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Mindfulness in Borderline Personality Disorder: Decentering Mediates the Effectiveness

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Abstract

Background: Mindfulness skills training is a core component of dialectical behavior therapy (DBT) that has proven to be an effective stand-alone treatment for the general symptoms commonly present in patients with borderline personality disorder (BPD). The aim of the present study was to compare the effectiveness of mindfulness-based DBT skills training (DBT-M) to interpersonal effectiveness-based DBT skills training (DBT-IE) in reducing BPD symptoms. We also evaluated the specific mechanism of action of these therapies through two proposed mediators: decentering and emotion dysregulation. **Method:** A total of 102 participants diagnosed with BPD were included in the study. Multivariate repeated-measures ANOVAs were performed followed by a multiple mediation analysis. **Results:** The analyses showed that DBT-M was more effective than DBT-IE in reducing BPD symptoms, although both interventions were effective in reducing emotion dysregulation. We identified a serial mediation model in which DBT-M reduced BPD symptoms by increasing decentering ability, which in turn reduced emotion dysregulation. This mediation effect showed that changes in decentering preceded improvements in emotion dysregulation. **Conclusions:** These findings underscore the key role of decentering as a primary mechanism of action in DBT-M, suggesting that this skill is a main component for BPD treatment.

Keywords: Borderline personality disorder; mindfulness; decentering; emotion dysregulation; mediation analysis.

Resumen

Mindfulness en el Trastorno Límite: el Descentramiento Media la Efectividad del Entrenamiento. **Antecedentes:** el entrenamiento de habilidades en Mindfulness es un componente central en la terapia dialéctica conductual para el tratamiento del trastorno límite de la personalidad (TLP). El objetivo del estudio fue comparar la efectividad del entrenamiento de habilidades DBT basado en mindfulness (DBT-M) con el entrenamiento de habilidades DBT basado en la efectividad interpersonal (DBT-IE), en reducir síntomas TLP. También evaluamos el mecanismo de acción específico de estas terapias a través de dos mediadores propuestos: descentramiento y desregulación emocional. **Método:** 102 participantes diagnosticados con TLP fueron incluidos en el estudio. Se realizaron Anova de medidas repetidas y análisis de mediación múltiple. **Resultados:** DBT-M fue más efectivo que DBT-IE en reducir síntomas TLP, aunque ambas intervenciones fueron eficaces para reducir la desregulación emocional. Identificamos un modelo de mediación en serie en el que DBT-M redujo síntomas TLP al aumentar la capacidad de descentramiento, lo que a su vez redujo la desregulación emocional. Este efecto de mediación mostró que los cambios en el descentramiento precedieron a las mejoras en la desregulación emocional. **Conclusiones:** estos hallazgos destacan el rol del descentramiento como un mecanismo de acción primario en DBT-M y sugiere que esta habilidad es un componente principal para el tratamiento del TLP.

Palabras clave: trastorno límite de la personalidad; mindfulness; descentramiento; desregulación emocional; análisis de mediación.

Borderline personality disorder (BPD) is a severe, complex mental illness characterized by a pervasive pattern of emotion dysregulation, impulsivity, interpersonal relationships disturbances, and identity dysfunction (American Psychiatric Association, 2013). It is also associated with intensive use of mental health resources, chronicity, and severe psychosocial deterioration (Álvarez-Tomás et al., 2017). Consequently, there is a clear need for effective, empirically-based psychotherapies designed to address the full complexity of this disorder.

Meta-analyses have shown that dialectical behavior therapy (DBT) is an effective psychotherapeutic treatment for BPD (Stoffers-Winterling et al., 2012; Storebø et al., 2020). Standard DBT is a multifaceted therapeutic intervention involving four primary modes of treatment delivery: individual therapy, group skills training, consultation teams for therapists, and telephone coaching (Linehan, 1993; 2014). The group skills component is often used as a stand-alone treatment which has proven to be an effective, non-comprehensive treatment by itself (Linehan et al., 2015; Soler et al., 2009). DBT skills training has been shown to be effective in decreasing anxiety, depression, in reducing suicide attempts, nonsuicidal self-injury, and in improving anger control (Linehan et al., 2015; Neacsiu et al., 2010; Soler et al., 2009).

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DBT skills training comprises four different modules: mindfulness, distress tolerance, interpersonal effectiveness, and emotion regulation (Linehan, 1993; 2014). The specific efficacy of each module alone, and the mechanism of action through which these modules achieve benefits, are still unknown, nor is it clear whether DBT can still be effective when certain skills (or modules) are absent (Valentine et al., 2015). Therefore, dismantling designs for the study of DBT skills are necessary to evaluate the active components of each module and to understand the specific mechanism of action that contribute to symptomatic improvement in patients with BPD. Linehan (2014) postulated that mindfulness training is the core component of these four modules. Studies have shown that the mindfulness module alone can effectively reduce BPD symptoms (Elices et al., 2016) and impulsivity (Carmona i Farrés et al., 2019; Soler et al., 2016). Given the effectiveness of this module and the relevance of mindfulness in DBT, understanding the active component of this module is relevant to clinical practice.

The concept of mindfulness is derived from the Buddhist tradition and it is generally defined as present-centred awareness with an attitude of acceptance and openness as opposed to a tendency to judge experience (Kabat-Zinn, 1990; Linehan, 2014). Linehan (1993) developed a treatment strategy that integrates the principles of Zen Buddhism and acceptance-related mindfulness practice, which includes specific techniques on how to achieve acceptance. Deficits in mindfulness skills have been linked to certain key characteristics of BPD such as impulsivity and emotion dysregulation (Fossati et al., 2012). Moreover, patients with BPD score significantly lower on measures of dispositional mindfulness (Soler et al., 2014) and show greater deficits in DBT skills (Neacsiu & Tkachuck, 2016) compared to patients with other psychiatric disorders.

Metacognitive awareness has been described as a primary cognitive mechanism within mindfulness meditation that is associated with an individual's decentering ability (Dahl et al., 2015). Decentering is defined as the capacity to observe one's thoughts and feelings in a non-attached manner (Fresco et al., 2007). Decentering allows people to shift their perspective and to disidentify themselves from the contents of their experience (thoughts and emotions), while perceiving these experiences as transitory mental events, instead of identifying with them or believing that they are reflection of a static self or reality (Safran & Segal, 1990; Shapiro et al., 2006). These metacognitive processes (meta-awareness and disidentification from experiential content) also help to reduce reactivity from thought (Bernstein et al., 2015). Decentering has been proposed as a mediating mechanism in several disorders, including generalized anxiety (Hoge et al., 2015), social anxiety (Hayes-Skelton & Graham, 2013), and depression (Gelcht et al., 2014). In patients with BPD, the decentering capacity is diminished (Soler et al., 2014). Mindfulness-based DBT skills training could help to compensate for those deficits since mindfulness interventions have been shown to improve decentering capacity in BPD. This studies have shown that this capacity is a predictor of reduced symptom severity, although its mediating effect on DBT skills training has not yet been tested (Elices et al., 2016; Soler et al., 2014).

Furthermore, emotion dysregulation is a central feature of BPD, characterized by greater reactivity and intensity of negative affect (Linehan, 1993; Selby et al., 2009). Individuals with BPD show significant deficits in emotion regulation (Glenn & Klonsky, 2009) and DBT skills training is effective at reducing difficulties in this area (Carmona i Farrés et al., 2019). To our knowledge, the relationship between decentering and emotion dysregulation has not been explored in DBT skills training, although both capacities are likely mechanisms of change underlying the reduction in overall symptoms in patients with BPD who undergo this treatment. Similarly, it is not known whether changes in decentering precede changes in emotion dysregulation or the inverse, although some studies in patients with anxiety disorders have found that decentering improve emotion regulation (Hayes-Skelton et al., 2015; O'Toole et al., 2019).

In this context, we hypothesized that decentering is a primary mechanism of action -driven by mindfulness skills- in the treatment of BPD, which improves emotion dysregulation and BPD symptoms. The objective of the present study was to compare the DBT mindfulness module (acceptance skills) with the interpersonal effectiveness module (change skills) and to assess the mediating role of decentering and emotion dysregulation in reducing BPD symptoms. We chose interpersonal effectiveness as an active control group because is the module that differs the most from mindfulness skill. Comparing an acceptance-oriented module to a change-oriented module ensures that there is no overlap between the contents of each training.

Method

Participants

This study forms part of a wider project that includes several trials to evaluate the effectiveness of DBT skills training. The present study was based on data from BPD outpatient facility of the Hospital de la Santa Creu i Sant Pau (Barcelona, Spain) who participated in two previous psychotherapeutic clinical trials (Carmona i Farrés et al., 2019; Elices et al., 2016). In addition, new participants were recruited to complement the previous data in order to obtain a larger sample. The same procedure was performed as in the previous trials. All participants were interviewed by a psychiatrist and a psychologist, with experience in BPD research and treatment, who performed the diagnostic interviews and conducted the clinical assessments. A total sample of 149 patients was obtained, whose 47 were excluded due to the absence of key clinical data (i.e., without post-assessment scales completed). Therefore, 102 participants were included in the present study.

Inclusion criteria were as follows: 1) clinical diagnosis of BPD based on two semi-structured interviews (Structured Clinical Interview for DSM IV axis II Disorders (SCID II: First et al., 1997) and the Revised Diagnostic Interview for Borderlines (DIB-R: Barrachina et al., 2004); 2) age 18-50 years (inclusive); 3) absence of any of the following comorbid conditions: schizophrenia, drug-induced psychosis, organic brain syndrome, substance dependence, bipolar disorder, intellectual disability, or major depressive episode in course; 4) not receiving any other type of psychotherapy at the time of study enrolment. Patients were allowed to continue taking any medications prescribed prior to study inclusion but they were not allowed to modify the type or dose of these drugs during the intervention period. The participants had no previous experience in mindfulness meditation and had not participated in a DBT skills training.

Procedure

A single-center randomized controlled trial design was used, with pre- and post-treatment measures. Participants were randomized and assigned to one of two treatment conditions: DBT-mindfulness

skill training (DBT-M) or DBT-interpersonal effectiveness skill training (DBT-IE). The research unit coordinator was responsible for the randomization process.

The sessions were led by DBT-trained therapists (two in each group) and organised according to usual DBT procedures. All therapists were psychologists with a PhD degree and personal experience in mindfulness meditation. Both interventions followed the same structure and were delivered in group format (9-12 participants/group). Each treatment session was 2.5 hours in duration and held weekly over a 10-week period (10 sessions). At the start of each session, the assigned home-based tasks were reviewed and then each participant commented on their experience with the practice (including any difficulties). Next, the therapists reinforced the participants' progress and suggested specific changes related to DBT skills. Subsequently, a new skill was introduced and practiced through the use of role plays and discussion. At the end of the session, new tasks were assigned for home-based practice during the week. Written informed consent was obtained prior to inclusion in the study. The study was approved by the Clinical Research Ethics Committee at the Hospital de la Santa Creu i Sant Pau and carried out in accordance with the Declaration of Helsinki.

DBT-M training: Mindfulness training consisted in teaching mindfulness skills based on the DBT skill training protocol (Linehan, 1993; 2014). The skills taught were: (i) Wise mind skill; (ii) What skills (i.e., observe, describe, participate); (iii) How skills (i.e., taking a non-judgmental stance, focusing on one thing in the moment, and being effective). Both formal and informal meditations were taught. Participants received a CD with all formal meditations and were instructed to practice at home. As our objective was to evaluate all the skills related to mindfulness of DBT skill training protocol, we also included acceptance skills taken from the Distress tolerance module to reinforce the attitudinal component of mindfulness practice (6-weeks mindfulness skills plus 3-weeks acceptance skills). Similarly, a 10-session mindfulness skill program is also proposed by Linehan as an alternative to the standard DBT skill (Linehan, 2014, p. 120) that include mindfulness and acceptance skills.

DBT-IE training: Interpersonal effectiveness training was also based on the DBT skill training protocol (Linehan, 1993; 2014). The overall aim was to increase the patient's repertoire of effective social behavior. Three types of effectiveness skills were taught: (i) Learn to act effectively in maintaining your rights and goals in a particular situation; (ii) Learn to act effectively in relationships, including skills for keeping and improving relations and validation skills; (iii) Learn to defend their self-respect. Because the interpersonal effectiveness module consists of 6 sessions in the original protocol, two consecutive sessions were dedicated to each of the three effectiveness skills to equal the number of DBT-M sessions.

Instruments

The Borderline Symptom List -23 (BSL-23: Bohus et al., 2009). A self-report instrument that assesses global BPD severity. The BSL-23 has an unifactorial solution, with higher scores indicating more severe BPD. The Spanish validation study showed high internal reliability (Cronbach's $\alpha = .94$) and good test-retest results ($r = .73$; $p < .01$) (Soler et al., 2013).

Experiences Questionnaire (EQ: Fresco et al., 2007). This is a 20-item self-report scale to assess decentering and rumination. In the present study, we used the EQ-Decentering scale, which assesses an individual's ability to observe thoughts and feelings in a detached manner (Fresco et al., 2007). The EQ has a proven sensitivity to detect changes after mindfulness-based interventions (Soler et al., 2014). The Spanish version has good internal reliability (Cronbach's $\alpha = .89$) (Soler et al., 2014).

Difficulties in Emotion Regulation Scale (DERS: Gratz & Roemer, 2004). This is a self-report questionnaire to assess difficulties in emotion regulation and consist of five factors: Awareness, Clarity, Non-acceptance, Goals, and Impulse-Strategies. The Spanish validation showed high internal reliability (Cronbach's $\alpha = .93$) with moderate to high internal reliability on the five scales (Cronbach's $\alpha = .73$ to $.91$) (Hervás & Jodár, 2008). In this study, the total DERS score was used as an overall measure of emotion dysregulation.

Data analysis

First, multiple chi-square and independent t-tests were performed at baseline to assess for possible demographic and clinical differences between groups (DBT-M vs. DBT-IE). Second, to evaluate the impact of both treatments on the primary outcome (BSL-23), a repeated measure ANOVA were conducted. Self-reported BPD symptoms scores were entered as the dependent variable; time (pre- and post-treatment) was entered as the within-subjects factor, and group condition (DBT-M vs. DBT-IE) was entered as the between-subjects factor. Two repeated-measures ANOVAs were conducted for secondary variables (EQ and DERS); time (pre- and post-treatment) was included as the within-subjects factor and group condition (DBT-M vs. DBT-IE) was entered as the between-subjects factor. Post hoc analyses were conducted when significant interactions were found.

Finally, we conducted mediation analyses to evaluate the possible mediating role of secondary outcomes (i.e., EQ and DERS) in the post-treatment decrease in BSL-23 scores. We used the PROCESS macro in SPSS 24.0 and bootstrapping confidence intervals with 10,000 resamples to obtain estimates of indirect effects (Hayes, 2013; Hayes & Preacher, 2014). The proposed model included the intervention (DBT-M vs. DBT-IE) as independent variable and borderline symptoms (BSL-23) as the outcome. Two possible mediators were included in a serial multiple mediation model: decentering (EQ) and emotion dysregulation (DERS).

Results

Baseline demographic and clinical characteristics

The demographic and clinical variables are shown in Table 1. There were no significant differences between the groups in demographic variables (age, sex, education, employment, marital status) or clinical characteristics (DIB-R and pharmacological treatment). Likewise, there were no between-group differences in self-report measures at baseline: BSL-23 ($t = -.17$, $df = 100$, $p = .86$), EQ ($t = -.50$, $df = 100$, $p = .61$), and DERS ($t = -.43$, $df = 92$, $p = .66$).

Differences between groups in efficacy

We first evaluated the effects of the two interventions on the primary outcome (Table 2). BSL-23 scores showed a main effect of time ($F(1,100) = 7.27$, $p = .008$, $\eta^2 = .07$) and a significant group

Table 1
Baseline Demographics and Clinical Characteristics

	DBT-M		DBT-IE		Analysis		
	n = 50		n = 52		t	χ^2	p
Age (mean, SD)	32.06	8.0	32.56	8.0	-.31		.75
Female (n, %)	47	92.2	48	92.3		.00	.97
Education (n, %)						.89	.64
Primary	13	25.5	14	26.9			
Secondary	20	39.2	24	46.2			
University	18	35.3	14	26.9			
Employment status (n, %)						5.04	.08
Student	1	2.0	5	9.6			
Employed	20	39.2	12	23.1			
Unemployed/sick leave	30	58.8	35	67.3			
Marital Status (n, %)						2.97	.22
Single	34	66.7	26	50.0			
Married/couple	9	17.6	13	25.0			
Divorced/separated	8	15.7	13	25.0			
DIB-R (mean, SD)	7.35	1.25	7.75	1.59	-1.30		.19
Pharmacological treatment (n, %)							
Antidepressants	38	80.9	40	83.3		.10	.75
Benzodiazepines	28	59.6	26	54.2		.28	.59
Mood stabilizers	10	21.7	10	20.8		.01	.91
Antipsychotics	15	32.6	20	41.7		.82	.36

Note: DBT-M = Dialectical Behavior Therapy-Mindfulness group; DBT-IE = Dialectical Behavior Therapy-Interpersonal Effectiveness group; DIB-R = Revised Diagnostic Interview for Borderlines

Table 2
Scores pre- and post-treatment between Groups in Self-report Measures

	DBT-M				DBT-IE						
	PRE		POST		PRE		POST		Group x Time Interaction		
	M	SD	M	SD	M	SD	M	SD	F	p	η^2
BSL-23	48.04	20.26	37.38	24.91	48.75	21.73	48.90	20.75	7.38*	**.000**	.07
EQ	25.20	7.38	31.28	6.58	26.19	7.44	27.48	6.78	12.27*	**.001**	.09
DERS	97.97	22.06	86.32	24.79	100.00	23.04	95.26	22.70	2.97*	.08	.03

Note: DBT-M = Dialectical Behavior Therapy-Mindfulness group; DBT-IE = Dialectical Behavior Therapy-Interpersonal Effectiveness group; BSL-23 = Borderline Symptom List -23; EQ = Experiences Questionnaire-Decentering Scale; DERS = Difficulties in Emotion Regulation Scale.
* = Time Main Effect

× time interaction (F (1,100) = 7.38, p = .008, η^2 = .07), without a group main effect (F (1,100) = 2.48, p = .11, η^2 = .02). Post hoc analyses showed that, after treatment, BSL-23 scores decreased only in the DBT-M group while remaining unchanged in the DBT-IE group (post-treatment score of DBT-M vs. DBT-IE: t = -2.52, df = 100, p = .01). For secondary outcomes, EQ showed a main effect of time (F (1,100) = 29.02, p < .00, η^2 = .22) and a significant group × time interaction (F (1,100) = 12.27, p = .001, η^2 = .11), without a group main effect (F (1,100) = 1.31, p = .25, η^2 = .01). Post hoc analyses showed that EQ scores increased significantly after treatment only in the DBT-M group (post-treatment score of DBT-M vs. DBT-IE: t = 2.85, df = 100, p = .005). For DERS scores, we found only a main effect of time (F (1,90) = 16.73, p < .000, η^2 = .16), without group × time interaction (F (1,90) = 2.97, p = .08, η^2 = .03) and without a group main effect (F (1,90) = 1.51, p = .22, η^2 = .02). Post hoc analysis showed a tendency for further improvement in DBT-M (post-treatment score of DBT-M vs. DBT-IE: t = -1.82, df = 92, p = .07).

Mediation analysis

We evaluated whether the decrease in BPD symptoms (BSL-23) observed in the DBT-M group versus the DBT-IE group was influenced by changes in decentering (EQ) and emotion

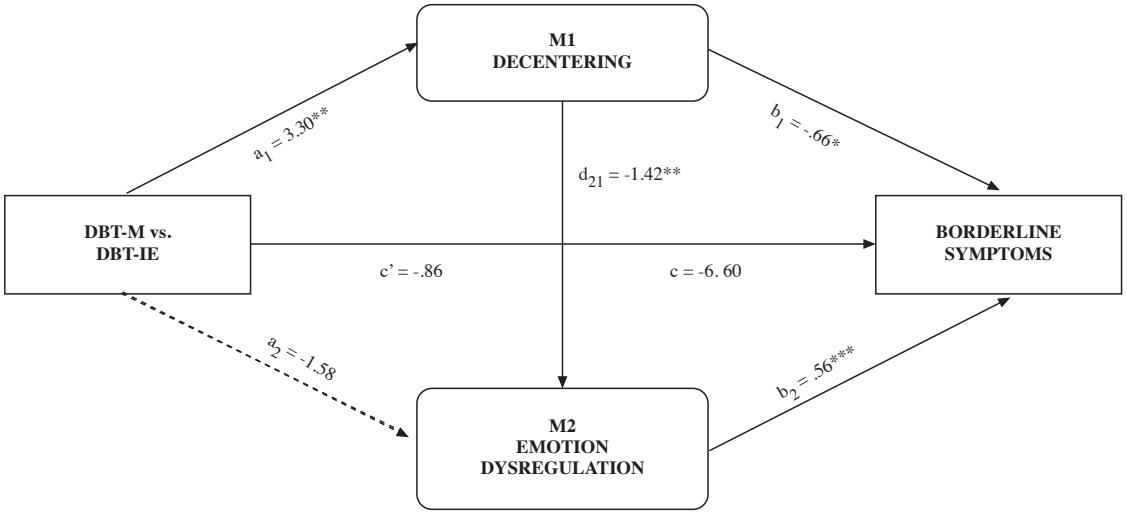
dysregulation (DERS) scores. We performed a mediation analysis that simultaneously included these measures, first EQ and then DERS, in a serial mediator model (Model 6: Hayes, 2013). In this analysis, we followed the recommendations of Hayes & Rockwood (2017) in order to obtain more precise estimates, therefore, we specified baseline scores of BSL-23, EQ and DERS as covariates. That is, we used the post-treatment scores while controlling by earlier measures of those variables (pre-treatment) rather than using difference score as a measure of change (i.e., post-treatment minus pre-treatment). We obtained a model with three possible mediation paths (Figure 1). The first mediation analysis showed that DBT-M treatment versus DBT-IE was significantly associated with decentering (path a_1: B = 3.30, SE = 1.20, p = .007), while decentering was significantly associated with borderline symptoms (path b_1: B = -.66, SE = .30, p = .03). The DBT-M treatment condition was not significantly associated with borderline symptoms after controlling for the mediators (path c´: B = -.86, SE = 3.16, p = .78). In these analyses, bias-corrected bootstrapping showed that the confidence interval did not include zero, indicating that the indirect effect was significant (path a_1b_1: B = -2.18, Boot SE = 1.35, 95% CI [-5.33, -0.12]), and demonstrating that the reduction of BSL-23 scores in the DBT-M group was mediated by decentering.

In the second mediation path, the DBT-M treatment condition, compared to DBT-IE, was not significantly associated with emotion dysregulation (path a_2: B = -1.58, SE =3.57, p = .65); however, emotion dysregulation was significantly associated with borderline symptoms (path b_2: B = .56, SE = .09, p < .001). Moreover, the bias-corrected bootstrapping showed that the indirect effect was not significant (path a_2b_2: B = -.89, Boot SE = 2.09, 95% CI [-5.58, 2.76]). In this case, emotion dysregulation does not mediate between DBT-M and a reduction in borderline symptoms.

In the third mediation path, which includes the two serial mediators, the DBT-M treatment condition -in contrast to DBT-IE- was significantly associated with decentering (path a_1: B = 3.30, SE = 1.20, p = .007) and decentering (M1) was significantly associated with emotion dysregulation (path d_{21}; B = -1.42, SE = .30, p < .001). Consecutively, emotion dysregulation (M2) was significantly associated with borderline symptoms (path b_2: B = .56, SE = .09, p < .001). The bias-corrected bootstrapping showed that the indirect effect was significant (path $a_1d_{21}b_2$: B = -2.66, Boot SE = 1.20, 95% CI [-5.33, -0.60]). This mediation means that DBT-M reduces borderline symptoms by increasing decentering ability, which in turn decreases emotion dysregulation. In order to test this serial relationship between the mediators, we contrasted this indirect effect by reversing the order of the mediators; that is, we placed emotion dysregulation first followed by decentering in a new mediation model. In this case, the indirect effect with two mediators was not significant (path $a_1d_{21}b_2$: B = -.59, Boot SE = .44, 95% CI [-1.57, 0.10]). The above finding indicate the unidirectional relationship of the mediators in the proposed model.

Contrast of indirect effects

In the model we obtained two significant indirect effects (path a1b1: decentering [M1] and path a1d21b2: decentering and emotion dysregulation [M1→M2]. For this reason, we tested whether these effects differed in terms of the estimate size. We used a pairwise contrast of the indirect effect using bias-corrected bootstrapping to assess whether one indirect effect was significantly superior to the other (Hayes & Rockwood, 2017), a procedure that is available in the PROCESS macro (Hayes, 2013). We found that the indirect effect via decentering (EQ) was not significantly different from



	Total Effect (95% CI)	Direct Effect (95% CI)	Indirect Effect (95% CI)
DBT-M vs. DBT-IE	-6.60 (-14.50, 1.29)	-.86 (-7.15, 5.43)	-5.74 (-11.71, -0.77)
Path EQ			-2.18 (-5.33, -0.12)
Path DERS			-.89 (-5.58, 2.76)
Path EQ→DERS			-2.66 (-5.33, -0.60)

Note: Analysis with multiple mediators. Dotted line means that path was not significant. c′ = Direct Effect; c = Total Effect.
* P < .05, ** P < .01, *** P < .001

the indirect effect via decentering and emotion dysregulation (EQ→DERS) (path a1b1 minus path a1d21b2: B = .48, Boot SE = 1.60, 95% CI [-2.90, 3.60]). This result indicates that when we added DERS to the mediation model, the indirect estimation effect did not differ significantly.

Discussion

This study was carried out to compare the mindfulness-based DBT skills training with the interpersonal effectiveness-based DBT skills training and investigate the mediational role of decentering and emotion dysregulation -as possible mechanisms of action- in improvement BPD symptoms. Our findings showed that DBT-M (but not DBT-IE) reduced BPD symptomatology, and this improvement was mainly mediated by decentering. We also identified a multiple mediation model in which DBT-M was associated with a decrease in BPD symptoms through the two proposed mediators (decentering and emotion dysregulation). Interestingly, this path resulted in a serial mediation; that is, decentering led to a decrease in emotion dysregulation (but not the inverse). These findings indicate that the decrease in emotion dysregulation and BPD symptoms both depend on improvements in decentering ability.

Only a few studies have evaluated the effectiveness of the DBT skills modules separately. However, two studies found that DBT-M was more effective than DBT-IE in reducing impulsivity (Carmona i Farrés et al., 2019; Soler et al., 2016), although both interventions were equally effective in decreasing BPD symptoms and certain aspects of emotion dysregulation (Carmona i Farrés et al., 2019; Elices et al., 2016). Our results -based on a larger dataset (sample size)- expands the findings of those previous studies, demonstrating that DBT-M is more effective than DBT-IE in increasing decentering ability and reducing BPD symptoms.

A core component in mindfulness-based interventions that foster decentering is through a state of meta-awareness (Lutz et al., 2015). Meta-awareness -awareness of subjective experience- is the process that leads to disidentification of disruptive thought patterns by generating non-reactive attention to the contents of the experience (Bersntein et al., 2015; Bernstein et al., 2019). Although decentering skill can be explicitly trained through different therapeutic interventions (e.g., emotion regulation therapy: Mennin & Fresco, 2014) or through similar strategies (e. g., perspective broadening: Travers-Hill et al., 2017), is the mindfulness meditation what promotes the ability to monitor our experience from a decentered perspective. This process is well explained in the mindfulness mechanism denominated "reperceiving", a decentering-related construct, described by Shapiro and colleagues (Shapiro et al., 2006). Those authors suggested that, by developing the capacity to stand back and witness thoughts and emotional states (i.e., disidentification), habitual reactive patterns are interrupted and thus the individual becomes less controlled by emotions and thoughts. In turn, development of this capacity should decrease impulsivity and mood-dependent behaviours, consistent with previous studies that used DBT-M to decrease impulsivity in BPD (Carmona et al., 2019; Soler et al., 2016).

In our study, mindfulness training consisted of 10 sessions of DBT-M based on skills from the mindfulness module and acceptance skills from the distress tolerance module. Therefore, the core of this training was to teach mindfulness and acceptance skills. Mindfulness practice in DBT-M is the intentional process of observing, describing, and participating nonjudgmentally in reality, in the moment, and with effectiveness (i.e., by using skilful means). The combination of attention and acceptance training is likely to cultivate a "decentering" perspective in patients, since all three constructs are intercorrelated (Feliu-Soler et al., 2016; Fresco et al., 2007). Indeed, the mindfulness-based DBT skills are the first taught to the patients (e.g., observe and describe nonjudgmentally), since comprise primary skills to later be able to develop any other set of skills (i.e., emotion regulation or distress tolerance). In particular, the observing without judgment exercises in DBT promote the ability to attend to events, which requires a corresponding ability to step back from the event and to be alert and awake, like a sentry guarding a gate. This process eventually reduces reactivity to the content of the experience (Berstein et al., 2015) and can help to change maladaptive strategies such as experiential avoidance or thought suppression (Hayes-skelton et al., 2015). This likely explains why decentering leads to a decrease in emotion dysregulation.

Interventions focused on improving decentering ability appear to be crucial to obtaining therapeutic achievements in disorders characterized by high emotion dysregulation (Neacsiu et al., 2014; Neacsiu & Trachuck, 2016). From a transdiagnostic perspective, some researchers suggest an endophenotype common in emotion dysregulation disorders, as in BPD, consisting of a negative self-referential processing characterized by higher worry, rumination, and self-criticism (Mennin & Fresco, 2013). Interestingly, several studies have found that DBT skills training adapted to this type of patient significantly reduces emotion dysregulation (Kells et al., 2020; Neacsiu et al., 2014), while decentering ability predicted changes in clinical outcomes in interventions aimed at treating anxiety and depression disorders (Mennin et al., 2018). These results show the importance of metacognitive skills as a self-regulatory mechanism of the emotion reactivity. Future studies should continue to study the potential of decentering as a cognitive mechanism that capable of generating emotional well-being in patients with high emotion dysregulation.

This study has several important limitations. First, all of the patients continued pharmacological therapy during the study. This means that the changes observed could be, at least partially, attributable to the effect of these medications. Nonetheless, it is important to emphasise that there were no differences between groups in terms of the medications used. Second, another limitation was not including intention-to-treat analysis. We only analysed data from individuals completing the interventions and this left out people that dropped out. This information could be useful to assess the level of efficacy according to the level of adherence. Thirth, we did not use an appropriate time sequence between the proposed mediators and the outcome variable, since we only assess pre and post-treatment. However, the theory has proposed decentering as a robust mediator in other therapies and some studies have occupied a time sequence similar (e.g., Hoge et al., 2014). Finally, the instrument used to assess BPD symptoms, the BSL-23, may not have been the optimal choice. Although the BSL-23 is a specific tool for BPD with a global single score, other multifaceted scales could potentially have provided more specific information related to the dimensions of borderline pathology.

The findings of this study underscore the crucial role of decentering as a primary mechanism of action to reduce BPD symptoms and improve emotion regulation in patients who receive mindfulness-based DBT skills training. These novel results advance our understanding of DBT skill modules, revealing the specific mechanism by which the individually contribute to therapeutic change. These findings indicate that decentering plays a key role in BPD treatment, which suggests that future interventions should focus on decentering as a primary component of BPD treatment.

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