Dialectical Behavior Therapy for the Treatment of Comorbid Borderline Personality Disorder and Eating Disorders in A Naturalistic Setting: A Six-Year Follow-Up Study

Abstract

Background: Dialectical Behavior Therapy (DBT) has shown evidence of its effectiveness in the treatment of borderline personality disorder (BPD) and eating disorders (EDs) separately, and there is preliminary evidence of its effectiveness for co-occurrent BPD and EDs. However, the long-term effectiveness of DBT for this specific population is still unknown. The main goal of this study was to assess long-term treatment effectiveness in people diagnosed with BPD and ED. Methods: Participants (N=109) had previously received a six-month treatment during a clinical trial (Standard DBT = 64 vs. Cognitive Behavior Therapy; TAU CBT = 45). Outcome measures (emotional eating, depressive symptoms, anger, emotion regulation, impulsiveness, and resilience) were evaluated prospectively at 4- and 6-year follow-ups. Results: There was a statistically significant improvement in most outcomes from pre-treatment to the follow-ups in the DBT condition, and in depressive symptoms and trait anger in the TAU CBT condition. There were no between-group differences, except on the resilience scale, where DBT remained superior. Conclusions: Findings of this study support the long-term effectiveness of DBT for comorbid BPD and ED, and they contribute to determining how effective these treatments are in routine psychotherapeutic practice. Longitudinal studies with larger sample sizes are needed to confirm these results.

Introduction

Borderline Personality Disorder (BPD) and Eating Disorders (EDs) comorbidity in adulthood has been associated with more severe distortions in eating attitudes, a higher number of hospitalizations, and non-suicidal and suicidal behaviors (e.g. Ben-Porath et al., 2009; Chen et al., 2009). Moreover, a diagnosis of ED has been suggested as a predictor of early treatment dropout in individuals with BPD (Carmona et al., 2018).

Recent studies indicate a high prevalence of comorbid BPD and ED symptoms in samples with eating disorders (ED), including interpersonal difficulties, an unstable self-image, marked impulsivity, and emotion dysregulation (e.g., Martinussen et al., 2017; Newton, 2019). A 10-year follow-up study of the course of EDs in people diagnosed with BPD found that, although baseline comorbid ED remitted at the 10-year follow-up, diagnostic migration of EDs was common in the long term (Zararini, et al., 2010). Given common migrations from one ED to another (Fairburn & Bohn, 2005) and shared etiological factors in individuals with co-occurrent BPD and ED, transdiagnostic treatment approaches such as Dialectical Behavior Therapy (DBT; Linehan, 1993) have been considered adequate treatments for BPD and ED psychopathologies (Treasure & Schmidt, 2002).

DBT has been suggested as an efficacious intervention for a wide range of disorders with symptoms that are functionally similar to those of BPD (e.g. substance use disorder, anxiety disorders, eating disorders), and emotion dysregulation has been proposed as the core etiological and transdiagnostic factor (Neacsiu et al., 2015). Although more research is needed, DBT is currently the psychological treatment for BPD with the most evidence supporting it (Stoffers et al, 2012), and there is also some evidence of DBT adaptations to treat EDs (e.g. Bankoff et al., 2012; Ben-Porath et al., 2020).

Specifically, a recent review reported that the Stanford Model (Safer et al., 2009) has the most rigorous and numerous studies demonstrating its efficacy and effectiveness for people diagnosed with Binge Eating Disorder (BED), but there is not enough evidence about the efficacy of DBT in treating BN and AN (Ben-Porath et al., 2020).

Evidence about DBT for BPD and ED comorbidity is still in its infancy. An open trial conducted in Germany evaluated an adapted three-month DBT plus an added cognitive behavioral module specific to EDs in a large sample of inpatients (n=24) with BPD and EDs (Bulimia Nervosa and Anorexia Nervosa). The results showed significant improvements in self-rated eating-related complaints and general psychopathology, as well as global psychosocial functioning at post-treatment and 15-month follow-up. (Kroger et al., 2010). Furthermore, in a non-randomized controlled trial, Standard DBT was compared to Treatment as Usual Cognitive Behavior Therapy (TAU CBT) for BPD and ED comorbid features. Participants (N=118) were women diagnosed with BPD and ED (Anorexia Nervosa [AN], Bulimia Nervosa [BN] and Eating Disorder Not Otherwise Specified [EDNOS]), assigned to one of the two treatment conditions (DBT=71; TAU CBT=47). DBT, compared to TAU CBT, showed a greater decrease in dysfunctional behaviors used to regulate emotions (e.g. substance abuse, impulsive spending, unprotected sex, etc.), non-suicidal self-injuries, and depressive symptoms, as well as a greater increase in cognitive reappraisal and global functioning (Navarro et al., 2018). Neither of these studies presented long-term follow-up results.

Regarding long-term outcomes of standard DBT for adults with BPD, to our knowledge, follow-up studies have consisted of a maximum of two-year periods (e.g. Linehan et al., 2006; McMain et al., 2012). However, a shorter version of DBT for BPD was evaluated long term in a 10-year follow-up study conducted in Spain. Participants were BPD outpatients (N=64) who had participated in a previous clinical trial comparing

olanzapine plus DBT vs. placebo plus DBT for 12 weeks (Soler et al., 2005). Significant improvements were reported on BPD domains (affect, impulse action patterns, and interpersonal relationships), as well as significant decreases in BPD criteria, self-harm, and suicidal behavior, but social and occupational functioning continued to be impaired over time, and there was still comorbidity with other mental disorders (Álvarez-Tomás et al., 2016). Furthermore, several longitudinal studies have evaluated the course of BPD after treatment, but they have not controlled for the treatment approach. Findings indicated that over a period of 10-16 years, BPD was associated with low rates of relapse and high rates of remission of BPD acute symptoms (e.g. self-harm, suicide attempts), but less remission of temperamental symptoms (e.g., chronic anger, intolerance of aloneness) and severe and persistent impairments in social functioning (e.g. Gunderson et al., 2011; Zanarini et al., 2016). Results of these studies are consistent with the long-term research conducted in Spain.

To our knowledge, there are no published studies with long-term outcomes comparing Standard DBT (including the four treatment modes: individual psychotherapy, skills training, phone calls, and a consultation team) to other interventions specifically for the treatment of comorbid BPD and ED. Therefore, the main purpose of this study was to compare long-term treatment outcomes of Standard DBT vs. TAU CBT for individuals with BPD and ED (Anorexia Nervosa, Bulimia Nervosa, and EDNOS) in a naturalistic setting. Given DBT's focus on transdiagnostic emotion dysregulation, we expected DBT to be more effective than TAU CBT during the follow-up periods in decreasing clinical outcomes related to emotion dysregulation (depression, anger, emotional eating, expressive suppression, and impulsivity) and increasing adaptive emotion regulation strategies (cognitive reappraisal).

Methods

Participants

Participants were recruited from three private outpatient and day-hospital clinics in the Valencian community (Spain). These clinics receive referrals from heterogeneous practice settings ranging from private practice to the public mental health system. Before starting the treatment, advisors of the clinics carried out a screening process to assess whether participants met the inclusion/exclusion criteria for the study. Inclusion criteria were: (1) meeting the DSM-IV diagnostic criteria for BPD, as assessed by the Structured Clinical Interview for the DSM-IV Axis II Disorders (SCID-II; First et al., 1997); (2) meeting the DSM-IV diagnostic criteria for an eating disorder (BN, AN, or EDNOS), assessed by the clinician using the Structured Clinical Interview for the DSM-IV Axis I Disorders (SCID-I; First et al., 1996). Only diagnoses scored as full threshold on the SCID-I were considered; and (3) age 18 years or older. Exclusion criteria were: (1) a diagnosis of psychotic disorder and/or bipolar I disorder; (2) alcohol or other substance dependence; or (3) organic disease that could interfere with the psychological treatment. Characteristics of the sample that participated in the follow-up are described in the results section.

Study design and Procedure

The current research is a prospective study with long-term outcomes of the previous pre-post clinical controlled trial (Navarro-Haro et al., 2018).

The previous study was a multiple site, non-randomized, controlled trial conducted in a naturalistic setting, and it was approved by the clinical research ethics review board of the clinical center. Moreover, the research project was funded by a national agency and went through an ethical review process. Written informed consent was obtained from all the participants. The complete procedure for the clinical trial can

be found in the cited study. A summary of the clinical trial procedure is presented as follows.

Ten clinicians with training and experience in structured interviews for personality and eating disorders assessed whether patients met the diagnosis of BPD and ED and ensured that the inclusion criteria were met. Then, the researchers informed eligible participants about the study goal. If they agreed to participate, they signed an informed consent and were assigned to one of the two treatment conditions (Dialectical Behavior Therapy vs. Cognitive-Behavior Therapy Treatment as Usual). Assignment to the treatment conditions was conducted based on two main criteria: 1) therapist trained in DBT and 2) type of treatment setting (outpatient or day hospital). Therefore, participants who were assigned to DBT-trained therapists (according to the therapist's workload) received DBT, and those who were assigned to therapists not trained in DBT received TAU CBT. Number of participants from the different settings (outpatient or day hospital) was equivalent between conditions.

Regarding therapists, ten clinicians participated in the study (five of them administered DBT, and the other five administered TAU CBT). One of the DBT therapists (author A G-P) had received training in DBT and DBT adherence coding at the University of Washington from Dr. Linehan's team and trained the other four therapists in DBT. Training consisted of 40 h of DBT seminars and supervised practice over the course of 6 months. The therapists conducting TAU CBT had received training in CBT for ED protocols. They were also supervised during the 6 months of the treatment by the senior clinicians of the center, who had more than 25 years of experience in clinical practice and research in CBT.

Follow-up study: The current follow-up study had two time periods. The outcome measures were followed prospectively for 6 years after the interventions, with two

assessment points: 4 years (T2) and 6 years (T3). Participants in the follow-up assessment points were contacted via email to answer a survey (using Survey Monkey, following the ethical standards) that contained the study measures described below. Before filling out the measures, participants were given a description of the study and a consent form. Participants who were not reached by email were contacted by phone by the clinic's consultants and if they agreed to participate, completed the questionnaires over the phone.

Instruments

Pre-intervention: The demographic and clinical characteristics of the sample were assessed using the BPD Clinical Data Inventory (García-Palacios, 2005, unpublished manuscript). The BPD clinical data inventory is a clinical document that was designed by our research team and used by the clinician to gather relevant and specific demographic and clinical information. The demographic information collected was: age, marital status (single, in a relationship, married, or divorced), education level (no formal education, elementary, middle, higher), and employment status (student, unskilled worker, skilled worker, unemployed, housewife, disability, sick leave/retired). Clinical information selected for this study included: multiaxial diagnosis (DSM-IV-TR, APA 2000), previous psychological treatment, use of substances, frequency of maladaptive eating behaviors, dysfunctional impulsive behaviors (e.g. use of alcohol, impulsive sex, etc.), non-suicidal self-injuries in the past week, and frequency of suicide attempts and hospitalization in the past 6 months.

Main outcome measures:

The outcome measures selected for the follow-up were those that allowed the four time periods to be compared. The main outcome measures for this study were: depression, impulsivity, anger, emotional eating, emotional regulation strategies, and resilience.

Participants were assessed using standardized and validated self-report measures, as follows.

Depression. The Beck Depression Inventory-II (BDI-II; Beck et al., 1996, Spanish version; Sanz et al., 2003) is one of the most widely used self-report measures to assess depressive symptoms. It contains 21 items answered on a Likert-type response scale ranging from 0 to 3. Scores range from 0 to 63, with higher scores reflecting greater depressive symptomatology. Internal consistency was .87 for the Spanish version (Sanz et al., 2003), which is similar to the alpha found in other studies (e.g. Aasen, 2001; Hunt et al., 2003).

Emotional Regulation. The Emotion Regulation Questionnaire (ERQ, Gross & John 2003, Spanish version; Cabello et al., 2013) is a self-report measure to evaluate two commonly used emotion regulation strategies: cognitive reappraisal and expressive suppression. It contains 10 items with a Likert-type response scale ranging from 1 (strongly disagree) to 7 (strongly agree) and it is divided into two subscales: cognitive reappraisal (6 items) and expressive suppression (4 items). *Cognitive reappraisal* is a form of cognitive change that involves construing a potentially emotion-eliciting situation in a way that changes its emotional impact. *Expressive suppression* is a type of response modulation that involves inhibiting ongoing emotion-expressive behaviors. Scores range from 10 to 70 for the whole scale: 6 to 42 for Cognitive reappraisal and 4 to 28 for Expressive suppression. Gross and John (2003) found adequate psychometric properties for this measure, with alpha reliabilities of 0.79 for reappraisal, 0.73 for suppression. The Spanish version presented adequate internal consistency (α = .75 for suppression, and α = .79 for reappraisal; Cabello et al. 2013).

Impulsivity. The Barratt Impulsiveness Scale (BIS-11; Barrat, 1995; Spanish version; Oquendo et al., 2001) is one of the most commonly administered self-reports for

the assessment of impulsiveness (a multidimensional personality trait related to the control of emotions and behavior; Barratt et al., 2004) in both general and clinical settings. The BIS-11 consist of 30 items with 4 response options. Higher mean scores indicate greater impulsiveness. Exploratory component analysis of the items identified three subscales: Attentional Impulsiveness, Motor Impulsiveness, and Non-planning Impulsiveness. For this study, only the total score was used. Alpha coefficients for the total BIS total score ranged from 0.79 to 0.83 in clinical populations (Patton et al., 1995), and the total score has shown high predictive validity in assessing high-risk behaviors in both adults and adolescents (e.g. Salvo & Castro, 2013; Stanford et al., 2009; von Diemen et al., 2007). The reliability of the total score for the Spanish version was also high (α = 0.81; Oquendo et al., 2001).

Anger. The State-Trait Anger Expression Inventory–2 (Spielberger, 1999; Spanish version; Tobal et al., 2001) is one of the most widely used self-report measures to assess the experience, expression, and control of anger in research and clinical settings. The STAXI-2 comprises 49 items with a Likert-type 4-point response scale, and it is divided into three scales: (a) how angry the examinee currently feels (state), (b) how angry the examinee generally feels (trait), and (c) how the examinee reacts when angry (control). In this study, only the state anger and trait anger scales were used. The state anger scores range from 15 to 60; and the trait anger scores range from 10 to 40. The internal consistency of the STAXI-2 showed Cronbach's alphas for the scales ranging from 0.73 to 0.93 (Spielberger, 1999). The Spanish validation of the scale also showed good internal consistency (Cronbach's alpha of .89 for state anger and .82 for trait anger; Tobal et al., 2001).

Emotional Eating. The Emotional Eating Scale (EES; Arnow et al., 1995) asks participants to rate the extent to which different feelings lead them to feel an urge to eat,

using a 5-point scale ranging from "no desire to eat" to "an overwhelming urge to eat." Higher scores indicate a greater desire/urge to eat in response to a specific feeling. This scale has 25 items divided into 3 subscales: Anger/Frustration, Anxiety, and Depression. All three subscales correlated highly with measures of binge eating, providing evidence of the "emotional eating" construct. Only the total score was used in this study. The original coefficient alpha for the total scale ranged from .81 (Arnow et al., 1995) to 0.93 (Waller & Osman,1998), indicating acceptable internal consistency. The adaptation of this scale for children and adolescents has been validated in the Spanish population, showing good internal consistency (Perpiñá et al., 2011).

Resilience. The Resilience Scale (RS; Wagnild and Young, 1993) is a self-report measure of the extent individual *resilience*, conceptualized as a positive personality characteristic that enhances successful adaptation when facing adversity (Gail & Heather, 1993). The current study used the shortened 15-item version (RS15), with Likert-type responses on a 7-point scale ranging from disagree to agree. Possible scores range from 15 to 105, and higher mean scores indicate greater perceived resilience. A preliminary factor analysis of the RS15 showed a unidimensional global resilience factor, with factor loadings ranging from 0.52 to 0.75. Its 15 items accounted for 44% of the variance (Pülschen et al., 2015). Both the original RS and RS15 have shown good internal consistency, reporting Cronbach's alphas of around 0.90 (Gail & Heather, 1993; Pülschen et al., 2015). The RS has shown good internal consistency in Spanish clinical samples (α =0.88) (Becoña Iglesias et al., 2013).

Interventions

The interventions conducted during the pre-post study are described briefly (for a more extended description, see Navarro-Haro et al., 2018).

DBT: Standard Dialectical Behavior Therapy (Linehan, 1993, 2015) included four intervention modes: individual psychotherapy, skills training, phone calls, and a consultation team. Individual psychotherapy was provided in one-hour weekly sessions with the aim of improving awareness and reducing specific problem behaviors. Individual therapy followed the principles and target hierarchy of standard DBT (Linehan 1993). Skills training consisted of weekly group sessions lasting approximately two hours. The aim of the skills training was to increase skills related to acceptance and awareness (mindfulness, distress tolerance) and to behavioral change (emotion regulation and interpersonal effectiveness). This training lasted 24 sessions, and contents were taken from Linehan's 1993b manual and its version translated into Spanish (Linehan, 2003). The phone coaching mode was applied to generalizing skills to daily life and learning how to ask for help in crisis situations. The consultation team met weekly with the aim to support the therapists and ensure adherence to the treatment program.

TAU CBT: Treatment as usual is a cognitive behavioral program focused mainly on addressing ED psychopathology (education of the disorder, self-monitoring, establishing regular eating, reducing dysfunctional eating behaviors, and changing misinterpretations of body image). The TAU CBT program included components of CBT for BN (Wilson et al., 1997) and AN (Garner et al., 1997). The program also targeted other symptoms that are more related to the personality psychopathology (self-harm, substance use, etc.), using CBT strategies. In order to match the dose of therapy received in the two treatment conditions, participants in TAU CBT received one weekly individual therapy session lasting one hour and one weekly group session lasting approximately two hours. The TAU CBT was adapted to a group format by the clinical team.

The treatment programs lasted 6 months. The DBT program was adapted to 6 months, instead of 12 months, to match the TAU CBT's length and because research applying DBT for six months shows good outcomes (e.g. Brassington & Krawitz, 2006; McMain et al., 2017). The main difference between the two treatments is that the DBT program focused on emotion dysregulation and included acceptance-based strategies, whereas the CBT TAU program aimed to change eating psychopathology and related symptoms (e.g. perfectionism). Dysfunctional eating behaviors in DBT are conceptualized as attempts by individuals to mitigate emotions when experiencing affective dysregulation and nutritional vulnerability caused by caloric deprivation or indulgence (Bankoff et al., 2012).

Most of the participants received pharmacological treatment (87%) during the pre-post trial. Medication was constant during the study in most cases, and medication changes were made in exceptional cases. There is still not enough evidence about pharmacological treatment for BPD (i.e., Stoffers, et al., 2010), therefore medication was co-adjutant or auxiliary (Linehan, 1993, p. 105) to the psychological treatment, the primary treatment based on clinical guidelines for BPD (e.g. American Psychological Association; APA; 2006). Participants in outpatient and day hospital settings received the assigned treatment condition (DBT or TAU CBT), but the individuals attending the day hospital also attended other ancillary therapeutic activities that were part of the day hospital routine (e.g. normalization of eating habits). Both DBT and CBT programs accept auxiliary treatments as a complement to their protocols.

Statistical analysis

The baseline sociodemographic and clinical characteristics of participants were described using means (and standard deviations) for the continuous variables, and

frequencies (and percentages) for the categorical variables. To compare significant baseline differences in sociodemographic and clinical characteristics between the DBT and TAU CBT conditions, Chi-square statistics were performed on categorical variables, whereas Student's *t* tests were used for continuous variables.

Changes in outcome measures from pre-treatment to the follow-ups (T0-T1, T0-T2 and T0-T3), and during the follow-up period (T1-T2, and T2-T3), were evaluated separately. Different Student's *t* tests for repeated measures of the scores on the outcome measures were conducted for each treatment condition. The mean and the standard deviation were used to summarize the results at each time point. Finally, to assess the statistical significance of the differences between the DBT and TAU CBT conditions in the change over time, Student's *t* tests for independent samples were used. All statistical analyses were computed using SPSS version 22.0 software for Windows. All tests were performed using a two-sided approach, with a significance level set at 0.05.

Missing Data: As normally occurs in longitudinal research, not all participants reported information at all the time points. Participants were assessed four times: before the treatment (T0; n=109), after the treatment (T1; $n = 69$), 4 years later (T2; $n = 15$), and 6 years later (T3; $n = 15$). Missing values were less than 5% at T0, less than 38% at T1, and 83.5% at T2 and T3. As recommended (Graham, 2009; van Ginkel et al., 2020), missing data were multiple imputed, one of the best methods currently available to deal with missingness. We employed multiple imputation in SPSS to create and analyze imputed datasets ($m = 100$) using the main outcome measures (Graham et al., 2007). In addition, we also included auxiliary variables in the missing data model (Allison, 2001; Collins et al., 2001). Consistent with suggestions by Hardt et al. (2012), the number of auxiliary variables included in the imputation could not exceed 1/3 of the number of completers. Thus, we included five auxiliary variables used at pre-treatment: (1)

frequency of maladaptive eating behaviors in the past week, (2) frequency of dysfunctional impulsive behaviors in the past week, (3) frequency of hospitalization in the past 6 months, (4) frequency of non-suicidal self-injuries in the past week, and (5) frequency of suicide attempts in the past six months. The comparison of the original and imputed databases of outcomes at pre-treatment revealed no significant sample differences in the analyzed variables. Thus, the results from the imputed database were reported.

Results

Participants' characteristics

Table 1 presents participants' characteristics at pretreatment for the total sample and by treatment condition. One hundred nine women (age 27.38 ± 8.81 years) participated in the study. The majority of the participants were single (67%), had mid-level education or less (74.3%), and had an EDNOS (60.7%). There were no statistically significant differences at baseline between the two treatment conditions on any of the sociodemographic or psychological outcomes.

INSERT TABLE 1 about here

Attrition bias assessment

As is common in longitudinal research, not all the participants supplied data at the four time points. Main treatment outcome data were obtained for 69 participants at post-test (DBT = 38, TAU CBT = 31) and for 15 participants in the first and second follow-up periods (DBT = 10, TAU CBT = 5). The TAU CBT condition retained fewer participants at post-treatment and in the follow-up periods than the DBT condition, but these differences were not statistically significant ($p = .310$; $p = .501$; respectively).

To assess attrition bias, we compared participants who dropped out of the study (T0 to T3; $n = 93$) with those who completed all the time points (T0 to T3; $n = 16$) on the mean scores on the primary outcomes at pre-treatment, using Student's t test for independent samples. No statistically significant differences between completers and dropouts were found on depression ($t = $ -1.35, $p = $ .181), cognitive reappraisal of emotional regulation ($t = 0.92$, $p = $ .359), expressive suppression of emotional regulation ($t = $ -1.03, $p = $ .305), resilience ($t = 1.28$, $p = $ .202), impulsivity ($t = $ -0.52, $p = $ .605), or trait anger ($t = $ -0.18, $p = $ .858). There were statistically significant differences between completers and dropouts at pre-treatment on emotional eating scores ($t = $ -3.98, $p < $ .001) and state anger ($t = $ -1.85, $p = $ .075), although the difference in state anger scores was only marginally significant. Thus, we performed the analyses on the imputed database.

Pre–post Analysis for Each Treatment

Pre-post analyses were performed based on the imputed database. Tables 2 and 3 display means and standard deviations for the outcome measures at pre-treatment, post-treatment, and follow-up periods for the DBT and TAU CBT conditions, respectively. In the DBT condition, participants showed an improvement on the BDI-II, Resilience, and Trait Anger scores at the post-treatment assessment (see Table 2), whereas participants in the TAU CBT condition did not exhibit pre-post improvements in any variable (see Table 3).

INSERT TABLES 2 and 3 about here

Follow-up Comparisons for Each Treatment

Follow-up analyses were performed based on the imputed database. For the DBT condition, as Table 2 shows, contrasts between T0 and T2, and between T0 and T3, revealed that there were statistically significant improvements in most of the study

variables from the pre-treatment assessment to the follow-up assessments, except for State Anger. In addition, contrasts between T1 and T2, and between T2 and T3, showed that there was a trend toward continued improvement on the BDI-II, Resilience, Trait Anger, and Emotional Eating scores from the post-treatment assessment to the follow-up assessments, although the improvement in the BDI scores between T2 and T3 was only marginally significant ($p = .069$).

In the TAU CBT condition (see Table 3), comparisons of T0 and T2, and T0 and T3, revealed that there were statistically significant improvements in the BDI-II, Resilience, and Trait Anger scores from the pre-treatment assessment to the follow-up assessments. Moreover, there were statistically significant improvements in the Expressive suppression and Emotional Eating scores from the pre-treatment assessment to the second follow-up assessment (T0-T3). Comparisons of T1 and T2, and T2 and T3, showed that the Resilience and Trait Anger scores improved during the follow-up periods. In addition, comparisons of T1 and T2 revealed that there was an improvement in the scores on the BDI-II and cognitive reappraisal from the ERQ from the post-treatment assessment to the first follow-up assessment. Finally, the emotional eating and expressive suppression scores improved from the second follow-up assessment to the last follow-up period (comparison of T2 and T3).

Between-subjects Comparisons

Between-subject comparison analyses were performed based on the imputed database. Table 4 shows different Student's *t* test analyses for between-subject comparisons of the change over time. There were no statistically significant differences between DBT and TAU CBT on any variable at any time, but there was a marginally significant between-group difference in the resilience scores ($p = .052$) from the pre-

treatment assessment to the follow-up assessment (T0-T2). DBT showed a greater increase in the resilience scores, compared to TAU CBT.

INSERT TABLE 4 about here

Discussion

The main purpose of this study was to compare long-term treatment outcomes of two interventions, standard DBT vs. TAU CBT, to treat BPD and ED comorbidity in a naturalistic setting. Our main hypothesis was that, in the long term, DBT would be superior to CBT TAU in improving variables related to emotion dysregulation (depression, anger, impulsivity, emotional eating, and emotion regulation strategies).

In the DBT condition, there was a statistically significant improvement in most of the study variables (depression, emotional eating, trait anger, impulsivity, and expressive suppression) from pre-treatment to the follow-up periods (T0-T2 and T0-T3), except for state anger. In addition, there was a trend toward continued improvement on depression, resilience, and the emotional eating scores. In the TAU CBT condition, there was a statistically significant improvement in depression, resilience, and trait anger scores from the pre-treatment assessment to the follow-up assessments (T0-T2 and T0-T3). There was a trend toward continued improvement on the resilience and trait anger scores.

To our knowledge, this is the first study to test emotional eating in individuals with BPD and EDs. Emotional eating has been defined as the tendency to eat in order to regulate negative emotions, without attending to physiological hunger needs (López-Montoyo & Cebolla, 2016). From a DBT perspective, maladaptive eating behaviors are forms of emotion regulation used by individuals in response to emotions that are difficult to tolerate (Bankoff et al., 2012). These results indicate that an ED factor related to emotion dysregulation decreased after a DBT intervention, and the improvement was

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maintained in the long term. On the other hand, the improvement in depression found with both interventions is consistent with previous studies using shorter follow-ups to evaluate treatments for BPD (e.g. McMain et al., 2012). In a recent literature review on the effectiveness of DBT for EDs, medium to large effect sizes were noted in treating depression symptoms (Lenz et al., 2014). Furthermore, both treatments improved trait anger over time, which is a promising outcome because previous studies show that personality traits, such as chronic anger, are more resistant over time (Álvarez-Tomás et al., 2016; Gunderson et al., 2011; Zanarini et al., 2016). However, state anger did not improve in any condition. Due to the emotional instability of the BPD population, it is difficult to analyze state measures.

Another interesting finding is that DBT improved impulsivity and expressive suppression over time. These results are promising because they suggest a good outcome on two fundamental etiological factors of emotional vulnerability in BPD according to the biosocial theory: impulsivity and emotion regulation difficulties (Crowel et al., 2009). Emotional suppression also appears to be a factor that mediates the regulation of negative affect and emotional reactivity in the BPD population (Rosenthal et al., 2008). These results suggest that DBT may help to improve dispositional impulsivity and a maladaptive emotion regulation strategy in the long term. However, cognitive reappraisal, found to be an adaptive emotion regulation strategy (see Gross & John, 2003), did not increase after treatment, but it had improved at the 4-year follow-up. A recent laboratory study indicates that individuals with BPD have difficulties with learning cognitive reappraisal (Schulze et al., 2011). Thus, further practice might have helped to improve cognitive reappraisal after the treatment.

Contrary to our hypotheses, there were no statistically significant differences between DBT and TAU CBT in the analyzed variables over time. However, there was a

marginally significant difference between groups in improvements on the resilience scores from the pre-treatment assessment to the follow-up assessment (T0-T2). In this case, DBT showed a greater increase in resilience scores, compared to TAU CBT. This result is interesting from our point of view. Resilience is a broad concept that refers to the ability to maintain wellbeing despite adversity (Masten, 2001). Resilience has been associated with positive adjustment in difficult and stressful situations, such as the ability to problem solve or accept the results of change (Reivich & Shatte, 2002) instead of resisting or denying the change. Furthermore, emotion-oriented coping has been associated with low resilience (Campbell-Sills et al., 2006). Along these lines, a qualitative study (Paris et al., 2014) compared pairs of sisters, one with BPD and the other without BPD, who had experienced severe abuse and neglect. The results showed that the sisters with BPD reported that they were unable to use strategies related to resilience (e.g. seeking social support, managing negative emotional experiences, accepting the past). These abilities are similar to the essential strategies taught in DBT. DBT treatment balances change and acceptance by training individuals in problem-solving strategies, emotion regulation, interpersonal effectiveness, mindfulness practice, and reality acceptance skills (Linehan, 2015). The change in resilience found in this study may indicate that DBT could help to develop a protective factor against psychiatric disorders in the long term in individuals with severe emotion dysregulation.

Finally, although it was not the main purpose of this study, we would like to mention that the TAU CBT condition retained fewer participants at post-treatment and in the follow-up periods than the DBT condition, but these differences were not statistically significant. This result is consistent with previous studies showing that DBT has high retention rates after treatment and at follow-up in BPD and ED populations (e.g. Linehan

et al., 2006; Navarro et al., 2018; Safer et al., 2010), which may improve long-term cost-effectiveness.

Despite these findings, the study has several limitations. First, randomization of participants was not carried out. Therefore, this study has limitations related to internal validity, and so we cannot interpret the results in terms of treatment efficacy. Given that many RCTs have been conducted to test the efficacy of DBT, our main goal was to evaluate how effective these treatments were in the field of routine psychotherapeutic practice. Another possible limitation is the difference in the number of participants assigned to the different conditions (71 participated in DBT and only 47 in TAU CBT) at pre-treatment, due to the workload of the therapists. Nonetheless, results showed that there were no differences between groups at baseline on clinical and demographic variables. Furthermore, the fact that some patients were taking psychotropic medications and receiving auxiliary therapy activities is also a limitation because we did not study the effects of these additional treatments on the study outcomes in the long term. Finally, although long-term outcomes were statistically valid, the sample sizes at the follow-up points were small. Randomized controlled trials with bigger sample sizes at follow-up are needed to confirm the long-term efficacy of these treatments.

In conclusion, results of this study support the long-term effectiveness of standard DBT for comorbid BPD and ED in naturalistic settings, and they contribute to the research on the efficacy of these treatments in the field of routine psychotherapeutic practice. DBT may be a good treatment to improve long-term resilience in people suffering from a severe mental condition. Longitudinal studies with larger sample sizes are needed to confirm these findings.

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