantic levels of the body experience, and assess movement characteristics and preferences of patients	Inpatient Unit	n=7 AN (DSM-IV) n=7 female age - 15-56 ethnicity - NR	Pilot qualitative study rooted in grounded theory	Body-oriented dance/movement therapy	Experiential and semantic levels of the body experience of patients	Movement observation and verbalisations during sessions	Findings: changes in the patients' movement patterns i.e. greater capacity to alternate sudden and sustained movements and in more resilient movements. patients also verbalized more comfort with their own bodies and more willingness to gain weight.
Proulx [82], USA	To understand participants' experience and perceived impact of self-regulatory intervention of the M-BED group	Community-based mental health centred and psychotherapists	n=6 BN (DSM IV-TR) some have anxiety and depression n=6 female Age - NR but 'college students' Ethnicity - NR	Qualitative, phenomenological study	Mindfulness-based Eating Disorder Treatment group (M-BED Group)	Subjective experiences of BOT and its impact	Individual interview after completion of group and self-portraits completed before and after group, compared and discussed at interview	Findings: Participants described change from 'emotional and behavioral extremes, disembodiment, and self-loathing' to 'cultivation of an inner connection' self-awareness, acceptance, and compassion, less emotional distress and better management of stress. (p.52)
Savidaki, Demirtoka [83], Spain	To evaluate the effects of a Dance Movement Therapy (DMT) intervention on ED symptoms and to explore participants' experience of DMT	Private day clinic specialising in the treatment of ED	n=14 - 5AN+6 EDNOS+1BN+2 NR n=14 female Ages - 14-32 (M=20.28, SD 5.91) Ethnicity - NR	Mixed methods – Quasi-randomised trial (DMT group v usual care group) and qualitative	Dance Movement Therapy (DMT) based on Chace's model and guided imagery (n=7)	- Body image - Alexithymia Subjective experience of DMT and its therapeutic process	- MBSRQ - TAS-20 - Pre and post BOT (14 weeks) - Reflective diaries written by BOT participants	2 control group ppt dropped out. BOT ppts completed 4-11(out of 12) sessions. Within BOT group but across time, ppt improved in body area satisfaction, and appearance orientation, but no significant difference was found when compared to the control. Qualitative: In general, BOT was received positively with improved mood and self-awareness. 5 domains:

				written diaries	(Control – usual care, n=7)		at end of each session	Emotion and Mood; Body and movement; Interpersonal aspects; metaphors and reflections .

Keys: BN – Bulimia Nervosa; TAS-20 - Toronto Alexithymia Scale; MBSRQ - Multidimensional Body-Self Relations Questionnaire; EDDS - Eating disorder diagnostic scale; EDE-Q - Eating disorder examination questionnaire; DERS - Difficulties in emotion regulation scale; FSCRS - The forms of self-criticizing/attacking and self-reassuring scale; SCS-SF - Self-compassion scale–short form; TMS - Toronto mindfulness scale; ATSPPH-SF - Attitudes toward seeking professional psychological help–short form; EDI-2 - Eating Disorder Inventory-2; EDEQ - The Eating Disorder Examination Questionnaire; CIA - Clinical Impairment Assessment; BDI-II - Beck Depression Inventory-II; STAI - State Trait Anxiety Inventory; 5-FMQ - Five Factor Mindfulness Questionnaire; AAQ-II - Acceptance and Action Questionnaire-II; RRSED - Ruminative Response Scale for Eating Disorders; EAQ - Emotional Avoidance Questionnaire; EDE-Q - Eating Disorder Examination-Questionnaire; PANAS - Positive and Negative Affect Schedule; HAS - Hamilton Anxiety Scale; SAM - Self- Assessment Manikin; GPM - Global Psychological Maladjustment component; B-GSI - Global Severity Index of the Body Uneasiness Test; SCL- 90 - Symptom Checklist-90; SMQ - State of Mind Questionnaire; EAT-26 - Eating Attitudes Test 26-Item; BAT - Body Attitude Test; EAT-40 - Eating Attitude Test-40; BCS - Body Cathexis Scale; BPSS - Body Parts Satisfaction Scale; FKE -"questionnaire for body experience (Körpererleben, in German); EMI-B - Emotional Inventory (Emotionalitätsinventar, in German); ANIS - Anorexia-Nervosa-Inventory

Table 3: Intervention characteristics table

Source paper	Theoretical basis for BOT	Type of Body Oriented Therapy	BOPT - format	BOT - contact time (hour) /duration (week) - group/individual (motionless/passive/active)	BOT therapists - Discipline Training and supervision	Concurrent therapies
BOPT interventions:						
Albertsen, Natvik [63]	Phenomenology of the body (Merleau-Ponty)	Basic Body Awareness Therapy. Delivered as psychomotor physiotherapy - movement awareness domain	Lie on back, aware contact with ground, noticing breath, small movement, stretch, sit up, seated reflection with therapist, body movements seated, standing then Qi gong and massage	Hours - not specified 35 weeks for 1 participant, 55 weeks for other participant Individual Motionless, active movement and passive movement	Psychotherapist, trained BBAT therapist, years of working with ED patients	CBT-e standard treatment weekly
Alexandridis [64]	Integrative (psychomotricity, movement therapy and cognitive therapy)	Integrative therapy concept developed by study team with elements of psychomotor therapy, sport therapy and cognitive therapy with considerations re motivational aspects	integrative therapy concept developed by study team with elements of psychomotor therapy, sport therapy and cognitive therapy with considerations re motivational aspects	4 sessions per week (90 minutes)	Integrative (psychomotricity, movement therapy and cognitive therapy)	Integrative therapy concept developed by study team with elements of psychomotor therapy, sport therapy and cognitive therapy with considerations re motivational aspects
Artoni, Chierici [65]	Integrate three aspects of perception: (1) Body Schema and body memory (Schilder), (2) Tactile Form (Gadsby), (3) Neuroscience and phenomenology of mind-body interactions (Merleau-Ponty)	Body Perception Treatment	Body schema intervention: 60 mins focuses on interoceptive, and proprioceptive perception facilitated by gradual state of induced relaxation, improved by breath control and focused attention techniques. Body perception intervention (90 mins) aims at increasing awareness of bodily sensations and misperception, including 10 min of brief	60/90 mins Twice weekly Through duration of inpatient treatment (mean = 89.20 days SD = ± 33.77) Group Motionless	NR	Inpatient ED Treatment: therapeutic rehabilitation programme with CBT including a weekly one-hour CBT body image therapy for 12 weeks

			psychoeducational introduction, a light relaxation, self-perception body-oriented experience with selective focus attention on the different body parts, end with self-evaluation of experience and distress through drawing own body and writing narrative, and 20 mins debrief.			
Bastoni, Guerrini Usubini [66]	Use of bodily movement in a therapeutic way, to encourage the awareness of thoughts and emotions that cannot be differently expressed	Dance Movement Therapy (DMT)	Each session divided into four parts: First part: Introduced to DMT, prepared, express feelings Second part: therapist presented and realized the main activities of the session Third part: participants to come into contact with their bodies and thoughts and feelings Final part: opportunity to reflect	4 sessions/ once a week 1 hour each Group (9-10 participants in each) (motionless/passive/active)	Psychologist specialized in DMT	Multidisciplinary rehabilitation program for weight management: with medical, dietitian, physical, and psychological components including individual and group counselling, physical activity and psychotherapy
Catalan-Matamoros, Helvik-Skjaerven [68]	Humanistic and Holistic focuses on self-exploration and self-experience of movement quality, on the interplay between conscious being, doing and relating	Basic Body Awareness Therapy	Session 1: Encounter between the patient and the physiotherapist; 2: Exercises in lying position; 3: Exercises in sitting position; 4: Exercises in standing position; 5: Push-hands and walking exercises: 6: Session ending	1.5 hours 12 sessions over 7 weeks 2 individual + 10 group sessions (Week 1 and 2: 1-hour individual per week. Weeks 3-7: 2 group sessions of 1.5 hours) Active movement	Therapist -certified physical therapist specialist in Basic Body Awareness Methodology by an official postgraduate university programme	Standard outpatient treatment including psychotherapy and psychiatry 54% ppts on pharmacotherapy have meds adjusted
Dor-Haim, Yaroslavsy [72]	Freud (1923), self as bodily self; object relations theories (Krueger, 1989)	Dyadic group movement therapy	Chace movement model (Chaiklin, 1975; Chaiklin & Schmais, 1979) – movement in a circle: warm up,	45-minute session Weekly Duration of inpatient care	Group leader is 'movement therapist'	Not reported but receiving inpatient ED care

			development, closure (verbal) (use of props)	Group-based Active		
Konzag, Klose [77]	Based upon a psychodynamically informed BOPT (concentrative movement therapy = Konzentrative Bewegungstherapie in German)	BOPT delivered as part of a multimodal, integrative and psychodynamically oriented inpatient psychotherapy programme	Working at the periphery of body perception with emphasis on body boundaries/demarcation, promoting the differentiation of tactile and proprioceptive body awareness, followed by working on affective-cognitive body cathexis. Body boundaries are emphasised through self-touch. Further exercises thematise the protection of body boundaries. Exercises to emphasise and strengthen self-object and subject-world differentiation. Focus on body image aberration, improving symbolising capabilities to support the subsequent talking therapy exploration.	45 mins / 30 mins	Based upon a psychodynamically informed BOPT (concentrative movement therapy = Konzentrative Bewegungstherapie in German)	BOPT delivered as part of a multimodal, integrative and psychodynamically oriented inpatient psychotherapy programme
López-Túnez, Catalán-Matamoros [79]	Self-exploration and self-experience. Re-education of the body schema and its functions	Basic Body Awareness Therapy	1 BBAT-based exercises 2 Diaphragmatic breathing exercises with coordination and postural control in different positions (supine, sitting, standing) and with different movements (flexo-extension, rotations, stretching) 3 Therapeutic massage	1 hour Twice weekly 5 weeks 8 individual, two group Active and passive movement	Physiotherapist	All 10 in psychiatric and psychotherapeutic care. 5 of them also on pharmacological treatment
Padrão and Coimbra [81]	Developmental-constructivist position on psychology of the arts	Psychotherapeutic dance movement	Warm up with body awareness techniques, guided or free thematic movement/expressive dance, warm down with verbalization	75 mins Weekly sessions 6 months	Not reported	Not reported but inpatient care

			and reflection about the movement experience	Group Active movement		
Savidaki, Demirtoka [83]	Embodiment and enaction	Dance movement therapy	Chase method and Reddemann (guided imagery) 6 parts: check-in, warm-up, guided imagery, exploration in movement, writing, check out.	90-minute sessions 12 sessions/ 14 weeks Group Motionless Active movement Passive movement	Therapist – Dance Movement therapist in training, who received clinical supervision	Usual treatment
HBOT interventions:						
Brennan, Whelton [67]	Mindfulness-based practice and a holistic approach to wellness	Kripalu yoga	Pranayama (breathing), asana (postures), and meditation practices. Mindfulness and self-compassion and attention to experiences (i.e., physical sensations, emotions, thoughts) emphasised	90 mins Weekly 8 weeks Group with max group size = 12 Motionless and active movement	Registered Yoga Teacher trained in the Kripalu Yoga tradition, led all of the Yoga classes	Not reported but n=42 reported previous therapy; n=11 reported none Psychotropic Medication Yes n= 16; No n= 37
Concha Mirauda, Cruzat-Mandich [69]	To reduce the attention given to automatic negative or anxious thoughts, to increase self-control over the body and mind, so to strengthen the connection between body and mind.	Kundalini yoga	Session 1: Introduction to KY; 2: Experiencing relief and relaxation; 3: Experiencing inner strength; 4: Promoting self-love; 5: Enhancing connection between sexuality and femininity; 6: Promoting personal power and self-efficacy; 7 and 8: Managing addictive behaviors associated with ED	90-minute 2 months Group Motionless and active movement	Not reported	Psychological + psychiatric + nutritional (n=4) Psychological + nutritional (n=2) Psychological + psychiatric (n=1) Psychological + nutritional + alternative (n=1) Psychological (n=1)
Cook-Cottone, Beck [70]	Mindfulness-based practice and a holistic approach to wellness	Kripalu yoga	Pranayama (breathing), asana (postures), and meditation practices. Mindfulness and self-compassion and attention to experiences (i.e., physical	90 mins Weekly 8 weeks	Registered Yoga Teacher trained in the Kripalu Yoga tradition, led all of the Yoga classes	Not reported but n=42 reported previous therapy; n=11 reported none

			sensations, emotions, thoughts) emphasised	Group with max group size = 12 Motionless and active movement		Psychotropic Medication Yes n= 16; No n= 37
Diers, Rydell [71]	Yoga Sutras of Patanjali [84]	Yoga, as part of a yoga body image (YBI) intervention	Body-positive therapeutic yoga group and 45 mins group discussion	90-minute sessions 8 weeks Group-based Active	Led by an ED-trained registered yoga instructor (min 200 hour registered yoga certificate) and licensed therapist	Treatment as usual (CBT based)
Fendel, Sandler [73]	Psychoanalysis Importance of sensory experience of touch in infant development including Winnicott 'holding' function (1949, 1960)	Body Monochord	Therapist plays Monochord (stringed instrument) fitted on the back of the Monochord Chair (MoC) and on the bottom of Monochord Table (MoT). Therapist sits behind the Chair or beside the Table. Vibrations transmitted via the recipient's body contact with the instrument.	Weekly 3 weeks (1 introduction + 2 treatments) 20-minutes Individual Motionless	Physician (2 years professional experience (psychosomatic medicine)	Usual inpatient care
Gueguen, Piot [74]	Mind-body intervention and a branch of traditional Chinese medicine aiming to strengthen qi (life energy) and focus on interoceptive processes	Qigong	Relaxation phase focused on breathing sensations (10 min), self-massage (20 min), dynamic qigong exercises (30 min), paired massage (10 minutes for each patient, total of 20 min), relaxation phase (10 minutes)	90-minute sessions Weekly Throughout in-patient treatment Group-based Motionless Active movement Passive movement	Nurse with advanced training in qigong	Usual inpatient treatment
Hall, Ofei-Tenkorang [75]	Embodiment and interception. Postures called asanas focus attention inward and the practitioner transcends the mind-body divide in an attempt to experience the true self or soul	Hatha based yoga classes (non-heated, gentle)	Inversions Arm balances Deep breathing Sanskrit chanting Seated meditation Sun salutations + flow Restoration postures Postures + movement Postures + rhythmic breathing	60-90 mins depending upon classes 12 classes, which took participants 12-29 weeks (mean 20) to complete Group	Certified yoga instructor trained at the minimum 200-hr level certification through the Yoga Alliance, some also licensed social workers or certified school teachers	Outpatients at clinic with medical monitoring, nutritional counselling and social work intervention

				Active movement	Active movement	
Karlsen, Vrabel [76]	Yoga contributes to body awareness, a lack of which is a key risk factor for developing Eds.	Hatha Yoga	Hatha yoga - Relaxation with awareness of the body, followed by different physical exercises, breathing exercises, and concentration meditation, and end with a longer relaxation. Home practice encouraged with written information.	90 mins Twice weekly 11 weeks Plus, home practice encouraged and supported by written information and illustration Group Active movement + motionless	Experienced and educated yoga teacher	6 also having psychotherapy; 2 also on anti-anxiety medication
Laumer, Bauer [78]	Feldenkrais's theory of holistic somatic education and unity of body and mind as a concrete reality, through movement an access for change of the entire person is sought	Feldenkrais method "Awareness through movement"	Respiration exercises and movement topics of infancy and motor development	45 mins 1 introductory class then Twice week 5 weeks Active movement Group (closed)	Therapists - NR	Intensive multimodal therapy program but BOPT groups did not receive any other movement Intensive multimodal therapy programme of the inpatient unit during time frame of the investigation
Pacanowski, Diers [80]	Yoga has potential to promote embodiment, for those with EDs who often have disconnection from bodies (Diers, 2016)	Yoga	Yoga starting with standing start sequence, integrated movement using specific asanas (postures), focused intentions and breathing techniques, end with a relaxation pose	1 hour Daily Five days before mealtime Group Active movement	ED-sensitive Yoga Alliance registered yoga teachers	Not specified Residential ED treatment
Proulx [82]	Systems-based, self-regulation practice – mindfulness meditation (Kabat-Zinn, 1990, 1994).	Mindfulness-Based Eating Disorder Treatment Group (M-BED Group)	Experiential meditation practice, psychoeducation, discussion and assigned home practice	2-hour group sessions + home practice Weekly 8 weeks	Not reported	Individual psychotherapy

				Group Motionless		

3.2 Study characteristics

Overall, there are 21 studies included in this review (see Table 2). These studies took place across 10 countries – five in the USA; three in Spain; four in Germany; two in Norway; two in Italy; one each in Mexico, Israel, Canada, France and Portugal. Seven studies used pure qualitative methods (n=3 phenomenology [63, 74, 82]; n=3 grounded theory [69, 73, 81], n=1 case study [72]); five of these studies used interviews to collect their data and the other two used observational methods. In addition, one questionnaire study included qualitative data alongside quantitative measures [71] and one mixed-methods study used qualitative written diaries alongside their quasi-RCT [83]. Twelve studies employed quantitative methods only: four studies were RCTs [67, 68, 76, 80]; three were case-control [65, 78, 79]; three were same group pre-post study [66, 70, 75]. One study was a non-randomised comparison study [64]; and one was a longitudinal cohort [77].

Included studies involved 728 participants (522 who received the intervention, 206 controls). In terms of study participants, nearly all were female (97%). In the 17 studies where diagnoses were individually reported, there were 171 participants with AN; 232 with BN; 58 with BED and 125 with EDNOS. Four studies only reported the total number of participants, rather than by ED type [70-72, 76].

Three studies focused on only on participants with anorexia [73, 74, 81]; two on those with bulimia [64, 82]; one on BED [63] and six studies focused on both AN and BN [68-70, 77-79]. One study focused on those with AN, BN and BED [66]; one on AN and EDNOS [83], and one on BN and BED [67]. The other three studies, which identified separate diagnoses for participants, included a range of eating disorders [65, 75, 80]. Three studies did not define the specific included EDs by type [71, 72, 76].

Only three studies clearly reported on the ethnicities of the study participants [67, 70, 75]. The age of participants was reported variably, and seven studies reported the inclusion of participants under the age of 18 [65, 70, 72, 74, 75, 81, 83]. In terms of comorbidities, six studies reported that participants had other psychiatric comorbidities [63-65, 73, 77, 82]. The other 15 did not report any comorbidities but five of these studies reported that they excluded those with other severe mental health issues or physical instability [66, 67, 75, 76, 83].

The included studies report some similarities in terms of the expected outcomes that the BOT could impact and used a range of measures as presented in Table 2. Twelve studies aimed to address dimensions of body experience [63, 66, 68, 69, 72-74, 78, 79, 81-83]; four studies focused on body

(dis)satisfaction [65, 70, 78, 79] and three specifically referred to body image [64, 71, 83]. Four studies involved outcomes around emotions [66, 67, 80, 83] and two studies looked at quality of life [68, 79]. Nine studies used various outcomes related to eating disorder symptoms and/or behaviours. One on therapeutic effects [64], one on help seeking [67] and one on depression [75].

3.3 Intervention characteristics

Table 3 presents a summary of the intervention characteristics from the included studies. Ten studies were classified as BOPT, and 11 studies were classified as HBOT. In terms of the type of therapy used, for the BOPT, three studies used Basic Body Awareness Therapy (BBAT) [63, 68, 79]; three used Dance Movement Psychotherapy [66, 81, 83]; one was Concentrative Movement Therapy [77]; one involved Movement Psychotherapy [72]; one was Psychomotor Therapy [64] and one was Body Perception Treatment [65]. For the remaining HBOT studies, seven used yoga [67, 69-71, 75, 76, 80]; one was Qigong [74]; one used the Body Monochord (therapeutic musical instrument where user experiences sound vibration through skin/body) [73]; one used Feldenkrais [78] and one used mediation/breathwork [82]. Although, these were not designed as Body-oriented *psychological* therapies, three of the interventions did include a form of talking/reflection within them [70, 71, 82]. Overall, movement was a component within 18 of the interventions; two holistic BOT [73, 82] and one BOPT [65] did not involve active movement.

Four BOPT studies were delivered in both individual and group format [64, 68, 77, 79]. One HBOT was delivered individually [73]. The other interventions were delivered in a group format. Therapies were delivered across variable timespans and frequencies and durations. Some were over a short period. Three BOPT [64, 66, 79] and one HBOT [78] were 4-5 weeks in duration with 45-90 minute sessions delivered between 1-4 times a week. Two HBOT interventions were shorter than this; one lasted 5 days, once a day for 60 minutes [80] and another for 3 weeks (after a two week introduction), weekly for 20 mins [73]. However, one BOPT intervention lasted 6 months, weekly for 75 minutes [81] and another was delivered over the course of 7-12 months [63]. Three studies reported the intervention lasted the 'duration of care' [65, 72, 74].

A description of who delivered the therapies was present in 13 of the studies. For HBOT, five interventions were delivered by yoga teachers [67, 71, 75, 76, 80] and two by a nurse/physician [73, 74]. For BOPT, one was delivered by a BBAT therapist [68]; two by a movement therapist [72, 83]; one by a physiotherapist [79] and one by a psychotherapist [63] and one by a psychologist [66].

In terms of the delivery, for BOPT, seven out of ten interventions took place in inpatient units [63-66, 72, 77, 81] and the other three were part of outpatient care [68, 79, 83]. For HBOT, four were part of inpatient treatment [73, 74, 78, 80]; four took place in other settings i.e. yoga or university or other community settings [67, 69, 75, 82]; two took place as part of outpatient care [70, 71] and one [76] did not specify where it was delivered. Other therapies were an adjunct to the BOT in 18 studies commonly including psychotherapeutic, CBT, or nutritional elements. Two HBOT used the BOT alone [70, 78] during the trial period and one BOPT study did not report on this [72].

3.4 Risk of bias in studies

Using the JBI qualitative tool to evaluate the seven pure qualitative studies, we found that only four studies expressed a congruity between the stated philosophical perspective and the research methodology; between the research methodology and the research question or objectives [63, 74, 81, 82], and between the research methodology and the methods used to collect data [63, 69, 74, 82]. Only three studies showed congruity between the research methodology and the interpretation of results [63, 72, 82]. All the other criteria of the JBI QA tool were met by at least half of the studies. Three studies achieved 9/10 or 10/10 positive 'yes' to all criteria [63, 74, 82] but four studies had less than half of the questions answered positively. One study was reported in a book chapter [81], and another [72] was written through a psychoanalytic therapist's perspective, which involve different reporting styles. Both these studies contributed less to the overall synthesis, but no studies were excluded based on quality as their different disciplinary, methodological and reporting procedures were considered.

For the 14 studies using various quantitative methodologies, we used the most relevant JBI quality assessment checklists to rate each of them. For the 4 RCTs [67, 68. 76, 80], it was most concerning that the randomisation sequence used for assigning participants were unclear. Allocation concealment was only clearly reported in two RCTs [68, 76]. While it is understandable that blinding of participants or therapists was not feasible in the trials of BOT, only one reported masking the outcome assessors to treatment assignment [76]. No RCT provides any details on the power calculation of the sample sizes - ranged from 20 [68] to 72 [67]. Participant attrition reached 26% [67], 30% [68] and 36% [76] respectively, and outcome data of those lost to follow-up were omitted in analyses. None reported any adverse events. Statistical analyses across 3 RCTs provided no clear evidence of appropriate methods were used (e.g. in accounting for loss in follow-up, intention-to-treat or per protocol analysis); Pacanowski et al. (2017 [80]) was an exception in these respects.

We rated the remaining ten studies using the most relevant JBI checklists studies [64-66, 70, 71, 75, [83] [77] 78, 79]. Most of these studies reported clear criteria for participant inclusion; though the matched controls were not always used or if used details of matching were limited. As such, the reporting of the participant demographics and clinical information and hence appropriate strategies employed to deal with confounders were rated as good in only 3 studies [65, 70, 75]. The remainders provided unclear evidence on such criteria as well as on follow-up data collection.

Across the 14 quantitative studies, the lack of evidence in justifying the sample size (e.g. n=14 in Catalan-Matamoros et al. [68]), reporting attrition and handling incomplete follow-up data in a transparent and robust manner (6 out of 8 in the control arm in Catalan-Matamoros et al., [68] were lost in follow up; in Brennan et al., 2020 [67], 72 participants were randomised but only 53 (74%) were included in the analysis) were of concern. As no studies achieved the standard 80% completion rate (i.e. the common threshold to judge study quality), analysis using completers' data only rather than intention-to-treat principles (i.e. all included quantitative studies) might carry additional bias, in particular, over-estimated positive effect size of the intervention [58].

Against the additional quality measures [61], we also found that none of the articles had reflected on issues of intersectionality. Only four studies reported how they had made every effort to ensure fair and equal opportunity of participation [65, 71, 73, 74] and only one study [81] appropriately involved the participants in the research. There was only one study involving quantitative data that evidenced critical reflection on the role of the study setting and local conditions in shaping the study [83].

3.5 Results of studies

3.5.1 Effectiveness of BOT

3.5.1.1. RCTs

The results of each individual study can be seen in Table 2. There are 4 studies (with 143 participants in total) using a RCT design to evaluate the effects of BOT - 3 RCT on HBOT [67, 68, 80] and one on BOPT [68] – comparing to usual care or waitlist [67, 68, 80] or a group providing nutrition information and physical activity to control for attention and time [76]. Only one RCT targeted inpatients diagnosed with AN or BN by providing a 5-day yoga intervention prior to evening mealtime [80]. The other three BOTs were delivered to community-dwelling adult patients: BBAT for those diagnosed with AN or BN [68], Hatha yoga for BN and EDNOS [76]; and Kripalu yoga for BED and BN [67]. These BOT ran between 7 and 11 weeks. All BOTs had a group-therapy element, led by trained physical therapist (BBAT) or certified yoga teachers. The BBAT, in addition to 8 group sessions, began with 2 individual sessions [68].

Considering the heterogeneity of included RCTs across study populations, interventions and outcome measures used, it was inappropriate to aggregate outcome data into a meta-analysis. Instead, we report the results individually herewith. Hatha yoga was reported to be effective in reducing global ED symptoms compared to group sessions of nutrition advice and physical activities [76]. In a study comparing Kripalu yoga with waitlist for adults with BED or BN [67], the HBOT group experienced significant decreases in binge eating frequency, emotional regulation difficulties and self-criticism, and increases in self-compassion. However, the 5-day trial of yoga before evening mealtimes [80] reported no significant differences between HBOT or usual inpatient care groups in outcome of ED symptoms or affect. Comparing BBAT with usual care, BOPT patients had better ED traits (p=0.015), subjective body attitude (p=0.012) and ED symptoms (p=0.039) at the end of a 7-week programme [68]. These results should be interpreted with caution due to the aforementioned risks of bias found in the RCTs. All results reported here are from immediately post-intervention timepoint (the longest being 28 weeks) with only one RCT that reported follow-up data at 1-month post-HBOT (Karlsen et al., 2018).

3.5.1.2. Results from other included studies using a quantitative method

Ten studies included in the review used other quantitative designs to assess the feasibility and impacts of the BOT. One commonly used study design was case control, where the BOT was delivered to a selected group of participants and controls matching their diagnoses and characteristics were identified from the same study sites[64, 65, 78, 79, 83]. Five studies used a same-group pre-post/case series design [66, 70, 71, 75, 77].

The quality of these studies varied but overall raises doubt on the results reported. A study reported using “quasi-randomisation” to allocate 14 young people and adults with various ED diagnoses into a BOPT (Dance Movement Therapy group) or a usual care group [83]. Others reported the comparison of participants’ outcomes under a specialist ED treatment centre either pre-dating or after the introduction of the BOT at their service. This approach was used to study a BOPT programme in an inpatient ED centre in Italy [65] and a HBOT named “Awareness through Movement” treatment in a German ED in-patient treatment centre [78]. Demographics details of the populations and confounders or considerations in addressing any (if identified) are scarce. For instance, in a pre-post BOPT evaluation study on DMT for female patients in an inpatient ED rehabilitation unit, significant improvement in outcomes was reported, without consideration of the existing comprehensive treatment given concurrently [66]. Similar to the RCTs, reporting of attrition and loss to follow-up in

these quantitative studies was minimal except for one pilot study which reported that 9 out of 20 participants (45%) discontinued the yoga treatment and only those who provided data at both pre and post-HBOT were analysed [75]. Further, study author-devised questionnaires or unvalidated subscales of outcome measures were used, rendering results impossible to interpret or unreliable.

These studies, in general, report a positive reception to the BOT – 3 BOPT and 4 HBOT [64, 66, 70, 71, 77, 78, 83] or they reported that the addition of BOT (2BOPT, 1HBOT) to the pre-existing intensive usual care made no significant difference to participants' outcomes [65, 75, 79]. Positive impact reported included reduced alexithymia, body dissatisfaction and ED symptomatology and improved emotional regulation, interoceptive awareness, and body perception. However, given the concerns over the quality of the studies and the analytic approaches used and results reported (e.g. sample size not fully powered, subscales rather than full scales being used, and no p-value reported), it is difficult to establish the impact of these BOT on any particular outcomes.

3.5.2. Qualitative thematic synthesis - Patients' experiences of body-oriented therapies to treat eating disorders

The nine studies that employed qualitative methods to explore subjective experiences of HBOT [69, 71, 73, 74, 82] and BPOT [63, 72, 81, 83] focused on different eating disorders and therapeutic approaches but, despite these differences we identified five analytic themes related to experiences of having and being a body across the studies.

3.5.2.1 From body as an object to bodily connection

Participants described feeling like their body was an object, something separate to themselves, and the body was figured 'as a problem' [63] (p.5). This perception could make the feeling of engaging with the body unbearable and they imagined body parts as 'not a part of me' [82] (p.60). Through BOT, participants in several qualitative studies [63, 69, 71, 73, 74, 83] reported feeling more connected to their bodies, of having a more unified sense of self.

In terms of BOPT, as a part of the BBAT in the study by Albertsen [63], the participants became more aware of their bodies as a site of trauma or life experience. This positioning helped them 'reclaim' their bodies as a part of their self (p.9). For HBOT interventions, in the study by Diers et al. [71] (p.486) and Concha-Mirauda [69], participants in a yoga programme reported feeling more 'accepting' and 'peaceful' with their bodies through the yoga movement practice, although in Diers study a third of participants continued to report a 'negative' relationship with their bodies (p.486).

Through a different mechanism – the body monochord – Fendel et al [73] reported that participants were able to feel parts of their bodies and then connect to them, as vibrations travelled across their whole body forcing a 'conscious concentration' there (p.12). Concentration could lead to reflection on a person's relationship with their body [73] and, sometimes, finding more acceptance of it [69].

3.5.2.2 Escaping discomfort to working through it

Participants explained that they had used their relationship with food as a way of managing discomfort or soothing difficult emotions [63] [82]. Several studies found that the BOT helped participants identify previously unknown needs [69, 71, 82, 83].

A mechanism through which to sit with discomfort or accept difficult emotions was the relaxation and calmness engendered by different therapeutic approaches [63, 69, 73, 74, 83]. This sense of calm could be used in difficult situations or to manage challenging emotions that had previously been coped with by eating.

However, there were some participants who felt discomfort or unpleasant feelings, including heaviness and awkwardness in DMT [83], some even finding themselves feelings of 'derealisation' in the experience of the body monochord [73] (p.12). As a participant in Diers [71] yoga intervention explained, the physical movement of the body into certain poses could elicit emotional difficulty, 'Heart openers always pull out emotion when I may not want to experience it' (p.487). Some participants also struggled with the physical contact with the body in yoga and Qigong [71, 74].

A lot of the discomfort described by participants related to a need to be able to 'do' the activity successfully. For some participants in Diers [71] yoga study, the physical challenge was too much and led to negative self-talk '[the positions] make me feel like I'm not good enough' (p.487). This was similarly noted in Gueguen et al. [74] Qigong study where participants were said to have felt they had 'failed' if they weren't able to relax (p.7). Sometimes sitting in this discomfort was the lesson [69].

3.5.2.3 From isolation to connection

Eating disorders are often conceived as involving 'isolation and secrecy' [82] (p.53). However, five studies using qualitative methods reported on group-based therapy. This presented an interesting tension between participants who felt uncomfortable in a group setting [74, 83] and worried about how they were perceived, to those experiences where participants felt closeness from being

together [74, 82] and who found energy and confidence through working with others even in non-verbal ways: 'a new type of connection where words haven't been necessary' [83] (p.14).

More broadly, through having a different experiences of the body through BOT, participants reported being able to relate to others in a different and more positive way thus feeling less isolated and separated [63] [71] [69, 82]. Two yoga studies found that participants could focus on better care of their needs and feel more self-compassion [69, 71]. Functioning well as an individual led to better functioning with others [63].

3.5.2.4 Time and repetition – the notion of a practice

Due to the well-worn habit of existing practices around food – for example using food to soothe, or starving to control emotion – participants acknowledged that it was easy to slip back into these patterns [63]. In Gueguen et al.'s [85] study, they found that participants needed to spend time on the Qigong activity and repeat it or let time pass to be able to benefit and adhere to the practice. Indeed, it was recognised across the studies that the body-oriented practice was part of a 'a long path' [83] and 'a challenging work in progress' [71] to recover from an eating disorder. The yoga practice in Concha Mirauda's (2017) study helped participants attune to this journey and keep up the practice as a 'constant' (p.91)[69]. For some participants, it was difficult to assess the longer-term impact of the BOT [74, 83] although they appreciated the chance to have a momentary release from negative thoughts.

3.5.2.5 Movement for learning and pleasure

In the midst of an eating disorder, participants said that exercise had negative connotations, associated with 'guilt' for participants with BED [63] (p.7) and part of 'hyperactivity' for those with AN [74] (p.6) where exercise was a negative 'should' [71] (p.486). Through the BOT, participants felt able to derive more pleasure from movement. Through engaging with movement in BBAT, the participants in Albertsen's [63] study felt that they had 'greater awareness of muscle tension, relaxation, and body posture' (p.7). Participants in Diers [71] reported an increased sense of physical strength, and confidence gained from the balancing movements in yoga. Objects such as balls featured in three interventions using yoga, Qigong and DMT [71, 74, 83] and all studies observed that the object helped the participant connect with their physical self and to elicit a more playful or relational movement with others. The contact of the ball helped a participant feel 'integrated'[83] (p.10). Indeed, whilst eating disorders had caused isolation, pain, and discomfort, through the BOT, four studies [69, 71, 74, 83] reported that participants began to feel their bodies as a site of 'play',

'joy' or 'comfort'. This pleasure was antithetical to way their eating disorders were addressed with other treatment which had an illness/deficit focus [74] [69].

Discussion

This review provides a comprehensive overview of the potential of BOT for ED. With evidence emerging across disciplines about how a sense of disembodiment or seeing the body as an object might relate to ED [25, 27], BOT that go 'beyond words' [86] (p.52) and work on mind-body connection might be a valuable resource in recovery. As Catalan-Matamoras [68] articulate, 'changing the way eating disorders patients experience their bodies should be considered a priority in the treatment of this disorder' (p.618). This review therefore adds to understanding of how BOT with body experience and mind-body integration as a shared purpose might have potential to help people with eating disorders.

Our review of the evidence found 21 studies between 2006 and 2023 evaluating BOT interventions, classified as either BOPT, or those with a shared emphasis on mind-body integration/body experience (HBOT), which were delivered to people of different ages, with different ED diagnoses and symptom severity, indicating the broad potential of BOT as an inclusive therapeutic approach. Four RCTs and ten other quantitative studies found that these BOT interventions made some positive improvements to eating disorder symptoms, body attitudes, experience and image and emotional regulation. While the volume of rigorous RCT evidence on BOT intervention effects on ED symptoms is scarce (from 4 RCTs with a total of 143 participants), only one RCT which included 22 patients investigated BBAT, a form of BOPT [68]; other RCTs focused on HBOT. Further, given the risk of bias in these studies, the evidence provided from these interventions can be viewed as limited. Poorly described follow up, the inclusion of unvalidated measures (or using just parts of a validated measures), and the inability to separate out confounding factors and the impact of other therapies impeded the ability to draw comparison across the studies. Some key shortfalls in the data drawn from the quantitative studies include the lack of sample size calculation with primary and secondary and/or mediating outcomes clearly identified. No studies provided any transparent reporting of the follow up, ways to handle missing data, and adverse effects monitoring/reporting. Data on completion or attrition, and adverse effects are particularly important considering the well-known challenges in sustaining treatment adherence among the study populations.

The qualitative evidence from nine studies of BOT interventions elucidates, and more successfully describes the potential impact of these therapies for patients. Qualitative evidence is valuable in the

domain of lived, body experience because of its phenomenological nature. The five analytical themes we identified suggest some important areas for further exploration. Enhanced bodily connection was experienced by participants describing the impact of these types of BOT interventions. Specifically, participants felt their body as more a part of their self. This is significant because when the body is split away from selfhood, with disembodied subjectivity, it can arguably more easily be controlled, punished, or starved [27]. As the body is envisioned as a fundamental and constituting part of the self, this creates potential for positive change [87], as was suggested by the quantitative studies which found trends of improved body attitudes and reduced eating disorder symptoms. None of the studies we reviewed used measures designed to assess experiences of embodiment such as the 'Experience of Embodiment Scale' [29] or the 'IDEA' (identity and embodiment) questionnaire, which could more helpfully identify improvements in this area [30].

A key theme across the studies was the impact of BOT on helping people to work through or regulate their emotions. Participants in the studies described how they avoided difficult emotions, or used their relationship with food (food restriction or purging, for example) to manage emotions, as previous research has found [88]. However, there were some notable blocks to this; first in response to BOT, some people felt that they were 'not good enough' or able enough to 'achieve' the relaxation. This idea of needing to achieve and improve may be connected to perfectionism traits. Perfectionism has previously been shown to play a role in the aetiology, maintenance, and treatment of eating disorders [89]. BOT brought to the fore the conflict between wanting to change and an awareness of the difficulty of this process, one 'fraught with tension' [71]. BOT, by their very definition, require an attuning to the body, which might be very challenging for those early on in treatment and recovery. Developing and fostering patient's abilities to express and process emotions and their dysregulated behavioural consequences is one of the core principles of the psychotherapeutic process work in BOPT [39]; this could be more specifically developed and explored in future clinical trials.

It is important to recognise that many of the holistic BOTs come from practice-based disciplines (for example yoga, qigong) which, through their philosophical and/or spiritual underpinnings require cultivation, wherein the, 'theoretical cognition of the truth is possible only through practice' [90] (pp.85-86). Given the short length of time in some of these interventions, and the often protracted nature of ED recovery [91], it is perhaps not surprising that participants only felt short term effects and that those who were able to practice for longer, or a second time, had a better understanding. It is also valuable that participants in the studies felt a better ability to connect with others after the

BOT, especially given that people with eating disorders who feel that they have recovered describe the value of positive relationships in their journey [92].

The final theme around movement for learning and pleasure opens an area that might be important to people with eating disorders. With BOT, participants explained that they experienced pleasure and joy from movement, in contrast to negative experiences of exercise in their eating disorder [93]. Anhedonia, defined as loss of pleasure has been identified as elevated in ED [94] so participants' expression of pleasure in the BOT is important, but not something that any of the studies specifically identified in their outcome measures.

Limitations and strengths

While our systematic review approach allowed comprehensive research evidence generated through mixed-method studies to be collated, there are limitations with the evidence we synthesised. First, the heterogeneity across clinical, population and methodological domains in the quantitative studies made it inappropriate to meta-analyse the evidence to provide recommendations on effectiveness of BOT. Further, the concerns over study quality cast significant uncertainty in the findings. Although most of the qualitative studies were of reasonable quality, some of the research conducted by BOT practitioners lacked methodological underpinning, even if the BOT itself was strongly theoretically framed. Overall, there was a diversity within the synthesis of BOT, eating disorders, and characteristics of interventions that it makes it hard to confidently ascertain the mechanisms by which the BOT is successful. Studies did not report on the ethnicity of participants in most cases, nor did they consider any issues of intersectionality affecting participants. This is a limitation given that more evidence is needed to better understand the experiences of people of all ethnicities with eating disorders [95, 96].

In terms of the systematic review process, our eligibility criteria had an impact on the range of studies we included in our review. In addition to the interventions using the established BOPT, we had a specific criterion for the definition of a HBOT to guide our selection of studies. This allowed us to broaden out beyond those studies defined as BOPT, to bring in more evidence from studies where the interventions had some similar shared purpose to address body experience and sense of being 'whole', which is important to people with eating disorders in their sense of recovery [50]. It is important to note that sometimes these HBOT did also include a reflective or talking therapy element, and so the distinction between these categories can be blurred. Indeed, we acknowledge that there are other studies of BOT that did not explicitly express their intention as addressing and

working through mind-body connection or sense of embodiment but that may have still ended up impacting these outcomes. There were some studies we located, for example, which used yoga, but which did not contextualise their interventions in terms of mind-body connection or embodiment (for example, referring only to yoga's relaxing benefits, hence qualified as body therapies). These studies may well have led to improvements for people with eating disorders in the same way as the BOTs we included in this review. Although we resolved this through discussion, a broader review might have found further evidence to include. Rather than get caught up in semantics of how interventions are categorised it might be more beneficial for the field to take broader criteria to be able to find the highest quality studies on the topic. Meanwhile, better reporting of intervention description including theoretical underpinning, using established guidelines such as the TIDieR checklist, should be widely implemented [97]. Finally, whilst we included papers in three languages, there will be studies from other countries published in a wider range of languages than we were able to work with.

Implications for clinical practice and research

This review provides important insights into the potential of BOT for eating disorders. Nearly all the studies we reviewed concluded that further, more robust research was needed. Given the limited efficacy of current treatments, and the increasing understanding of the role of bodily experience in the development and recovery from eating disorders, this review concurs with these conclusions. Working with people with lived experience to better define how BOT works for them, what their body experience feels like and what recovery means in embodied terms is crucial for future research and clinical practice. Measures designed with a cognitive or 'top-down' understanding of mental health might miss out on more embodied or 'bottom-up' experiences that people have with eating disorders. One key significant findings drawn by this review point to BOT brings joy and connectedness between body and mind for ED patients. Such notion should be embraced in clinical practice with this population. Studies included in this review also showcase a wide range of clinical settings (inpatient, specialist residential centre, community, non-clinical) in which BOT was applied, often as an adjunct to other cognitive, behavioural, and psychological treatment. This, together with the emerging evidence yielded on HBOT which compared to BOPT, was less researched in prior reviews on BOT for EDs (and other mental health conditions), call for better recognition of and more rigorous research on HBOT's values for ED patients. Lastly, regardless of therapy modalities containing an explicit psychotherapy element or not, clinical practice applying BOT for ED patients should involve the end-users in its design, delivery and evaluation, for the maximum benefits. Appropriate research to investigate this could involve 'embodied methodologies' that more directly

access these experiences [98].

Conclusion

People with various EDs seemed receptive to participate in BOT and saw these therapies as offering something positive, away from focusing on their eating disorder to focusing on their sense of being in their body, as well as their bodily capabilities and resources and this was an important trigger for wider change. Quantitative evidence suggested positive improvements in body perception, emotional regulation and eating disorder symptomology. However, given the risk of bias in the studies conducted to date, more studies investigating effects of BOT on embodiment and other body-mind connection outcomes and their mechanisms of actions on ED-symptomatology are essential to better understand the impact of this potentially important therapeutic direction.

Registration and protocol

The reporting of this review follows the PRISMA guidelines [99]. The review was registered on PROSPERO (CRD42022358511)[56] [57].

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Competing interests

None

Availability of data, code and other materials

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Table 3: Intervention characteristics table

Source paper	Theoretical basis for BOT	Type of Body Oriented Therapy	BOPT - format	BOT - contact time (hour) /duration (week) - group/individual (motionless/passive/active)	BOT therapists - Discipline Training and supervision	Concurrent therapies
BOPT interventions:						
Albertsen, Natvik [63]	Phenomenology of the body (Merleau-Ponty)	Basic Body Awareness Therapy. Delivered as psychomotor physiotherapy - movement awareness domain	Lie on back, aware contact with ground, noticing breath, small movement, stretch, sit up, seated reflection with therapist, body movements seated, standing then Qi gong and massage	Hours - not specified 35 weeks for 1 participant, 55 weeks for other participant Individual Motionless, active movement and passive movement	Psychotherapist, trained BBAT therapist, years of working with ED patients	CBT-e standard treatment weekly
Alexandridis [64]	Integrative (psychomotricity, movement therapy and cognitive therapy)	Integrative therapy concept developed by study team with elements of psychomotor therapy, sport therapy and cognitive therapy with considerations re motivational aspects	integrative therapy concept developed by study team with elements of psychomotor therapy, sport therapy and cognitive therapy with considerations re motivational aspects	4 sessions per week (90 minutes)	Integrative (psychomotricity, movement therapy and cognitive therapy)	Integrative therapy concept developed by study team with elements of psychomotor therapy, sport therapy and cognitive therapy with considerations re motivational aspects
Artoni, Chierici [65]	Integrate three aspects of perception: (1) Body Schema and body memory (Schilder), (2) Tactile Form (Gadsby), (3) Neuroscience and phenomenology of mind-body interactions (Merleau-Ponty)	Body Perception Treatment	Body schema intervention: 60 mins focuses on interoceptive, and proprioceptive perception facilitated by gradual state of induced relaxation, improved by breath control and focused attention techniques. Body perception intervention (90 mins) aims at increasing awareness of bodily sensations and misperception, including 10 min of brief	60/90 mins Twice weekly Through duration of inpatient treatment (mean = 89.20 days SD = ± 33.77) Group Motionless	NR	Inpatient ED Treatment: therapeutic rehabilitation programme with CBT including a weekly one-hour CBT body image therapy for 12 weeks

			psychoeducational introduction, a light relaxation, self-perception body-oriented experience with selective focus attention on the different body parts, end with self-evaluation of experience and distress through drawing own body and writing narrative, and 20 mins debrief.			
Bastoni, Guerrini Usubini [66]	Use of bodily movement in a therapeutic way, to encourage the awareness of thoughts and emotions that cannot be differently expressed	Dance Movement Therapy (DMT)	Each session divided into four parts: First part: Introduced to DMT, prepared, express feelings Second part: therapist presented and realized the main activities of the session Third part: participants to come into contact with their bodies and thoughts and feelings Final part: opportunity to reflect	4 sessions/ once a week 1 hour each Group (9-10 participants in each) (motionless/passive/active)	Psychologist specialized in DMT	Multidisciplinary rehabilitation program for weight management: with medical, dietitian, physical, and psychological components including individual and group counselling, physical activity and psychotherapy
Catalan-Matamoros, Helvik-Skjaerven [68]	Humanistic and Holistic focuses on self-exploration and self-experience of movement quality, on the interplay between conscious being, doing and relating	Basic Body Awareness Therapy	Session 1: Encounter between the patient and the physiotherapist; 2: Exercises in lying position; 3: Exercises in sitting position; 4: Exercises in standing position; 5: Push-hands and walking exercises: 6: Session ending	1.5 hours 12 sessions over 7 weeks 2 individual + 10 group sessions (Week 1 and 2: 1-hour individual per week. Weeks 3-7: 2 group sessions of 1.5 hours) Active movement	Therapist -certified physical therapist specialist in Basic Body Awareness Methodology by an official postgraduate university programme	Standard outpatient treatment including psychotherapy and psychiatry 54% ppts on pharmacotherapy have meds adjusted
Dor-Haim, Yaroslavsy [72]	Freud (1923), self as bodily self; object relations theories (Krueger, 1989)	Dyadic group movement therapy	Chace movement model (Chaiklin, 1975; Chaiklin & Schmais, 1979) – movement in a circle: warm up,	45-minute session Weekly Duration of inpatient care	Group leader is 'movement therapist'	Not reported but receiving inpatient ED care

			development, closure (verbal) (use of props)	Group-based Active		
Konzag, Klose [77]	Based upon a psychodynamically informed BOPT (concentrative movement therapy = Konzentrative Bewegungstherapie in German)	BOPT delivered as part of a multimodal, integrative and psychodynamically oriented inpatient psychotherapy programme	Working at the periphery of body perception with emphasis on body boundaries/demarcation, promoting the differentiation of tactile and proprioceptive body awareness, followed by working on affective-cognitive body cathexis. Body boundaries are emphasised through self-touch. Further exercises thematise the protection of body boundaries. Exercises to emphasise and strengthen self-object and subject-world differentiation. Focus on body image aberration, improving symbolising capabilities to support the subsequent talking therapy exploration.	45 mins / 30 mins	Based upon a psychodynamically informed BOPT (concentrative movement therapy = Konzentrative Bewegungstherapie in German)	BOPT delivered as part of a multimodal, integrative and psychodynamically oriented inpatient psychotherapy programme
López-Túnez, Catalán-Matamoros [79]	Self-exploration and self-experience. Re-education of the body schema and its functions	Basic Body Awareness Therapy	1 BBAT-based exercises 2 Diaphragmatic breathing exercises with coordination and postural control in different positions (supine, sitting, standing) and with different movements (flexo-extension, rotations, stretching) 3 Therapeutic massage	1 hour Twice weekly 5 weeks 8 individual, two group Active and passive movement	Physiotherapist	All 10 in psychiatric and psychotherapeutic care. 5 of them also on pharmacological treatment
Padrão and Coimbra [81]	Developmental-constructivist position on psychology of the arts	Psychotherapeutic dance movement	Warm up with body awareness techniques, guided or free thematic movement/expressive dance, warm down with verbalization	75 mins Weekly sessions 6 months	Not reported	Not reported but inpatient care

			and reflection about the movement experience	Group Active movement		
Savidaki, Demirtoka [83]	Embodiment and enaction	Dance movement therapy	Chase method and Reddemann (guided imagery) 6 parts: check-in, warm-up, guided imagery, exploration in movement, writing, check out.	90-minute sessions 12 sessions/ 14 weeks Group Motionless Active movement Passive movement	Therapist – Dance Movement therapist in training, who received clinical supervision	Usual treatment
HBOT interventions:						
Brennan, Whelton [67]	Mindfulness-based practice and a holistic approach to wellness	Kripalu yoga	Pranayama (breathing), asana (postures), and meditation practices. Mindfulness and self-compassion and attention to experiences (i.e., physical sensations, emotions, thoughts) emphasised	90 mins Weekly 8 weeks Group with max group size = 12 Motionless and active movement	Registered Yoga Teacher trained in the Kripalu Yoga tradition, led all of the Yoga classes	Not reported but n=42 reported previous therapy; n=11 reported none Psychotropic Medication Yes n= 16; No n= 37
Concha Mirauda, Cruzat-Mandich [69]	To reduce the attention given to automatic negative or anxious thoughts, to increase self-control over the body and mind, so to strengthen the connection between body and mind.	Kundalini yoga	Session 1: Introduction to KY; 2: Experiencing relief and relaxation; 3: Experiencing inner strength; 4: Promoting self-love; 5: Enhancing connection between sexuality and femininity; 6: Promoting personal power and self-efficacy; 7 and 8: Managing addictive behaviors associated with ED	90-minute 2 months Group Motionless and active movement	Not reported	Psychological + psychiatric + nutritional (n=4) Psychological + nutritional (n=2) Psychological + psychiatric (n=1) Psychological + nutritional + alternative (n=1) Psychological (n=1)
Cook-Cottone, Beck [70]	Mindfulness-based practice and a holistic approach to wellness	Kripalu yoga	Pranayama (breathing), asana (postures), and meditation practices. Mindfulness and self-compassion and attention to experiences (i.e., physical	90 mins Weekly 8 weeks	Registered Yoga Teacher trained in the Kripalu Yoga tradition, led all of the Yoga classes	Not reported but n=42 reported previous therapy; n=11 reported none

			sensations, emotions, thoughts) emphasised	Group with max group size = 12 Motionless and active movement		Psychotropic Medication Yes n= 16; No n= 37
Diers, Rydell [71]	Yoga Sutras of Patanjali [84]	Yoga, as part of a yoga body image (YBI) intervention	Body-positive therapeutic yoga group and 45 mins group discussion	90-minute sessions 8 weeks Group-based Active	Led by an ED-trained registered yoga instructor (min 200 hour registered yoga certificate) and licensed therapist	Treatment as usual (CBT based)
Fendel, Sandler [73]	Psychoanalysis Importance of sensory experience of touch in infant development including Winnicott 'holding' function (1949, 1960)	Body Monochord	Therapist plays Monochord (stringed instrument) fitted on the back of the Monochord Chair (MoC) and on the bottom of Monochord Table (MoT). Therapist sits behind the Chair or beside the Table. Vibrations transmitted via the recipient's body contact with the instrument.	Weekly 3 weeks (1 introduction + 2 treatments) 20-minutes Individual Motionless	Physician (2 years professional experience (psychosomatic medicine)	Usual inpatient care
Gueguen, Piot [74]	Mind-body intervention and a branch of traditional Chinese medicine aiming to strengthen qi (life energy) and focus on interoceptive processes	Qigong	Relaxation phase focused on breathing sensations (10 min), self-massage (20 min), dynamic qigong exercises (30 min), paired massage (10 minutes for each patient, total of 20 min), relaxation phase (10 minutes)	90-minute sessions Weekly Throughout in-patient treatment Group-based Motionless Active movement Passive movement	Nurse with advanced training in qigong	Usual inpatient treatment
Hall, Ofei-Tenkorang [75]	Embodiment and interception. Postures called asanas focus attention inward and the practitioner transcends the mind-body divide in an attempt to experience the true self or soul	Hatha based yoga classes (non-heated, gentle)	Inversions Arm balances Deep breathing Sanskrit chanting Seated meditation Sun salutations + flow Restoration postures Postures + movement Postures + rhythmic breathing	60-90 mins depending upon classes 12 classes, which took participants 12-29 weeks (mean 20) to complete Group	Certified yoga instructor trained at the minimum 200-hr level certification through the Yoga Alliance, some also licensed social workers or certified school teachers	Outpatients at clinic with medical monitoring, nutritional counselling and social work intervention

				Active movement	Active movement	
Karlsen, Vrabel [76]	Yoga contributes to body awareness, a lack of which is a key risk factor for developing Eds.	Hatha Yoga	Hatha yoga - Relaxation with awareness of the body, followed by different physical exercises, breathing exercises, and concentration meditation, and end with a longer relaxation. Home practice encouraged with written information.	90 mins Twice weekly 11 weeks Plus, home practice encouraged and supported by written information and illustration Group Active movement + motionless	Experienced and educated yoga teacher	6 also having psychotherapy; 2 also on anti-anxiety medication
Laumer, Bauer [78]	Feldenkrais's theory of holistic somatic education and unity of body and mind as a concrete reality, through movement an access for change of the entire person is sought	Feldenkrais method "Awareness through movement"	Respiration exercises and movement topics of infancy and motor development	45 mins 1 introductory class then Twice week 5 weeks Active movement Group (closed)	Therapists - NR	Intensive multimodal therapy program but BOPT groups did not receive any other movement Intensive multimodal therapy programme of the inpatient unit during time frame of the investigation
Pacanowski, Diers [80]	Yoga has potential to promote embodiment, for those with EDs who often have disconnection from bodies (Diers, 2016)	Yoga	Yoga starting with standing start sequence, integrated movement using specific asanas (postures), focused intentions and breathing techniques, end with a relaxation pose	1 hour Daily Five days before mealtime Group Active movement	ED-sensitive Yoga Alliance registered yoga teachers	Not specified Residential ED treatment
Proulx [82]	Systems-based, self-regulation practice – mindfulness meditation (Kabat-Zinn, 1990, 1994).	Mindfulness-Based Eating Disorder Treatment Group (M-BED Group)	Experiential meditation practice, psychoeducation, discussion and assigned home practice	2-hour group sessions + home practice Weekly 8 weeks	Not reported	Individual psychotherapy

				Group Motionless		

Highlights

- People with various EDs seemed receptive to participate in BOT
- BOT often formed part of a comprehensive treatment programme for people with EDs
- Duration of BOT vary significantly from 5 weeks to 12 months
- More studies are required on BOT effects on embodiment and body-mind connection
- More studies are required on BOT mechanisms of actions on ED-symptomatology