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CBT4BN: A Randomized Controlled Trial of Online Chat and Face-to-Face Group Therapy for Bulimia Nervosa

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Disclosures

Dr. Bulik is a grant recipient and consultant for Shire Pharmaceuticals and has consulted for Ironshore. Dr. Marcus is on the Scientific Advisory Board of Weight Watchers International, Inc. Dr. Peat is recipient of a contract from RTI and Shire Pharmaceuticals and has consulted for Sunovion Pharmaceuticals, L.E.K consulting, and Nexus Global Solutions. Dr Watson. is supported by a research grant from Shire awarded to UNC-Chapel Hill. Dr. Zerwas has consulted for L.E.K consulting.

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Abstract

Objective—Although cognitive-behavioral therapy (CBT) represents the first-line evidence-based psychotherapy for bulimia nervosa (BN), most individuals seeking treatment do not have access to this specialized intervention. We compared an Internet-based manualized version of CBT group therapy for BN conducted via a therapeutic chat group (CBT4BN) to the same treatment conducted via a traditional face-to-face group therapy (CBTF2F).

Method—In a two-site, randomized, controlled non-inferiority trial, we tested the hypothesis that CBT4BN would not be inferior to CBTF2F. One hundred forty-nine adult patients with BN (2.6% males) received up to 16 sessions of group CBT over 20 weeks in either CBT4BN or CBTF2F and outcomes were compared at the end of treatment and 12-month follow-up.

Results—At the end of treatment, CBT4BN was inferior to CBTF2F in producing abstinence from binge eating and purging and in leading to reductions in the frequency of binge eating and purging. However, by 12-month follow-up, CBT4BN was mostly not inferior to CBTF2F. Participants in the CBT4BN condition, but not CBTF2F, continued to reduce their binge-eating and purging frequency from end of treatment to 12-month follow-up.

Conclusions—CBT delivered online in a group chat format appears to be an efficacious treatment for BN although the trajectory of recovery may be slower than face-to-face group therapy. Online chat groups may increase accessibility of treatment and represent a cost-effective approach to service delivery. However, barriers in service delivery such as state-specific license and ethical guidelines for online therapists need to be addressed.

Background

Cognitive-behavioral therapy (CBT) is the first-line evidence-based psychotherapy for bulimia nervosa (BN) in adults [1–3]. Approximately 40–60% of patients who complete this treatment demonstrate significant improvement [3]; group and individual CBT are similarly effective[4] although some have found that group CBT is less likely to produce abstinence from binge eating and purging [4].

Patients with BN struggle with a fragmented system of care and social barriers to treatment. Well-trained CBT therapists and eating disorder specialists are difficult to locate [5]. Treatment may require considerable travel to university hospitals or specialty clinics and a substantial time and financial commitment [6]. Although group CBT is more economical, group delivery can deter patients who experience social anxiety or shame from seeking treatment [7, 8].

In response to these barriers, mental health services using online computer-mediated communication technologies (e.g., videoconferencing, mobile self-monitoring, text messaging, chat groups, digital coaching, and online self-help training) have emerged to fill gaps in service delivery and have demonstrated promise in treating bulimic symptoms [9–

13]. An advantage of the chat group format is that it provides anonymity to all meeting participants, which can facilitate discussion of sensitive issues and promote openness and self-disclosure [9, 14]. Also, patients in chat-group psychiatric treatment have reported high levels of community, support, and acceptance that approach acceptability ratings of face-to-face treatment [15]. No studies, however, have evaluated whether group therapy delivered via a “chat” room is as effective as face-to-face group therapy for BN [16].

The objective of the current investigation was to compare the efficacy of a therapist-moderated chat group for BN (CBT4BN) to traditional face-to-face group CBT for BN (CBTF2F). We hypothesized that an online group chat would be an acceptable platform to disseminate evidence-based treatment for BN and that CBT4BN would not be inferior to CBTF2F. We expected that patients in both conditions would be equally likely to experience abstinence from binge eating and purging behaviors at the end of treatment and at the 12-month follow-up.

Methods

Design and Procedure

The randomized controlled trial was designed as a two-site non-inferiority trial. The institutional review boards at both institutions approved the trial and all patients provided informed consent. Details regarding the design, methods, and treatment of the study have been published previously, registered at ClinicalTrials.gov (NCT00877786), and can be found in Online Supplement: Methods [17, 18]. Patients were assessed at baseline, end of treatment, and 12-month follow-up. During the follow-up period, patients had no further therapeutic contact with study personnel.

Participants

Patients were recruited via clinical referrals and completed a telephone screen to assess inclusion and exclusion criteria before an in-person baseline assessment. The CONSORT Flow Diagram (Online Figure 1) summarizes participant enrollment and study flow. Details about inclusion and exclusion criteria for the trial can be found in Online Supplement: Methods. Analyses were conducted on the intent-to-treat (ITT) sample and included all randomized participants, except patients who were terminated from the study (due to changes in status that led them to meet exclusion criteria during the course of the trial) or withdrew consent.

Treatment

Participants in both groups participated in 16, 90-minute group CBT sessions delivered over 20 weeks (12 weekly followed by 4 bi-weekly sessions). Groups were therapist-led and included 3–5 patients. Modules included psychoeducation, self-monitoring, normalization of meals, cue identification, challenging automatic thoughts, thought restructuring, chaining, and relapse prevention—with sections on body image, assertiveness, and cultural messages [19]. Two sessions focused on the dietary exchange system and were moderated by a registered dietitian. Treatment content and duration were equivalent in CBT4BN and CBTF2F, but the delivery method differed. Patients in CBT4BN groups convened with the

therapist via an online chat group; patients in CBTF2F met the therapist and group members face-to-face for each session. Treatment completion was defined as attendance at ≥75% of treatment sessions. Additional details about the treatment and therapist supervision and adherence can be found in Online Supplement: Methods.

Assessment

Additional details about the assessments can be found in Online Supplement 1: Methods.

Eating Disorder Symptoms—The *Eating Disorder Examination* interview (EDE) was administered at baseline, end of treatment, and follow-up by assessors blind to the patient's treatment condition [20]. The primary outcome variable was abstinence from binge eating and purging (0 episodes over the previous 28 days). Secondary outcome variables included BN diagnosis and the frequency of binge and purge episodes and the tertiary outcome included the global EDE score.

Comorbid Psychopathology—Tertiary outcomes measured by the SCID-I/P [21] included the presence of a major depressive disorder or anxiety disorder (i.e., social phobia, generalized anxiety disorder, and specific phobia). Depression and anxiety severity were measured by the Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI) [22, 23].

Quality of Life—Quality of life was measured by the Eating Disorders Quality of Life Questionnaire (EDQOL) and the Short-Form Health State Classification (SF-6D) [24, 25].

Treatment Evaluation

Treatment Preference and Evaluation—At baseline, participants recorded their preference for treatment (CBT4BN vs. CBTF2F) and rated credibility (i.e., how logical the proposed treatment appeared) and expectancy (i.e., how confident participants were that treatment would succeed) with the Client Satisfaction Questionnaire (CSQ) [26]. At the end of treatment, they completed a 6-item self-report measure designed for this study that assessed their satisfaction with treatment.

Post-Treatment Service Utilization—Using the McKnight Follow-up of Eating Disorders (MFED) [27], participants were interviewed at 3-, 6-, and 12-month follow-up and reported whether they had psychotherapy for their eating disorder or had taken any psychotropic medications during the post-treatment period.

Randomization, Power, and Statistical Analyses

Details about randomization, power and statistical analyses have either been published previously or are described in Online Supplement: Methods [17, 18].

With a 15% margin, one-sided 95% confidence interval (CI), and expected 30% abstinence in the CBTF2F and CBT4BN group, we calculated power at 63% (PASS, version 11.00.10). This margin ($d = 0.38$) re-parameterized as an odds ratio and converted to Cohen's d was used for all outcomes in the study to determine inferiority.

Analyses were conducted using Stata 12.1 and SAS 9.4. Generalized estimating equations (GEE) models were constructed for each primary, secondary, and tertiary outcome. Each model included a main effect term for treatment condition (CBT4BN and CBTF2F); a covariate term for site; dependent variables with a measure of baseline severity had baseline value included as a covariate term; a time main effect; and a treatment condition × time interaction term (end of treatment and follow up), which tested whether the effects of CBT4BN and CBTF2F differed over time. Results for the main hypothesis were interpreted with respect to the 95% CI of *d* and the non-inferiority margin (i.e., Cohen's $d = 0.38$ instead of *p* values) [28].

Participants who did not provide data on abstinence were scored non-abstinent at the end of treatment, to conservatively estimate missing data on the primary outcome. Remaining missing data were imputed using multiple imputation by chained equations (MI) and maximum likelihood estimation with the expectation-maximization imputation (ML).

Results

The sample was somewhat diverse (6% African-American, 3% Asian, 1% Native Hawaiian or Pacific Islander, 6% endorsing other, and 5% Latino) and 2% of the sample was male (Online Table 1). There were no significant differences between randomization groups on any baseline variables. Treatment completers had greater education and lower BMI than non-completers (Online Tables 1 & 2).

Table 1 and Online Table 3 give the results of the main analyses. Regarding the primary outcome, the percentage of abstinent participants increased from baseline to the end of treatment and from end of treatment to follow-up in both groups (Figure 1). At end of treatment, CBT4BN was inferior to CBTF2F but by the follow-up, CBT4BN was no longer inferior.

At baseline, CBT4BN was not inferior to CBTF2F on failure to engage in treatment; but was inferior on the rating of treatment preference and credibility. At the end of treatment, CBT4BN was not inferior to CBTF2F on percentage reduction in binge eating, major depression diagnosis, BDI, EDQOL, and SF-6D; but was inferior on treatment acceptability rating, treatment dropout, and self-monitoring adherence. At follow-up, CBT4BN was not inferior to CBTF2F on percentage reduction in binge eating, EDE, BMI, major depression diagnosis, BDI, BAI, and SF-6D; but was inferior on binge-eating frequency.

In terms of other factors that could have affected outcome, we compared reports of antidepressant usage at baseline and at post-treatment (~70% available data) and at post-treatment and follow-up (~50% available data), with no group difference on missingness. There were no statistically significant differences between groups in antidepressant use at any time points or in changes in use between time points. There were also no statistically significant differences between groups in psychotherapy use during the 12-month follow-up. Over the follow-up, 41% in CBT4BN and 58% in CBTF2F took antidepressant medication and 54% in CBT4BN and 47% in CBTF2F received psychotherapy.

Conclusions

CBT4BN was inferior to CBTF2F in producing abstinence from binge eating and purging at post-treatment, but by 12-month follow-up, was non-inferior on most measures. In both groups, symptom severity (as measured by the global EDE), comorbidity and general quality of life were improved, with CBT4BN non-inferior to CBTF2F at follow-up (with the exception of anxiety symptoms). Internet-based CBT may be a viable alternative intervention, that may be associated with a slower trajectory of change than CBTF2F in its current incarnation. Further study is needed, however, to examine why chat-based CBT resulted in a slower path to abstinence from binge eating and purging. We hypothesize that because of its inherent anonymity, chat-based therapy in CBT4BN may have led to fewer social demands for change than a face-to-face group during the trial. However during the follow-up period, participants in CBT4BN appeared to “catch up” to participants in CBTF2F. It might be that subsequent face-to-face interventions complemented CBT4BN more effectively than providing an extension to CBTF2F. Participants in CBT4BN might also have benefitted from easier access to the online manuals and worksheets during the follow-up period.

In absolute terms, the cognitive-behavioral treatment used in this study, whether delivered via CBT4BN or CBTF2F, only led to abstinence for a minority (14–30%) of participants. The majority were still symptomatic at the end of treatment and at follow-up. These abstinence rates mostly align with the previous RCT of this form of CBT (28% abstinence) [14]. However, previous RCTs of individual CBT have had greater success in achieving abstinence, with 38–47% of patients reporting abstinence by the end of 20-week treatment [17, 29, 30]. Our findings may represent an improvement over previous RCTs of group CBT, which reported 0–16% of participants abstinent by post-treatment, and only 10% at 6-month follow up [31–33]. Subsequent papers will examine treatment effectiveness by taking into account other individual characteristics associated with outcome (i.e., moderators) and explore potential adverse effects of psychotherapy [34, 35].

The high failure to engage and dropout rates in both conditions question the general acceptability of both interventions. Treatment augmentation, perhaps through individual visits, asynchronous email communication [36], text messages with therapists [37], and video conferencing [38], or intermittent face-to-face contact for on-line participants [16] may engage and retain patients for longer. More frequently scheduled groups and greater homework may also yield greater success [39].

In light of the present findings, placing CBT4BN within a system of clinical care requires careful consideration because improvement is slower. Although group CBT delivered through CBT4BN represents a parsimonious use of therapist time [7], the balance between the personal and economic costs and benefits needs investigation. CBT4BN (like CBTF2F) may represent an important intermediate step in a tiered treatment system that falls between self-help and individual CBT. Online therapy might also be more effective for patients with less comorbid psychopathology, and CBT4BN may be more suited for these individuals [16]. CBT4BN may have value as a treatment modality for patients who would otherwise be

unable to access treatment due to long wait lists at specialist clinics, lack of mobility, or access to face-to-face CBT.

In the United States, for example, barriers for implementing chat group therapy include differences across state licensing boards and limitations on practicing across state boundaries [40]. Moreover, online medical services would need to meet strict federal privacy guidelines with clear protections and encryption of sensitive medical information [40]. Similar barriers exist with treatment across national borders and could be further compounded by language issues. In addition, there are significant ethical and legal concerns for treating participants remotely, particularly when patients experience suicidal ideation.

Secular trends in how adolescents and young adults (the peak age of risk for BN) [41] use technology have led to a decline in the use of online chat groups and a corresponding increase in communication through phones, particularly smartphones. In the U.S., although 55% of online adolescents reported going to web-based chat rooms in 2000, by 2006, this number had declined to 18% [42]. In contrast, in 2015, 91% of adolescents reported texting through a mobile app or website and 73% reported having their own smartphone [43]. Although texting in a group versus chat group conversations are functionally quite similar, it remains to be seen whether CBT4BN delivered through a mobile group text would be as effective as the web-based chat group described here.

Limitations and Strengths

Limitations of the present study include: power limitations for non-inferiority analyses, low inter-rater reliability for major depressive disorder, and high levels of dropout. However, this study represents the largest randomized controlled trial of chat group CBT for BN to date and one of only a few studies to examine the use of chat group technology in the treatment of mental illness [16].

Communication technologies, offer significant benefits for delivering psychotherapy including lowering barriers to access. However, as technological change outpaces research, clinicians need to examine both empirical evidence and legal guidelines before carefully deciding when, where, and to whom to deliver technologically-enhanced CBT for BN.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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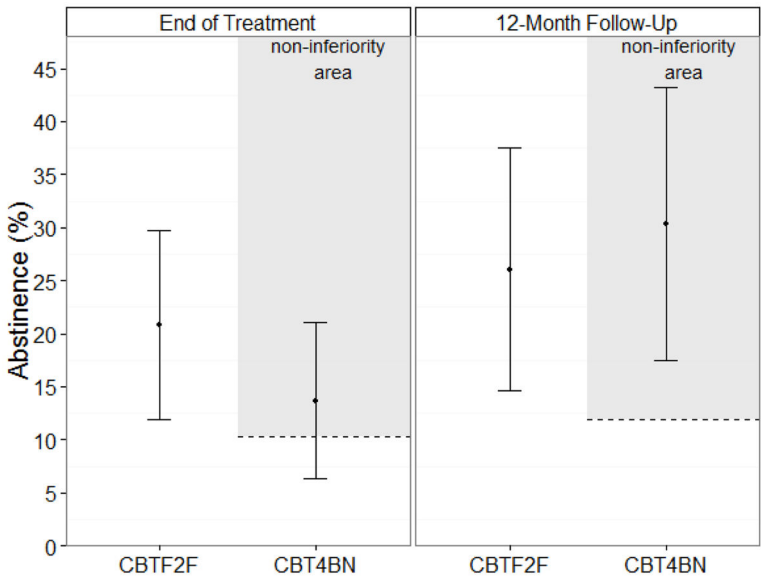

Figure 1.

Percentage of participants abstinent from binge eating and purging by therapy group [online CBT (CBT4BN) vs. face-to-face CBT (CBTF2F)] at the end-of-treatment and 12-month follow-up time points.[a]

[a]Participants with missing data at the end-of-treatment time point are considered non-abstinent and missing data at 12-month follow-up are imputed using multiple imputation.

Table 1

Comparison of online CBT (CBT4BN) to face-to-face CBT (CBTF2F) at end-of-treatment and 12-month follow-up for the treatment of bulimia nervosa: Multiple imputation analysis with the exception of abstinence at end of treatment (N = 179).

		End of treatment (95% Confidence Intervals)				12-month follow-up (95% Confidence Intervals)			
	Rater	***d*[a]**	**lower**	**upper**	**result**	***d*[a]**	**lower**	**upper**	**result**
Primary Outcome									
Abstinence	Clinician	−0.18	−0.47	0.11	INF[b]	0.07	−0.22	0.37	NI[c]
Secondary Outcomes									
BN symptoms									
Binge-eating frequency	Clinician	0.06	−0.23	0.36	NI	0.10	−0.20	0.39	INF
% Reduction in binge eating	Clinician	−0.01	−0.29	0.29	NI	0.08	−0.21	0.38	NI
Purging frequency	Clinician	0.02	−0.27	0.31	NI	−0.01	−0.29	0.29	NI
% Reduction in purging	Clinician	−0.04	−0.33	0.26	NI	0.01	−0.29	0.29	NI
BN diagnosis	Clinician	0.05	−0.24	0.35	NI	−0.01	−0.30	0.28	NI
Treatment acceptability	Self	−0.31	−0.60	−0.01	INF	-	-	-	-
Tertiary Outcomes									
Eating Disorder Examination (Global Score)	Clinician	0.04	−0.25	0.33	NI	−0.12	−0.41	0.18	NI
Body mass index	Self	−0.24	−0.53	0.06	NI	0.01	−0.28	0.31	NI
Comorbidity									
Depressive disorder	Clinician	−0.11	−0.40	0.18	NI	−0.10	−0.39	0.19	NI
BDI[d]	Self	−0.07	−0.37	0.23	NI	−0.10	−0.40	0.21	NI
Anxiety disorder	Clinician	0.14	−0.16	0.43	INF	−0.04	−0.33	0.25	NI
BAI[e]	Self	0.04	−0.25	0.34	NI	−0.17	−0.46	0.12	NI
EDQOL[f]	Self	0.01	−0.29	0.30	NI	−0.08	−0.38	0.21	NI
SF-6D[g]	Self	0.04	−0.25	0.33	NI	0.14	−0.16	0.43	NI
Treatment									
Failure to engage	NA	−0.24	−0.53	0.05	NI				
Dropout	NA	0.20	−0.09	0.49	INF	-	-	-	-
Self-monitoring adherence	Self	−0.14	−0.44	0.15	INF	-	-	-	-

[a] Cohen's *d* estimate;

[b] Inferior;

[c] Non-inferior;

[d] Beck Depression Inventory;

[e] Beck Anxiety Inventory;

[f] Eating Disorders Quality of Life;

[g] Short-Form Health State Classification.

When maximum likelihood produced the opposite substantive conclusion to multiple imputation this is noted with grey shading. Results for the main hypothesis were interpreted with respect to the upper (UCL) and lower (LCL) 95% confidence limits of *d* and the non-inferiority margin (i.e., Cohen's *d* = 0.38 instead of *p* values). For outcomes whereby higher magnitude is desirable (i.e., abstinence, treatment acceptability), if the LCL is >−0.38 then CBT4BN is non-inferior, elsewise CBT4BN is inferior (e.g., abstinence at end of treatment, LCL is = −0.47, ∴ CBT4BN is inferior). For outcomes whereby lower magnitude is desirable (i.e., binge-eating frequency, BDI, EDQOL), if the UCL is < 0.38 then CBT4BN is non-inferior, elsewise CBT4BN is inferior (e.g., anxiety disorder at end of treatment, UCL is = 0.43, ∴ CBT4BN is inferior).