Appetite-Focused Dialectical Behavior Therapy for the Treatment of Binge Eating with Purging: A Preliminary Trial

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ABSTRACT

Objective: This treatment development study investigated the acceptability and efficacy of a modified version of dialectical behavior therapy (DBT) for bulimia nervosa (BN), entitled appetite focused DBT (DBT-AF).

Method: Thirty-two women with binge/purge episodes at least one time per week were randomly assigned to 12 weekly sessions of DBT-AF ($n = 18$) or to a 6-week delayed treatment control ($n = 14$). Participants completed the EDE interview and self-report measures at baseline, 6 weeks, and posttreatment.

Results: Treatment attrition was low, and DBT-AF was rated highly acceptable. At 6 weeks, participants who were receiving DBT-AF reported significantly fewer BN symptoms than controls. At posttest, 26.9% of the 26 individuals who entered treatment (18 initially assigned and 8 from the delayed treatment control) were abstinent from binge/purge episodes for the past month; 61.5% no longer met full or subthreshold criteria for BN. Participants demonstrated a rapid rate of response to treatment and achieved clinically significant change.

Discussion: Results suggest that DBT-AF warrants further investigation as an alternative to DBT or cognitive behavior therapy for BN. © 2010 by Wiley Periodicals, Inc.

Keywords: dialectical behavior therapy; bulimia nervosa; treatment; appetite awareness; mindfulness

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Introduction

Cognitive behavior therapy (CBT) is considered the first-line treatment for bulimia nervosa (BN). Compared to other treatments for BN, CBT produces either superior or equal outcomes,[1] and the majority of improvement in bulimic symptoms occurs early in treatment.[2] However, CBT is insufficient for a substantial number of individuals who seek treatment for BN. Typically, only half of treatment completers fully recover.[3] In addition, the food monitoring aspect of CBT is not always rated as highly acceptable.[4,5] Some investigators have suggested that developing several different alternatives could be one way to improve overall outcome.

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In this treatment development study, two alternative approaches, hypothesized to have potential to improve outcomes or broaden treatment acceptability, were combined. Craighead et al. developed appetite awareness training (AAT) to redirect the client's focus from monitoring amount and type of foods consumed to internal appetite signals. AAT has been shown to be successful at both enhancing acceptability of monitoring and reducing binge eating. In the treatment of women with binge eating disorder (BED[5,6]), AAT produced equivalent reductions in binge eating compared to standard CBT. In the treatment of women with BN, AAT showed superiority to waitlist,[7,8] with 62% of individuals in the treatment group abstinent posttreatment. The majority of women in both studies rated appetite monitoring as more helpful and more focused on what they felt was important compared to their past experiences with food monitoring.

Safer et al.,[9–11] using a different approach to address eating problems, adapted acceptance-based strategies and emotion regulation skills from dialectical behavior therapy (DBT[12,13]). These researchers modified the standard DBT program into a 20-session group format (no indi-

vidual sessions or phone coaching) for women who had eating disorders without co-occurring suicidality.[9–11,14–16] Preliminary studies found this modified version of DBT to be effective and acceptable in treating the focal symptoms of BED.[15,16] Telch et al.[16] compared the treatment to a wait-list control and reported that dropout was low (18%), abstinence rates were high (89% abstinent by posttest), and abstinence was well maintained at 6-month follow-up. Safer et al.[14] further adapted this DBT treatment to treat BN (20 individual sessions) and compared it to a wait-list control in a study of 31 women with clinical and subclinical BN (averaging at least one binge/purge episode per week). DBT had low dropout (0%) and produced significant reductions in focal symptoms compared to wait-list, with 29% of participants in the treatment condition abstinent posttreatment. Preliminary reports of the full DBT program (skills group, individual therapy, telephone coaching) for individuals with eating disorders and co-occurring borderline personality disorder have been promising.[17,18]

For DBT, results were relatively more positive for the treatment of BED[15,16] than for BN.[14] One reason may be that while DBT addresses emotional eating (as well as emotion dysregulation more generally), the model does not put dietary restriction specifically in the treatment hierarchy, nor does it include specific skills to reduce restrictive eating. BN is characterized by higher levels of restraint compared to BED[19] and reductions in restraint are the strongest predictor of early response to CBT for BN,[2] suggesting that DBT might benefit from adding more specific intervention to address restraint. It is hypothesized that incorporating appetite monitoring from AAT might be a way to address restraint successfully while maintaining the integrity of DBT as an "awareness-based" treatment.

AAT and DBT are theoretically compatible; both develop awareness of internal cues (e.g., appetite or emotions) and teach skills to replace binge eating with more adaptive behaviors. AAT introduces self-monitoring of relevant eating-specific cues (hunger as well as fullness) early in treatment, but it does not ask individuals to monitor food. Neither food nor appetite is monitored in DBT. DBT skills may be relatively more effective in targeting binge eating episodes triggered by negative emotions, while appetite monitoring may be more effective in targeting binge eating episodes triggered by dietary restraint (getting too hungry) and overeating ("what the heck"). AAT is designed to help clients learn to distinguish between eating urges that are driven by physical hunger versus negative emotions, and it supports the practice of eating disorder specific mindfulness skills such as mindful eating. Early response predicts positive outcome in CBT,[20,21] and food monitoring is believed to facilitate early change in CBT. Like food monitoring, appetite monitoring promotes the regular eating patterns believed to enhance early response in CBT. Thus, adding appetite monitoring to DBT might enhance early response to DBT for BN and might enhance AAT's effectiveness in decreasing emotional eating episodes.

This study was undertaken to investigate whether a treatment, appetite-focused dialectical behavior therapy (DBT-AF), which integrates AAT and DBT strategies, is an effective and acceptable alternative treatment for BN. The predictions were as follows: (1) both therapists and participants will rate DBT-AF as a highly acceptable treatment, (2) compared to no treatment, participants who receive DBT-AF would report greater improvement in eating symptoms and related pathology at 6 weeks, and (3) participants who received DBT-AF will demonstrate significant and rapid improvements in symptoms, and demonstrate clinically significant change.

Method

Participants

The University of Colorado Human Research Committee approved the protocol, and all participants provided written informed consent before enrolling in the study. Participants included 32 women who reported an average of at least one binge eating and one vomit episode per week over the previous 3 months, and used vomiting as their primary compensatory behavior. In this study, purge episodes refers to vomit episodes only. The rationale for including subthreshold BN was twofold. First, modified criteria increase the applicability of study findings to clinical settings, given that subthreshold cases of BN often present to clinical settings with significant distress.[22] Second, Safer et al.[14] used these modified criteria in their study of DBT for BN. Matching the Safer inclusion criteria allowed for a more direct comparison with that study. Women who were taking psychotropic medication were included in the study if they were stable on the current dose of medication for at least 4 weeks and if they agreed to stay on the same dose of medication throughout the treatment (unless medically contraindicated).

Women were excluded on the basis of (1) age less than 18 years, (2) current diagnosis of anorexia nervosa (AN) or BED, (3) concurrent psychotherapy focused on eating issues, (4) current suicidal ideation, (5) substance de-

pendence at the level deemed to interfere with treatment, (6) cognitive impairment at the level deemed to interfere with treatment, and (7) past or present psychosis. Men were excluded from the study in light of its preliminary nature and the much higher prevalence of BN in women.[23]

Procedure

After the initial assessment and diagnostic conference, participants who met the inclusion criteria were randomly assigned (using computer generated random numbers, www.random.org) to either DBT-AF treatment for 12 weeks (n = 18) or to a 6-week delayed treatment control (n = 14). Group numbers are different because block randomization methods were not used. Prior to randomization, participants had been stratified on current diagnosis (subthreshold BN vs. BN) and history of AN because those variables have been shown to influence outcome in prior treatment studies. All participants assigned to treatment accepted the assignment and started treatment. After the 6-week assessment, eight of the controls accepted assignment to the intervention and started treatment immediately. Thus, in total, 26 women accepted assignment and started treatment.

Measures

Participants completed interviews and self-report assessments at three time periods: baseline, midtreatment (6 weeks), and posttreatment (12 weeks).

General Psychopathology. The screening questions from the Structured Clinical Interview for Axis I DSM-IV Disorders (SCID-I[24]) were used at baseline to screen for current substance abuse/dependence and psychotic symptoms. A clinical interview assessed for current and past psychiatric treatment, suicidality, and medication use.

Eating Disorder Diagnosis. The Eating Disorder Examination 12th Edition (EDE[25]) was used at all time periods to diagnose DSM-IV eating disorders and evaluate the frequency of objective binge episodes (OBEs), subjective binge episodes (SBEs), and compensatory behaviors. The EDE has excellent interrater reliability[26] and good discriminant validity.[19,27,28] Questions used only for subscale scores were omitted because they were assessed via the self-report version (see below).

The SCID-I Eating Disorder Module[24] was used to assess both current and past eating disorder diagnosis. The eating disorder module of the SCID-I has good interrater and test–retest reliability.[29] In this study, interrater reliability was excellent for current eating disorder diagnosis (kappa = 1.0).

Eating-Related Symptoms. Self-report measures assessed eating related symptomatology at all time points. The Eating Disorder Examination–Self-Report Questionnaire Version (EDE-Q[30]) was used to assess eating disorder pathology over the previous 28 days on four main subscales: restraint, shape concern, weight concern, and eating concern. The subscales of the EDE-Q have high test–retest reliability and internal consistency.[31] Global scores are averages of the four subscales. Because of a clerical error, the restraint subscale was omitted in the packets of five participants at baseline. For these participants, global EDE-Q scores were calculated by averaging the three subscales that were available.

The Mizes Anorectic Cognitions Scale-Revised (MACR[32]) was used to measure eating disorder cognitions on three factors: (1) rigid weight and eating regulation, (2) weight and eating behavior as a basis of approval from others, and (3) self-esteem based on excessive control. The measure has high internal consistency, discriminant validity, and sensitivity.[32]

The Interoceptive Awareness Scale-Expanded (IA-E[33]) was used to assess awareness of appetite signals and emotions. The IA-E is an 18-item self-report that was expanded from the interoceptive awareness subscale (IA) of the Eating Disorder Inventory-2 (EDI-2[34]) to establish separate subscales assessing appetite awareness and emotion awareness. The IA-E has high internal consistency and discriminant validity.[35]

The Preoccupation with Eating Weight and Shape Scale (PEWS[36]) was used to assess the amount of time (percent of waking day) participants spend thinking about food/eating or weight/shape. In addition, the global score reflects the degree of distress associated with these thoughts, the amount of difficulty in stopping the thoughts, and the degree that the thoughts interfere with concentration. The PEWS has good internal consistency, convergent and discriminant validity, and is sensitive to change.[37]

Participants' height and weight were obtained. These variables were used to calculate body mass index (BMI[38]).

Emotion Regulation. Several self-reports assessed emotion regulation. The Emotional Eating Scale (EES[39]) was used to assess the degree to which 25 different emotions lead to urges to overeat. The EES has three separate subscales: Anger/frustration, anxiety, and depression, and demonstrates high internal consistency and temporal stability[39] and is sensitive to change.[16]

The Negative Mood Regulation Scale (NMR[40]) was used to assess participant self-efficacy to regulate negative moods. This 30-item self-report uses 5-point Likert scales to assess the extent to which an individual expects a behavior or thought will regulate negative moods. Higher total scores on the NMR indicate higher expectancy and are associated with lower depression symptoms and better adjustment. The NMR has sufficient internal

consistency and short-term (3–4 and 6–8 week) test–retest reliability.[40]

The Positive and Negative Affect Schedule (PANAS[41]) was used to assess overall positive and negative mood using two 10-item scales: negative affect (NA) and positive affect (PA). The PANAS has high internal consistency and sufficient 8-week test–retest reliability.[41]

The Beck Depression Inventory-II (BDI-II[42]) assessed severity of depressive symptoms over the previous 2 weeks. The validity of the BDI-II is well established and its internal consistency is high.[42]

Treatment Acceptability. Acceptability of treatment was assessed via self-report, dropout rates, and compliance with self-monitoring. At pretreatment, midtreatment, and posttreatment, participants used Likert type scales to rate the acceptability of the treatment rationale and satisfaction with treatment components. Because of a clerical error, this measure was omitted in the posttest assessment for seven participants. Therapists completed treatment acceptability ratings after study completion.

Self-monitoring and Treatment Adherence. Participants assigned to treatment completed a DBT-AF Diary Card on a daily basis throughout treatment. Wait-list participants did not self-monitor. The DBT-AF Diary Card combines appetite monitoring,[43] with skills monitoring modified from the DBT Skills Card.[12,44] The appetite monitoring component of the DBT-AF Diary Card asks individuals to record their level of hunger or fullness on a 7-point scale (1 = very hungry to 7 = very full) before and after each eating episode.

Therapists

Therapists included one doctoral level therapist and four doctoral candidates with master's degrees in clinical psychology. The PI was trained by Dr. Debra Safer in the modified DBT treatment and by Dr. Linda Craighead in AAT treatment. Additional therapists were trained by reading the DBT[13] and AAT[43] treatment manuals, listening to treatment tapes conducted by the PI, and attending eight sessions of weekly didactic instruction on DBT-AF. Therapists audiotaped their first DBT-AF pilot case and received verbal and written feedback on adherence to DBT-AF procedures from the PI for each session. The first author provided weekly supervision throughout the remainder of the study, though no formal adherence ratings were given. After each DBT-AF session, therapists completed adherence self-reports. These self-reports assessed for in session chain analysis and homework review, mindfulness practice, commitment strategies, dialectical communication strategies, and skills taught.

Interviewers

The assessment team included advanced undergraduate psychology students trained in assessment and confidentiality. Interviewers were trained to 0.8 reliability before administering interviews. Interviewers were blind to participants' condition at all assessment intervals.

Treatment Conditions

DBT-AF Treatment Condition. DBT-AF proposes that difficulties in regulating emotions and appetite signals contribute to the development and maintenance of bulimic symptoms. DBT-AF's goals are to teach clients to: (1) develop greater awareness of emotions and appetite signals, (2) replace binge eating and purging with adaptive emotion regulation skills, and (3) use internal signals of hunger and fullness to guide their eating. The two components of DBT-AF are appetite awareness training and emotion regulation skills.

Appetite Awareness Training. Craighead[43] posits that binge eating results when individuals fail to respond to internal cues of hunger and fullness. Chronically overriding appetite signals either by restricting or overeating causes individuals to lose touch with their appetite signals. Lack of awareness of hunger leads to maladaptive cycles of getting too hungry, which triggers binge eating, which may then be followed by compensatory behavior. Lack of awareness of moderate fullness leads to maladaptive cycles, including the "what the heck" response, which results in binge eating.

The principle objective of AAT is to teach individuals to use internal appetite signals to guide food intake to develop a more natural pattern of eating. This objective is accomplished through self-monitoring of appetite levels. In contrast to food monitoring in CBT, appetite monitoring in AAT draws attention away from food type toward internal signals of hunger and fullness. It is also more easily transformed into "mental monitoring" to enhance maintenance.

Emotion Regulation Skills. The primary objective of DBT is to teach individuals adaptive emotion regulation skills. Telch et al.[11,15] originally adapted the emotion regulation model for binge eating from the DBT biosocial model for borderline personality disorder.[12,13] According to Telch's model, individuals who binge eat lack the skills to adaptively regulate emotional experiences and, instead, use binge eating to shift attention away from negative emotions.[11] When the emotional experience is successfully avoided, negative reinforcement serves to maintain the binge eating behavior.[45]

In this study, the DBT-AF treatment incorporated AAT as manualized in *The Appetite Awareness Workbook*[43] with DBT skills training as manualized in *Dialectical Behavior Therapy for Binge Eating and Bulimia*.[44] Note, prepublication versions of the manuals were utilized in this study. DBT for BN was modified in the following ways. First, the treatment rationale was modified to include the AAT model of binge eating. Second, AAT was

incorporated into the first 4 weeks of treatment and the DBT Diary Card was modified to include appetite monitoring. Third, "decrease getting too hungry or too full" was included in the hierarchy of treatment targets. Fourth, the chain analysis was modified to include appetite levels as a possible link to problem eating behavior. Fifth, two additional eating disorder skills were taught to target dietary restriction: appetite awareness (avoid getting too hungry) and antideprivation eating (choosing to eat treats to prevent feelings of deprivation). The prior study on AAT for BN had demonstrated that 12 sessions (over 16 weeks) was adequate for the majority of the clients to become abstinent; however, the prior study on DBT for BN had comprised 20 sessions.[14] This study evaluated DBT-AF initially with only 12 sessions because, if adequate, the shorter time frame would make the program more feasible to offer in university settings (typically 15 week semesters) or managed care (where number of sessions may be limited). However, to include the added content, the length of the first six DBT-AF sessions was increased to 90 min. Thus, DBT-AF comprised a total of 15 h of intervention (presented as 12 individual sessions over 12 weeks).

Therapy sessions were structured such that the first half of each session focused on mindfulness practice, diary card/homework review and chain analyses and the second half focused on teaching and practicing new skills. After a pretreatment session, three modules were taught: (1) appetite awareness and mindfulness, (2) distress tolerance, and (3) emotion regulation. On weeks when participants were unable to attend sessions (e.g. due to sickness, holidays, vacations), they were asked to attend a make-up session the following week.

Waitlist Condition. Participants randomly assigned to delayed treatment were told that they were assigned to waitlist and were asked to refrain from psychotherapy treatment during the 6-week waiting period. After 6 weeks, participants in the delayed treatment condition were reassessed and offered DBT-AF treatment.

Results

Baseline Characteristics

One hundred twenty-five individuals responded to advertisements for the study. After initial phone screen and in-person interview, 32 participants were still interested and were eligible to participate. Participants were randomized to treatment (n = 18) or waitlist (n = 14). As shown in **Table 1**, there were no significant differences between groups on baseline measures of eating pathology. Four (12.9%) participants (two treatment and two waitlist) dropped out of the study before the 6-week assessment. Drop outs were not significantly different from completers on any baseline measures. After the 6-week assessment, eight participants from the waitlist condition agreed to start treatment. Two of these eight dropped out during their treatment. Thus, four of the 26 who started treatment at any point (15.4%) dropped out. Treatment dropout was not significantly associated with pretreatment eating pathology, history of AN, initial condition, or therapist.

Most participants were white (n = 30, 93.8%), with one (3.1%) African American and one (3.1%) Asian-American. Their average age was 22.0 years, average BMI was 22.6 kg/m^2, and most common occupation was college student (n = 26, 81.3%). All but six met full DSM-IV criteria for BN; the other six met the modified, subthreshold criteria. At baseline, participants had a median of 16.5 OBEs (range = 5–50) and a median of 16.5 vomit episodes (range = 4–50) over the previous 28 days. Only two participants (6.2%) were on stable doses of antidepressant medications. These doses were maintained throughout the study.

Data Analysis

Data were checked to ensure that all entries were in the expected value range, and 25% of data were double entered to ensure minimal entry errors. If there were missing data, data were estimated by entering mean values for missing cells.[46] Since binge episodes and purges were not normally distributed, square root transformed data were used in analyses.[46] All regression models were analyzed for normality of residuals, outliers, or other abnormalities, and all analyses used a 0.05 significance level.

All analyses were performed for both intent-to-treat (ITT) and completer samples. For the between group comparison at 6 weeks, ITT was defined as all participants who underwent randomization (n = 32). ANOVAs showed no baseline differences between the 18 participants initially assigned to treatment and the eight delayed treatment controls who agreed to enter treatment after the 6-week assessment, so their data were combined for the posttest evaluation. For posttest, ITT was defined as the 26 participants who agreed to start DBT-AF. The completer sample was defined as all participants who completed at least 10 (80%) of the 12 treatment sessions (n = 22). Given limited space, and the overall similarity between the ITT and completer analyses, only the more conservative ITT analyses are presented. Completer analyses are available from the first author.

TABLE 1. Baseline characteristics for participants randomly assigned to treatment versus waitlist

	Treatment Condition (n = 18)	Waitlist Condition (n = 14)	Analysis		
			t	df	p
	Mdn (range)				
Eating disorder examination[a]					
Objective binge episodes/28days	15.50 (5–50)	18.00 (9–36)	−0.46	30	.65
Subjective binge episodes/28 days	4.50 (0–43)	0.00 (0–60)	0.11	30	.92
Vomit episodes/28 days	15.50 (4–50)	23.5 (6–38)	−0.97	30	.34
	M (SD)				
Age (years)	22.67 (5.86)	21.08 (2.93)	−0.93	29	.36
Body mass index (kg/m^2)	23.23 (5.20)	21.65 (2.15)	−1.17	30	.25
Eating disorder examination–questionnaire global score	3.61 (1.16)	4.24 (0.99)	1.61	30	.12
Interoceptive awareness scale–expanded global score	55.33 (8.87)	57.07 (9.33)	0.54	30	.60
Preoccupation with food, eating, shape and weight global score	4.45 (1.15)	4.52 (1.02)	0.16	30	.87
Mizes anorectic cognitions scale	77.73 (13.65)	86.79 (10.98)	2.02	29	.05
Emotional eating scale	3.27 (0.67)	3.15 (0.48)	−0.53	30	.60
Negative mood regulation scale	100.33 (17.72)	103.32 (12.87)	0.52	29	.61
Positive and negative affect scale					
Positive affect	28.33 (9.13)	29.71 (8.32)	0.44	30	.66
Negative affect	26.57 (7.91)	27.50 (6.97)	0.35	30	.73
Beck depression inventory-II	16.23 (10.40)	18.00 (6.32)	0.56	30	.58
			X^2	df	p
	Number of Participants (%)				
Eating disorder diagnosis			0.33	1	.57
Bulimia nervosa	14 (77.78)	12 (85.71)			
Subclinical bulimia nervosa	4 (22.22)	2 (15.38)			
History of anorexia nervosa	5 (27.78)	6 (42.86)	0.79	1	.37
Drop out of study before T2	2 (11.11)	2 (14.29)	0.07	1	.79

[a] Analyses of data on binge eating and purging involved square root transformations.

Acceptability of Treatment

The first hypothesis was that participants and therapists would rate DBT-AF as highly acceptable.

Client Acceptability. At pretreatment, participants (n = 26) rated the treatment rationale very highly. Using nine-point scales, with higher scores being more positive ratings, participants rated the treatment rationale as very logical (M = 8.7, SD = 0.5), conveyed being very comfortable about participating in the DBT-AF treatment (M = 8.3, SD = 0.9), reported they were highly confident that they would be successful in the treatment (M = 7.4, SD = 1.0), and reported they would strongly recommend the treatment to a friend with similar problems (M = 8.1, SD = 1.1).

After 6 weeks of monitoring appetite levels, participants (n = 21) rated their response to appetite monitoring using 6-point scales; it was rated as very helpful (M = 5.2, SD = 1.0) and as not a hassle (M = 2.4, SD = 1.5) and not unpleasant (M = 1.7, SD = 1.6). Participants also endorsed that they frequently visualized the form or thought about how they would rate their appetite levels when not recording their appetite (M = 4.4, SD = 1.5). Eleven (52.4%) of the participants had had prior experiences with food monitoring. Of these participants, the majority (n = 9; 81.8%) rated appetite monitoring as more helpful than their past experiences with food monitoring, and none indicated she would be more willing to monitor food than appetite. The following open-ended comments demonstrate the typical feedback about monitoring appetite versus food intake: "I would not have been willing to food monitor. That always gets me into trouble" and, "Appetite monitoring was more helpful. I could use it as a tool and not a calorie count. Food monitoring would have caused me to count calories."

At posttest, participants completing the acceptability ratings (n = 15) rated treatment very positively. The average of the ratings was 3.6 (SD = 0.6) on a 4-point scale from 1 (not helpful) to 4 (very helpful). Scores for specific components indicate that all were considered very helpful appetite awareness: M = 3.8, SD = 0.5, mindfulness: M = 3.8, SD = 0.4, distress tolerance: M = 3.5, SD = 0.6, emotion regulation: M = 3.6, SD = 0.7, and chain analysis: M = 2.9, SD = 1.0.

Therapist Acceptability. Therapists (n = 4) also rated the treatment as highly acceptable. When asked to rate the treatment components in their degree of helpfulness to clients on 7-point scales, therapists rated appetite awareness (M = 7.0), mindfulness (M = 6.3), and chain analysis (M = 6.0) most highly, followed by distress tolerance skills (M = 5.7), the DBT team meeting (M = 5.7), and emotion regulation skills (M = 5). When asked the degree to

which training in each component enhanced their own experience as therapists, results were similar (appetite awareness: M = 7, mindfulness: M = 7, chain analysis: M = 6.3, DBT team meeting: M = 6.3, distress tolerance: M = 5.3, emotion regulation: M = 5.3, DBT stylistic strategies: M = 5.0).

Between Group Comparison at 6-Weeks for ITT Sample

The second hypothesis was that at 6-weeks the DBT-AF group would report decreased eating pathology compared to the delayed treatment group. To test this hypothesis, analysis of covariance (ANCOVA) tests were run, regressing each dependent variable of interest on group, controlling for its baseline score. Between group effects sizes at 6 weeks were calculated by dividing the difference in group means by their pooled standard deviations.

As shown in **Table 2**, at 6 weeks, participants in the treatment group reported lower past month frequency of OBEs than controls and lower frequency of purges. There was no significant difference in frequency of past month SBEs. Although this point was too early to assess abstinence, as that is typically reported for the past month, the majority of the participants reported they were already having periods of one week or more with no episodes of binge eating or purging.

The treatment group also reported lower pathology than the control group on most of the self-report measures completed at week 6 (medium to large effect sizes for most measures). Compared to waitlist, treatment led to lower EDE-Q global scores and MAC-R global scores. Treatment resulted in lower global scores on the PEWS and percent time thinking about food, although not percent time thinking about shape and weight. Treatment improved appetite awareness as assessed by that subscale of the IA-E, but not emotional awareness. Treatment resulted in more positive affect and lower BDI-II scores. Groups did not differ on negative affect, emotional eating, or self-efficacy for affect regulation.

Pre-Post Treatment Effects for the ITT Sample

The third hypothesis was that at posttest, participants receiving treatment would show significant and rapid improvement in eating pathology. At posttreatment (12 week assessment), 7 of 26 (26.9%) participants who started treatment (the ITT sample) were abstinent (i.e., no OBEs or purges in the past month). An additional four were abstinent on one of the two indices. Overall, 16 of the 26 (61.5%) no longer met either full or subthreshold criteria for BN.

Table 3 reports the means for the ITT sample across all three assessments and reports the ANOVAs across time. As shown there, significant effects for time were shown for all variables, and in all cases, specific tests supported the conclusion that these effects were linear over time (pretreatment = 1, 6-weeks = 0, posttest = −1). All variables were tested for quadratic effects (pretreatment = +1, 6-weeks = −2, posttest = +1) to determine if more of the change occurred during the first 6 weeks than during the last 6 weeks. As shown in **Table 3**, quadratic effects were significant for the focal symptoms (OBEs and purges).

As predicted, the majority of improvement occurred during the first half of treatment. For the ITT sample, 72% of posttreatment reduction in binge episodes and 68% of posttreatment reduction in purges occurred by week 6. Treatment completers showed a similar rate of improvement; 84% reduction in binge eating episodes; and 79% reduction in purges occurred by week 6.

Discussion

This study was a preliminary test of the acceptability and efficacy of DBT-AF, a treatment designed to teach both appetite awareness and emotion regulation skills to women with BN. Overall, the hypotheses were supported: (1) DBT-AF was rated as highly acceptable to clients, and clients clearly preferred appetite monitoring in comparison to past experiences with food monitoring, (2) compared to a delayed treatment control, DBT-AF produced greater improvement in focal and secondary symptoms of BN (at 6 weeks), and (3) participants who received DBT-AF showed rapid reduction in bulimic symptoms and related pathology.

Treatment Acceptability

DBT-AF treatment, as well as its specific components, was highly acceptable to both therapists and clients. Only 15.4% of those who accepted assignment to treatment dropped out compared to 29% reported in the Agras et al.[47] trial of CBT. Prior studies of DBT[14] and of AAT[8] reported unusually low treatment dropout (0%), but both were small studies so those results might not be typical. A couple of modifications might further enhance acceptability of treatment and reduce dropout. First, the DBT-AF protocol involved adding a new module (AAT) to DBT while at the same time reducing the

TABLE 2. Treatment group versus waitlist at 6-weeks[a]

	Treatment Condition (n = 18)		Waitlist Condition (n = 14)		Analysis			
	Baseline	6-weeks	Baseline	6-weeks	F	df	p	ES
	Mdn (Range)		Mdn (Range)					
Eating disorder examination[b]								
Objective binge episodes/28days	15.50 (5–50)	4.00 (0–50)	18.00 (9–36)	9.5 (5–40)	7.37	1.30	<.05	0.79
Subjective binge episodes/28days	4.5 (0–43)	0 (0–43)	0 (0–60)	0 (0–60)	1.13	1.30	.30	−0.07
Vomit episodes/28 days	15.50 (4–50)	2.50 (0–50)	23.5 (6–38)	12.5 (1–60)	4.74	1.30	<.05	0.76
	M (SD)	M (SD)	F	df	p	ES		
Eating disorder examination—questionnaire								
Global score	3.61 (1.16)	2.48 (1.39)	4.24 (.99)	3.98 (1.09)	7.45	1.30	<.05	0.77
Restraint	3.44 (0.96)	2.02 (1.47)	4.07 (1.32)	3.90 (1.32)	7.25	1.19	<.05	1.26
Shape Concern	4.12 (1.49)	3.05 (1.65)	4.66 (1.11)	4.36 (1.23)	4.49	1.30	<.05	0.57
Eating concern	3.03 (1.33)	1.99 (1.31)	3.96 (1.08)	3.71 (1.26)	8.16	1.30	<.01	0.62
Weight concern	4.03 (1.50)	2.87 (1.68)	4.33 (1.26)	3.94 (1.33)	3.74	1.30	.06	0.60
Interoceptive awareness scale—expanded								
Global score	55.33 (8.87)	49.78 (15.54)	57.07 (9.33)	61.16 (10.84)	5.32	1.30	<.05	0.59
Appetite awareness	29.67 (6.34)	23.33 (7.34)	31.04 (3.87)	31.07 (4.98)	11.75	1.30	<.01	1.10
Emotional awareness	16.75 (4.15)	15.50 (3.79)	14.86 (4.80)	16.57 (4.57)	3.53	1.30	.07	0.83
Preoccupation with food, eating, shape and weight								
Global score	4.45 (1.15)	3.36 (1.57)	4.52 (1.02)	4.40 (1.14)	6.05	1.30	<.05	0.88
Preoccupation with food/eating	4.72 (1.32)	3.61 (1.72)	4.65 (0.87)	4.45 (1.14)	4.28	1.30	<.05	0.76
Preoccupation with shape/weight	4.19 (1.45)	3.11 (1.73)	4.38 (1.27)	4.36 (1.22)	7.09	1.30	<.05	0.90
% of day thinking about food	70.00 (18.07)	49.41 (23.78)	70.83 (18.69)	73.75 (20.13)	9.09	1.24	<.01	1.22
% of day thinking about weight/shape	54.63 (34.85)	42.64 (32.94)	70.77 (22.90)	65.71 (26.30)	1.82	1.26	.19	0.32
Mizes anorectic cognitions scale								
Global score	77.73 (13.65)	65.93 (13.56)	86.79 (10.98)	85.71 (9.82)	11.90	1.29	<.01	0.81
Emotional eating scale								
Global score	3.27 (0.67)	2.91 (0.89)	3.15 (0.48)	3.07 (0.49)	1.38	1.30	.25	0.48
Negative mood regulation scale	100.33 (17.72)	106.78 (15.98)	103.32 (12.87)	102.76 (7.94)	2.38	1.29	.13	−0.60
Positive and negative affect scale								
Positive affect	28.33 (9.13)	32.89 (7.01)	29.71 (8.32)	28.64 (5.21)	6.43	1.30	<.05	−0.75
Negative affect	26.57 (7.91)	23.78 (7.25)	27.50 (6.97)	27.79 (7.62)	2.72	1.30	.11	0.49
Beck depression inventory-II	16.23 (10.40)	9.23 (8.43)	18.00 (6.32)	16.79 (7.92)	7.37	1.30	<.05	0.76

[a] Analyses include data for intent-to-treat sample.
[b] Analyses of data on binge eating and purging involved square root transformations.

number of sessions from 20 to 12. Therapists reported they felt rushed to teach all the skills required by the protocol. They indicated they would have preferred more time to develop the client–therapist relationship, attend to motivational issues, and work on skill generalization. Similarly, several participants indicated they would have preferred more time to apply the skills. Some participants found the initial 90 min sessions a bit too long, and some found that 12 weeks was not quite long enough to become fully abstinent. Thus, in clinical practice flexibility in terms of number of skills taught as well as the length, number of, and spacing of sessions might enhance treatment acceptability and perhaps increase treatment retention.

Bulimic Symptomatology

DBT-AF was successful in rapidly reducing bulimic episodes. At posttest, 61.5% of the ITT sample no longer met full or sub-threshold DSM-IV criteria for bulimia and 26.9% were fully abstinent. This abstinence rate is similar to the findings of Safer et al.'s[14] earlier study of DBT for BN, which reported 28.6% abstinence for the ITT/completer sample and the Agras et al.[47] trial of CBT for BN, which reported 29% abstinence for the ITT sample. The investigators hypothesized that DBT-AF might achieve higher abstinence rates because the initial trial of AAT[8] reported 62% abstinence after 12 sessions. However, in that trial, the posttest assessment was held at week 16 (rather than after 12 weeks in the current study) because the last four sessions were done biweekly. In that trial, 31% were fully abstinent at the 8 week assessment but another 31% had become abstinent by week 16 for a total of 62%. Because abstinence reflects frequency over the past month, this study's assessment of DBT-AF at week 12 may not adequately reflect its potential effectiveness.

The ability to compare the current results for DBT-AF to prior studies on the primary outcome is limited by the different time frames used for assessment. In the DBT and CBT studies, abstinence reflected weeks 16–20 from the start of treatment. In the AAT study, abstinence reflected weeks 12–16. This study reflects abstinence in weeks 8–12. Thus, future studies are needed to provide direct

TABLE 3. Change in symptomatology over time for the intent-to-treat sample (*N* = 26)

	Pre-treatment	6-weeks	Post-treatment (12-weeks)	Effect	Analysis			
					F	*df*	*p*	ES[b]
		Mdn (*Range*)						
Focal symptoms								
Eating disorder examination[a]								
Objective binge episodes/28 days	16.5 (5–50)	4.5 (0–50)	1.5 (0–50)	Time	39.60	2	<.001	0.84
				Lin	45.07	1	<.001	
				Quad	20.41	1	<.001	
Vomit episodes/28 days	15.5 (4–60)	2.5 (0–50)	2.0 (0–50)	Time	32.04	2	<.001	0.84
				Lin	41.24	1	<.001	
				Quad	16.06	1	<.001	
Eating-related symptoms		*M* (*SD*)						
Eating disorder examination–questionnaire								
Global Score	3.73 (1.06)	2.64 (1.28)	2.04 (1.04)	Time	24.22	2	<.001	1.61
				Lin	36.18	1	<.001	
				Quad	1.83	1	.19	
Restraint	3.47 (1.06)	2.42 (1.33)	1.83 (1.21)	Time	17.57	2	<.001	1.44
				Lin	23.58	1	<.001	
				Quad	1.67	1	.21	
Shape Concern	4.21 (1.30)	3.28 (1.53)	2.59 (1.37)	Time	16.64	2	<.001	1.21
				Lin	26.17	1	<.001	
				Quad	.29	1	.59	
Eating Concern	3.24 (1.32)	2.05 (1.25)	1.48 (.95)	Time	21.81	2	<.001	1.53
				Lin	32.27	1	<.001	
				Quad	2.53	1	.12	
Weight Concern	3.97 (1.35)	3.10 (1.58)	2.45 (1.31)	Time	14.58	2	<.001	1.14
				Lin	24.93	1	<.001	
				Quad	.25	1	.62	
Interoceptive awareness scale—expanded								
Appetite Awareness	30.73 (5.60)	23.83 (6.63)	20.61 (5.70)	Time	33.65	2	<.001	1.79
				Lin	48.85	1	<.001	
				Quad	4.18	1	.05	
Emotional Awareness	15.83 (4.14)	15.12 (3.56)	13.29 (2.90)	Time	7.52	2	<.001	0.71
				Lin	11.64	1	<.01	
				Quad	1.16	1	.29	
Preoccupation with food, eating, shape, and weight								
Global Score	4.58 (1.03)	3.45 (1.83)	2.69 (1.36)	Time	28.00	2	<.001	1.57
				Lin	35.53	1	<.001	
				Quad	1.41	1	.25	
% of day thinking about food	66.15 (21.27)	49.42 (22.91)	39.23 (22.57)	Time	17.35	2	<.001	1.23
				Lin	25.12	1	<.001	
				Quad	1.04	1	.32	
% of day thinking about weight/shape	56.88 (31.27)	49.23 (31.83)	41.34 (23.43)	Time	4.72	2	<.05	0.56
				Lin	10.47	1	<.01	
				Quad	0.00	1	.98	
Mizes anorectic cognitions scale								
Global Score	79.54 (12.23)	70.99 (14.94)	65.44 (13.95)	Time	13.37	2	<.001	1.07
				Lin	17.20	1	<.001	
				Quad	0.84	1	.37	
Emotion regulation symptoms								
Emotional eating scale								
Global score	3.26 (.61)	2.86 (.88)	2.51 (.88)	Time	13.92	2	<.01	0.99
				Lin	20.84	1	<.001	
				Quad	.04	1	.84	
Negative mood regulation scale	101.47 (15.18)	104.83 (16.07)	112.38 (9.90)	Time	7.70	2	<.001	−0.85
				Lin	14.53	1	<.001	
				Quad	0.73	1	.40	
Positive and negative affect scale								
Positive affect	28.04 (8.25)	32.54 (8.47)	34.62 (8.47)	Time	11.67	2	<.001	−0.79
				Lin	18.49	1	<.001	
				Quad	1.27	1	.27	
Negative affect	26.55 (7.81)	23.04 (6.62)	19.94 (6.11)	Time	11.49	2	<.001	0.94
				Lin	19.22	1	<.001	
				Quad	0.04	1	.85	
Beck depression inventory-II	15.96 (9.04)	10.00 (8.90)	7.25 (7.49)	Time	12.96	2	<.001	1.05
				Lin	21.60	1	<.001	
				Quad	1.31	1	.26	

[a] Analyses of data on binge eating and purging involved square root transformations.
[b] Effect size was calculated comparing pretreatment and posttest means.

comparison of DBT-AF to alternative treatments over the same time periods.

Participants completing DBT-AF treatment showed both statistically and clinically significant changes in more global aspects of ED pathology as well as the primary target behaviors. Kazdin[48] defined clinical significance as, "the extent to which the effect of an intervention makes an 'important' difference to the clients or has practical or applied value" (p. 572). At posttest, average eating pathology (EDE-Q global scores) was within the range reported for a large non-clinical community sample (M = 1.42, SD = 1.04) and outside the range reported for eating disorder cases (M = 3.09, SD = 0.83; Ref. 49). This reflects a change from the 94th percentile to the 67th percentile of a community sample.[49,50] Only two participants who completed the treatment remained in the clinical range.

DBT-AF produced rapid therapeutic effects on bulimic symptoms, with the majority of improvement in binge eating and purging occurring by mid treatment. This result replicates Wilson et al.'s[2] finding that 62% of the final posttest improvement for purges in CBT was evident by week 6. Wilson et al. argue that rapid treatment effects in CBT are likely attributable to behavioral interventions, presumably due to increased self-efficacy and enhanced awareness of the connections between problem behaviors and their triggers. Behavioral interventions such as appetite monitoring, homework, and chain analysis are foundational in DBT-AF and were introduced early, when the majority of change in bulimic symptoms occurred. Further study is needed to determine whether these DBT-AF procedures are responsible for early reduction in symptoms that was reported.

Supporting conclusions from the early trials, the current results indicated that most individuals who were close to abstinence by week 6 became abstinent by week 12. Those who were not even close to abstinence by midtreatment typically continued to improve but did not become abstinent. This pattern is similar to that reported in the prior AAT study. Thus, individuals who are not close to abstinence at least by week 12 would likely benefit from considering alternatives, perhaps adding medication or switching to the more intensive format of traditional DBT (rather than simply continuing weekly individual therapy).

Appetite Awareness

The study's results support the hypothesis that DBT-AF treatment helps women regain awareness of their satiety cues and increase their ability to use these cues as a guide for normalized eating patterns. By 6 weeks, DBT-AF participants had increased their awareness of appetite cues, even though at that point they did not report greater awareness of emotions than controls. The specific technique of appetite monitoring may have been responsible for these changes. However, the mindfulness practice in DBT is designed to increase awareness of internal cues more generally, which likely also contributed to the increase in appetite awareness. Future studies could test whether treatments that employ mindfulness training without appetite monitoring[51] produce a similar impact on measures of appetite awareness.

Dietary Restraint

One important reason for integrating AAT with DBT was to add skills that would specifically target restriction. In CBT for BN, which uses food monitoring, reduction in dietary restraint has been shown to mediate improvement in purge episodes.[2] As predicted, measures assessing cognitive as well as behavioral aspects of restraint showed improvement after DBT-AF treatment. By 6 weeks, DBT-AF resulted in lower scores on EDE-Q restraint scores, anorexic cognitions, and preoccupation with food compared to controls, with the largest effect size occurring for EDE-Q restraint. By post-test, EDE-Q restraint scores of treatment completers averaged 1.4, which is in the range of a community sample mean (M = 1.3, SD = 1.3; Ref. 49); participants had moved from the 92nd percentile into the 55th percentile of the community sample.[49,50] The degree of reduction in restraint was similar to that reported previously for CBT.[47]

A second goal of appetite awareness training was to reduce restraint without increasing distress about eating or preoccupation with food, and this was achieved. Participants demonstrated significant improvement on measures of bulimic symptoms, restraint, and appetite awareness, while actually decreasing preoccupation with food. At pretest, the treatment completer sample reported they spent a lot of time thinking about food and eating (71.9% of day). By 6 weeks, this report was down to 49% of the day, and after 12 weeks it was down to 33.1%, despite the fact that they had been doing regular monitoring of appetite levels and mindful eating practice. Preoccupation with food scores clearly moved closer to the range reported for a female college sample (21%; Ref. 37) than the range for a BN sample (64%; Ref. 8).

As predicted, the appetite monitoring component of treatment was rated as highly acceptable, and most women reported they would prefer to

appetite monitor over food monitor. These findings, in conjunction with previous evaluations of AAT,[5,7,8] raise questions about the necessity of using food monitoring to achieve reductions in restraint and modify maladaptive eating patterns. Appetite monitoring appears to be a viable, if not preferable, form of self-monitoring that does not reduce treatment effectiveness.

Emotion Regulation

A primary assumption of DBT-AF is that eating disorder behaviors serve as maladaptive attempts to regulate emotions. Participants are taught to replace binge eating and purging with effective emotion regulation strategies, such as mindfulness skills, emotion regulation skills, and distress tolerance skills. In this study emotion regulation skills were not introduced until week 5 of treatment. Thus, it was not surprising that the treatment and waitlist groups did not differ on measures of emotion regulation at 6 weeks. By posttreatment, participants receiving DBT-AF did show significant improvement on awareness of emotions, emotional eating, self-efficacy to regulate emotions, and negative affect. Thus, the current findings, in the context of the larger body of controlled studies of DBT,[14,16] lend support to the hypothesis that DBT leads to improvement in emotion regulation. However, it remains unclear whether these changes can be attributed to specific rather than nonspecific treatment components. Because investigations of other treatment approaches (e.g., CBT) have not assessed change on measures of emotion regulation, it will be important to test, in future research, whether changes in emotion regulation are unique to DBT-based treatments.

Interestingly the BDI-II, assessing depressive symptoms scores, did show a rapid treatment response, with the treatment group showing greater reductions compared to no treatment by 6 weeks. Before treatment, 13 (61.9%) of the participants were in the moderate to severe range on the BDI-II (above a score of 14), but by posttest, all but two had moved into the no or minimal depression range. Many researchers have argued that depressive symptoms in BN may best be characterized as a consequence of BN symptomatology rather than as reflecting a separate comorbid disorder. Thus, the early reduction in BDI-II scores likely reflected the early progress in BN symptoms, as improved emotion regulation skills were not evident until later in treatment.

Strengths and Limitations

The DBT-AF treatment presented in this study is innovative because an awareness-based component that directly targets eating-specific behaviors (particularly dietary restriction) was added to DBT as previously modified to treat BN. Importantly, this study demonstrates that a relatively brief intervention (12 weekly sessions) can be effective for a large percentage of cases although, based on the current results, spacing out the later sessions is recommended, and some clients will need additional sessions to become abstinent. Thus, DBT-AF may be a particularly viable option for university counseling centers and other settings with time limitations on treatment. The intervention was effective with both clinical and subthreshold eating disorder cases and the protocol appears to be relatively easy to master, as high levels of effectiveness were found across four master's level therapists who had modest prior clinical experience. All reported high satisfaction with, and high compliance with, the study protocol. However, treatment adherence measures still need to be developed and utilized to confirm that therapists are able to deliver the treatment as described.

A number of limitations are noted. This study was a small pilot study to evaluate acceptability and feasibility. However, medium to large effect sizes were found even with the small sample size. In addition, a brief waitlist comparison group was utilized that did not control for nonspecific factors[52] or allow for a follow-up comparison, which is clearly needed in subsequent trials. Given past studies of CBT showing the majority of change occurs in the first 6 weeks or so, it was predicted that between group effects would be apparent early in treatment, and this was the case. Treated waitlist participants did not differ from those initially treated so both groups were combined for posttest analyses. Although this approach is not unusual in preliminary studies of this type, it carries unavoidable statistical and clinical implications.

Summary

CBT continues to be the first-line treatment for BN until more randomized controlled trials support the utility of alternative treatments. This study has demonstrated the acceptability and viability of DBT-AF, an alternative that may be particularly useful for individuals who are less willing to comply with food monitoring or those who need more intensive focus on emotion regulation skills. Twelve sessions of DBT-AF led to abstinence rates similar to those typically reported after 20 sessions of CBT. Appetite awareness improved and restraint dimin-

ished significantly early in treatment when appetite awareness/mindfulness was the focus. Depression symptoms also decreased significantly during that time. Improvement on measures of emotion regulation did not emerge until after those techniques were taught, in the second half of treatment. The short time frame (12 weeks) utilized in this study may not have allowed enough time to demonstrate the full potential of DBT-AF as those who were close to abstinence might have become fully abstinent if treatment had been extended to the more typical 20 week time frame. Direct comparison to CBT or other active treatments over similar time periods is now needed to replicate these results and determine if some individuals would prefer, or would benefit more from, this alternative intervention.

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