

The effectiveness of acceptance and commitment therapy upon weight management and psychological well-being of adults with overweight or obesity: A systematic review

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Abstract

Several studies have examined acceptance and commitment therapy's (ACT) effectiveness for addressing physical and psychological distress people with obesity can face. Nevertheless, no review focusing specifically on ACT analysing randomized controlled trials (RCT) has been done up to date in this field. The present systematic review was developed following the PRISMA statement and aimed to examine ACT's effects on weight management and psychological well-being of adults with overweight or obesity. A conjunction of keywords related to ACT and excess weight was searched in four databases (Medline, PubMed, Psycinfo and Scopus) for articles meeting inclusion criteria. The literature search yielded 2,074 papers, and 16 were included in the review, finally. In 71.43% of the studies, ACT was effective to enhance psychological well-being; in 50% effectively targeted process variables and health behaviours related to weight management; in 31.82% of studies, physical variables were improved; and 21.38% of studies showed evidence in favour of ACT for eating behaviour modification. The present review supports ACT for promoting emotional aspects of individuals immersed in such weight-related battles and highlights the benefits of psychological well-being-oriented ACT in the context of obesity treatment. More studies targeting psychological well-being primarily and with longer follow-ups are required.

KEYWORDS

acceptance and commitment therapy, obesity, randomized controlled trial, systematic review, weight management, well-being

1 | INTRODUCTION

Acceptance and commitment therapy (ACT) is a behavioural therapy based on functional contextualism (Hayes et al., 1999) and relational frame theory (RFT; Hayes et al., 2001). As ACT posits that psychological inflexibility is the origin of every form of psychological human suffering, it consequently targets the promotion of psychological

flexibility; specifically, it focuses on the ability to consciously experience the present moment and change or maintain behavioural patterns depending on their consistency with individuals' personal values (Hayes et al., 2006, 2011). Further, ACT employs mindfulness and acceptance as an alternative strategy to experiential avoidance. It enhances the willingness to experience uncomfortable private events despite any attempts to consciously and deliberately try to control or

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avoid them (Hayes et al., 1996). In this context, individuals can choose to abandon dysfunctional behaviours they would rather use and focus on valued actions that lead them to a more meaningful life (Hayes et al., 1999). This approach supports the idea that the same processes can explain and intervene in every kind of psychological distress, which demonstrates its transdiagnostic nature (Dindo et al., 2017). Therefore, literature supports the use of ACT for a variety of psychological and behavioural issues, including depression, anxiety, substance abuse or addiction, somatic health problems, agoraphobia, psychoses, chronic pain, type II diabetes, and epilepsy (A-Tjak et al., 2015; Hayes et al., 2006).

Such emotional suffering can also be a reality for people struggling with their weight, which is influenced by a variety of biological, environmental, behavioural and psychological factors. It is widely recognized that biological factors (e.g., genetics and brain–gut axis) play a major role in the development of obesity. These biological factors are affected by an individual's environment (e.g., obesogenic environment and chemicals) and behaviour (e.g., caloric dietary patterns and sedentary lifestyle) and, together, can influence an individual's susceptibility to having obesity (Kadouh & Acosta, 2017). In terms of the biological factors, the homeostatic regulatory system works to maintain one's weight. Research shows that this system is prone to favour weight gain after a substantial reduction over weight loss in the face of a sudden weight increase (Schwartz et al., 2003). Similarly, restrictive diets have been associated with cortisol secretion and psychological stress (Tomiya et al., 2010).

Marks (2015) proposed that psychological factors are determinant for a susceptible individual develop obesity and that this is due to, at least in part, a psychological homeostatic imbalance or the activation of the 'circle of discontent' (COD). The COD is a feedback system where body dissatisfaction, negative affect, energy-dense consumption and weight gain are interrelated. Similar to this concept, Tomiyama (2014) explored the effect of weight-based stigma on the behavioural, physiological and emotional regulatory responses that can ultimately lead to weight gain or difficulties with weight loss. Additionally, research points out that body weight perception is more relevant than real body weight when predicting such negative affect (Carter et al., 2021).

Evidence suggests that particular internal events, such as emotions or cognition, can influence eating behaviour (Devonport et al., 2019; Ganley, 1989; Hsu & Forestell, 2021; Massicotte et al., 2019). However, emotional eating is not derived from the mere presence of emotional events, but rather from such maladaptive regulation strategies as suppression (Evers et al., 2010), which are a form of experiential avoidance (Litwin et al., 2017). Similarly, research suggests that weight-related experiential avoidance (i.e., avoidance of weight-related unwanted thoughts, feelings and sensations) predicts binge eating as an emotional regulation strategy connected to variations in weight (Lillis et al., 2011). Moreover, Duarte et al. (2017) found that bingeing in the presence of a distressing affective state, such as shame, is partially explained by being fused to body image-related internal experiences. Accordingly, different but related psychological constructs referring to difficulties in the regulation of eating

Key Practitioner Message

- ACT enhances psychological well-being of people with overweight.
- Weight-centred ACT has weak effect on weight loss.
- Psychological well-being-centred ACT stands out for emotional well-being, health behaviour modification and effective weight management.

or uncontrolled eating—including disinhibited eating or eating in response to cognitive or emotional cues; emotional eating or eating in response to one's emotions; or external eating or eating in response to environmental cues—are associated with food intake, weight gain or less weight loss (Frayn & Knäuper, 2018; Vainik et al., 2019). Moreover, a recent study indicated that female dieters' weight gain may be explained by emotional and subsequent external eating or solely by emotional eating (van Strien et al., 2020).

On the other hand, it is noteworthy that people deemed as having excess weight endure various pervasive forms of discrimination derived from existing social stigma, which directly impacts their physical health-related quality of life as well as psychological and subjective well-being (Carr & Friedman, 2005; Magallares et al., 2014). Such weight-related stigma can be internalized and create lower self-esteem; decrease one's overall and mental health-related quality of life; and lead to psychological distress, depression, anxiety, body image dissatisfaction, social isolation, stress, disordered eating and substance use (Alimoradi et al., 2019; Farhangi et al., 2017; Pearl & Puhl, 2018; Rubino et al., 2020). Furthermore, those who experience such weight-related discrimination face a mortality rate greater than those who do not (Rubino et al., 2020). Stigmatization can also occur in different important life domains, and studies have demonstrated that even healthcare professionals are not exempt from such stereotypical assumptions, which can negatively affect the quality of healthcare provided to people with obesity (Puhl & Heuer, 2009).

Aside from psychological repercussions, excess body fat is associated with a myriad of physical non-communicable diseases, such as cardiovascular diseases, diabetes, musculoskeletal disorders and some cancers, which negatively impact their quality of life (World Health Organization—WHO, 2020). It is worth noting the role of the psychological distress associated with stigmatization in this regard. Research shows that individuals exposed to weight discrimination have greater levels of C-reactive protein, cortisol and glycosylated haemoglobin, as well as long-term cardio-metabolic risk compared to those who are not exposed to this kind of discrimination (Rubino et al., 2020; Tomiyama et al., 2018). Additionally, the prevalence of overweight and obesity has steadily increased in recent decades in many countries (Abarca-Gómez et al., 2017; WHO, 2020). Therefore, different approaches have been used to address these issues. The traditional treatments for weight control include dietetic restriction and physical activity, and while they typically produce significant short-term weight

loss, it is common to regain this weight in the long term (Nordmo et al., 2020; Rubino et al., 2020; Wilson & Brownell, 2002). As weight loss is considered the primary or unique goal, no psychological level benefits are typically reported. Thus, dietetic and physical activity-related retraining derived from the oversimplified 'body weight = calories in – calories out' equation falls short when dealing with this matter.

In contemplating the relevance of psychological variables in maintaining behavioural changes over time (Byrne, 2002; Byrne et al., 2004; Cooper & Fairburn, 2001; Kwasnicka et al., 2016; Samdal et al., 2017) and effectively tackling weight-related stigma and derived psychological distress (Alimoradi et al., 2019), it is essential to include a psychological approach when addressing such weight-related struggles. Taking into account the cognitive factors associated with weight management behaviours, cognitive-behavioural therapy (CBT) is one of the most often recommended and preferred methods for treating obesity to date (Byrne et al., 2004; Cooper & Fairburn, 2001; Moffitt et al., 2015). Such interventions typically apply behavioural and cognitive modification strategies to foster lifestyle behavioural changes and subsequent weight loss (van Dorsten & Lindley, 2008). However, contradictory results have been reported regarding CBT's effectiveness in maintaining weight loss (Castellnuovo et al., 2017; Comşa et al., 2020; Cooper et al., 2010; Nordmo et al., 2020); moreover, literature does not indicate that CBT can effectively target the emotional issues of individuals struggling with weight (Comşa et al., 2020; Jacob et al., 2018). Indeed, attempts to control or suppress these aversive internal experiences can be ineffective, or even paradoxically augment them (Forman et al., 2007; Forman, Hoffman, et al., 2013; Hooper et al., 2012), often leading to overeating, bingeing or weight gain (Barnes & Tantleff-Dunn, 2010). Therefore, an alternative approach is necessary to address individuals' psychological suffering and guarantee they maintain healthy habits and their overall well-being over time.

In the context of obesity treatment, ACT aims to enhance healthy behavioural patterns consistent with personal values by promoting mindfulness and acceptance (Lillis et al., 2020; Lillis & Kendra, 2014). Aiming to pursue a meaningful life, ACT is characterized by modifying the function of the adverse internal events that push people to behave in opposition to their personal values, instead of trying to alter their content (Lillis & Kendra, 2014). Regarding the core processes within ACT, willingness, acceptance and distress tolerance promote an openness and kindness towards unwanted internal events, instead of trying to repress them (Forman & Butryn, 2015), which is especially relevant for people susceptible to food cues (Forman et al., 2007). Mindfulness enhances the individual's consciousness of threatening cues (Tapper, 2017), enabling oneself to adopt values-driven behaviours at every moment. Regarding weight-related psychological flexibility, this positively impacts eating behaviours and dietary habits (Hsu & Forestell, 2021; Palmeira et al., 2019; Sairanen et al., 2017; Warren et al., 2017). Similarly, defusion or decentring involves considering those experiences as temporary and taking distance, which is more beneficial than thought suppression in addressing food cravings in the long term (Forman et al., 2007; Forman, Hoffman, et al., 2013;

Hooper et al., 2012). Identifying the essential personal values in acquiring a healthy lifestyle is also essential for maintaining behavioural changes over time (Forman & Butryn, 2015; Levin et al., 2018; Lillis et al., 2020). Overall, and combined with mindfulness, ACT has been proven the best treatment for reducing emotional eating (Frayn & Knäuper, 2018) and shows promise for effectively targeting weight stigma and improving the quality of life (Hunger et al., 2020). Moreover, Guerrini-Usubini et al. (2021) recently observed that psychological flexibility is a major predictor of psychological well-being in people with obesity.

Some current reviews have targeted the use of ACT for different clinical and eating disorders (Manlick et al., 2013; Yıldız, 2020), body image dissatisfaction and weight-related self-stigma (Griffiths et al., 2018). Literature has also examined ACT's effect on lifestyle behavioural changes, including weight-related aspects (Öst, 2014; Roche et al., 2019). Nevertheless, only one review to our knowledge targets ACT's effect on weight management behaviours specifically, within the third-wave cognitive behavioural treatment (3wCBT) framework (Lawlor et al., 2020). In the study presented by Lawlor et al. (2020), ACT was the most consistently effective in producing weight loss for up to 12 months among 3wCBTs. However, such an analysis was not performed for psychological outcomes, making it unfeasible to discern ACT's effect on psychological well-being from 3wCBTs'. Additionally, the scientific community has recently questioned the influence of obesity treatments' focus on effectiveness. In this context, a debate exists regarding not only the ineffectiveness of addressing obesity from a weight-normative perspective but also whether significantly emphasizing body weight may then have adverse psychological or physical effects on people immersed in such weight-related battles (Bombak et al., 2019; Hunger et al., 2020; Tylka et al., 2014).

Therefore, the current review considers ACT's outstanding effect for weight loss and aims to comprehensively analyse this effect as well as ACT's effect on psychological well-being, health behaviours and eating habits. This work primarily aims to systematically evaluate randomized controlled trials (RCTs) testing ACT-based interventions for weight management and/or the psychological well-being of people with overweight or obesity, synthesize the findings and obtain reliable conclusions. Additionally, considering the current debate regarding how the focus of ACT influences its effectiveness, this review will analyse how differences in the primary target of intervention affect the effectiveness of ACT.

2 | METHOD

2.1 | Procedures

This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Statement (PRISMA; Moher et al., 2009) and registered under the international prospective register of systematic reviews (PROSPERO; registration number: CRD42020185569).

2.1.1 | Literature search

Medline, PubMed, Psycinfo and Scopus databases were used to search keywords related to ACT ('acceptance and commitment therapy' or 'ACT') in conjunction with keywords related to excess weight ('obesity' or 'weight') using Boolean operators (e.g., 'ACT' and 'obesity') from the earliest date available to 31 May 2020 (the search date). Duplicate records were removed, and a first screening was performed to determine if key terms were included in the titles or abstracts. Subsequently, the abstracts were read and works were excluded that were single-group designs, not peer reviewed, or presenting further analyses based on studies already included in the review. The remaining articles and those that were insufficiently clear were retrieved and fully and independently read by the first and corresponding authors to confirm the study selection criteria.

2.1.2 | Inclusion and exclusion criteria

Table 1 presents the criteria used to determine which works were included in or excluded from the study.

2.2 | Data extraction plan

The first and corresponding authors of the current review revised the selected articles to assess their eligibility. They extracted data regarding the following aspects of each work: the study design; participants' characteristics, including sample size, percentage of females in the sample, mean body mass index (BMI), and mean age; primary target of intervention; intervention format; number of intervention sessions

and total hours; comparison group; attrition of each of the groups involved in the study; if possible, the follow-up length; outcomes and measures; improvement compared with control at post-treatment and/or at follow-up; and, if possible, the mean Cohen's *d* value as an effect size indicator. If the Cohen's *d* was not available in the article, it was calculated if such data were available. Values between 0.2 and 0.4, 0.5 and 0.7 and greater than 0.8 indicate small, medium and large effects, respectively (Cohen, 1988). If the authors had doubts related to the data, they contacted the original researcher for clarification. If any discrepancies occurred in the data extracted, the authors reviewed the original article to discuss them, and if disagreements remained, a third reviewer helped them reach a consensus.

2.2.1 | Risk of bias assessment

Two reviewers independently assessed each study's risk of bias using the revised Cochrane risk of bias tool for randomized trials (RoB 2). Five domains were assessed for risk of bias—the randomization process, deviations from intended interventions, missing outcome data, measurement of the outcome and selection of the reported result—to obtain a global risk of bias rating for each study: low risk, some concerns or high risk of bias. The risk of bias was assessed at the outcome level.

3 | RESULTS

3.1 | Study selection

After duplicate items were removed, 1,340 results were obtained from the search. After screening, 47 papers remained to be assessed for eligibility based on the established inclusion and exclusion criteria. Thirty-one articles were removed based on the exclusion criteria, and 16 articles and 14 studies were included in the review (Figure 1).

3.2 | Study characteristics

Table 2 displays the included studies' characteristics.

3.2.1 | Design

All included studies were RCTs. One trial compared three interventions: ACT including environmental change skills, standard behavioural treatment (SBT) and a behavioural treatment focused on environmental change (Butryn et al., 2017); another study compared three groups receiving ACT face-to-face, online and a no-intervention group (Järvelä-Reijonen et al., 2018); five compared ACT with another intervention, whether behavioural weight-loss (BWL) intervention, SBT or a self-help treatment (Afari et al., 2019; Carels et al., 2019;

TABLE 1 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
RCT design	Participants diagnosed by an eating disorder (*studies in which participants presented disordered eating attitudes were accepted)
Assess the effect of an ACT-based intervention	
Collect at least pretreatment and posttreatment data	
Sample's mean BMI ≥ 25 (overweight or obesity)	
Adult participants (≥ 18 years old)	
Weight and/or weight management behaviours as outcome	
Weight, weight management behaviours, or a variable related to psychological well-being as main outcome	
Peer reviewed original papers written in English	

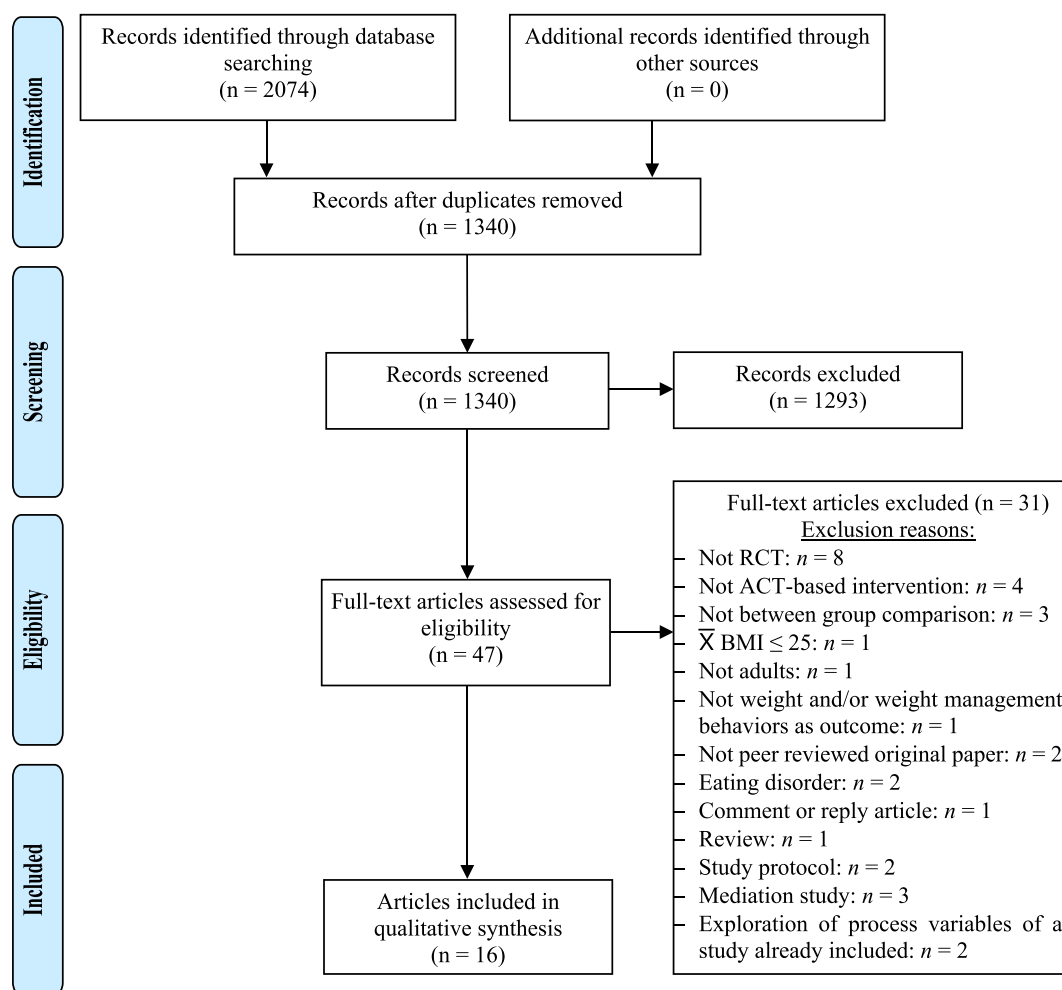


FIGURE 1 Article selection process flowchart

Forman et al., 2016, 2019; Forman, Butryn, et al., 2013; Lillis et al., 2016); and seven trials compared ACT with no/usual intervention (i.e., treatment as usual—TAU; Frayn et al., 2020; Katterman et al., 2014; Levin et al., 2017; Lillis et al., 2009; Palmeira et al., 2017; Tapper et al., 2009; Weineland, Arvidsson, et al., 2012; Weineland, Hayes, & Dahl, 2012).

3.2.2 | Population

The sample size ranged from 23 (Levin et al., 2017) to 283 (Butryn et al., 2017). Samples from three studies included solely women (Katterman et al., 2014; Palmeira et al., 2017; Tapper et al., 2009), while the samples of the other studies were mixed, with the lowest proportion of females being 23.9% (Afari et al., 2019) and the highest 92.4% (Frayn et al., 2020). The lowest mean BMI was 26.63 ± 2.19 (Katterman et al., 2014), and the highest was 37.6 ± 5.3 (Lillis et al., 2016). The samples' youngest mean age was 22.35 ± 2.89 (Katterman et al., 2014), while the oldest mean age was 57.3 ± 9.9 (Afari et al., 2019).

3.2.3 | Intervention

Twelve studies delivered ACT face to face, either in a group (Afari et al., 2019; Butryn et al., 2017; Carels et al., 2019; Forman et al., 2016, 2019; Forman, Butryn, et al., 2013; Järvelä-Reijonen et al., 2018; Katterman et al., 2014; Lillis et al., 2009, 2016; Palmeira et al., 2017; Tapper et al., 2009), or individually (Frayn et al., 2020). Three conducted treatments online using either a mobile app (Järvelä-Reijonen et al., 2018; Levin et al., 2017) or Internet application (Weineland, Arvidsson, et al., 2012; Weineland, Hayes, & Dahl, 2012). Regarding the hours of treatment, the shortest were 0.67–1.33 h long (Frayn et al., 2020), while the longest duration lasted 37.5 h (Forman, Butryn, et al., 2013). Concerning the attrition rate of the group receiving ACT, two studies had no attrition (Carels et al., 2019; Lillis et al., 2009), and the highest dropout rate was 62.86% (Frayn et al., 2020). Regarding the attrition rate of the comparison group, one study had no withdrawal (Butryn et al., 2017), while the highest rate was 51.61% (Frayn et al., 2020). The components of the interventions were diverse and are displayed in Table 3.

TABLE 2 Studies' characteristics and effects

Study	Design	Participants	PTI	FI	No. of sessions (total hours)	Comp	Attr ACT %
Afari et al. (2019)	RCT (ACT vs. BWL)	N = 88 (ACT n = 45) 23.9% F \bar{X} BMI = 37.2 ± 7 \bar{X} age = 57.3 ± 9.9	Disinhibited eating behaviour	G	4 (8)	BWL	4.44
Butryn et al. (2017)	RCT (BT + EA vs. BT vs. BT + E)	N = 283 (BT + EA n = 102) 78.8% F \bar{X} BMI = 35.2 \bar{X} age = 53.2	Weight loss	G	26 (32.5)	BT and BT + E	24.51
Carels et al. (2019)	RCT (MISS-ABBI vs. MISS-SH)	N = 28 (MISS-ABBI n = 15) n/a % F n/a \bar{X} BMI n/a \bar{X} age	Weight loss	G	8 (12)	SH	0
Forman, Butryn, et al. (2013)	RCT (ABBI vs. SBT)	N = 128 (ABBI n = 74) n/a % F \bar{X} BMI = 34.1 ± 3.6 \bar{X} age = 45.7 ± 12.8	Weight loss	G	30 (37.5)	SBT	11.94
Forman et al. (2016); Forman et al. (2019)	RCT (ABBI vs. SBT)	N = 190 (ABBI n = 100) 82.1% F \bar{X} BMI = 36.9 ± 0.4 \bar{X} age = 51.6 ± 0.7	Weight loss	G	25 (31.25)	SBT	21
Frayn et al. (2020)	RCT (ACT vs. TAU)	N = 87 (ACT n = 44) 92.4% F n/a \bar{X} BMI \bar{X} age = 46.9	Weight loss	Ind	8 (0.67–1.33)	TAU	62.86
Järvelä-Reijonen et al. (2018)	RCT (ACT-Ftf vs. ACT-M vs. C)	N = 219 (ACT-Ftf n = 70; ACT-M n = 78) 85% F \bar{X} BMI = 31.3 ± 2.9 \bar{X} age = 49.5 ± 7.4	Eating behaviour and diet quality	G or M	6 (9) (ACT-Ftf), 1 + M (ACT-M)	C	11.43 (ACT-Ftf); 3.85 (ACT-M)
Katterman et al. (2014)	RCT (ABBI vs. C)	N = 58 (ACT n = 29) 100% F \bar{X} BMI = 26.6 ± 2.2 \bar{X} age = 22.3 ± 2.9	Weight gain prevention	G	8 (10)	C	27.59
Levin et al. (2017)	RCT (ACT-M vs. WL)	N = 23 (ACT-M n = 12) 57% F \bar{X} BMI = 27.3 ± 5.0 \bar{X} age = 26.9 ± 8.7	Diet and exercise behaviour	M	1 (0.25–0.33) + M	WL	25

TABLE 2 (Continued)

Study	Design	Participants	PTI	FI	No. of sessions (total hours)	Comp	Attr ACT %
Lillis et al. (2009)	RCT (ACT vs. WL)	N = 84 (ACT n = 40) %90.48 F \bar{X} BMI = 33.0 ± 7.1 \bar{X} age = 50.8 ± 11.3	Weight-related stigma and distress	G (WS)	1 (6)	WL	0
Lillis et al. (2016)	RCT (ABBI vs. SBT)	N = 162 (ABBI n = 81) 85.19% F \bar{X} BMI = 37.6 ± 5.3 \bar{X} age = 50.2 ± 10.9	Weight loss	G	32 (32)	SBT	16.05
Palmeira et al. (2017)	RCT (ACT vs. TAU)	N = 73 (ACT n = 36) 100% F \bar{X} BMI = 34.2 ± 5.0 \bar{X} age = 42.4 ± 8.6	Weight self-stigma, eating behaviour and quality of life	G	12 (30)	TAU	15.63
Tapper et al. (2009)	RCT (ACT vs. C)	N = 62 (ACT n = 31) 100% F \bar{X} BMI = 31.6 ± 6.1 \bar{X} age = 41 ± 13	Weight loss	G (WS)	4 (8)	C	14.81
Weineland, Arvidsson, et al. (2012); Weineland, Hayes, and Dahl (2012)	RCT (ACT – Ftf + I vs. TAU)	N = 39 (ACT n = 19) 89.74% F \bar{X} BMI = 27.2 \bar{X} age = 43.1	Emotional eating, body dissatisfaction and quality of life	Ind + I	2 (3) + I	TAU	6.25

Abbreviations: -, not reported; AAQ, Acceptance and Action Questionnaire; AAQ-II, Acceptance and Action Questionnaire for Weight-Related Difficulties; AAQW-R, Acceptance and Action Questionnaire for Weight-Related Difficulties-Revised; ABBI, acceptance-based behavioural intervention; ACT, acceptance and commitment therapy; ACT-Ftf, acceptance and commitment therapy-based face-to-face intervention; ACT-M, acceptance and commitment therapy-based mobile-app intervention; Attr, attrition; AUDIT-C, AUDIT Alcohol Consumption Questions; BDI-II, Beck Depression Inventory-II; BES, Binge Eating Scale; BMI, body mass index; BPAT, Brief Physical Assessment Tool; BS, bariatric surgery; BSQ, Body Shape Questionnaire short version; BT, behavioural treatment; BWL, behavioural weight-loss; C, control; CFQ-FC, Cognitive Fusion Questionnaire – Food Craving; Comp, comparison group; DEBQ, Dutch Eating Behaviour Questionnaire; DTS, Distress Tolerance Scale; E, environmental change; EA, environmental change and acceptance-based skills; EAT-26, Eating Attitudes Test-26; ecSI 2.0, ecSatter Inventory 2.0; EDE-Q, Eating Disorders Examination Questionnaire; EI, Eating Inventory; EPER, Eating for Physical rather than Emotional Reasons; G, group; Ftf, face-to-face; F, female; FAAQ, Food Craving Acceptance and Action Questionnaire; FFMQ-15, Five Facet Mindfulness Questionnaire-15; FI, format of intervention; FSCRS, Forms of Self-Criticizing/Attacking & Self Reassuring Scale; FU, follow-up; GHQ, General Health Questionnaire; GHQ-12, General Health Questionnaire-12; GHQ-28, General health Questionnaire-28; HTAS, Health and Taste Attitude Scales; I, internet application; IDQ, Index of Diet Quality; Id R, identified regulation; IES-1, Intuitive Eating Scale; Ind, individual; In R, integrated regulation; M, mobile-app; n/a, not available; ORWELL-97, Obesity Related Well-Being Questionnaire-97; PAAQ, Physical Activity Acceptance and Action Questionnaire; PAH, Physical Activity History; PASTAS-5, Physical Appearance State and Trait Anxiety Scale-State; PEWS, Preoccupation with Eating, Weight, and Shape Scale; PHLMS, Philadelphia Mindfulness Scale; PTI, primary target of intervention; QOLI, Quality of Life Inventory; REBS, Regulation of Eating Behaviour Scale; SH, self-help; sig, significant; SBEQ, Subjective Binge Eating Questionnaire for bariatric surgery patients; SBT, standard behavioural treatment; SCS, Self-Compassion Scale; SH, self-help; TAU, treatment as usual; TFEQ, Three-Factor Eating Questionnaire; TFEQ-R18, Three-Factor Eating Questionnaire-Revised-18; TFEQ-R21, Three Factor Eating Questionnaire-Revised-21; TSQR, Treatment Self-Regulation Questionnaire; UFR, Using Food as a Reward; VQ, Valuing Questionnaire; WBIS, Weight Bias Internalization Scale; WCSS, Weight Control Strategies Scale; WELQ, Weight Efficacy Lifestyle Questionnaire; WHOQOL-BREF, World Health Organization Quality of Life-BREF; WS, workshop; WL, wait list control; WSSQ, Weight self-stigma Questionnaire; WSQ, Weight Stigma Questionnaire.

TABLE 2 (Continued)

Study	Attr comp %	FU	Outcomes (measures)	Improvement compared to control (post) (X Cohen's <i>d</i>)	Improvement compared to control (follow-up) (X Cohen's <i>d</i>)
Afari et al. (2019)	2.33	3 m 6 m	Binge eating (BES)	0/1 sig	3 m 0/1 sig
			Emotional eating (DEBQ)	0/1 sig	6 m 0/1 sig
			External eating (DEBQ)	0/1 sig	0/1 sig
			Restraint eating (DEBQ)	0/1 sig	0/1 sig
			Obesity-related quality of life (ORWELL-97)	0/1 sig	0/1 sig
			Weight-related psychological flexibility (AAQ-W)	0/1 sig	0/1 sig
Butryn et al. (2017)	13.64 (BT), 0 (BT + E)	-	Weight (scale)	0/1 sig	0/1 sig
			Weight loss percentage (scale)	0/1 sig	-
			Physical activity (GT3X accelerometer)	0/1 sig	-
			Calorie intake (24-h recall)	0/1 sig	-
			Self-efficacy (WELQ)	0/1 sig	-
			Autonomous motivation (TSRQ)	0/1 sig	-
Carels et al. (2019)	38.1	-	Uncontrolled eating (TFEQ)	0/1 sig	-
			Weight loss percentage (scale)	0/1 sig	-
			Weight loss percentage (scale)	0/1 sig	-
			Quality of life (QOLI)	0/1 sig	-
Forman, Butryn, et al. (2013)	6.98	6 m	Weight loss percentage (scale)	0/1 sig	12 m 0/1 sig
			Quality of life (QOLI)	0/1 sig	24 m 0/1 sig
			Weight loss percentage (scale)	1/1 sig (0.42)	0/1 sig
			Quality of life (QOLI)	1/1 sig (0.29)	1/1 sig (0.28)
Forman et al. (2016); Forman et al. (2019)	22.22	12 m 24 m	Depression (BDI-II)	0/1 sig	0/1 sig
			Weight (scale)	0/1 sig	-
			Emotional eating (DEBQ)	0/1 sig	-
			Body fat percentage (n/a)	0/1 sig	-
Frayn et al. (2020)	51.61	-	External eating (DEBQ)	0/1 sig	-
			Restraint eating (DEBQ)	0/1 sig	-
			Distress tolerance (DTS)	0/1 sig	-
			Mindfulness awareness (PHLMS)	0/1 sig	-
			Values clarification (ad-hoc)	0/1 sig	-
			Weight loss percentage (scale)	0/1 sig	-

TABLE 2 (Continued)

Study	Attr comp %	FU	Outcomes (measures)	Improvement compared to control (post) (X Cohen's d)	Improvement compared to control (follow-up) (X Cohen's d)
Järvelä-Reijonen et al. (2018)	-	6.5 m	Intuitive eating (IES-1)	1/4 sig (EPER Ftf = M > C)	-
			Eating behaviour (TFEQ-R18)	0/3 sig	-
			Health and taste attitudes (HTAS)	1/2 sig (UFR M < Ftf)	-
			Eating competence (ecSI 2.0)	0/5 sig	-
			Motivation for eating behaviour regulation (REBS)	2/6 sig (ln R Ftf > C = M; Id R Ftf > C = M)	-
			Diet quality (IDQ)	0/1 sig	-
			Alcohol consumption (AUDIT-C)	0/1 sig	-
			Nutrient intake (48-h recall)	0/1 sig	-
Katterman et al. (2014)	-	12 m	Weight and BMI (scale, stadiometer)		1/1 sig
			Physical activity (PAH)		0/1 sig
			Uncontrolled eating (TFEQ-R18)		0/1 sig
			Emotional eating (TFEQ-R18)		0/1 sig
			Psychological flexibility (AAQ-II)		0/1 sig
			Experiential acceptance related to food cravings (FAAQ)		0/1 sig
			Experiential acceptance related to physical activity (PAAAQ)		1/1 sig (0.76)
Levin et al. (2017)	-	-	Health behaviours related to weight management (WCSS)	2/5 sig (1.26)	-
			Valued living (VQ)	0/2 sig	-
			Experiential acceptance related to food cravings (FAAQ)	0/1 sig	-
Lillis et al. (2009)	-	3 m	Psychological distress (GHQ)	-	1/1 sig (0.92)
			Obesity-related quality of life (ORWELL-97)	-	1/1 sig (1.14)
			Weight-related stigma (WSQ)	-	1/1 sig (1.07)
			Weight, BMI (scale, stadiometer)	-	1/1 sig (0.92)
			Weight loss percentage (scale)	-	1/1 sig (0.82)
			Psychological flexibility (AAQ)	-	1/1 sig (0.70)
			Weight-related psychological flexibility (AAQ-W)	-	1/1 sig (1.38)
			Distress tolerance (breath-holding time)	-	1/1 sig (0.89)
Lillis et al. (2016)	13.58	6 m 12 m	Weight, BMI (scale, stadiometer)	0/1 sig	12 m 0/1 sig
			Weight loss percentage (scale)	0/1 sig	0/1 sig
			Internal disinhibition (EI)	0/1 sig	0/1 sig

(Continues)

TABLE 2 (Continued)

Study	Attr comp %	FU	Outcomes (measures)	Improvement compared to control (post) (X Cohen's <i>d</i>)	Improvement compared to control (follow-up) (X Cohen's <i>d</i>)
Palmeira et al. (2017)	13.51	-	Weight self-stigma (WSSQ)	1/1 sig (0.74)	-
			Obesity-related quality of life (ORWELL-97)	1/1 sig (0.68)	-
			Emotional eating (TFEQ-R21)	1/1 sig (0.52)	-
			Uncontrolled eating (TFEQ-R21)	1/1 sig (0.61)	-
			Weight, BMI (body composition analyser, stadiometer)	1/1 sig (0.13)	-
			Waist circumference (tape measure)	0/1 sig	-
			Total cholesterol (blood sample)	0/1 sig	-
			Psychological distress (GHQ-28)	1/1 sig (1.18)	-
			Physical exercise (ad-hoc)	1/1 sig (2.00)	-
			Weight-related psychological flexibility (AAQW-R)	1/1 sig (0.96)	-
			Self-criticism and self-reassurance (FSCRS)	2/2 sig (0.91)	-
			Self-compassion (SCS)	0/1 sig	-
			Mindfulness (FFMQ-15)	0/1 sig	-
Tapper et al. (2009)	-	2 m	Weight, BMI (scale, stadiometer)	-	0/1 sig
			Physical activity (BPAT)	-	1/1 sig (0.34)
			Psychological distress (GHQ-12)	-	0/1 sig
Weineland, Arvidsson, et al. (2012); Weineland, Hayes, and Dahl (2012)	10	6 m	Disordered eating behaviour (EDE-Q)	3/5 sig (0.67)	0/5 sig
			Subjective binge eating (SBEQ)	1/1 sig (0.85)	0/1 sig
			Body dissatisfaction (BSQ)	1/1 sig (0.82)	1/1 sig (0.77)
			Quality of life (WHOQOL-BREF)	1/1 sig (0.61)	1/1 sig (0.88)
			Weight-related psychological flexibility (AAQ-W)	1/1 sig (1.05)	0/1 sig
			Valued living (bull's eye)	4/4 sig	2/4 sig

Abbreviations: -, not reported; AAQ, Acceptance and Action Questionnaire; AAQ-II, Acceptance and Action Questionnaire-II; AAQ-W, Acceptance and Action Questionnaire for Weight-Related Difficulties; AAQW-R, Acceptance and Action Questionnaire for Weight-Related Difficulties-Revised; ABBI, acceptance-based behavioural intervention; ACT, acceptance and commitment therapy; ACT-Ftf, acceptance and commitment therapy-based face-to-face intervention; ACT-M, acceptance and commitment therapy-based mobile-app intervention; Attr, attrition; AUDIT-C, AUDIT Alcohol Consumption Questions; BDI-II, Beck Depression Inventory-II; BES, Binge Eating Scale; BMI, body mass index; BPAT, Brief Physical Assessment Tool; BS, bariatric surgery; BSQ, Body Shape Questionnaire short version; BT, behavioural treatment; BWL, behavioural weight-loss; C, control; CFQ-FC, Cognitive Fusion Questionnaire - Food Craving; Comp, comparison group; DEBQ, Dutch Eating Behaviour Questionnaire; DTS, Distress Tolerance Scale; E, environmental change; EA, environmental change and acceptance-based skills; EAT-26, Eating Attitudes Test-26; ecSI 2.0, ecSatter Inventory 2.0; EDE-Q, Eating Disorders Examination Questionnaire; EI, Eating Inventory; EPER, Eating for Physical rather than Emotional Reasons; G, group; Ftf, face-to-face; F, female; FAAQ, Food Craving Acceptance and Action Questionnaire; FFMQ-15, Five Facet Mindfulness Questionnaire-15; FI, format of intervention; FSCRS, Forms of Self-Criticizing/Attacking & Self Reassuring Scale; FU, follow-up; GHQ, General Health Questionnaire; GHQ-12, General Health Questionnaire-12; GHQ-28, General health Questionnaire-28; HTAS, Health and Taste Attitude Scales; I, internet application; IDQ, Index of Diet Quality; Id R, identified regulation; IES-1, Intuitive Eating Scale; Ind, individual; In R, integrated regulation; M, mobile-app; n/a, not available; ORWELL-97, Obesity Related Well-Being Questionnaire-97; PAAQ, Physical Activity Acceptance and Action Questionnaire; PAH, Physical Activity History; PASTAS-S, Physical Appearance State and Trait Anxiety Scale-State; PEWS, Preoccupation with Eating, Weight, and Shape Scale; PHLMs, Philadelphia Mindfulness Scale; PTI, primary target of intervention; QOLI, Quality of Life Inventory; REBS, Regulation of Eating Behaviour Scale; SH, self-help; sig, significant; SBEQ, Subjective Binge Eating Questionnaire for bariatric surgery patients; SBT, standard behavioural treatment; SCS, Self-Compassion Scale; SH, self-help; TAU, treatment as usual; TFEQ, Three-Factor Eating Questionnaire; TFEQ-R18, Three-Factor Eating Questionnaire-Revised-18; TFEQ-R21, Three Factor Eating Questionnaire-Revised-21; TSQR, Treatment Self-Regulation Questionnaire; UFR, Using Food as a Reward; VQ, Valuing Questionnaire; WBIS, Weight Bias Internalization Scale; WCSS, Weight Control Strategies Scale; WELQ, Weight Efficacy Lifestyle Questionnaire; WHOQOL-BREF, World Health Organization Quality of Life-BREF; WS, workshop; WL, wait list control; WSSQ, Weight self-stigma Questionnaire; WSQ, Weight Stigma Questionnaire.

TABLE 3 Intervention components

Study	Components
Afari et al. (2019); Forman et al. (2016); Forman et al. (2019); Lillis et al. (2016)	Acceptance, values and mindfulness
Butryn et al. (2017)	Acceptance and values
Carels et al. (2019)	Acceptance, values and defusion
Forman, Butryn, et al. (2013)	Acceptance, values, mindfulness, defusion and distress tolerance
Frayn et al. (2020)	Acceptance, values, mindfulness and distress tolerance
Järvelä-Reijonen et al. (2018)	Acceptance, values, mindfulness and self-as-context
Katterman et al. (2014); Lillis et al. (2009); Tapper et al. (2009)	Acceptance, values, mindfulness and defusion
Levin et al. (2017)	Values
Palmeira et al. (2017)	Acceptance, values, mindfulness, defusion, distress tolerance and self-compassion
Weineland, Arvidsson, et al. (2012); Weineland, Hayes, and Dahl (2012)	Acceptance, values, mindfulness, defusion and self-as-context

3.2.4 | Outcomes and assessment

Eight studies centred on weight loss or weight management (Butryn et al., 2017; Carels et al., 2019; Forman et al., 2016, 2019; Forman, Butryn, et al., 2013; Frayn et al., 2020; Katterman et al., 2014; Lillis et al., 2016; Tapper et al., 2009); three were focused on health and/or eating behaviours (Afari et al., 2019; Järvelä-Reijonen et al., 2018; Levin et al., 2017); and three addressed variables related to well-being: weight self-stigma, eating behaviours and quality of life (Palmeira et al., 2017); weight-related stigma and distress (Lillis et al., 2009); and emotional eating, body dissatisfaction and quality of life (Weineland, Arvidsson, et al., 2012; Weineland, Hayes, & Dahl, 2012). Accordingly, several self-reported measures and devices were used to assess outcomes related to physical variables, health behaviours, eating behaviour, psychological well-being, psychological flexibility and other subprocess measures (Table 2). Regarding assessment points, while five studies did not conduct follow-up assessments (Butryn et al., 2017; Carels et al., 2019; Frayn et al., 2020; Levin et al., 2017; Palmeira et al., 2017), the rest did (Afari et al., 2019; Forman et al., 2016, 2019; Forman, Butryn, et al., 2013; Järvelä-Reijonen et al., 2018; Katterman et al., 2014; Lillis et al., 2009, 2016; Tapper et al., 2009; Weineland, Arvidsson, et al., 2012; Weineland, Hayes, & Dahl, 2012). The durations of such assessments spanned 2 (Tapper et al., 2009) to 24 months (Forman et al., 2019).

3.3 | Risk of bias assessment

We assessed each study given the five domains as suggested by the RoB 2 tool (Table 4). Eleven studies (78.57%) elicited some concern, two (14.29%) were rated as having a high risk of bias (Carels et al., 2019; Frayn et al., 2020), and one (7.14%) was judged to have a low risk of bias (Afari et al., 2019). Among those that generated some concern, two trials obtained such ratings due to missing outcome data, as such data could be missing due to the true value of the outcome (Lillis et al., 2016; Palmeira et al., 2017). Five studies elicited some

concern due to missing outcome data and the selection of the reported results' domains (Butryn et al., 2017; Forman et al., 2016, 2019; Forman, Butryn, et al., 2013; Katterman et al., 2014; Tapper et al., 2009). The latter domain was rated as eliciting some concern because the lack of a study protocol made it impossible to assure that the measurements and analyses in the article were equally reported in a prespecified plan. One study was rated as presenting some concerns due to missing outcome data and measurement for outcome-related issues; this is because utilizing self-reported questionnaires and non-masking participants could influence measurements, as participants knew which intervention they were allocated to (Järvelä-Reijonen et al., 2018). Another study elicited some concern regarding the measurement of the outcome and selection of the reported results' domains (Lillis et al., 2009), and two studies presented some concerns due to missing outcome data, the measurement of the outcome and the selection of the reported results (Levin et al., 2017; Weineland, Arvidsson, et al., 2012; Weineland, Hayes, & Dahl, 2012). One study presented a high risk of bias primarily due to the significant group differences in the proportion of participants who dropped out immediately after randomization (Carels et al., 2019). The other trial was rated as having a high risk of bias because both deviations from intended interventions and missing outcome data domains were evaluated as high risk due to participants' clear non-adherence to treatment; further, some reasons for the missing outcome data directly related to the particular characteristics of the intervention received (Frayn et al., 2020). Figure 2 illustrates the proportion of studies presenting a low risk of bias, some concerns or a high risk of bias for each domain.

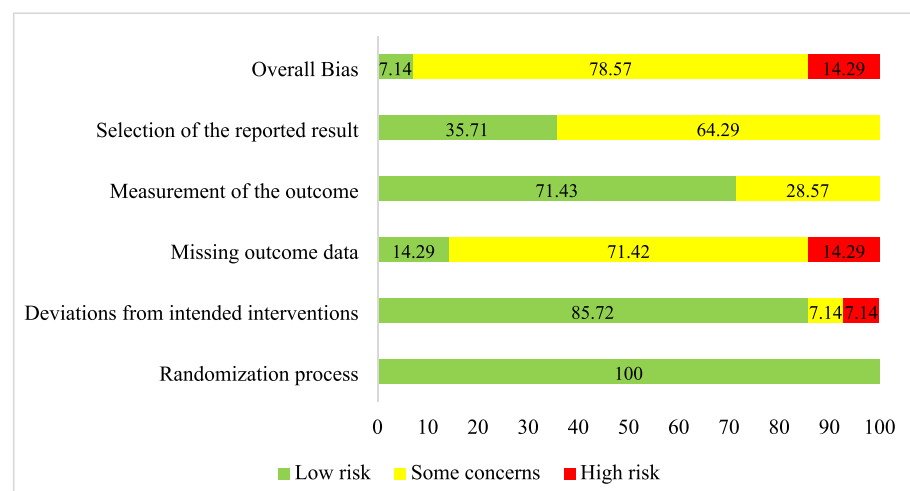
Relevant findings of the studies included in the review are shown in Table 2 and detailed below.

3.4 | Effects of ACT on physical variables

The reviewed studies measured physical variables such as weight loss, weight loss percentage, body fat percentage, waist

TABLE 4 Studies' domain-level and general risk of bias

Study	Randomization process	Deviations from intended interventions	Missing outcome data	Measurement of the outcome	Selection of reported results	Overall bias
Afari et al. (2019)	Low	Low	Low	Low	Low	Low
Butryn et al. (2017)	Low	Low	Some concerns	Low	Some concerns	Some concerns
Carels et al. (2019)	Low	Some concerns	High	Low	Some concerns	High
Forman, Butryn, et al. (2013)	Low	Low	Some concerns	Low	Some concerns	Some concerns
Forman et al. (2016); Forman et al. (2019)	Low	Low	Some concerns	Low	Some concerns	Some concerns
Frayn et al. (2020)	Low	High	High	Low	Low	High
Järvelä-Reijonen et al. (2018)	Low	Low	Some concerns	Some concerns	Low	Some concerns
Katterman et al. (2014)	Low	Low	Some concerns	Low	Some concerns	Some concerns
Levin et al. (2017)	Low	Low	Some concerns	Some concerns	Some concerns	Some concerns
(Lillis et al., 2009)	Low	Low	Low	Some concerns	Some concerns	Some concerns
Lillis et al. (2016)	Low	Low	Some concerns	Low	Low	Some concerns
Palmeira et al. (2017)	Low	Low	Some concerns	Low	Low	Some concerns
Tapper et al. (2009)	Low	Low	Some concerns	Low	Some concerns	Some concerns
Weineland, Arvidsson, et al. (2012); Weineland, Hayes, and Dahl (2012)	Low	Low	Some concerns	Some concerns	Some concerns	Some concerns

**FIGURE 2** Studies' domain-level and general risk of bias percentage

circumference and total cholesterol. Three out of seven trials demonstrated ACT generated greater weight loss at either the post-treatment phase compared with TAU ($d = 0.13$; Palmeira et al., 2017), at the 3-month follow-up compared with controls ($d = 0.92$; Lillis et al., 2009), or at the 12-month follow-up relative to TAU (Katterman et al., 2014). No differences were found in the remaining four trials at the post-treatment or follow-up phases (Afari et al., 2019; Frayn et al., 2020; Lillis et al., 2016; Tapper et al., 2009). From six studies, one observed ACT produced greater weight loss percentage at the 3-month follow-up compared with the controls ($d = 0.82$; Lillis et al., 2009), and another trial demonstrated that

while such effect was found at post-treatment compared with SBT ($d = 0.42$; Forman et al., 2016), no differences were observed at the 12- and 24-month follow-ups (Forman et al., 2019). No such differences were observed in the other four studies, either at the post-treatment or follow-up phases (Butryn et al., 2017; Carels et al., 2019; Forman, Butryn, et al., 2013; Lillis et al., 2016). Similarly, the unique study examining it did not discover any difference between the groups in body fat percentage post-treatment (Frayn et al., 2020). Moreover, in a trial, no differences between the groups in waist circumference and total cholesterol were observed in the post-treatment phase (Palmeira et al., 2017).

3.4.1 | Effects of ACT on physical variables depending on the primary target of intervention

Of the eight studies that focused on weight loss or weight management, one study showed that the group receiving ACT achieved a greater improvement in physical variables at the follow-up period than did the comparison group (Katterman et al., 2014), and another trial revealed such effect at post-treatment (Forman et al., 2016), while no difference was observed at follow-up (Forman et al., 2019). No differences were found in the remaining six trials (Butryn et al., 2017; Carels et al., 2019; Forman, Butryn, et al., 2013; Frayn et al., 2020; Lillis et al., 2016; Tapper et al., 2009). In the trial that focused on health and/or eating behaviours, no effect was found on the physical variables at either assessment point (Afari et al., 2019). In both of the studies that focused primarily on psychological well-being, the intervention group reported a greater change in physical variables than did the comparison group at post-treatment and follow-up (Lillis et al., 2009; Palmeira et al., 2017).

3.5 | Effects of ACT on health behaviours

The reviewed studies measured health behaviours such as physical activity, weight management-related health behaviours, calorie intake, nutrient intake, diet quality and alcohol consumption. In two of four studies, ACT enhanced physical activity more than no/usual intervention, either at post-treatment ($d = 2.00$; Palmeira et al., 2017) or at the 2-month follow-up ($d = 0.34$; Tapper et al., 2009). No differences were observed in the other two trials at the post-treatment or follow-up phases (Butryn et al., 2017; Katterman et al., 2014). One trial observed that an ACT-based mobile app promoted weight management-related health behaviours overall, and specifically effective psychological coping strategies more than control group at post-treatment ($d = 1.26$; Levin et al., 2017). Two studies assessed calorie or nutrient intake without differences between groups at the post-treatment phase (Butryn et al., 2017; Järvelä-Reijonen et al., 2018). Another trial did not find differences in diet quality and alcohol consumption between groups in the post-treatment phase (Järvelä-Reijonen et al., 2018).

3.5.1 | Effects of ACT on health behaviours depending on the primary target of intervention

In one of the three studies centring on weight loss or weight management did ACT improve health behaviours in the treatment group in comparison with the control group at follow-up (Tapper et al., 2009). No such effect was found in the other two studies (Butryn et al., 2017; Katterman et al., 2014). Individuals receiving ACT, in comparison with the control group, showed a greater increase in health behaviours after treatment in one of the two studies that targeted

health and/or eating behaviours (Levin et al., 2017). Conversely, no such effect was found in the other trial (Järvelä-Reijonen et al., 2018). In the study by Palmeira et al. (2017), which focused primarily on psychological well-being, ACT facilitated greater improvements in health behaviours than the comparison treatment at the post-treatment assessment.

3.6 | Effects of ACT on eating behaviour

The reviewed studies examined eating behaviours, such as uncontrolled, emotional, external or restrained eating (deliberately controlling food intake to prevent weight gain). The studies also examined intuitive eating, eating for pleasure or reward, eating competence (being positive, comfortable and flexible with eating), internal disinhibition, maladaptive eating behaviours and binge eating. Of the six studies analysing eating behaviours, emotional eating and uncontrolled eating decreased more in the ACT group than in the TAU group at post-treatment in one trial ($d = 0.52$ and $d = 0.61$, respectively; Palmeira et al., 2017). Conversely, no difference was found for these variables among the remaining five trials, either at post-treatment or follow-up (Afari et al., 2019; Butryn et al., 2017; Frayn et al., 2020; Järvelä-Reijonen et al., 2018; Katterman et al., 2014). One study evaluating intuitive eating revealed that while a higher tendency to eat driven by physical hunger rather than emotions was observed in the ACT group than the control group, no differences were noted regarding other intuitive eating-related aspects at post-treatment (Järvelä-Reijonen et al., 2018). Similarly, one trial discovered that the tendency to use food as indulgence decreased more in the ACT mobile app group than in the ACT face-to-face group at post-treatment, while no effect was observed on the enhancement of pleasure and eating competence (Järvelä-Reijonen et al., 2018). Another study targeting internal disinhibition found no such differences at the post-treatment or follow-up phases (Lillis et al., 2016).

A unique study assessing it noted that ACT decreased overall disordered eating behaviours and concerns about shape and weight more than TAU at post-treatment ($d = 0.67$; Weineland, Arvidsson, et al., 2012); conversely, no differences were found at a 6-month follow-up visit (Weineland, Hayes, & Dahl, 2012). Of two trials, in one ACT produced a greater decrease in binge eating than TAU at post-treatment phase ($d = 0.85$ Weineland, Arvidsson, et al., 2012), while BWL intervention reduced it more than ACT in another study ($d = 0.36$; Afari et al., 2019). In contrast, no differences were observed at 3- and 6-month follow-ups (Afari et al., 2019; Weineland, Hayes, & Dahl, 2012).

3.6.1 | Effects of ACT on eating behaviour depending on the primary target of intervention

Not one of the four trials centred on weight loss or weight management revealed differences in eating behaviour at the

post-treatment or follow-up period (Butryn et al., 2017; Frayn et al., 2020; Katterman et al., 2014; Lillis et al., 2016). Of the two studies that had health and/or eating behaviours as the primary target of the intervention, it was observed that while ACT was less effective for improving eating behaviour than the comparison group during post-treatment, no difference was found at follow-up (Afari et al., 2019). Conversely, another trial demonstrated that ACT improved some eating behaviour-related aspects in comparison to the control group at the post-treatment period (Järvelä-Reijonen et al., 2018). One of the two studies that focused primarily on psychological well-being reported that ACT was more effective than the comparison treatment at improving eating behaviour immediately post-treatment (Palmeira et al., 2017); in contrast, another trial found such effect at post-treatment (Weineland, Arvidsson, et al., 2012) and not during the follow-up period (Weineland, Hayes, & Dahl, 2012).

3.7 | Effects of ACT on psychological well-being

Psychological well-being-related variables such as quality of life, psychological distress, depression, weight-related stigma, body dissatisfaction and self-criticism were targeted by the studies in this review. From six trials, two observed that ACT promoted quality of life more than TAU at the post-treatment ($d = 0.68$ and $d = 0.61$; Palmeira et al., 2017; Weineland, Arvidsson, et al., 2012) and the 6-month follow-up phases ($d = 0.88$; Weineland, Hayes, & Dahl, 2012). Similarly, two studies revealed ACT's effectiveness in enhancing quality of life at the 3-month ($d = 1.14$; Lillis et al., 2009) and 12- and 24-month follow-ups ($d = 0.29$ and $d = 0.28$, respectively; Forman et al., 2019) compared with the no intervention and SBT groups, respectively. In contrast, two studies observed no difference compared with SBT or BWL intervention, either at the post-treatment or follow-up phases (Afari et al., 2019; Forman, Butryn, et al., 2013). Of three studies, one indicated that ACT decreased psychological distress more than TAU during the post-treatment phase ($d = 1.18$; Palmeira et al., 2017). At the follow-up phase, while one study demonstrated ACT reduced psychological distress more than control group at 3 months ($d = 0.92$; Lillis et al., 2009), another study found no differences at 2 months (Tapper et al., 2009). Another unique study targeting depression did not reveal differences at 12- and 24-month follow-ups (Forman et al., 2019).

In both studies analysing weight-related stigma, ACT was more effective in decreasing it than no/usual intervention at the post-treatment ($d = 0.74$; Palmeira et al., 2017) and the 3-month follow-up phases ($d = 1.07$; Lillis et al., 2009). In a unique study assessing body dissatisfaction, lower rates were found in the ACT group than in the TAU group at the post-treatment ($d = 0.82$; Weineland, Arvidsson, et al., 2012) and 6-month follow-up phases ($d = 0.77$; Weineland, Hayes, & Dahl, 2012). Another study observed that ACT more effectively reduced self-criticism than TAU at the post-treatment phase ($d = 0.91$; Palmeira et al., 2017).

3.7.1 | Effects of ACT on psychological well-being depending on the primary target of intervention

Regarding the three trials that focused on weight loss or weight management, one study demonstrated that ACT enhanced psychological well-being-related variables more than control treatment at the follow-up phase (Forman et al., 2019). The other two studies found no differences between the groups (Forman, Butryn, et al., 2013; Tapper et al., 2009). The single study that focused on health and/or eating behaviours found that ACT had no effect on psychological well-being at either assessment point (Afari et al., 2019). Regarding the three studies that focused primarily on psychological well-being, ACT improved variables related to psychological well-being to a greater extent than did the control treatment both at the post-treatment and follow-up period in all three studies (Lillis et al., 2009; Palmeira et al., 2017; Weineland, Arvidsson, et al., 2012; Weineland, Hayes, & Dahl, 2012).

3.8 | Effects of ACT on psychological flexibility and ACT subprocesses

The current review also examined the processes directly targeted during ACT, such as general psychological flexibility, weight-related psychological flexibility, physical activity-related experiential acceptance, food craving-related experiential acceptance, valued living and mindfulness. From the two trials, one noted that the ACT group demonstrated greater levels of psychological flexibility compared with the control group at 3-month follow-up phase ($d = 0.70$; Lillis et al., 2009). The other trial found no differences relative to TAU at the 12-month follow-up phase (Katterman et al., 2014). Two of the four studies assessing it revealed that ACT produced greater weight-related psychological flexibility than no/usual intervention at post-treatment ($d = 0.96$; Palmeira et al., 2017) and another at the 3-month follow-up ($d = 1.38$; Lillis et al., 2009). In another study, ACT increased weight-related psychological flexibility more than TAU at post-treatment ($d = 1.05$; Weineland, Arvidsson, et al., 2012), and no such differences were observed at 6-month follow-up (Weineland, Hayes, & Dahl, 2012). In contrast, one study found no differences in comparing with BWL intervention at post-treatment and at the 6-month follow-up (Afari et al., 2019). A unique trial assessing it observed that ACT facilitated greater improvements in physical activity-related experiential acceptance than the control group at the 12-month follow-up ($d = 0.76$; Katterman et al., 2014). Two studies evaluated experiential acceptance related to food cravings, with no differences obtained at post-treatment (Levin et al., 2017) or follow-up (Katterman et al., 2014). From the three studies assessing valued living, no difference between conditions was found post-treatment in two of these trials (Frayn et al., 2020; Levin et al., 2017). In contrast, another study noted that ACT produced greater valued living than TAU in all four domains at post-treatment and in two of them (work and leisure) at the 6-month follow-up (Weineland, Hayes, & Dahl, 2012). Two studies assessing mindfulness found no between-

group difference in the post-treatment period (Frayn et al., 2020; Palmeira et al., 2017).

3.8.1 | Effects of ACT on psychological flexibility and ACT subprocesses depending on the primary target of intervention

In one of the two studies that focused on weight loss or weight management, the treatment group showed differences in physical activity-related psychological flexibility compared with the control group during the follow-up assessment; conversely, no differences were observed in the other domain-specific or general psychological flexibility aspects (Katterman et al., 2014). In contrast, no effects on the ACT subprocesses were found in the other study at the post-treatment phase (Frayn et al., 2020). Regarding the health and/or eating behaviours focused interventions, none demonstrated differences between groups in terms of psychological flexibility or ACT subprocesses at either assessment point (Afari et al., 2019; Levin et al., 2017). Two of the three trials that focused on psychological well-being observed greater domain-specific or general psychological flexibility within the treatment groups than within the control groups at the post-treatment or follow-up period (Lillis et al., 2009; Palmeira et al., 2017). Conversely, while ACT increased weight-related psychological flexibility compared to control treatments at the post-treatment assessment in the other study (Weineland, Arvidsson, et al., 2012), no such effect was observed during the follow-up period (Weineland, Hayes, & Dahl, 2012). Regarding subprocesses, ACT produced greater effect in this regard compared to the control group at either assessment point in a trial (Weineland, Hayes, & Dahl, 2012), whereas no such effect was found in another trial at the post-treatment phase (Palmeira et al., 2017).

4 | DISCUSSION

4.1 | Main findings

Literature suggests that ACT could benefit people with overweight or obesity (Forman & Butryn, 2015; Lillis & Kendra, 2014). Moreover, a recent review and meta-analysis observed that ACT-based interventions had the greatest evidence of efficacy for weight loss among 3wCBTs (Lawlor et al., 2020). Therefore, and with the aim to delve into this field beyond weight-related outcomes, we have conducted the present review as the first systematic review to exclusively analyse RCTs, with a focus on ACT to facilitate weight management behaviours and psychological well-being.

The results support ACT for enhancing overall psychological well-being, as it resulted in an effective quality of life promotion or decrease in psychological distress, weight-related stigma, body dissatisfaction or self-criticism in 71.43% of studies, whether in the short, medium, or long term. It is important to note that moderate to large effect sizes were observed, and benefits were maintained for up to

2 years in a trial. It is worth noting that in this latter study, participants experienced psychological well-being-related benefits disengaged from weight-related results because no further weight loss was observed long term. This finding parallels the positive results from systematic reviews by Masuda and Hill (2013) and Lawlor et al. (2020) regarding quality of life. These results also agree with a recent systematic review conducted by Griffiths et al. (2018), which concluded that 66.67% of the analysed studies supported ACT regarding weight-related self-stigma and body image dissatisfaction. Therefore, ACT seems an effective treatment for promoting overall psychological well-being over time. This is relevant when considering the role negative affect and body dissatisfaction can play in spurring the 'COD', which can result in high caloric food intake and weight gain (Marks, 2015). Additionally, taking into account that people living in larger bodies are a target of discriminating attitudes, a treatment that enhances psychological well-being as well as combats weight stigma perception is key for protecting an individual from suffering further physiological or psychological impairments (Puhl & Suh, 2015; Tomiyama, 2014; Wu & Berry, 2018).

Optimistic results have been noted regarding ACT's effectiveness in enhancing psychological flexibility, as either general or domain-specific benefits were found in 50% of trials in the short, medium or long term. It is remarkable that overall, medium to large effect sizes were found, and that weight- or physical activity-related psychological flexibility increases stood out mainly. Another review found stronger support, which observed that ACT effectively fostered general or specific psychological flexibility in the short or medium term in 80% of the cases (Griffiths et al., 2018). Promoting psychological flexibility is essential as it is associated with psychological well-being (Guerrini-Usubini et al., 2021). Research suggests that successful weight loss can be partially explained by physical activity and weight-related psychological flexibility (Sairanen et al., 2017; Schumacher et al., 2019). Weight-related psychological flexibility has also been found to enhance intuitive eating (Sairanen et al., 2017). A similar pattern was observed concerning ACT's effect on health behaviours, as 50% of trials supported ACT in the short or medium term. While no effectiveness regarding dietary changes was observed, ACT demonstrated some evidence of effectiveness regarding the promotion of physical activity, although no long-term benefits were found. Further research of follow-up assessments is required to arrive at reliable conclusions. Yıldız's (2020) recent systematic review examining ACT's effect among physically inactive individuals revealed stronger support, as 66.67% of trials had encouraging short-term results. Engaging in physical activity can be beneficial for people with overweight or obesity in terms of promoting quality of life as well as reducing weight and visceral fat (Carraça et al., 2021; Lee & Lee, 2021); therefore, fostering an active lifestyle among such individuals is key.

In contrast, regarding ACT's effect on the amelioration of physical variables, weak evidence of effectiveness has been found, as 31.82% of trials support ACT for weight loss at short, medium or long term with medium or large effect sizes. Similarly, it must be mentioned that 33.33% of trials support ACT for long-term weight loss. This result parallels a previous systematic review and meta-analysis focusing on

health behavioural changes, as the researchers discovered that only a few studies significantly affected weight loss after acceptance or mindfulness-based interventions (Roche et al., 2019). Additionally, ACT is also scarcely effective in addressing eating behaviour overall, as 21.38% of studies supported ACT in the short term without obtaining any evidence of long-term effectiveness. Nevertheless, it is remarkable that two studies in this review without significant results in physical variables or eating behaviour were rated as having a high risk of bias. Additionally, the majority of interventions that did not obtain significant results had weight loss as the primary target of intervention.

In this regard, discussions currently examine which ACT perspective could effectively address the physical or psychological distress that people with obesity can face. Additionally, literature has widely questioned whether weight loss as the primary focus of intervention is in line with ACT's philosophical approach; because it could independently reflect a form of experiential avoidance unless a reflection of one's values occurs, and losing weight is a mere goal in the individual's valued path (Lillis & Kendra, 2014). Therefore, we examined ACT's effectiveness in improving the different aspects of obesity treatments depending on what the intervention is centred on. The subsequent results reveal that although further research is needed in this regard, treatments centred on psychological well-being indicate highly encouraging results at the short or medium term. Concretely, such treatments are beneficial in 100% of the studies on promoting psychological well-being, modifying health behaviour and improving physical variables, with medium to large effect sizes. In addition, after ACT interventions based on well-being, eating behaviours were effectively modified in 75% of studies with medium-sized effects and psychological flexibility, and ACT subprocesses were enhanced in 66.66% of the trials with large effects. Conversely, weight loss- or weight management-focused interventions were scarcely effective in addressing the modification of physical variables, as 18.75% found encouraging results in the short and long term. It is remarkable that the trial obtaining positive results in the short term did not maintain such benefits in the long term. Likewise, one study demonstrating long-term benefits through ACT was the only one preventing participants from losing excessive weight, adopting a different approach. Similarly, 33.33% of studies assessing weight loss- or weight management-centred ACT supported its enhancing of health behaviours, psychological well-being, or processes directly targeted in ACT, with small- or medium-sized effects. Remarkably, weight-centred ACT seems promising for promoting quality of life, as one study noted benefits for up to 2 years after treatment. No evidence of effectiveness was obtained from weight-centred treatments to address eating behaviour. As few treatments are centred on modifying health behaviours and/or eating behaviour, more studies and trials with long-term assessments are necessary. However, evidence suggests that this approach might be beneficial for promoting positive health behaviours, with 50% of studies demonstrating encouraging results in the short term.

Our findings agree with recent research supporting interventions oriented towards psychological well-being (Ulian et al., 2018). These

treatments effectively meet the specific demands of individuals immersed in weight-related battles, being not only sensitive to existing weight-related stigma, but also distanced from predominant weight-normative approaches (Tylka et al., 2014). In the same vein, two distinct but related ACT-derived approaches have recently been distinguished for targeting weight-related issues (Lillis et al., 2020): acceptance-based behavioural treatment (ABT) and values-based healthy living (VHL). While ABT adheres to the typical weight loss agenda integrating acceptance-based strategies and clarifying health-related values, VHL broadens the perspective to focus on values linked to every area of life. Therefore, the latter expands the view to every meaningful area of human being rather than focusing specifically on weight change, as it remains to be frequent. Accordingly, the present review highlights the encouraging results derived from a shift away from the weight-centred perspective, supporting a greater focus on psychological well-being in its stead. It would be of great interest for future researchers to systematically compare the effectiveness of different approaches aiming to confront the overall distress people with overweight or obesity could face.

4.2 | Conclusions, limitations and future directions

This work provides support for ACT to enhance psychological well-being in people with overweight or obesity, and the results are promising for targeting the promotion of health behaviours and such key process variables as psychological flexibility. In contrast, ACT shows weak effectiveness for improving physical variables and eating behaviour. However, the results suggest that an intervention's focus can be a determinant of effectiveness. Psychological well-being-oriented ACT treatments are promising approaches to foster overall well-being, healthy behavioural patterns and effective weight management. Moreover, treatments with an excessive focus on weight are less effective for individuals immersed in such weight-related battles.

Nevertheless, this review is not exempt from its limitations. Overall, ACT is a relatively new approach in psychology, and thus, few RCTs have been developed to target weight management behaviours and/or psychological well-being. Therefore, we saw the need to include exploratory or pilot RCTs. Following this rationale, we also observed the need to broaden the scope to include not only ACT but also ACT-based interventions with that purpose. This undoubtedly increased interventions' variability and complicate the conclusion of which characteristics may provide an effective ACT-based intervention for people with overweight or obesity.

Similarly, and in light of existing trends, weight-centred studies were the most prevalent and no trial directly compared the different treatment approaches, which may create bias in this review's conclusions. Likewise, while some studies included in the review used a full intent-to-treat sample analysis to compare groups, other trials considered completers analyses, which may complicate the comprehensiveness of the results. Additionally, trials scarcely conduct long-term follow-ups, although the maintenance of benefits remains a challenge for obesity treatments. Therefore, more research involving longer

follow-up periods and alternative approaches should be conducted to draw firm conclusions regarding ACT's effectiveness in each examined area.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to declare that are relevant to the content of this article.

DATA AVAILABILITY STATEMENT

The data that support the findings relative to the risk of bias assessment are openly available in the Datasets collection of DSpace (<http://hdl.handle.net/10810/49927>).

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