

RESEARCH ARTICLE

Personality Changes in Bulimia Nervosa after a Cognitive Behaviour Therapy

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Abstract

Objectives: The goals of this study were to evaluate changes in personality traits in outpatients with bulimia nervosa and specific clinical predictors of such personality changes, after cognitive behaviour therapy (CBT).

Method: The sample comprised 100 purging bulimia nervosa outpatients (DSM-IV-TR). Assessment measures included the Eating Disorders Inventory-2, Symptom Check List Revised and Temperament and Character Inventory-Revised, as well as other clinical and psychopathological indices. All measures were administered before and after 22 weeks of group CBT.

Results: The temperament traits of Harm Avoidance and Reward Dependence and the character traits of Self-Directedness and Self-Transcendence changed after CBT. Pre-post CBT reduction in Eating Disorders Inventory-2 total score predicted the decrease and increase in Harm Avoidance and Self-Directedness, respectively.

Conclusions: Results suggest that group CBT in outpatient women settings influence changes in some personality traits, which appear mainly related to an overall improvement in eating pathology. Copyright © 2012 John Wiley & Sons, Ltd and Eating Disorders Association.

Keywords

personality; bulimia nervosa (BN); cognitive behaviour therapy (CBT)

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Q1 Introduction

An important factor to consider when studying recovery outcome in eating disorders (ED) is underlying personality traits (Wagner et al., 2006). Evidence suggests that some personality traits, especially high Harm Avoidance (HA, related to individual and social insecurity) and low Self-Directedness (SD, related to low self-efficacy and self-acceptance), are important risk factors for ED. In this line, some studies (Anderson, Joyce, Carter, McIntosh, & Bulik, 2002; Bloks, Hoek, Callewaert, & van Furth, 2004; Dalle Grave et al., 2007; Halvorsen & Heyerdahl, 2006; Klump et al., 2004; Lilienfeld et al., 2000; Wagner et al., 2006) have focused on the stability of personality in ED over the course of treatment. Nevertheless, to our knowledge, only a scarce amount of studies (Anderson et al., 2002; Dalle Grave et al., 2007) have analyzed the stability of personality in ED patients before and after a cognitive behaviour therapy (CBT). The purpose of the present study

therefore is to identify personality changes after an outpatient CBT treatment.

Personality traits in eating disorder patients

Personality characteristics of individuals with ED have been the focus of much research (Cassin & von Ranson, 2005). Some studies have shown that EDs were commonly related to specific personality traits, mainly elevated HA (Bulik, Sullivan, Fear, & Pickering, 2000; Fassino et al., 2002; Klump et al., 2000) and low SD (Alvarez-Moya et al., 2007; Fassino et al., 2002; Klump et al., 2000) and Cooperativeness (Fassino, Daga, Piero, Leombruni, & Rovera, 2001; Fassino et al., 2002; Klump et al., 2000). However, when different ED subtypes have been considered, more heterogeneous personality traits have been revealed with anorexia nervosa (AN) generally displaying high Persistence (PS) (Kleifield, Sunday, Hurt, & Halmi, 1994) and low Novelty Seeking (NS) (Bloks et al., 2004; Klump et al., 2000, 2004), and bulimia nervosa (BN)

displaying high impulsivity, HA and NS (Fassino et al., 2002; Fernandez-Aranda et al., 2006).

Personality changes in bulimia nervosa patients after a cognitive behaviour therapy treatment

The effectiveness of CBT for the treatment of BN has been demonstrated in numerous randomized controlled trials (Agras et al., 2000; Hay, Bacaltchuk, Stefano, & Kashyap, 2009; Schmidt et al., 2007). However, little previous research has addressed personality changes in BN patients in response to treatment, and the few findings that have been reported have been conflicting (Anderson et al., 2002; Bloks et al., 2004; Dalle Grave et al., 2007; Lilenfeld et al., 2000; Wagner et al., 2006). Although the model of Cloninger (Cloninger, Svrakic, & Przybeck, 1993) theorized that highly heritable temperamental personality traits are expected to be less likely to change, other studies using the Temperament and Character Inventory (TCI) (Cloninger, 1999) have shown several changes in some personality traits after a CBT programme (Anderson et al., 2002; Bloks et al., 2004; Dalle Grave et al., 2007; Wagner et al., 2006); although these personality changes are not to the extent of the values obtained from healthy control groups (Bloks et al., 2004; Klump et al., 2004; Wagner et al., 2006). Thus, further study is needed to clarify these discrepancies.

Personality changes and treatment recovery outcome in bulimia nervosa patients

Personality changes after treatment have been associated with a greater level of recovery in ED (Dalle Grave et al., 2007). Supporting these findings, some studies (Anderson et al., 2002; Bulik, Sullivan, Joyce, Carter, & McIntosh, 1998) have reported a positive association between personality changes (namely an increase in SD and a decrease in HA) and symptomatic improvement in purging behaviour and depressive symptoms. However, to our knowledge, no study has undertaken an assessment to evaluate predictive models of personality changes. This omission in the literature leaves unanswered questions about the degree to which different factors contribute to greater positive changes in certain personality traits.

Even though some evidence exists about changes in personality for BN patients after treatment, it should be acknowledged that previous studies have suffered from several fundamental shortcomings, including small sample sizes and heterogeneous samples and treatments. Several studies (Bloks et al., 2004; Dalle Grave et al., 2007) assessed only inpatient treatment effects on personality changes, and therefore, hardly anything is known about the effects of outpatient treatment. Also, the few studies that have examined the impact of outpatient therapy on personality (Anderson et al., 2002) have done so with rather short treatments. Furthermore, some studies (Klump et al., 2004; Lilenfeld et al., 2000; Wagner et al., 2006) compared currently ill BN patients and/or recovered patients but not the same patients before and after treatment. Moreover, in some studies (Klump et al., 2004; Lilenfeld et al., 2000; Wagner et al., 2006), the patients were recruited from advertisements, and they have not undergone the same type of treatment.

To conclude, there is a body of evidence suggesting that some personality traits (such as HA and SD) are more susceptible to change than others [mainly temperamental traits such as NS,

Reward Dependence (RD) and PS] after typical/classical CBT treatment and that these personality changes are also associated with a favourable treatment outcome in BN patients. Investigating personality changes after classical CBT treatment is important because it may help to provide potential measures of treatment efficacy and relapse prevention. Furthermore, determining which personality traits are highly or not susceptible to change after treatment could help tailor treatment to individuals with maladaptive but changeable personality profiles. For example, it could be the case that women with specific personality features such as high perseverance that includes clinical perfectionism would better benefit from CBT-E (Fairburn et al., 2009), which has modules addressing it.

The present study attempted to overcome the limitations of the previous studies about personality changes in ED after CBT treatment by including a larger and homogeneous sample of purging BN patients. Furthermore, we were interested in assessing the relationship between personality changes and clinical and psychopathological improvement by using predictive models of change, which has not been attempted before. To our knowledge, no previous study has addressed the topic to identify what are the main predictors (independent variables) for changes in personality traits (dependent variables) achieved after CBT therapy in BN. The evidences cumulated until the present explored the personality scores as independent variables, interaction terms or mediation factors into the relationship between the therapy and the clinical measures associated to ED.

The specific aims of the present study are twofold: (i) to evaluate changes in personality traits in outpatient women with the purging subtype of BN after undergoing a CBT treatment and (ii) to examine specific clinical predictors of such personality changes.

With the current literature, we hypothesized that some personality traits (e.g. HA and SD) would be more susceptible to change after a CBT treatment than other traits (mainly temperamental traits such as NS, RD and PS) and that improvements in bulimic symptomatology and general psychopathology would be related to changes in certain personality traits (e.g. HA and SD).

Method

Participants

The final sample included 100 women with purging BN (BN-P). Experienced psychologists and psychiatrists diagnosed all participants according to DSM-IV-TR (APA, 2000a) criteria using a semistructured clinical interview. Participants were those BN-P individuals referred for an outpatient group CBT and who completed treatment at the Eating Disorders Unit of the Department of Psychiatry at the University Hospital of Bellvitge in Barcelona between 2001 and 2006. The inclusion criteria for the BN-P sample were as follows: (i) female patients; (ii) 18 years and older; (iii) diagnosed with BN-P according to DSM-IV-TR criteria; and (iv) have completed CBT treatment. The mean age for the sample was 23.7 years ($SD = 3.50$). The majority of the participants were single (89.9%), employed (81.8%) and had completed primary studies (35.7%). For the present analysis, from an initial sample of 167 BN patients, the following four groups of individuals were excluded: (i) non-purging BN patients (BN-NP) ($N = 22$) in order

to homogenize the sample; (ii) participants with higher severity of ED and/or psychopathological symptoms requiring individual and/or inpatient therapy at the time ($N = 20$); (iii) patients with no ED symptoms after having completed the first six psychoeducational sessions and who therefore do not need to complete the following 16 weekly CBT outpatient sessions ($N = 19$); and (iv) men ($N = 6$) as the number of men with this diagnosis was too small for meaningful comparison. This decision was made by the psychologists/psychiatrists who completed the first interview and after discussion with members of the supervisory team, following our manual (Fernandez-Aranda & Turon, 1998) and according to the APA guidelines criteria (APA, 2000b). The ethics committee of our institution approved this study, and written informed consent was obtained from all participants.

Assessment

For the assessment, commonly applied questionnaires in the field of EDs, comprising the Eating Disorders Inventory-2 (EDI-2; Garner, 1991), the Symptom Checklist-Revised (SCL-90-R; Derogatis, 1990) and the Temperament and Character Inventory-Revised (TCI-R; Cloninger, 1999) were employed. In addition, the participants were assessed by a structured clinical interview regarding their clinical and psychopathological symptoms for ED patients and their family history of an ED (Fernandez-Aranda & Turon, 1998).

Eating Disorders Inventory-2 (Garner, 1991)

This is a reliable and valid 91-item multidimensional self-report questionnaire that assesses different cognitive and behavioural characteristics, which are typical for EDs. The EDI-2 retains the 64 items grouped into eight scales: Drive for Thinness, Bulimia, Body Dissatisfaction, Ineffectiveness, Perfectionism(P), Interpersonal Distrust, Interoceptive Awareness and Maturity Fears of the EDI and adds 27 new items into three provisional scales: Asceticism, Impulse Regulation and Social Insecurity. All of these scales are answered on a 6-point Likert scale and provide standardized subscale scores. When this instrument was validated in a Spanish population (Garner, 1998), a mean internal consistency of 0.63 (coefficient alpha) was found.

Symptom Checklist-Revised (Derogatis, 1990)

To evaluate a broad range of psychological problems and symptoms of psychopathology, the SCL-90-R was employed. This test contains 90 items and helps to measure nine primary symptom dimensions, which are as follows: (i) Somatization; (ii) Obsession-Compulsion; (iii) Interpersonal Sensitivity; (iv) Depression; (v) Anxiety; (vi) Hostility; (vii) Phobic Anxiety; (viii) Paranoid Ideation; and (ix) Psychoticism. In addition, it includes three global indices, which are a Global Severity Index (GSI), designed to measure overall psychological distress, a Positive Symptom Distress Index, designed to measure the intensity of symptoms, as well as a Positive Symptom Total, which measures self-reported symptoms. The GSI can be used as a summary of the test. This scale has been validated in a Spanish population (Derogatis, 2002), obtaining a mean internal consistency of 0.75 (coefficient alpha).

Temperament and Character Inventory-Revised (Cloninger, 1999)

The TCI-R (Cloninger, 1999) is a 240-item, reliable and valid questionnaire that measures, 5-point Likert scale, as in the original TCI version (Cloninger et al., 1993), seven dimensions of personality: four temperament (HA, NS, RD and PS) and three character dimensions [SD, Cooperativeness and Self-Transcendence (ST)]. The performance on the Spanish version of the original questionnaire (Gutiérrez et al., 2001) and the revised version (Gutiérrez-Zotes et al., 2004) has been documented. The scales in the latter showed an internal consistency (coefficient alpha) of 0.87.

Procedure

Experienced psychologists and psychiatrists completed the anamnesis during a semi-structured face-to-face interview. In addition to a comprehensive clinical and psychological evaluation (including the instruments mentioned previously), further demographic-clinical information including age, weight, height, marital status, occupation, education and clinical-psychopathological variables were also obtained. As a standard procedure of clinical assessment in the ED unit of our hospital, all the participants completed the questionnaires individually and voluntarily before starting the treatment. An information sheet presented at the start of the questionnaire informed the participants about the purpose of the study and assured confidentiality of results. Furthermore, it was emphasized that participation in the study was completely voluntary and that the participants were free to withdraw from the study at any time. No patient refused to participate. The assessment was repeated at the end of the treatment.

Treatment

All BN individuals received 22 weekly outpatient sessions comprising psychoeducation (six sessions) and 16 weekly outpatient sessions of CBT treatment. Patients first received six sessions of psychoeducational brief group therapy based on the model of Davis et al. (1990). The main objective of this brief group intervention was to offer information and psychoeducation about negative consequences of BN, nutritional patterns, monitoring of meal plans and preventing strategies for decreasing bingeing and purging behaviour without going into details of the patients' individual problems. Following the last psychoeducational treatment session, all patients received outpatient group therapy based on the model of Fairburn et al. (1993). This intervention consisted of 16 weekly outpatient sessions (90 min each) with a total of 8–10 patients per group. The group was conducted by an experienced psychologist and a co-therapist. As described by Fairburn et al. (1993), one of the main goals of this group was to eliminate binge episodes and compensatory behaviours, as well as to establish correct nutritional patterns. This programme focused on issues such as rationale of cognitive model, training in problem solving strategies and cognitive restructuring, addressed to self-esteem, body image and body weight and relapse prevention strategies. This programme and accompanying programme material have already been manualized and published in Spanish (Fernandez-Aranda et al., 1998) with demonstrated effectiveness (Fernández-Aranda et al., 2004).

Statistical analysis

Statistical analysis was carried out with SPSS 17.0.2 (IBM Corporation, Armonk, NY, USA) for Windows. First, repeated measures ANOVA adjusted by patients' age and baseline values was conducted to analyze differences between pre-treatment and post-treatment for ED measures (EDI-2), general psychopathology (SCL-90-R) and personality (TCI-R). Second, predictive models of changes for TCI-R scale scores were explored with multiple regression models. For each model, the criterion was the differences between prescore and postscore in TCI-R personality scales and predictors were duration of the disorder (years), premorbid obesity, difference (pre-post) of weekly bingeing frequency, difference (pre-post) of weekly purging frequency, difference (pre-post) in EDI-2 total score and difference (pre-post) and prevalue of SCL-90-R GSI score. Probability for stepwise entry and removal were 0.05 and 0.10, respectively.

Because of the multiple statistical tests, Type I error inflation was controlled through Finner's adjustment with an SPSS macro (Doménech, 2008). This procedure allows adjusting the *p*-values to control the familywise error rate while retaining better power than Bonferroni's method (Brown & Russell, 1997).

Results

Changes in eating disorder symptoms and general psychopathology after treatment

After controlling for age and baseline values, BN individuals reported a significant decrease in the weekly frequency of binge

eating (7.69 vs 2.46; $F(1, 77) = 222.8$; $p < 0.001$), laxative use (4.97 vs 0.65; $F(1, 77) = 299.9$; $p < 0.001$) and vomiting episodes (8.89 vs 2.72; $F(1, 77) = 197.6$; $p < 0.001$). As can be seen in Table 1, mean scores were also lower after treatment than at baseline for all EDI-2 subscales except for Maturity Fears and Perfectionism.

With regard to general psychopathology, BN patients reported significant lower scores for all SCL-90-R scales except for obsessive-compulsive, phobic anxiety and GSI at the end of the treatment when compared with baseline values (Table 1).

Personality changes after treatment

With regard to personality changes after treatment, Table 2 contains the means and standard deviations of the TCI-R scores in BN patients before and after treatment. The BN individuals reported statistically significant changes in various personality traits after treatment, including lower scores on HA and ST and higher on RD and SD.

Predictors of personality changes in bulimia nervosa patients at the end of treatment

The multiple regression models in Table 3 display the predictors of personality changes in BN-P patients at the end of treatment. Once adjusted for current age and TCI-R baseline values, our results showed that a positive decrease (i.e. decrease in the direction of normative scores) in HA was associated with clinical improvement, measured by the difference (change) pre-post of

Table 1 Changes in eating disorder symptomatology and psychopathology after treatment

BN-P patients (N = 100)	Prevalue		Postvalue		ANOVA adjusted by age and baseline		
	Mean (SD)	Mean (SD)	df	MD	<i>p</i>	95% CI for MD	
EDI-2: Drive for Thinness	16.02 (4.23)	13.22 (6.52)	1, 94	2.92	<0.0005	1.79; 4.05	
EDI-2: Body Dissatisfaction	19.10 (6.33)	16.97 (8.01)	1, 94	2.25	<0.0005	1.07; 3.42	
EDI-2: Interceptive Awareness	13.57 (6.08)	10.64 (7.52)	1, 94	2.94	<0.0005	1.63; 4.24	
EDI-2: Bulimia	10.80 (4.97)	6.04 (5.74)	1, 94	4.85	<0.0005	3.78; 5.91	
EDI: Interpersonal Distrust	6.63 (4.77)	5.54 (4.29)	1, 94	0.94	0.005	0.30; 1.57	
EDI-2: Ineffectiveness	12.17 (7.22)	10.50 (6.81)	1, 94	1.73	0.004	0.60; 2.87	
EDI-2: Maturity Fears	8.41 (6.00)	7.87 (5.98)	1, 94	0.61	0.243	-0.39; 1.60	
EDI-2: Perfectionism	6.28 (4.66)	6.08 (4.27)	1, 92	0.20	0.536	-0.44; 0.84	
EDI-2: Impulse Regulation	8.42 (6.01)	5.49 (5.39)	1, 92	2.94	<0.0005	2.04; 3.84	
EDI-2: Asceticism	7.76 (3.92)	5.71 (4.32)	1, 91	2.04	<0.0005	1.30; 2.78	
EDI-2: Social Insecurity	8.73 (5.21)	6.90 (5.43)	1, 93	1.74	<0.0005	0.87; 2.61	
EDI-2: Total score	117.4 (39.2)	95.72 (47.5)	1, 88	22.47	<0.0005	14.5; 30.4	
SCL-90-R: Somatization	1.79 (0.92)	1.45 (0.94)	1, 94	0.37	<0.0005	0.22; 0.52	
SCL-90-R: Obsessive-Compulsive	1.97 (0.83)	1.84 (0.96)	1, 94	0.15	0.059	0.00; 0.31	
SCL-90-R: Interpersonal sensitivity	2.19 (0.92)	1.88 (0.99)	1, 94	0.33	<0.0005	0.18; 0.48	
SCL-90-R: Depression	2.33 (0.86)	1.99 (1.01)	1, 94	0.35	<0.0005	0.19; 0.52	
SCL-90-R: Anxiety	1.90 (0.89)	1.58 (0.98)	1, 94	0.35	<0.0005	0.19; 0.51	
SCL-90-R: Hostility	1.57 (0.94)	1.35 (1.00)	1, 94	0.22	0.009	0.06; 0.38	
SCL-90-R: Phobic Anxiety	1.15 (0.97)	1.05 (1.05)	1, 94	0.11	0.162	-0.04; 0.25	
SCL-90-R: Paranoid Ideation	1.57 (0.85)	1.38 (0.92)	1, 94	0.22	0.009	0.06; 0.37	
SCL-90-R: Psychoticism	1.41 (0.70)	1.15 (0.80)	1, 94	0.26	0.001	0.13; 0.40	
SCL-90-R: GSI	1.86 (0.73)	1.80 (2.52)	1, 94	0.07	0.786	-0.43; 0.56	
SCL-90-R: PST	67.4 (17.0)	60.0 (22.3)	1, 94	7.94	<0.0005	4.53; 11.35	
SCL-90-R: PSDI	2.40 (0.58)	2.21 (0.64)	1, 94	0.19	0.001	0.09; 0.29	

ANOVA, analysis of variance; SD, standard deviation; MD, mean difference/change pre-post values; df, degrees of freedom; BN-P, purging bulimia nervosa; EDI-2, Eating Disorders Inventory-2; SCL-90-R, Symptom Checklist-Revised; GSI, Global Severity Index; PST, Positive Symptom Total; PSDI, Positive Symptom Distress Index.

Table 2 Personality changes after cognitive behaviour therapy treatment

	Prevalue	Postvalue	ANOVA adjusted by age and baseline				
	Mean (SD)	Mean (SD)	df	MD	<i>p</i>	95% CI	MD
TCI-R: Novelty Seeking	105.5 (15.1)	104.8 (13.7)	1, 97	0.61	0.562	-1.21	2.43
TCI-R: Harm Avoidance	118.8 (22.1)	114.6 (22.5)	1, 97	4.20	0.016	1.17	7.23
TCI-R: Reward Dependence	103.3 (17.5)	105.9 (15.6)	1, 97	-2.67	0.016	-4.59	-0.75
TCI-R: Persistence	106.6 (22.9)	108.8 (23.8)	1, 97	-2.28	0.178	-5.25	0.69
TCI-R: Self-Directedness	111.2 (19.2)	117.3 (22.4)	1, 96	-5.81	0.003	-9.18	-2.44
TCI-R: Cooperativeness	135.4 (19.8)	135.9 (17.4)	1, 97	-0.46	0.686	-2.71	1.79
TCI-R: Self-Transcendence	67.4 (15.8)	63.4 (15.2)	1, 97	3.96	0.003	1.80	6.12

ANOVA adjusted by age and baseline for comparing prevalues versus postvalues into BN-P cohort.

SD, standard deviation; MD, mean difference/change pre-post values; df, degrees of freedom; TCI-R, Temperament and Character Inventory-Revised.

Table 3 Predictors of Temperament and Character Inventory-Revised changes at the end of treatment

Dependent variable: change pre-post	Independent variable: significant predictors	<i>B</i>	95% CI for <i>B</i>	Beta	Sig.	aR ²	
Harm Avoidance	Premorbid obesity	8.29	-0.31;	16.9	0.19	0.059	.474
	Difference (pre-post) weekly bingeing frequency	0.40	-0.02;	0.81	0.18	0.059	
	Difference (pre-post) EDI total score	0.24	0.16;	0.33	0.53	<0.001	
Reward Dependence	Difference (pre-post) weekly purging frequency	0.19	-0.02;	0.41	0.20	0.079	.260
Persistence	Duration of the disorder (years)	1.35	0.03;	2.68	0.28	0.046	.218
	Difference (pre-post) EDI total score	-0.10	-0.21;	0.00	-0.24	0.045	
	Difference (pre-post) weekly bingeing frequency	-0.37	-0.76;	0.03	-0.16	0.067	.567
Self-Directedness	Difference (pre-post) EDI total score	-0.31	-0.40;	-0.23	-0.67	<0.001	
	Difference (pre-post) weekly bingeing frequency	0.31	-0.03;	0.65	0.20	0.076	.250

Results of multiple regressions adjusted by age and TCI-R baseline values (stepwise). aR², adjusted R² coefficient.

Dependent variables: differences (changes) pre-post in the TCI-R total scores.

The initial set of independent variables included the following: duration of the disorder (years), premorbid obesity, difference (pre-post) of weekly bingeing frequency, difference (pre-post) of weekly purging frequency, difference (pre-post) in EDI-2 total score and difference (pre-post) of SCL-GSI score.

the EDI-2 total score. Likewise, favourable increases in SD and P after treatment were associated with a decrease in eating symptomatology (difference pre-post EDI-2 total score). Moreover, a statistically significant favourable increase in PS was associated with a shorter duration of disorder.

Discussion

The current study assessed which personality traits are highly susceptible to change in BN-P outpatient women after a group CBT therapy. Moreover, we evaluated the association between personality changes and treatment recovery in BN-P women, which has not previously been attempted. The first main findings were in terms of therapy effects. After CBT, there were overall significant symptomatology reduction for eating and general psychopathology, in agreement with previous studies that showed the efficacy of CBT as a first intervention for BN (Agras et al., 2000; Schmidt et al., 2007). CBT was also useful in terms of personality, some temperamental (namely HA and RD) and character traits (namely SD and ST) changed over the course of treatment, although BN-P women still reported higher HA and lower SD mean scores than the norm (Gutiérrez-Zotes et al., 2004). Finally, our findings were able to uncover a positive

association between personality changes and clinical improvement (i.e. changes in some personality dimensions were positively related to reductions in eating symptomatology after treatment, measured through pre-post differences in the EDI-2 total score).

Changes in personality traits over the course of treatment

Our first hypothesis that some personality traits (mainly HA and SD) would be more susceptible to change after CBT than other traits (mainly temperamental traits such as NS, RD and PS) was partially supported by present findings. Although HA and SD have been shown to change after treatment, unexpected changes in RD and ST were also shown. In agreement with previous studies, the HA temperamental dimension (Bloks et al., 2004; Dalle Grave et al., 2007) and the character traits of SD (Anderson et al., 2002; Bloks et al., 2004; Dalle Grave et al., 2007) and ST (Dalle Grave et al., 2007) changed after treatment. These results are also in line with other studies that have examined personality changes in diseases such as depression or social phobia (Corruble, Duret, Pelissolo, Falissard, & Guelfi, 2002; Mortberg, Bejerot, & Aberg Wistedt, 2007).

However, these results are not consistent with the model of Cloninger (Cloninger et al., 1993), which theorized that

temperamental dimensions, such as HA and RD, are hypothesized to be more genetically explained, hence theoretically should be less susceptible to treatment. The fact that bulimic patients showed a decrease in HA and ST and an increase in SD after treatment may suggest that CBT is directed at breaking down avoidance behaviour, taking acceptance of responsibility for one's choice and promoting a positive attitude towards change (Anderson et al., 2002; Bloks et al., 2004; Dalle Grave et al., 2007). However, surprisingly and inconsistent with previous research, the present study also showed an increase in the temperamental RD scale after treatment. Because low RD scores have been associated with people who do not seek emotional support from others, show little interest in social relationships and have difficulty in showing their feelings, the increase in this scale could be related to the fact that CBT teaches patients strategies to talk about thoughts and feelings.

However, despite these personality changes after CBT, BN-P women still reported higher HA and lower SD mean scores than the norm sample, which is in agreement with previous research (Klump et al., 2004; Wagner et al., 2006). The fact that HA and SD continue to deviate from normative scores after recovery from an ED suggests that they are potential vulnerability factors contributing to the development of the illness (Lilenfeld et al., 2000).

Association between clinical improvement and personality changes

Our second hypothesis that improvements in bulimic and general psychopathology would be related to changes in certain personality traits was only partially supported. Although the clinical improvement (measured through pre–post differences in the EDI-2 total score) has been shown to be associated with certain personality changes (e.g. a decrease in HA and an increase in PS and SD), our results showed no significant association between the outcome of general psychopathology (measured through pre–post differences in the SCL-90-R GSI score) and personality changes. Accordingly, previous studies have also reported a positive relationship between an increase in SD and symptomatic reduction in purging frequency (Anderson et al., 2002; Bulik et al., 1998). However, in contrast to our findings, another study (Dalle Grave et al., 2007) indicated that the improvement of psychopathology (specifically depressive symptomatology) was related to changes in HA and SD.

Limitations and strengths of the present study

The present study should be evaluated within the context of several limitations. First, we only assessed the participants at the termination of the intervention, and there is no way of knowing whether these effects may persist over time. The absence of medium-term to long-term follow-up data makes impossible to assess the stability of personality changes after treatment. Second, it would have been interesting to have an alternative but comparable treatment group (e.g. interpersonal psychotherapy) as it was not clear whether the personality changes were specific to CBT as suggested or could also be expected from other therapy modalities. Finally, it would have been useful to have pre and post TCI-R scores of an untreated or wait-listed BN-P comparison group to confirm the observed effects of CBT treatment on personality changes. However, longitudinal data of a control group is hard to obtain and moreover, because in our unit there is no

waiting list, it would not be achievable or ethical to have this group.

Notwithstanding these limitations, to our knowledge, the current study has addressed for the first time, in a large and homogeneous Spanish sample of BN-P women receiving 22 weekly sessions of a group CBT, the evaluation of both personality changes and specific clinical factors that may explain such changes.

Future research should aim to overcome the aforementioned limitations and include follow-up measures of at least 6 months to 1 year to evaluate the stability of these personality changes. Moreover, forthcoming research could expand these results by employing neuropsychological data. In this line, it would be useful to explore the relationship between the effect of neuropsychological functions (disinhibition, perseveration for reward, cognitive flexibility and decision making) and self-report measures of personality (mainly impulsivity and sensitivity to punishment). In addition, neuropsychological examination would allow us to assess other facets of impulsivity (namely urgency, lack of premeditation and lack of perseverance) and not just the sensation seeking.

Clinical implications

Because substantial improvement of personality function might be necessary for achieving a clinically significant reduction of BN, determining which personality traits are more susceptible to change as an effect of CBT treatment could highlight important targets to be addressed during treatment in BN individuals. Furthermore, it is important to investigate the association between personality changes and clinical improvement over the course of treatment, because it might allow us to develop the most appropriate treatment to address specific patients' needs in relation to their personality profile. In addition, these personality changes over the course of treatment could be valuable as potential measures of treatment effectiveness and indicators of therapeutic change.

Conclusion

In conclusion, our findings indicate that changes in certain personality traits occurred after a CBT treatment, not only in character traits (namely SD and ST) as predicted but also in some temperamental traits (namely HA and RD). However, despite these personality changes after treatment, scores in the BN-P patients remained deviated from the normative scores. Furthermore, our results show that changes in some personality traits are related to positive outcome.

Acknowledgements

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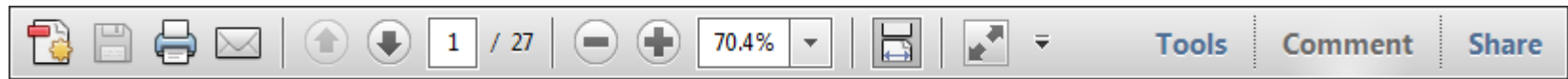
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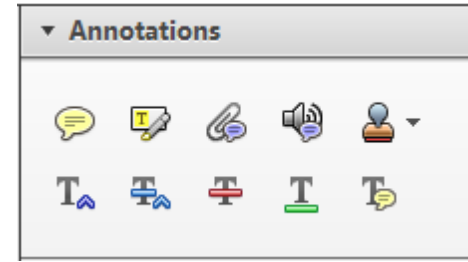
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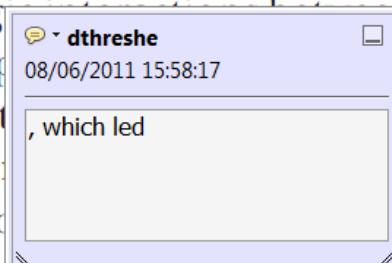


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standard framework for the analysis of microeconomics. Nevertheless, it also led to the emergence of strategic behavior in the number of competitors in the industry. This is that the structure of the industry, which led to the emergence of strategic behavior, are exogenous to the industry. Important works on this by Shirasaka (henceforth) we open the 'black b



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there is no room for extra profits and the number of competitors are zero and the number of (net) values are not determined by Blanchard and ~~Kiyotaki~~ (1987), perfect competition in general equilibrium of aggregate demand and supply in the classical framework assuming monopoly. An exogenous number of firms

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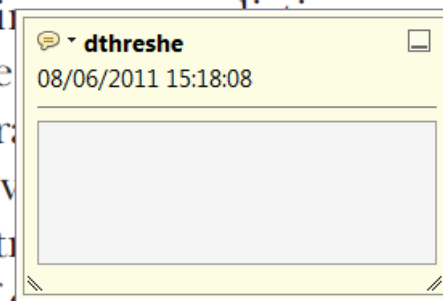


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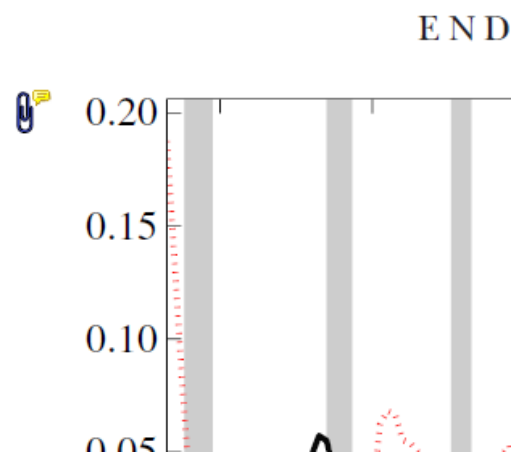
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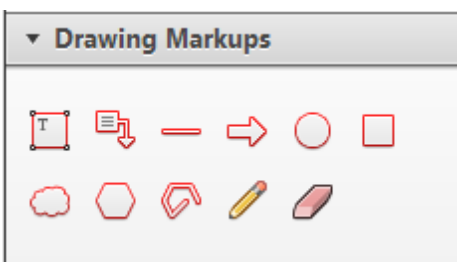


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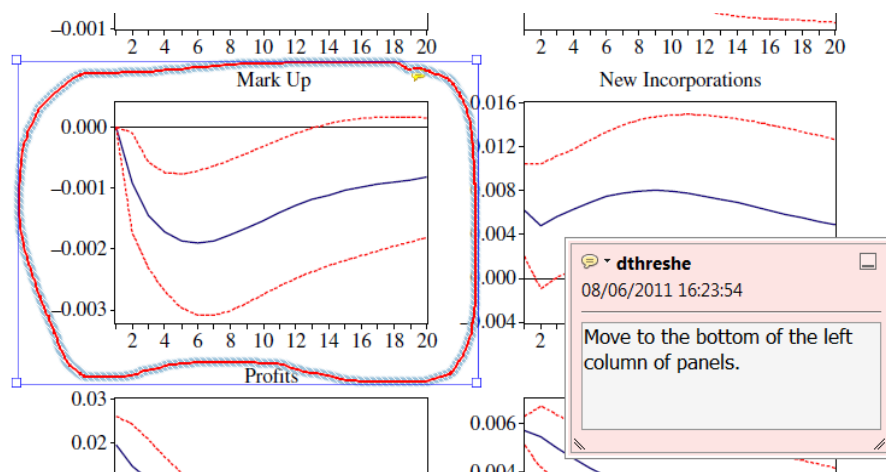


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