Adapting Dialectical Behavior Therapy For Outpatient Adult Anorexia Nervosa—A Pilot Study

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Abstract

Objective—Anorexia Nervosa (AN) is associated with excessive self-control. This iterative case series describes the augmentation of Dialectical Behavior Therapy (DBT) for outpatient adult AN with skills addressing emotional and behavioral overcontrol. An overly controlled style is theorized to develop from the transaction between an individual with heightened threat sensitivity and reduced reward sensitivity, interacting with an environment reinforcing overcontrol and punishing imperfection.

Method—Case Series 1 utilized standard DBT, resulting in retention of 5/6 patients and a body mass index (BMI) effect size increase of $d = -50.5$ from pre- to post-treatment. Case series 2, using standard DBT augmented with skills addressing overcontrol, resulted in retention of 8/9 patients with an effect size increase in BMI at post-treatment that was maintained at 6-and 12-months follow-up ($d = -1.12$, $d = -0.87$, and $d = -1.12$).

Discussion—Findings suggest that skills training targeting rigidity and increasing openness and social connectedness warrant further study of this model and treatment for AN.

Keywords

anorexia nervosa; dialectical behavior therapy; adult; outpatient; case series

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Introduction

Anorexia Nervosa (AN) has the highest mortality rate of any psychiatric illness, with death typically due to suicide or serious medical complications.[1] Comparative outpatient psychotherapy trials for adult AN including Cognitive Behavior Therapy,[2,3] Maudsley Anorexia Nervosa Treatment for Adults (MANTRA),[4,5] specialist supportive clinical treatment,[3] and psychodynamic therapy[6] suggest there is no outpatient psychotherapy with demonstrated superiority for adult AN.[1] The multiple co-occurrence of disorders such as anxiety and medical problems with AN as well as its ego syntonic nature lead to high dropout ranging from 25 to 40% in outpatient trials.[1] In addition to a high suicide rate and high risk of death due to medical problems, the course of AN is often chronic. Unfortunately the outcomes achieved with treatments currently available for adult AN are not optimal and therefore there is need to develop new and more effective treatments for this disorder.

Given the unique challenges associated with utilizing outpatient psychotherapy for adult AN, the aim of this article is to report two iterative case series for outpatients with adult AN: the first, using standard Dialectical Behavior Therapy (DBT) and the second using standard DBT with additional skills addressing over controlled emotions and behaviors. Standard DBT[7,8] was chosen because it was originally developed for borderline personality disorder, which like adult AN is a chronic and severe mental illness marked by suicidal behavior. DBT has special protocols for crisis management and therapy interfering behavior, including outpatient treatment dropout, which make it especially fitting for treating adult AN. DBT also appeared appropriate for the multiple problems associated with adult AN. DBT is a comprehensive multimodal treatment with group, individual and 24-h phone coaching components for clients. It is also principle rather than agenda driven in nature, allowing a therapist to flexibly address multiple and changing treatment targets. The weekly therapist consultation team meeting for therapists in standard DBT is unique in fostering effective compassion for therapists towards a disorder which is regarded as "difficult-to-treat". Given the extreme fearful avoidance of food commonly observed with AN and the difficulties clients experience accepting weight recovery, DBT was also thought to be effective in teaching skillful emotional responding for the former and uniquely balancing these change-based strategies with acceptance-based strategies for the latter. There is also an evidence base for both standard DBT for borderline personality disorder and eating disorders[9–12] and inpatient eating disorders.[13]

Unlike borderline personality and other disorders involving under controlled behaviors and affect, AN is typified by greater reward insensitivity such as distress over tolerance; as well as greater threat sensitivity, including risk avoidance[14]; cognitive inflexibility,[15] and emotional inhibition and regulation difficulties.[16] However, the majority of standard DBT studies have targeted disorders of under control. Lynch has developed an adaptation of DBT that addresses disorders of over controlled emotions and behaviors.[17,18] In this framework, disorders marked by an emotionally over controlled style, including AN, are argued to be a result of over controlled bio-temperamental biases for heightened threat sensitivity and diminished reward sensitivity and an environment experienced as emphasizing that "mistakes are intolerable" and "self-control is imperative". An over-controlled style is theorized to be typified by rigid, predictable behavioral responses and less receptivity to

environmental feedback, thereby limiting opportunities to learn new skills and make use of positive social reinforcers. This new approach uniquely addresses the bio-temperamental deficits by linking the communicative functions of emotional expression to the formation of close social bonds. New skills target social signaling and focus on changing neurophysiological arousal. The primary targets of DBT for over controlled emotions and behaviors involve decreasing severe behavioral over control while increasing behavioral flexibility, openness, and emotional expression. Eating disordered behaviors such as extreme dietary restriction are perceived as examples of over controlled behavior that have been intermittently reinforced. It is important to note that there are some similarities in the target of the DBT skills for over control used in this article with Cognitive Remediation[19–21] as both address difficulties with social connection, cognitive inflexibility, and emotional awareness. However, the skills taught in the DBT module addressing over control are informed by a trans diagnostic neurophysiological theory of temperament and socio-emotional expression, and in this study was conducted in the framework of standard DBT.

DBT for over controlled behaviors and emotions has been developed over the course of a series of Phase II randomized controlled trials for refractory depression[18,22] and an ongoing multisite trial (http://www.controlled-trials.com/ISRCTN85784627/).

Addressing over controlled behaviors and emotions may be important as poor awareness of emotions as well as cognitive inflexibility may be obstacles to recovery in AN. Additionally, using a standalone version of this treatment developed for an inpatient setting, an open noncomparative trial of ~21 weeks stay with adult AN restrictive type resulted in an effect size increase of $d = -21.71$ in BMI (mean change in BMI = 3.21 from an initial mean of 14.43) with an overall response rate of 90% and significant improvements in eating disorder psychopathology, quality of life, and reductions in psychological distress.[23]

This article documents the Stage I[24,25] treatment development process by first applying a standard treatment, DBT, to a population it was not originally developed for, AN and subclinical AN in Case Series 1. Given the preliminary findings of standard DBT alone, standard DBT was augmented with a skills module for over controlled emotions and behaviors (labeled 'Radical Openness Skills'[17]) in Case Series 2. The aim of Case Series 2 was to explore the preliminary feasibility, acceptability, and efficacy of the addition of skills targeting the core over controlled features of AN with regards to BMI, eating disorder psychopathology, other Axis I disorders and medical problems and psychological functioning.

Standard DBT for Outpatient Adult AN—Case Series 1

Method

Participants—Case Series 1 was conducted from July 2009 to July 2011 utilizing standard DBT for 6 adult women meeting DSM-IV subclinical or full AN (Table 1). Clients were self-referred to an adult outpatient eating disorders clinic. The protocol was approved by the institutional review board and written informed consent was obtained from all participants prior to enrollment. Psychotherapy was offered as fee for service. For inclusion, participants (a) met Diagnostic Statistical Manual IV (DSM-IV)[26] criteria for current (past 3 months)

AN or EDNOS (subclinical AN), (b) were female, (c) were 18 years and older, and (d) were under a physician's care. Participants were excluded: if (a) they required priority treatment for other debilitating conditions (e.g., bipolar disorder, psychosis), (b) were on appetite or weight medication, (c) were receiving current eating disorder treatment or (d) were medically unstable. Participants taking psychotropic medication were study eligible if they had been stable on the medication for at least 1 month.

Measures—Structured Clinical Interviews for DSM-IV Axis I (SCID I)[27] and Axis II disorders (SCID II)),[28] Participants were assessed with the SCID I and II at baseline and with the SCID I component of the eating disorders module at end of treatment.

Weight and height were measured in order to calculate BMI.

Procedure—All clients were screened by telephone and eligible clients were cleared as medically stable for outpatient treatment by a physician. Clients were required to make regular contact with their physician and any necessary specialist (e.g., psychiatrists, nephrologist) to monitor medical and psychiatric stability. Participants were assessed by assessors not involved in treatment.

Treatment—We utilized the standard DBT manual,[7,8] as well as the DBT for binge eating[29] manual. Treatment involved standard individual DBT psychotherapy, individually delivered DBT skills training repeated over time if clients were in treatment for longer than 6 months, and compressed if in treatment for less than six months, 24-h phone coaching and interaction with a therapist consultation team. As treatment was fee-for-service, treatment duration was established at the start of treatment between the client and therapist but was renewable for the same duration. We followed the four miss rule of standard DBT where treatment dropout is defined as missing four consecutive weeks of psychotherapy or skills training. To set treatment goals, we used the standard DBT target hierarchy that ranks target behaviors in this order: life-threatening behavior, therapy-interfering behavior, quality-of-life interfering behavior and other client goals. We addressed a client's weight-loss problem behavior case-by-case and given where it fell on the target hierarchy. For instance, if a client was fasting while deemed medically unstable, this behavior was regarded as life-threatening; if they were not learning the skills because they repeatedly fell asleep during the session due to dieting, this may be regarded as therapy-interfering behavior; if they were restricting but medically stable, this may be targeted as quality-of-life interfering behavior. Weight restoration was undertaken with the clients and their physician's collaboration adhering to the principle of consultation-to-the-client rules in DBT. Weight was taken at each therapy session. For further details, see Wisniewski et al. (2007).[30] The primary therapist (EYC) had treated eating disorder patients for 12 years and had used standard DBT for 5 years.

Results

All clients were Caucasian with the exception of Client #1, who was African-American. Ages ranged from 20 to 47 years, 2/6 were employed or studying, and 5/6 were single, never married. One third met criteria for AN of the binge purge subtype, one-sixth the AN restricting subtype, and half met EDNOS with restrictive and binge purge behaviors. All

clients would have met DSM 5[31] criteria for AN. SCID I responses showed that participants were practicing extreme weight-loss behaviors to sustain a significantly low weight (Criterion A); intensely feared weight gain (Criterion B); and lacked recognition of the seriousness of their disorder or based their self-evaluation on extreme weight and shape concerns or viewed their weight unrealistically (Criterion C). Five/six would have met the DSM 5 "Restricting type" specifier. Of the six, three met the "Mild" severity specifier; 2/6 "moderate"; and 1/6 "extreme" severity specifier. All six clients made a documented previous attempt at weight restoration, with 4/6 utilizing inpatient stays. The duration of the eating disorder ranged from 7 to 20 years. On the SCID I, half had a history of co-occurring Axis I disorders, half met criteria for a personality disorder and a third had serious medical problems related to the eating disorder. Two of the six were on psychotropics (#2 and 4).

One participant (#3) dropped out of treatment for a higher level of care (day patient and inpatient). The amount of standard DBT received ranged from 4 to 24 months.

The low dropout in Case Series 1 and the fact that we could recruit and enroll participants within a clinical service supports the preliminary feasibility and acceptability of conducting a case series using standard DBT with adults with AN and subclinical AN. The change in baseline and post-treatment BMI yielded an effect size of $d = -0.50$ (95th CI: -1.47 to 0.59), supporting the preliminary efficacy of the treatment but suggesting that further alteration and testing is needed. Unfortunately there were no follow-up assessments. See Appendix for the formula utilized for effect size and 95th confidence interval calculations throughout this study. All effect size calculations used an intent to treat analysis with the last data point carried forward. We chose this method because the dropout and missing data were small.

Case Series 2—Standard DBT Augmented with Skills for Emotional Over Control (Known as Radical Openness Skills[17])

Method

Participants—Case Series 2 was conducted from July 2011 to July 2012 utilizing an adapted form of DBT for 9 women with AN or EDNOS with AN symptoms (Table 2). Clients were self-referred to an adult outpatient eating disorders clinic and psychotherapy was offered without fee. The inclusion and exclusion criteria were the same as for Case Series 1.

Measures—Participants for Case Series 2 were assessed at baseline with the SCID I and II as in Case Series 1. The Eating Disorder Examination 12th Edition (EDE)[32] interview was also included to confirm the presence of DSM-IV[26] eating disorder diagnoses. BMI and bulimic episode severity, frequency, abstinence, and the EDE total score were assessed.

Additionally, in order to assess the changes in other noneating Axis I disorders after treatment, the Longitudinal Interview Follow-up Evaluation-Psychiatric Status Ratings (LIFE)[33] was used weekly to evaluate the presence and severity of Axis I diagnoses over time.

The Global Assessment of Functioning (DSM-IV) (GAF)[26] included a 0–100 scale that was coded by the assessor at each assessment time-point.

Procedure—The procedure for consent, phone screening, medical requirements for eligibility, and monitoring, was the same as for Case Series 1. The primary outcome was BMI. Outcomes were assessed with the EDE, LIFE, and GAF at the end of treatment, and 6- and 12-month follow-up.

To assess treatment acceptability, at the end of Case Series 2 participants were asked to rate on a Likert scale from 0 to 6 "How suitable do you think this treatment will be for your eating disorder?" where 0 = not at all suitable, 3 = suitable, and 6 = very suitable. They were also asked to rate: "How confident would you be in recommending the treatment you will receive to a friend with similar problems?" where 0 = not at all confident, 3 = confident, and 6 = very confident.

Case Series 2 was conducted in the same clinic as Case Series 1. Assessors blind to treatment conducted the standardized clinical interviews and a separate treatment team conducted treatment. The primary therapist had 5 years' experience of standard DBT and had worked with complex eating disorders for 2 years (KS). Therapists in the consultation team attended Lynch's training workshops at national meetings.

Treatment—This Case Series 2 iteration used standard DBT augmented by an early version (October, 2010) of a skills module addressing an over controlled style developed by Lynch et al.,[17] to standard DBT. This early version of the module addressing over controlled emotions and behaviors taught: (1) mindfulness mind states for over control; (2) identification of habitual ways of coping; (3) how to change social behavior by changing physiology; (4) engagement in novel behaviors, including playful behavior and disinhibited expression; (5) openness to others' feedback; (6) trusting others and revealing feelings and thoughts; and (7) practicing Loving-Kindness Meditation to prolong the activation of social-safety mood states. A more updated description of this skills module is detailed in Lynch et al., 2014.[23]

As in Case Series 1, Case Series 2 utilized standard individual DBT psychotherapy, individually delivered skills training, phone coaching as needed and a therapist consultation team meeting. Weight-loss problem behaviors were addressed in the same way as in Case Series 1. Lynch's 8-week module addressing over controlled emotions and behaviors was taught individually after the standard DBT skills training.

Results

All participants were Caucasian with exception of #6 (African-American) and #9 (Asian). Case #3 was Hispanic. Age ranged from 19 to 51 years. Eight were employed or studying full-time, one received social security and all were single and never married. See Table 2 for demographics and outcomes.

Using DSM-IV[26] criteria, one met criteria for AN binge-purge subtype (#3) and the remaining participants met EDNOS criteria. All participants in this case series would have

met DSM 5 criteria for AN,[31] evidenced by their baseline EDE responses and their medical history. Participants reported significantly restricting their food intake or vomiting or abusing insulin in the context of Type I diabetes (#7) to sustain a significantly low weight (Criterion A). Eating disorder behaviors reported at baseline are detailed in Table 3. These behaviors had led to ketoacidosis (#7) and anemia (#1) in two participants. Two developed osteoporosis (#5 and 8) in adolescence due to AN with neither achieving regular menses prior to treatment. Because of extreme weight loss practices, participants #1, # 2, and #9 came to the attention of their institution to participate in treatment or risk withdrawal. When weight was assessed and in response to the EDE, clients exhibited an intense fear of weight gain, meeting Criterion B of the DSM 5 diagnosis for AN. Clients also met Criterion C in lacking recognition of the seriousness of their disorder or focusing excessively on weight and shape concerns as a means of self-evaluation or reporting a disturbed experience of their weight. Of the nine participants, two met the "Restricting type" specifier and 8/9 would have met the "Mild" severity specifier. Of the 9 clients in Case Series 2, 7 made previous attempts at weight restoration, including utilizing inpatient, intensive outpatient, outpatient, and support groups (#7); partial hospitalization and intensive outpatient programs (#2); and outpatient only treatments (#1,#4, #6, #8, #9). Some participants utilized more than one outpatient program ranging from two (#1 and #4) to four programs (#6). One participant had tried Prozac unsuccessfully (#8) and one was currently stable on Wellbutrin and Prozac (#4). The duration of the eating disorder ranged from 1 to 29 years. Participants had co-occurring Axis I disorders (5/9), personality disorders (5/9), and reported histories of suicidal/nonsuicidal self-injury (2/9).

One client was withdrawn prematurely due to medical instability and the need for inpatient treatment (#4). The amount of DBT and augmented skills training received ranged from 4 to 12 months.

Comparing baseline to post-treatment, yielded an effect size improvement in BMI of $d=$ −1.12; 95th CI: −0.40 to −1.84 that was maintained at 6 months, $d = -0.87$, 95th CI: −0.13 to −1.60, and 12-months follow-ups, $d = -1.21$, 95th CI: −0.64 to −1.78. Improvements in total EDE scores at the end of treatment for all participants with a history of binge-eating and compensatory behavior (all except #1) yielded an effect size of $d = 0.53$, 95th CI: −0.76 to 1.82 that was sustained at 6-months follow-up, $d = 0.49$, 95th CI: −0.90 to 1.88 but declined at 12-months follow-up, $d = 0.39$, 95th CI: −1.01 to 1.79. Figure 1 details the median BMI for Case Series 1 and Case Series 2 at each assessed time point.

With regards to menses, at baseline, none reported regular periods, with #2, #3, #6, and #7 being amenhorreaic, #1, #5, #8, and #9 on the birth control pill, and #4 being menopausal. At treatment completion, #2, #8, and #9 resumed menses. By the 6-month follow-up, the menstrual status of treatment completers remained the same except that case #5 regained menses. At 12-months follow up, the menstrual status of treatment completers remained the same with the exception of #6 who also regained menses.

Eating disorder behaviors (Table 3) improved at the end of treatment, with Cases #1, #2, and #9 experiencing abstinence from initial eating disorder behaviors in the last month. Case #7 with Type I Diabetes also improved in hemoglobin A1C levels from 14 at baseline to 10 at

the end of treatment, where 6 = normal. At 6- and 12-months follow-up, Cases #1, #2, and #9 continued to experience abstinence from ED behaviors in the last month while Case #7 had improved hemoglobin A1C levels of 8-at 12-month follow-up.

At baseline, participants experienced a range of medical problems associated with AN and comorbid Axis I and II disorders (see column "Other" in Table 2). At post-treatment the number of comorbid disorders was reduced from 24 disorders to 15, yielding an effect size of $d = 0.89$, 95th CI: 0.04 to 1.75, that was sustained at 6-months, $d = 0.82$, 95th CI: −0.12 to 1.76, and 12-months follow-ups, $d = 0.84$, 95th CI: 0.03 to 1.65.

GAF improved by the end of treatment, yielding an effect size of $d = -0.69$, 95th CI: −4.91 to 3.54, and declined at 6 months follow-up such that $d = -0.44$, 95th CI: −10.64 to 9.75, but increased at 12-months follow-up to $d = -0.77$, 95th CI: −9.66 to 8.13. With regards to GAF, compared with baseline, at the end of treatment: 3/9 had improved, 4/9 did not change, and 1/9 worsened. At 6 months followup, given changes from baseline categories: 4/9 improved, 1/9 did not change, and 3/9 worsened; and at 12-months follow-up, 5/9 improved, 1/9 did not change, and 2/9 worsened.

When asked at the end of treatment "How suitable do you think this treatment will be for your eating disorder?," the median response was 3, closest to "suitable" which was scored "4". The median response to "How confident would you be in recommending the treatment you will receive to a friend with similar problems?" was 5, closest to "very confident" = 6.

Discussion

This article describes the preliminary feasibility, acceptability, and efficacy of two iterative case series using outpatient DBT for adults with AN. Case Series 1 utilized standard DBT and appeared acceptable and feasible to conduct with a low treatment dropout rate (16%) and a modest effect size increase in BMI of $d = -0.50$. Given this, Case Series 2 augmented standard DBT with a skills module developed for over controlled emotions and behaviors.[17] This augmentation appeared acceptable as evidenced by the low treatment dropout rate (11%) and clients ratings of the treatment's suitability and the confidence they would have recommending the treatment to others. Although the sample size for Case Series 2 was smaller than previous studies, the dropout rate appears low (45.8%[34]; 36%[2]; 18%[4]).

Case Series 2 resulted in effect sizes for BMI of $d = -1.12$ from baseline to post-treatment, that were sustained at 6 months ($d = -0.87$) and 12 months follow-ups ($d = -1.21$). The improvement in BMI at the end of treatment was less than that seen with an inpatient version of DBT for over controlled emotions and behaviors where $d = -1.71$,[23] but similar to estimated effect sizes for an outpatient Emotion Acceptance Behavior Therapy treatment ($d = -1.0$ over post-treatment, 6-months and 12-months follow-up)[34] and better than outpatient MANTRA at 1-year follow-up ($d = -0.85$).[2] Improvements for total EDE scores at the end of treatment yielded an effect size of $d = 0.53$ that was sustained at 6-months ($d = 0.49$) but declined at 12-months follow-up ($d = 0.39$). Although we cannot make the same effect size comparisons to other studies[2,34] the effect sizes appeared smaller for this variable. This may

be due to the fact that DBT was not designed to directly target over concern about weight and shape.

This study extends the baseline and end of treatment results from a previous study using a more extensive DBT adaptation[23] for adults with AN treated in an inpatient setting by showing that weight restoration can be sustained with a version of this treatment at 6- and 12-month follow-up. This study also adds to the previous findings by showing a reduction in the number of other non-ED Axis I and II diagnoses and medical problems.

Both case series were limited by small sample sizes and by differences in the outcomes assessed. Outcomes were also assessed at different time points in both case series. Future studies could assess: outcomes such as readiness for change, treatment-relevant outcomes like emotional expressiveness and openness to experience; and weekly measures of eating disorder behavior. Treatment durations were uncontrolled in both case series. Finally, the majority of clients in the two case series met DSM-IV EDNOS criteria and not the full criteria for DSM-IV AN. Clients in the two case series would have met DSM 5 criteria for AN, with most being mild in severity. This limits the generalizability of the findings to less severe cases of AN treated in an outpatient setting.

Comparisons between Case Series 1 and 2 should take into account these differences. Clients in Case Series 1 compared with Case Series 2 were older, more chronic, more severe or lower weight, and reported primarily restricting behaviors rather than binge eating and compensatory behavior. Clients in Case Series 1 were drawn from a fee for service clinic while those in Case Series 2 received treatment in exchange for research participation which may have been associated with demand effects. The use of trainees in Case Series 2, because of strong beliefs in the therapy, may have led to stronger therapist effects, although this may have been moderated by the use of assessors blind to treatment. Finally, because iterative case series designs involve case series conducted at different time points, this design is prone to time effects.

Despite these limitations, the strengths of the study are the iterative case design, strong client retention and blinded assessment. Case Series 2, utilizing the EDE, resulted in large BMI changes, despite the fact that DBT and the skills addressing an over controlled style do not focus on weight restoration. Both case series had strong retention and the results for BMI in Case Series 2 appear comparable if not better than other outpatient treatments for AN.

In summary, our results suggest adding skills addressing over controlled emotions and behaviors to standard DBT may be helpful and are enduring although given the study design and limitations these are very tentative conclusions. The use of Radical Openness skills for weight-restored AN clients may be helpful for relapse prevention. This study also motivates further evaluation of the full DBT protocol for over controlled emotions and behaviors[23] using randomized controlled trials designs. Additionally the theory of over controlled disorders[23] is a testable trans-diagnostic model that overlaps with the National Institute of Mental Health Research Domain Criteria initiative encouraging the development of new treatments integrating behavioral constructs with neurobiology.

Appendix

There are a variety of ways of calculating Cohen's d for pre-post open trials. Here we chose this formula because we wanted to capture the variability in treatment outcome.

This study used this formula:

$$\text{Cohen's } d = (\text{mean of pre- and post- difference scores})/(\text{sd of mean difference scores}).$$

We are cognizant that there are alternate ways of calculating *d* and that we cannot directly compare this formal with other Cohen's *d* calculations reported in other studies or meta-analyses.

To calculate a 95th percentile confidence interval around the difference of the pre- and post-difference score means we used this formula as described in Cummings and Finch (2001)[35]:

$$\text{Upper and lower limits of the 95th percentile CI} = (M/\text{SDdiff} \pm w)$$

Where

M = estimate of the mean of the difference

SDdiff = standard deviation of the difference means

$w = \text{SE} \times t_{(n-1),\text{C}}$

$\text{SE} = \text{SD}/\ n$

SE = standard error of the difference means;

SD = standard deviation of the difference means;

n = sample size;

t is the critical value cutting off the lower 2.5% and upper 2.5% given (n–1).

The *t*-value for (n–1) was 2.571 for Case Series 1 (where n = 6) and 2.306 for Case Series 2 (where n = 9).

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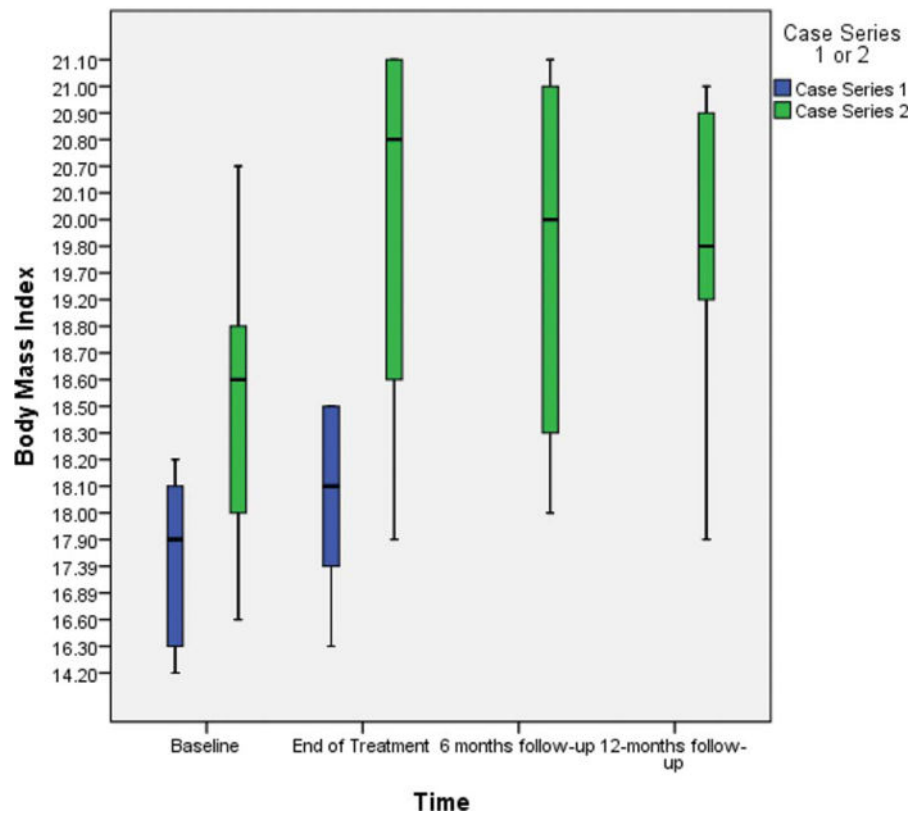
FIGURE 1.
Changes in median body mass indices (BMI) for case series 1 using standard DBT with adults with AN and case series 2 using standard DBT augmented by a skills module for over controlled emotions and behaviors.[17] Box plots denote medians and 1st and 3rd quartiles (interquartile interval).

TABLE 1

Means and standard deviations for primary outcomes for case series 1 using standard DBT with adults with AN

#	Age	Dur	Men1	In	ED Sym1	Co-Occurring Disorders	Tx	BMI1	BMI2
1	47	17	A	2	Restricting	Kidney disease, past MD	24	14.2	16.3
2	42	9	A	2	Restricting, Occasional Vomiting, Overexercise, Chewing and spitting	PDNOS, Osteoporosis, Crohn's Disease (in remission), Nephrolithiasis, 1 suicide attempt	12	16.3	18.1
3	30	18	Pill	0	Restricting, Occasional laxatives	None reported	6	16.9	—
4	20	7	A	1	Restricting, Occasional overexercise	PDNOS	12	18.2	17.4
5	30	20	A	2	Restricting, Subjective binge-eating and vomiting	MD, History of self-injury, one involving 100 stitches and ER visit, BPD	6	18.1	18.5
6	25	15	A	0	Objective binge-eating and vomiting	MD, Panic Attack Disorder, Social Phobia, PTSD deferred, GAD	4	18.1	18.5
M(SD)	32.3 (10.25)	14.3 (5.2)	5/6 A	4/6 In		2.5 (2.1)	10.7 (7.3)	16.97 (1.56)	17.62 (0.90)

Dur: duration of AN in years; Men1: menstrual status Pre-DBT; A: amenhorrhea; Pill: birth control; In.: of Inpatient admissions for weight restoration prior to DBT; ED sym1: eating disorder symptoms baseline.; Tx: months of standard DBT; MD: major depression; PDNOS: personality disorder not otherwise specified; BPD: Borderline Personality Disorder; PTSD: post traumatic stress disorder; GAD: generalized anxiety disorder; BMI1: baseline body mass index (BMI); BMI2: BMI at the end of DBT; M: mean; SD: standard deviation.

TABLE 2

Case series 2 utilizing standard DBT augmented by a skills module for over controlled emotions and behaviors[17]

#	Age	Dur	DSM 5 type	EDE1	EDE2	EDE3	EDE4	Co1	Co2	Co3	Co4	Tx	BMI1	BMI2	BMI3	BMI4	GAF1	GAF2	GAF3	GAF4
1	19	3	Restricting	0.03[a]	0.34[a]	0.21[a]	0.45[a]	OCD; MD; anemia (3)	0	0	1	7	18.00	18.70	18.20	19.20	60	75	86	75
2	24	1	Binge-purge	4.94	0.28	4.66	4.94	MD (1)	0	0	0	5	18.60	21.10	20.80	19.80	50	60	80	80
3	21	8	Binge-purge	4.84	3.10	1.74	1.45	BPD (1)	1	1	1	6	16.60	17.90	18.00	17.90	42	46	46	56
4	51	29	Binge-purge	3.98	dpt	dpt	dpt	MD; ADNOS; PD & agora, OCPD (4)	dpt	dpt	dpt	4	18.00	dpt	dpt	dpt	50	dpt	dpt	dpt
5	24	6	Restricting	1.21	0.31	0.05	0.28	Osteo.(1)	0	0	0	9	20.10	21.10	20.90	20.80	75	79	82	82
6	25	13	Binge-purge	4.97	4.49	4.49	4.84	MD; BPD; SA (11 times) & NSSI (innumerable lifetime); SPD; PTSD; OCD (5)	3	2	2	12	20.70	21.10	21.10	20.90	31	31	31	51
7	24	3	Binge-purge	1.13	1.47	0.76	0.39	BPD; NSSI (1)	1	1	1	12	18.80	20.00	19.20	19.70	62	65	55	60
8	38	11	Binge-purge	4.11	4.02	5.11	5.11	BP II; SocP; GAD; Agora; AVPD; DPD; OCPD; Osteo. (8)	6	7	1	12	18.60	21.00	21.00	21.00	52	50	50	50
9	22	4	Restricting	0.23	0.66	0.49	0.74	None	0	0	0	5	18.60	18.50	18.30	18.80	65	65	60	63
M (SD)	27.56 (10.31)	8.67 (8.59)	2/9 Restricting	3.18 (1.98)	2.29 (1.80)	2.28 (2.16)	2.46 (2.29)	2.67 (2.60)	1.67 (2.18)	1.67 (2.40)	1.78 (2.33)	8 (3.2)	18.67 (1.19)	19.71 (1.42)	19.50 (1.42)	19.57 (1.19)	54.11 (13.09)	57.89 (15.14)	60.00 (18.78)	63.00 (12.91)

Dur: Duration of AN in years; EDE1: baseline EDE total; EDE2: end of treatment EDE total; EDE3: 6-months followup EDE total; EDE4: 12-months followup EDE total; Co1: comorbid disorders or medical problems at baseline; Co2: at end of treatment; Co3: 6-months followup; Co4: 12-months followup; PD: panic disorder; agora: agoraphobia; OCD: Obsessive Compulsive disorder; MD: major depression; BPD: Borderline Personality Disorder; ADNOS: anxiety disorder NOS; PD: panic disorder; agora: agoraphobia; OCPD: obsessive compulsive personality disorder; Osteo:osteoperosis; SA & NSSI: suicide attempt and non-suicidal self-injury; SPD: Schizotypal Personality Disorder; PTSD: Post-traumatic Stress Disorder; BP II: Bipolar II; SocP: Social Phobia; GAD: generalized anxiety disorder; AVPD: Avoidant Personality Disorder; DPD: Depressive Personality Disorder; Tx: months of adapted DBT; BMI1: body mass index (BMI) at baseline; BMI2: BMI at end of treatment; BMI3: BMI at 6-months followup; BMI4: BMI at 12-months follow-up; GAF1: Global Assessment of functioning (GAF) at baseline; GAF2: GAF at end of treatment; GAF3: GAF 6-months follow-up; GAF4: GAF 12-months follow-up; GAF 31–40: impaired in reality testing or communication; GAF 41–50: serious impairment; GAF 51–60: moderate impairment; GAF 61–70: mild impairment; GAF 71–80: slight impairment; Drpt: treatment dropout; M: Mean; SD: Standard Deviation.

[a]Excluded these scores from the calculation of means and standard deviations as this individual did not have a history of binge-eating and/or compensatory behavior.

TABLE 3

Changes in objective binge-eating episodes, subjective binge-eating episodes, vomiting and overexercise in Case Series 2 utilizing Standard DBT augmented by a skills module for over controlled emotions and behaviors[17]

#	ED Beh.	ED 1	ED 2	ED 3	ED 4	% Reduction from Baseline to End of Treatment	% Reduction from Baseline to Six months follow-up	% Reduction from Baseline to 12 months follow-up
1	R	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	OBE	4	0	0	0	100%	100%	100%
	SBE	18	0	2	0	100%	89%	100%
	V	16	0	0	0	100%	100%	100%
3	OBE	28	13	20	28	54%	29%	0%
	SBE	28	20	10	24	29%	64%	14%
	V	420	39	200	280	91%	52%	33%
	OE	28	7	12	4	75%	57%	86%
4	OBE	15	dpt	dpt	dpt	dpt	dpt	dpt
	V	13						
5	R	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	OE	28	20	20	0	29%	29%	100%
6	SBE	14	28	6	38	−100%	57%	−171%
	V	6	4	4	21	60%	60%	−250%
	OE	28	28	0	0	0%	100%	100%
7	Insulin abuse	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	OBE	42	40	35	35	5%	17%	17%
	OE	28	28	28	28	0%	0%	0%
9	OBE	8	0	0	1	100%	100%	88%
	SBE	5	0	0	0	100%	100%	100%
	V	13	0	0	1	100%	100%	92%

ED Beh:Type of baseline eating disorder behavior as assessed by the Eating Disorders Examination (EDE); R:Restricting; OBE:objective binge episodes; SBE:subjective binge episodes; V:vomiting; and OE:Overexercise episodes for last month; ED1:# of episodes of eating disorder behavior in the last month at baseline as assessed on the EDE; ED2:at end of treatment; ED3:at six months follow-up; ED4:at 12 months follow-up; N/A: Not Applicable; dpt:Dropout.