Master's Thesis

Self-help interventions for the prevention, detection, and early treatment of eating disorders

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Abstract

Background: Evidence-based self-help interventions have shown promising effects on prevention, detection, and early treatment of eating disorders, but research is still inconclusive about those programs at various treatment stages, age groups and guidance modalities. This systematic review aimed to examine the current state of the art, interventions' suitability for adolescents, and the impact of additional guidance.

Methods: The databases *Web of Science*, *Scopus,* and *PsycINFO* were searched for studies describing self-help interventions focusing on the prevention, detection, and early treatment of DSM-based eating disorders. The quality of studies was assessed using the Joanna Briggs Institute (JBI) framework. Included studies were reviewed and narratively analysed regarding the review's predefined goals.

Results: Thirty studies fulfilled inclusion and quality criteria and described 21 self-help interventions. Most of them applied CBT principles for the prevention and early intervention of mainly bulimia nervosa, binge-eating or EDNOS in primarily female participants, even though other frameworks were also used besides CBT. Detection was targeted once. Results further indicated significant symptom reductions in primary outcomes in 28 papers. Additionally, only five interventions addressed adolescent target groups, two of them using family-based therapy. Finally, guidance seemed to have a beneficial effect on intervention adherence and effectiveness.

Conclusions: This review supports the value of self-help interventions targeting early stages of eating disorders, but further research should address gaps like programs for anorexia nervosa, adolescents, or the detection of eating disorders as well as what entails high quality guidance.

Keywords: Self-help, systematic review, eating disorders, prevention, detection, early intervention, adolescents, guidance

Contents

Introduction

Eating disorders are among the most prevalent psychological disorders today and cause significant impairment to patients and health care providers (Keski-Rahkonen & Mustelin, 2016). Studies suggest that roughly 13 % of young women develop an eating disorder in their life and 25 % develop subthreshold symptoms, which, untreated, can turn into an eating disorder (Traviss-Turner et al., 2017). While the prevalence rates for men are significantly lower than women, with varying percentages from 0.1 % to 0.5 % for adolescents, it is assumed that the symptomatology is roughly the same for both genders (Keski-Rahkonen & Mustelin, 2016). In addition, eating disorders are associated with increased mortality rates due to, for example, dehydration or electrolyte imbalances but even self-harming behaviours and suicidal ideation (Jáuregui-Garrido, & Jáuregui-Lobera, 2012).

Eating disorders

The DSM-5 has defined three main categories of eating disorders. The first category, anorexia nervosa, is characterised by a significant fear of gaining weight resulting in considerable weight loss and low BMI. The restrictive type of anorexia nervosa achieves this low weight with excessive exercise or food restriction, while the binge-eating/ purging type also uses vomiting as a strategy. Overall, the fear of weight gain is a constant companion in patients with anorexia nervosa and can cause the avoidance of whole food groups (e.g., carbohydrates) or excessive rituals like prolonged eating. The predominating factors for the second category, namely bulimia nervosa, are repeated episodes of compulsive eating attacks and a lack of control which patients try to compensate with purging, extreme dieting, or excessive exercise. Despite generally having average body weight, bulimic patients tend to significantly misperceive their bodies, resulting in unhealthy control measures and a desire for a different shape and weight

(Anitha et al., 2019). Lastly, the DSM-5 characterises binge eating disorder by severe eating attacks without any purging or regulatory strategies, which results in patients often being overweight. Other categories are: “Other specified feeding or eating disorders” (OSFED), previously called “eating disorder not otherwise specified” (EDNOS), which show similarities to the three main categories but do not meet all criteria, as well as Pica, rumination disorder, avoidant/ restrictive food intake disorder (AFRID) and “unspecified feeding or eating disorders” (UFED) (American Psychiatric Association, 2013).

Besides this symptomatology, research acknowledges several well-known risk factors contributing to either the beginning of eating disorders or worsening of symptoms (Keski-Rahkonen & Mustelin, 2016). For example, family, genetics, or peer environments like school settings are indicators of why youth and adolescence are critical periods for the onset of eating disorders (Bulik et al., 2016; Micali et al., 2015). Especially body image-related factors like the promotion of thin beauty ideals through the media can contribute to the onset of eating disorders (Bissel, 2010). In addition, comorbidity is an issue, as other diagnoses like anxiety disorders, mood disorders, substance abuse disorders, and alcohol misuse are often present in people with disordered eating tendencies (Halmi, 2018; Keski-Rahkonen & Mustelin, 2016).

Treatment of eating disorders

Much research went into treating eating disorders in the past (Costa & Melnik, 2016). Up to this point, cognitive behavioural therapy (CBT) is considered the standard therapy for binge eating disorder and bulimia nervosa (Murphy et al., 2010). The methodology of CBT focuses on the correction of dysfunctional beliefs like body dissatisfaction or the desire for thinness, which are thought to maintain the vicious cycle of eating disorders. Less research has been conducted for anorexia nervosa, for which most evidence has suggested family therapy to be the more

suitable option (Costa & Melnik, 2016). In addition, interpersonal therapy has established itself as a viable option for treating bulimia nervosa by not focusing on dysfunctional cognitions of clients but instead on interpersonal conflicts (Costa & Melnik, 2016). Furthermore, antidepressants like Fluoxetin have shown to be beneficial for bulimia nervosa and binge eating disorder, but not as significant as CBT, especially regarding long-term effectiveness (Wilson & Fairburn, 2007). Recently, research also addressed the implementation of third-wave treatments like mindfulness-based approaches or acceptance and commitment therapy to improve patients' resilience and promote their well-being (Steck et al., 2003).

Besides addressing fully diagnosed eating disorders, a different approach is to reduce the incidence of eating disorders by focusing on even earlier treatment stages like the prevention, detection, and early intervention. The Commonwealth Department of Health and Aged Care (2000) proposed a definition to differentiate prevention and early intervention. Prevention refers to strategies that operate before the onset of a disorder to reduce the risk of a full diagnosis unfolding. Further differentiation in universal, selective, and indicated prevention is possible, depending on whether the intervention addresses an entire population (e.g., a school), a specific subpopulation (e.g., female students) or individuals at risk for a particular disorder (Gordon, 1983). In contrast, early intervention specifically targets help-seeking individuals who display early symptoms or experience the first episode. Furthermore, Achar et al. (2020) defined detection as the process to solely identify individuals with first symptoms or at risk of developing a first episode. Figure 1 illustrates these various steps within a visual overview.

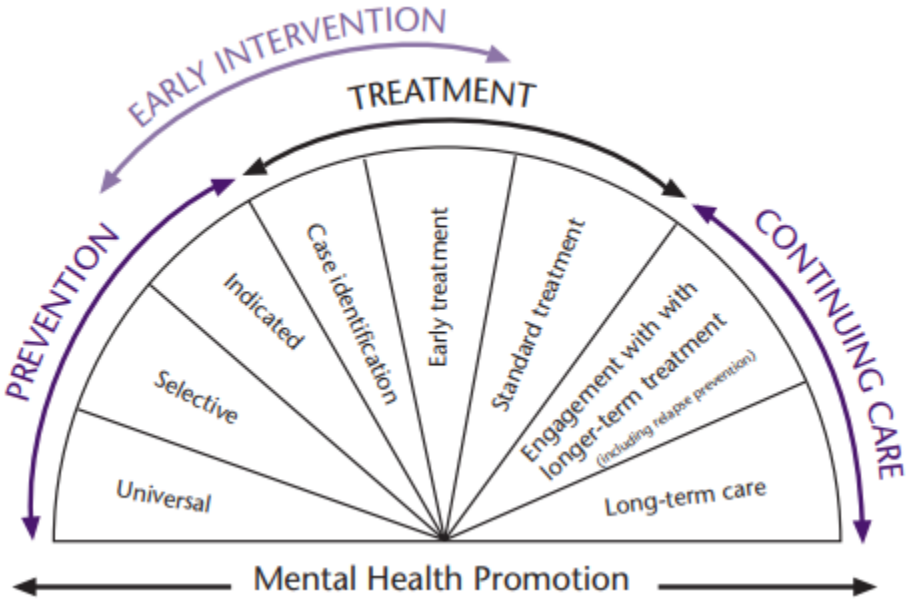

Figure 1

Spectrum of interventions for mental disorders

Note. Adapted from: Commonwealth Department of Health and Aged Care (2000). *Promotion, Prevention and Early Intervention for Mental Health – A monograph.* Commonwealth Department of Health and Aged Care. Canberra

However, despite the beforementioned strategies, most cases remain untreated because several potential barriers impede the early recognition and treatment of eating disorders (Griffiths et al., 2018). For example, people with disordered eating often feel shame or fear of stigmatisation, which reduces the likelihood of seeking help or treatment (Thompson & Park, 2016). Other reasons are financial barriers like costs of treatments or insufficient coverage by insurance companies and long waiting lists for psychotherapy (Becker et al., 2009; McLaughlin, 2004). The latter is especially problematic, as time spent on waiting lists has shown to negatively impact patients' motivation and commitment to therapy and significantly predict treatment

dropout (Carter et al., 2012). In addition, chances for recovery significantly decrease if symptoms are not treated within three years (Keski-Rahkonen & Mustelin, 2016; Traviss-Turner et al., 2017). However, regular face-to-face prevention programs lack a sense of anonymity and convenience, which would be helpful for patients suffering from these previously described treatment barriers (Serdar et al., 2014). Overall, this implies the need for alternative strategies to address those at risk of eating disorders, otherwise being not identified and not receiving help in time.

Self-help interventions

A potential alternative to circumvent the problems mentioned above are self-help interventions. Such programs are specifically designed to be used with minimal or no help from a professional and usually rely on scientific principles instructed by an underlying theory to deliver psychoeducation that the user acquires independently (Lewis et al., 2003). While most self-help programs have applied CBT, frameworks like interpersonal therapy, dialectical behaviour therapy, or acceptance and commitment therapy were also implemented (Yim & Schmidt, 2019). Self-help interventions also differ regarding the modus operandi, as some interventions are of bibliotherapeutic nature, while others use an internet-based delivery or CD-ROM (Traviss-Turner et al., 2017). Overall, these programs have shown potential for treating bulimia nervosa and binge eating disorder compared to waiting list conditions (Yim & Schmidt, 2019). Furthermore, self-help interventions have the advantage of reaching a large audience by reducing psychosocial barriers like shame or stigma (e.g., due to anonymity) and geographical barriers and demanding only minimal personal and financial resources (Aardoom et al., 2016; Bauer et al., 2013).

However, research has also identified aspects of the use of self-help interventions that deserve further exploration. For example, despite the onset of eating disorders peaking during adolescence, only a few studies are available for this younger target audience (Volpe et al., 2016). This is surprising because receiving early treatment for disordered eating has been shown to increase the chances of recovery (Traviss-Turner et al., 2017). So far, initial results suggest the suitability of family-based treatments and CBT for this target group, with CBT having a slight advantage regarding costs and effectiveness (Wagner et al., 2013). Even if family-based elements are not employed in an intervention, it is still recommended to involve and inform parents of patients regarding the treatment process (Wagner et al., 2013). In addition, the impact of guidance in self-help interventions has often been discussed in the past. Research suggests that additional guidance from a professional therapist or discussion groups seemed to increase interventions' effectiveness compared to waiting list conditions and other treatments (Traviss-Turner et al., 2017). Furthermore, first evidence of the usefulness of guided self-help as a helpful adjunct at the beginning of a stepped care procedure for bulimia nervosa and overall treatment adherence has been demonstrated (Perkins et al., 2006; Wagner et al., 2013). However, most results for the beneficial impact of guidance on self-help interventions are preliminary because many studies lack sufficient descriptions of the content of the guidance and staff members' expertise (Yim and Schmidt, 2019). Additionally, Yim and Schmidt (2019) suggested that a gap exists regarding the content of high-quality guidance and which factors can increase it.

Present study

This systematic review aims to collect and summarise current studies that focus on self-help interventions for the prevention, detection, and early treatment of eating disorders. Therefore, in response to considerations by Yim and Schmidt (2019), the focus is implementing

self-help interventions at earlier stages of the treatment process, e.g., for identifying at-risk individuals, offering strategies to reduce the likelihood of an eating disorder onset, well as delivering initial treatment for patients with first symptoms, on waiting lists, or without sufficient therapeutic guidance.

Additionally, the collected self-help interventions are analysed regarding two criteria. First of all, interventions' suitability for young people and adolescents will be assessed, as they are a highly relevant risk group for eating disorders and treatment approaches for this group are less frequent (Thompson-Brenner et al., 2009). This can be conceptualised as a severe gap because the onset of eating disorders peaks during adolescence (see Volpe et al., 2016). Thus, self-help interventions focusing on earlier or even pre-stages of the treatment process should consider young people and adolescents as a critical target group. Secondly, the current state of the art of guided in comparison to unguided self-help interventions will be explored. As Yim and Schmidt (2019) indicated the need for more research, this aspect can prove helpful for various reasons. For example, if current research suggests that guided self-help would only provide marginal benefits in comparison, more efforts might go into developing unguided versions, as fewer staff demands might lead to a higher reach of unguided interventions. In contrast, if unguided self-help interventions proved less effective due to the absence of professional supervision and sole reliance on users' motivation (see Mehrotra et al., 2017), guided self-help may be the better option for patients with disordered eating.

Methods

Search strategy

A systematic review was conducted for articles published in English using three scientific databases, namely *Web of Science*, *Scopus*, and *PsycINFO*. Three constructs were used for the

search, which used different synonyms for the following three keywords: eating disorders, self-help, and intervention/prevention. These terms were combined with Booleans like “OR” and “AND” and truncated, whenever appropriate (see Figure 2).

Regarding the two sub-aspects of young people and adolescents and guided vs unguided interventions, no specific constructs and search terms were used, as included studies will be analysed explicitly in this regard.

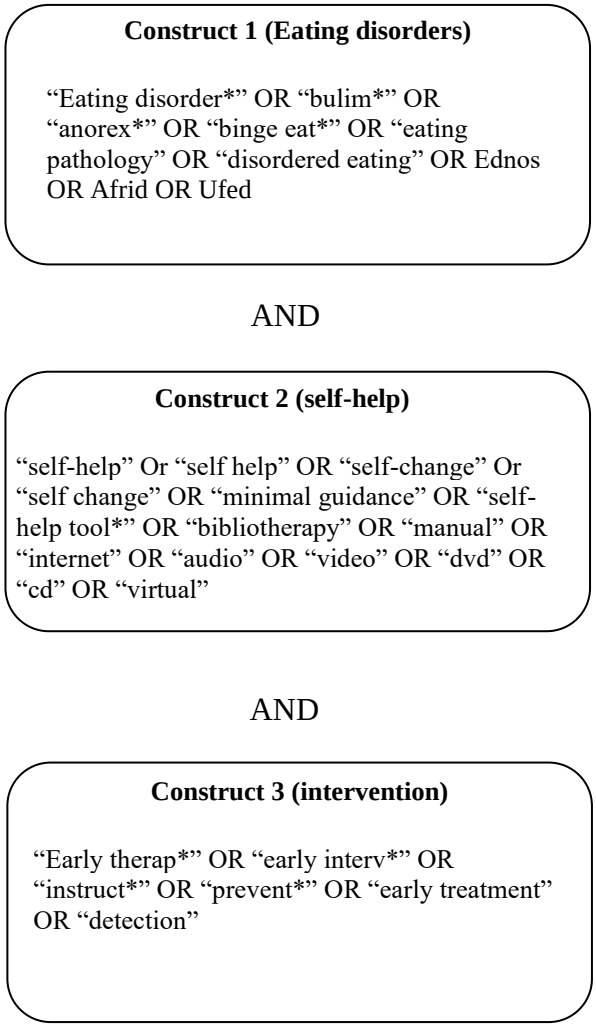

Figure 2

Search strategy for databases

Criteria for considering studies in this review

This systematic review followed the Prisma guidelines (Moher et al., 2009). Using this approach requires the implementation of explicit criteria for the eligibility of studies. First of all, studies were included which focused on eating disorders as specified in the DSM. Those studies that included eating disorders mainly as comorbidities of another diagnosis (e.g., major depressive disorder) were excluded from this review. Furthermore, only those studies that clearly described or evaluated a self-help intervention for an eating disorder were used. This included a clear theoretical framework and treatment structure, which aids users to improve their skills in dealing with eating disorder related problems. Purely educational material was not sufficient. Regarding the type of study, randomised controlled trials, pilot studies, experimental designs, and uncontrolled studies were included. Study protocols were removed from the analysis due to the potential changes in study design and the absence of participant data. Additionally, only studies describing interventions with a clear emphasis on the detection, early treatment, and prevention of eating disorders were included.

Assessment of methodological quality

Before data analysis, every study was evaluated regarding its quality using standardised assessment forms from the Joanna Briggs Institute (JBI). While RCTs were analysed with the JBI Checklist for randomised controlled studies, the remaining studies with non-randomised or uncontrolled designs were checked for quality with the JBI Checklist for quasi-experimental studies (Tufanaru et al., 2020). Both checklists inquired various study details, e.g., from randomisation and blinding procedures to the use of control groups, follow-up descriptions and appropriate statistical measures. Statements could either be scored with “yes”, “no”, “unclear” or “not applicable” (see Appendix). The number of statements answered with “yes” was intended to

estimate studies' risk of bias. Low risk was given if 70 % of answers were checked with "yes", while a moderate risk was given in case of 50 to 69 % of questions scored "yes". Finally, a high risk of bias was determined in cases of less than 50 % of questions scored with "yes" (Goplen et al., 2019; Peters et al., 2015). As a high risk of bias suggests low confidence that results truly represent implied treatment effects, those studies categorised as highly biased were removed from the analysis (see Viswanathan et al., 2012).

Analysis

After quality assessments, the analysis took place in a threefold manner. The first step was a descriptive analysis of relevant study characteristics based on the information given in studies. This included objectives and outcomes, a description of target groups, targeted eating disorders, and interventions' classification along the stages of the care-pathway, such as early intervention or prevention (see Figure 1). Studies were considered universally preventive if a whole population was targeted, while a focus on a specific target population with a heightened risk of developing an eating disorder was attributed to being selectively preventive (Watson et al., 2016). Finally, indicated preventive designs only included symptomatic individuals after extensive screenings for ED symptomatology, including self-ratings by participants (Watson et al., 2016).

In a second step, all studies were analysed to answer the main research question. Therefore, interventions were described in detail, with particular attention given to the underlying theoretical frameworks, modes of delivery (e.g., web-based), and contents of interventions, as well as additional insights into their effectiveness. Overall, this step aimed to provide a narrative synthesis of the current state of the art for self-help interventions targeting

eating disorders at early stages of the care-pathway, considering the underlying theories, interventions' intended purposes, and their effectiveness based on studies' conclusions.

The third step was an analysis of interventions' applicability for adolescents and younger patients and the impact of guidance to answer the two sub-questions of this review. Interventions were considered applicable for adolescents if the respective study provided information that either the target group consisted primarily of adolescents or that the current program might also be used for a younger target audience. Regarding the impact of guidance, studies were categorised as being unguided or using additional guidance. Both categories were then described and compared regarding interventions' effectiveness to gain insight into which modality might be the preferred option for self-help interventions. If studies compared two versions of the same intervention with different guidance levels, they were analysed separately but also considered to gain insight into the impact of additional guidance.

Results

Data collection

The search was conducted in April 2021. The initial inquiry in the three databases *Web of Science*, *Scopus,* and *PsycINFO* revealed 3372 publications (see Figure 3). According to previously defined selection criteria, search results were further confined by limiting results to exclusively English studies, resulting in the exclusion of 137 studies. Furthermore, deduplication via the reference program *Endnote* identified 314 duplicates (Bramer et al., 2016). Abstracts and titles of the remaining studies were screened for relevant inclusion criteria, resulting in the exclusion of 2828 studies. The remaining 57 publications were assessed in detail for eligibility. This resulted in removing 25 studies for either not being accessible or having a different intervention focus than prevention, early treatment, or detection of eating disorders. One study

turned out to be a literature review, and one study missed specific details about the underlying theoretical model of the intervention. Thus, both were excluded. Overall, 32 studies met all predefined criteria and were eligible for this systematic review. Table 1 provides a detailed overview of study characteristics.

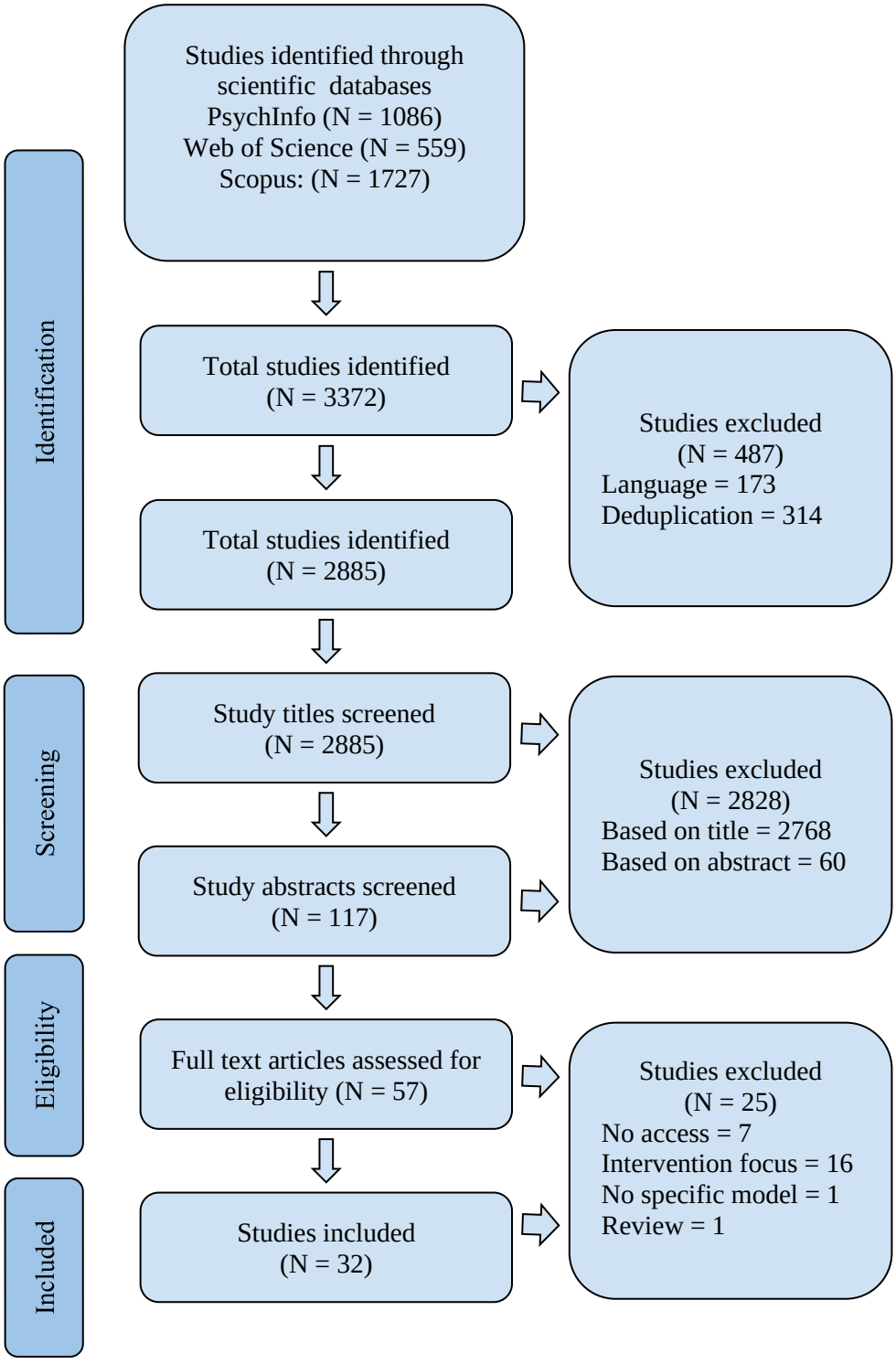

Figure 3.

Flow chart of the selection procedure

Table 1
Characteristics of included studies

Study	Intervention	Target group (age)	Types of EDs	Study goal	Stage	Model	Outcome measures	Study design
Bara-Carril et al. (2004)	CD-ROM based CBT	Young women (M=30)	Bulimia Nervosa	Feasibility and efficacy of intervention	Early intervention	CBT	Symptom frequency	Uncontrolled study
Bauer et al. (2009)	ES[S]PRIT	College students at risk (M=31)	Diagnostic EDs	Feasibility of intervention	Indicated prevention	Cognitive dissonance	Validity of screening algorithm	Uncontrolled pilot study
Beintner et al. (2019)	Everybodyfit	Women (42.6)	Obesity, Overweight	Feasibility of intervention	Selective prevention	CBT	Weight/shape concern, logins	Uncontrolled pilot study
Brown et al. (2004)	Student Bodies parent	Female high-school sophomores (15.1) and parents	Subthreshold EDs	Effectiveness of intervention	Selective prevention	CBT	Body image, eating style, critical behaviour, and attitudes	Controlled study
Burnette and Mazzeo (2020)	Intuitive eating workbook	College women	Sub-threshold Bulimia Nervosa/ Anorexia Nervosa	Feasibility, acceptability, and efficacy of intervention	Indicated prevention	Pos. psychology	Feasibility, acceptability, fidelity	Uncontrolled pilot study
Carrard et al. (2010)	SALUT	Women (M=24.7)	Bulimia Nervosa/ Sub-threshold Bulimia Nervosa/ EDNOS	Evaluation of intervention	Early intervention	CBT	ED/comorbid pathology	Uncontrolled study

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Carrard et al. (2011)	Overcome binge eating	Women (20-70)	Binge eating disorder	Effectiveness of intervention	Early intervention	CBT	ED/comorbid pathology, weight loss, acceptance	Controlled trial
Carter et al. (1998)	Overcoming binge eating	Women (M=39.7)	Binge eating disorder	Comparing PSH vs GSH	Early intervention	CBT	ED/ comorbid pathology, self-esteem, suitability	RCT
Celio et al. (2000)	Student Bodies	Undergraduate Women	Sub-threshold EDs	Comparison of different versions	Selective prevention	CBT	Weight/shape concern	RCT
Celio et al. (2002)	Student Bodies	Undergraduate Women	Sub-threshold EDs	Compliance in four prior studies	Selective prevention	CBT	Weight/ shape concerns	RCT
Chithambo et al. (2017)	CBI-I/ DBI-I	Female students (M=20.85)	Sub-threshold EDs	Comparing CBI-I vs DBI-I	Indicated prevention	Cognitive dissonance	ED symptoms, shape concern, dieting, depression	RCT
Denison-Day et al. (2019)	MotivATE	Adults	Diagnostic EDs	Increasing attendance at ED service centre	Early intervention	Self-determin-ation theory	Attendance at initial assessment	Zelen RCT
Fitz-simmons-Craft et al. (2019)	Healthy body image Program	Primarily women (M=22.28)	Sub-threshold EDs	effectiveness of intervention's reach	Detection	CBT	Screening reach, risk estimation	RCT
Franko et al. (2013)	Bodimojo	Adolescents (M=15.4)	Sub-threshold EDs	Comparison of intervention with control condition	Universal prevention	Social cognitive theory	Body image concerns, peer comparisons	RCT

Jacobi et al. (2012)	Student Bodies+	Women (M=22.3)	Subthreshold EDs	Efficacy of intervention	Indicated prevention	CBT	Attitudes and ED symptoms	RCT
Jacobi et al. (2018)	E@T	Female adolescents (11-17)	Subthreshold Anorexia Nervosa	Efficacy of intervention	Indicated prevention	Family-based	Weight normalisation, Anorexia Nervosa symptoms	RCT
Kass et al. (2014)	Student Bodies	College women (18-25)	Subthreshold EDs	Comparing guided vs unguided version	Indicated prevention	CBT	Weight/shape concerns, ED symptoms	RCT
Linardon et al. (2020)	Break Binge Eating	Primarily women (over 18)	Subthreshold EDs	Efficacy of intervention	Early intervention	t-CBT, c. diss., ACT	ED/comorbid pathology	RCT
Moessner et al. (2016)	Proyouth	Adolescents	Subthreshold EDs	Efficacy for healthcare access	Indicated Prevention	Cognitive dissonance	Impairment, help-seeking, barriers	Uncontrolled study
Saekow et al. (2015)	Student Bodies	Women (18-25)	Subthreshold EDs	Effectiveness of intervention	Indicated prevention	CBT	Weight/shape concerns, ED symptoms	RCT
Sanchez-Ortiz et al. (2011)	iCBT Overcoming Bulimia Nervosa	Primarily women (M=23.9)	Bulimia Nervosa and EDNOS	Effectiveness of intervention	Early intervention	CBT	ED pathology, comorbid pathology	RCT
Schmidt et al. (2008)	Overcoming Bulimia	Primarily Women (M=27.1)	Bulimia Nervosa and EDNOS	Effectiveness of intervention	Early intervention	CBT	ED pathology	RCT
Shu et al. (2019)	ICBT-P	Female (14-19)	Perfect-ionism, sub-threshold EDs	Effectiveness of perfectionism on ED symptoms	Indicated prevention	CBT	Perfectionism, ED/ comorbid pathology, adherence	RCT

Steele et al. (2008)	"When perf. isn`t good enough"	Primarily women (17-39)	Bulimia Nervosa	Comparing three types of interventions	Early intervention	CBT	ED/ comorbid pathology, perfectionism, self-esteem	RCT
Stice et al. (2012)	Ebody Project	College women (M=21.6)	Subthreshold EDs	Comparing three types of intervention	Indicated prevention	Cognitive dissonance	ED/ comorbid pathology	Randomised pilot study
Stice et al. (2017)	Ebody Project	Women (M=22.2)	Subthreshold EDs	Comparing three intervention types	Indicated prevention	Cognitive dissonance	ED/ comorbid pathology	Randomised pilot study
Stice et al. (2020)	Ebody Project	Women (M=22.2)	Subthreshold EDs	Comparing three intervention types	Indicated prevention	Cognitive dissonance	ED/ comorbid pathology	Randomised pilot study
Strandskow et al. (2017)	www.zenitstudien.se	Primarily Swedish women (>18)	Bulimia Nervosa and EDNOS	Effectiveness, knowledge acquisition and outcome	Early intervention	ACT, CBT	ED/ comorbid pathology	RCT
Tasca et al. (2019)	Overcoming binge eating	Primarily women (M=41.87)	Binge eating disorder	Effectiveness of intervention	Early intervention	CBT	ED/ comorbid pathology	RCT
Völker et al., (2011)	Adapted Student Bodies	Women (18-38)	Subthreshold EDs	Feasibility of intervention	Indicated prevention	CBT	ED/ comorbid pathology	Uncontrolled pilot study
Wagner et al. (2013)	Netunion.com	Women (M=24.7)	Bulimia Nervosa	Comparing guided i. and bibliotherapy	Early intervention	CBT	ED pathology	RCT
Winzelberg et al. (2000)	Student Bodies	Women (M=20)	Subthreshold EDs	Effectiveness and feasibility of intervention	Selective Prevention	CBT	Body image and disordered eating attitudes	RCT

Quality of the studies

Randomised controlled trials

Overall, 23 studies fulfilled the criteria for an RCT design, with three of them being identified as pilot studies. All 23 papers were analysed with the JBI Checklist for randomised controlled trials (Tufanaru et al., 2020). Ten studies had a low risk of bias, and 13 studies were determined to be moderately biased (see Table 2). All papers have met especially the randomisation criterion and used control groups. The participant data at the baseline level were generally similar, and appropriate outcome measures and statistics were used. However, many studies did not use blinding procedures or stated the impossibility of blinding participants or staff members due to the nature of the study. This might have heightened the risk of distorted outcome measurements; thus selection bias cannot be ruled out entirely (Tufanaru et al., 2020). Nevertheless, all studies were suitable for a deeper analysis in this systematic review, as no study was determined to be at high risk of bias.

Table 2

JBI Checklist for randomised controlled trials

Study	Random.	Con-cealed groups	Similar groups	Part. blinded	Staff blinded	Outcome assessor blinded	Groups treated similar	Follow-up	ITT	Same measure across groups	Reliable measure	Appr. stat.	Appr. design	% yes
Carter et al. (1998)	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	76.9 %
Celio et al. (2000)	Yes	Uncl.	Yes	Uncl.	Uncl.	Uncl.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	69.2 %
Celio et al. (2002)	Yes	Uncl.	Uncl.	No	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	53.8 %
Chithambo et al. (2017)	Yes	Uncl.	Yes	Uncl.	Uncl.	Uncl.	Yes	No	No	Yes	Yes	Yes	Yes	53.8 %
Denison-Day et al. (2019)	Yes	Yes	Uncl	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	92.3 %
Fitz-Simmons-Craft et al. (2019)	Yes	Yes	No	Yes	Uncl.	Uncl.	Uncl.	Yes	Uncl.	Yes	Yes	Yes	Yes	61.5 %
Franko et al. (2013)	Yes	Uncl.	Yes	Uncl.	Uncl.	Uncl.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	69.2 %
Jacobi et al. (2012)	Yes	Yes	Yes	Uncl.	Yes	Uncl.	Yes	Yes	Uncl.	Yes	Yes	Yes	Yes	76.9 %
Jacobi et al. (2018)	Yes	Uncl.	Yes	Uncl.	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	69.2 %
Kass et al. (2014)	Yes	Yes	Yes	Uncl.	Uncl.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	84.6 %

Linardon et al. (2020)	Yes	Yes	Yes	Yes	Yes	Uncl.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	92.3 %
Saekow et al. (2015)	Yes	Yes	Yes	Yes	Yes	Uncl.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	92.3 %
Sanchez-Ortiz et al. (2011)	Yes	Yes	Yes	Uncl.	Uncl.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	84.6 %
Schmidt et al. (2008)	Yes	Yes	Yes	Uncl.	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	84.6 %
Shu et al. (2019)	Yes	Yes	Uncl.	Uncl.	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	61.5 %
Steele et al. (2008)	Yes	Uncl.	No	Uncl.	Uncl.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	69.2 %
Stice et al. (2012)	Yes	Yes	Yes	Yes	Uncl.	Yes	Yes	Yes	Uncl.	Yes	Yes	Yes	Yes	84.6 %
Stice et al. (2017)	Yes	Uncl.	Yes	Uncl.	Uncl.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	76.9 %
Stice et al. (2020)	Yes	Yes	Yes	Uncl.	Uncl.	Uncl.	Yes	Yes	Uncl.	Yes	Yes	Yes	Yes	69.2 %
Strandskow et al. (2017)	Yes	Yes	Uncl.	Uncl.	Uncl.	Uncl.	Uncl.	No	Yes	Yes	Yes	Yes	Yes	53.8 %
Tasca et al. (2019)	Yes	Uncl.	Uncl.	Uncl.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	69.2 %
Wagner et al. (2013)	Yes	Uncl.	Yes	Uncl.	Uncl.	Uncl.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	69.2 %
Winzelberg et al. (2000)	Yes	Uncl.	Uncl.	Uncl.	Uncl.	Uncl.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	61.5 %

Uncontrolled studies

The remaining studies were checked for quality with the help of the JBI checklist for quasi-experimental studies (Tufanaru et al., 2020). Table 3 provides a detailed overview. Overall, five studies had a low risk of bias, while two studies scored moderately. However, the studies by Bauer et al. (2009) as well as Völker et al. (2011) were determined to be at a high risk of bias. Therefore, those two were removed from the following analysis. The remaining papers met the criteria for the precise classification of dependent and independent variables, appropriate statistics, and reliable outcome measures. However, no study used a control group except Carrard et al. (2011), which weakened the examination of causal plausibility for the remaining studies. Additionally, follow-up data and descriptions of strategies for potential data deterioration have not been met for some studies, thus providing a threat to the internal validity. Overall, the absence of proper randomisation and control groups only offers preliminary evidence of effectiveness for the described interventions and the necessity for follow-up randomised controlled trials. However, this has been mentioned by almost all authors as remarks for future studies. Therefore, all remaining studies were considered sufficient in quality and appropriate for the following analysis.

Table 3

JBI Checklist for quasi-experimental studies

Study	Clear cause and effect	Similar participants across groups	Similar treatment across groups	Control group	Multiple measurements	Complete follow-up	Similar measures across groups	Reliable measures	Appr. statistics	% yes
Bara-Carril et al. (2004)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	88.9 %
Bauer et al. (2009)	Yes	NA	NA	No	NA	No	NA	Yes	Yes	33.3 %
Beintner et al. (2019)	Yes	NA	NA	No	Yes	Yes	NA	Yes	Yes	55.6 %
Brown et al. (2004)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100 %
Burnette and Mazzeo (2020)	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	77.8 %
Carrard et al. (2010)	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	77.8 %
Carrard et al. (2011)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	88.9 %
Moessner et al. (2016)	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	66.7 %
Völker et al. (2011)	Yes	NA	No	No	Yes	No	NA	Yes	Yes	44.4 %

Study characteristics

A general characteristic of the included studies was the respective aim. Most papers either provided insights regarding interventions' effectiveness or efficacy to reduce the risk of eating disorders or treat early symptoms (*n*=14), compared different versions of the same intervention or different modes of delivery (*n*=11), as well as interventions' feasibility (*n*=6). Furthermore, two studies focused on the ability of described programs for attendance reach and screening efficacy (Denison-Day et al., 2019; Fitzsimmons-Craft et al., 2019). To evaluate studies' success, symptoms of disordered eating, risk symptoms and signs of pathology assessed with the help of standardised questionnaires served as outcome measures.

A critical inclusion criterion was a study's focus on early stages of the care-pathway, namely the prevention, early intervention, or detection of eating disorders. Only the study by Fitzsimmons-Craft et al. (2019) focused on the latter, as their intervention was explicitly designed for the screening of patients with first signs of disordered eating. Besides that, 19 studies focused on preventing eating disorders. Most of them applied indicated prevention strategies (*n*=13) and targeted primarily subthreshold symptomatic individuals, which required initial screening procedures like questionnaires for participants to be included. In contrast, five papers applied selective prevention targeting a specific subgroup at risk of developing an eating disorder, primarily female students or adolescents (e.g., Brown et al., 2004; Celio et al., 2002). Only Franko et al. (2013) used universal prevention without specific inclusion criteria but instead offered an intervention to several high school classes of four high schools. Furthermore, 14 studies addressed the early intervention stage, focusing primarily on individuals with either subthreshold symptoms or those already diagnosed with an eating disorder but without sufficient treatment options.

Besides the intervention stage, self-help programs also differed regarding the intended target group. Eighteen studies consisted entirely of adult women, of which six studies also included a small minority of male subjects. A single paper limited the scope to Swedish women (Strandskow et al., 2017). Only the study by Denison-Day et al. (2019) provided no specific information. Participants were primarily treated for eating disorders in general (*n*=19), of which 17 studies exclusively targeted individuals with subthreshold symptomatology and one paper diagnosed eating disorders (Denison-Day et al., 2019). Furthermore, nine studies also addressed bulimia nervosa, of which some also mentioned EDNOS (*n*=4), binge eating disorder (*n*=3) and anorexia nervosa (*n*=2). Finally, Beintner et al. (2019) only targeted obesity and overweight, while two studies focused on perfectionism next to subthreshold eating disorders (Shu et al., 2019; Steele et al., 2008).

Content of self-help interventions

This systematic review identified 21 self-help interventions in total. Sixteen were internet-based (15 accessible via browser and one using a mobile application format), two used CD-ROM delivery, and three used a booklet. The majority of interventions provided psychoeducation to inform participants about the nature of eating disorders, often combined with moderated discussion groups, chats, feedback sessions and even homework or weekly assignments. Despite these overlaps, interventions differed based on the theoretical framework and models they used.

Cognitive behavioural therapy

The most often applied theory was CBT (*n* = 12), with the most prominent example being *Student Bodies* (*n*=8). In typical CBT fashion, this preventive program for disordered eating symptoms educated primarily young women in models of vicious cycles, the consequences of

excessive worrying and offered weekly exercises like journal log prompts, combined with guided feedback sessions and discussion groups (e.g., Kass et al., 2014). Various RCTs found significant improvements regarding body image concerns and thrive for thinness in *Student Bodies* (e.g., Saekow et al., 2015; Winzelberg et al., 2000). Moreover, these improvements were still valid at follow-up periods after interventions' end (Celio et al., 2000). Celio et al. (2002) further provided insights regarding the superiority of an internet-based version of *Student Bodies* compared to CR-ROM-based delivery.

Several studies modified this core program to fit different target groups. For example, Beintner et al. (2019) adjusted *Student Bodies* for adult, obese women, resulting in *Everybody Fit*. The program provided psychoeducative materials for intuitive eating strategies, exercises, social skills as well as media literacy training. Without directly targeting weight loss, it significantly reduced disordered eating symptoms, although the uncontrolled study design denied any causal conclusions (Beintner et al., 2019). Meanwhile, Brown et al. (2004) modified *Student Bodies* to address parents of children at risk of eating disorders (*Student Bodies Parent*). The intervention aimed to increase parents' acceptance of variations in weight and shape by analysing potential patterns of miscommunication with their children and offering guidelines to detect risk signs of disordered eating (Brown et al., 2004). While participation was moderate at best with 50% and reductions of disordered eating symptoms in the children were not sustained at follow up, this controlled study significantly improved parental attitudes and showed potentially beneficial effects of involving parents in *Student Bodies.* Finally, *Student Bodies+* was developed to specifically meet the needs of women with subthreshold eating disorders by adding a weekly symptom checklist, body image exercises, and minor content from dialectical

behavioural therapy, which resulted in significant improvements in participants' eating attitudes and significant reductions of disordered eating symptoms (Jacobi et al., 2012).

Another CBT-based intervention with different modalities was the *Overcoming* series. *Overcoming Bulimia* relied on CD-ROM-based delivery and showed preliminary effectiveness targeting early symptoms of bulimia nervosa and EDNOS offering CBT-based psychoeducation and offering strategies to tackle unhelpful thoughts and self-management skills-training (Schmidt et al., 2008). However, reductions in EDNOS symptoms were not sustained at post-hoc analyses (Bara-Carril et al., 2004; Schmidt et al., 2008). Additionally, Sanchez-Ortiz et al. (2011) developed an internet-delivered version with email support, called *Overcoming Bulimia Online*, which in comparison to CD-ROM based versions showed significant reductions of disordered eating symptoms. Finally, booklet-based and web-based formats of *Overcoming Binge Eating* targeted early binge-eating symptoms, resulting in significant increases of binge-eating abstinence, well-being and significant shape concern reductions, even though small sample sizes and partially non-significant data impeded clear causal explanations (Carrard et al., 2011; Tasca et al., 2019).

An additional nine studies also described CBT-based interventions, six of them being RCTs. For example, two internet-delivered interventions called *SALUT,* and *netunion.com* targeted subthreshold Bulimia Nervosa and EDNOS symptomatology with CBT techniques, resulting in significant symptom reductions (Carrard et al., 2010; Wagner et al., 2013). Furthermore, *CD-ROM based CBT* offered psychoeducation against unhelpful thoughts and self-management skills-training to target early bulimia nervosa and EDNOS symptoms with first preliminary effectiveness, even though results for EDNOS were non-significant (Bara-Carril et al., 2004). Finally, *When perfectionism isn't good enough* as well as *ICBT-P* used CBT principles

but additionally focused on perfectionism with promising results, as both programs resulted in significant reductions of disordered eating symptoms compared to waiting list or stress management conditions, which was sustained at follow-up (Steele et al., 2008; Shu et al., 2019).

Theory of cognitive dissonance

Another category of self-help interventions was based on the theory of cognitive dissonance. One of these programs was the *Ebody Project*, which applied user-driven educational activities to create cognitive dissonance towards the thin beauty ideal. In three randomised pilot studies, Stice and colleagues compared the effectiveness of an internet-delivered, unguided version of the *Ebody Project* with clinician-led and peer-led group versions, as well as an educational video group condition. The peer-led group conditions outperformed the internet-based intervention, which in turn was more effective than the video condition (Stice et al. 2012; Stice et al. 2017; Stice et al. 2020). Another cognitive dissonance-based self-help intervention was *ProYouth*. Self-education materials, forums, chats, and psychologist-led sessions were intended to improve patients' mental health literacy and facilitate access to conventional therapy by reducing help-seeking barriers (Moessner et al., 2016). The latter has achieved a 50 % success rate for the participant sample, thus delivering first evidence for the program's feasibility to increase conventional service attendance (Moessner et al., 2016).

Combined approaches

Furthermore, two studies used combined framework approaches for the prevention and early intervention. For example, Chithambo et al. (2017) compared the two web-based programs *DBI*, dissonance-based and inspired by the *Body Project,* as well as *CBI*, CBT-based and inspired by a self-help manual called *Healthy Body Image Workbook*. Despite no program being superior to the other, both interventions resulted in significant reductions in body dissatisfaction,

thin beauty ideal, and depressive symptoms compared to no intervention (Chithambo et al., 2017). Finally, an RCT by Linardon et al. (2020) tested the efficacy of a self-guided mobile application called *Break Binge Eating*, which combined both theories with acceptance and commitment therapy elements. The intervention aimed to reduce binge-eating symptoms with audio-visual materials, diaries, and weekly emails to encourage self-monitoring. Overall, this resulted in significant reductions in all relevant binge-eating symptoms except compensatory behaviour frequencies (Linardon et al., 2020).

Another combined approach with several frameworks has been applied by the *Healthy body image program*, although it was the only intervention focusing solely to detect people at-risk of disordered eating (Fitzsimmons-Craft et al., 2019). Individuals were reached via emails, flyers, or face-to-face counselling. The primary screening tool was the *Standford-Washington University Eating Disorder Screen* which sorted individuals of 28 U.S. universities into four different categories: Possible anorexia nervosa, subclinical ED besides anorexia nervosa, as well as high and low risk for eating disorders based on weight and shape concerns (Fitzsimmons-Craft et al., 2019). After categorisation, participants were then sorted to CBT-based interventions like *Student Bodies-Classic* or *StayingFit,* depending on participants' displayed symptoms and risk factors (Fitzsimmons-Craft et al., 2019). Reach was relatively low at 1.9 %, with email delivery accounting for 50% of detected cases, suggesting the effectiveness of digital delivery to reach out to individuals. However, 60 % of participants showed ED risk symptoms, which indicated the effectiveness of the intervention to attract participants with signs of disordered eating (Fitzsimmons-Craft et al., 2019).

Acceptance and commitment therapy

The current review also identified interventions that used elements of acceptance and commitment therapy. For example, *zenitstudien.se* was a website for Swedish adult patients diagnosed with bulimia nervosa, who received CBT-based psychoeducation and ACT-influenced exercises like mindfulness and clinicians' feedback, resulting in small to moderate symptoms decreases (Strandskow et al., 2017). Furthermore, Burnette and Mazzeo (2020) introduced the *Intuitive Eating Workbook.* Instead of aiming for reductions in thin body idealisation, this intervention offered body acceptance strategies, which resulted in significant decreases in body dissatisfaction, weight bias, and life satisfaction, even though the design was an uncontrolled pilot study (Burnette & Marreo, 2020).

Other frameworks

The remaining interventions were developed based on different theories and psychological models. For example, the internet-based intervention *MotivATE* applied the self-determination theory and motivational interviewing to increase patients' motivation to attend an ED service assessment centre (Denison- Day et al., 2019). The program provided interactive materials to emphasise the importance of change and goal-setting according to patients' values and that their autonomy is valued. However, results suggested non-significant increases in attendance (Denison-Day et al., 2019; Muir et al., 2017). Furthermore, *Bodimojo* tried to promote a healthy body image in high school students and to reduce participants' tendency of appearance-related comparisons with peers (Franko et al., 2013). Four modules provided cognitive-based strategies with a specific emphasis on social networks and peers based on social cognitive theory. Results indicated significant improvements in body esteem and body dissatisfaction, even though results were not significant at three months follow-up (Franko et al., 2013). Finally, Jacobi et al. (2018) tested an intervention called *E@T* (*Eltern als Therapeuten*),

which used elements of family-based therapy for the treatment of adolescents at-risk for anorexia nervosa. While parents' uptake and motivation to participate was generally low and intervention effects were primarily non-significant, girls of participating parents gained weight significantly faster than a control group (Jacobi et al., 2018).

Overall, taking all frameworks into consideration, most interventions provided psychoeducation, exercises to improve participants' knowledge for risk factors of disordered eating, and preventive strategies. The most often applied theory in this regard has been CBT. Especially *Student Bodies* and the *Overcoming* series were tested within multiple RCTs, providing a solid corpus of evidence for the programs' effectiveness. However, other interventions based on frameworks like the theory of cognitive dissonance, family-based therapy, or acceptance and commitment therapy also effectively reduced disordered eating symptoms like body dissatisfaction, thin-beauty ideal, or excessive dieting. Only *Overcoming Bulimia* and *MotivATE* did not significantly affect the intended outcomes due to low participation uptake and unsustained results at post-hoc analyses (Denison-Day et al., 2019; Schmidt et al., 2008).

Applicability for adolescents and children

Of all these interventions, five were also applicable for adolescents. One program was *Student Bodies Parent,* which allowed parents of young, female adolescents to anonymously complete a four-week, unstructured intervention, including discussion groups and forums to foster exchanges with other parents (Brown et al., 2004). The program aimed at encouraging acceptance of weight and shape variation and reduce negative, appearance-related attitudes (Brown et al., 2004). Similarly, *E@T* not only provided preventive, family-based psychoeducation for 11-17-year-old girls with a high risk of anorexia nervosa but also involved their parents (Jacobi et al., 2018). The latter received information about the danger of anorexia

nervosa and guided coaching on preventing further development of disordered eating, accompanied by interactive quizzes, videos, and forums for exchange with other participants (Jacobi et al., 2018). Besides family-based approaches, Franko et al. (2013) specifically designed the internet-based program *Bodimojo*, which included games, quizzes, and point-based activities for young people to promote healthy eating habits (Franko et al., 2013). Especially, the inclusion of elements of social cognitive theory like peer comparisons and participants' social networks were essential aspects of *Bodimojo* (Franko et al., 2013). Furthermore, ICBT-P addressed adolescents by using various CBT-based techniques to address perfectionism as an important risk factor of disordered eating (Shu et al., 2019). Lastly, the internet-based program *ProYouth* was designed to educate children and adolescents with psychoeducational material of varying difficulty to improve mental health literacy to prevent subsequent eating disorders (Moessner et al., 2016). *ProYouth* also included forum activities and the option to book individual chat sessions with counsellors (Moessner et al., 2016).

Overall, only a minority of interventions were identified to be applicable for adolescent participants. All five programs were preventive in nature by either selectively targeting the subgroup of female adolescents or specifically addressing subsymptomatic adolescent individuals. An exception was *Bodimojo* due to its universally preventive character, as Franko et al. (2013) offered the program to several high schools without further inclusion criteria. A particular emphasis has been given to family-based interventions, as almost half of the studies included participants' parents. Regardless of methodology, all described interventions besides *Bodimojo* were generally effective to address study outcomes and seem promising for this target group. The remaining studies neither addressed adolescents nor indicated that their described interventions might be modifiable for this younger target audience.

Guided vs unguided formats

While most interventions differed in terms of intervention objectives and targeted audience, the mode of delivery usually varied between two types: Guided versus unguided formats. The guided format has been explicitly mentioned and analysed in 19 studies. Guidance usually referred to expert staff providing feedback, structure, and technical support via email or chats (e.g., Carrard et al., 2011; Sanchez-Ortiz, 2011). In some studies, face-to-face meetings were organised as well (Celio et al., 2000). Another guiding opportunity usually took place via moderated forums, peer-support, and discussion groups (Saekow et al., 2015). Other approaches like Chitambo et al. (2012) provided additional structure by giving homework and regular assignments for participants. Guidance also served as a strategy to increase participants' adherence by sending periodic email reminders, even though this has also been done in unguided interventions. (Celio et al., 2000; Shu et al., 2019). The unguided format was described in seven studies. Besides email-based reminders, these interventions were designed to be used by participants without any form of expert guidance. However, technical support was still given in many interventions whenever necessary (e.g., Tasca et al., 2019). Finally, one study showed no insights regarding the use of guided or unguided delivery, as no detailed descriptions were available (Fitzsimmons-Craft et al., 2019).

Three studies were primarily of interest, as they compared different degrees of guidance. For example, Celio et al. (2002) tested the compliance rates in four conditions of the program *Student Bodies* with varying amounts of guidance based extracted from prior studies, of which two were also part of this review (Celio et al., 2000; Winzelberg et al., 2000). Increasing guidance like additional structure, assignments, or group activities resulted in improved compliance rates from 53% up to 85% (Celio et al., 2002). However, adding face-to-face

meetings or removing participants' anonymity lead to no significant increases in compliance rates (Celio et al., 2002). Furthermore, Kass et al. (2014) compared the unguided intervention *Ebody Project* with another version that included a moderated discussion group. Results suggested significant improvements in participants' body and shape concerns favouring the guided version (Kass et al., 2014). Finally, Carter et al. (1998) compared the unguided self-help book *Overcoming binge eating* with a more guided version, in which facilitators offered program-led sessions to support the participants. While pure self-help resulted in reductions of binge eating symptom frequency in 40 % of cases, the guided version registered 10 % additional symptom reductions and higher compliance rates (Carter et al., 1998).

Overall, most studies favoured more guided approaches. Especially those studies which compared both the modalities revealed benefits of guidance. First, adding discussion groups and intervention facilitators to the programs resulted in higher symptom reductions of disordered eating like body dissatisfaction or binge-eating frequency than more unguided interventions (e.g., Carter et al., 1998; Kass et al., 2014). Second, additional structure, assignments, group activities, and regular email reminders showed beneficial effects on participants' compliance rates (Celio et al., 2002). However, results for unguided self-help were also promising, as these interventions generally were more effective to reduce symptoms of disordered eating than waiting list conditions or purely educational material like brochures (e.g., Linardon et al., 2020; Stice et al., 2017).

Discussion

This systematic review summarised the state of the art of existing self-help interventions for the prevention, detection, and early intervention of eating disorders. In response to existing literature like Yim and Schmidt (2019), a secondary aim was a narrative overview of existing

self-help interventions' applicability for adolescents and the impact of guidance. Results indicate the availability of various frameworks and methodologies and that most programs resulted in significant reductions of disordered eating symptoms or risk factors. In contrast, only a few interventions were applied for adolescent target groups. Additionally, the impact of guidance seemed to be beneficial regarding both interventions' effectiveness and participant adherence.

Main findings

An essential characteristic of interventions was the mode of delivery. While modalities like CD-ROM or bibliotherapy effectively reduced disordered eating symptoms or reached study outcomes (see Bara-Carril et al., 2004; Wagner et al., 2013), an emphasis on internet-based delivery was noticeable. A reason might be that web-based programs allow combining educational content with interactive elements, discussion groups, or chat opportunities, thus enabling scalable interventions (Yim & Schmidt, 2017). However, given the recent rise of mobile applications (see Anastasiadou et al., 2018), it was surprising that only Linardon et al. (2020) used a mobile application format. An explanation for this might be the current scarcity of mobile applications that rely on evidence-based principles and frameworks, which was a critical inclusion criterion of this study (Anastasiadou et al., 2018). In addition, the marketplace for mobile applications concerning the treatment of eating disorders shows significant asymmetry, as only a few applications account for the majority of monthly active users (Wasil et al., 2021). This illustrates the need for more high-quality, evidence-based mobile programs, especially considering the significant amount of time people spend on their smartphones nowadays (Kuss et al., 2018).

Furthermore, another observed tendency concerned the underlying frameworks of interventions. CBT or the theory of cognitive dissonance have been applied in most studies,

primarily represented by well-researched and established programs like *Student Bodies* and the *Ebody Project* (see Yim, & Schmidt, 2019). Particularly the frequency of CBT-based interventions was an expected finding, as this framework has often been considered the standard treatment of bulimia nervosa and binge eating disorder (Murphy et al., 2010). However, the implementation of other frameworks might be even more interesting. Especially the inclusion of family-based elements was noteworthy, as it was the only framework used to target symptoms of anorexia nervosa by including participants' parents (Jacobi et al., 2018). In addition, this framework also seemed favourable regarding interventions' applicability for adolescents, as two of the five studies that addressed this target group also included participants' families (Brown et al., 2004; Jacobi et al., 2018). Especially Brown et al. (2004) offered a promising strategy by combining CBT and family-based therapy, which corresponds to recommendations by Wagner et al. (2013) to include elements of the latter theory when focusing on younger participants. These approaches are noteworthy given the significant gap of programs for adolescents and anorexia nervosa (Traviss-Turner et al., 2017). While Wilson and Zandberg (2012) even indicated that self-help for anorexia nervosa might be contraindicated due to increased medical risks for anorexic patients, Yim and Schmidt (2019) still suggested the usefulness of self-help for anorexia nervosa. An implication of this might be that more programs should be developed that implement family-based elements to address current gaps in eating disorder treatments.

Another noticeable gap was the small number of self-help interventions focusing on the detection and universal prevention of eating disorders. Past research provided evidence for these findings because indicated and selective prevention, as well as early intervention programs have shown superior effectiveness to universal prevention (Stice et al., 2007). Instead, most interventions targeted either a specific subgroup like females or individuals specifically at-risk of

developing an eating disorder. Especially women are a common target of interventions given high prevalence rates in this subgroup (Traviss-Turner et al., 2017). However, the scarcity of detective and universally preventive interventions might be problematic because a high rate of people with disordered eating generally stays under the radar (Griffiths et al., 2018). This might be addressed with low-threshold detection programs that spot individuals at-risk, taking into account common treatment barriers like guilt or fear of stigmatisation (Thompson & Park, 2016). Without proper detection, individuals may not receive treatment in time, thus reducing the chances of early symptom minimisation. In addition, universal prevention programs might be helpful by reducing the incidence of eating disorders before the actual onset of symptoms (Schwartz et al., 2019). However, current results are mostly preliminary and generally mixed in this area of research (Schwartz et al., 2019). Therefore, detective and universally preventive self-help interventions like *Bodimojo* (see Franko et al., 2013) or the *Healthy body image program* (see Fitzsimmons-Craft et al., 2019) should be further addressed in the future. Nonetheless, programs focusing on other stages of the care-pathway showed promising results and indicated the potential of current self-help interventions to treat eating disorders.

A final takeaway was the impact of guidance in self-help interventions. While studies suggested that unguided self-help might be a valuable first step of the treatment process due to higher effectiveness than waiting list conditions or brochures, additional guidance had several advantages (Linardon et al., 2020; Stice et al., 2017). These included reduced body dissatisfaction in participants and increases in study adherence by adding discussion groups, peer support, or additional structure (e.g., Celio et al., 2002; Kass et al., 2014). Traviss-Turner et al. (2017) explained these benefits with the importance of the quality of guidance and expertise of staff members, for example receiving advice from an eating disorder specialist (see also Beintner

et al., 2014). However, Celio et al. (2002) suggested that expertise is not solely responsible for study adherence, as the addition of a graduate research assistant instead of a student as group moderator did not improve participants' willingness to continue treatment. Instead, the addition of discussion groups and email-delivered reminders and feedback seemed more important for participants' adherence by offering support and increasing motivation (Carrard et al., 2011; Sanchez-Ortiz et al., 2011; Wagner et al., 2013). This confirms prior findings that guidance is usually supportive in nature as self-help interventions are mainly user-led, highlighting the importance of social support and regular reminders (Kelders et al., 2012; Yim & Schmidt, 2019). While the proposed gap regarding the content of high-quality guidance remains (see Yim & Schmidt, 2019), further evidence for the importance of reminders and social support was given. Future research on guidance might address this supportive aspect, such as developing specific strategies to improve participants' adherence and motivation, e.g., using high-quality email reminders.

Strengths of this study

One of the strengths of this review was the implementation of high-quality studies. Evidence for this has been given in the assessment of methodological quality. Especially the inclusion of several randomised controlled studies increased the confidence in study findings, as the chance of selection bias was either low or middle in most papers. Studies with low quality were excluded to only base findings on results with sound methodology. In addition, the included articles provided a great variety of frameworks and self-help interventions. This was possible because the scope of this review included the whole range of early stages within the treatment process, as described by the Commonwealth Department of Health and Aged Care (2000). This heterogeneity allowed an overarching synthesis of current self-help interventions for earlier

treatment stages of eating disorders. Overall, sufficient insights regarding predefined research questions were generated, which partially confirmed prior findings and gave new insights that future research might further explore.

Limitations of this study

Despite these strengths, this systematic review also showed methodological limitations. Especially the absence of a second author regarding the screening of titles, abstracts, and full texts increased the probability of selection bias (Traviss-Turner et al., 2017). This was also evident while assessing the methodological quality of studies, as the Joanna Briggs Institute reviewers' manual highlighted the importance of two researchers for quality assessment (Peters et al., 2015). Therefore, the absence of sufficient interrater reliability has to be considered a limitation. In addition, the differentiation of various treatment stages as proposed by the Commonwealth Department of Health and Aged Care (2000) has been criticised in the past because based on where the line is drawn, categorisation might have looked vastly different. For example, every study at these early treatment stages could be considered solely preventive in nature (Price, 2001). In addition, many studies showed overlaps of being both designed for the early intervention and prevention of eating disorders (e.g., Moessner et al., 2016). Especially the scarcity of detective interventions is based on the framework by the Commonwealth Department of Health and Aged Care (2000). Therefore, the categorisation of interventions in said categories might have looked different in another systematic review. This has been evident in past studies, which differed significantly regarding their categorisation in universal, selective, or indicated prevention (Le et al., 2017).

Future recommendations

Regarding future research, it would be helpful to investigate treatment gaps identified in this systematic review. For example, the scarcity of mobile-based applications with evidence-based frameworks suggests an important area for future studies. In addition, only a few interventions addressed anorexia nervosa and adolescents. Reasons might be high medical risks for anorexic patients, and the limited amount of researchers and research centres focus on these younger patient populations (Lock, 2010; Wilson & Zandberg, 2012). Thus it is recommended that more research should pay attention to these critical target groups and foster the development of self-help interventions that are specifically applicable for anorexic or young patients. Promising findings of the current review considered the implementation of family-based elements as a noteworthy strategy. Furthermore, universally preventive and detective self-help interventions were only identified in two studies. Developing more interventions with a universally preventive or detective focus might allow reaching individuals early in time, thus raising the chances of identifying at-risk individuals or reducing the risk of first symptoms. Especially universal prevention has the advantage of targeting at-risk individuals before the occurrence of first risk signs (Schwartz et al., 2019). Finally, besides these identified gaps, it might be worthwhile to conduct more randomised controlled trials to gain insights about specific strategies to improve guidance, especially concerning its impact on participants' support and motivation.

Conclusions

The results of this systematic review demonstrated that a solid variety of self-help interventions and frameworks of eating disorders are currently available and that most of them have shown to be effective within earlier treatment stages. The current study adds to the corpus of evidence by confirming prior findings like the dominance of CBT or web-based delivery in

self-help interventions. In addition, it is recommended to further address family-based elements, detective and universally preventive programs or supportive aspects in guidance, which might foster the development of new promising self-help interventions. This, in turn, might help to reduce current gaps like the scarcity of interventions for anorexia nervosa or programs targeting adolescents.

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Appendix

Checklists for quality assessments

JBI CRITICAL APPRAISAL CHECKLIST FOR RANDOMIZED CONTROLLED TRIALS

Reviewer_____Date_____

Author_____Year_____ Record Number_____

		Yes	No	Unclear	NA
1.	Was true randomization used for assignment of participants to treatment groups?	☐	☐	☐	☐
2.	Was allocation to treatment groups concealed?	☐	☐	☐	☐
3.	Were treatment groups similar at the baseline?	☐	☐	☐	☐
4.	Were participants blind to treatment assignment?	☐	☐	☐	☐
5.	Were those delivering treatment blind to treatment assignment?	☐	☐	☐	☐
6.	Were outcomes assessors blind to treatment assignment?	☐	☐	☐	☐
7.	Were treatment groups treated identically other than the intervention of interest?	☐	☐	☐	☐
8.	Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	☐	☐	☐	☐
9.	Were participants analyzed in the groups to which they were randomized?	☐	☐	☐	☐
10.	Were outcomes measured in the same way for treatment groups?	☐	☐	☐	☐
11.	Were outcomes measured in a reliable way?	☐	☐	☐	☐
12.	Was appropriate statistical analysis used?	☐	☐	☐	☐
13.	Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?	☐	☐	☐	☐

Overall appraisal: Include ☐ Exclude ☐ Seek further info ☐

Comments (Including reason for exclusion)

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JBI CRITICAL APPRAISAL CHECKLIST FOR QUASI-EXPERIMENTAL STUDIES

Reviewer_____Date_____

Author_____Year_____ Record Number_____

	Yes	No	Unclear	Not applicable
1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	☐	☐	☐	☐
2. Were the participants included in any comparisons similar?	☐	☐	☐	☐
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	☐	☐	☐	☐
4. Was there a control group?	☐	☐	☐	☐
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	☐	☐	☐	☐
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	☐	☐	☐	☐
7. Were the outcomes of participants included in any comparisons measured in the same way?	☐	☐	☐	☐
8. Were outcomes measured in a reliable way?	☐	☐	☐	☐
9. Was appropriate statistical analysis used?	☐	☐	☐	☐

Overall appraisal: Include ☐ Exclude ☐ Seek further info ☐

Comments (Including reason for exclusion)

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