

An Open Trial Examining Dialectical Behavior Therapy Skills and Behavioral Weight Loss for Adults With Emotional Eating and Overweight/Obesity

Abby Braden
Rachel Redondo
Emily Ferrell
LaNaya Anderson
Jennifer Grant Weinandy
Tanya Watford
Wesley R. Barnhart
Bowling Green State University

Third-wave cognitive behavioral interventions for weight loss have shown promise. However, sparse data exists on the use of dialectical behavior therapy for weight loss. Adapted dialectical behavior therapy skills programs may be especially well suited for adults who engage in emotional eating and are seeking weight loss. Dialectical behavior therapy is skills-based, shares theoretical links to emotional eating, and is effective in treating binge eating. The current study examined the feasibility, acceptability, and preliminary efficacy of Live FREE: FREedom from Emotional Eating, a 16-session group-based intervention. A total of 87 individuals expressed interest in the program, and 39 adults with overweight/obesity (BMI ≥ 25) and elevated self-reported emotional eating were enrolled. Live FREE targeted emotional eating in the initial sessions 1–9, and sessions 10–16 focused primarily on behavioral weight loss skills while continuing to reinforce emotion regulation training. Assessments were administered at baseline, posttreatment, and 6-month follow up. Enrolled participants were primarily female (97.4%) and Caucasian (91.7%). Treatment retention was strong with participants attending an average of 14.3 sessions and 89.7% of

participants completing the intervention. On average, participants lost 3.00 kg at posttreatment, which was maintained at follow-up. Intent-to-treat analyses showed improvements in key outcome variables (self-reported emotional eating, BMI, emotion regulation) over the course of the intervention. Combining dialectical behavior therapy skills with conventional behavioral weight loss techniques may be an effective intervention for adults with overweight/obesity who report elevated emotional eating.

Keywords: emotional eating; dialectical behavior therapy; behavioral weight loss

OVERWEIGHT AND OBESITY continue to be widespread, harmful, and costly public health concerns (Malik et al., 2013). Between 2017–2018, 31.1% and 42.5% of adults in the United States had a body mass index (BMI) that fell into the overweight and obese ranges, respectively (Fryar et al., 2020). In addition to the well-documented detrimental physical effects of overweight and obesity (National Task Force on the Prevention and Treatment of Obesity, 2000; Pi-Sunyer, 1999), the psychosocial correlates are numerous (Sarwer & Polonsky, 2018). Adults with overweight and obesity are at risk for depression, binge eating, body image disturbance, discrimination, and self-stigma (see Sarwer & Polonsky, 2018, for review). Efficacious interventions for adults with overweight and obesity are sorely needed.

The authors received no funding from an external source.

Address correspondence to Abby Braden, Ph.D., Department of Psychology, 822 East Merry Avenue, Bowling Green, OH 43402. e-mail: abbym@bgsu.edu.

To date, the gold-standard behavioral intervention for overweight/obesity is behavioral weight loss (Alamuddin & Wadden, 2016). Behavioral weight loss interventions incorporate a combination of dietary and physical activity education with traditional behavioral change techniques including goal-setting, self-monitoring, and problem solving. Intervention content includes a minor emphasis on the impact of psychological factors on eating and weight. Behavioral weight loss interventions are often delivered in a group-based setting over a 1-year time frame, with a 6-month active weight loss phase.

Behavioral weight loss treatments demonstrate moderate benefits in the short-term. For example, a review conducted by the American College of Cardiology/American Heart Association Task Force showed that average weight loss in behavioral weight loss programs is approximately 8 kilograms, or 8% of initial body weight, at the end of the active weight loss phase and at 1 year (Jensen et al., 2014). Despite this, approximately one-third of people fail to lose at least 5% of body weight (Christian et al., 2010). In addition, standard behavioral weight loss is generally not effective in producing lasting weight change (Wadden et al., 2011). After treatment ends, behavioral weight loss participants tend to regain weight over time, including regaining approximately one-third of weight lost, in the year after treatment (Butryn et al., 2011). Continuing to develop and test novel weight management interventions is a critical public health goal.

Modifying behavioral weight loss interventions to target mechanisms of obesity that vary across subgroups may be an effective strategy for improving outcomes. Although research identifying obesity subtypes is in its infancy (Gordon-Larsen, 2019), a recent study examining treatment-seeking adults with overweight/obesity found that four distinct classes of obesity emerged (Field et al., 2018). One of these classes was characterized by disordered eating, including the tendency to eat when not hungry. Emotional eating is one behavioral phenotype that is characterized by an urge to eat in response to emotional cues rather than feelings of hunger (Arnou et al., 1995). Emotional eating has been associated with poor weight loss outcomes in an assortment of studies with varying weight loss approaches (Braden et al., 2016; Elfhag & Rössner, 2005; Niemeier et al., 2007; Wedin et al., 2014). Emotional eating has been explained by affect regulation models which indicate that when people lack adaptive emotion regulation strategies, they eat in attempt to regulate emotions (Telch et al., 2001). Adults who

engage in emotional eating and with overweight/obesity may especially benefit from a modified behavioral weight loss intervention that targets underlying mechanisms (i.e., affect regulation difficulties) contributing to weight gain.

A variety of third-wave cognitive-behavioral interventions for weight loss have been developed with the goal of promoting nonjudgmental awareness and acceptance of internal and external cues that interfere with weight loss (Forman et al., 2015). Key features of third-wave cognitive behavioral approaches include elements of mindfulness and acceptance that are absent from traditional behavioral weight loss methods (Forman et al., 2015). These interventions emphasize acceptance rather than avoidance of uncomfortable internal sensations (e.g., negative emotions, food cravings) and a commitment to making behavioral choices (e.g., not overeating) that are consistent with personal values and goals. A recent systematic review and meta-analysis found that third-wave behavioral weight loss interventions produced greater weight loss than standard behavioral weight loss at posttreatment, 12-month, and 24-month follow-up (Lawlor et al., 2020). Interestingly, the review identified and examined only two published studies that investigated dialectical behavior therapy (DBT; Linehan, 2014), and both were nonrandomized designs and thereby not included in the meta-analysis. Consequently, although third-wave cognitive behavioral weight management approaches demonstrated superior efficacy compared to traditional behavioral weight loss, definitive conclusions about the efficacy of DBT could not be made.

DBT (Linehan, 2014) is one third-wave cognitive behavioral approach that may be promising in the treatment of adults with emotional eating and overweight/obesity. DBT originated as an intervention for adults with borderline personality disorder who were less responsive to standard cognitive-behavioral approaches (Dimeff & Linehan, 2001). As an alternative to traditional cognitive-behavioral approaches, DBT incorporated acceptance and validation strategies, in addition to traditional change techniques. In DBT, clients learn how to label and regulate emotions, accept what cannot be changed, and tolerate distress. Traditional DBT is multifaceted and comprised of a skills group, individual therapy, and a consultation team (Linehan, 2014). Since its inception, DBT has been modified to include fewer treatment components (e.g., skills group only) and target a variety of patient populations (e.g., eating disorders, substance abuse; Valentine et al., 2014).

DBT may be especially effective in the treatment of adults with overweight/obesity and emotional eating given its emphasis on emotion regulation (Linehan, 2014), which is theoretically linked to emotional eating (Evers et al., 2010). According to Linehan's biosocial model, which underlies DBT, the combination of a biological predisposition to poor emotion regulation and environmental invalidation leads to emotion dysregulation (Linehan, 2014). Emotion dysregulation is characterized by a high level of emotional sensitivity, greater emotional reactivity, and persistence of heightened emotions. A recent study showed that the association between key aspects of the biosocial model (i.e., maternal and paternal invalidation and emotional reactivity) and self-reported emotional eating was mediated by emotional regulation (Braden et al., 2020). Consequently, given the theoretical basis, DBT may effectively target the mechanisms of emotional eating, leading to improved weight loss.

Another reason that DBT may be effective in treating adults with emotional eating and overweight/obesity is that DBT is a skills-based approach that has widespread appeal. In a commentary by Swenson (2000), the author explained that many clinicians are attracted to DBT because it offers practical, concrete therapeutic interventions. In contrast to Acceptance and Commitment Therapy, another third-wave behavioral treatment, DBT includes a greater focus on teaching clients behavioral skills (Chapman, 2006). For example, in DBT, mindfulness is conceptualized as a set of skills that reflect the primary components of mindfulness. An assortment of distinct skills are taught in didactic and manualized DBT skills groups (Swenson, 2000). As a result, practitioners in a variety of disciplines, including case managers and counselors with a range of experiences, are able to learn and implement DBT skills in their work (Swenson, 2000). The skills-based approach of DBT may be especially well-suited to behavioral weight loss interventions that are similarly structured and educational in nature. Furthermore, since clinicians in a variety of fields are able to teach DBT skills, dissemination of a weight management intervention that incorporates DBT skills may be achievable.

Given that adapted versions of DBT have been used to successfully treat binge eating disorder (Masson et al., 2013; Safer et al., 2009; Safer & Jo, 2010; Telch et al., 2001), which often overlaps with emotional eating (Arnou et al., 1995), DBT may also effectively decrease emotional eating. Several published pilot studies have observed improvement in emotional eating among adults

with overweight/obesity who completed DBT skills training interventions (Beaulac et al., 2019; Cancian et al., 2019; Dastan et al., 2019; Roosen et al., 2012). In two of these investigations, weight change was not reported (Beaulac et al., 2019; Cancian et al., 2019), and the other two showed improvement in weight (Roosen et al., 2012) or BMI (Dastan et al., 2019). Interestingly, in all of these studies, the intervention only included DBT skills training, and conventional weight management techniques were not introduced. However, in a recent study of adolescents, a treatment that sequentially administered DBT skills followed by behavioral weight loss components resulted in improved emotional eating and a trend toward weight loss (Boutelle et al., 2018). Thus, combining DBT skills and behavioral weight loss techniques may be an effective strategy for decreasing emotional eating and promoting weight loss in adults with emotional eating and overweight/obesity.

The current study was an open trial examining a novel intervention (i.e., Live FREE: Freedom from Emotional Eating) for adults with self-reported emotional eating and overweight/obesity. Live FREE is a 16-week group-based program that initially targets emotional eating via DBT skills training (sessions 1–9), followed by traditional weight management techniques (sessions 10–16). Implementing a sequential approach to treatment may be effective since participants can initially learn strategies for decreasing emotional eating, which may encourage greater engagement and success in adopting necessary weight loss behaviors in the latter portion of the intervention. Primary aims of the present study were to investigate treatment feasibility and acceptability by measuring treatment utilization (recruitment and eligibility rates), treatment dose (sessions attended and homework completion), and liking (acceptability ratings) of Live FREE. A secondary aim was to examine initial efficacy by examining weight loss over the course of the intervention and at a 6-month follow-up. Self-reported emotional eating and emotion regulation difficulties were examined as possible mediators of change in body mass index from baseline to posttreatment.

Method

PARTICIPANTS

Adults with overweight/obesity and elevated emotional eating were recruited for participation in Live FREE using the following methods: flyers, newspaper and Facebook advertisements, emails to university faculty, and emails to students' parents and faculty in a public-school system.

Eligibility was determined by completion of a phone screen followed by an in-person assessment. Inclusion criteria included: body mass index (BMI) of greater than or equal to 25, aged ≥ 22 and < 65 , minimum 6th grade reading level of English, ability to attend assessment appointments and treatment sessions, and denying plans to move from their geographic location in the next year. Participants were also required to endorse elevated emotional eating. Emotional eating cut-off scores were based on mean scores calculated from an online community sample of adults with overweight/obesity (Braden et al., 2018), because normative emotional eating data has not been published. Participants were included if they scored above the mean on at least one of the emotional eating scale (EES) subscales (EES depression [Koball et al., 2012], cutoff ≥ 21 ; EES anxiety/anger [Koball et al., 2012], cutoff ≥ 17 ; EES boredom [Koball et al., 2012], cutoff ≥ 21) or ≥ 4.70 on the emotional appetite questionnaire (EAQ) positive subscale (Geliebter & Aversa, 2003).

Exclusion criteria included being pregnant or currently breastfeeding; engaging in purging or other compensatory behaviors (i.e., vomiting, misusing laxatives or diet pills, over-exercising) in the last 3 months; experiencing psychosis, substance abuse disorder, or severe depression with recent suicidality; receiving concurrent psychotherapy; taking weight altering medications; experiencing changes to psychotropic medications in the past 3 months; having immediate plans for weight loss surgery; and currently participating in another weight control program. Participants who endorsed a medical condition that would require physician monitoring (e.g., history of cardiovascular disease, stroke, seizures, orthopedic problems that would limit activity, diabetes, or uncontrolled hypertension) were also excluded.

MEASURES

Anthropometry

Height (cm) was measured using a Schorr measuring board and weight (kg) was measured with a Tanita Digital Scale. BMI (kg/m^2) was then calculated using the CDC online BMI Calculator: http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/english_bmi_calculator/bmi_calculator.html. Waist circumference was measured in centimeters with a tape measure.

Treatment Dose

Treatment dose was assessed by summing both the number of sessions attended and homework completion. Homework completion was assessed by percentage of worksheet completion, resulting in

the following categories: not completed (0 points; 0% completion), partially completed (0.5 points; 1–79% completed), or fully completed (1 point, 80–100% completion).

Acceptability

Acceptability of the treatment program was assessed beginning with the third of five waves of the program. Participants were administered questions related to helpfulness, length, and perceptions of the FREE program. Participants were asked: “How much did you like the FREE weight loss program?” and Likert response answers ranged from (1) *did not like it* to (5) *loved it*. Next, participants were asked: “How much do you agree/disagree that the treatment has helped you decrease emotional eating?” and Likert response answers ranged from (1) *strongly agree* to (5) *strongly disagree*. Participants were also asked to rate the following statement, “I would recommend the program to others,” on a Likert scale ranging from (1) *strongly agree* to (5) *strongly disagree*. Additional items explored the perceived helpfulness of the DBT and behavioral weight loss portions of treatment, inquiring: “How helpful was the first stage of treatment that taught Dialectical Behavior Therapy (DBT) techniques?” and “How helpful was the second stage of treatment that taught traditional behavioral weight loss techniques?” Participants indicated their responses on a Likert scale ranging from (1) *not at all helpful* to (5) *very helpful*.

Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)

The DERS is a 36-item measure used to assess emotion regulation. Participants indicate how often statements apply to them on a 5-point Likert scale ranging from “almost never” to “almost always.” The DERS evaluates different types of emotion regulation difficulties through six subscales: (1) nonacceptance of emotional responses (e.g., “When I am upset, I become angry with myself for feeling that way”), (2) difficulty engaging in goal-directed behavior (e.g., “When I am upset, I have difficulty thinking about anything else”), (3) impulse control difficulties (e.g., “I experience my emotions as overwhelming and out of control”), (4) lack of emotional awareness (e.g., “I am attentive to my feelings”), (5) limited access to emotion regulation strategies (e.g., “When I’m upset, I believe that I will remain that way for a long time”), and (6) lack of emotional clarity (e.g., “I have no idea how I am feeling”). Total scores are rendered by summing the items for the scale. Higher scores indicate greater

emotion regulation difficulties. The DERS has shown good psychometric properties (Gratz & Roemer, 2004). In the present study, the DERS showed good internal consistency at baseline ($\alpha = .91$), posttreatment ($\alpha = .92$), and follow-up ($\alpha = .88$).

Emotional Eating Scale–Revised (EES-R; Koball et al., 2012)

The EES-R consists of 25 items that assess the urge to eat in response to emotions. Participants rate their urge to eat in response to emotions on a 5-point Likert scale ranging from “no desire to eat” to “an overwhelming urge to eat.” The scale consists of subscales assessing eating in response to depression (e.g., sad, upset, discouraged), boredom (e.g., disinterested, unstimulated, restless), and anxiety/anger (e.g., nervous, irritated, furious). Subscale scores were calculated by computing the mean of the items in each subscale. Higher scores indicate a greater urge to eat in response to emotions. The EES-R has shown good psychometric properties (Koball et al., 2012). In the present study, the EES-R showed good internal consistency at baseline ($\alpha = .88$), posttreatment ($\alpha = .92$), and follow-up ($\alpha = .94$).

Binge Eating Scale (BES; Gormally et al., 1982)

The BES is a 16-item self-report questionnaire that assesses behavioral and other psychological symptoms of binge eating (e.g., “I feel incapable of controlling urges to eat”). Each item includes 3 or 4 statements, and respondents select the statement that most applies to them. Items are summed to create a total score. Total scores can range from 0–32, and higher scores indicate more severe binge eating. Cutoff scores of 18 and 27 are used to indicate mild to moderate and severe levels of binge eating, respectively (Marcus et al., 1988). Evidence for the reliability and validity of the BES exists in clinical samples of adults (Greeno et al., 1995; Timmerman, 1999). Internal consistency of the BES in our sample was adequate at baseline ($\alpha = .77$), posttreatment ($\alpha = .84$), and follow-up ($\alpha = .86$).

Emotional Appetite Questionnaire (EAQ; Nolan et al., 2010)

The EAQ measures eating behavior in response to emotional states and situations. The scale includes both positive and negative emotions and situations. However, only the positive emotions (e.g., confident, enthusiastic) and situations (e.g., “when falling in love”) subscales were used for this study. Participants rate how much they typically eat in response to emotions on a 9-point Likert scale with 1 through 4 indicating “much less,” 5

representing “the same,” and 6 through 9 indicating “much more.” Responses for each item also include the options “not applicable” and “don’t know.” These latter two options were not included in scoring. The positive emotion and positive situation scores were calculated by averaging the items. An overall positive emotional eating score was calculated by averaging the scores for the two subscales. Higher scores indicate greater food intake in response to positive emotions and situations. The EAQ has shown good psychometric properties (Nolan et al., 2010). In the present study, the EAQ showed adequate internal consistency at baseline ($\alpha = .87$), posttreatment ($\alpha = .92$), and follow-up ($\alpha = .78$).

STUDY DESIGN AND PROCEDURE

Given the preliminary nature of the research, a single-group study design was used. Individuals who met criteria after the initial phone screen were invited to attend an in-person orientation. An overview of the study was presented, and interested individuals gave informed consent before proceeding. Then, an in-person baseline assessment was conducted which included measurement of anthropometric data and completion of several self-report questionnaires. Assessments were then administered at posttreatment, following the 16-week intervention, and again at a 6-month follow-up appointment. Participants were compensated with a 25-dollar gift card following the completion of each assessment. The present study was approved by the Institutional Review Board at a midwestern university.

TREATMENT

The Live FREE program included 16 weekly 2-hour sessions co-led by a licensed clinical psychologist and a doctoral clinical psychology student. The intervention included nine sessions of DBT skills training followed by seven sessions of combined focus on behavioral weight loss and DBT techniques. The Live FREE treatment protocol was refined in an initial study (Braden & O’Brien, 2020), which ultimately resulted in a slightly revised protocol that was implemented in the present study. Intervention content was informed by Safer et al. (2009) DBT for binge eating and bulimia treatment protocol, Linehan’s DBT Skills Training Manual (2014), Brownell’s LEARN program (2004), Boutelle and colleagues’ (2018) PEER program, and the 2015–2020 Dietary Guidelines for Americans (USDA, 2015). A total of five waves of treatment groups were conducted with 5 to 10 participants in each group.

Treatment began with each participant completing a 30-minute individual session with the intervention leader, the clinical psychologist. Consistent with [Safer et al. \(2009\)](#) DBT for binge eating intervention, pretreatment sessions serve to build rapport, introduce the affect regulation model of eating, and build commitment and motivation.

Participants were weighed at the start of all intervention sessions. In the first several sessions (1–9), participants were discouraged from paying close attention to their weight. Instead, they were asked to focus on learning DBT skills that would promote decreased emotional eating, which would ultimately support their weight loss efforts. Then, in sessions 10–16, traditional behavioral weight loss skills were introduced, and participants were encouraged to lose weight (i.e., 1–2 pounds per week).

All sessions began with a required check-in where participants reported on specific questions. During DBT-focused sessions, questions were used to examine whether participants engaged in emotional eating, which skills were practiced, and whether the diary card and behavior chain analysis were completed. During behavioral weight loss sessions, group members reported on emotional eating and skills use, as well as self-monitoring of food intake, weight, and physical activity. Additional detail about the intervention content and process can be found in a recently published case study ([Braden, Ferrell, et al., 2020](#)).

DBT Session Content

In the first two sessions of Live FREE, the emotion dysregulation model of emotional eating was introduced ([Safer et al., 2009](#)). Dialectical abstinence was introduced to help participants commit to stopping emotional eating while simultaneously holding the willingness to fully recommit should one engage in emotional eating. Diaphragmatic breathing was also taught. Then, the following DBT-focused sessions centered on three of the four core DBT skill areas: Mindfulness, Emotion Regulation, and Distress Tolerance ([Linehan, 2014](#)). Participants were asked to record problematic eating behaviors, emotions, and skills practice using a daily diary card (see [Table 2, Braden et al., 2020](#)). Participants were also taught how to perform a behavior chain analysis to understand and prevent emotional eating episodes. Participants were asked to complete a weekly behavior chain.

Mindfulness. Participants learned about wise mind, the skill of finding a balance between “emotion mind,” when emotions guide behavior, and “reasonable mind,” when logic guides behavior.

Participants were also introduced to the concept of mindful eating. Then, mindfulness “how” skills were introduced. “How” skills focus on implementing mindfulness by approaching situations nonjudgmentally (using just the facts of the situation, not labeling things as “good” or “bad”), one-mindfully (focusing on one thing at a time and being fully present in the moment), and effectively (engaging in value-driven behaviors, using pragmatism in decision making).

Emotion Regulation. Participants learned about the function of emotions (e.g., emotions can be an alarm to indicate something is happening). Participants were encouraged to observe their emotions, increase awareness of bodily sensations, and distinguish themselves from their emotional experience. Participants also learned strategies for changing emotions, including “checking the facts” (i.e., objectively describing situations without using emotional words) and “opposite action” (i.e., acting opposite to emotions that are not effective).

Distress Tolerance. Distress tolerance skills were also introduced. Distracting (e.g., engaging in a behavior that distracts from emotions) and self-soothing (e.g., engaging in a relaxing or enjoyable activity) behaviors were described. To reduce suffering, radical acceptance was taught to help participants accept emotions and experiences that cannot be changed.

Behavioral Weight Loss Content. The behavioral weight loss content (sessions 10 through 16) focused on dietary recommendations, physical activity education, and behavior modification strategies. During these sessions, participants continued to complete the same diary card that they completed during the beginning of the intervention, but they were also asked to record their daily food intake. In addition, DBT content was consistently reviewed throughout these sessions via skills tracking on diary cards and completion of a behavior chain analysis as a group at the end of each session.

Dietary Recommendations. The dietary recommendations given to the participants were based on the 2015–2020 Dietary Guidelines for Americans published by the USDA ([USDA, 2015](#)). A daily calorie range of 1,200 to 1,500 calories for participants weighing <114 kg (250 pounds) and 1,500 to 1,800 calories for participants weighing ≥114 kg was recommended. It was advised that participants produce a calorie deficit that would result in weight loss of 1–2 pounds per week (i.e., calorie reduction of 500–750 calories per day). Dietary education was provided, focusing

Table 1
Characteristics of Study Sample

	Enrolled participants (<i>n</i> = 39)	Participants who completed the intervention (<i>n</i> = 35)	Participants who dropped out (<i>n</i> = 4)
Mean (<i>SD</i>) age (<i>n</i> = 38)	49.21 (10.91)	49.23 (11.16)	<i>n</i> = 3, 49 (9.17)
Female (<i>n</i> = 39)	97.4%	97.1%	100%
Mean (<i>SD</i>) BMI (<i>n</i> = 39)	35.77 (6.84)	35.40 (6.86)	39.07 (6.67)
Caucasian, non-Hispanic (<i>n</i> = 36)	91.7%	94.3%	<i>n</i> = 1, 0%
Married or living with partner (<i>n</i> = 35)	65.7%	<i>n</i> = 34, 67.6%	<i>n</i> = 1, 0%
College degree (<i>n</i> = 38)	76.3%	74.3%	<i>n</i> = 3, 100%
Working full-time (<i>n</i> = 36)	69.4%	68.6%	<i>n</i> = 1, 100%
Household income (<i>n</i> = 36)			
≥75k	44.4%	45.7%	<i>n</i> = 1, 0%
50k–74.9k	27.8%	28.6%	<i>n</i> = 1, 0%
<49.9k	27.8%	25.7%	<i>n</i> = 1, 100%

on daily serving recommendations for each food group. Participants were encouraged to include a variety of vegetables, fruits, low-fat or nonfat dairy items, proteins, and oils in their diet.

Physical Activity Education. The physical activity recommendation was ≥150 minutes of moderate intensity exercise per week (CDC, 2008), and participants were encouraged to increase their physical activity to reach a goal of ≥300 minutes per week. Information about different types of moderate (e.g., brisk walking) and vigorous (e.g., jogging) intensity exercises were provided. Strategies for addressing barriers to physical activity and meeting physical activity goals were discussed.

Behavior Modification Strategies. As noted above, participants were instructed to implement self-monitoring of food intake, physical activity, and twice weekly self-weighing. Goal-setting was taught with the use of the SMART (i.e., specific, measurable, attainable, realistic, timely) goals acronym. Time was also spent identifying high-risk food situations and describing stimulus control methods that can be used to alter the environment and promote healthy eating and physical activity behaviors.

Final Session. During the final session, participants were invited to reflect on their progress throughout the program. Relapse prevention strategies were addressed. Participants also spent time setting goals to continue pursuing after treatment.

Results

TREATMENT UTILIZATION

Prior to study enrollment, 87 adults completed telephone screens to assess study eligibility. Of these individuals, 28 were excluded from partici-

pation based on exclusion criteria. The remaining 59 participants were invited to an in-person assessment. Of these individuals, 20 participants were not enrolled in treatment, resulting in a total of 39 adults who were enrolled in treatment. Participant enrollment data are presented in Figure 1.

DEMOGRAPHICS

Demographic data for the full sample, treatment completers, and individuals who dropped out of treatment are presented in Table 1. Of note, some demographic data were missing for four participants. At baseline, participants had a mean (*M*) age of 49.2, (*SD*) = 10.9. Mean BMI was 35.8 (*SD* = 6.8). The majority of the participants were female (97.4%), Caucasian non-Hispanic (91.7%), married or living with a partner (65.7%), college graduates (76.3%), and working full time (69.4%). Reported household income ranged from less than \$50,000 to \$75,000 or more, with most participants reporting an income of 50,000 or more per year (72.2%). T-tests showed that treatment completers and individuals who dropped out were similar in terms of age and baseline BMI. Due to small and uneven sample sizes, analyses were not conducted to examine possible group differences in categorical variables.

TREATMENT ACCEPTABILITY

Treatment acceptability questions were completed by 22 participants (waves 3–5). Of these participants, 86% reported that they “loved” the FREE program, 91% “strongly agreed/somewhat agreed” that the treatment helped them decrease emotional eating, and 91% “strongly agreed” that they would recommend the FREE program to others. Ninety-five percent of participants

Table 2

Means, Standard Deviations, and ANOVA Results for BMI, Emotional Eating, Binge Eating, DBT Skills, and Emotion Regulation Difficulties Between Baseline, 10 Weeks into Treatment, Posttreatment, and Follow-up in Enrolled Participants

	Baseline		Week 10		Posttreatment		Follow-up		$F(2,37)$	η_p^2
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
BMI	35.77	6.84	35.68	6.98	34.69 ^{a,b}	7.02	34.77 ^{a,b}	6.99	22.48	.652
EES-Depression	3.57	.80	–	–	2.46 ^a	1.03	2.66 ^a	.97	37.13	.667
EES-Boredom	3.18	.74	–	–	2.22 ^a	.87	2.33 ^a	.87	34.10	.648
EES-Anxiety/Anger	3.04	.82	–	–	2.31 ^a	.90	2.41 ^a	.85	17.78	.490
Emotional Eating - Positive	4.73	1.11	–	–	4.82	.99	4.62	1.01	.92	.047
Binge Eating Scale (BES)	22.67	6.67	–	–	12.69 ^a	7.84	13.62 ^a	7.86	29.59	.614
DBT Skills	2.51	.41	–	–	2.96 ^a	.44	2.95 ^a	.41	31.29	.628
DERS	94.74	24.02	–	–	83.10 ^a	21.80	78.15 ^a	22.26	8.32	.310

Note: $N = 39$; All ANOVAs were significant ($p < .001$); Pairwise comparisons: ^aSignificantly different from baseline ($p < .05$), ^bSignificantly different from Week 10 ($p < .05$), all others were not significantly different.

endorsed that the first stage of treatment covering DBT techniques was either somewhat or very helpful and 91% endorsed that the second stage of treatment covering behavioral weight loss techniques was either somewhat or very helpful.

TREATMENT DOSE

The mean number of sessions completed by the participants was 14.3 ($SD = 4.0$). Four participants dropped out during treatment, but the remainder ($n = 35$) completed the intervention. Of the 39 participants who enrolled in treatment, 89.7% ($n = 35$) attended the posttreatment assessment and 82.1% ($n = 32$) attended the follow-up assessment at 6 months. Mean homework completion ratings were as follows: .6 ($SD = .3$) for diary cards, .6 ($SD = .3$) for behavior chains, and .8 ($SD = .3$) for food logs. Overall homework completion mean was .7 ($SD = .3$).

OUTCOME VARIABLES

Change in Weight and Waist Circumference

For all within-subjects analyses, intent to treat analyses were used. Participants lost an average of 3.22% ($M = 3.0$ kg, $SD = 3.1$) of their initial body weight between baseline and posttreatment, and an average of 2.89% ($M = 2.8$ kg, $SD = 4.9$ kg) between baseline and follow-up. A closer examination of weight change during the DBT, behavioral weight loss, and follow-up periods, respectively, showed that, on average, participant weight change was -.3 kilograms (kg), ($SD = 2.3$) between baseline and week 10, -2.69 kg ($SD = 2.1$) between week 10 and posttreatment, and 0.23 kg ($SD = 3.3$) between posttreatment and follow-up. Mean change in waist circumference from baseline to posttreatment was -4.2 cm ($SD = 6.1$) and from posttreatment to follow-up was 0.87 cm ($SD = 4.1$).

Repeated Measures ANOVA

Repeated measures ANOVA was used to examine change in BMI, self-reported emotional eating, emotion regulation, binge eating symptoms and DBT skills use over the course of the intervention and follow-up period (Table 2). The ANOVA examining BMI change included BMI at baseline, week 10, posttreatment, and follow-up. Results examining BMI showed a significant effect of time (Wilks' Lambda = .35, $F[3, 36] = 22.48$, $p < .001$). BMI did not significantly decrease from baseline to week 10 of treatment, but BMI decreased from baseline and week 10 to posttreatment and this change was maintained at follow-up.

ANOVAs examining self-reported emotional eating, emotion regulation, binge eating symptoms, and DBT skills included baseline, posttreatment, and follow-up time points. Significant change over time was observed for self-reported emotional eating in response to depression (Wilks' Lambda = .33, $F[2, 37] = 37.13$, $p < .001$), anxiety/anger (Wilks' Lambda = .51, $F[2, 37] = 17.78$, $p < .001$), and boredom (Wilks' Lambda = .35, $F[2, 37] = 34.10$, $p < .001$), with each type of self-reported emotional eating decreasing from baseline to posttreatment and follow-up. ANOVA results examining binge eating symptoms (Wilks' Lambda = .39, $F[2, 37] = 29.59$, $p < .001$), DBT skills use (Wilks' Lambda = .37, $F[2, 37] = 31.29$, $p < .001$), and emotion regulation difficulties (Wilks' Lambda = .69, $F[2, 37] = 8.32$, $p = .001$) were significant. Over the course of the intervention, DBT skills, binge eating symptoms, and emotion regulation difficulties improved, and improvement was maintained at follow-up. The ANOVA examining change in self-reported eating in response to positive emotions was not significant (Wilks' Lambda = .95, $F[2, 37] = .92$, $p = .407$).

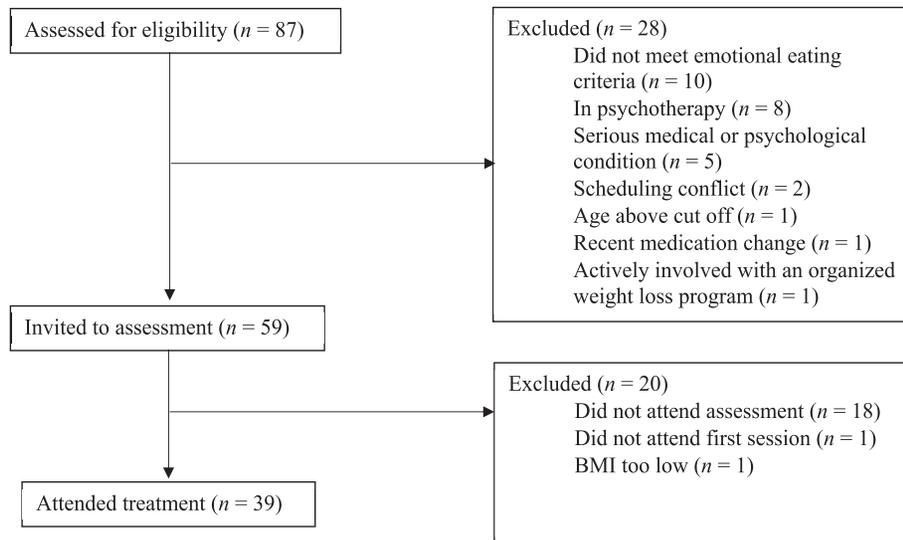


FIGURE 1 Participant Enrollment in the FREE trial.

Mediation Analysis

To explore potential mediators of the effect of the Live FREE intervention on outcome variables, mediation analysis for repeated measures designs was conducted using the MEMORE for SPSS Macros (Montoya & Hayes, 2017). Results showed that change in self-reported emotional eating in response to depression ($\beta = 0.20$, BootSE = 0.32, 95% CI [-0.35 to 0.91]), anxiety/anger ($\beta = 0.14$, BootSE = 0.17, 95% CI [-0.18 to 0.48]), and boredom ($\beta = -0.03$, BootSE = 0.22, 95% CI [-0.49 to 0.38]) did not mediate the effect of the intervention on BMI change from baseline to posttreatment. Mediation analysis was also conducted to explore whether change in emotion regulation (DERS) mediated the effect of the intervention on the change in each type of self-reported emotional eating (e.g., depression, boredom, anxiety/anger) from baseline to posttreatment. As presented in Figure 2, results showed that emotion regulation (DERS) mediated the effect of intervention on change in self-reported emotional eating in response to depression (EES-D) ($\beta = 0.15$, BootSE = 0.08, 95% CI [0.02 to 0.34]). Emotion regulation did not mediate the effect of the intervention on change in self-reported emotional eating in response to anxiety/anger ($\beta = 0.05$, BootSE = 0.09, 95% CI [-0.11 to 0.24]) or boredom ($\beta = -0.04$, BootSE = 0.09, 95% CI [-0.19 to 0.15]).

Discussion

The current study was a pilot investigation of Live FREE (Freedom from Emotional Eating) using a

small sample of adults ($n = 39$) in a single-group design. Data were collected at baseline, posttreatment, and 6-months posttreatment. Live FREE was designed to target emotional eating and weight loss among adults with BMI (≥ 25) who reported elevated emotional eating. The intervention used a sequential approach in which sessions 1–9 focused exclusively on the teaching of DBT skills and sessions 10–16 continued to reinforce these skills while introducing standard behavioral weight loss techniques. Results supported treatment feasibility and acceptability as evidenced by adequate rates of treatment utilization and high levels of treatment engagement and satisfaction. Furthermore, initial efficacy was demonstrated as measured by improvement in BMI, self-reported emotional eating (depression, anxiety/anger, and boredom), emotion regulation, and DBT skills use over the course of the program.

In our initial investigation of Live FREE (Braden & O'Brien, 2020), we aimed to refine the treatment protocol in a sample of 10 adults with overweight/obesity and self-reported emotional eating. At the conclusion of that study, several changes were made to the intervention protocol, and the revised protocol was tested in the current study. Consistent with phase IIa of the ORBIT model of behavioral intervention development, the next step was to utilize an efficient, within-subject design to test a finalized intervention protocol (Czajkowski et al., 2015).

Results of the present pilot study showed adequate rates of treatment utilization in a small, Midwestern community. Recruitment strategies

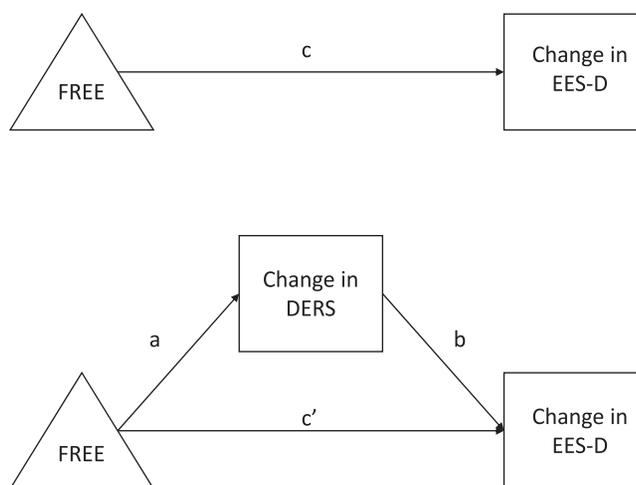


FIGURE 2 Within-participant serial mediation model where changes in emotion dysregulation (DERS) mediated the association between FREE and changes in eating in response to depression (EES-D). FREE: Freedom from emotional eating intervention, DERS: Difficulties in Emotion Regulation Scale, EES-D: Emotional Eating Scale-Depression. Total effect of FREE on change in EES-D is c , direct effect is c' .

were successful over five waves of treatment, and sessions were administered to 5–10 adults per group. Furthermore, almost half of those individuals (45%) initially screened for study eligibility later enrolled in Live FREE. Examination of treatment dose also yielded encouraging results. Similar to our initial investigation in which 9 out of 10 of our enrolled participants completed treatment (Braden & O'Brien, 2020), the rate of treatment completion was 89.7% in the present study. Also consistent with our initial study, on average, participants attended the vast majority of sessions ($M = 14.3$, $SD = 4.0$). Homework completion was not measured in our initial investigation. However, in the present study, participants tended to at least partially complete homework assigned during the intervention, including weekly diary cards, behavior chains, and food logs.

In addition to evidence showing strong treatment utilization and retention, treatment acceptability ratings were consistently high. Treatment acceptability ratings are limited because they were absent from the assessment protocol during waves one and two of the intervention. After the study commenced, study researchers recognized the usefulness of measuring acceptability via participant ratings, and they were then inserted into the assessment protocol. Nonetheless, in the limited sample, 86% of participants stated that they “loved” the FREE program. Participants also generally agreed that the program helped them decrease emotional eating and that both DBT and behavioral weight loss techniques were helpful. Ninety-one percent of participants indicated that they would recommend the program to others.

The secondary aim of the present study was to examine preliminary efficacy. Results showed improvement in BMI over the course of the intervention, which was maintained at the 6-month follow-up. Participants lost an average of 3.0 kg, but the vast majority of weight loss (2.69 kg) occurred during the latter part of the intervention, when weight loss was directly targeted with behavioral weight loss techniques. Two previous pilot studies (Dastan et al., 2019; Roosen et al., 2012) also examined the use of DBT skills for adults with overweight/obesity and reported BMI change, although weight loss was not identified as an intervention goal. Despite this, Dastan et al. (2019) found that compared to the control group (no intervention), the DBT intervention resulted in greater reduction in BMI at posttreatment. However, follow-up data were not collected. Results from the current study are also consistent with Roosen and colleagues (2012), who found a significant decrease in BMI over the course of the DBT skills intervention that was maintained at follow-up. However, unlike Roosen and colleagues (2012), who found a small effect on BMI, results in the current study showed a large effect for BMI change. Although results are preliminary in nature, it is possible that the addition of intervention sessions focused directly on conventional weight loss techniques (i.e., calorie reduction and increased physical activity) may yield a greater effect on BMI change than DBT skills alone.

Preliminary efficacy of Live FREE is also supported by positive changes in self-reported emotional eating (depression, anxiety/anger, boredom), binge eating symptoms, emotion regulation,

and DBT skills use. Results were in line with previous pilot studies that have examined the use of DBT skills with adults who have overweight/obesity and simultaneously shown improvement in self-reported emotional eating (Beaulac et al., 2019; Cancian et al., 2019; Dastan et al., 2019; Roosen et al., 2012). The current findings specific to binge eating are also comparable to Cancian et al. (2019), who observed a large effect on binge eating in their sample of adults with obesity. Binge eating symptoms were not measured in the other studies (Beaulac et al., 2019; Dastan et al., 2019; Roosen et al., 2012). In addition, like the present study, two of these studies measured and observed significant improvement in emotion regulation difficulties (Beaulac et al., 2019; Cancian et al., 2019). In the current study, emotion regulation also mediated the change in self-reported emotional eating in response to depression from baseline to posttreatment, suggesting that it may be a mechanism underlying emotional eating behavior in response to depressed mood. However, the small sample size and exploratory approach limits the interpretation of this analysis so these results should be taken with extreme caution. Furthermore, in contrast to these previously published pilot studies, the present study was the first to measure and document improvement in DBT skills use, providing some support that the implementation of specific DBT techniques increases over the course of DBT skills treatment for adults who report engaging in emotional eating. Moreover, only one of these studies examined specific types of emotional eating (Dastan et al., 2019) and none examined possible changes in eating in response to boredom or positive emotions.

Examination of specific emotions that trigger emotional eating can be useful given that particular emotions differentially affect eating (Macht, 2008) and are uniquely related to psychological variables (Braden et al., 2018). Similar to Dastan et al. (2019), results of the present study showed effects for self-reported eating in response to anxiety and anger. However, unlike the current study, Dastan et al. (2019) found that their DBT-based intervention did not result in greater improvement in self-reported emotional eating in response to depression, compared to the control group. Methodological differences may account for differing findings given that Dastan et al.'s study was conducted in Iran, utilized a control group, and recruited adults with binge eating disorder. Despite this, future investigations of DBT-based interventions for adults with elevated BMI may seek to examine whether interventions differentially influence certain emotions that trigger

eating. Additionally, given the sequential design, measuring self-reported emotional eating after the DBT portion of the intervention would have been informative. Furthermore, self-reported eating in response to positive emotions did not decrease in the current study. Positive emotional eating appears to be less closely related to negative psychological correlates (e.g., disordered eating symptoms, emotion regulation) than negative emotional eating (Braden et al., 2018), particularly among adults who engage in overeating and binge eating (Sultson et al., 2017). Thus, Live FREE, which was designed to target emotion regulation, may not have adequately targeted eating in response to positive emotions. It is also possible that adults with overweight/obesity who report engaging in emotional eating are not bothered by or motivated to change positive emotional eating behavior.

LIMITATIONS

Despite promising results, the current study is not without limitations. Of particular importance, Live FREE included only seven sessions dedicated to behavioral weight loss, which is much less than a full dose of standard behavioral weight loss treatment. Standard behavioral weight loss programs include 14 or more sessions over the course of 6 months, with treatment sessions often extending to at least a year (Wadden et al., 2020). Furthermore, in the current study, participants lost 2.89% of body weight, on average, which is below the commonly used clinically significant threshold of at least 5% (Jensen et al., 2014). Weight loss was also less than the 8% that is typically observed in standard behavioral weight loss programs (Jensen et al., 2014). Consequently, given that a full dose of behavioral weight loss was not administered, the current study is not able to shed light on the possible additive benefit that emotion regulation skills may have to the gold-standard behavioral weight loss treatment. It is possible that administering a standard dose of behavioral weight loss, following the DBT portion of the intervention, may have been associated with greater weight loss.

The present study is also limited by the use of self-report questionnaires for the assessment of emotional eating. Major concerns exist about the validity of self-report questionnaires given that they do not consistently predict laboratory-based measurement of emotional eating (Bongers & Jansen, 2016; Braden, Emley, et al., 2020; Evers et al., 2018). For example, Adriaanse et al. (2011) have suggested that self-report measures of emotional eating may reflect eating concern,

as opposed to actual emotional eating. Consequently, Live FREE may not actually be associated with true emotional eating improvement. Given the limitations of self-report measurement of emotional eating, future studies may consider using interview-based, behavioral, and or naturalistic measures of emotional eating. Furthermore, select demographic data were missing for four participants, three of whom did not complete treatment which prevented the examination of possible relationships between demographic factors (e.g., socioeconomic status, age, race) and treatment attrition. Relatedly, the present study did not permit the examination of possible differences between participants who completed and dropped out of treatment due to missing data and a small sample size. Moreover, it is important to note that the study is limited by the inclusion of a non-diverse sample of adults. Future research should examine the feasibility and efficacy of Live FREE with a more heterogenous sample of adults with overweight/obesity.

CONCLUSION

In summary, the current study adds to the body of literature examining third-wave cognitive behavioral interventions for weight management. Third-wave approaches have demonstrated superiority over standard behavioral weight loss interventions (Lawlor et al., 2020). However, in this recently published review, limited conclusions were drawn regarding the efficacy of DBT given the scarce number of clinical trials using DBT that exist. The present study is limited by a small, non-diverse sample, a single-group design, and a sub-therapeutic dose of behavioral weight loss. Nevertheless, promising feasibility, acceptability, and efficacy suggest that an important next step is to modify Live FREE to add a full 6 months of standard behavioral weight loss and further test its possible efficacy.

References

- Adriaanse, M. A., de Ridder, D. T., & Evers, C. (2011). Emotional eating: Eating when emotional or emotional about eating?. *Psychology and Health* 26(1), 23–39.
- Alamuddin, N., & Wadden, T. A. (2016). Behavioral treatment of the patient with obesity. *Endocrinology and Metabolism Clinics*, 45(3), 565–580. <https://doi.org/10.1016/j.ecl.2016.04.008>.
- Arnou, B., Kenardy, J., & Agras, W. S. (1995). The emotional eating scale: The development of a measure to assess coping with negative affect by eating. *International Journal of Eating Disorders*, 18(1), 79–90. [https://doi.org/10.1002/1098-108X\(199507\)18:13.0.CO;2-V](https://doi.org/10.1002/1098-108X(199507)18:13.0.CO;2-V).
- Beaulac, J., Sandre, D., & Mercer, D. (2019). Impact on mindfulness, emotion regulation, and emotional overeating of a DBT skills training group: A pilot study. *Eating and Weight Disorders – Studies on Anorexia, Bulimia and Obesity*, 24, 373–377. <https://doi.org/10.1007/s40519-018-0616-9>.
- Bongers, P., & Jansen, A. (2016). Emotional eating is not what you think it is and emotional eating scales do not measure what you think they measure. *Frontiers in Psychology*, 7, 1932.
- Boutelle, K. N., Braden, A., Knatz-Peck, S., Anderson, L. K., & Rhee, K. E. (2018). An open trial targeting emotional eating among adolescents with overweight or obesity. *Eating Disorders: The Journal of Treatment & Prevention*, 26(1), 79–91. <https://doi.org/10.1080/10640266.2018.1418252>.
- Braden, A., Anderson, L., Redondo, R., Watford, T., Emley, E., & Ferrell, E. (2020). Emotion regulation mediates relationships between perceived childhood invalidation, emotional reactivity, and emotional eating. *Journal of Health Psychology*, 1–13. <https://doi.org/10.1177/1359105320942860>.
- Braden, A., Emley, E., Watford, T., Anderson, L., & Musher-Eizenman, D. (2020). Self-reported emotional eating is not related to greater food intake: Results from two laboratory studies. *Psychology & Health*, 35(4), 500–517.
- Braden, A., Ferrell, E., Redondo, R., & Watford, T. (2020). Dialectical Behavior Therapy Skills and Behavioral Weight Loss for Emotional Eating and Obesity: A Case Study. *Journal of Contemporary Psychotherapy*, 1–10. <https://doi.org/10.1007/s10879-020-09451-x>.
- Braden, A., Flatt, S. W., Boutelle, K. N., Strong, D., Sherwood, N. E., & Rock, C. L. (2016). Emotional eating is associated with weight loss success among adults enrolled in a weight loss program. *Journal of Behavioral Medicine*, 39, 727–732. <https://doi.org/10.1007/s10865-016-9728-8>.
- Braden, A., Musher-Eizenman, D., Watford, T., & Emley, E. (2018). Eating when depressed, anxious, bored, or happy: Are emotional eating types associated with unique psychological and physical health correlates? *Appetite*, 125, 410–417. <https://doi.org/10.1016/j.appet.2018.02.022>.
- Braden, A., & O'Brien, W. (2020). Pilot study of a novel treatment using dialectical behavioral therapy skills for adults with overweight/obesity and emotional eating. *Journal of Contemporary Psychotherapy*, 1–9.
- Brownell, K. (2004). *The LEARN program for weight management* (10th ed.). American Health Publishing Company.
- Butryn, M. L., Webb, V., & Wadden, T. A. (2011). Behavioral treatment of obesity. *Psychiatric Clinics*, 34(4), 841–859.
- Cancian, A. C. M., de Souza, L. A. S., Liboni, R. P. A., Machado, W. de L., & Oliveira, M. da S. (2019). Effects of a dialectical behavior therapy-based skills group intervention for obese individuals: A Brazilian pilot study. *Eating and Weight Disorders – Studies on Anorexia, Bulimia and Obesity*, 24(6), 1099–1111. <https://doi.org/10.1007/s40519-017-0461-2>.
- Centers for Disease Control and Prevention (2008). *U.S. department of health and human services physical activity guidelines for Americans 2008*. Author.
- Chapman, A. L. (2006). Acceptance and mindfulness in behavior therapy: A comparison of dialectical behavior therapy and acceptance and commitment therapy. *International Journal of Behavioral Consultation and Therapy*, 2(3), 308–313. <https://doi.org/10.1037/h0100785>.
- Christian, J. G., Tsai, A. G., & Bessesen, D. H. (2010). Interpreting weight losses from lifestyle modification trials: Using categorical data. *International Journal of Obesity*, 34(1), 207–209.

- Czajkowski, S. M., Powell, L. H., Adler, N., Naar-King, S., Reynolds, K. D., Hunter, C. M., Laraia, B., Olster, D. H., Perna, F. M., Peterson, J. C., Epel, E., Boyington, J. E., & Charlson, M. E. (2015). From ideas to efficacy: The ORBIT model for developing behavioral treatments for chronic diseases. *Health Psychology, 34*(10), 971. <https://doi.org/10.1037/hea0000161>.
- Dastan, B., Zanjani, S. A., Adl, A. F., & Habibi, M. (2019). The effectiveness of dialectical behaviour therapy for treating women with obesity suffering from BED: A feasibility and pilot study. *Clinical Psychologist, 24*(2), 133–142. <https://doi.org/10.1111/cp.12197>.
- Dimeff, L., & Linehan, M. M. (2001). Dialectical behavior therapy in a nutshell. *The California Psychologist, 34*, 10–13.
- Elfhag, E., & Rössner, S. (2005). Who succeeds in maintaining weight loss? A conceptual review of factors associated with weight loss maintenance and weight regain. *Obesity Reviews, 6*(1), 65–67. <https://doi.org/10.1111/j.1467-789X.2005.00170.x>.
- Evers, C., Dingemans, A., Junghans, A. F., & Boevé, A. (2018). Feeling bad or feeling good, does emotion affect your consumption of food? A meta-analysis of the experimental evidence. *Neuroscience & Biobehavioral Reviews, 92*, 195–208.
- Evers, C., Stok, F. M., & de Ridder, D. T. D. (2010). Feeding your feelings: Emotion regulation strategies and emotional eating. *Personality and Social Psychology Bulletin, 36*(6), 792–804. <https://doi.org/10.1177/0146167210371383>.
- Field, A. E., Inge, T. H., Belle, S. H., Johnson, G. S., Wahed, A. S., Pories, W., Spaniolas, K., Mitchell, J. E., Pomp, A., Dakin, G. F., Wolfe, B., & Courcoulas, A. P. (2018). Association of obesity subtypes in the Longitudinal Associations of Bariatric Surgery study and 3-year post-operative weight change. *Obesity, 26*(12), 1931–1937. <https://doi.org/10.1002/oby.22287>.
- Forman, E. M., Butryn, M. L., Manasse, M., & Bradley, L. E. (2015). Acceptance-based behavioral treatment for weight control: A review and future directions. *Current Opinion in Psychology, 2*, 87–90. <https://doi.org/10.1016/j.copsyc.2014.12.020>.
- Fryar, C. D., Carroll, M. D., & Afful, J. (2020). Prevalence of overweight, obesity, and severe obesity among adults aged 20 and over: United States, 1960–1962 through 2017–2018. *NCHS Health E-Stats*.
- Geliebter, A., & Aversa, A. (2003). Emotional eating in overweight, normal weight, and underweight individuals. *Eating Behaviors, 3*(4), 341–347. [https://doi.org/10.1016/s1471-0153\(02\)00100-9](https://doi.org/10.1016/s1471-0153(02)00100-9).
- Gordon-Larsem, P. (2019). Heterogeneity in obesity: More research needed to improve precision weight loss treatment. *Obesity, 26*(12), 1868. <https://doi.org/10.1002/pby.22333>.
- Gormally, J. I. M., Black, S., Daston, S., & Rardin, D. (1982). The assessment of binge eating severity among obese persons. *Addictive Behaviors, 7*(1), 47–55.
- Gratz, K., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41–54, 0882-2689/04/0300-0041/0.
- Greeno, C. G., Marcus, M. D., & Wing, R. R. (1995). Diagnosis of binge eating disorder: Discrepancies between a questionnaire and clinical interview. *International Journal of Eating Disorders, 17*(2), 153–160.
- Jensen, M. D., Ryan, D. H., Apovian, C. M., Ard, J. D., Comuzzie, A. G., Donato, K. A., Hu, F. B., Hubbard, V. S., Jakicic, J. M., Kushner, R. F., Loria, C. M., Millen, B. E., Nonas, C. A., Pi-Sunyer, F. X., Stevens, J., Stevens, V. J., Wadden, T. A., Wolfe, B. M., & Yanovski, S. Z. (2014). 2013 AHA/ACC/TOS guideline for the management of overweight and obesity in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and The Obesity Society. *Journal of the American College of Cardiology, 63*(25 Part B), 2985–3023.
- Koball, A. M., Meers, M. R., Storfes-Isser, A., Domoff, S. E., & Musher-Eizenman, D. R. (2012). Eating when bored: Revision of the emotional eating scale with a focus on boredom. *Health Psychology, 31*(4), 521–524. <https://doi.org/10.1037/a0025893>.
- Lawlor, E. R., Islam, N., Bates, S., Griffin, S. J., Hill, A. J., Hughes, C. A., Sharp, S. J., & Ahern, A. L. (2020). Third-wave cognitive behaviour therapies for weight management: A systematic review and network meta-analysis. *Obesity Reviews, 21*(7), e13013. <https://doi.org/10.1111/obr.13013>.
- Linehan, M. M. (2014). *DBT skills training manual* (2nd ed.). The Guilford Press.
- Macht, M. (2008). How emotions affect eating: A five-way model. *Appetite, 50*(1), 1–11. <https://doi.org/10.1016/j.appet.2007.07.002>.
- Malik, V. S., Willett, W. C., & Hu, R. B. (2013). Global obesity: Trends, risk factors and policy implications. *Nature Reviews Endocrinology, 9*, 13–27. <https://doi.org/10.1038/nrendo.2012.199>.
- Marcus, M. D., Wing, R. R., & Hopkins, J. (1988). Obese binge eaters: Affect, cognitions, and response to behavioral weight control. *Journal of Consulting and Clinical Psychology, 56*(3), 433.
- Masson, P. C., von Ranson, K. M., Wallace, L. M., & Safer, D. L. (2013). A randomized wait-list controlled pilot study of dialectical behaviour therapy guided self-help for binge eating disorder. *Behavior Research and Therapy, 52*(11), 723–728. <https://doi.org/10.1016/j.brat.2013.08.001>.
- Montoya, A. K., & Hayes, A. F. (2017). Two-condition within-participant statistical mediation analysis: A path-analytic framework. *Psychological Methods, 22*(1), 6. <https://doi.org/10.1037/met0000086>.
- National Task Force on the Prevention and Treatment of Obesity (2000). Overweight, obesity, and health risk. *Archives of Internal Medicine, 160*, 898–904. <https://doi.org/10.1001/archinte.160.7.898>.
- Niemeier, H. M., Phelan, S., Fava, J. L., & Wing, R. R. (2007). Internal disinhibition predicts weight regain following weight loss and weight loss maintenance. *Obesity, 15*(10), 2485–2494. <https://doi.org/10.1038/oby.2007.295>.
- Nolan, L. J., Halperin, L. B., & Geliebter, A. (2010). Emotional appetite questionnaire construct validity and relationships with BMI. *Appetite, 54*(2), 314–319. <https://doi.org/10.1016/j.appet.2009.12.004>.
- Pi-Sunyer, F. X. (1999). Comorbidities of overweight and obesity: Current evidence and research issues. *Medicine & Science in Sports & Exercise, 31*(11), S602–S608. <https://doi.org/10.1097/00005768-199911001-00019>.
- Roosen, M. A., Safer, D., Adler, S., Cebolla, A., & van Strien, T. (2012). Group dialectical behavior therapy adapted for obese emotional eaters; a pilot study. *Nutricion Hospitalaria, 27*(4), 1141–1147. <https://doi.org/10.3305/nh.2012.27.4.5843>.
- Safer, D. L., & Jo, B. (2010). Outcome from a randomized controlled trial of group therapy for binge eating disorder: Comparing dialectical behavior therapy adapted for binge

- eating to an active comparison group therapy. *Behavior Therapy*, 41(1), 106–120. <https://doi.org/10.1016/j.beth.2009.01.006>.
- Safer, D. L., Telch, C. F., & Chen, E. Y. (2009). *Dialectical behavior therapy for binge eating and bulimia*. The Guilford Press.
- Safer, D. L., Telch, C. F., Chen, E. Y., & Linehan, M. M. (2009). *Dialectical behavior therapy for binge eating and bulimia*. Guilford Publications. M.U.A. Retrieved from <http://lib.myilibrary.com?ID=213563>.
- Sarwer, D. B., & Polonsky, H. M. (2018). The psychosocial burden of obesity. *Endocrinology and Metabolism Clinics of North American*, 45(3), 677–688. <https://doi.org/10.1016/j.ecl.2016.04.016>.
- Sultson, H., Kukk, K., & Akkermann, K. (2017). Positive and negative emotional eating have different associations with overeating and binge eating: Construction and validation of the Positive-Negative Emotional Eating Scale. *Appetite*, 116, 423–430. <https://doi.org/10.1016/j.appet.2017.05.035>.
- Swenson, C. R. (2000). How can we account for DBT's widespread popularity? *Clinical Psychology: Science and Practice*, 7(1), 87–91. <https://doi.org/10.1093/clipsy/7.1.87>.
- Telch, C. F., Agras, W. S., & Linehan, M. M. (2001). Dialectical behavior therapy for binge eating disorder. *Journal of Consulting and Clinical Psychology*, 69(6), 1061–1065. <https://doi.org/10.1037/0022-006X.69.6.1061>.
- Timmerman, G. M. (1999). Binge eating scale: Further assessment of validity and reliability 1. *Journal of Applied Biobehavioral Research*, 4(1), 1–12.
- United States Department of Agriculture (2015). *2015–2020 Dietary Guidelines for Americans*. Author.
- Valentine, S. E., Bankoff, S. M., Poulin, R. M., Reidler, E. B., & Pantalone, D. W. (2014). The use of dialectical behavior therapy skills training as stand-alone treatment: A systematic review of the treatment outcome literature. *Journal of Clinical Psychology*, 71(1), 1–20. <https://doi.org/10.1002/jclp.22114>.
- Wadden, T. A., Neilberg, R. H., Wing, R. R., Clark, J. M., Delahanty, L. M., Hill, J. O., Krakoff, J., Otto, A., Ryan, D. H., Vitolins, M. Z., & Look AHEAD Research Group (2011). Four-year weight losses in the Look AHEAD study: Factors associated with long-term success. *Obesity*, 19(1), 1987–1998. <https://doi.org/10.1038/oby.2011.230>.
- Wadden, T. A., Tronieri, J. S., & Butryn, M. L. (2020). Lifestyle modification approaches for the treatment of obesity in adults. *American Psychologist*, 75(2), 235.
- Wedin, S., Madan, A., Correll, J., Crowley, N., Malcom, R., Byrne, T. K., & Borckardt, J. J. (2014). Emotional eating, marital status and history of physical abuse predict 2-year weight loss in weight loss surgery patients. *Eating Behaviors*, 15(4), 619–624. <https://doi.org/10.1016/j.eatbeh.2014.08.019>.

RECEIVED: June 7, 2021

ACCEPTED: January 19, 2022

AVAILABLE ONLINE: 7 FEBRUARY 2022