Examination of Predictors and Moderators for Self-help Treatments of Binge Eating Disorder

Robin M. Masheb, Ph.D. and **Carlos M. Grilo, Ph.D.**
Department of Psychiatry, Yale University School of Medicine.

Abstract

Predictors and moderators of outcomes were examined in 75 overweight patients with binge eating disorder (BED) who participated in a randomized clinical trial of guided self-help treatments. Age variables, psychiatric and personality disorder comorbidity and clinical characteristics were tested as predictors and moderators of treatment outcomes. Current age and age of BED onset did not predict outcomes. Key dimensional outcomes (binge frequency, eating psychopathology, and negative affect) were predominately predicted, but not moderated, by their respective pretreatment levels. Presence of personality disorders, particularly Cluster C, predicted both post-treatment negative affect and eating disorder psychopathology. Negative affect, but not major depressive disorder, predicted attrition, and post-treatment negative affect and eating disorder psychopathology. Despite the prognostic significance of these findings for dimensional outcomes, none of the variables tested were predictive of binge remission (i.e., a categorical outcome). No moderator effects were found. The present study found poorer prognosis for patients with negative affect and personality disorders suggesting that treatment outcomes may be enhanced by attending to the cognitive and personality styles of these patients.

Keywords

binge eating disorder; obesity; overweight; predictors; moderators; negative affect; personality disorders

---

Binge eating disorder (BED) is a prevalent clinical problem associated with high levels of eating disorder psychopathology, psychological distress, and medical comorbidity (Hudson, Hiripi, Pope, & Kessler, 2007). Although effective treatments have been identified for binge eating problems (Wilson, Grilo, & Vitousek, 2007), even in treatment studies with the most impressive results (e.g., Wilfley et al., 2002), a substantial proportion of patients do not achieve abstinence from binge eating and fail to lose weight. Thus, it is important to find ways to predict response to treatments as this could facilitate the development of more targeted and effective interventions.

Unfortunately, there has been a relative absence of data published on predictors of outcome for BED (Wilson et al., 2007) and a critical review of that small literature highlighted its significant methodological shortcomings (Berkman, Lohr, & Bulik, 2007). Preliminary studies have identified several factors that may be associated with poor outcome. Severity of binge eating (Agras et al., 1995; Agras, Telch, Arnow, Eldredge, & Marnell, 1997), earlier onset of BED (Agras et al., 1995), and younger age at time of presentation for treatment (Agras et al., 1997) predicted worse binge outcome in some studies. Two studies have found that

---

Correspondence concerning this article should be addressed to Robin M. Masheb, Yale University School of Medicine, PO Box 208098, 301 Cedar Street, 2nd Floor, New Haven, Connecticut 06520-8098. E-mail: robin.masheb@yale.edu.

pretreatment binge frequency predicted post-treatment binge frequency in group cognitive-behavioral treatment (CBT) (Peterson et al., 2000) and self-help CBT (Loeb, Wilson, Gilbert, & Labouvie, 2000). Wilfley and colleagues (2000) reported that psychiatric, and for the most part personality disorder comorbidity were unrelated to treatment outcome. Thus, little is known about predictors of treatment outcome for BED and even less is known about treatment moderators for this disorder (Wilson et al., 2007).

In the present study, we examined predictors and moderators among participants in a controlled trial testing guided self-help CBT (CBTgsh) and behavioral weight loss (BWLgsh) treatments (Grilo & Masheb, 2005). Potential predictor variables were chosen based on either an attempt to replicate previous findings (age variables, comorbidity, and binge frequency), or to test specific variables (eating disorder psychopathology, negative affect, and self-esteem) that have theoretical importance in prominent models of eating disorders (Fairburn et al., 2003).

Method

Participants

Participants were 75 patients who met *Diagnostic and Statistical Manual of Mental Disorders (4th ed.) - Text Revision* (*DSM-IV-TR*; American Psychiatric Association [APA], 2000) research criteria for BED and participated in a randomized controlled trial of CBTgsh and BWLgsh from January 2000 to June 2004. Recruitment consisted of advertisements seeking participants who wanted to "stop binge eating and lose weight." Participants were required to be 18 to 60 years, have a body mass index (BMI) of 27 or greater, and have BED. Exclusion criteria were: concurrent treatment for eating, weight, or psychiatric illness; medical conditions (diabetes) that influence eating or weight; severe current psychiatric conditions requiring other treatment (psychosis, bipolar disorder); and pregnancy. The study was approved by the Yale University School of Medicine institutional review board, and all participants provided written informed consent.

Ninety consecutively evaluated individuals were randomized, based on the order accepted into the study, to CBTgsh (*n*=37), BWLgsh (*n*=38) or wait-list control (*n*=15). A computer generated randomization list was prepared by an independent statistician, and randomization was concealed for each participant until after completion of the baseline assessment. As reported in greater detail elsewhere (Grilo & Masheb, 2005), CBTgsh had significantly higher completion rates (87% vs. 67%) and binge remission rates (46% vs. 18%) than BWLgsh. CBTgsh and BWLgsh did not differ significantly in secondary outcomes measures of ED psychopathology, negative affect, or weight loss, which showed substantial improvements -- except for weight loss which was minimal.

Only the 75 participants receiving *active* treatments (CBTgsh or BWLgsh) were eligible for this study. Participants were 20 to 60 years (*M*=46.0, *SD*=9.1); 81% (*n*=61) were female, and 84% (*n*=63) attended or finished college. The group was 73% (*n*=55) Caucasian, 11% (*n*=8) African American, 13% (*n*=10) Hispanic American, and 3% (*n*=2) of other ethnicity. Mean BMI was 35.3 (*SD*=6.9).

Diagnostic Assessment

The diagnostic assessment was performed by trained and monitored doctoral-level research-clinicians. *DSM-IV-TR* (APA, 2000) Axis I psychiatric disorder diagnoses were based on the *Structured Clinical Interview for DSM-IV Axis I Disorders* (*SCID-I/P)* (First, Spitzer, Gibbon, & Williams, 1996), and the BED diagnosis was confirmed with the *Eating Disorder Examination Interview*-12th Edition version (*EDE)* (Fairburn & Cooper, 1993). Axis II personality disorder diagnoses were based on the *Diagnostic Interview for DSM-IV Personality*

Disorders (DIPD-IV; Zanarini, Frankenburg, Sickel & Young, 1996). Inter-rater reliability for diagnoses ranged from kappa 0.58 to 1.0; kappa for BED was 1.0.

Measures

Daily self-monitoring records were used throughout the 12-weeks, and at the end of treatment, to assess prospectively binge remission and binge frequency using the EDE definition for objective bulimic episodes (OBEs; Grilo, Masheb, & Wilson, 2001). Research clinicians collected and checked records for accuracy at each session, and any incomplete records were completed. Several self-report measures were given prior to the study, monthly during treatment and at the end of treatment. *The Eating Disorder Examination - Questionnaire Version* (EDE-Q; Fairburn & Beglin, 1994), the self-report version of the EDE Interview (Fairburn & Cooper, 1993), generates a total global score derived from the four subscales; this serves a measure of overall eating disorder psychopathology. The EDE-Q has received empirical support for its use with patients with BED (Grilo et al., 2001). In the present study Cronbach's alphas for subscales range .61 to .75. *The Beck Depression Inventory* (BDI; Beck & Steer, 1987) 21-item version, is a well-esteablished measure of the symptoms of depression and negative affect. A large volume of research has reported adequate internal consistency, acceptable short-term test-retest reliability, and convergent validity. In the present study the BDI had excellent internal consistency ($\alpha = .87$). *The Rosenberg Self-Esteem Scale* (RSES; Rosenberg, 1979) is a well-established 10-item measure of global self-esteem, with adequate internal consistency and test-retest reliability. In the present study, the RSES had good internal consistency ($\alpha = .77$).

Guided Self-Help Treatments

Treatments were administered individually following a guided self-help approach. The 12-week protocol included six brief (15–20 minute) individual meetings, and one of the following patient manuals: *Overcoming Binge Eating* (Fairburn, 1995) for CBTgsh or *LEARN Program for Weight Management 2000* (Brownell, 2000) for BWLgsh.

Overview of Analyses

Pretreatment variables were tested as predictors and moderators of treatment outcomes. Predictors of treatment outcome were identified by significant findings for a main effect of the pretreatment variable on categorical (attrition and binge remission) or dimensional (binge frequency, eating disorder psychopathology, and negative affect) BED outcomes. Moderators of treatment outcome were identified by significant findings for an interaction effect of the pretreatment variable and treatment condition on treatment outcomes, regardless of the presence of a main effect for that pretreatment variable (Kraemer et al., 2002). Missing data was imputed using expectation maximization (EM) algorithms from the SPSS Missing Value Analysis add-on module.

Results

What Predicts Attrition?

Logistic regression analyses were performed to identify predictors of attrition. Negative affect (BDI) was the only significant predictor of attrition. Follow-up analyses revealed that participants who dropped out reported significantly more negative affect (M=21.9, SD=11.0 vs. M=15.1, SD=8.4; $F(1, 73)$=7.69, p=.007) than those who completed treatment.

Does Age or Age of BED Onset Predict or Moderate BED Treatment Outcomes?

Table 1 (top) summarizes the main effects of multiple regression analyses examining age variables as predictors. No significant main effects were found for current age or age of BED onset. In addition, no significant interaction effects were found for these variables.

Does Comorbidity Predict or Moderate BED Treatment Outcomes?

Table 1 (bottom) summarizes the main effects of multiple regression analyses examining psychiatric and personality disorder comorbidity. Comorbidities investigated were any psychiatric disorder (n=54, 72.0%), major depressive disorder (MDD) (n=35, 46.7%), any personality disorder (n=18, 24.0%), and any Cluster C personality disorder (n=16, 21.3%). Analyses were not performed for cluster A and B personality disorders given their low frequencies (n=0, 0%; n=1, 1.3%, respectively) in this study. Participants with personality disorders had greater post-treatment eating disorder psychopathology (M=3.7, SD=0.2 vs. M=2.6, SD=0.1; $F(1, 74)$=18.10, p<.001) and greater negative affect (M=14.3, SD=9.66 vs. M=5.7, SD=5.6; $F(1, 74)$=22.21, p<.001) than those without personality disorders. Participants with Cluster C disorders had greater post-treatment eating disorder psychopathology (M=3.7, SD=0.2 vs. M=2.6, SD=0.1; $F(1, 74)$=16.31, p<.001) and greater negative affect (M=15.6, SD=2.0 vs. M=9.8, SD=0.9; $F(1, 74)$=6.44, p=.013) than those without. No significant interaction effects with treatment were found for the psychiatric and personality disorders.

Do Pretreatment Clinical Characteristics Predict or Moderate BED Treatment Outcomes?

Table 2 summarizes the main effects of multiple regression analyses examining the prediction of dimensional treatment outcomes. Post-treatment binge frequency was predicted by pretreatment binge frequency as well as pre-treatment eating disorder psychopathology. Post-treatment eating disorder psychopathology was predicted by pretreatment eating disorder psychopathology as well as pretreatment negative affect and self-esteem. Post-treatment negative affect was predicted by its pretreatment level only. All findings were in the expected direction, (i.e., better functioning on pretreatment scores predicted better functioning on post-treatment scores). No significant interaction effects were found for any of the pretreatment clinical characteristics with treatment conditions.

Do Pretreatment Clinical Characteristics Predict Binge Remission?

Logistic regression analyses were performed to identify potential predictors of binge remission with pretreatment binge frequency as a covariate. No significant main effects were found for the age variables, comorbidity, or pretreatment clinical characteristics in the prediction of binge remission.

Discussion

Investigating predictors of short-term self-help treatment outcomes is particularly important in light of recent guidelines suggesting these represent potential first-line treatment for BED (see Wilson et al., 2007). Our findings suggest that negative affect, as measured by the BDI, was the most salient predictor of guided self-help treatment outcome for BED. Negative affect predicted attrition and post-treatment levels of negative affect and eating disorder psychopathology. Our finding that negative affect predicted attrition is at odds with findings from a smaller study of self-help for BED (Loeb et al., 2000), while our finding that negative affect did not predict post-treatment binge eating corroborated a previous report (Peterson et al., 2000).

In contrast to the robust predictive significance of negative affect, the presence of psychiatric comorbidity, and more specifically MDD, did not predict or moderate attrition or outcomes.

These findings are consistent with previous research in which subtyping BED patients using the BDI (a broad measure of negative affect) had much greater concurrent and predictive utility than subtyping by MDD co-morbidity (Stice et al., 2001). Wilfley and colleagues' (2000) previously reported that psychiatric comorbidity in BED patients was not predictive of group CBT or group interpersonal psychotherapy outcomes. On the other hand, we did find that personality disorders, particularly Cluster C disorders, were predictive of post-treatment levels of eating disorder psychopathology and negative affect.

Key dimensional outcomes, including binge frequency, eating psychopathology, and negative affect were predicted by their respective pretreatment levels. It was not the case, however, that binge remission (a categorical outcome) was predicted by pretreatment binge frequency. This latter finding replicates two studies of CBT, delivered in group (Peterson et al., 2000) and self-help (Loeb et al., 2000) formats.

We were unable to identify any significant moderators of treatment. Moderators refer to whom and under what conditions treatments have different outcomes (Kraemer et al., 2002). It appears that the guided self-help versions of these two structured and behaviorally oriented treatments performed comparably in patients with BED. Thus, our findings provide no guidance for matching patients to either CBTgsh or BWLgsh treatments. The only other study to date that investigated moderators of BED treatments also failed to find any significant moderators (Hilbert et al., 2007).

The identification of predictors and moderators of treatment in the present study was limited to some extent by the sample size. Power analysis for continuous outcome measures (assuming a two-tailed alpha of .05) revealed that, after controlling for treatment and baseline measurement, the current sample size provided adequate power (.80) to identify a predictor accounting for an additional 7–9% depending upon the specific outcome and predictor variables (Hintze, 2001). Power analysis for tests of moderation revealed that depending upon the strength of the relationship between predictor and outcome, the current size provided adequate power (.80) to identify a moderator accounting for an additional 6–9% of the criterion variance over-and-above the main effects model (Hintze, 2001). Power analyses for logistic regression analysis indicated that after controlling for treatment, the current sample size provided adequate power (.80) to identify a predictor with an adjusted odds ratio of 2.08 and a moderator with an adjusted odds ratio ranging from 2.08–2.11 depending upon the specific variables (Hintze, 2001).

Although our study was powered to detect effect sizes as described above, the ability to detect smaller effects would require larger sample sizes. Large sample sizes are often not feasible in conducting behavioral studies although there are ways to partly remedy the problem (Jaccard et al., 2006; Maxwell 2000, 2004) which were considered in the present study. First, with the exception of negative affect and self-esteem ($r=-.69$), the selected variables were not highly correlated (r's ranged from .01–.35). Second, significance tests were supplemented with effect size measures and confidence intervals. Finally, multiple regression, using product terms and the full continuum of the measures, was used to test moderating effects, a more powerful approach than the use of categorical groupings.

We note other potential limitations to consider. Findings in the present study pertain to overweight individuals with BED who participated in a study of guided self-help treatments at a university medical center, and may not generalize to different clinical settings, treatment methods, or longer-term approaches or outcomes. For example, unlike the two Stanford studies (Agras et al., 1995, 1997) with more intensive forms of CBT, we did not find that either age at presentation for treatment (Agras et al., 1997) or earlier onset of BED (Agras et al., 1995) was related to outcome. It could be that younger patients fare worse than older patients in group

CBT, but not guided self-help interventions. The majority (73%) of participants were Caucasian; although the racial and ethnic diversity was representative of New Haven County and the state of Connecticut. Lastly, failure to observe moderating effects may have been limited by a narrow range of scores on dependent measures that are typical of clinical samples.

Overall, negative affect, but not MDD comorbidity, was a robust negative prognostic indicator for most dimensional treatment outcomes for BED as well as for attrition. Key dimensional treatment outcomes were predominately predicted, but not moderated, by their respective pretreatment levels and by the presence of personality disorders, particularly Cluster C disorders. Despite the prognostic significance of these findings for dimensional outcomes, none of the variables tested were predictive of binge remission (i.e., a categorical outcome). The absence of moderating effects for any of the variables tested suggests future research should focus on the differential effects of other, perhaps more intensive, types of treatments for BED. In sum, the present study found poorer prognosis for patients with negative affect and personality disorders suggesting that treatments may be enhanced by attending to the cognitive and personality styles of these patients.

Acknowledgements

References

Agras WS, Telch CF, Arnow B, Eldredge K, Detzer MJ, Henderson J, et al. Does interpersonal therapy help patients with binge eating disorder who fail to respond to cognitive-behavioral therapy? Journal of Consulting and Clinical Psychology 1995;63:356–360. [PubMed: 7608347]

Agras WS, Telch CF, Arnow B, Eldredge K, Marnell M. One-year follow-up of cognitive-behavioral therapy for obese individuals with binge eating disorder. Journal of Consulting and Clinical Psychology 1997;65:343–347. [PubMed: 9086701]

American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4 ed. Washington, DC: Author; 2000. - text revision.

Beck, AT.; Steer, R. Manual for Revised Beck Depression Inventory. New York: Psychological Corporation; 1987.

Berkman ND, Lohr KN, Bulik CM. Outcomes of eating disorders: A systematic review of the literature. International Journal of Eating Disorders 2007;40:293–309. [PubMed: 17370291]

Brownell, KD. LEARN program for weight management 2000. Dallas, TX: American Health; 2000.

Fairburn, CG. Overcoming binge eating. New York: Guilford Press; 1995.

Fairburn CG, Beglin SJ. Assessment of eating disorders: interview or self-report questionnaire? International Journal of Eating Disorders 1994;16:363–370. [PubMed: 7866415]

Fairburn, CG.; Cooper, Z. The Eating Disorder Examination. In: Fairburn, CG.; Wilson, GT., editors. Binge eating: nature, assessment, and treatment. 12th ed. New York: Guilford Press; 1993. p. 317-360.

Fairburn CG, Cooper Z, Shafran R. Cognitive behaviour therapy for eating disorders: a "transdiagnostic" theory and treatment. Behaviour Research and Therapy 2003;41:509–528. [PubMed: 12711261]

First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured clinical interview for DSM-IV Axis I Disorders - Patient Version (SCID-I, Version 2.0). New York: New York State Psychiatric Institute; 1996.

Grilo CM, Masheb RM. A randomized controlled comparison of guided self-help cognitive behavioral therapy and behavioral weight loss for binge eating disorder. Behaviour Research and Therapy 2005;43:1509–1525. [PubMed: 16159592]

Grilo CM, Masheb RM, Wilson GT. A comparison of different methods for assessing the features of eating disorders in patients with binge eating disorder. Journal of Consulting and Clinical Psychology 2001;69:317–322. [PubMed: 11393608]

Hilbert A, Saelens B, Stein R, Mockus D, Welch R, Matt G, et al. Pretreatment and process predictors of outcome in interpersonal and cognitive behavioral psychotherapy for binge eating disorder. Journal of Consulting and Clinical Psychology 2007;75:645–651. [PubMed: 17663618]

Hintze, J. NCSS and PASS. Number cruncher statistical system. Kaysville: Utah; 2001.

Hudson JI, Hiripi E, Pope HG Jr, Kessler RC. The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. Biological Psychiatry 2007;61:348–358. [PubMed: 16815322]

Jaccard J, Guilamo-Ramos V, Johansson M, Bouris A. Multiple regression analyses in clinical child and adolescent psychology. Journal of Clinical Child and Adolescent Psychology 2006;35:456–479. [PubMed: 16836483]

Kraemer HC, Wilson GT, Fairburn CG, Agras WS. Mediators and moderators of treatment effects in randomized clinical trials. Archives of General Psychiatry 2002;59:877–883. [PubMed: 12365874]

Loeb KL, Wilson GT, Gilbert JS, Labouvie E. Guided and unguided self-help for binge eating. Behaviour Research and Therapy 2000;38:259–272. [PubMed: 10665159]

Maxwell SE. Sample size and multiple regression analysis. Psychological Methods 2000;5:434–458. [PubMed: 11194207]

Maxwell SE. The persistence of underpowered studies in psychological research: Causes, consequences, and remedies. Psychological Methods 2004;9:147–163. [PubMed: 15137886]

Peterson CB, Crow SJ, Nugent S, Mitchell JE, Engbloom S, Mussell MP. Predictors of treatment outcome for binge eating disorder. International Journal of Eating Disorders 2000;28:131–138. [PubMed: 10897074]

Rosenberg, M. Conceiving the self. New York: Basic Books; 1979.

Stice E, Agras WS, Telch CF, Halmi KA, Mitchell JE, Wilson T. Subtyping binge eating-disordered women along dieting and negative affect dimensions. International Journal of Eating Disorders 2001;30:11–27. [PubMed: 11439405]

Wilfley DE, Friedman MA, Dounchis J, Stein R, Welch R, Ball S. Comorbid psychopathology in binge eating disorder: relation to eating disorder severity at baseline and following treatment. Journal of Consulting and Clinical Psychology 2000;68:641–649. [PubMed: 10965639]

Wilfley DE, Welch RR, Stein RI, Spurrell EB, Cohen LR, Saelens BE, et al. A randomized comparison of group cognitive-behavioral therapy and group interpersonal psychotherapy for the treatment of overweight individuals with binge-eating disorder. Archives of General Psychiatry 2002;59:713–721. [PubMed: 12150647]

Wilson GT, Grilo CM, Vitousek KM. Psychological treatments of eating disorders. American Psychologist 2007;62:199–216. [PubMed: 17469898]

Zanarini, MC.; Frankenburg, FR.; Sickel, AE.; Young, L. The diagnostic interview for DSM-IV personality disorders. Belmont, MA: McLean Hospital; 1996.

Table 1

Patient Characteristics Predicting BED Treatment Outcomes

Patient Characteristics		BED Treatment Outcomes					
		Binge Frequency		Eating Disorder Psychopathology		Negative Affect (BDI)	
		β	95% CI	β	95% CI	β	95% CI
Age Variables	*M (SD)*						
Age	46.0 (9.1)	.004	−0.16–0.16	−.037	−0.74–0.52	−.005	−0.18–0.17
Age of BED onset	28.1 (13.6)	−.085	−0.14–0.07	.169	−0.08–0.77	.076	−0.07–0.16
DSM-IV-TR Disorders	*N (%)*						
Any psychiatric disorder	54 (72.0)	.087	−1.96 – 4.34	.106	−7.85 – 20.87	.048	−3.18 – 4.80
MDD	35 (46.7)	.003	−2.92 – 3.00	.213	−1.30 – 25.36	.244	0.11 – 7.22
Any personality disorder	18 (24.0)	.071	−2.45 – 4.50	.420*	12.69 – 41.70	.517*	5.38 – 13.03
Cluster C personality disorders	16 (21.3)	.126	−1.77 – 5.54	.419*	12.85 – 43.70	.563*	6.49 – 14.39

Note. BED=Binge Eating Disorder. MDD=Major Depressive Disorder. Eating Disorder Psychopathology = EDE-Q global score. BDI = Beck Depression Inventory. CI = Confidence Interval.

*
$p < .001$.

Table 2

Pretreatment Clinical Characteristics Predicting BED Treatment Outcomes

				BED Treatment Outcomes				
		Binge frequency		Eating disorder psychopathology		Negative affect (BDI)		
Pretreatment Clinical Characterstics	M (SD)	β	95% CI	β	95% CI	B	95% CI
Binge frequency	14.9 (8.5)	.238*	0.01 – 0.34	.164	−0.15 – 1.22	-.160	−0.33 – 0.04
ED psychopathology	3.7 (0.9)	.364**	0.05 – 0.18	.473***	0.37 – 0.94	.014	−0.08 – 0.09
Negative affect (BDI)	16.7 (9.4)	.202	−0.02 – 0.28	.302**	0.26 – 1.52	.517***	0.25 – 0.58
Self-esteem (RSES)	28.6 (5.3)	−.101	−0.38 – 0.15	−.346**	−2.84 – −0.76	-.092	−0.54 – 0.28

Note. BED = Binge Eating Disorder. Eating Disorder Psychopathology = EDE-Q global score. BDI = Beck Depression Inventory. CI = Confidence Interval. RSES = Rosenberg Self-esteem Scale.

*
p < .05

**
p < .01

***
p < .001.