The Effect of Cognitive-Behavioral Therapy for Bulimia Nervosa on Temperament and Character as Measured by the Temperament and Character Inventory

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Cognitive-behavioral therapy (CBT) is a successful treatment method for reducing symptomatology associated with bulimia nervosa (BN). Less is known regarding the impact of CBT on measures of temperament and character across treatment. We explore changes on the Temperament and Character Inventory (TCI) from pretreatment to 1-year follow-up in a sample of women with bulimia nervosa (BN). Ninety-one women who met DSM-III-R criteria for BN, completed pretreatment measures, and participated in a randomized clinical trial with a core treatment of CBT were available for follow-up at 1 year. Participants were assessed at pretreatment using the TCI as part of a larger assessment battery, and received eight sessions of CBT and eight sessions of exposure with response prevention or relaxation training. The TCI was readministered at the 1-year follow-up point. We compared TCI scores across the two administra-

tions and explored the relation between clinical status at 1 year and TCI scores. Significant decreases in the TCI temperament scale of harm avoidance and increases in the character scale of self-directedness were observed between pretreatment and 1-year follow-up. Observed differences in these scales were independent of change in depression scores as well as other measures of therapeutic change (i.e., binge and purge frequency). We conclude that self-directedness and harm avoidance scores are positively affected by CBT. Higher scores on self-directedness not only predict treatment outcome for BN, but overall self-directedness is improved with CBT in women with BN. These results suggest that the elements of CBT affecting self-directedness may hold promise for enhancing the effectiveness of treatment for BN.

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THE DEVELOPMENT and enhancement of effective approaches to the treatment of bulimia nervosa (BN) has taken a high priority in outcome research over the past decade. Cognitive-behavioral therapy (CBT) has proven particularly effective in the treatment of BN, outperforming the next most effective approach, interpersonal therapy, in a recent study.¹ The effectiveness of CBT for the treatment of BN has been demonstrated in numerous clinical trials, with approximately two thirds of patients who complete treatment showing a significant improvement.²⁻⁹

Determining which treatment modalities are most effective has been only one of the major foci in outcome research. Within treatment modalities, identifying characteristics of individuals that are predictive of treatment outcome holds implications

both for choice of treatment and for treatment planning. For example, personality characteristics may influence or be associated with how well a person responds to a given treatment. In addition to predicting outcome at pretreatment, these personality characteristics may also undergo change over the course of treatment and, as such, can be especially valuable as potential measures of treatment effectiveness and indicators of therapeutic change. If independent of other measures of treatment response, such characteristics may also be able to inform us as to the mechanism of action of a given treatment. The question of what components might constitute the "active ingredient(s)" in a given treatment modality remains an open and potentially fertile area of inquiry.

In a previous study, we reported that the character trait of "self-directedness" as measured by the Temperament and Character Inventory (TCI)¹⁰ was the only personality variable that predicted treatment outcome at 1 year of follow-up.¹¹ In this study of 101 women with BN, higher self-directedness scores at pretreatment were associated with better outcome. According to Cloninger et al.,¹² self-directedness is a developmental process that encompasses several distinct aspects, including acceptance of responsibility for one's choices, identification of individually valued goals and purposes, resourcefulness, and self-acceptance. These

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Supported by the Health Research Council of New Zealand and the New Zealand Lottery Grants Board.

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0010-440X/02/4303-0010\$35.00/0
doi:10.1053/comp.2002.32359

characteristics would appear to capture many of the salient elements necessary for the success of CBT. The predictive capacity of self-directedness at pretreatment raises the intriguing question of whether self-directedness constitutes a trait-like dispositional predictor of outcome at pretreatment, or whether self-directedness scores might be enhanced over the course of treatment with CBT. A significant increase in self-directedness scores over the course of treatment would not only constitute a measure of treatment effectiveness, but might be suggestive of an important mechanism of action for CBT.

The present study examines the extent to which CBT for BN affects measures of temperament and character when controlling for measures of clinical outcome.

METHOD

Participants

The data in this report are taken from pretreatment and 1-year follow-up assessments of a randomized clinical trial examining the additive efficacy of two forms of exposure with response prevention to a core of CBT for the treatment of BN. Initial results from the clinical trial have been presented elsewhere.¹³ Participants were 135 women, aged 17 to 45 years, with a current DSM-III-R¹⁴ diagnosis of BN. Inclusion criteria for this study were female gender, age 17 to 45 years, and the presence of a current primary DSM-III-R diagnosis of BN. Exclusion criteria were current anorexia nervosa, current obesity (body mass index >30 kg/m²), current severe major depression (including serious suicidal intent or inability to engage in cognitive therapy due to severity of depression), current severe medical illness or severe medical complications of BN, or the current use of psychoactive medication and unwillingness to undergo a supervised drug wash-out period. Recruitment was broad-based and included direct mailings to general practitioners and mental health providers, and advertisements at local universities, polytechnic institutes, and in the local media. Of the 135 women who began the study, 106 completed treatment, and 93 completed the assessment battery at the 1-year follow-up point.

Procedure

This study was approved by the Southern Regional Health Authority (Canterbury) and the University of Canterbury ethical committees. All participants signed written informed consent. Prior to treatment, participants underwent an extensive psychiatric and behavioral assessment. The present report focuses on responses to the TCI.¹⁰

Treatment Conditions

All treatment was manual-based and conducted by trained female clinical psychologists. All individuals who entered the study first received eight sessions of CBT. For the first fortnight, sessions were twice weekly, followed by weekly sessions for 4 weeks. Treatment consisted of self-monitoring, psychoeduca-

tion, cue identification, challenging automatic thoughts, thought restructuring, chaining, and relapse prevention. Specific goals for each session were outlined clearly in the manuals and homework was assigned for each module.

Participants were then randomized to either exposure with response prevention to pre-binge cues (B-ERP), exposure with response prevention to pre-purge cues (P-ERP), or a control condition of relaxation training. The nature of these treatments is described elsewhere in greater detail.¹³ Briefly, in the B-ERP condition, individuals were exposed to cue combinations that preceded binge eating, did not actually eat any food, and were prevented from engaging in the binge response. In the P-ERP condition, participants were exposed to pre-purge cue combinations, which included eating high-risk foods, and the purging response was prevented. Relaxation involved guided progressive deep muscle relaxation exercises. Each of the experimental treatments included eight sessions over 6 weeks.

Post-treatment Assessment

Following the last treatment session, all participants underwent a final post-treatment assessment with one of the principal investigators who was blind to treatment condition. This assessment consisted of the same structured interview for bulimic symptoms administered at pretreatment, Hamilton Depression Rating Scale (HDRS),¹⁵ and a semistructured measure of bulimic symptom severity. In addition, the cue reactivity assessment was repeated at this time.

Summarizing the results of the trial, there were no significant differences across the three behavioral treatments on percentage of individuals who were abstinent from bingeing or purging, or mean frequency of bingeing and purging at end-treatment. At the end of treatment, B-ERP, but not P-ERP, significantly reduced anxiety on the cue reactivity assessment, food restriction, body dissatisfaction, drive for thinness, and depression. These differences were not, however, maintained at 6-month or 1-year follow-up.¹³

One-Year Follow-Up

One year after the completion of treatment, all participants were contacted for a face-to-face follow-up evaluation. The participant and the assessor developed a lifechart for the 6 months prior to the evaluation. The lifechart divided the 6-month interval into fortnightly epochs and the frequency of objective bingeing and purging during each epoch was recorded. We enhanced the accuracy of recall by anchoring the fortnightly epochs to memorable events in the patient's life and by including information that had been obtained previously in a face-to-face interview 6 months earlier and in a telephone interview 3 months earlier. We then calculated the mean frequency of bingeing and purging per fortnight in the 3 months prior to the 1-year follow-up assessment to develop an index of outcome based on the core behavioral features of BN. This definition reflected the diagnostic thresholds in DSM-IV¹⁶ (i.e., bingeing and compensatory behaviors occurred, on average, a minimum of twice per week for 3 months). The outcome categories were, for the 3 months prior to follow-up: (1) no bingeing or purging; (2) some bingeing and/or purging but neither were more than twice per week on average; and (3) bingeing and purging twice per week or more on average. The TCI¹⁰ was readministered at the 1-year follow-up assessment.

Table 1. Means and Standard Deviations for TCI Scales at Pretreatment and 1-Year Follow-Up With Statistical Analyses of the Experimental Treatment Effects

Scale	Pretreatment		1-Year Follow-Up		ANOVA			ANCOVA		
	M	SD	M	SD	n	F	P	n	F	P
Novelty seeking	22.4	6.1	22.1	6.3	91	0.55	NS			
Harm avoidance	20.2	6.7	17.7	7.7	91	25.38	†	89	8.02	*
Reward dependence	15.7	4.2	16.8	3.4	91	8.04	*	89	1.93	NS
Persistence	4.8	2.0	4.5	1.9	91	1.78	NS			
Self-directedness	24.2	8.1	29.8	9.2	91	43.09	†	89	10.24	*
Cooperativeness	33.9	5.7	35.6	4.4	91	8.29	*	89	0.48	NS
Self-transcendence	11.3	5.7	12.0	6.1	91	2.99	NS			

Abbreviations. ANOVA, analysis of variance; ANCOVA, analysis of covariance; NS, nonsignificant.

* $P < .01$.

† $P < .001$.

Participant Flow and Follow-Up

Of the 135 women who began the clinical trial, 106 (78.5%) completed both the CBT and exposure/relaxation portions of the treatment. Of the 106 individuals who completed treatment, complete pretreatment and 1-year follow-up TCI data were available for 91 women, who comprise the participants in this report.

Data Analyses

Differences in TCI scale and subscale scores from pretreatment to 1-year follow-up were preliminarily examined via a repeated-measures analysis of variance for all scales. A formal assessment was then performed using analysis of covariance to compare change across treatment and 1-year follow-up while controlling for the effects of covariates. Specifically, a repeated measures analysis of covariance was performed on each of the scales showing significant differences across time, with measures of clinical change (binge and purge frequency) and change in depression scores ($D_{T1} - D_{T2}$) entered as covariates.

RESULTS

Means and standard deviations for the seven TCI scales at pretreatment and 1-year follow-up are summarized in Table 1. Of the 135 participants who entered the study, 42 participants did not complete 1-year follow-up measures, and pretreatment measures were not available for two participants. Noncompleters differed significantly from completers only on age: $F(1, 133) 4.42, P < .04$ (noncompleters were younger). In addition, only self-directedness scores predicted completion (odds ratio [OR] = 1.08; 95% confidence interval [CI], 1.01 to 1.15).

To test the effects of treatment on TCI scores, we performed a one-way analysis of variance with repeated measures on each TCI scale ($n = 91$), restricting our analyses to those individuals who had completed both a pretreatment and 1-year fol-

low-up TCI. Changes in TCI scores for each scale across time are shown in Fig 1 (see also Table 1). There was no significant effect for treatment on novelty seeking, $F(1, 90) = 0.55, P > .05$; persistence, $F(1, 90) = 1.78, P > .05$; or self-transcendence, $F(1, 90) = 2.99, P > .05$. A significant effect for treatment was observed for harm avoidance, $F(1, 90) = 25.38, P < .0001$; reward dependence, $F(1, 90) = 8.04, P < .01$; self-directedness, $F(1, 90) = 43.09, P < .0001$; and cooperativeness, $F(1, 90) = 8.29, P < .01$. In addition, given the salience of self-directedness scores to treatment outcome as identified in a previous study,¹¹ an analysis of variance with repeated measures was also performed on the self-directedness subscales to determine whether the effect of treatment was localized within the subscales. Significant effects for treatment were observed for all self-directedness subscales: SD1 (responsibility ν blaming), $F(1, 90) = 9.96, P < .01$; SD2 (purposefulness ν lack of goal-direction), $F(1, 90) = 33.98, P < .0001$; SD3 (resourcefulness), $F(1, 90) = 18.50, P < .0001$; SD4 (self-acceptance ν self-striving), $F(1, 90) = 4.18, P < .05$; and SD5 (enlightened second nature), $F(1, 90) = 39.57, P < .0001$.

We then conducted analyses of covariance on the scales showing significant change in the repeated measures analysis to determine whether the effect on TCI scores was robust to change in outcome measures at one year follow-up (i.e., binge and purge frequency) and depression scores ($n = 89$). The means and standard deviations for these outcome measures are summarized in Table 2. Analyses of covariance with repeated measures were conducted on the TCI harm avoidance, re-

Fig 1. TCI temperament and character scale scores at pre-treatment and 1-year follow-up.

ward dependence, self-directedness, and cooperativeness scales with change scores for binge frequency, purge frequency, and HDRS scores (from pretreatment to follow-up) entered as covariates (see Table 1). After controlling for the effects of these covariates, a significant main effect for treatment was observed for harm avoidance, $F(1, 85) = 8.02, P < .01$. In addition, a time $\times$ Δ purge frequency interaction was observed for harm avoidance, $F(1, 85) = 4.68, P < .05$ indicating that part of the effect of treatment on harm avoidance is accounted for by changes in purge frequency over the course of treatment and follow-up. A significant main effect for treatment was also observed for self-directedness, $F(1, 85) = 10.24, P < .01$. A time $\times$ Δ HDRS interaction was observed for self-directedness, $F(1, 85) = 5.53, P < .05$, indicating part of the effect of treatment on self-directedness is accounted for by changes in depression scores

over the course of treatment and follow-up. Previously observed main effects for treatment were no longer significant for reward dependence, $F(1, 85) = 1.93, P > .05$, and cooperativeness, $F(1, 85) = 0.48, P > .05$ after controlling for the effects of these covariates.

DISCUSSION

The present study extends previous findings that pretreatment self-directedness scores predicted outcome at 1-year follow-up after CBT treatment of women with BN¹¹ by demonstrating that self-directedness scores change over the course of a 1-year follow-up period after treatment with CBT. Moreover, these changes are independent of measures of clinical status (binge and purge frequency) and depression scores at 1 year. The independent effect of self-directedness scores over depression is particularly salient, as improvement in TCI self-directedness scores among depressed patients has been observed with the administration of serotonergic antidepressants.¹⁷

The fact that scores on self-directedness are moderated by depression scores suggests that changes in self-directedness may be partially explained by characteristics secondarily associated with the abatement of depressive symptomatology such as responsibility, purposefulness, resourcefulness, and self-acceptance. It seems reasonable to suggest that characteristics associated with an in-

Table 2. Means and Standard Deviations of Dependent Measures

Variables	Pretreatment		1-Year Follow-Up	
	M	SD	M	SD
Binge frequency	10.62	10.92	1.95	3.63
Vomiting frequency	12.53	18.55	3.64	8.68
Laxative use frequency	1.70	4.59	0.64	2.50
Total purge frequency	14.24	18.79	4.29	9.12
HDRS	8.60	5.69	5.36	6.03

crease in self-directedness may partially reflect, or co-occur with, an abatement of depressive symptomatology. However, it may as easily be said that changes in self-directedness over the course of treatment and follow-up influence change in depression scores. It is also possible that the effect of treatment on self-directedness may not be unique to CBT. Change in self-directedness scores may prove to be a reliable indicator of therapeutic change for any successful treatment, including pharmacologically based modalities, as noted above. However, the independent effect of treatment on self-directedness observed in the present study implies a global enhancement of characteristics that are inclusive of, but not limited to, many of the cognitive features associated with depression.

By contrast, previous findings indicated that pretreatment scores on the TCI temperament dimension of harm avoidance were not predictive of treatment outcome at 1-year follow-up.¹¹ In a more recent study, however, low harm avoidance scores were found to be associated with rapid response to CBT.¹⁸ As a temperament dimension, harm avoidance is hypothesized to be genetically determined, hence theoretically should be less likely to change as a function of treatment. However, harm avoidance has been found to vary as a function of mood and anxiety symptoms in previous studies.¹⁹⁻²⁴ More specifically, harm avoidance has been found to vary with depressive symptomatology²³ and is highly correlated with the measures of neuroticism (.71) which, in turn, is known to vary with level of depressive symptomatology.²⁴

Despite the high level of association of harm avoidance with depression, we found that changes in depression scores were not wholly responsible for observed differences in harm avoidance scores. However, we observed an interaction between purge frequency and harm avoidance, indicating that the effect of CBT treatment on harm avoidance is moderated by purge frequency. A reduction in purge frequency may reflect changes in characteristics associated with harm avoidance such as anticipatory worry, fear of uncertainty, shyness, and fatigability. It seems reasonable to suggest that the social, interpersonal, and intrapersonal consequences of maintaining high purge frequency may be ameliorated as the patient begins to gain control of the purging behaviors. As Johnson-Sabine et

al.²⁵ observed, dysphoric mood symptoms accompanying binge and purge episodes abate with the reduction of bulimic symptomatology and, as such, may constitute a secondary manifestation related to the presence of abnormal eating symptoms. It may be, as well, that the broad anxiolytic effects of treatment, as captured by changes in harm avoidance scores, may ameliorate the functional anxiolytic process hypothesized to underlie purging behaviors.²⁵⁻²⁹

Limitations

The results presented must be interpreted in light of certain limitations that may have impacted the assessment of change in personality variables between pretreatment and 1-year follow-up examination. In the present study, approximately one third of the sample failed to complete follow-up measures designed to assess the effect of treatment. Given that we cannot be certain that noncompleters were responsive to treatment, findings with respect to change in self-directedness scores over the course of treatment may have been affected.

In addition, while statistical control of covariation allows the robustness of treatment effects to be rigorously evaluated, the lack of a control group of untreated or wait-listed women with BN makes it difficult to differentiate the actual effect of treatment from change that might have taken place over time even in the absence of treatment. This is especially salient in the present study where the treatment intervention was relatively brief.

Implications

The findings of the present study have implications both for the efficacy of CBT in the treatment of women with BN and the value of personality measures as indicators of treatment efficacy. While, in the absence of a control group, the presence of a third variable responsible for the change in self-directedness cannot be wholly eliminated, the correspondence between the elements that constitute self-directedness and those likely to be enhanced by CBT is noteworthy. On the basis of the pretreatment predictive capacity of self-directedness, Bulik et al. observed that self-directedness appeared to capture the optimal characteristics necessary for the success of CBT.¹¹ The findings of the present study suggest that self-directedness scores are not only predictive of successful outcome in CBT, but that CBT may have the ability to affect

positive change in the very elements that constitute self-directedness. As such, change in self-directedness scores may constitute a measure of therapeutic change in the cognitive-behavioral treatment of BN.

In addition, the findings of the present study indicate that the efficacy of CBT is particularly robust, where eight sessions of CBT plus eight sessions of exposure or relaxation training appear to have produced significant change in self-directedness measured at 1-year follow-up. The possibility that CBT as a whole, or one or more of its components, may be effective at enhancing self-directedness raises the intriguing possibility that CBT may have an identifiable "active ingredient" that might be distilled and utilized to enhance readiness for therapeutic change. As Bulik et al. suggest, it may be possible to selectively enhance self-directedness at pretreatment via motivational enhancement therapy or other techniques designed to enhance readiness for change.¹¹

Moreover, these results offer support for the pursuit of additional dismantling studies that may help determine what aspects of CBT are most beneficial to self-directedness. This information might be utilized to enhance extant CBT packages

to broaden the efficacy of the treatment. Techniques aimed at bolstering self-directedness may also be useful as a pretreatment intervention for other therapeutic modalities including interpersonal therapy, Adlerian-based treatments, and process-oriented group therapies.

This is not to presume a priori that it is possible to dismantle or deconstruct therapeutic approaches into "active" or (relatively) "inactive" components. It may well be the case that a given therapeutic modality acts as a whole and cannot be dismantled without violating its gestalt and impairing its effectiveness. However, most if not all therapeutic approaches are, in fact, multimodal in nature. For example, CBT, at a broad level, represents the conjoining of two traditions and, at a finer level of detail, incorporates a variety of techniques including psychoeducation, self-monitoring, thought restructuring, and problem solving, to name but a few. Given that CBT is effective in treating a wide range of psychiatric disorders, whether one or more of its components are particularly effective in treating a specific disorder is highly salient to researchers and clinicians interested in designing more effective treatments.

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