UAB

Universitat Autònoma de Barcelona

UNIVERSITAT AUTÒNOMA DE BARCELONA

FACULTAT DE MEDICINA

DEPARTAMENT DE PSIQUIATRIA I MEDICINA LEGAL

HOSPITAL DE LA SANTA CREU I SANT PAU

DISREGULACIÓN EMOCIONAL Y MINDFULNESS

EN EL TRASTORNO LÍMITE DE LA PERSONALIDAD:

CARACTERÍSTICAS Y TRATAMIENTO

Tesis Doctoral presentada por

Matilde Elices Armand-Ugon

para obtener el grado de Doctor por la Universitat Autònoma de Barcelona

Directores:

Dr. Joaquim Soler Ribaudi

Dr. Juan Carlos Pascual Mateos

Dra. Montserrat Gomà i Freixanet

Barcelona, 2016

El Dr. Joaquim Soler Ribaudi (Departamento de Psiquiatría del Hospital de la Santa Creu i Sant Pau), el Dr. Juan Carlos Pascual Mateos (Departamento de Psiquiatría del Hospital de la Santa Creu i Sant Pau) y la Dra. Montserrat Gomà i Freixanet (Universitat Autònoma de Barcelona)

Certifican:

Que han supervisado la presente tesis doctoral titulada:

Disregulación Emocional y Mindfulness en el Trastorno Límite de la Personalidad: Características y Tratamiento

Realizada por Matilde Elices Armand-Ugon y consideran que es apta para su lectura y defensa pública para optar por el grado de Doctor por la Universitat Autònoma de Barcelona.

Por tal motivo queda constancia en el presente documento en Barcelona,

01 de Febrero de 2016.

Dr. Joaquim Soler Ribaudi   **Dr. Juan Carlos Pascual Mateos**

Dra. Montserrat Gomà i Freixanet

Doctoranda: Matilde Elices Armand-Ugon

FINANCIACIÓN

ÍNDICE

RESUMEN

RESUMEN

Los objetivos principales de esta tesis fueron estudiar la disregulación emocional y los déficits en mindfulness en pacientes con trastorno límite de la personalidad (TLP) y explorar los efectos de una intervención en mindfulness sobre la clínica característica del trastorno. Para ello se realizaron cuatro estudios (dos de caracterización del trastorno y dos de intervención en mindfulness). En el Estudio 1 se encontró que los pacientes con TLP, en comparación con controles sanos (CS), presentaron una mayor intensidad basal de emociones negativas, pero no una mayor reactividad emocional ante estímulos inductores de emociones discretas (ira, miedo, asco, tristeza). Sin embargo, sí se observaron diferencias entre grupos (TLP vs. CS) en relación a los estímulos relacionados con la clínica del trastorno (abandono, rechazo y dependencia emocional), para los cuales se encontró una reactividad emocional mayor a nivel subjetivo (pero no fisiológico) en el grupo de TLP. Resultados del Estudio 2 sugieren que algunas experiencias traumáticas infantiles, especialmente, el hecho de haber sufrido abuso sexual, se relacionan con déficits en algunas facetas del mindfulness (i.e., "actuación consciente" y "no-juzgar"). A pesar de esta asociación, parecería ser qué los rasgos temperamentales, especialmente el neuroticismo y la impulsividad, tienen una mayor influencia sobre los déficits en mindfulness que las experiencias traumáticas infantiles. Los Estudios 3 y 4 indican que una intervención en mindfulness de 10 semanas de duración fue más eficaz que una intervención control (i.e., entrenamiento en efectividad interpersonal), provocando una disminución de la severidad del trastorno y un aumento de la capacidad de decentering y de otras facetas del mindfulness. Además, el entrenamiento en mindfulness parecería ser eficaz para mejorar algunos aspectos relacionados con la impulsividad, como la tolerancia a las recompensas demoradas o modificar la percepción temporal. En conjunto, los resultados de esta tesis contribuyen a incrementar el conocimiento en relación a la sintomatología nuclear del trastorno y aportan conocimiento en relación a la eficacia del mindfulness como tratamiento para el TLP.

Palabras clave: trastorno límite de la personalidad, desregulación emocional, impulsividad, mindfulness, decentering, temperamento, traumas

ABSTRACT

The aims of this dissertation were twofold. The first objective was to study emotional dysregulation and mindfulness deficits in borderline personality disorder (BPD) and the second was to explore the effects of a mindfulness-based intervention on the core characteristics of BPD. To achieve those aims, four studies were carried out (two of them were dedicated to explore the characteristics of the disorder and the other two were focused on investigating the impact of mindfulness training). Findings of Study 1 showed that BPD patients – when compared to healthy controls (HC) – presented more intense negative emotions at baseline. BPD subjects presented no subjective heightened reactivity to film-fragments eliciting discrete emotions (anger, fear, disgust and sadness). However, differences between groups (BPD vs. HC) were observed in regard to BPD-related stimulus (abandonment, rejection and emotional dependence), BPD participants exhibited a more heightened subjective reactivity (but not in physiological variables) than HC. Results from Study 2 suggested that early traumatic experiences, especially sexual abuse, are related to deficits in some mindfulness facets (i.e., "acting with awareness" and "non-judging") in BPD participants. In spite of this association, the results of this study seem to indicate that temperamental traits, specifically neuroticism and impulsivity, have a greater impact on mindfulness deficits than traumatic experiences. Finally, Studies 3 and 4 indicate that a 10-week mindfulness training is efficacious for diminishing BPD's severity and increasing decentering and other mindfulness facets, when compared to a control intervention (i.e., interpersonal effectiveness training). In addition, mindfulness training seems to have a positive impact on some impulsivity-related variables (Study 4), increasing the tolerance for delayed rewards and modifying temporal perception. Overall, the present results contribute to the knowledge in regard to BPD's core symptoms and provide evidence on the efficacy of mindfulness training for BPD.

Key words: borderline personality disorder, emotion dysregulation, impulsivity, mindfulness, decentering, temperamental traits, trauma

PRÓLOGO

PRÓLOGO

La presente tesis presentada para obtener el grado de Doctor por la Universitat Autònoma de Barcelona, representa el trabajo realizado entre los años 2011 y 2016 como becaria y técnica superior de investigación del Servei de Psiquiatria del Hospital de la Santa Creu i Sant Pau (Barcelona).

Esta tesis se compone de cuatro artículos publicados en revistas internacionales indexadas y con factor de impacto.

ESTUDIO 1

Elices M, Soler J, Fernández C, Martin-Blanco A, Portella MJ, Pérez V, Álvarez E, Pascual JC. (2012). Physiological and self-assessed emotional responses to emotion-eliciting films in borderline personality disorder. *Psychiatry Research, 200*(2), 437-443.

ESTUDIO 2

Elices M, Pascual JC, Carmona C, Martin-Blanco A, Feliu-Soler A, Ruiz E, Gomà Freixanet M, Pérez V, Soler J. (2015). Exploring the relation between childhood trauma, temperamental traits and mindfulness in borderline personality disorder. *BMC psychiatry, 15*(1), 180-187.

ESTUDIO 3

Elices M, Pascual JC, Portella MJ, Feliu-Soler A, Martin-Blanco A, Carmona Soler J. Impact of mindfulness training on borderline personality disorder: A pilot randomized trial. *Mindfulness* (In-Press).

ESTUDIO 4

Soler J, Elices M, Pascual JC, Martin-Blanco A, Feliu-Soler A, Carmona C, Portella MJ. (2016). Effects of mindfulness training on different components of impulsivity in borderline personality disorder: Results from a pilot randomized study. *Borderline Personality Disorder and Emotion Dysregulation, 3*(1), 1-10.

Además, los resultados de esta tesis han sido comunicados en distintos simposios y congresos nacionales e internacionales:

PONENCIAS

Pascual JC. Disregulación emocional: estudios de inducción emocional en pacientes con TLP. Simposio: Hallazgos neurobiológicos asociados a disfunciones clínicas características del Trastorno Límite de la Personalidad. XIV Congreso Nacional de Psiquiatría. Barcelona, 2010.

Elices M, Martín-Blanco A, Feliu-Soler A, Soler J, Pascual JC, Carmona C, Ruiz E, Álvarez E. Influencia del abuso sexual en la respuesta emocional de sujetos con Trastorno Límite de la Personalidad. XXVIII Jornada de Teràpia del Comportament i Medicina Conductual en la Pràctica Clínica. Barcelona, 2013.

Carmona C, Elices M, Pascual JC, Martín-Blanco A, Navarro H, Soler J, Álvarez E. Mindfulness vs Efectivitat Interpersonal. Estudi aleatoritzat en Trastorn Límit de la Personalitat. XXIX Jornada de Teràpia del Comportament i Medicina Conductual en la Pràctica Clínica. Barcelona, España, 2014.

Pascual JC**.** Repercusiones de los antecedentes traumáticos en el TLP. Ponencia, Sesión Plenaria, X Congreso Nacional de Trastornos de la Personalidad. Barcelona, España, 2014.

Elices M. Efectos del mindfulness en la impulsividad de pacientes con Trastorno Límite de la Personalidad. X Congreso Nacional de Trastornos de Personalidad. Barcelona, España, 2014.

Elices M. Relación entre traumas infantiles, rasgos de personalidad y mindfulness en pacientes con Trastorno Límite de la Personalidad. 1st International Meeting on Mindfulness. Zaragoza, España, 2014.

POSTERS

Elices M, Soler J, Fernández C, Martín-Blanco A, Portella MJ, Álvarez E, Pascual JC. Physiological and Self- Assessed Emotional Responses in Borderline Personality Disorder. International Congress of Cognitive Therapy. Istanbul, Turkey, 2011.

Martín-Blanco A, Villalta L, Soler J, Elices M, Fernández C, Portella MJ, Pascual JC. Diferencias en los patrones de respuesta emocional entre pacientes con trastorno límite de la personalidad y controles sanos: estudio de inducción emocional con fragmentos de películas. XV Congreso Nacional de Psiquiatría. Oviedo, España, 2011.

Narváez V, Navarro H, Elices M, Feliu-Soler A, Ruiz E, Pascual JC, Soler J. Efecto predictivo de las Variables de Personalidad y de los Traumas Infantiles sobre las habilidades de Mindfulness en pacientes con Trastorno Límite de la Personalidad. X Congreso Nacional de Trastornos de

la Personalidad. Barcelona, España, 2014.

Soler J, Elices M, Martín-Blanco A, Feliu-Soler A, Pascual JC. Factors associated with dispositional mindfulness in individuals with borderline personality disorder: the role of childhood trauma and temperamental traits. 3rd Congress on Borderline Personality Disorders and Allied Disorders. Roma, Italia, 2014.

Soler J. Elices M. Carmona C. Martín-Blanco A. Pascual JC. Effects of Mindfulness vs. Interpersonal Effectiveness Skills on Borderline Personality Disorder: A pilot randomized trial. SPM, Seattle, USA, 2015.

ABREVIATURAS

ABREVIATURAS

AFFM	Alternative Five Factor Model
BIS	Barrat Impulsiveness Scale
BSL-23	Borderline Symptom List - 23
CLPDS	Collaborative Longitudinal Personality Disorders Study
CPF	Corteza Pre-Frontal
CS	Controles Sanos
DIB-R	Diagnostic Interview for Borderlines - Revised
DSM	Diagnostic and Statistical Manual of Mental Disorders
EC	Ensayo Clínico
EI	Efectividad Interpersonal
fMRI	functional Magnetic Resonance Imaging
IAPS	International Affective Picture System
ICG - TLP	Impresión Clínica Global para el Trastorno Límite de la Personalidad
ICG- TLP-M	Impresión Clínica Global para el Trastorno Límite de la Personalidad – Mejoría
ICG- TLP – S	Impresión Clínica Global para el Trastorno Límite de la Personalidad – Severidad
IPDE	International Personality Disorder Examination
MBCT	Mindfulness Based Cognitive Therapy
MBSR	Mindfulness Based Stress Reduction
MSAD	McLean Study of Adult Development
OFC	Orbito-Frontal Cortex
SCID-II	Structured Clinical Interview for Axis II Personality Disorders
STEPPS	System Training for Emotional Predictability & Problem Solving
TBM	Terapia Basada en la Mentalización
TCC	Terapia Cognitivo Conductual
TCE	Terapia Centrada en Esquemas
TDAH	Trastorno por Déficit Atencional con Hiperactividad
TDC	Terapia Dialéctico Conductual

TDC-EH	Terapia Dialéctico Conductual Entrenamiento en Habilidades
TDC-I	Terapia Dialéctico Conductual Individual
TDC-S	Terapia Dialéctico Conductual Standard
TDM	Trastorno Depresivo Mayor
TEPT	Trastorno por Estrés Postraumático
TFF	Terapia Focalizada en la Transferencia
TH	Tratamiento Habitual
TLP	Trastorno Límite de la Personalidad
TP	Trastorno de Personalidad
ZKPQ	Zuckerman-Kuhlman Personality Questionnaire
- Act	Activity
- Agg-Host	Aggression-Hostility
- Imp-SS	Impulsivity-Sensation Seeking
- N-Anx	Neuroticism-Anxiety
- Sy	Sociability

PLANTEAMIENTO GENERAL DE LA TESIS

PLANTEAMIENTO GENERAL DE LA TESIS

El trastorno límite de la personalidad (TLP) es uno de los trastornos psiquiátricos más complejos, caracterizado por una gran inestabilidad en la regulación de las emociones, en las relaciones interpersonales y en el control de impulsos (American Psychiatric Association, 2013). La prevalencia del trastorno en la población general se estima entre un 2% y un 5%, cifra que asciende notoriamente en poblaciones clínicas (15-22%; Leichsenring, Leibing, Kruse, New, & Leweke, 2011).

En las últimas décadas el TLP ha despertado gran interés en la comunidad científica, siendo actualmente el trastorno de personalidad más estudiado. La investigación se ha centrado tanto en la identificación y descripción de aspectos relevantes a la psicopatología del trastorno, como en el desarrollo y evaluación de tratamientos que permitan abordar su complejidad clínica de forma eficaz.

Según modelos actuales de naturaleza biosocial, el TLP sería consecuencia de la transacción entre una vulnerabilidad temperamental de tipo biológico y experiencias ambientales invalidantes y traumáticas, como el abuso emocional o el abuso sexual (Linehan,1993a). La disregulación emocional ha sido señalada como la característica principal del TLP, que en conjunto con una marcada impulsividad, explicarían las características más prominentes del trastorno, como los intentos de suicidio, las autolesiones, la disfunción en las relaciones interpersonales o el consumo de sustancias (Linehan, 1993a). Más recientemente, algunos estudios han relacionado estas características con déficits en la capacidad de mindfulness (Wupperman, Neumann, & Axelrod, 2008; Wupperman, Neumann, Whitman, & Axelrod, 2009), entendida como la habilidad para prestar atención al momento presente, de forma no-evaluativa y no-reactiva (Kabat Zinn, 1990). Aunque estos déficits parecen relacionarse con la clínica del TLP, aun hace falta evidencia para determinar cual es su relación con otras características del trastorno.

En lo que respecta al tratamiento para el TLP, la terapia dialéctica conductual (TDC), desarrollada por Marsha M. Linehan a finales de 1980, es actualmente el abordaje para el TLP con mayor evidencia empírica (Stoffers et al., 2012). En su formato estándar, la TDC propone cuatro modos de terapia: terapia individual, entrenamiento grupal en habilidades, soporte telefónico y grupo de consultoría para terapeutas (Linehan, 1993a). Debido a este carácter multi-modal, la TDC resulta un tratamiento de larga duración y elevados costes económicos, lo que obstaluliza su implementación en servicios de salud pública.

En un intento de maximizar la terapia, se ha estudiado la eficacia diferencial de los distintos componentes de la TDC. Actualmente, hay evidencias que apoyan el uso del entrenamiento en habilidades como tratamiento único (i.e., sin terapia individual; Stoffers et al., 2012). Este entrenamiento consiste en cuatro módulos: regulación emocional, mindfulness, efectividad interpersonal y tolerancia al malestar. Las habilidades de mindfulness tienen un rol protagonista en la terapia, son las primeras en enseñarse y continúan durante el resto de los módulos (Linehan, 1993b). Además, algunos trabajos indican que son las habilidades más practicadas por los pacientes en TDC, lo que podría ser un indicador de su eficacia terapéutica (Lindenboim,

Comtois, & Linehan, 2007; Stepp, Epler, Jahng, & Trull, 2008). A pesar de esto, la evidencia en relación a los efectos del mindfulness en el TLP es escasa y por tanto, son necesarios estudios metodológicamente rigurosos para determinar su impacto en la sintomatología borderline.

Con el objetivo de contribuir al estudio de los aspectos nucleares del TLP y de los efectos del entrenamiento en mindfulness en este trastorno, la presente tesis se compone de cuatro estudios empíricos. En el Estudio 1, se investigan las características de la disregulación emocional en el TLP. A través de una inducción emocional con fragmentos de películas, se explora la respuesta emocional ante emociones discretas y ante estímulos inductores de emociones complejas relacionados con experiencias traumáticas y sintomatología característica del trastorno. En el Estudio 2, se explora si la presencia de eventos traumáticos durante la infancia, los rasgos temperamentales y la interacción de ambos factores podrían relacionarse con una baja capacidad de mindfulness en la fase adulta en pacientes con TLP. Por otra parte, en los otros dos estudios se exploran los efectos específicos de una intervención en mindfulness de 10 semanas de duración sobre la sintomatología borderline general, sobre las facetas del mindfulness (Estudio 3) y sobre diferentes aspectos relacionados con la impulsividad (Estudio 4).

Los resultados de esta tesis pretenden contribuir al conocimiento de las características nucleares del TLP, así como investigar la posible eficacia del entrenamiento en mindfulness como tratamiento para el trastorno.

1.INTRODUCCIÓN

1. 1 EL TRASTORNO LÍMITE DE LA PERSONALIDAD

1.1.1 Concepto

El término borderline fue utilizado por primera vez en 1938 por Stern (1938) para hacer referencia a un grupo de pacientes que no respondían al tratamiento psicoanalítico y que no podían clasificarse dentro de las categorías de "neurosis" o "psicosis" por presentar elementos de ambas. Más tarde, Otto Kernberg (1967) propone el concepto de "organización limítrofe de la personalidad" para referirse a pacientes que presentaban una profunda alteración estructural de la personalidad.

En 1980 el TLP aparece en el Diagnostic and Statistical Manual of Mental Disorders (DSM-III; American Psychiatric Association, 1980) como una entidad diagnóstica definida y desde entonces, el concepto de TLP no ha estado exento de controversias. Mientras algunos autores lo consideran una entidad diagnóstica diferenciada, otros lo han conceptualizado dentro de diversos espectros: como un trastorno del espectro esquizofrénico (Wender, 1977), del espectro afectivo (Akiskal, 2004), del control de impulsos (Zanarini, 1993) o como un trastorno de estrés postraumático (Kroll, 1993). A pesar de estas controversias y de los intentos realizados por construir modelos alternativos, la versión mas actual del DSM publicada recientemente (DSM-5; American Psychiatric Association, 2013) mantiene la categoría diagnóstica de TLP

propuesta en ediciones anteriores.

1.1.2 Epidemiología, curso y pronóstico

La prevalencia media del TLP en la población general se estima alrededor de un 1.3% (rango: .05 – 5.9%; Torgersen, Kringlen, & Cramer, 2001; Leichsenring et al., 2011). El TLP es una patología de alta prevalencia en poblaciones clínicas, estimándose que alrededor del 10% de los pacientes ambulatorios cumplen criterios para el diagnóstico del trastorno, cifra que asciende a entre un 15% y un 25% en pacientes ingresados (Leichsenring et al., 2011). Aunque tradicionalmente se ha considerado que la mayoría de los pacientes con este diagnóstico corresponden al sexo femenino, existen estudios en los que no se observan diferencias significativas en relación a la prevalencia por sexos (Leichsenring et al., 2011).

El TLP es una de las patologías con mayor riesgo suicida, dependiendo del estudio la tasa de suicidios consumados estaría entre un 3% y un 10% (e.g., Paris & Zweig-Frank, 2001; Zanarini et al., 2007). Ademas, se estima que un 90% de los pacientes con TLP realizan autolesiones no-suicidas (Zaheer, Links, & Liu, 2008; Zanarini et al., 2006).

La evolución del trastorno suele implicar un alto grado de deterioro funcional que trae aparejada una alta tasa de utilización de los servicios de atención sanitaria, lo que repercute en altos costes sociales y económicos (Bender et al., 2001). Los pacientes con TLP suelen comenzar a recibir tratamiento sobre los 18 años, sin embargo, es frecuente que los síntomas relacionados con el trastorno aparezcan mucho antes (Zanarini, Frankenburg, Khera, & Bleichmar, 2001). Por ejemplo, Zanarini y colaboradores han señalado que aproximadamente el 30% de los pacientes con TLP comienza a autolesionarse antes de los 12 años y otro 30% lo hace entre los 13 y los 17 años (Zanarini et al., 2006).

Para estudiar el curso del trastorno se han llevado a cabo estudios longitudinales con un número importante de pacientes, destacándose el McLean Study of Adult Development (MSAD) y el Collaborative Longitudinal Personality Disorders Study (CLPDS). En conjunto, los resultados de estos trabajos cuestionan la idea de que el TLP es un trastorno crónico. Por ejemplo, en el CLPDS se encontró que en un periodo de 10 años, el 85% de los pacientes había logrado la remisión durante al menos 1 año (Gunderson et al., 2011). Los resultados del MSAD son similares, a los 16 años de seguimiento, el 99% de los pacientes había alcanzado criterios de remisión durante al menos 2 años y el 78% cumplía criterios para remisión durante los últimos 8 años (Zanarini, Frankenburg, Reich, & Fitzmaurice, 2012). En la misma línea, en un estudio de Paris y colaboradores se mostró que solo un 8% de los pacientes continuaba cumpliendo criterios para el TLP 27 años después de la primera evaluación (Paris & Zweig-Frank, 2001). En estos estudios la remisión se define como la ausencia de criterios diagnósticos para el TLP, pero esto no implica necesariamente la ausencia de síntomas ni de malestar subjetivo. En general, parecería ser que los síntomas y signos asociados a la impulsividad (e.g., autolesiones, amenazas suicidas) remiten más rápidamente, mientras que la remisión del área afectiva es

más lenta. La disforia, los sentimientos de vacío y la ira son características que permanecen con más énfasis a lo largo del tiempo (Zanarini & Frankenburg, 2001; Zanarini et al., 2007).

Estos estudios han identificado también factores de riesgo asociados a un peor pronóstico, entre ellos: abuso de sustancias comórbido, diagnóstico de trastorno por estrés postraumático (TEPT) y otros trastornos de ansiedad, familiares con enfermedades mentales, haber recibido tratamiento psiquiátrico de larga duración, experiencias traumáticas en la infancia y un pobre funcionamiento psicosocial en la fase adulta (Wedig et al., 2012; Zanarini et al., 2007).

En conjunto, los estudios de seguimiento sugieren que, a pesar de la elevada remisión clínica, persisten graves dificultades en el funcionamiento psicosocial que se reflejan en una pobre autonomía y vida familiar, y una baja o nula actividad laboral (Zanarini et al., 2007).

1.1.3 Etiopatogenia

Actualmente existe consenso sobre la etiología multifactorial del TLP (Linehan, 1993a). Específicamente, el modelo biosocial propuesto por Linehan (1993a), destaca la transacción entre ciertas características biológicas y ciertos factores de predisposición ambiental, que, en conjunto, contribuirían al desarrollo de la disregulación emocional característica del trastorno.

En un individuo biológicamente vulnerable ciertos contextos familiares y/o ciertas experiencias traumáticas tempranas, dificultarían la adquisición de habilidades de regulación emocional. Los llamados "entornos invalidantes" son contextos familiares especialmente propensos para esto, ya que la expresión de experiencias privadas, especialmente la expresión de emociones, es castigada, rechazada, minimizada o simplemente ignorada (Linehan, 1993a). De acuerdo con esta hipótesis, distintos estudios demuestran que entre un 30% y un 90% de los pacientes con diagnóstico de TLP han sufrido algún tipo de experiencia traumática durante la infancia (Battle et al., 2004; Lobbestael, Arntz, & Bernstein, 2010; Zanarini, 2000). Estudios retrospectivos indican que entre el 40% y el 71% de estos pacientes han sido víctimas de abuso sexual (Lobbestael et al., 2010; Zanarini, 2000), otorgando a esta forma de abuso un papel predominante en la psicopatología del trastorno (Linehan, 1993a). Sin embargo, otras formas de abuso/negligencia también son frecuentes, reportándose que entre un 25% y un 53% de los pacientes con TLP han padecido abuso físico (Golier et al., 2003; Zanarini, 2000) y entre un 13% y un 76% han sufrido abuso emocional (Laporte, Paris, Guttman, & Russell, 2011; Lobbestael et al., 2010). Por otra parte, estudios prospectivos confirman que las experiencias traumáticas infantiles constituyen un factor de riesgo para el desarrollo del trastorno, encontrándose una mayor prevalencia de TLP en la fase adulta en sujetos con historia de abuso/ negligencia física o sexual (Widom, Czaja, & Paris, 2009). Además, la historia de trauma y especialmente la cronicidad del maltrato parecerían asociarse también a la gravedad de los sintomas del TLP (e.g. Hecht, Cicchetti, Rogosch, & Crick, 2014).

De acuerdo con el modelo biosocial propuesto por Linehan (1993a) parecería ser que el haber sufrido experiencias traumáticas en la infancia no conduce necesariamente al desarrollo

del trastorno, o de patología psiquiátrica en general (Collishaw et al., 2007; Spataro, Mullen, Burgess, Wells, & Moss, 2004) y que la clave estaría en la relación transaccional establecida entre factores ambientales y factores de vulnerabilidad biológica. Estudios de neuroimágen han constatado ciertas alteraciones a nivel estructural y funcional que se relacionarían con las características del TLP. Estos estudios señalan diferencias estructurales en pacientes con TLP comparado con controles sanos en el volumen de amígdala e hipocampo (Ruocco, Amirthavasagam, & Zakzanis, 2012), córtex cingulado anterior (Minzenberg, Fan, New, Tang, & Siever, 2009) y córtex orbito-frontal (Tebartz van Elst et al., 2003). Además, se han reportado alteraciones en la desactivación de la default mode network (Doll et al., 2013; Wolf et al., 2011). A nivel genético, se considera que algunos individuos tendrían un genotipo determinado que, en presencia de ciertas experiencias adversas, los haría más vulnerables para desarrollar el trastorno (Leichsenring et al., 2011).

Los rasgos temperamentales parecen ser otro de los factores que contribuyen a la vulnerabilidad para desarrollar el trastorno (Bornovalova, Gratz, Delany-Brumsey, Paulson, & Lejuez, 2006; Paris, 2000). La mayoría de estudios realizados hasta el momento coinciden en señalar dos disposiciones temperamentales fuertemente asociadas a la sintomatología límite: 1) la disregulación e inestabilidad afectiva y 2) una alta impulsividad (Bornovalova et al., 2006; Crowell, Beauchaine, & Linehan, 2009; Gomà-i-Freixanet, Soler, Valero, Pascual, & Perez, 2008; Skodol et al., 2002). Aunque tradicionalmente ésta última fue considerada como consecuencia de la alta disregulación emocional, una reformulación del modelo biosocial otorga una mayor relevancia a la impulsividad (Crowell et al., 2009). La impulsividad temprana sería entonces un aspecto característico de los sujetos con TLP, a independencia de la disregulación emocional. La impulsividad y la vulnerabilidad emocional podrían emerger de forma independiente y contribuir a diferentes aspectos del trastorno (Figura 1). En transacción permanente, tanto las características de vulnerabilidad del niño como del cuidador se intensificarían, reforzando expresiones emocional extremas y la disregulación emocional en su conjunto. Esto a su vez, facilitaría un procesamiento de la información distorsionado y comportamientos dependientes del estado de ánimo, impidiendo que el sujeto logre metas no-emocionales. Con la reiteración de estas transacciones, se reforzarían conductas desadaptativas (e.g., aislamiento, conductas impulsivas, evitación) que se utilizarían como métodos desadaptativos de regulación emocional.

1.1.4 Diagnóstico

Según los criterios del DSM-5, el TLP se caracteriza por un patrón general de inestabilidad en el área afectiva, las relaciones interpersonales, la autoimagen y el control de impulsos (American Psychiatric Association, 2013).

Para realizar el diagnóstico de TLP según la actual clasificación del DSM-5 (American Psychiatric Association, 2013) es necesario cumplir con 5 de los 9 criterios establecidos (ver Tabla 1). Es así que los 9 criterios diagnósticos pueden combinarse de 256 formas distintas, resul-
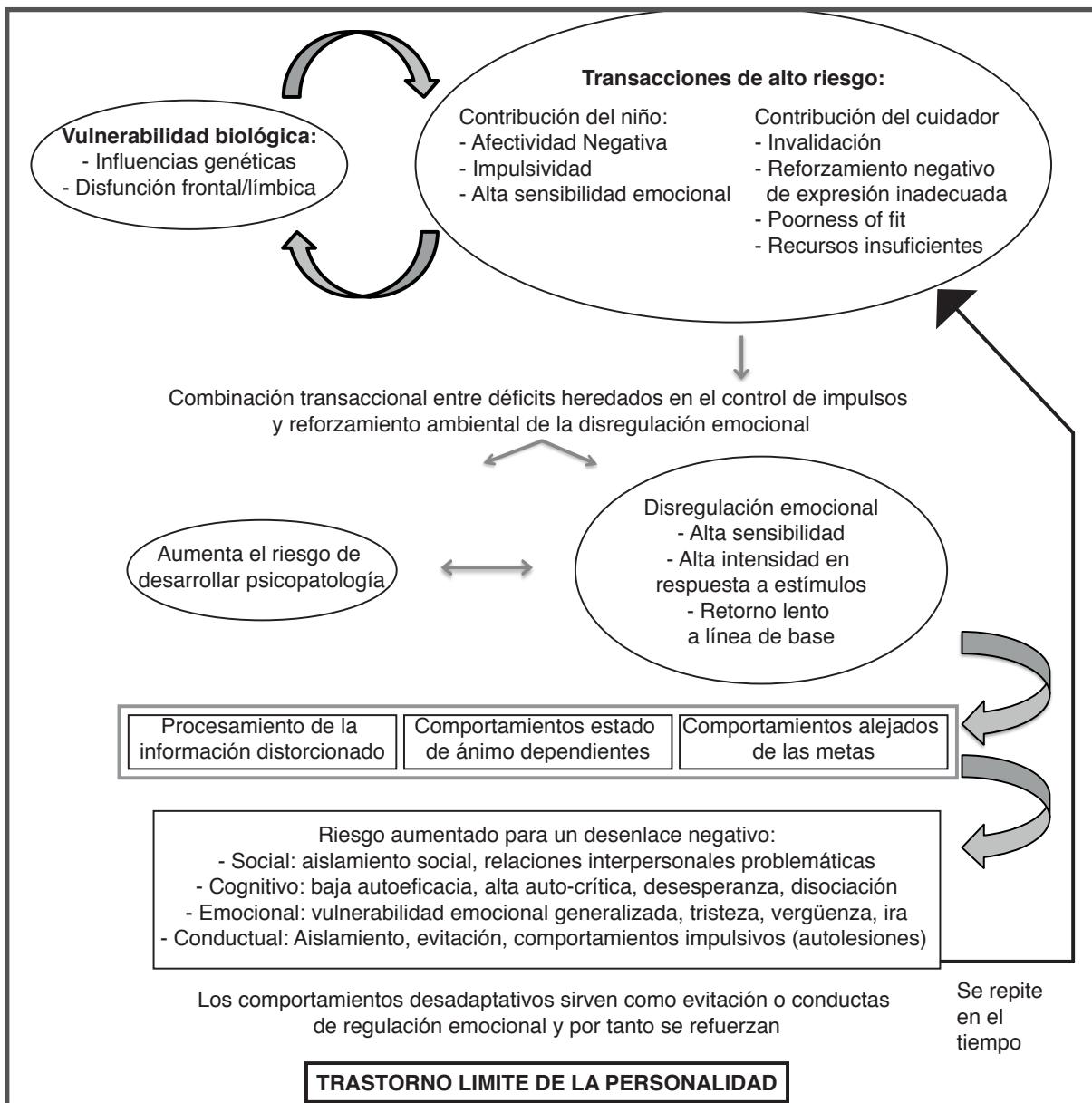
Figura 1. Modelo biosocial del TLP: Esquema de la transacción entre factores ambientales y de vulnerabilidad biológica que contribuyen a la disregulación emocional. Adaptado de Linehan, 2014.

tando en un trastorno de presentación heterogénea, ya que dos pacientes con el diagnóstico de TLP pueden compartir tan solo un criterio diagnóstico (Leichsenring et al., 2011).

Debido a las fuertes críticas realizadas al modelo categorial de la personalidad defendido en los sucesivos DSM y considerando las distintas propuestas derivadas de modelos de personalidad dimensionales (y no patológicos), el DSM-5 plantea una clasificación alternativa de los trastornos de personalidad (TP; Sección III; American Psychiatric Association, 2013). En ella, el TLP se define como un conjunto de rasgos patológicos de la personalidad en 3 dominios: afectividad negativa (i.e., labilidad emocional, ansiedad y depresión), desinhibición (i.e., impulsividad y propensión al riesgo) y antagonismo (i.e., hostilidad).

Para realizar el diagnóstico de TLP, la entrevista clínica puede complementarse con entrevistas de evaluación estructuradas o con cuestionarios auto-informados. Actualmente, se utilizan tanto entrevistas globales (i.e., que exploran los distintos TP) como la Structured Clinical

Tabla 1. Criterios diagnósticos para el TLP según el DSM-5.

Un patrón general de inestabilidad en las relaciones interpersonales, la autoimagen y la afectividad y una notable impulsividad, que comienzan al principio de la edad adulta y se dan en diversos contextos, como lo indican cinco (o más) de los siguientes ítems:

1. Esfuerzos frenéticos por evitar un abandono real o imaginado (Nota: No incluir los comportamientos suicidas o de automutilación que se recogen en el criterio 5)

2. Un patrón de relaciones interpersonales inestables e intensas caracterizado por la alternancia entre los extremos de idealización y devaluación.

3. Alteración de la identidad, autoimagen o sentido de sí mismo, acusada y persistentemente inestable.

4. Impulsividad en al menos dos áreas, potencialmente dañina para sí mismo (e.g., gastos, sexo, abuso de sustancias, conducción temeraria, atracones de comida). Nota: No incluir comportamientos suicidas o de automutilación que se recogen en el criterio 5.

5. Comportamientos, intentos o amenazas suicidas recurrentes, o comportamientos de automutilación.

6. Inestabilidad afectiva debida a una notable reactividad del estado de ánimo (e.g., episodios de intensa disforia, irritabilidad o ansiedad que suelen durar unas horas y rara vez unos días).

7. Sentimientos crónicos de vacío.

8. Ira inapropiada o intensa o dificultades para controlar la ira (e.g., muestras frecuentes de mal genio, enfado constante, peleas físicas recurrentes).

9. Ideación paranoide transitoria relacionada con el estrés o síntomas disociativos graves.

Interview for Axis II Personality Disorders (SCID-II; Gibbon & Spitzer, 1997; Gómez-Beneyto et al., 1994) o la International Personality Disorders Examination (IPDE; Loranger et al., 1994), como entrevistas específicas para el TLP que permiten una exploración más exhaustiva del trastorno. Por ejemplo, la Diagnostic Interview for Borderlines-Revised (DIB-R; Barrachina et al., 2004; Zanarini, Gunderson, Frankenburg, & Chauncey, 1989) permite determinar la gravedad del trastorno en un periodo que comprende los dos últimos años de la vida del sujeto. En ella se exploran en profundidad 4 áreas: afectividad, control de impulsos, cognición y relaciones interpersonales.

Complementarios a las entrevistas estructuradas de evaluación, también contamos con cuestionarios auto-reportados que son útiles para realizar un screening diagnóstico teniendo en cuenta la perspectiva del paciente. Uno de los instrumentos más utilizados es el Borderline Symptom List-23, un cuestionario de 23 ítems que evalúa la gravedad de los síntomas durante la semana previa a su administración (Bohus et al., 2008). La versión en castellano del BSL-

23 (Soler et al., 2013) contiene buenas propiedades psicométricas y es sensible al cambio producto del tratamiento psicológico. Existen además otras escalas como la Impresión Clínica Global de Severidad para el TLP (ICG-TLP; Pérez et al., 2007) que permite evaluar, desde la perspectiva del clínico, tanto la severidad del paciente (ICG-TLP-S), como la magnitud del cambio luego de una intervención (ICG-TLP-M).

1.1.5 Características clínicas nucleares

Como comentamos anteriormente, la disregulación emocional y la impulsividad son dos características nucleares del TLP, no sólo por su papel en el desarrollo del trastorno sino por su relación con el resto de la sintomatología límite. Según el modelo de Linehan, la disregulación emocional sería un componente clave que explicaría la disregulación de otras áreas, incluyendo el área interpersonal, cognitiva, conductual y del self (Linehan, 1993a). Es así que en presencia de una alta emocionalidad, las relaciones interpersonales se ven afectadas por un gran temor al abandono y una fuerte dependencia e idealización del círculo más íntimo, que oscila con momentos de intensa rabia y desvalorización, provocando relaciones tormentosas e inestables (American Psychiatric Association, 2013; Leichsenring et al., 2011). La disregulación cognitiva también suele asociarse a periodos de intensa ansiedad o estrés agudo, promoviendo síntomas disociativos (i.e., despersonalización o desrealización), amnesia o ideación paranoide transitoria.

Ademas la disregulación emocional y la impulsividad se relacionarían también con las conductas desadaptativas características del trastorno como las autolesiones, el abuso de sustancias, el gasto excesivo de dinero, la promiscuidad sexual y/o los atracones y con la dificultad para la consecución de objetivos personales, contribuyendo al sentimiento de vacío y la falta de estabilidad en la percepción de uno mismo. (Linehan, 1993a).

A continuación describiremos en profundidad las características de la disregulación emocional y la impulsividad en el TLP.

1.1.5.1 Disregulación emocional

En un sentido amplio, el concepto de disregulación emocional se utiliza para definir la falta de capacidad para modificar o regular la experiencia, las acciones y las expresiones verbales y/o no-verbales ante la presencia de un estímulo emocional (Linehan, Bohus, & Lynch, 2007). En el TLP, la falta de estas habilidades se traduce en una respuesta emocional intensa y prolongada que tiene como consecuencia la disregulación conductual e interpersonal.

Según el modelo biosocial, la desregulación emocional en el TLP presenta tres componentes relacionados de forma interdependiente: 1) una alta intensidad basal de las emociones negativas (independiente de la presencia de estímulos específicos), 2) una alta reactividad emocional ante estímulos, y 3) un lento retorno al estado emocional basal (Kuo & Linehan, 2009; Linehan, 1993a).

Estudios de intensidad emocional basal

A través de la utilización de instrumentos de auto-reporte, distintos estudios han demostrado que los pacientes con TLP presentan una alta emocionalidad negativa de forma basal, tanto en comparación con controles sanos (CS; Rosenthal et al., 2008), como en comparación con sujetos con otras patologías psiquiátricas (Henry et al., 2001; Kuo & Linehan, 2009). Además, estudios de monitorización ambulatoria del estado de ánimo también indican que los sujetos con TLP presentan una mayor intensidad de emociones negativas (Ebner-Priemer et al., 2007; Stein, 1996) y mayores niveles de tensión aversiva (Stiglmayr et al., 2005) que los controles sanos en un contexto naturalístico.

Estudios de reactividad emocional

El concepto de "reactividad emocional" hace referencia a la respuesta emocional de un individuo ante un estímulo determinado. Por tanto, para estudiar este componente de la disregulación emocional se ha utilizado diferentes estímulos (e.g. imágenes estandarizadas, fragmentos de peliculas, recuerdos autobiograficos) que permiten inducir emociones en contextos experimentales.

Si bien existen algunos estudios de resonancia magnética funcional (fMRI) en los que se observó una híper-activación de la amígdala que estaría vinculada a la alta reactividad emocional (Hazlett et al., 2007; New et al., 2007; Salvador et al., 2016), la mayoría de los estudios han utilizado parámetros de activación fisiológica para estudiar el fenómeno de la reactividad emocional (Kuo & Linehan, 2009).

En conjunto, estos estudios presentan hallazgos contradictorios. Herpertz y colaboradores realizaron tres estudios (Herpertz et al., 2001; Herpertz, Kunert, Schwenger, & Sass, 1999; Herpertz et al., 2000) en los que se monitorizó la respuesta fisiológica ante imágenes de valencia positiva, negativa y neutra tomadas del International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1999). En estos estudios no se encontró evidencia a favor de una elevada reactividad. Sin embargo, y contrariamente a lo esperado, en dos de estos trabajos (Herpertz et al., 1999; Herpertz et al., 2000) se reportó una menor activación fisiológica en sujetos con TLP comparados con CS. Específicamente, el grupo con TLP mostró un nivel de conductancia dermal significativamente menor que el grupo control en respuesta a los 3 tipos de estímulos (valencia positiva, negativa y neutra). En la misma línea, los pacientes con TLP también mostraron una disminución de la reactividad fisiológica ante un guión de abandono (Schmahl et al., 2004) y un fragmento de película inductor de tristeza (Kuo & Linehan, 2009). En este último estudio (Kuo & Linehan, 2009), se observó además una discrepancia entre el registro emocional subjetivo (en donde los sujetos con TLP puntúan una mayor intensidad emocional) y el registro fisiológico (en donde se ve una desactivación simpática). Los autores sugieren que ante la alta activación emocional subjetiva producida por el estímulo, los sujetos con TLP podrían estar aplicando estrategias de regulación emocional de forma implícita, disminuyendo así la activación fisiológica (Kuo & Linehan, 2009). Otros estudios sí

han reportado una mayor reactividad fisiológica en sujetos con TLP en comparación con CS, evidenciada a través de una intensidad mayor del reflejo de sobresalto (Ebner-Priemer et al., 2005) y un mayor nivel de frecuencia cardiaca (Ebner-Priemer et al., 2007).

A la luz de los trabajos mencionados anteriormente, algunos autores han planteado que la discrepancia entre la teoría –que sostiene una alta reactividad a los estímulos emocionales- y los hallazgos experimentales –en los que no se ha encontrado esta reactividad- podría explicarse por las características de los estímulosutilizados para inducir emociones. En este sentido, es probable que en contextos experimentales se recreen escenarios artificiales y se utilicen estímulos que están muy alejados de las circunstancias con las que se enfrenta el paciente en la vida real (Jacob et al., 2009; Kuo & Linehan, 2009; Rosenthal et al., 2008). Podría ocurrir que los estímulos estandarizados más frecuentemente utilizados (e.g., imágenes, fragmentos de películas) no sean lo suficientemente "potentes" como para inducir una respuesta emocional similar a la desplegada en contextos naturalísticos. En esta línea, estudios realizados con pacientes con diagnóstico de estrés postraumático muestran que, al menos en estas poblaciones, la reactividad emocional es claramente mayor ante escenas relacionadas con los eventos traumáticos padecidos por el sujeto, que ante estímulos estandarizados (McTeague et al., 2010).

Así, algunos investigadores se focalizaron en investigar la respuesta emocional de individuos con TLP ante la imaginación de escenas relacionadas con la clínica específica del trastorno. Para explorar esto, Limberg y colaboradores (Limberg, Barnow, Freyberger, & Hamm, 2011) utilizaron como métodos de inducción emocional tres guiones en los que se describían escenas de abandono y otros tres, en los que se describían escenas de rechazo. Además, se utilizaron guiones que contenían escenas traumáticas personalizadas según la historia de cada participante. Como condición control, se escogieron guiones estandarizados de valencia neutra, negativa y positiva. Los participantes fueron divididos en tres grupos: TLP sin síntomas de estrés postraumático, TLP con síntomas de estrés postraumático leves, y TLP con síntomas de estrés postraumático severos. En concordancia con estudios previos (Herpertz et al., 1999; Kuo & Linehan, 2009), no se encontraron diferencias significativas entre el grupo de TLP y el grupo de controles sanos en la respuesta autonómica (conductancia dermal y frecuencia cardiaca) ante los estímulos estandarizados (guiones en los que se relataba una situación aversiva, e.g., estar enfermo o estar solo). Por el contrario, sí se observaron diferencias significativas entre grupos en las respuestas a los guiones de rechazo y abandono. En comparación con controles sanos, el grupo con TLP mostró una mayor activación simpática y una mayor activación del reflejo de sobresalto. En base a estos resultados, los autores sugieren que la alta reactividad emocional en el TLP estaría específicamente relacionada con estímulos asociados a eventos traumáticos de abandono y rechazo, desestimando hipótesis de una reactividad general exagerada. En la misma línea, en otro estudio, se reportó una mayor reactividad en TLP –en comparación con sujetos con otros trastornos de personalidad y CS- ante el feedback negativo (Sieswerda, Arntz, & Wolfis, 2005). En otros estudios en

los que se han utilizado paradigmas de interferencia emocional (e.g., Stroop emocional) se encontró un patrón de hipervigilancia ante los estímulos emocionales negativos relacionados con el TLP (e.g., ineficaz, inaceptable), pero no ante estímulos de valencia positiva o neutra (Arntz, Appels, & Sieswerda, 2000). En otro trabajo en el que también se utiliza un Stroop emocional, Portella y colaboradores (Portella et al., 2011) reportaron un mayor enlentecimiento ante estímulos relacionados con la clínica del TLP, sugiriendo también una relación entre la disregulación emocional y ciertos contenidos específicos.

Estudios de recuperación de la línea de base emocional

La recuperación del estado emocional basal es probablemente el componente del modelo de Linehan (1993a) que ha sido menos estudiado. Este fenómeno ha sido definido como la reducción momento a momento de la respuesta emocional una vez que el estímulo disparador ha desaparecido (Davidson, 1998). Gratz y colaboradores (Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2010) estudiaron el impacto de dos estresores en la respuesta emocional subjetiva de pacientes con TLP en comparación con un grupo de sujetos sin TP. Los participantes del estudio debían puntuar la intensidad de distintas emociones (i.e., ansiedad, irritabilidad, hostilidad y vergüenza) durante y después de la presentación de cada estímulo. Ambos grupos mostraron un patrón similar de reactividad emocional y de recuperación del estado emocional para las emociones de ansiedad, irritabilidad y hostilidad. Sin embargo, los participantes con diagnóstico de TLP mostraron un patrón diferencial en relación a la vergüenza. Específicamente, este grupo mostró una mayor intensidad de la emoción de vergüenza y ésta se mantuvo significativamente más alta, tanto en el periodo de recuperación inmediato al estímulo como al final del estudio. En un trabajo de Jacob et al. (2009) tampoco se encontraron diferencias entre sujetos con TLP, trastorno depresivo mayor (TDM) y CS en cambios en ira, alegría, ansiedad, vergüenza, y tristeza, después de exponerse a un estímulo inductor de ira. Scheel y colaboradores (Scheel et al., 2013) exploraron los cambios en un grupo de sujetos con TLP, TDM y CS en vergüenza, ira, ansiedad, tristeza, alegría, fastidio y aburrimiento 3, 6 y 8 minutos después de una inducción de vergüenza. En concordancia con otros estudios, no se encontraron diferencias significativas entre los grupos. Recientemente, Fitzpatrick y Kuo (2015) evaluaron la recuperación del estado emocional de pacientes con TLP, comparándolos con un grupo de pacientes con trastorno de ansiedad generalizada y CS. En concordancia con los trabajos anteriormente mencionados, en este estudio los participantes con TLP no mostraron una recuperación más lenta que los otros 2 grupos.

Otra forma de aproximarse al estudio del retorno a la línea de base emocional es investigar la duración de los estados emocionales, en el entendido de que una mayor duración de la emoción puede interpretarse como una recuperación más lenta. En este sentido, Reisch y colaboradores estudiaron la respuesta emocional de 50 pacientes con TLP en comparación con 50 CS a través de un registro ambulatorio (Reisch, Ebner-Priemer, Tschacher, Bohus, & Linehan, 2008). Cada participante recibía un dispositivo que disparaba una alarma 4 veces por hora, indicando al sujeto que registrara su estado de ánimo. En este estudio, se observó que

las emociones de ansiedad y tristeza, fueron más persistentes en el grupo con TLP que en el de CS. Además, los pacientes con TLP experimentaron más cambios de una emoción negativa a otra (e.g., cambio de ansiedad a ira, o de ansiedad a tristeza), lo que también podría indicar una menor recuperación del estado emocional. Finalmente, en un trabajo de Ebner-priemer (Ebner-priemer et al., 2015) se evaluaron 3 procesos: estado emocional basal, variabilidad afectiva y recuperación del estado emocional. Los resultados indican que los individuos con patología límite se caracterizan por una alta intensidad basal de emociones negativas y altos niveles de variabilidad afectiva. Si bien se encontraron diferencias entre grupos en cuanto al retorno a la línea de base emocional, estas no fueron tan consistentes como en relación a los otros dos componentes (Ebner-priemer et al., 2015).

En conjunto, la evidencia acumulada hasta el momento indica que los pacientes con TLP se caracterizarían por una elevada emocionalidad basal negativa, más que por una híper-reactividad ante los estímulos emocionales. Sin embargo, es probable que estos hallazgos se vean influenciados por el tipo de estímulos utilizados para inducir emociones. Ya que, como describimos anteriormente, la híper-reactividad emocional parecería estar asociada a cierto tipo de estímulos relacionados con experiencias traumáticas o con mayor contenido auto-biográfico. Finalmente, y aunque pocos estudios se han focalizado en explorar las características de la recuperación del estado emocional, es también probable que la emocionalidad negativa basal sea consecuencia de la larga duración de los estados emocionales negativos, produciéndose una suerte de efecto de "arrastre" emocional que no permite recuperar la estabilidad.

1.1.5.2 Impulsividad

Otra de las características definitorias del TLP es la alta impulsividad que se refleja en conductas como el abuso de sustancias, los gastos desproporcionados, la promiscuidad sexual, los atracones, y/o la conducción temeraria (American Psychiatric Association, 2013; Zanarini et al., 1989). Estos comportamientos tienen en común la falta de consideración por las consecuencias a largo plazo. Sin embargo, la definición del constructo "impulsividad" es compleja y no existe un consenso respecto a su especificación y evaluación (Sebastian, Jacob, Lieb, & Tüscher, 2013). Como consecuencia de esto, existen diferentes instrumentos de auto-reporte y paradigmas conductuales para evaluar distintos aspectos de lo que se engloba bajo el constructo de "impulsividad".

Estudios con medidas auto-informadas de impulsividad

Considerando la impulsividad como un rasgo de personalidad, la mayoría de estudios utilizan la escala de Barrat [Barrat Impulsiveness Scale (BIS-11; Patton, Stanford, & Barratt, 1995)]. Se trata de un cuestionario auto-informado en el que se evalúan tres facetas: impulsividad motora, cognitiva y no-planificada. En comparación con CS, los pacientes con TLP muestran puntuaciones significativamente más elevadas en las tres sub-escalas del BIS (Berlin, Rolls & Iversen, 2005; Domes et al., 2006; Jacob et al., 2010; Kunert, Druecke, Sass, & Herpertz, 2003;

Paris et al., 2004; Rentrop et al., 2008). Respecto a otras poblaciones clínicas, Henry (Henry et al., 2001) reportó mayores puntuaciones en el BIS en sujetos con TLP que en individuos con diagnóstico de trastorno bipolar tipo II, mientras que Wilson (Wilson et al., 2007) también reportó puntuaciones más altas en TLP que en sujetos con TDM. Una excepción parecería ser el trastorno por déficit de atención con hiperactividad (TDAH), que, en comparación con el TLP presentaría puntuaciones más elevadas en impulsividad rasgo (Lampe et al., 2007).

Estudios con medidas conductuales/neuropsicológicas de impulsividad

Para la evaluación neuropsicológica de la impulsividad se utilizan diversos paradigmas, entre ellos: paradigmas de inhibición de respuesta (tipo Go/NoGo), paradigmas de interferencia cognitiva (e.g., Stroop), paradigmas de toma de decisiones (e.g., Iowa Gambling Task), paradigmas de estimación temporal (e.g., time production/time estimation) y paradigmas que evalúan la tolerancia a la demora de recompensas. En general, parecería que en comparación con CS, los individuos con personalidad límite tienen una peor performance en paradigmas de inhibición de repuesta, asociada a mayores errores de comisión (i.e., responder ante un estímulo no-target; Coffey, Schumacher, Baschnagel, Hawk, & Holloman, 2011; Rentrop et al., 2008). Los sujetos con TLP también exhibirían una baja tolerancia a demorar recompensas (Dougherty, Bjork, Hukabee, Moeller & Swann, 1999), reflejada en la tendencia a escoger recompensas más pequeñas pero que se obtienen más rápidamente, en vez de recompensas más elevadas a largo plazo (Ainslie, 1975; Mischel, Shoda, & Rodriguez, 1989). Se ha descrito que la baja capacidad de demorar la gratificación se asocia a distintas conductas disfuncionales características del TLP como el abuso de sustancias (Coffey, Gudleski, Saladin, & Brady, 2003; Kollins, 2003), trastornos de la alimentación (Kane, Loxton, Staiger, & Dawe, 2004) o intentos de suicidio (Mathias et al., 2011). Los pacientes con TLP también presentarían una tendencia a sobre-estimar periodos temporales, una característica que también ha sido asociada a la impulsividad en otras poblaciones (Barratt, 1983; Stanford & Barratt, 1996). En un estudio de Berlin y Rolls (2004) participantes con diagnóstico de TLP produjeron menores tiempos en una prueba de estimación temporal que los controles sanos, y esto se correlacionó de forma significativa con una mayor impulsividad, alto neuroticismo y síntomas generales del TLP.

Algunos autores han destacado la relación entre disregulación emocional e impulsividad, sosteniendo que la impulsividad es secundaria a la disregulación emocional (Linehan, 1993a; Sebastian et al., 2013). Esta hipótesis ha sido respaldada en algunos estudios que reportan asociaciones significativas entre falta de control de impulsos y emociones negativas (Chapman, Leung, & Lynch, 2008) y desestimada en otros trabajos que no encuentran esta asociación (Domes et al., 2006). En un estudio reciente de Cackowski y colaboradores (2014) se evaluó el impacto de una situación de estrés en la impulsividad comparando un grupo de participantes con TLP (n = 30, mujeres, sin medicación) con un grupo de CS (n = 30, apareadas en edad, educación y nivel de inteligencia). Las participantes realizaron una tarea de inhibición conductual (i.e., paradigma Go/NoGo) y toma de decisiones (Iowa) primero bajo condiciones normales (condición A) y después bajo condiciones de estrés (i.e. visionado

de imágenes aversivas, sonido aversivo y cálculos matemáticos que debían realizarse en cierto tiempo: condición B). En la condición B ambos grupos mostraron un aumento de la impulsividad – estado, no así durante la condición A. Las participantes con diagnóstico de TLP mostraron índices de peor performance –en comparación con los CS- en la tarea de Go/NoGo para la condición B (estas diferencias no se encontraron en el Iowa). Además, en el grupo de TLP se encontraron correlaciones significativas entre medidas de impulsividad y medidas de regulación emocional. En conclusión, parecería ser que en pacientes con TLP el estrés tiene un impacto significativo tanto en la impulsividad-estado como en la inhibición de respuesta y por tanto algunos autores plantean que la impulsividad característica del trastorno estaría estrechamente asociada a la disregulación emocional (Cackowski et al., 2014; Linehan, 1993a; Sebastian et al., 2013).

1.2 TRATAMIENTO DEL TRASTORNO LÍMITE DE LA PERSONALIDAD

1.2.1 Psicoterapias para el TLP

El primer tratamiento específicamente desarrollado para el TLP fue la Terapia Focalizada en la Transferencia de orientación psicodinámica (TFF; Kernberg, 1984). A partir de la década de 1980, comienzan a surgir otras terapias basadas en modelos conductuales, como la terapia cognitiva para los trastornos de personalidad de Beck (Beck, Freeman, & Davis, 1990) o la TDC de Linehan (Linehan, 1993a). Posteriormente, han surgido otros modelos terapéuticos, que en mayor o menor medida, también han demostrado su eficacia en ensayos controlados. Entre estas terapias, además de la TDC o la TFF, se encuentran la Terapia Basada en la Mentalización (TBM; Bateman & Fonagy, 2004), la Terapia Centrada en Esquemas (TCE; Young, Klosko, & Weishaar, 2003) y System Training for Emotional Predictability & Problem Solving (STEPPS; Blum, Pfohl, John, Monahan, & Black, 2002).

En la última revisión Cochrane publicada en el año 2012 (Stoffers et al., 2012) se revisan 28 estudios (n total = 1804 pacientes con diagnóstico de TLP) con ramas de tratamiento paralelas. En todos los estudios las ramas activas de tratamiento resultaron más eficaces que las intervenciones control, confirmando que los pacientes con TLP se beneficiarían de intervenciones estructuradas y manualizadas, independientemente de sus contenidos específicos (Gabbard, 2007; Paris, 2010). A pesar de esto, es importante recalcar que existen diferencias sustanciales en la rigurosidad metodológica de los estudios evaluados, y por tanto la revisión concluye que la TDC es la única psicoterapia que cuenta actualmente con estudios suficientes como para considerarse un tratamiento para el TLP "basado-en la evidencia".

1.2.2 Terapia Dialéctica Conductual: descripción general

La terapia dialéctica conductual es un tratamiento creado inicialmente para pacientes con múltiples conductas suicidas que cumplen criterios para el diagnóstico de TLP. A diferencia

del enfoque cognitivo-conductual estándar, la TDC combina técnicas de la psicología de la conducta con elementos tomados de la filosofía dialéctica y de la práctica Zen (Linehan, 1993a). La dialéctica más importante de la terapia es la de aceptación y cambio y para lograr la "síntesis" entre estos dos elementos el terapeuta combina estrategias de resolución de problemas con estrategias de aceptación y validación.

La TDC es una terapia altamente estructurada alrededor de 5 funciones principales: 1) aumentar las habilidades del paciente, 2) incrementar la motivación para el cambio, 3) generalizar las habilidades en todos los contextos relevantes para el paciente, 4) estructurar el contexto de forma que facilite el trabajo entre terapeuta y paciente y 5) incrementar las habilidades y motivación del terapeuta para tratar de forma efectiva a los pacientes (Linehan, 1993a). Para lograr esto, la terapia se estructura en torno a 4 modos también guiados por objetivos específicos. En la terapia individual de frecuencia semanal, se trabaja en función de las conductas problema ocurridas durante la semana. En el entrenamiento en habilidades en formato grupal, también de frecuencia semanal, se trabajan 4 módulos de habilidades orientadas a ampliar el repertorio conductual del paciente: mindfulness, tolerancia al malestar, regulación emocional y efectividad interpersonal. El soporte telefónico está destinado al manejo de crisis y a ayudar al paciente a generalizar habilidades. Y por último, el grupo de consulta para terapeutas tiene el objetivo de prevenir el burn-out de los terapeutas, incrementar su motivación y asegurar que éstos se mantengan dentro del enfoque dialéctico.

Hay tres 3 principios terapéuticos fundamentales que subyacen a cada uno de los modos de intervención:

Terapia de la Conducta: Asumiendo que muchos de los patrones comportamentales disfuncionales de los pacientes son aprendidos, la TDC es una terapia conductual con gran énfasis en los principios de aprendizaje. En la terapia individual se realizan "análisis en cadena" de las conductas desadaptativas para identificar las variables que refuerzan o mantienen estas conductas. Una vez clarificados los antecedentes y las consecuencias de la conducta problema y sus reforzadores se plantea un "análisis de solución" para identificar posibles comportamientos alternativos.

Zen: La introducción de principios del Zen se debe a la necesidad de promover en los pacientes una mayor aceptación de la realidad y una mayor tolerancia al sufrimiento. Los principios derivados del Zen permiten balancear las estrategias de cambio que provienen de la terapia de la conducta.

Dialéctica: La filosofía dialéctica hace referencia al proceso de síntesis entre dos elementos (en el caso de la TDC la dialéctica principal es la integración sabia del cambio –tesis- y de la aceptación –antítesis-). Desde la visión dialéctica, los distintos elementos de la realidad están interconectados y dos cosas aparentemente opuestas pueden ser realidad en un mismo momento. Esta visión es radicalmente diferente a la percepción polarizada que suelen tener los pacientes con TLP, quienes tienden a codificar el mundo en términos de "blanco" o "negro",

dejando de lado cualquier matiz de gris.

Es frecuente que los pacientes con TLP presenten una gran complejidad clínica, caracterizada por la comorbilidad con otros trastornos y por la simultaneidad de diversos problemas conductuales. Considerando esto, la TDC plantea una etapa de pre-tratamiento y 4 estadios de tratamiento, secuenciales y con objetivos ordenados de forma jerárquica en relación a su importancia terapéutica. De esta forma, la agenda de la terapia se determina en función de estos objetivos, otorgando a paciente y terapeuta una guía clara en relación a los problemas a abordar.

Durante la fase de "pre-tratamiento" se busca orientar al paciente a la filosofía de la intervención. En esta etapa, paciente y terapeuta acuerdan los objetivos de la terapia, se exploran las expectativas del paciente y se acuerda un compromiso de tratamiento. En el primer estadio se trabaja el "descontrol conductual severo". El objetivo de esta fase es aumentar el control conductual sobre las autolesiones, las conductas suicidas o el abuso de sustancias. Los comportamientos suicidas adquieren la primera prioridad en este estadio, ya que son conductas que interfieren con la vida del paciente. En segundo lugar, se trabaja sobre las conductas que interfieren con la terapia (e.g., llegadas tarde, cancelación de sesiones, excesivas llamadas telefónicas entre sesiones). En este estadio también se trabaja para reducir los patrones conductuales que interfieren con la calidad de vida, por ejemplo: trastornos alimentarios o comportamientos sexuales de riesgo. El cuarto objetivo de este estadio refiere a aumentar las habilidades conductuales del paciente mediante el entrenamiento en habilidades realizado en la terapia grupal. En el segundo estadio de la terapia, los esfuerzos se dirigen a trabajar sobre los síntomas de estrés postraumático y el procesamiento emocional de eventos históricos importantes para el paciente. Las habilidades de regulación emocional y de tolerancia al dolor son fundamentales para exponer al paciente a estas emociones. El tercer estadio se focaliza en aumentar la calidad de vida, aumentando el auto- respeto, la autoeficacia y la consecución de objetivos personales. Y finalmente, el cuarto y último estadio se orienta a disminuir la sensación de vacío, intentando generar un mayor sentido de plenitud.

1.2.2.1 Evidencia empírica de la Terapia Dialéctica Conductual

En 1991, Linehan publicaba el primer ensayo clínico controlado (Linehan, Armstrong, Suarez, Allmon, & Heard, 1991), en el que se comparaba la eficacia de la TDC para el TLP vs. Tratamiento habitual (TH). Como resultado de este estudio se constató que la TDC fue más eficaz que la intervención control a la hora de disminuir la frecuencia y gravedad de las conductas parasuicidas y la frecuencia y duración de los días de ingreso hospitalario, logrando además una mayor retención en tratamiento. Aunque no se encontraron diferencias significativas respecto al TH, las participantes asignadas a TDC también experimentaron una reducción de la clínica depresiva, desesperanza, ideación suicida y un aumento de las razones para vivir. Las mejorías constatadas durante el tratamiento se mantuvieron 6 y 12 meses después de finalizado el mismo, observándose también una mejoría significativa en

la escala de Impresión Clínica Global (ICG), una disminución de la ira rasgo, y una mayor adaptación social (Linehan, Tutek, Heard, & Armstrong, 1994).

Los resultados prometedores de este primer estudio motivaron otros ensayos clínicos controlados que, en conjunto, han posicionado a la TDC como el tratamiento con más evidencia empírica para el TLP. Actualmente contamos con un total de 11 ensayos aleatorizados y controlados llevados a cabo por investigadores independientes en los que se compara la TDC versus el TH en poblaciones con TLP (Carter, Willcox, Lewin, Conrad, & Bendit, 2010; Koons et al., 2001; Linehan et al., 1991; Linehan, Schmidt, Dimeff, & Comtois, 1999; Linehan et al., 2002; Linehan et al., 2006, 2015; McMain et al., 2009; Pasieczny & Connor, 2011; Turner, 2000; Verheul et al., 2003). En general, estos estudios reportan efectos beneficiosos en distintos aspectos de la sintomatología límite incluyendo: conductas suicidas, depresión y ansiedad (tamaño del efecto muy importantes), rabia (tamaño del efecto importante), conductas parasuicidas (tamaño del efecto moderado), y salud mental general (tamaño del efecto de moderado a importante). En aquellos estudios en los que la TDC fue evaluada en contraste con una rama de tratamiento más rigurosa que el TH, como por ejemplo el tratamiento según guías APA (McMain et al., 2009) o la terapia de expertos (Linehan et al., 2006), la TDC mostró superioridad en algunos aspectos (i.e. conductas parasuicidas, suicidas y depresión), aunque esta superioridad no resultó ser estadísticamente significativa. Ver Tabla 2 para un resumen.

1.2.2.2 Entrenamiento en Habilidades de la Terapia Dialéctica Conductual

El entrenamiento en habilidades de la TDC tiene como principal objetivo que el paciente logre adquirir, fortalecer y generalizar un nuevo repertorio conductual más adaptativo (Linehan, 1993b, 2014). Las habilidades que se enseñan en TDC se derivan de estudios en psicología social, enseñanzas religiosas/espirituales y adaptaciones de distintos tratamientos basados en la evidencia (Linehan, 2014). El paquete original de habilidades fue desarrollado para personas con diagnóstico de TLP, sin embargo, las habilidades de la TDC se utilizan en poblaciones con diferentes problemas conductuales (Valentine, Bankoff, Poulin, Reidler, & Pantalone, 2015). Actualmente, existen dos ediciones del manual de entrenamiento en habilidades. La primera, publicada en 1993 (Linehan, 1993b) y una segunda, de publicación más reciente (Linehan, 2014). En esta segunda edición se mantienen los 4 módulos, pero el número de habilidades ha aumentado considerablemente, permitiendo crear distintos programas para targets más específicos. De hecho, un aspecto central en la adaptación de la TDC a distintos trastornos es el carácter modular de las habilidades que permite la modificación y el ajuste de éstas según las necesidades específicas de la población objetivo. A continuación veremos los principales objetivos de cada uno de los 4 módulos.

Habilidades de mindfulness: Las habilidades de mindfulness son la adaptación psicológica y conductual de técnicas meditativas y contemplativas orientales. Los objetivos de este módulo son disminuir la impulsividad, la disregulación emocional y del self, aumentando la capacidad de experimentar la realidad de forma consciente, el control atencional y disminuyendo la actitud

Tabla 2. Resumen de los principales hallazgos de ensayos clínicos controlados en los que se compara la eficacia de la TDC (formato estándar) con otras intervenciones como tratamiento para el TLP.

Autor y año	Sujetos N/% mujeres	Duración de la intervención/ seguimiento	Tratamiento/ Comparador	Resultados
Linehan et al., 1991	47 / 100	1 año / a 1 año	TDC / TH	En TDC: mejorías en conducta parasuicida, menos días de hospitalización, mayor retención. Las mejorías se mantienen en el seguimiento.
Linehan et al., 1999	28 / 100	1 año / a 4 meses	TDC / TH	En TDC: reducción en abuso de sustancias, mayor retención. Seguimiento: mejoría en ajuste social y global.
Turner et al., 2000	24 / 74	1 año	TDC / TCC	En TDC: mejoría en autolesiones, ideación suicida, depresión, impulsividad, ira, funcionamiento psicológico global, menos días de ingreso hospitalario. Mayor retención.
Koons et al., 2001	20 / 100	6 meses	TDC / TH	En TDC: mejoría en ideación suicida, depresión, desesperanza y rabia.
Linehan et al., 2002	23 / 100	1 año / a 4 meses	TDC / 12 pasos	Reducción de psicopatología y consumo de opiáceos tratamiento y seguimiento para ambas ramas. Mayor retención en intervención control.
Verheul et al., 2003	58 / 100	1 año / a 6 meses	TDC / TH	En TDC: mejoría en autolesión, consumo de alcohol y retención. Las mejorías se mantienen en el seguimiento: impulsividad, autolesiones y reducción consumo alcohol. No hay diferencias en disminución de consumo de drogas entre ambas intervenciones.
Linehan et al., 2006	101 / 100	1 año / a 1 año	TDC / TCE	En TDC: mejoría conducta suicida, menor hospitalización por ideación suicida, menos visitas a urgencias y hospitalizaciones psiquiátricas y mayor retención. Ambas intervenciones mejoran: depresión, razones para vivir, ideación suicida.
McMain et al., 2009	180 / 100	1 año	TDC / GPM	Ambas mejoran: conductas suicidas, utilización de recursos asistenciales, clínica general.
Carter et al., 2010	73 / 100	6 meses	TDC / TH + LE	En TDC: reducción en discapacidad (cantidad de días en cama) y calidad de vida (dominios físico, psicológico y ambientales). Ambas mejoran en: autolesión y hospitalización.
Pasieczny et al., 2011	43 / 100	6 meses	TDC / TH + LE	En TDC: reducciones en autolesiones, visitas a urgencias, ingresos y duración de los ingresos, depresión, ansiedad y sintomatología general.
Linehan et al., 2015	90 / 100	1 año / 1 año	TDC-S / TDC- I / TDC- EH	Todas las condiciones: mejorías en frecuencia y severidad de intentos de suicidio, ideación suicida, uso de servicios de urgencias, y aumento de razones para vivir. TDC –S, TDC- EH > TDC- I en frecuencia de autolesiones, depresión, ansiedad. TDC – S > TDC- I retención, utilización de servicios de urgencias, ingresos en psiquiatría.

evaluativa y juiciosa de las experiencias. Las habilidades de mindfulness se utilizan para aprender a diferenciar entre 3 estados mentales, la mente emocional (sensible, apasionada y enfocada en el corto plazo), la mente racional (lógica, analítica y abstracta y orientada al largo plazo) y la mente sabia (síntesis de las dos anteriores que incorpora una sabiduría asociada a la intuición). Las habilidades de mindfulness se dividen en dos tipos. Por un lado las habilidades "qué", referidas a qué hay que hacer en la práctica de mindfulness: observar, describir y participar. Y por otro, las habilidades "cómo" (i.e., sin juzgar, haciendo una cosa a la vez y siendo eficaz), en las que se enseña el componente actitudinal asociado a la práctica. En el tratamiento estándar, las habilidades de mindfulness ocupan un lugar central (de ahí que se denominen *core mindfulness skills*), son las primeras en enseñarse y se revisan entre módulo y módulo.

Habilidades de tolerancia al malestar: En este módulo se enseñan habilidades orientadas a tolerar y aceptar las emociones negativas. Estas habilidades son importantes porque los sentimientos negativos son parte de la vida y muchas veces no pueden ser evitados o eliminados. Además, la capacidad de tolerar el malestar es fundamental para perseverar y mantener la motivación cuando se está intentado lograr un cambio conductual. En este módulo se incluyen estrategias como: distracción, auto-tranquilización, mejorar el momento y la consideración de ventajas/desventajas de tolerar una situación. El módulo de tolerancia al malestar también integra técnicas de aceptación de la realidad (i.e., aceptación radical, orientándose hacia la aceptación, predisposición negativa versus terquedad, media sonrisa y "*willing hands*", y mindfulness con los pensamientos).

Habilidades de efectividad interpersonal: El objetivo de este módulo es enseñar habilidades para manejar adecuadamente las relaciones interpersonales frecuentemente conflictivas y caóticas. El contenido del módulo es similar al de los programas de asertividad enseñándose habilidades para distinguir entre distintos estilos de comunicación (según el contexto y la prioridad de la situación) e incrementando también las habilidades para hacer peticiones (o negarse a peticiones de los demás cuando estas son inadecuadas).

Habilidades de regulación emocional: El objetivo de este módulo es disminuir la disregulación emocional a través de estrategias orientadas a modificar aspectos que contribuyan con esta disregulación. Para esto se enseñan habilidades orientadas a reconocer las emociones y sus funciones, ser capaz de describirlas y etiquetarlas, conocer cuáles son los factores que impiden cambiar la respuesta emocional y desarrollar estrategias para modificarlos. Además, se enseñan habilidades orientadas a incrementar las emociones positivas en la vida diaria del paciente.

El entrenamiento en habilidades como componente único del tratamiento (sin terapia individual) ha despertado el interés en el ámbito clínico y de la investigación y actualmente existen estudios en los que se confirma su eficacia. La motivación para aplicar el entrenamiento en habilidades como único tratamiento se sustenta en las ventajas asociadas a un tratamiento de menor duración y por tanto, de menor coste económico. El primer estudio en que se evaluó

la eficacia del entrenamiento en habilidades como componente único fue publicado en el año 2009 por Soler y colaboradores (Soler et al., 2009). En este estudio, 59 pacientes con diagnóstico de TLP fueron randomizadas a TDC-EH (n=29) o a tratamiento grupal estándar (n = 30). Después de 13 semanas de tratamiento, los participantes asignados a TDC-EH mostraron, en comparación con el grupo control, menores índices de depresión, ansiedad, irritabilidad, ira e inestabilidad afectiva. Además, se encontraron diferencias significativas en relación a la retención de ambos tratamientos: 34.5 % de dropout en TDC-EH versus 63.4% en la intervención control. A partir de este estudio se han publicado distintos trabajos en los que la TDC-EH mostró ser eficaz en el tratamiento de distintas poblaciones, además del TLP (Valentine et al., 2015).

Considerando la evidencia empírica acumulada y el interés de investigadores y clínicos en la TDC-EH, el objetivo del último ensayo clínico (EC) publicado por Linehan (Linehan et al., 2015) fue realizar un análisis de componentes de la TDC para determinar la eficacia aislada de cada uno de ellos y compararlos entre sí. Las participantes eran todas mujeres ($n = 99$) con diagnóstico de TLP que fueron asignadas aleatoriamente a uno de los tres grupos: 1) TDC en formato estándar (TDC-S), 2) entrenamiento en habilidades (TDC-EH) o 3) terapia individual (TDC-I). La dosis de tratamiento se controló para que fuera similar en las tres condiciones y todos los profesionales utilizaron el protocolo de la TDC para evaluar y manejar el riesgo suicida. En las tres condiciones se encontraron mejorías en relación a la frecuencia y la gravedad de los intentos de suicidio, la ideación suicida, el uso de servicios de crisis por ideación suicida y un aumento de las razones para vivir. En comparación con el tratamiento de terapia individual (TDC-I), las intervenciones que incluyeron habilidades (TDC-S y TDC-EH) fueron más eficaces para disminuir la frecuencia de autolesiones, los síntomas de depresión y los síntomas de ansiedad durante el periodo de tratamiento (1 año). En comparación con la TDC-I, la TDC-S fue más eficaz para retener a los pacientes en tratamiento y para disminuir la utilización de recursos de urgencias y las hospitalizaciones psiquiátricas durante el seguimiento (1 año). En conjunto, los resultados de este estudio son de gran relevancia puesto que confirman la eficacia de los tres componentes de la TDC y sugieren que el entrenamiento en habilidades es un componente activo y fundamental del tratamiento, ya que los tratamientos que incluían habilidades resultaron más eficaces que la TDC-I.

Por otra parte, hay también evidencias que asocian el uso de habilidades al éxito terapéutico. En un análisis post-hoc de resultados de un EC previo (Linehan et al., 2006), se demostró que la utilización de las habilidades es un mediador del éxito de la intervención, especialmente en relación a la reducción de los intentos de suicidio y los síntomas depresivos, y la mejoría en el control de la ira (Neacsiu, Rizvi, & Linehan, 2010). Si bien este trabajo destaca la importancia del uso de habilidades en la mejoría terapéutica, es importante aclarar que estos pacientes recibían el pack completo de la terapia (i.e. terapia individual más EH), y por tanto resulta difícil aislar la eficacia del entrenamiento en habilidades. En otro estudio, Stepp y colaboradores (Stepp et al., 2008) exploraron la relación entre el uso de habilidades y la mejoría de los

síntomas de TLP, concluyendo que el uso total de habilidades se relaciona con la mejoría de síntomas del trastorno (mejoría global y específica en relación a: inestabilidad afectiva, problemas de identidad y problemas en el área interpersonal). Otros estudios se han focalizado en explorar la frecuencia de la utilización de las distintas habilidades, reportando diferencias entre módulos. Parecería que las habilidades de mindfulness son las más practicadas, seguidas por las de tolerancia al malestar, regulación emocional y, en último lugar, las de efectividad interpersonal (Lindenboim et al., 2007). Esta preferencia por las habilidades orientadas hacia la aceptación (i.e., mindfulness y tolerancia al malestar) podría indicar una mayor utilidad terapéutica. De esta forma, podría ocurrir por ejemplo que, ante un problema interpersonal, los pacientes eligieran practicar habilidades de mindfulness orientadas a aceptar la situación o las características personales de la otra persona, en lugar de aplicar directamente habilidades de efectividad interpersonal. Sin embargo, hasta el momento no se han realizado estudios que comparen la eficacia de los cuatro módulos de habilidades entre sí y por tanto no es posible asegurar si algún componente del entrenamiento en habilidades es más eficaz que otro.

1.3 MINDFULNESS

1.3.1 Mindfulness en el Trastorno Límite de la Personalidad

Una de las definiciones más ampliamente utilizadas del término "mindfulness" es la de Kabat Zinn (Kabat-Zinn, 1990), según la cual mindfulness implica "prestar atención de una forma particular: intencionalmente, en el momento presente y sin juzgar". De ella se desprenden dos aspectos que han sido resaltados por varios autores. Por un lado, mindfulness implica la regulación de la atención con el fin de mantenerla en el momento presente y por otro, una actitud implícita de no-juzgar, aceptación y curiosidad (Bishop et al., 2004). Otros autores han identificado múltiples facetas dentro del constructo de mindfulness. Por ejemplo, Baer y colaboradores distinguen 5 aspectos: 1) la capacidad de observar y notar la experiencia, 2) la habilidad para describir la experiencia (i.e., poner en palabras o etiquetar lo que se está observando), 3) la capacidad de no-juzgar, 4) la capacidad de no-reaccionar (i.e., dejar que los pensamientos y las emociones pasen sin tener que reaccionar a ellas), y 5) la capacidad de actuar con consciencia del momento presente (i.e., opuesta a las conductas automáticas; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). El concepto de mindfulness se relaciona a su vez con otros constructos, como el de "*decentering*", que hace referencia a la habilidad para distanciarse de la propia experiencia interna, observando los pensamientos y las emociones como fenómenos temporales que no necesariamente reflejan la realidad (Teasdale et al., 2000).

Además de ser una capacidad entrenable a través de la práctica, algunos autores han conceptualizado el mindfulness como un rasgo disposicional que todos tenemos en mayor o menor medida (Baer et al., 2006). Desde esta perspectiva, parecería ser que los sujetos

con TLP presentan una disminución de la capacidad de mindfulness (Baer, Smith, & Allen, 2004) y de decentering (Soler et al., 2014) al compararlos con CS. En un trabajo realizado con una muestra no-clínica de estudiantes universitarios, se reportó una asociación significativa entre déficits en mindfulness y algunas características del TLP (Wupperman et al., 2008). En concreto, una baja capacidad de mindfulness se relacionó con dificultades en las relaciones interpersonales y un mayor uso de estrategias impulsivas/pasivas de regulación emocional, incluso al controlarlo por el grado de neuroticismo (Wupperman et al., 2008). En un estudio posterior (Wupperman et al., 2009) realizado con una muestra de pacientes psiquiátricos (n = 70), se corroboraron los resultados anteriores: la baja capacidad de mindfulness se correlacionó con formas desadaptativas de resolver conflictos interpersonales, estrategias de regulación emocional pasivas e impulsivas y neuroticismo. Además, el mindfulness resultó ser un mediador de la relación entre síntomas del TLP y autolesiones y otros comportamientos (e.g., abuso de sustancias, atracones; Wupperman, Fickling, Klemanski, Berking, & Whitman, 2013).

Utilizando el modelo propuesto por el Baer y colaboradores (Baer et al., 2006), algunos trabajos recientes sugieren que la interacción entre algunas facetas del mindfulness se asocia especialmente con los síntomas del trastorno. En un estudio de Peters et al. (Peters, Eisenlohr-moul, Upton, & Baer, 2013) se reportó que la interacción entre las facetas de "actuación consciente" y "no-juzgar", predicen ciertas características del TLP incluyendo los problemas interpersonales, la impulsividad y la rumiación. Según este estudio, la faceta de "no-juzgar" es un moderador de la relación entre baja "actuación consciente" y síntomas del TLP. En este sentido, parecería ser que la baja capacidad de no-juzgar es un elemento clave en la psicopatología de esta patología. En un estudio reciente en el que 40 pacientes con TLP contestaron cuestionarios de mindfulness (FFMQ) y de síntomas del trastorno límite (BSL-23) durante 4 semanas consecutivas se encontró que las fluctuaciones individuales en la faceta de "no-juzgar" predicen la expresión de los síntomas del trastorno (Eisenlohr-Moul, Peters, Chamberlain, & Rodriguez, 2015). Concretamente, a menores niveles de "no-juzgar", mayor severidad de los síntomas del TLP. A su vez, este estudio muestra también que algunas facetas serían más estables que otras, ya que la variabilidad intra-sujeto en las puntuaciones de "no-juzgar" y "no-reaccionar" fue mayor que la variabilidad en la faceta de "actuación consciente" (45 y 49% vs. 26% de variabilidad respectivamente; Eisenlohr-Moul et al., 2015).

A pesar de la asociación descrita entre sintomatología límite y baja capacidad de mindfulness, pocos trabajos han establecido hipótesis en relación a los factores que podrían ser precursores de estos déficits. A la luz de los estudios realizados, parece probable que ciertos rasgos temperamentales, como el neuroticismo o la impulsividad, predispongan al sujeto a presentar alteraciones en la capacidad de mindfulness. Hasta el momento no existen estudios en los que se haya explorado, al menos en muestras clínicas, si los factores ambientales asociados al desarrollo del TLP (como las experiencias traumáticas infantiles) podrían afectar la capacidad de mindfulness en la fase adulta.

En una muestra no clínica, Michal (Michal et al., 2007) encontró correlaciones significativas y negativas entre haber experimentado maltrato emocional en la niñez y la capacidad de mindfulness. Además, la relación inversa entre ciertas facetas del mindfulness y la gravedad del trastorno por estrés postraumático también sugieren esta asociación (Bergomi, Ströhle, Michalak, Funke, & Berking, 2012).

En resumen, según la literatura disponible hasta el momento, las características principales del TLP podrían asociarse a déficits en distintas facetas del mindfulness. A pesar de estos resultados interesantes, los estudios antes descritos tienen limitaciones metodológicas importantes, por ejemplo, el uso mayoritario de muestras no-clínicas, que impiden establecer conclusiones determinantes acerca de la relación entre mindfulness y síntomas del TLP.

1.3.2 Mindfulness en la Terapia Dialéctica Conductual

Aunque algunos autores han propuesto que el aumento de la capacidad de mindfulness es un objetivo común a distintos tipos de enfoques terapéuticos (Bliss & McCardle, 2013), solo la TDC hace un énfasis explícito en la adquisición de estas habilidades. Como comentamos anteriormente, en TDC las habilidades de mindfulness son fundamentales, considerándose necesarias para la posterior adquisición de otras habilidades de auto-regulación (Linehan, 1993b).

En terapia dialéctica el objetivo primordial de la práctica de mindfulness es participar de la experiencia y ser capaz de fundirse con ella (Linehan, 1993b; Lynch, Chapman, Rosenthal, Kuo & Linehan, 2006). Para esto el mindfulness se presenta como un conjunto de habilidades a entrenar, instruyendo al paciente en los pasos necesarios para esto (describiremos estos pasos más adelante). En contraste con otros modelos, en TDC hay un énfasis en la práctica informal que proviene de la hipótesis de que la práctica formal durante largos periodos de tiempo puede ser extraordinariamente difícil para un paciente con TLP (Dimidjian & Linehan, 2003).

Las habilidades de mindfulness se agrupan en dos categorías, las habilidades "qué" y las habilidades "cómo". Las primeras orientan al paciente sobre "qué" hacer durante la práctica: observar, describir y participar. "Observar", refiere al acto de ser consciente de las experiencias internas (e.g, pensamientos, emociones y deseos) o externas (e.g., sensaciones físicas), sin ponerles etiquetas verbales. La segunda habilidad (i.e., "describir") refiere a la capacidad de poner en palabras sin juzgar, ni evaluar, la experiencia que estamos observando. Esta habilidad se ha asociado a un incremento de la regulación emocional, ya que promovería una mayor capacidad de reconocer los propios estados emocionales, implicando el distanciamiento de los mismos (Creswell, Way, Eisenberger, & Lieberman, 2007). Finalmente, la habilidad de participar, objetivo fundamental de la práctica de mindfulness, implica la entrega completa al momento presente de forma fluida y espontánea. Si consideramos que la participación sin consciencia es característica de los actos impulsivos y estado de ánimo dependientes, participar con consciencia es importante

para disminuir este tipo de conductas. El concepto de participación tiene muchas similitudes con el concepto de *flow* proveniente de la psicología positiva (Csikszentmihalyi, 1991).

El segundo grupo de habilidades, las habilidades "cómo", indican el aspecto actitudinal de la práctica de mindfulness y guían al paciente para observar, describir y participar: 1) focalizándose en una sola cosa a la vez (*one-mindfully*), 2) sin adoptar una postura juiciosa o evaluativa, y 3) priorizando las actuaciones eficaces. Focalizar la atención en el presente es fundamental para evitar fusionarse con los contenidos mentales vinculados a preocupaciones, interpretaciones o expectativas de futuro. La atención en el momento presente debe acompañarse de una actitud no-evaluativa y por tanto se propone el remplazo de los juicios por la descripción de las consecuencias negativas. De esta forma, la experiencia deja de etiquetarse como "buena" o "mala", para pasar a ser "tal cual es" y se trasforma sin recurrir necesariamente a las estrategias clásicas de re-estructuración cognitiva (Lynch et al., 2006). La tercera de estas habilidades es la capacidad de actuar maximizando la eficacia y disminuyendo entonces, las conductas dependientes del estado de ánimo (Linehan, 2014). Las habilidades "cómo" reflejan la importancia de trabajar la actitud con que nos aproximamos a la experiencia. La aceptación de la realidad es fundamental entonces para vincularnos con la experiencia interna y externa, sin incrementar el sufrimiento. Linehan plantea el concepto de "aceptación radical" de la realidad, haciendo referencia a esta tendencia de apertura a la realidad –especialmente a los eventos dolorosos- que es opuesta a la evitación, el rechazo o la supresión, estrategias frecuentemente utilizadas por las personas con trastorno límite (Linehan, 2014; Lynch et al., 2006). La aceptación radical implica aceptar la experiencia por mas dolorosa que sea, sin oponerme ni reaccionar a ella. Así, el paciente aprende habilidades para aceptar ciertos hechos de su vida (actual o pasada) o ciertas limitaciones que no son modificables y que están vinculadas a un gran sufrimiento (Linehan, 2014). Aunque las habilidades de aceptación radical de la realidad se incluyen dentro del módulo de "tolerancia al malestar", como plantea Linehan (2014), estas habilidades son la progresión natural de la práctica de mindfulness.

En conjunto, todas estas habilidades son un vehículo para realizar actuaciones guiadas por la "mente sabia" (Linehan, 1993b, 2014), un estado mental que representa la síntesis entre la mente emocional (i.e., la mente de las preferencias, los deseos y las urgencias de acción) y la mente racional (i.e., la mente fría, lógica, intelectual).

1.3.3 Efectos terapéuticos y mecanismos de acción del mindfulness

La literatura actual sugiere que diversos mecanismos de acción podrían estar implicados en los beneficios de la práctica de mindfulness (Holzel et al., 2011). Estudios con poblaciones no-clínicas, asocian la práctica de mindfulness a una mayor regulación emocional, relacionada

con una disminución del estado de ánimo negativo, un aumento del estado de ánimo positivo (Davidson et al., 2003; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010), y una reducción de los pensamientos rumiativos (Jain et al., 2007). Esto fue corroborado en un estudio de neuroimágen funcional en el que se monitorizó la activación cerebral mientras los sujetos etiquetaban imágenes emocionales (Creswell et al., 2007). Los resultados del estudio muestran que durante el visionado y etiquetado de estas imágenes los sujetos con mayores puntuaciones en las escalas de mindfulness mostraban una activación cerebral congruente con una mayor regulación emocional. En concreto, estos sujetos mostraron: (a) mayor activación de regiones cerebrales de la corteza pre-frontal (incluida la CPF ventromedial, CPF medial y CPF ventrolateral), (b) menor actividad de la amígdala, (c) mayor asociación inhibitoria entre la amígdala y regiones de la CPF (Brown, Ryan, & Creswell, 2007). La práctica de mindfulness también contribuiría a una mejor regulación emocional impidiendo el desarrollo de emociones secundarias. La capacidad de "no-reaccionar" ante los eventos que provocan malestar emocional y de no-juzgarlos sería fundamental para impedir entonces que este tipo de emociones tengan lugar (Lynch, et al., 2006).

Hasta el momento, solo hay un estudio en el que se ha explorado los efectos del mindfulness en la regulación emocional en una muestra clínica de pacientes con TLP (Feliu-Soler et al., 2014). En este estudio se evaluó la respuesta ante imágenes de contenido de valencia negativa, en un grupo de sujetos que habían realizado una intervención en mindfulness (n = 18) y se los comparó con un grupo de sujetos en TH (n = 17). No se encontraron diferencias significativas en la respuesta emocional post-tratamiento, sin embargo sí se encontró una mejoría en los pacientes asignados al grupo de mindfulness en variables clínicas: síntomas depresivos y gravedad de síntomas psiquiátricos generales (Feliu-soler et al., 2014).

Por otra parte, los efectos beneficiosos del mindfulness también parecen relacionarse con ciertas modificaciones a nivel de funciones cognitivas (Chiesa, Calati, & Serretti, 2011), especialmente a nivel de procesos atencionales (Holzel et al., 2011). En la mayoría de los ejercicios de mindfulness, el sujeto recibe instrucciones de focalizar la atención sobre un objeto (e.g., la respiración) y de volver a él –con firmeza y amabilidad- cada vez que la mente divague y se distraiga. Algunas prácticas de mindfulness proponen centrar el foco de atención en un objeto específico (i.e., *focusing the mind practices*), mientras que otras proponen una monitorización más abierta (i.e., *opening the mind practices*; Lutz, Slagter, Dunne, & Davidson, 2008). La práctica de mindfulness ha sido asociada con cambios a nivel de distintas facetas atencionales: la atención sostenida, la atención selectiva y las capacidades de monitorizar y cambiar el foco atencional (Bishop et al., 2004; Chiesa et al., 2011; Jha, Krompinger, & Baime, 2007; Lutz et al., 2008; Shapiro, Carlson, Astin, & Freedman, 2006). En muestras de TLP, el primer estudio en explorar el efecto del mindfulness a nivel atencional fue el de Soler y colaboradores (Soler et al., 2012). En este trabajo, 60 pacientes con diagnóstico de TLP fueron aleatorizados a un entrenamiento en mindfulness de 10 semanas de duración (n = 40) o a TH (n = 20). Los participantes que recibieron entrenamiento en mindfulness mostraron mejorías

significativas en varios índices del CPT-II, un test neuropsicológico de atención sostenida (Conners, 2000). Específicamente, se encontraron diferencias significativas entre grupos en las variables de: 1) comisión, 2) tiempo de reacción, y 3) detectabilidad, sugiriendo que el entrenamiento en mindfulness aumentaría la capacidad de distinguir targets de no-targets, y esto se correspondería con tiempos de reacción mas largos (Soler et al., 2012). Además, los participantes del grupo de mindfulness mostraron mejorías en relación a los índices globales de inatención e impulsividad (Soler et al., 2012).

Conjuntamente con los cambios producidos a nivel atencional, parecería ser que la práctica de mindfulness contribuiría a una disminución de la impulsividad, mediante el aumento de la capacidad para distinguir entre "reaccionar" a la experiencia o "responder" a ella. Reaccionar a la experiencia es característico de los comportamientos impulsivos, mientras que responder a ella implica una mayor consciencia y facilita por tanto, las conductas premeditadas (Kabat-Zinn, 1990; Shapiro et al., 2006). Esta capacidad de no-reaccionar ante los eventos –ya sean internos o externos- se relaciona a su vez con la capacidad de descentramiento (Teasdale et al., 2002).

La exposición a ciertos contenidos mentales o emocionales con cierta distancia facilita el reprocesamiento de los mismos. La aceptación de la experiencia tal y como es junto con la exposición a emociones, pensamientos o sensaciones que anteriormente habían sido evitadas es clave para reducir el malestar (Holzel et al., 2011; Lynch et al., 2006). Al permitir la experimentación de estas emociones de forma no-evaluativa y con aceptación podrían modificarse condicionamientos previos (Lynch et al., 2006), lo que sería particularmente útil para el tratamiento de memorias traumáticas que suelen ser rechazadas por el sujeto. De esta forma se pretende promover el procesamiento emocional y la habituación a experiencias aversivas, volviéndolas menos intensas y más tolerables (Teasdale, Segal, & Williams, 1995).

A modo de conclusión, y como se ha descrito a lo largo de la introducción de esta tesis, aún quedan muchos aspectos por investigar en relación a la conceptualización y el tratamiento del TLP. Aunque el modelo biosocial de Linehan sostiene que la disregulación emocional es la característica central del TLP, los hallazgos recogidos en la literatura no son concluyentes en cuanto a las particularidades que definirían esta disregulación y por tanto, hacen falta más estudios que contribuyan a conocer la especificidad de este fenómeno.

Algo similar ocurre con la relación entre los síntomas del TLP y el mindfulness. Aunque existen estudios que exploran esta relación, la mayoría se realizaron con poblaciones no clínicas, poniendo en duda la extrapolación de estos resultados a poblaciones con TLP. Por tanto, también son necesarios más estudios que permitan conocer las características del mindfulness disposicional en poblaciones de pacientes con este trastorno.

Por otra parte, en las últimas décadas el mindfulness ha tenido un rol central en el tratamiento para el TLP, especialmente dentro del marco de la terapia dialéctica. A pesar de contar con varios estudios que comprueban la eficacia de la TDC para el TLP, existen muy pocos estudios

en los que se examina la eficacia de los componentes aislados de la terapia –como por ejemplo el mindfulness-. En base a estas consideraciones, se presentan en esta tesis 4 publicaciones que tienen como objetivo contribuir al estudio de los aspectos antes mencionados. Los primeros dos trabajos se enfocan en explorar las características de la disregulación emocional y el mindfulness en el TLP. Los otros dos estudios se focalizan en investigar la eficacia de un entrenamiento en mindfulness para reducir la sintomatología asociada al trastorno y específicamente en mejorar aspectos relacionados con la conducta impulsiva.

2. HIPÓTESIS Y OBJETIVOS

HIPÓTESIS DE TRABAJO

Estudios de caracterización (Estudios 1 y 2)

Hipótesis 1: Los pacientes con TLP presentarían una mayor intensidad basal negativa comparado con controles sanos.

Hipótesis 2: Los pacientes con TLP presentarían una mayor reactividad emocional subjetiva y objetiva ante un procedimiento de inducción de emociones discretas.

Hipótesis 3: Los pacientes con TLP presentarian una mayor reactividad emocional subjetiva y objetiva ante la inducción de estímulos complejos relacionados con características del TLP como, por ejemplo, acontecimientos traumáticos.

Hipótesis 4: Los eventos traumáticos en la infancia, los rasgos temperamentales biológicos (como el neuroticismo o la impulsividad) así como la interacción entre ambos factores se asocirían a déficits en la capacidad de mindfulness en pacientes con TLP.

Estudios de intervención (Estudios 3 y 4)

Hipótesis 5: Los pacientes que reciben un entrenamiento en mindfulness presentarían una disminución de la sintomatología característica del TLP significativamente mayor que los pacientes que realizan un entrenamiento en efectividad interpersonal.

Hipótesis 6: El entrenamiento en mindfulness modificaría las facetas disposicionales del mindfulness y la capacidad de *decentering.*

Hipótesis 7: Los pacientes que reciben un entrenamiento en mindfulness presentarían una disminución de la impulsividad, medida tanto a través de pruebas neuropsicológicas como a nivel auto-reportado, en comparación con aquellos pacientes asignados a la intervención control.

OBJETIVOS

- Comparar la intensidad emocional basal negativa entre ,sujetos con TLP y controles sanos.

- Estudiar si la reactividad emocional (subjetiva y fisiológica) ante estímulos inductores de emociones discretas (ira, miedo, asco, tristeza y alegría), difiere entre sujetos con TLP y un grupo de controles sanos.

- Estudiar si la reactividad emocional (subjetiva y fisiológica) ante estímulos de contenido vinculado a la clínica del TLP (abuso sexual, dependencia emocional y abandono), difiere entre sujetos con TLP y un grupo de controles sanos.

- Explorar la relación entre los traumas infantiles y los rasgos temperamentales patológicos con los déficits en el mindfulness disposicional de pacientes con TLP.

- Evaluar los efectos de una intervención en mindfulness sobre la sintomatología nuclear del trastorno a través de un ensayo aleatorizado comparando con una intervención activa control.

- Investigar si una intervención en mindfulness modifica la capacidad de mindfulness y de decentering en pacientes con TLP.

- Investigar el efecto del mindfulness sobre diferentes áreas de la impulsividad medidas con instrumentos subjetivos y pruebas neuropsicológicas objetivas.

3. RESULTADOS

ESTUDIO 1

Elices M, Soler J, Fernández C, Martin-Blanco A, Portella MJ, Pérez V, Álvarez E, Pascual JC. (2012). Physiological and self-assessed emotional responses to emotion-eliciting films in borderline personality disorder. *Psychiatry Research, 200*(2), 437-443.

Physiological and self-assessed emotional responses to emotion-eliciting films in borderline personality disorder

Matilde Elices [a,b], Joaquim Soler [a], Cristina Fernández [a], Ana Martín-Blanco [a], María Jesús Portella [a], Víctor Pérez [a], Enrique Álvarez [a], Juan Carlos Pascual [a,*]

[a] Department of Psychiatry, Hospital de la Santa Creu i Sant Pau, Universitat Autònoma de Barcelona (UAB), Centro de Investigación Biomédica en Red de Salud Mental, CIBERSAM, Institut d'Investigació Biomèdica- Sant Pau (IIB-SANT PAU), Avenue Sant Antoni Mᵃ Claret 167, 08025 Barcelona, Spain
[b] Programa de Cognición, Instituto de Fundamentos y Métodos en Psicología, Facultad de Psicología, Universidad de la República. Tristán Narvaja 1674, 11200, Montevideo, Uruguay

ABSTRACT

According to Linehan's biosocial model, the core characteristic of borderline personality disorder (BPD) is emotional dysregulation. In the present study, we investigated two components of this model: baseline emotional intensity and emotional reactivity. A total of 60 women, 30 with BPD diagnosis and 30 age and sex-matched healthy subjects (HCs), participated in two experiments. In the first experiment, we evaluated emotional responses to six films designed to elicit discrete emotions (anger, fear, sadness, disgust, amusement and neutral). The second experiment evaluated emotional reactions to three emotion-eliciting films containing BPD-specific content (sexual abuse, emotional dependence and abandonment/separation). Skin conductance level, heart rate, and subjective emotional response were recorded for each film. Although self-reported data indicated that negative emotions at baseline were stronger in the BPD group, physiological measures showed no differences between the groups. Physiological results should be interpreted with caution since most BPD participants were under pharmacological treatment. BPD subjects presented no subjective heightened reactivity to most of the discrete emotion-eliciting films. Subjective responses to amusement and "BPD-specific content" films revealed significant between-group differences. These findings suggest that the main characteristic of BPD might be negative emotional intensity rather than heightened emotional reactivity.

© 2012 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

According to Linehan's (1993) biosocial developmental model, emotional dysregulation is the core characteristic of Borderline Personality Disorder (BPD). Linehan hypothesized that BPD is caused by a biological vulnerability to emotion dysregulation and an invalidating environment, mainly characterized by intolerance towards the expression of emotional experiences (Crowell et al., 2009). This biological vulnerability means that individuals with BPD may present: (a) high baseline negative emotional intensity, defined as negative emotionality that is independent of the presence of actual emotional stimuli (Jacob et al., 2009); (b) high emotional reactivity to stimuli, and (c) a slow return to emotional baseline (Kuo and Linehan, 2009).

Most studies have found that patients with BPD report greater intensity of negative emotions compared to healthy controls (HC) (Rosenthal et al., 2008; Kuo and Linehan, 2009). Studies that use ambulatory monitoring techniques have found that, compared to non-patients, BPD subjects report higher unpleasant emotional intensity (Stein, 1996; Ebner-Priemer et al., 2007) and higher levels of aversive tension (Stiglmayr et al., 2005). Kuo and Linehan (2009) found that BPD patients exhibited higher baseline emotional intensity compared to a group with generalized social anxiety disorder and a healthy control group.

Linehan's hypothesis of emotional hyperreactivity in BPD patients has not been confirmed by studies performed to date, which have failed to find a heightened emotional response in these subjects (Jacob et al., 2009; Kuo and Linehan, 2009). Indeed, some studies have even reported finding hypoarousal (defined as lower skin conductance) in BPD patients (Herpertz et al., 1999, 2000). Likewise, and contrary to expectations, a study by Schmahl et al. (2004) found that BPD participants were not more physiologically reactive to traumatic and abandonment scripts; moreover, both clinical groups (BPD and post-traumatic stress disorder) showed less variation in skin conductance reaction compared to the control group. In contrast, other groups have reported that BPD patients have a stronger reaction (as measured by self-reported data) to abuse-related stimuli (Lobbestael and

---

* Corresponding author. Tel.: +34 93 553 78 40; fax: +34 93 553 78 42.
E-mail address: jpascual@santpau.es (J. Carlos Pascual).

Arntz, 2010) and a higher physiological reactivity observed as increased heart rate, a larger startle response magnitude, and a slower habituation compared with healthy controls (Ebner-Priemer et al., 2005, 2007; Lobbestael and Arntz, 2010).

Although several studies have examined emotional process in BPD subjects, most have attempted to induce broad affective states (positive or negative) (Rosenthal et al., 2008). Reactivity to discrete emotional stimuli has not been sufficiently assessed in BPD subjects. Moreover, since emotional dysregulation in BPD has been linked to negative emotional valences, the few studies that have assessed emotional response to positive emotions (Jacob et al., 2009; Staebler et al., 2009) have obtained contradictory results. The use of pharmacological treatment could certainly influence the reactivity of emotional response. However, as Rosenthal et al. (2008) have pointed out, most studies recruited BPD patients without psychotropic medication, which might increase internal validity in detriment of external validity. Given that BPD typically presents co-morbidities, particularly with mood, anxiety and substance disorders (Leichsenring et al., 2011), and most of BPD patients receive pharmacological treat-ment (Pascual et al., 2010), studies including those patients receiving naturalistic care would provide useful and relevant information on how they process emotional cues.

The present report describes the results of two experimental studies aimed at investigating two aspects of emotional dysregu-lation described in Linehan's theory of BPD: baseline emotional intensity and emotional reactivity. In the first experiment, we compared a group of BPD patients to healthy controls to evaluate emotional response to six emotion-eliciting film clips, each of which was created to elicit one of the following six discrete emotions: anger, fear, disgust, sadness, amusement, and neutral state (Fernández et al., 2011). Physiological and subjective reac-tions to each of these film clips were measured. In the second experiment, the same groups were compared to evaluate emo-tional reactions to films containing content on sexual abuse, emotional dependence, and abandonment/separation all of which are associated with clinical features of BPD. Finally, an additional issue to be tested was the effect of having previous history of sexual abuse on emotional reactions to the film with sexual abuse content.

2. Methods

2.1. Participants

A total of 60 women were recruited: 30 with a diagnosis of BPD and 30 HCs to participate in the two experiments. Because of differences in electrophysiological response between genders (Chentsova-Dutton and Tsai, 2007), we elected to recruit only females. In addition, because age can affect emotional reactivity to emotion-eliciting events (Tsai et al., 2000), only participants between 18 and 45 years were recruited. All participants were Caucasian and their native language was Spanish.

Healthy participants were recruited directly by the authors through appeals at the hospital and university. Inclusion criteria for HCs were as follows: (a) female aged between 18 and 45 years; (b) no current or past psychiatric diagnosis; (c) no current or past use of psychotropic medication; and (d) absence of BPD diagnosis according to DSM-IV criteria.

The participants with BPD were outpatients recruited at the Department of Psychiatry, Hospital de la Santa Creu i Sant Pau, Universitat Autònoma de Barcelona. Inclusion criteria for the BPD subjects were as follows: (a) female aged between 18 and 45 years; and (b) a diagnosis of BPD according to DSM-IV criteria as assessed by two semi-structured diagnostic interviews. Exclusion criteria for the BPD group consisted of: (a) acute psychotic episode, or current affective or eating disorders according to DSM-IV criteria; (b) current substance misuse dependence; and (c) severe physical conditions: heart or respiratory illness, neurological disease or brain injury. Demographic and clinical data such as previous diagnosis, history of sexual abuse, substance use, and psychotropic medication were obtained through a clinical interview led by an experienced psychiatrist. To maximize external validity and generalization of findings (even if

doing so reduced internal validity), participants with BPD were allowed to have a prior comorbid axis I diagnosis, current axis II diagnosis, psychotropic medication therapy and substance misuse (as long as dependence criteria were not met). Subjects presenting an acute psychotic episode, or mood or eating disorders were excluded to avoid the influence of affective state on emotional response (Staebler et al., 2009). The Clinical Research Ethics Committee at the Hospital de la Santa Creu i Sant Pau approved the study, which was carried out according to the Declaration of Helsinki. Participants received no retribution for participating in the study and all participants signed the informed consent form after receiving detailed information about the study protocols.

2.2. Measures

2.2.1. Screening

The Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II; Gómez-Beneyto et al.,1994) and the Revised Diagnostic Interview for Borderlines (DIB-R; Barrachina et al., 2004) were administered to screen Axis II disorders and, specifically, for BPD diagnosis. The DIB-R is a semi-structured interview that also gives a BPD severity index. Both interviews were conducted by trained psychologists.

The MSI-BPD (Zanarini et al., 2003) was used as a screening instrument for BPD in HCs. The MDI-BPD is a self-administered questionnaire composed of 10 true/false questions. An MSI-BPD cut-off of seven yields a good sensitivity and specificity, making it a good screening instrument for BPD.

2.2.2. Emotional response by self-reports measures

The validated Spanish version of the Positive and Negative Affect Schedule (PANAS; Sandín et al., 1999) was used to investigate positive and negative affect at baseline. The PANAS measures affect state through 20 items, 10 for Positive Affect (PA) and 10 for Negative Affect (NA). Participants rated the extent to which they experienced each mood on a 5-point scale, ranging from one (not at all) to five (extremely).

Self-reported emotional response was obtained using the paper and pencil version of the Self-Assessment Manikin (SAM; Bradley and Lang, 1994). The SAM evaluates three major affective dimensions: pleasure, arousal and dominance. Each subscale is represented by graphic figures on a nine-point scale. Graphic representations on the pleasure scale range from a smiling, happy figure (one) to a frowning, unhappy one (nine). For arousal, the faces range from an excited, wide-eyed (one) to a relaxed, sleepy one (nine). The dominance scale represents changes in emotional control and ranges from a tiny, submissive figure (one), to a strong, powerful figure used to indicate maximum control of emotions (nine). For each of the three dimensions, subjects were instructed to place an "X" over the figure that best represented their feelings on the nine-point scale.

The Discrete Emotions Questionnaire (DEQ) is an adapted version of the "Post Film Questionnaire" used in a study from Rottenberg et al. (2007). The questionnaire has 18 items that target various emotional states. The subject rates each term on a 7-point Likert scale, from one (not at all) to seven (extremely). We analyzed only DEQ labels that were directly associated with the discrete emotions induced: amusement, anger, disgust, fear, and sadness, although participants were allowed to rate any other emotion they may have felt during the film.

2.2.3. Physiological measures

Physiological data was recorded using the Biofeedback X-pert 2000 (Schuh-fried, Mödling, Austria) a device that has been used in previous physiological studies (Moon and Jang-Han, 2011; Busch et al., 2012). The multi sensor was attached to the distal phalange of the index finger in the non-dominant hand and fastened with a Velcro strap. The skin was cleaned up before putting the sensor in place with a disposable alcohol pad. Skin conductance level (SCL) responses were determined as changes in sweat glands activity; the range of values obtained fitted into the interval provided by the manufacturer technical specifications. Heart rate (HR) responses were derived from changes of blood volume pressure per minute. Absorbed infra-red light was collected with the multi sensor on the finger artery and HR was obtained as a result of the flow of red blood corpuscles. The obtained HR results were in agreement with standard range of the instrument. Data were transmitted via Bluetooth to the experimenter's computer.

2.3. Emotional stimuli

We used a set of emotion-eliciting film clips that had been previously validated in a Spanish sample (PIE; Fernández, et al., 2011). This set of films included some of the scenes used in other standardized sets such as the one from Gross and Levenson (1995) and Schaefer et al. (2010).

The purpose of the first experiment was to evaluate individual emotional responses to discrete emotions, for which we used film scenes designed to induce the desired six emotions: anger, fear, disgust, sadness, amusement, and neutral state. Scenes were selected based on their previously demonstrated capacity to induce differentiated discrete emotions (Fernández et al., 2011, 2012).

Table 1
Description of emotion-eliciting films.

Film title	Description	Length (min)	Emotion
Man bites Dog	The main character threats an old lady with a gun and she dies	2′	Anger
The Blair Witch Project	Final scene in which the main characters apparently are dead	3′58′′	Fear
The Champ	A boxer dies in front of his little son	1′51′′	Sadness
Trainspotting	The main character dives into a dirty toilet	1′45′′	Disgust
There is something about Mary	The main character is fighting against a tiny dog	3′	Joy
Blue	A man puts some papers in order while a woman is walking by a garden.	40′′	Neutral
The Lover	Marguerite gets into a car, gets down and knocks at a door.	46′′	Neutral
Leaving Las Vegas	The main character is raped and beaten by a group of drunken men	2′29′′	BPD specific content—sexual abuse
The Proffessional	A girl is separated of his beloved protector	2′39′′	BPD specific content—abandonment
Misery	A man is tied up to a bed and a woman breaks his legs	3′42′′	BPD specific content–emotional dependence

Since traumatic experiences such as sexual abuse, emotional dependence, neglect and abandonment have been postulated as precursors for BPD, we selected three film clips with "BPD-specific content" from the PIE for use in the second experiment. Table 1 shows a detailed description of the emotion-eliciting films used in both experiments.

2.4. Procedures and setting

To avoid fatigue effects, experiments were carried out on two different days. All subjects were required to complete both experimental sessions. The laboratory was a 10 m² room where participants viewed films on a 15 inch screen with the lights off during presentation of the stimuli. The experimenter remained in the room with the participants during the entire session.

To counterbalance order effect, film clips of the same affective valence were not shown consecutively; that is, negative valence films were alternated with positive or neutral valence films. Participants' assignation to any particular film order was random. We showed seven films in the first experiment; of these, five were designed to elicit discrete emotions while the remaining two films were neutral. Subjects were given information about the procedures to be followed and were instructed to complete self-reported questionnaires. Participants were told to answer according to their personal reaction to the film clips; they were explicitly told to differentiate between their experience during the film and their emotional state during the rest of the day. Participants were informed that their answers would be confidential, and that they could abandon the study at any time. After the subjects had received all pertinent information and signed the informed consent form, the sensor was attached. First, participants completed the PANAS to assess baseline emotional intensity. Afterwards, the following steps were repeated for each film clip and each subject: (i) baseline physiological measures were recorded for 1 min; (ii) the emotion-eliciting film was presented (with finger electrode in place for physiological monitoring); and (iii) subjects completed the self-reported questionnaires (SAM and DEQ). We established a 3 min interval between film clips to allow subjects to return to baseline levels and to minimize any carryover effect.

Procedures for the second experiment were the same as in the first, except that only three films (with BPD-related content) were shown. We reviewed instructions from the first experiment and then repeated the steps described above for each film clip.

2.5. Data analysis

Data were analyzed using the PASW Statistics 18.0 software package for Windows. All hypotheses were tested with a two-sided significance level of 0.05. To determine emotional response to neutral emotion, the mean of the two neutral film clips were used. To determine baseline differences between groups on PANAS and physiological measures, one-way ANOVAs were performed for both experiments. The effect of receiving psychotropic treatment or antidepressants could not be analyzed because most BPD patients were taking antidepressants (Table 2). To evaluate the effect of benzodiazepines (BZDs) and antipsychotics (APs) treatment on these measures, we performed two separate ANOVAs with between-subject factors with three levels (taking medication, not taking medication and healthy controls). However, results of this analysis must be interpreted with caution given the large disparity in patients numbers included in each group (8 vs. 22) (Table 2).

To analyze subjective emotional reactivity, repeated measures ANOVAs were performed. We used Greenhouse-Geisser or Huynh-Feldt adjustments depending on the results of Mauchly's sphericity test (uncorrected *df* reported). Post-hoc analyses were then performed with one-way ANOVAs. Effects of pharmacological treatment with benzodiazepines or antipsychotics on emotional responses were analyzed by means of one-way ANOVAs (between-subject factor with three levels). In the second experiment the effect of sexual abuse history was analyzed

Table 2
Clinical characteristics of Borderline Personality Disorder group ($n=30$).

	BPD	
	M	(S.D.)
Diagnostic interview for borderline—revised (DIB-R)	7.9	(1.2)
	n	(%)
Previous hospitalizations	13	(43.3)
History of self-injury	24	(80)
History of sexual abuse	8	(26.7)
Substance misuse	18	(60)
Pharmacological treatment	28	(93.3)
Antidepressant	27	(90)
Benzodiazepines	22	(73.3)
Mood stabilizers	17	(56.7)
Antipsychotics	8	(26.7)
Axis I comorbidity		
Psychotic disorder	0	(0)
Affective disorder	15	(50)
Anxiety disorder	18	(60)
Eating disorder	15	(50)
Axis II comorbidity		
Cluster A disorders	5	(16.6)
Other Cluster B disorders	4	(13.3)
Cluster C disorders	10	(33.3)

by means of one-way ANOVA (between-subject factor: abused, non-abused and HC).

3. Results

3.1. Clinical characteristics of BPD group

As shown in Table 2, the BPD sample had a moderate to severe clinical profile: 43% had been previously hospitalized and 80% had a history of self-injury. Approximately 50% of BPD patients had a past Axis I co-morbid diagnosis. Most BPD patients were receiving pharmacological treatment: nearly 90% were taking antidepressants (mainly SSRIs), 50% were taking mood stabilizers; three quarters were taking benzodiazepines and one-quarter antipsychotics. There were no significant differences in terms of age between BPD and HC groups [$M=29.9$ yrs, S.D.$=5.9$ vs. $M=26.9$ yrs, S.D.$=6.5$; $F(1.59)=3.6$, $p=0.06$].

3.2. Experiment 1: emotional responses to discrete emotion stimuli

Baseline PANAS scores showed significant differences between groups. Subjects with BPD had higher scores on the Negative Affect Scale and lower scores on the Positive Affect Scale [$F(1,53)=24.9$, $p<0.001$; $F(1,58)=8.6$, $p=0.005$, respectively;

Table 3]. Data regarding physiological activation at baseline showed no significant differences between groups. When analyzing the effect of taking benzodiazepines on SCL and on HR we did not observe a significant effect [$F(2,56)=0.84$, $p=0.44$; $F(2,56)=0.23$, $p=0.79$, respectively]. In the case of antipsychotics, no effect was observed either for SCL [$F(2,56)=0.10$, $p=0.37$] or HR [$F(2,56)=0.27$, $p=0.76$].

To investigate physiological reactivity in regard to SCL and HR, a $6 \times 2 \times 2$ (respectively: six emotions by two physiological measures by two groups) repeated-measures ANOVA was performed. No significant main effect was found. There was a significant effect of group in fear [$F(1,56)=5.1$, $p=0.029$], sadness [$F(1,56)=4.2$, $p=0.045$] and anger films [$F(1,56)=3.9$, $p=0.05$]. In post-hoc analyses, one-way ANOVAs showed that physiological differences were observed only for HR but not for SCL. Compared with HCs, individuals with BPD presented a lower increase in HR for fear [$M=18.9$, S.D.$=17.4$ vs. $M=11.2$, S.D.$=7.9$; $F(1,58)=4.7$, $p=0.034$], sadness [$M=15.9$, S.D.$=17.3$ vs. $M=8.9$, S.D.$=6.9$; $F(1,58)=4.1$, $p=0.048$] and anger films [$M=15$, S.D.$=10.7$ vs. $M=10$, S.D.$=8$; $F(1,59)=4.11$, $p=0.047$] (Fig. 1). When analyzing the effect of taking benzodiazepines or antipsychotics we did not observe an effect of psychotropic medication; no significant differences between three groups (BPD subjects who take or not psychotropics and HCs) were observed (Table 4).

For SAM scores, a $6 \times 3 \times 2$ (respectively: six emotions by three SAM subscales by two groups) repeated measures ANOVA was carried out. A significant main effect of the ANOVA analysis was observed [$F(12,208)=1.9$, $p=0.035$] but not a significant effect of group. However, univariate contrast was only significant for the disgust eliciting movie [$F(2,110)=6.4$, $p=0.004$]. One-way ANOVA showed that BPD subjects presented significantly lower scores on the dominance scale for the disgust film [$F(1,59)=5.3$, $p=0.024$].

For DEQ scores, a $6 \times 5 \times 2$ (respectively: six emotions by five DEQ emotional labels by two groups) repeated measures ANOVA was performed. A significant main effect [$F(24,751)=1.8$, $p=0.015$] was found and a significant group effect for amusement [$F(1,55)=5.8$, $p=0.019$] and disgust films [$F(1,55)=4.5$, $p=0.039$].

Post hoc analyses for the amusement film showed no significant differences between groups for DEQ amusement label score but BPD subjects presented significant higher scores on DEQ anger label [$F(1,58)=9.5$, $p=0.003$] and DEQ disgust label [$F(1,58)=6.1$, $p=0.017$] (Fig. 2). For the disgust-eliciting film, one-way ANOVA showed significant differences between groups only for the DEQ amusement label [$F(1,58)=5.2$, $p=0.027$].

3.3. Experiment 2: emotional responses to BPD-related stimuli

As in experiment 1, PANAS scores were significantly different between groups on both Negative and Positive Affect Scales [$F(1,51)=19.3$, $p < 0.001$; $F(1,54)=9.9$, $p=0.003$, respectively; see Table 3]. Baseline physiological activation was not significantly different between groups, although HR tended to be higher in the BPD group ($M=78.7$, S.D.$=14$ vs. $M=71.8$, S.D.$=13.2$; $F(1,55)=3.5$, $p=0.07$). When considering the effect of medication (i.e., taking BZDs or APs compared to not taking these medications and HC), no significant differences were found for physiological activation. Particularly, no significant differences were found for taking BZDs on SCL [$F(2,52)=0.75$, $p=0.48$] or HR [$F(2,52)=2.38$, $p=0.10$], or for taking APs on SCL [$F(2,52)=0.05$, $p=0.95$], and HR [$F(2,52)=1.91$, $p=0.16$].

Physiological reactivity was evaluated by performing a 3 (BPD-related stimuli) $\times 2$ (physiological measures) $\times 2$ (groups: BPD and HC) repeated measures ANOVA; results showed no significant effect or differences between groups.

SAM scores were analyzed by means of a 3 (BPD-related stimuli) $\times 3$ (SAM subscales) $\times 2$ (groups: BPD and HC) repeated measures ANOVA. Results showed a main effect [$F(6,206)=3.1$, $p=0.006$] and a group effect for the sexual abuse film [$F(2,106)=7.4$, $p=0.002$] and emotional-dependence film [$F(2,106)=4.3$, $p=0.02$]. In post-hoc analyses, individuals with BPD presented higher scores (compared to HCs) on the arousal subscale of the SAM for the sexual-abuse related film ($M=7.4$, S.D.$=1.9$ vs. $M=5.5$, S.D.$=2$; $F(1,55)=12.5$, $p=0.001$) and emotional dependence film ($M=7.6$, S.D.$=1.7$ vs. $M=6.3$, S.D.$=1.4$; $F(1,54)=9.6$, $p=0.003$).

Table 3
PANAS baseline scores for borderline personality disorder subjects and healthy controls in both experiments.

|	1st **Experiment**			2nd **Experiment**		
	BPD	HC		BPD	HC	
	M (S.D.)	*M* (S.D.)	*p*	*M* (S.D.)	*M* (S.D.)	*p*
Negative affect	7.8 (6.4)	1.5 (1.7)	$p < 0.001$	8.6 (8.5)	1.3 (1.7)	$p < 0.001$
Positive affect	14.2 (7.6)	19.2 (4.9)	$p=0.005$	11.9 (7.6)	17.3 (4.9)	$p=0.003$
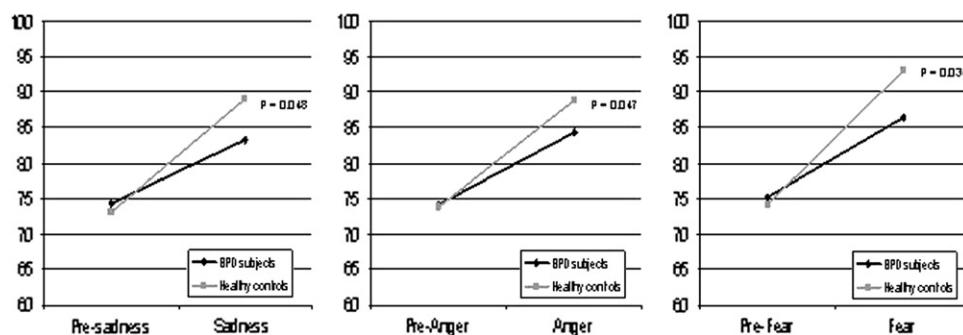
Fig. 1. Differences between subjects with Borderline Personality Disorder and healthy controls on heart rate increase during sadness, anger and fear elicitation.

Table 4
Effect of benzodiazepines and antipsychotics on heart rate in fear, anger, and sadness emotion-eliciting films.

	HC	BPD with BZDs	BPD without BZDs	F (df)	p	HC	BPD with APs	BPD without APs	F (df)	p
	M (S.D.)	M (S.D.)	M (S.D.)			M (S.D.)	M (S.D.)	M (S.D.)		
Fear	18.9 (17.4)	11.4 (7.8)	11.7 (8.9)	2.1 (2.56)	0.13	18.9 (17.4)	12.4 (11.2)	11.0 (6.5)	2.1 (2.55)	0.13
Sadness	15.9 (17.3)	9.2 (7.7)	8.8 (4.5)	1.8 (2.55)	0.16	15.9 (17.3)	8.5 (5.6)	9.4 (7.6)	1.8 (2.55)	0.16
Anger	15.0 (10.7)	10.7 (8.6)	9.3 (5.9)	1.8 (2.56)	0.17	15.0 (10.7)	13.1 (12.8)	9.3 (5.2)	2.2 (2.56)	0.12

HR=Heart Rate, HC=Healthy Controls, BPD=Borderline Personality Disorder, BZDs=Benzodiazepines, and APs=Antipsychotics.
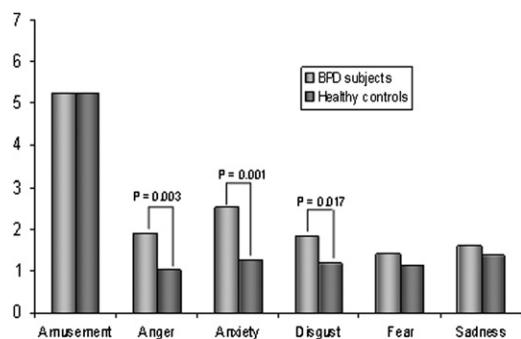

Fig. 2. Differences between subjects with Borderline Personality Disorder and healthy controls on subjective response on DEQ for amusement film.

For DEQ scores a $3 \times 5 \times 2$ (respectively: three BPD-related stimuli by five DEQ labels by two groups) repeated measures ANOVA was performed. Results showed a main effect [$F(12,602) = 2.1$, $p = 0.016$] and a group effect for the sexual abuse [$F(1,51) = 21.3$, $p < 0.001$] and emotional dependence films [$F(1,51) = 13.2$, $p = 0.001$]. For the sexual abuse film, post-hoc analyses showed that BPD subjects presented significantly higher scores for the anger [$F(1,54) = 5.4$, $p = 0.024$], disgust [$F(1,54) = 10.2$, $p = 0.002$], fear [$F(1,54) = 20.1$, $p < 0.001$] and sadness [$F(1,54) = 5.9$, $p = 0.019$] labels of the DEQ (Fig. 3a). For the emotional dependence film, post-hoc analyses showed significant differences in disgust [$F(1,53) = 4.8$, $p = 0.034$], fear [$F(1,53) = 9.3$, $p = 0.004$] and sadness [$F(1,53) = 7.6$, $p = 0.008$] labels of the DEQ (Fig. 3b).

Regarding the effect of past history of sexual abuse, there was a significant group effect for the SAM arousal subscale [BPD with sexual abuse $M = 7.8$, S.D. $= 1.6$; BPD without sexual abuse $M = 7.2$, S.D. $= 2.1$; HCs $M = 5.5$, S.D. $= 2$; $F(2,54) = 5.9$, $p = 0.005$], in which HC differed from the two groups of BPD patients, but no differences were detected between abused and non-abused patients. For DEQ scores, an effect of history of sexual abuse was only observed for the fear label [BPD with sexual abuse $M = 4.2$, S.D. $= 2.5$; BPD without sexual abuse $M = 1.7$, S.D. $= 1.2$; HCs $M = 2.2$, S.D. $= 1.2$; $F(2,53) = 4.2$, $p = 0.02$], where BPD subjects with a history of sexual abuse presented significantly higher scores compared to BPD patients without a history of sexual abuse and HCs.

4. Discussion

This study aimed to investigate two components of Linehan's (1993) biosocial model in subjects with BPD: (1) baseline emotional intensity and (2) emotional reactivity in a naturalistic sample of BPD subjects. Our results, suggest that BPD patients under pharmacological treatment present a heightened baseline negative emotional intensity but not a heightened emotional reactivity to discrete emotion stimuli. These findings partially support Linehan's theory. Physiological data showed that the increase in heart rate in response to films designed to elicit fear,
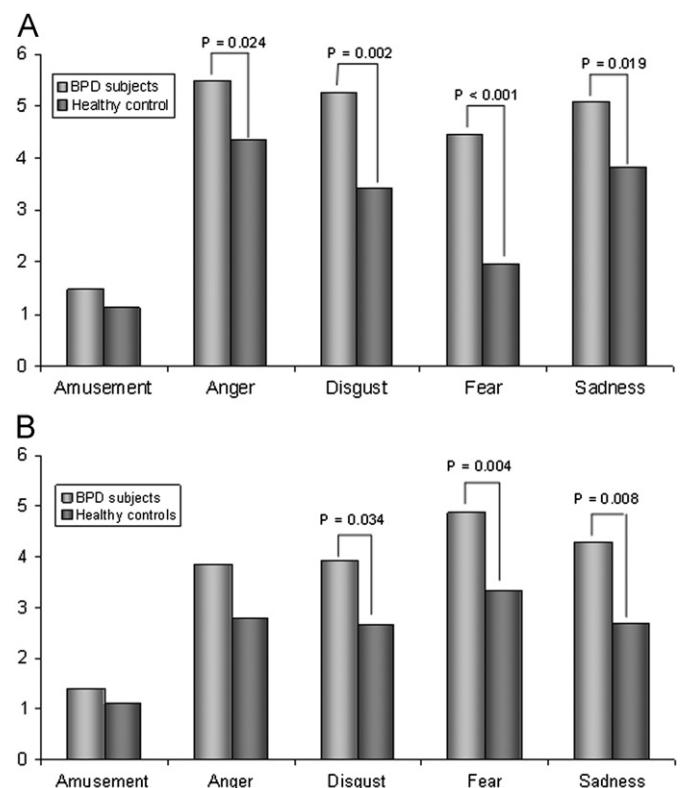

Fig. 3. Differences between subjects with Borderline Personality Disorder and healthy controls on DEQ scores for stimuli related to: (a) sexual abuse, and (b) emotional dependence.

anger and sadness was significantly lower in BPD subjects. However, with BPD-related stimuli (sexual abuse, emotional dependence scenes) we found a heightened subjective reactivity in the BPD group.

As expected, the self-reported assessment showed higher negative baseline emotional intensity in the BPD group. These findings are in line with previous studies (Levine et al., 1997; Ebner-Priemer et al., 2007; Jacob et al., 2009; Kuo and Linehan, 2009) and support one of the theoretical assumptions proposed by Linehan. This is a relevant finding because it provides further evidence that BPD is mostly characterized by a strong negative affect (Rosenthal et al., 2005; Jacob et al., 2009). Nevertheless, physiological data showed no significant differences between groups at baseline. Our results are consistent with those of Herpertz et al. (1999, 2000), although the physiological results differ from those of Kuo and Linehan (2009), especially with regards to SCL. Discrepancies may be due to methodological differences between the studies. In addition, although a priori we might expect that subjective emotional state and physiological data would correlate, previous studies have reported conflicting or inconclusive results (Mauss and Robinson, 2009).

We did not find a generalized heightened reactivity in the BPD group, a result that is unexpected in terms of Linehan's theoretical model. In fact, in terms of physiological measures, the BPD group presented a significantly lower HR increase in fear, anger and sadness-inducing films. Previous research has described both increased and reduced autonomic nervous system (ANS) activity in BPD patients (Herpertz et al., 1999, 2000; Austin et al., 2007; Kuo and Linehan, 2009). There are several possible explanations for the hypo-reactivity of the ANS in BPD. For instance, a lack of sympathetic activation has been previously related to poorer emotion regulation and could be linked to the typical emotion dysregulation of BPD (Stifter et al., 2011). However, since HR is controlled by both sympathetic and parasympathetic innervations, we cannot ensure that our findings were not influenced by a deficient sympathetic regulation. More accurate and better-differentiated measures of the sympathetic and parasympathetic systems would be needed to evaluate this. Recent research highlights the importance of accounting for the mediated role of PTSD and dissociation in physiological response. Limberg et al. (2011) recently studied emotional reactivity in relation to imaginary scripts in BPD patients with and without comorbid PTSD. Patients with both BPD and PTSD diagnosis showed an attenuated reactivity (reduce startle response magnitude) in response to abandonment and rejection stimuli, which the authors attribute to learned helplessness (Limberg et al., 2011). In our study, however, although we do know which patients were sexually abused during childhood, we lack a structured PTSD diagnosis. Moreover, we do not know if this traumatic event occurred only once or was ongoing during childhood. In any case, it is interesting to note that our sample has the same pattern of response as that reported by other authors who evaluated BPD samples with comorbid PTSD (McTeague et al., 2010; Limberg et al., 2011). Moreover, Barnow et al. (2012) measured dissociation states in BPD females while presenting emotional and neutral stimuli; results suggested that present dissociation mediated differences in physiological measures (lower SCL and startle response) between both groups (BPD and HC). A more detailed assessment of posttraumatic and dissociation symptomatology would be useful to determine if hyporeactivity is related to these symptoms. Impulsiveness is another clinical feature of BPD and it also has been associated to hypoarousal in psychopathic subjects (Raine, 1996). Finally, psychotropic medication might alter physiological responses as for instance heart rate. In this regard, Ikawa et al. (2001) reported that the combination of psychotropic medication affected heart rate due to anticholinergic effects and parasympathetic activity. In addition, a stronger vagolytic effect on cardiac autonomic function, probably due to a sympatholytic effect with antidepressants has been showed (Yeragani et al., 2002). In spite of this, we did not find differences between patients taking or not taking benzodiazepines or antipsychotics, although the majority of patients had been taking psychotropic drugs.

Self-reported data for negative valence films showed no hyperreactivity in BPD subjects, findings which corroborate those reported by Kuo and Linehan (2009). In contrast, however, we found significant differences between groups in subjective response to positive stimuli. Scores of BPD subjects on the DEQ amusement label were similar to healthy controls whereas anger and disgust scores were significantly higher than HCs. A similar response has been reported by Jacob et al. (2009), who found no differences between groups to joy-inducing stimuli even as BPD individuals reported higher levels of anxiety and sadness. As other authors have hypothesized, one possible explanation is that BPD subjects present a bias towards experiencing negative emotions (Herpertz et al., 2000, 2001; Reisch et al., 2008). Another explanation might be that the negative emotions that appear together with amusement in BPD patients are the result of posterior

cognitive processing. As Greenberg (2002) and Linehan (1993) proposed, in a given emotional situation, it may be possible to distinguish between a primary emotional reaction, usually more related to natural context, and other emotions that have been learned through previous conditioning experiences or cognitive processing. These learned emotional reactions could be the result of past traumatic experiences that lead to non-adaptive reactions. The emergence of negative conditioned emotions triggered by positive feelings can be mediated by the "self-invalidation" described in BPD patients (i.e., feeling guilty for having felt joy) (Linehan, 1993). Further research on BPD and positive emotions is needed to interpret this result accurately.

Our findings have shown that subjects with BPD present a higher subjective emotional reactivity in response to BPD-specific content stimuli. Previous studies have shown that BPD subjects possess a differentiated emotional reaction to stimuli related to abandonment, rejection, anger, self-harm and lack of empathy (Korfine and Hooley, 2000; Schmahl et al., 2004; Lobbestael and Arntz, 2010). In response to sexual abuse stimuli, we found that subjects with BPD presented higher arousal, anger, fear, disgust and sadness scores. Lobbestael and Arntz (2010) also reported higher self-assessed reactivity to abuse stimuli. In terms of physiological data, our results differ from Schmahl et al. (2004) and Lobbestael and Arntz (2010), who found higher physiological activation in BPD. Differences between results might be explained by the type of emotional stimuli, for example, Schmahl et al. (2004) used personally-relevant scripts, which, due to the auto-biographic component, may be more powerful emotional inductors. Sample characteristics may also influence the results, since it is expected that this type of stimuli may have a greater impact on patients with traumatic experiences. Lobbestael and Arntz (2010) reported a significant correlation between response and severity of abuse. Our results also showed that personal history had a partial influence on response to sexual abuse-related stimuli, with BPD subjects who had a history of sexual abuse presenting higher fear scores. Future studies could investigate the relationship between severity of childhood trauma and reactivity to traumatic experience stimuli.

A number of limitations of this study need to be considered. The fact that our sample was polymedicated call into question whether the physiological differences in emotional responses are attributable to the effect of medication or to the combination of suffering from BPD and being medicated. Therefore, our findings could not be extrapolated to all BPD subjects. We excluded subjects experiencing an acute episode because their affective state might have influenced the emotional response (Staebler et al., 2009). Secondly, the lack of a structured assessment of PTSD and dissociative symptoms during the experimental task does not allow us to consider their influence in emotional response, as other authors have pointed out previously (McTeague et al., 2010; Limberg et al., 2011; Barnow et al., 2012). Third, we realize that the use of additional physiological parameters, such as respiratory sinus arrhythmia (RSA) to estimate vagal tone, would have been useful in the analysis of physiological emotional reactions. Lastly, some characteristics of the procedure have to be taken into account. Some aspects, such as screen size, volume of the films, or the presence of the experimenter during the task might have affected the results. The same is true regarding the type of stimuli and the balancing strategy used. If we had fused both experiments into a single experiment by alternating discrete-emotions stimuli with BPD-related stimuli, the results might have been different. Differences between our study and others (i.e., methodology and self-reported and physiological measures) limit the ability to generalize our findings.

To conclude, our findings have both theoretical and clinical implications. Although BPD subjects have traditionally been

conceptualized as "more reactive" patients, stronger emotional reactivity may not actually be a hallmark of BPD. In fact, negative emotional intensity might well be the main characteristic of patients with BPD. That said, reactivity does seem to be important for BPD-specific emotional triggers related to traumatic personal history. Given the specific characteristics of our sample, this conclusion may not be generalized for BPD patients who do not take psychotropic medication or without comorbidities. From a psychotherapeutic perspective, the evidence suggests that treatments should be focused on developing tools to help patients to manage negative emotionality rather than to diminish emotional reactivity. Treatment should also take into account the influence of childhood trauma on emotional reactivity so as to integrate the confrontation with traumatic experiences in the treatment of BPD.

Acknowledgments

References

Austin, M.A., Todd, C.R., Porges, S.W., 2007. Borderline personality disorder and emotion regulation: insights from the polyvagal theory. Brain and Cognition 65 (1), 69–76.

Barnow, S., Limberg, A., Stopsack, M., Spitzer, C., Grabe, H.J., Freyberger, H.J., Hamm, A.O., 2012. Dissociation and emotion regulation in borderline personality disorder. Psychological Medicine 42, 783–794.

Barrachina, J., Soler, J., Campins, M.J., Tejero, A., Pascual, J.C., Alvarez, E., Zanarini, M.C., Pérez Sola, V., 2004. Validation of a Spanish version of the diagnostic interview for borderlines revised (DIB-R). Actas Españolas de Psiquiatría 32, 293–298.

Bradley, M.M., Lang, P.J., 1994. Measuring emotion: the self-assessment manikin and the semantic differential. Journal of Behavior Therapy and Experimental Psychiatry 25, 49–59.

Busch, V., Magerl, W., Kern, U., Haas, J., Hajak, G., Eichhammer, P., 2012. The effect of deep and slow breathing on pain, perception, autonomic activity, and mood processing: an Experimental Study. Pain Medicine 13, 215–228.

Chentsova-Dutton, Y.E., Tsai, J.L., 2007. Gender differences in emotional response among European Americans and Hmong Americans. Cognition and Emotion 21 (1), 162–181.

Crowell, S.E., Beauchaine, T.P., Linehan, M.M., 2009. A biosocial developmental model of borderline personality: elaborating and extending Linehan's theory. Psychological Bulletin 135, 495–510.

Ebner-Priemer, W.U., Badeck, S., Beckmann, C., Wagner, A., Feige, B., Weiss, I., Lieb, K., Bohus, M., 2005. Affective dysregulation and dissociative experience in female patients with borderline personality disorder: a startle response study. Journal of Psychiatric Research 39, 85–92.

Ebner-Priemer, U.W., Shaw-Welch, S., Grossman, P., Reisch, T., Linehan, M.M., Bohus, M., 2007. Psychophysiological ambulatory assessment of affective dysregulation in borderline personality disorder. Psychiatry Research 150, 265–275.

Fernández, C., Pascual, J.C., Soler, J., Fernández-Abascal, E., 2011. Spanish validation of an emotion-eliciting set of films. Psicothema 23, 778–785.

Fernández, C., Pascual, J.C., Soler, J., Elices, M., Portella, M.J., Fernández-Abascal, E., 2012. Physiological responses induced by emotion-eliciting films. Applied Psychophysiology and Biofeedback 37 (2), 73–79.

Gómez-Beneyto, M., Villar, M., Renovell, M., Pérez, F., Hernández, M., Leal, C., Cuquerella, M., Slok, C., Asencio, A., 1994. The diagnosis of personality disorder with a modified version of the SCID-II in a Spanish clinical sample. Journal of Personality Disorders 8, 104–110.

Greenberg, L.S., 2002. Emotion-Focused Therapy: Coaching Clients to Work Through Their Feelings. APA Press, Washington, DC.

Gross, J.J., Levenson, R.W., 1995. Emotion elicitation using films. Cognition and Emotion 9, 87–108.

Herpertz, S., Kunert, H., Schwenger, U., Sass, H., 1999. Affective responsiveness in borderline personality disorder: a psychophysiological approach. American Journal of Psychiatry 156, 1550–1556.

Herpertz, S., Schwenger, U., Kunert, H., Lukas, G., Gretzer, U., Nutzmann, J., Schuerkens, A., Sass, H., 2000. Emotional responses in patients with borderline as compared with avoidant personality disorder. Journal of Personality Disorders 14, 339–351.

Herpertz, S., Werth, U., Lucas, G., Qunaibi, M., Schuerkens, A., Kunert, H., Freese, R., Flesch, M., Mueller-Isberner, R., Osterheider, M., Sass, H., 2001. Emotion in criminal offenders with psychopathy and borderline personality disorders. Archives of General Psychiatry 58, 737–745.

Ikawa, M., Tabuse, H., Ueno, S., Urano, T., Sekiya, M., Murakami, T., 2001. Effects of combination psychotropic drug treatment on heart rate variability in psychiatric patients. Psychiatry and Clinical Neurosciences 55 (4), 341–345.

Jacob, G.A., Hellstern, K., Ower, N., Pillmann, M., Scheel, C.N., Rüsch, N., Lieb, K., 2009. Emotional reactions to standardized stimuli in women with borderline personality disorder: stronger negative affect, but no differences in reactivity. The Journal of Nervous and Mental Disease 197 (11), 808–815.

Korfine, L., Hooley, J.M., 2000. Directed forgetting of emotional stimuli in borderline personality disorder. Journal of Abnormal Psychology 109, 214–221.

Kuo, J.R., Linehan, M.M., 2009. Disentangling emotion processes in borderline personality disorder: physiological and self reported assessment of biological vulnerability, baseline intensity, and reactivity to emotionally evocative stimuli. Journal of Abnormal Psychology 118 (3), 531–544.

Leichsenring, F., Leibing, E., Kruse, J., New, A.S., Leweke, F., 2011. Borderline personality disorder. The Lancet 377, 74–84.

Levine, D., Marziali, E., Hood, J., 1997. Emotion processing in borderline personality disorders. Journal of Nervous and Mental Disease 185, 240–246.

Limberg, A., Barnow, S., Freyberger, H.J., Hamm, A.O., 2011. Emotional vulnerability in borderline personality disorder is cue specific and modulated by traumatization. Biological Psychiatry 69 (6), 574–582.

Linehan, M., 1993. Cognitive-Behavioral Treatment for Borderline Personality Disorder; the Dialectics of Effective Treatment. The Guilford Press, New York.

Lobbestael, J., Arntz, A., 2010. Emotional, cognitive and physiological correlates of abuse-related stress in borderline and antisocial personality disorder. Behaviour Research and Therapy 48, 116–124.

Mauss, I.B., Robinson, M.D., 2009. Measures of emotion: a review. Cognition and Emotion 23 (2), 209–237.

McTeague, L.M., Lang, P.J., Laplante, M.C., Cuthbert, B.N., Shumen, J.R., Bradley, M.M., 2010. Aversive imagery in posttraumatic stress disorder: trauma recurrence, comorbidity, and physiological reactivity. Biological Psychiatry 67 (4), 346–356.

Moon, J., Jang-Han, L., 2011. Predicting cigarette-seeking behavior: how reward sensitivity and positive emotions influence nicotine cravings. Social Behavior and Personality 39 (6), 737–746.

Pascual, J.C., Martín-Blanco, A., Soler, J., Ferrer, A., Tiana, T., Alvarez, E., Pérez, V., 2010. A naturalistic study of changes in pharmacological prescription for borderline personality disorder in clinical practice: from APA to NICE guidelines. International Clinical Psychopharmacology 25 (6), 349–355.

Raine, A., 1996. Autonomic nervous system factors underlying disinhibited, antisocial, and violent behavior. Annals of the New York Academy of Sciences 794, 46–59.

Reisch, T., Ebner-Priemer, U.W., Tschacher, W., Bohus, M., Linehan, M.M., 2008. Sequences of emotions in patients with borderline personality disorder. Acta Psychiatrica Scandinavica 118, 42–44.

Rosenthal, M.Z., Cheavens, J.S., Lejuez, C.W., Lynch, T.R., 2005. Thought suppression mediates the relationship between negative affect and borderline personality disorder symptoms. Behaviour Research and Therapy 43, 1173–1185.

Rosenthal, M.Z., Gratz, K.L., Kosson, D.S., Cheavens, J.S., Lejuez, C.W., Lynch, T.R., 2008. Borderline personality disorder and emotional responding: a review of the research literature. Clinical Psychology Review 28, 75–91.

Rottenberg, J., Ray, R.D., Gross, J.J., 2007. Emotion elicitation using films. In: Coan, J.A., Allen, J.J.B. (Eds.), Handbook of Emotion Elicitation and Assessment. Oxford University Press, New York, NY, pp. 9–28.

Sandín, B., Chorot, P., Lostao, L., Joiner, T.E., Santed, M.A., Valiente, R.M., 1999. Escalas Panas de Afecto Positivo y Negativo: Validación factorial y convergencia transcultural. Psicothema 11 (1), 37–51.

Schaefer, A., Nils, F., Sanchez, X., Philippot, P., 2010. Assessing the effectiveness of a large database of emotion-eliciting films: a new tool for emotion researchers. Cognition and Emotion 24 (7), 1153–1172.

Schmahl, C., Elzinga, B., Ebner, U., Simms, T., Sanislow, C., Vermetten, E., McGlashan, T.H., Bremner, D.J., 2004. Psychophysiological reactivity to traumatic and abandonment scripts in borderline personality and posttraumatic stress disorders: a preliminary report. Psychiatry Research 126, 33–42.

Staebler, K., Gebhard, R., Barnett, W., Renneberg, B., 2009. Emotional responses in borderline personality disorder and depression: assessment during an acute crisis and 8 month later. Journal of Behavior Therapy and Experimental Psychiatry 40, 85–97.

Stein, K.F., 1996. Affect instability in adults with a borderline personality disorder. Archives of Psychiatric Nursing 10, 32–40.

Stifter, C.A., Dollar, J.M., Cipriano, E.A., 2011. Temperament and emotion regulation: the role of autonomic nervous system reactivity. Developmental Psychobiology 53 (3), 266–279.

Stiglmayr, C.E., Grathwol, T., Linehan, M.M., Ihorst, G., Fahrenberg, J., Bohus, M., 2005. Aversive tension in patients with borderline personality disorder: a computerbased. Acta Psychiatrica Scandinavica 111, 372–379.

Tsai, J.L., Levenson, R.W., Carstensen, L.L., 2000. Autonomic, subjective, and expressive responses to emotional films in older and younger Chinese Americans and European Americans. Psychology and Aging 15 (4), 684–693.

Yeragani, V.K., Pesce, V., Jayaraman, A., Roose, S., 2002. Major depression with ischemic heart disease: effects of paroxetine and nortriptyline on long-term heart rate variability measures. Biological Psychiatry 52 (5), 418–429.

Zanarini, M.C., Vujanovic, A.A., Prachini, E.A., Boulager, J.L., Frankenburg, F.R., Hennen, J., 2003. A screening measure for BPD: the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD). Journal of Personality Disorders 17 (6), 568–573.

ESTUDIO 2

Elices M, Pascual JC, Carmona C, Martin-Blanco A, Feliu-Soler A, Ruiz E, Gomà Freixanet M, Pérez V, Soler J. (2015). Exploring the relation between childhood trauma, temperamental traits and mindfulness in borderline personality disorder. *BMC Psychiatry, 15*(1), 180-187.

BMC
Psychiatry

RESEARCH ARTICLE

Open Access

CrossMark

Exploring the relation between childhood trauma, temperamental traits and mindfulness in borderline personality disorder

Matilde Elices[1,2,3,4], Juan C. Pascual[1,2,3], Cristina Carmona[1,3], Ana Martín-Blanco[1,2,3], Albert Feliu-Soler[1,2], Elisabet Ruiz[1], Montserrat Gomà-i-Freixanet[5], Víctor Pérez[1,2,3] and Joaquim Soler[1,2,5*]

Abstract

Background: Deficits in mindfulness-related capacities have been described in borderline personality disorder (BPD). However, little research has been conducted to explore which factors could explain these deficits. This study assesses the relationship between temperamental traits and childhood maltreatment with mindfulness in BPD.

Methods: A total of 100 individuals diagnosed with BPD participated in the study. Childhood maltreatment was assessed using the Childhood Trauma Questionnaire (CTQ-SF), temperamental traits were assessed using the Zuckerman-Khulman Personality Questionnaire (ZKPQ), and mindfulness capabilities were evaluated with the Five Facet Mindfulness Questionnaire (FFMQ).

Results: Hierarchical regression analyses were performed including only those CTQ-SF and ZKPQ subscales that showed simultaneous significant correlations with mindfulness facets. Results indicated that neuroticism and sexual abuse were predictors of *acting with awareness*; and neuroticism, impulsiveness and sexual abuse were significant predictors of *non-judging*. Temperamental traits did not have a moderator effect on the relationship between childhood sexual abuse and mindfulness facets.

Conclusions: These results provide preliminary evidence for the effects of temperamental traits and childhood trauma on mindfulness capabilities in BPD individuals. Further studies are needed to better clarify the impact of childhood traumatic experiences on mindfulness capabilities and to determine the causal relations between these variables.

Keywords: Borderline personality disorder, Mindfulness, Childhood maltreatment, Temperament

Background

Borderline personality disorder (BPD) is a severe psychiatric condition marked by a pervasive pattern of emotional dysregulation, impulsive behaviour, identity disturbances and interpersonal conflicts [1]. Previous publications have established that the transaction between biological temperamental predispositions and environmental factors contribute to the development of the disorder [2–4]. BPD has been described as an extreme and maladaptive variant of normal temperamental dimensions [1, 5, 6] such as neuroticism, impulsiveness and aggression- hostility [1, 7]. In parallel, other studies have revealed that certain contextual factors such as adverse childhood experiences are also related to BPD symptoms and its severity [8, 9]. Retrospective studies have found high rates of early traumatic experiences in BPD, comprising 30 to 90 % of BPD cases and including sexual, physical and emotional abuse [10, 11]. Traumatic experiences and neuroticism are also independent predictors of BPD severity [9]. However, it seems that the interaction between these factors (i.e. neuroticism and adverse childhood experiences) is even more complex, as it contributes not only to the severity [8] but also to the development of the disorder [12].

* Correspondence: jsolerri@santpau.cat
[1]Servei de Psiquiatria, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain
[2]Institut d'Investigació Biomèdica - Sant Pau (IIB-Sant Pau), Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Madrid, Spain
Full list of author information is available at the end of the article

Elices *et al. BMC Psychiatry* (2015) 15:180

Page 2 of 7

In recent years, psychological treatments that include mindfulness training have been increasingly used to treat individuals with BPD with and without a history of early trauma [13–15]. Moreover, it has been suggested that improvements in the patient's mindfulness capacities are a common factor associated with the success of evidence-based therapies for BPD [16]. Mindfulness can be described as a particular way to pay attention to the present moment, in an inquiring and accepting manner, without judging or reacting to the experience [17]. The construct of mindfulness encompasses several facets [18, 19]: (1) the capacity to *observe* and notice the current experience; (2) the ability to *describe* the experience (i.e., putting into words or labelling the experience), (3) a non-judgemental and non-evaluative stance (i.e., *non-judging*), (4) *non-reactivity* to inner experience (i.e., allowing thoughts and feelings to come without getting caught up in them) and (5) *acting with awareness* (i.e., focusing on the present activity instead of behaving mechanically). The inclusion of mindfulness practices in BPD treatment is based on the idea that individuals with BPD have a deficit in certain important mindfulness capabilities and that this deficit is associated with symptoms of the disorder [20, 21]. Indeed, subjects with BPD display low levels of mindfulness compared to healthy controls and other clinical populations [22–24]. In addition, studies conducted by Wupperman and colleagues [25, 26] suggest an inverse relation between mindfulness and core characteristics of BPD, including neuroticism.

To date, research on the relationship between personality traits and the facets of mindfulness has mainly been conducted in non-clinical samples. Strong, inverse correlations between neuroticism and mindfulness [26] and between impulsivity and two facets of mindfulness (*acting with awareness* and *non-judging*) have been reported [27]. However, the influence of life-events on mindfulness capabilities has not been sufficiently explored. An exception to this is the study carried out by Michal et al. [28], in which a significant and negative correlation was found in a non-clinical population between emotional maltreatment and mindful attention and awareness. The inverse relation between certain mindfulness facets and the severity of post traumatic stress disorder (PTSD) symptoms also suggest an association between traumatic experiences and deficits in mindfulness capabilities [29–31].

Given the context described above, in this study we explore the association between temperamental traits, childhood maltreatment, and deficits in mindfulness capacities in a sample of BPD individuals. Since temperamental traits, especially neuroticism, appear to be moderators of the relationship between childhood maltreatment and psychopathology [12] as well as between childhood maltreatment and BPD severity [8], we also explored the role of temperamental traits as moderators of the association between childhood maltreatment and mindfulness. Based on the literature [27, 28], we hypothesized that some temperamental traits (specifically, neuroticism and impulsiveness) would be negatively associated with mindfulness. We also expected to find neuroticism to have a moderating effect on the association between childhood trauma and mindfulness. Research on the association between mindfulness and diverse childhood maltreatment experiences is scant. Therefore, no *a priori* hypotheses regarding the possible link between specific facets of mindfulness and different types of traumatic experiences were made.

Method

Participants

A total of 133 participants were recruited from the outpatient BPD unit at the Department of Psychiatry of the Hospital de la Santa Creu i Sant Pau (Barcelona, Spain). Only data from participants meeting the inclusion criteria were analysed, resulting in a final sample of 100 participants. Inclusion criteria were as follows: (1) diagnosis of BPD according to DSM-IV criteria [32] confirmed by two structured clinical interviews: Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II) [33] and Revised Diagnostic Interview for Borderlines (DIB-R) [34]; (2) age between 18 and 45 years; (3) no current co-morbidity with major depression, bipolar disorder, psychotic disorders, or substance dependence; (4) no severe physical conditions or intellectual disability; and (5) no previous training in mindfulness.

Instruments

Diagnostic measures

To ensure an accurate BPD diagnosis, the Spanish versions of two semi-structured clinical interviews were used. The SCID-II [33] was used to assess personality disorders according to DSM-IV criteria [32]. The SCID-II has shown adequate psychometric properties, including good reliability between interviewers (kappa: 0.85). The DIB-R [34] is a semi-structured interview to establish BPD diagnosis over the last 2 years. The cut-off point of the Spanish version is six (range: 0 to 10). Psychometric properties are good: internal consistency (Cronbach's alpha = 0.89), sensitivity (0.81), and specificity (0.94). The convergent validity with the diagnosis of the SCID-II is moderate (kappa: 0.59).

Self-report questionnaires

To assess adverse childhood experiences the Childhood Trauma Questionnaire – Short Form (CTQ-SF) [35] was administered. The CTQ-SF contains 28 items and retrospectively assesses childhood abuse and neglect across

Elices *et al. BMC Psychiatry* (2015) 15:180

Page 3 of 7

five subscales described as follows: (a) sexual abuse: sexual contact or conduct between a child under 18 years of age and an adult or older person, (b) physical abuse: bodily assaults on a child by an adult or older person that entail a risk of, or resulted in, injury, (c) emotional abuse: verbal assaults, humiliating or demeaning behaviour directed toward a child by an adult or older person, (d) physical neglect: the failure of caretakers to provide for a child's basic physical needs (food, shelter, clothing, safety, and health care), (e) emotional neglect: failure of caretakers to meet children's basic emotional and psychological needs, including love, belonging, support and nurture. Items are rated on a 5-point Likert Scale from "never true" to "very often true". For each sub-scale a cut-off point is provided in order to identify moderate – severe cases [36]. Across four diverse samples, all sub-scales have shown a good internal consistency (Cronbach's alpha): sexual abuse (0.92 to 0.95), physical abuse (0.81 to 0.86), emotional abuse (0.84 to 0.89), physical neglect (0.61 to 0.78) an emotional neglect (0.85 to 0.91) [35].

Temperamental traits were evaluated with the Zuckerman–Kuhlman Personality Questionnaire (ZKPQ) [37], a self-administered 99 item scale (true/false format) based on the Alternative Five Factor Model. The ZKPQ includes five temperamental traits from a psychobiological perspective: Neuroticism–Anxiety (*N-Anx*), Impulsive–Sensation Seeking (*ImpSS*), Aggression–Hostility (*Agg-Host*), Activity (*Act*), and Sociability (*Sy*). Additionally, an infrequency scale is provided to assess inattention to the questionnaire. The Spanish version has shown good psychometric properties, including good internal consistency (Cronbach's alpha ranging from 0.77 to 0.91), as well as satisfactory convergent, discriminant, and consensual validity [37].

The Five Facet Mindfulness Questionnaire (FFMQ) [38] was used as a mindfulness measure. The FFMQ is a 39-item questionnaire that evaluates mindfulness in five facets: (1) *observing* (noticing or attending to external and internal experiences -e.g., body sensations, thoughts or emotions-), (2) *describing* (putting words to, or labelling the internal experience), (3) *acting with awareness* (i.e., focusing on the present activity instead of behaving mechanically), (4) *non-judging* the inner experience (i.e., taking a non-evaluative stance towards thoughts or emotions), and (5) *non-reactivity* to inner experience. Participants are asked to rate the degree of concordance with each statement on a five point-likert scale ranging from one (never or very rarely true) to five (very often or always true). Cronbach's alpha from the Spanish version ranges from 0.80 to 0.91 [39].

Procedure
Study participants were evaluated at our unit during the years 2013 and 2014. As part of our routine assessment, diagnostic interviews were administered in two different sessions. After BPD diagnosis was confirmed, patients were invited to participate in the study. Prior to inclusion, all subjects signed an informed consent in which the study was explained and after that, completed self-report questionnaires. No remuneration (monetary or otherwise) was given for participation. The study was approved by the Ethical Research Committee at the Hospital de la Santa Creu i Sant Pau.

Data Analysis
Descriptive statistics were used to describe the socio-demographic and clinical characteristics of the sample. Pearson correlation analyses were carried out between childhood maltreatment (CTQ-SF) and mindfulness facets (FFMQ); and between personality traits (ZKPQ) and mindfulness facets (FFMQ).

Multiple hierarchical regression analyses were used to determine the single and interactive effects of childhood trauma and temperamental variables on mindfulness facets. Associations between demographic variables (age, gender, and education level) and dispositional mindfulness were also studied by means of Pearson correlations and Student's *t*-test to identify potential covariates for inclusion in the regression models. To create interaction terms and to account for multicolinearity, variables were mean-centred [39]. FFMQ subscales were entered as the dependent variable; temperamental traits (ZKPQ subscales) were entered in step 1, CTQ-SF subscales were included in step 2, and interaction terms (temperamental trait × type of abuse) in step 3.

Results
Demographic and clinical characteristics of the sample
The majority of participants were women (88 %), with an average age of 30.46 years (SD = 6.84). The mean DIB-R score suggest that the severity of BPD was high (M = 7.74, SD = 1.48). On the CTQ-SF subscales, the frequency of severe forms of childhood maltreatment was as follows: severe emotional abuse (63 %); severe emotional neglect (51 %); severe sexual abuse (45 %); severe physical neglect (35 %); and severe physical abuse (20 %). Additional demographic and clinical characteristics are presented in Table 1.

Correlations between childhood trauma and temperamental traits with mindfulness facets
Zero-order associations among childhood trauma (CTQ-SF), temperamental traits (ZKPQ), and mindfulness facets (FFMQ) are shown in Table 2. Negative associations were found between sexual abuse and *acting with awareness* (r = −.25, p = .03), and *non-judging* (r = −.27, p = .01). No other significant correlations were found

Elices *et al. BMC Psychiatry* (2015) 15:180

Page 4 of 7

Table 1 Demographic and descriptive characteristics of the sample

	Mean	(SD)
Gender (% of females)	88	
Age (years)	30.46	(6.84)
Marital status - married or cohabitating (%)	39	
Years of education	11.95	(3.32)
Currently employed (%)	34	
DIB-R total score	7.74	(1.48)
Childhood Trauma Questionnaire – Short Form (%)		
Severe Emotional Abuse	63	
Severe Sexual Abuse	45	
Severe Physical Abuse	20	
Severe Emotional Neglect	51	
Severe Physical Neglect	35	
Zuckerman-Kuhlman Personality Questionnaire		
Neuroticism-anxiety (N-Anx)	16.00	(3.50)
Impulsive-sensation seeking (ImpSS)	10.72	(5.30)
Aggression-hostility (Agg-Host)	9.91	(4.10)
Activity (Act)	7.35	(3.62)
Sociability (Sy)	6.00	(4.12)
Five Facet Mindfulness Questionnaire		
Observe	24.00	(8.05)
Describe	23.15	(8.00)
Acting with awareness	20.00	(8.20)
Non-Judge	18.73	(7.57)
Non-React	15.57	(6.66)

between the other CTQ-SF subscales and mindfulness facets.

N-Anx correlated significantly and inversely with several mindfulness facets: *acting with awareness* ($r = -.49$, $p = <.001$), *non-judging* ($r = -.53$, $p < .001=$), and *non-reactivity* ($r = -.23$, $p = <.001$). In addition, significant but weaker correlations were found between *ImpSS* and *non-judging* ($r = -.27$, $p = .01$).

Predictive effect of childhood trauma and temperamental traits on mindfulness facets

Given that no associations were found between demographic variables (age, gender, and education level) and any of the mindfulness facets, these variables were not included in the regression models. Moreover, since our primary interest was to study the effects of both childhood maltreatment and personality variables on mindfulness capacity, regression analyses included only those CTQ-SF and ZKPQ subscales that showed simultaneous significant Pearson correlations ($p < .05$) with mindfulness. The first model included *non-judging* as the dependent variable, *N-Anx* and *ImpSS* in step 1, sexual abuse in step 2, and interaction terms (*N-Anx* × sexual abuse and *ImpSS* × sexual abuse) in step 3. Temperamental traits, *N-Anx* and *ImpSS*, were significant predictors of *non-judging*, explaining 32 % of variance. When sexual abuse was added to the model, this increased the percentage of explained variance to 35 %. Interaction effects did not attain significance in the model. The second model included *acting with awareness* as the dependent variable, *N-Anx* in step 1, sexual abuse in step 2, and the interaction term (*N-Anx* × sexual abuse) in step 3. *N-Anx* and sexual abuse were significant predictors of acting with

Table 2 Associations between childhood trauma, temperamental traits and mindfulness facets

	FFMQ				
	Observing	Describing	Acting with Awareness	Non-Judging	Non- Reactivity
CTQ – SF subscales					
Emotional Abuse	.16	−.01	−.05	−.10	−.03
Physical Abuse	.17	.00	.06	−.06	−.06
Sexual Abuse	−.03	.09	−.25*	−.27*	−.10
Emotional Neglect	.89	−.08	.01	.07	.11
Physical Neglect	.17	.04	−.08	−.17	.02
ZKPQ subscales					
ImpSS	.15	−.07	−.19	−.27**	−.05
N-Anx	.03	−.17	−.49**	−.53**	−.23*
Agg-Host	−.11	−.01	−.01	−.04	.03
Act	.20	.06	.00	−.11	.07
Sy	.12	.11	.01	−.00	.13

CTQ-SF Childhood Trauma Questionnaire – Short Form, *ZKPQ* Zuckerman Kuhlman Personality Questionnaire, *ImpSS* impulsive-sensation seeking, *N-Anx* neuroticism-anxiety, *Agg-Host* aggression-hostility, *Act* activity, *Sy* sociability, *FFMQ* Five Facet Mindfulness Questionnaire
*$p < .05$; **$p < .01$

Elices *et al. BMC Psychiatry* (2015) 15:180

Page 5 of 7

awareness, explaining 27 % of the variance. No significant effect of the interaction between *N-Anx* and sexual abuse was found. Results of the regression analyses are shown in Table 3.

Discussion

The present study sought to investigate the association between temperamental traits, different types of childhood trauma, and various facets of mindfulness in a sample BPD patients. Our results indicate that there is a significant and negative association between *N-Anx* and several mindfulness facets: *acting with awareness, non-judging* and *non-reactivity* and between impulsiveness and *non-judging*. Additionally, five different types of childhood maltreatment were assessed, but only sexual abuse appears to be related with mindfulness deficits, having a negative impact on *acting with awareness* and increasing the judgmental stance towards inner and outer experiences. Based on our findings, it appears that temperamental traits might not play a role in moderating the relationship between a history of sexual abuse and mindfulness deficits. Overall, the present study indicates that temperamental traits might have a greater impact on mindfulness capacities than early traumatic experiences in BPD patients.

As suggested by previous work, our results indicate that neuroticism and impulsivity have a significant and negative association with mindfulness facets [20, 27, 28, 40]. However to the best of our knowledge, ours is the first study to test these associations in a BPD sample. *N-Anx* was a significant predictor of *acting with awareness* and, together with *ImpSS*, it was also a significant predictor of *non-judging*, indicating that higher scores on these traits are related to greater difficulties in being present-oriented and comprise a more judgemental and evaluative stance towards the experiences, consistent with BPD characteristics [21, 41].

In congruence with a previous study [42], it seems that having a history of childhood sexual abuse compromises the ability to *act with awareness*. Awareness difficulties can be explained by the presence of trauma-related thoughts and memories. In fact, a study involving adult sexual abuse survivors who underwent mindfulness treatment reported a decrease in re-experiencing and avoidance of numbing symptoms and an increase in mindfulness attention and awareness, suggesting a possible relationship between these two aspects [42]. Our results also indicate an association between judgemental information processing and sexual abuse. However, and considering that a history of sexual abuse only increased the explained variance in the regression analyses by a small amount, it seems that –at least in our sample- the impact of temperamental traits on mindfulness capacity is stronger than the influence of sexual abuse. In any case, the association between mindfulness facets and sexual abuse highlights the relevance of addressing mindfulness deficits during the treatment of BPD patients with traumatic histories [13, 14, 43]. Some interventional approaches combine exposure techniques (targeting direct experience processing and fostering awareness of the present experience) with mindfulness practice (to increase acceptance and diminish judgemental stances) [13, 43], and -in light of the present results- this approach would seem to be relevant to the treatment of trauma. Our findings suggest that not all types of childhood maltreatment are related to mindfulness facets in subjects with BPD. Even though sexual abuse may entail more severe and far-reaching consequences for BPD patients than other forms of abuse [11], the lack of a significant association in our study between other types of maltreatment and mindfulness facets was unexpected. Nevertheless, other studies [30, 31, 44] have found negative associations between mindfulness and PTSD symptoms and one study reported an inverse association between emotional maltreatment and awareness [28]. This difference between our study and others may be due to methodological or patient sample differences; however, further research in larger samples will be needed

Table 3 Hierarchical multiple regression analyses predicting FFMQ facets: non-judging (column A) and acting with awareness (column B)

		A Non-Judging							B Acting with awareness				
		B	B se	β	R^2	ΔR^2			B	B se	β	R^2	ΔR^2
	Predictor							Predictor					
Step 1	N-Anx	−.95	.19	−.45***	.32	.33***	Step 1	N-Anx	−1.07	.22	−.47***	.24	.25***
	ImpSS	−.44	.16	−.25**									
Step 2	Sexual abuse	−.29	.13	−.19*	.35	.03*	Step 2	Sexual abuse	−.31	.16	−.19*	.27	.03*
Step 3	Sexual abuse x N-Anx	−.09	.07	−.15	.35	.02	Step 3	Sexual abuse x N-Anx	−.00	.08	−.00	.25	.00
	Sexual abuse x ImpSS	.01	.03	.04									

R^2 = Adjusted R^2
ImpSS impulsive-sensation seeking, *N-Anx* neuroticism-anxiety
*p < .05, **p < .01,***p < .001

Elices *et al. BMC Psychiatry* (2015) 15:180

Page 6 of 7

to better assess the relationship between childhood maltreatment and mindfulness facets.

Considering previous research on the moderating role of neuroticism in the psychopathology and BPD severity [8, 12], we hypothesized that temperamental traits would play a role in moderating the relationship between traumatic experiences and mindfulness. Unexpectedly, we did not find any moderating effect of temperamental traits on *acting with awareness* or *non-judging*.

The present results should be interpreted in the context of the study limitations. The most important limitation is the cross-sectional design, which prevents us from reaching any conclusion about the direction of the associations. Second, the use of self-report measures to assess the variables (particularly childhood trauma) could have biased the results. Third, a comparison between the BPD group and other clinical populations would have been valuable to determine if the associations found in this study are specific to BPD or not.

Conclusions

Our results provide preliminary evidence demonstrating an association between certain temperamental traits and childhood experiences with mindfulness in a sample of individuals with BPD. It seems that, in individuals with BPD, mindfulness deficits may be more closely associated with high levels of neuroticism and impulsivity rather than early traumatic experiences. Although these findings should be taken with caution, it appears that mindfulness-based interventions could offer a valuable approach to treating emotionally-dysregulated individuals with a history of trauma. This approach might not only increase acceptance, but may also offer a possible pathway to increase awareness while decreasing avoidance symptoms. More research is needed to clarify the relationship between early traumatic experiences and mindfulness, as well as to determine the mechanism underlying the efficacy of mindfulness-based treatments for individuals with a history of traumatic experiences.

Authors' contributions
JS and JCP conceived and planned the study, and provide supervision with the data analysis and interpretation. ME and CC analyzed the data and wrote the manuscript. AMB, AFS and ER distributed questionnaires, as well as commented on the last versions of the manuscript together with VP. MGF reviewed the final version of the manuscript and contributed to the interpretation of findings. All authors read and approved the final manuscript.

Author details
[1]Servei de Psiquiatria, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain. [2]Institut d'Investigació Biomèdica - Sant Pau (IIB-Sant Pau), Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Madrid, Spain. [3]Departament de Psiquiatria i Medicina Legal, Universitat Autònoma de Barcelona, Barcelona, Spain. [4]Programa de Cognición. Instituto de Fundamentos y Métodos en Psicología. Facultad de Psicología, Universidad de la República, Montevideo, Uruguay. [5]Departament de Psicologia Clínica i de la Salut, Universitat Autònoma de Barcelona, Barcelona, Spain.

References
1. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Washington, DC. American Psychiatric Publishing; 2013.
2. Beauchaine TP, Klein DN, Crowell SE, Derbidge CM, Gatzke-Kopp L. Multifinality in the development of personality disorders: a biology × sex × environment interaction model of antisocial and borderline traits. Dev Psychopathol. 2009;21(3):735–70.
3. Crowell SE, Beauchaine TP, Linehan MM. A biosocial developmental model of borderline personality: Elaborating and extending Linehan's theory. Psychol Bull. 2009;135(3):495–510.
4. Linehan MM. Cognitive-behavioral treatment of borderline personality disorder. New York: Guilford Press; 1993.
5. Samuel D, Carroll KM, Rounsaville BJ, Ball S. Personality disorders as maladaptive, extreme variants of normal personality: borderline personality disorder and neuroticism in a substance using sample. J Personal Disord. 2013;27(5):625–35.
6. Trull TJ, Widiger TA, Lynam DR, Costa PT. Borderline personality disorder from the perspective of general personality functioning. J Abnorm Psychol. 2003;112(2):193–202.
7. Gomà-i-Freixanet M, Soler J, Valero S, Pascual JC, Perez-Sola V. Discriminant validity of the ZKPQ in a sample meeting BPD diagnosis vs. normal-range controls. J Personal Disord. 2008;22(2):178–90.
8. Martín-Blanco A, Soler J, Villalta L, Feliu-Soler A, Elices M, Pérez V, et al. Exploring the interaction between childhood maltreatment and temperamental traits on the severity of borderline personality disorder. Compr Psychiatry. 2014;55(2):311–8.
9. Zanarini MC, Frankenburg FR, Hennen J, Reich DB, Silk KR. Prediction of the 10-year course of borderline personality disorder. Am J Psychiatry. 2006;163(5):827–32.
10. Battle CL, Shea MT, Johnson DM, Yen S, Zlotnick C, Zanarini MC, et al. Childhood maltreatment associated with adult personality disorders: findings from the Collaborative Longitudinal Personality Disorders Study. J Personal Disord. 2004;18(2):193–211.
11. Lobbestael J, Arntz A, Bernstein DP. Disentangling the relationship between different types of childhood maltreatment and personality disorders. J Personal Disord. 2010;24(3):285–95.
12. Laporte L, Paris J, Guttman H, Russell J. Psychopathology, childhood trauma, and personality traits in patients with borderline personality disorder and their sisters. J Personal Disord. 2011;25:448–62.
13. Bohus M, Dyer A, Priebe K, Krüeger A, Kleindienst N, Schmahl C, et al. Dialectical Behaviour Therapy for Post-traumatic Stress Disorder after Childhood Sexual Abuse in Patients with and without Borderline Personality Disorder: A Randomised Controlled Trial. Psychother Psychosom. 2013;82:221–33.
14. Harned MS, Korslund KE, Linehan MM. A pilot randomized controlled trial of Dialectical Behavior Therapy with and without the Dialectical Behavior Therapy Prolonged Exposure protocol for suicidal and self-injuring women with borderline personality disorder and PTSD. Behav Res Ther. 2014;55:7–17.
15. Stoffers J, Völlm BA, Rücker G, Timmer A, Huband N, Lieb K. Psychological therapies for people with borderline personality disorder (Review). *Cochrane Database of Systematic Reviews*. John Wiley & Sons; 2012.
16. Bliss S, McCardle M. An Exploration of Common Elements in Dialectical Behavior Therapy, Mentalization Based Treatment and Transference Focused

Elices *et al. BMC Psychiatry* (2015) 15:180

Page 7 of 7

Psychotherapy in the Treatment of Borderline Personality Disorder. Clin Soc Work J. 2013;42(1):61–9.

17. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness. New York: Delacorte; 1990.

18. Baer RA, Smith GT, Hopkins J, Krietemeyer J, Toney L. Using self-report assessment methods to explore facets of mindfulness. Assessment. 2006;13(1):27–45.

19. Dimidjian S, Linehan MM. Defining an Agenda for Future Research on the Clinical Application of Mindfulness Practice. Am Psychol Assoc. 2003;10:166–71.

20. Linehan MM. *Skills training manual for treating borderline personality disorder*. Guilford Press; 1993.

21. Linehan MM. DBT Skills Training Manual. 2nd ed. New York: Guilford Press; 2014.

22. Fossati A, Vigorelli Porro F, Maffei C, Borroni S. Are the DSM-IV personality disorders related to mindfulness? An Italian study on clinical participants. J Clin Psychol. 2012;68(6):672–83.

23. Soler J, Franquesa A, Feliu-Soler A, Cebolla A, Garcia-Campayo J, Tejedor R, et al. Assesing decentering: Validation, psychometric properities and clinical usefulness of the Experiences Questionnaire in a Spanish sample. Behav Ther. 2014;45(6):863–71.

24. Wupperman P, Neumann CS, Axelrod SR. Do deficits in mindfulness underlie borderline personality features and core difficulties? J Personal Disord. 2008;22(5):466–82.

25. Wupperman P, Neumann CS, Whitman JB, Axelrod SR. The role of mindfulness in borderline personality disorder features. J Nerv Ment Dis. 2009;197(10):766–71.

26. Giluk TL. Mindfulness, Big Five personality, and affect: A meta-analysis. Personal Individ Differ. 2009;47(8):805–11.

27. Peters JR, Erisman SM, Upton BT, Baer R, Roemer L. A preliminary Investigation of the Relationships Between Dispositional Mindfulness and Impulsivity. Mindfulness. 2011;2(4):228–35.

28. Michal M, Beutel ME, Jordan J, Zimmermann M, Wolters S, Heidenreich T. Depersonalization, mindfulness, and childhood trauma. J Nerv Ment Dis. 2007;195(8):693–6.

29. Bernstein A, Tanay G, Vujanovic AA. Concurrent Relations Between Mindful Attention and Awareness and Psychopathology Among Trauma-Exposed Adults: Preliminary Evidence of Transdiagnostic Resilience. J Cogn Psychother. 2011;25(2):99–113.

30. Garland EL, Roberts-Lewis A. Differential roles of thought suppression and dispositional mindfulness in posttraumatic stress symptoms and craving. Addict Behav. 2013;38(2):1555–62.

31. Vujanovic AA, Youngwirth NE, Johnson KA, Zvolensky MJ. Mindfulness-based acceptance and posttraumatic stress symptoms among trauma-exposed adults without axis I psychopathology. J Anxiety Disord. 2009;23(2):297–303.

32. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-IV-TR). 4th ed. Washington: American Psychiatric Association; 2000.

33. Gómez-Beneyto M, Villar M, Renovell M, Pérez M, Herández M, Leal C. The diagnosis of personality disorder with a modified version of the SCID-II in a Spanish clinical sample. J Personal Disord. 1994;8:104–10.

34. Barrachina J, Soler J, Campins MJ, Tejero A, Pascual JC, Alvarez E, et al. Validation of a Spanish version of the Diagnostic Interview for Bordelines-Revised (DIB-R). Actas Esp Psiquiatr. 2004;32(5):293–8.

35. Bernstein DP, Stein J, Newcomb M, Walker E, Pogge D, Ahluvalia T. Development and validation of a brief screening version of the Childhood Trauma Questionnaire. Child Abuse Negl. 2003;27:169–90.

36. Bernstein DP, Fink. *Childhood Trauma Questionnaire. A retrospective self-report*. San Antonio: The Psychological Corporation; 1998.

37. Gomà-i-Freixanet M, Valero S, Puntí J, Zuckerman M. Psychometric Properties of the Zuckerman-Kuhlman Personality Questionnaire in a Spanish Sample. Eur J Psychol Assess. 2004;20(2):134–46.

38. Cebolla A, Garcia Palacios A, Soler J, Guillén V, Baños R, Botella C. Psychometric properties of the Spanish validation of the Five Facets of Mindfulness Questionnaire (FFMQ). Eur J Psychiatry. 2012;26(2):118–26.

39. Aiken LS, West SG. *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA. Sage; 1991.

40. Thompson BL, Waltz J. Everyday mindfulness and mindfulness meditation: Overlapping constructs or not? Personal Individ Differ. 2007;43(7):1875–85.

41. Peters JR, Eisenlohr-moul TA, Upton BT, Baer RA. Nonjudgment as a moderator of the relationship between present-centered awareness and borderline features : Synergistic interactions in mindfulness assessment. Personal Individ Differ. 2013;55(1):24–8.

42. Kimbrough E, Magyari T, Langenberg P, Chesney M, Berman B. Mindfulness Intervention for Child Abuse Survivors. J Clin Pscych. 2010;66(1):17–33.

43. Steil R, Dyer A, Priebe K, Kleindienst N, Bohus M. Dialectical Behavior Therapy for Posttraumatic Stress Disorder Related to Childhood Sexual Abuse : A Pilot Study of an Intensive Residential Treatment Program. J Trauma Stress. 2011;24(1):102–6.

44. Tyler Boden M, Bernstein A, Walser RD, Bui L, Alvarez J, Bonn-Miller MO. Changes in facets of mindfulness and posttraumatic stress disorder treatment outcome. Psychiatry Res. 2012;200(2–3):609–13.

ESTUDIO 3

Elices M, Pascual JC, Portella MJ, Feliu-Soler A, Martin-Blanco A, Carmona C, Soler J. Impact of mindfulness training on borderline personality disorder: A pilot randomized trial. Mindfulness (In Press).

Impact of mindfulness training on borderline personality disorder: A randomized trial

Matilde Elices [a,b,c,d] Juan C Pascual [a,b,c] Maria J Portella [a,b,c] Albert Feliu-Soler [a,b,c] Ana Martín-Blanco [a,b,c] Cristina Carmona [a,b,c] Joaquim Soler [a,b,e]*

(a) Servei de Psiquiatria. Hospital de la Santa Creu i Sant Pau (Barcelona).
(b) Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM). Institut d'Investigació Biomèdica - Sant Pau (IIB-Sant Pau).
(c) Departament de Psiquiatria i Medicina Legal. Universitat Autònoma de Barcelona.
(d) Programa de Cognición. Instituto de Fundamentos y Métodos en Psicología. Facultad de Psicología, Universidad de la República, Uruguay.
(e) Departament de Psicologia Clínica i de la Salut. Universitat Autònoma de Barcelona.

Abstract. Recent research suggests that deficits in the ability to be mindful may be related to core aspects of borderline personality disorder (BPD). Mindfulness plays a central role in BPD treatment and evidence also indicates that mindfulness is the most commonly practiced of the skills taught in Dialectical Behavior Therapy (DBT). The present study investigated whether a 10-week mindfulness-training program would improve BPD symptoms and mindfulness-related capacities in a sample of individuals diagnosed with BPD. A total of 64 participants (mean age = 31.64, SD = 6.9; 86% female) were randomized to 10 weeks of mindfulness (n = 32) or interpersonal effectiveness skills training (control group; n = 32). BPD symptoms and mindfulness capacities were measured at pre- and post-intervention. Compared to the control group, participants assigned to mindfulness experienced a significantly greater reduction and increase, respectively, in BPD symptoms and decentering capacity. Treatment response rates (in reference to BPD symptoms) were higher for the mindfulness group (40% vs. 13%). Interpersonal effectiveness alone did not result in improvements on any outcome measures. These findings suggest that mindfulness training may be a useful approach to decreasing BPD symptoms while simultaneously improving mindfulness capacities.

Introduction

Borderline Personality Disorder (BPD) is a severe psychiatric condition, characterized by a pervasive pattern of emotional dysregulation, impulsivity, interpersonal conflicts and unstable identity (American Psychiatric Association, 2013; Leichsenring, Leibing, Kruse, New, & Leweke, 2011). Individuals with BPD are likely to fulfill diagnostic criteria for other psychiatric disorders (Leichsenring et al., 2011; Lieb, Zanarini, Schmahl, Linehan, & Bohus, 2004), and are also likely to be frequent users of mental

health systems (Bender et al., 2001), and to have difficulties engaging with treatments (Stoffers et al., 2012).

Dialectical Behavior Therapy (DBT) is the only treatment with sufficient replication to be considered an evidence-based treatment for this disorder (Stoffers et al., 2012). DBT is a multifaceted therapeutic approach (involving individual therapy, group skills training, telephone coaching, and a consultation team for therapists), thus making it a long and expensive treatment. For these reasons, standard DBT is difficult to implement in some clinical settings and thus all the components of the standard intervention are rarely used. Instead, skills training is often used as a stand-alone treatment, without concurrent individual therapy (Soler et al., 2009; Valentine, Bankoff, Poulin, Reidler, & Pantalone, 2015). A recent dismantling study carried out by Linehan et al. (2015) concluded that skills training appears to be a central component to the effectiveness of DBT. Skills training consists of 4 modules (i.e., mindfulness, emotion regulation, distress tolerance, and interpersonal effectiveness) that target specific areas of dysregulation (Linehan, 1993b). The aim of interpersonal effectiveness and emotion regulation skills is to change maladaptive behaviors and emotional responses, while the aim of the other two modules - mindfulness and distress tolerance- is to foster acceptance (Linehan, 2014). Several studies have shown that mindfulness and distress tolerance are the two DBT skills most commonly practiced by patients, indicating a preference for acceptance-oriented versus change-oriented skills (Lindenboim, Comtois, & Linehan, 2007; Stepp, Epler, Jahng, & Trull, 2008).

Among the various skills taught in DBT, mindfulness has been defined as a "core skill" (Linehan, 1993b), thus

giving it a primary role in DBT. Indeed, mindfulness is among the first skills to be taught, and two sessions of mindfulness are repeated between every other module (Linehan, 1993b, 2014). Most definitions state that mindfulness entails a present-centered awareness combined with an attitude of acceptance and openness, which is opposite to the tendency of judging and evaluating the experience (Kabat-Zinn, 1990; Linehan, 2014). From the DBT perspective, the general aim of mindfulness training is to acquire a state of participation with awareness (Linehan, 2014). For that purpose, different skill sets, labeled "what" and "how" skills, are taught (Linehan, 1993b, 2014). "What" skills are oriented towards training patients in "what" to do when practicing mindfulness (i.e. observe, describe and participate), while the "how" skills focus on the attitudinal component of the practice (i.e. taking a nonjudgmental stance, focusing on one thing in a particular moment, and being effective). Jointly, these skills guide participants on how to handle undesirable, painful events or emotions without trying to change or avoid them. Patients are thus trained in the ability to step back and observe these events in a detached manner, thus fostering decentering and ultimately, increasing emotion regulation.

In parallel, research has shown that core BPD symptoms –including emotion dysregulation, impulsivity and interpersonal problems– are related to deficits in mindfulness skills, and these insufficiencies may underlie the clinical manifestations of the disorder (Peters, Eisenlohr-moul, Upton, & Baer, 2013; Wupperman, Fickling, Klemanski, Berking, & Whitman, 2013; Wupperman, Neumann, & Axelrod, 2008; Wupperman, Neumann, Whitman, & Axelrod, 2009). In contrast to healthy controls, individuals with BPD have been shown to have deficits

in present-centered awareness and acceptance, together with an elevated tendency to be judgmental towards the inner experience (Linehan, 2014; Peters et al., 2013; Wupperman et al., 2009). BPD is also characterized by a lack of decentering (Soler et al., 2014), defined as the ability to observe one's thoughts and feelings in a non-attached manner (Fresco et al., 2007).

Taken together, the evidence described above suggests that mindfulness could be an efficacious approach to treating BPD. However, evidence for the efficacy of mindfulness-based interventions for BPD is still scarce and existing studies on mindfulness interventions for BPD present important methodological shortcomings, including small non-randomized samples, comparison of interventions with uneven doses or formats, and the use of non-specific BPD outcome measures (Feliu-Soler et al., 2014; Sachse, Keville, & Feigenbaum, 2011; Soler et al., 2012). As a result, it is not possible to raise any definitive conclusions with regards to the true efficacy of mindfulness in BPD. Therefore, studies evaluating mindfulness as an isolated ingredient are strongly needed.

On this basis, this study was designed to evaluate the effects of a stand-alone mindfulness intervention on borderline symptoms and mindfulness-related capacities in patients with BPD. To do so, mindfulness was compared to interpersonal effectiveness (IE) skills training as the control intervention. IE was selected as the control condition for several reasons: 1) to contrast mindfulness training with another psychological intervention rather than a non-active comparison (e.g., waiting list); 2) to control nonspecific factors, such as treatment dose (the same number of treatment hours was used in both therapies) and group effect (both interventions were delivered as group

therapy, with 8 patients per group); and 3) to compare a change-oriented module (IE) with an acceptance-oriented one (M) to assure minimal overlap of therapeutic content. The main aim was to determine whether patients allocated to the mindfulness group would show better outcomes in overall BPD symptomatology than patients allocated to IE. A second objective was to explore the effects of mindfulness and IE training on mindfulness-related capacities.

Method

Participants

Participants were recruited from the outpatient BPD Unit at the Department of Psychiatry at the Hospital de la Santa Creu i Sant Pau (Barcelona, Spain). A total of 92 participants were referred to assess eligibility and 28 were excluded (19 did not meet inclusion criteria and 9 declined to participate). Thus, a total of 64 participants were included. Given the sample size of 32 and an expected drop out rate of 30%, the study had a power of 65%, with the level of significance set at 5% to detect a moderate effect (d = .6). Eligibility criteria included: 1) BPD criteria according to two diagnostic interviews: the Structured Clinical Interview for DSM-IV-TR Axis II disorders (SCID-II; Gibbon & Spitzer, 1997; Gómez-Beneyto et al., 1994) and the Diagnostic Interview for Borderlines Revised (DIB-R; Barrachina et al., 2004; Zanarini, Gunderson, Frankenburg, & Chauncey, 1989) and 2) age 18 - 45 years, inclusive. Exclusion criteria were: (1) lifetime diagnosis of schizophrenia, drug-induced psychosis, organic brain syndrome, bipolar disorder or mental retardation, (2) participation in any psychotherapy during the study or having received DBT in the past, (3) having meditation/yoga experience

(having attended > one session/class in the past). Participants with comorbid Axis I and Axis II disorders were allowed to participate in the study. Patients were allowed to continue taking any medications prescribed prior to study inclusion, provided that no modifications of the medication type or dose were made during the 10-week intervention period.

Figure 1 shows the study flow chart, including reasons for exclusion and dropouts.

Procedure

This was a single-center, randomized trial including 64 patients allocated to one of two treatment arms: mindfulness training, and interpersonal effectiveness training. Randomized allocation was performed with the online Research Randomizer (www.randomizer.org/form.htm), a program that generate 16 sets of 4 numbers each (ranging from 1 to 2 for M and IE, respectively). To obtain the same sample size in each treatment arm, allocation had to be perfectly balanced every four sets. Each group comprised 8 individuals corresponding to 4 consecutive sets of randomization. The research unit coordinator (not blind to treatment condition) was responsible for the randomization process. Study enrolment took place from December 2011 to January 2014. A trained psychiatrist and two psychologists familiar with screening interviews, who were blind to treatment arms, conducted diagnostic interviews. The interviewers presented a high inter-rater reliability (within-class correlation: .94). Baseline assessments were conducted a maximum of 1 week before treatment initiation and post-treatment assessments within 1 week of completing the 10-week intervention. Participants completed assessments in the presence of a psychologist from our

unit. Informed consent was obtained from all individual participants included in the study. No financial payments were made for study participation. The study was approved by the ethics committee of the Hospital de la Santa Creu i Sant Pau and carried out in accordance with the Declaration of Helsinki.

Interventions. Participants met once a week in groups of 8 for 10 consecutive weeks, with each session 150 min in duration. Sessions for both intervention modalities (i.e., M and IE) followed the same structure. Sessions began with the review of home-based tasks, each participant was asked to comment on her/his practice and difficulties during the week and therapists provided corrective feedback and reinforcement (60 min). Homework completion in both groups was tracked with recording sheets (diary card). In the second part of the session, a new skill was presented with step-by-step instructions on how to use/perform it (60 min). Metaphors, discussions, and in vivo role-plays were used to ensure that participants had understood the rationale for the skill and how to use it. Sessions ended with homework assignments (30 min), which consisted of practicing during the week the skills presented in each session.

Mindfulness. Mindfulness training preserved the essence of mindfulness skills taught in DBT, embracing the dialectical basis of the treatment, treatment strategies and targets. For the specific aim of this study, mindfulness skills were taught in 10 consecutive weeks and formal mindfulness practices were encouraged and reinforced.

Mindfulness training consisted in learning "what" skills (i.e., observe, describe, participate) and "how" skills (i.e., taking a non-judgmental stance,

focusing on one thing in the moment, and being effective). To foster these skills, participants were instructed to practice both formal and informal mindfulness (Linehan, 1993b, 2003, 2004). Considering that formal practice may be especially challenging for BPD patients (Dimidjian & Linehan, 2003), participants were free to choose the length of each formal practice. However, the following instruction was given: "once you decide to finish the exercise, continue to practicing it for at least one more minute, even if it is uncomfortable" (Soler et al., 2012). Participants received a CD with all formal meditations. Each session started with a review of the homework (50 min). Thereafter, a new mindfulness skill was introduced and practiced in session (80 min) and the session ended with homework assignment (20 min). Session 1 started by giving an orientation to skills training and explaining the biosocial theory for BPD, then an overview of the mindfulness module was given. In session 2, the mindfulness "wise mind" skill was presented. The goal of this skill is to help participants to find a synthesis between "emotion mind" and "reasonable mind", with the former characterized by the predominance of emotional states and mood-dependent thinking and behavior whereas the latter is characterized by intellectual knowledge, logical thinking, and a practical and "cool" approach to problems. When activating "wise mind" participants are able to break extreme patterns of behavior, cognition and emotional responses guided by "emotion mind" or "reasonable mind", by adding to "emotion mind" and "reasonable mind" an intuitive knowing (Linehan, 2014). Thereafter (between sessions 3 and 6, both included), "what skills" and "how skills" were presented as vehicles to achieve "wise mind". "What" skills are about what to do: (1)

observe (i.e., noting and attending to the ongoing experience), (2) describe (i.e., applying verbal labels to what has been observed, including events, thought, emotions, bodily sensations) and (3) participate fully in the current moment. The first two skills are essential skills for learning a new behavior and to constrain mood-dependent tendencies. Once a new behavior is learned, one can "participate" fully in the experience while being aware of it. The other three skills (i.e., "how" skills) instruct the patients how to observe, describe and participate: (1) in a non-judgmental manner, (2) focusing on one thing at a time and (3) being effective (i.e., focusing on doing what is needed in a particular situation, rather than focusing on being "right"). To practice both "what" and "how" skills, patients were instructed in several formal and informal mindfulness practices (see Table 1). Sessions 7, 8 and 9 focused on practicing acceptance-oriented skills, a core component of mindfulness practice itself (Bishop, 2004; Linehan, 2014). Acceptance skills were taken from the distress tolerance module to reinforce the attitudinal component of mindfulness practice. The objective of session 10 was to summarize the treatment content and motivate patients to continue practicing at home.

Interpersonal effectiveness. As in mindfulness training, IE skills training also sought to preserve the essence of DBT, following its treatment strategies and targets. Session 1 began with an overview of the skills training and the biosocial theory for BPD. After that, an overview of the IE module was given, stressing the overall aim of IE skills training: to increase the patient's repertoire of effective social behavior. Session 2 was dedicated to clarifying the goals of IE, instructing patients on how to decide the importance of the 3 effectiveness types: objectives effectiveness, relationship effectiveness

and self-respect effectiveness. All the factors that may reduce IE were discussed in session 2. During the IE training, a new skill was presented in one session and the following session was used to strengthen the acquisition and generalization of that skill (Table 1). Between sessions 3 and 8 (inclusive), core interpersonal skills targeting the 3 types of effectiveness were taught. Two consecutive sessions were dedicated to each of the 3 effectiveness types (Table 1). In sessions 3 and 4, participants learned objectives effectiveness, which refers to the ability to obtain an objective or goal in a particular situation (e.g., requesting something, refusing something or resolving a conflict). Sessions 5 and 6 were dedicated to "relationship effectiveness", including skills for keeping and improving relations and validation skills. In sessions 7 and 8 participants learned how to defend their self-respect. Session 9 was dedicated to building skills to manage or make requests. As in mindfulness training, session 10 was dedicated to summarizing the whole training program and to troubleshoot any difficulties in applying the skills in the future. Each session began with a review of tasks during the week (60 min). Sessions ended with homework assignment (30 min).

A detailed training schedule for both groups is summarized in Table 1.

Psychotherapists. Each group therapist (n = 4) was responsible for treating one treatment group (n= 8) in each of the two study groups. All of the therapists (two males, two females) were licensed psychologist, three with a Master's degree in psychology, and one with a PhD. The average length of clinical experience was 7 years (*SD* = 5.4). All therapists were trained in DBT and had personal experience with mindfulness practice. Two psychiatrists

provided psychotropic medication. Other team members followed each therapy session using a closed-circuit television, enabling supervision and feedback. Video cameras transmitted a signal for viewing, but did not record the sessions.

Measures

Diagnostic measures. The Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II; Gibbon & Spitzer, 1997; Gómez-Beneyto et al., 1994) and the Diagnostic Interview for Borderlines Revised (DIB-R; Barrachina et al., 2004; Zanarini et al., 1989) were used to establish BPD diagnosis and Axis II comorbidities. The DIB-R was used to assess BPD diagnosis over the last 2 years. The cut-off score for the Spanish version is 6 (range 1 to 10); higher scores represent increased severity of borderline symptoms (Barrachina et al., 2004).

Axis I comorbidities were assessed with the Psychiatric Diagnostic Screening Questionnaire (PDSQ; Pérez Gálvez, García Fernández, de Vicente Manzaro, & Olivera Valenzuela, 2010; Zimmerman & Mattia, 2001). The PDSQ contains 13 sub-scales to screen for: major depressive disorder, bulimia, post-traumatic stress disorder, panic disorder, agoraphobia, social phobia, generalized anxiety disorder, obsessive-compulsive disorder, alcohol abuse/dependence, drug abuse/dependence, somatization, hypochondriasis and psychosis. Depending on the sub-scale, participants were asked to rate the items considering the last two weeks (for major depressive disorder, bulimia, post-traumatic stress disorder, panic disorder and psychosis) or the last six months (for agoraphobia, social phobia, generalized anxiety disorder, obsessive-compulsive disorder, alcohol abuse/dependence, drug

abuse/dependence, somatization and hypochondriasis).

Borderline severity. This was the primary outcome measure. Borderline symptoms were assessed through the Borderline Symptoms List – 23 (BSL-23; Bohus et al., 2008; Soler et al., 2013) before and after the interventions to evaluate clinical improvement. Patients were asked to rate each item on a 5-point Likert scale from 0 (not at all) to 4 (very strong) to indicate their current status for each item versus the prior week. Higher scores on the BSL-23 indicate more severe BPD symptomatology. This instrument has shown good psychometric properties: high internal consistency (Cronbach´s alpha = .95) and good test-retest reliability ($r = .73$; $p<.01$). In addition, it has proven to be sensitive to the effects of therapy (Soler et al., 2013).

Mindfulness facets. Changes in mindfulness facets were measured by the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Cebolla et al., 2012). The FFMQ is a 39-item instrument for assessing five components of mindfulness consistent with the DBT framework; (1) observing (noticing external and internal experiences, e.g., body sensations, thoughts or emotions), (2) describing (putting words to, or labeling the internal experience), (3) acting with awareness (focusing on the present activity instead of behaving mechanically), (4) non-judging the inner experience (taking a non-evaluative stance towards the present experience, thoughts or emotions) and (5) non-reactivity to the inner experience (allowing thoughts and feelings to come, without getting caught up in or carried away by them). Participants were asked to rate the degree of concordance with each statement on a 5-point Likert scale

ranging from 1 (never or very rarely true) to 5 (very often or always true); higher scores indicate greater levels of dispositional mindfulness. For the purpose of the study, the timeframe used for the assessment was the prior week. The FFMQ has shown adequate psychometric properties in both non-clinical and clinical samples. Cronbach's α for the Spanish version of FFMQ range from .8 to .91 (Cebolla et al., 2012).

Decentering. As part of a wider vision of the mechanism of action of mindfulness-based interventions, the Decentering subscale of the Experience Questionnaire was also administered (EQ; Fresco et al., 2007; Soler et al., 2014). This 11-item self-reported scale measures decentering, defined as the capacity to observe one's thoughts and emotions as temporary events of the mind. Participants rate items on a 7-point Likert-type scale (from 1 = never, to 7 = all the time), to indicate their current status for each item versus the prior week. Higher scores on this scale suggest a higher capacity of decentering. Psychometric properties of the scale are satisfactory and EQ is also able to detect changes after a mindfulness intervention (Soler et al., 2014).

Data Analyses

In accordance with the statistical plan analysis, analyses were conducted on both per-protocol (PP) and intention-to-treat (ITT) samples. ITT analyses included all enrolled participants (n= 64), regardless of whether they completed the intervention or not. PP analyses comprise only participants who completed at least 80% of the intervention (completers) and for whom all data points (pre- and post-intervention) are available (M group: n = 19; IE group: n = 25). Missing data were treated with the last observation

carried forward (LOCF) method (Little & Rubin, 1987).

Patient demographic and baseline characteristics were compared using the chi-square test for categorical variables and the t-test for continuous variables. Kaplan-Meier survival analysis was performed to estimate differences between groups in time to treatment dropout. A repeated measures ANOVA was used to test the main hypothesis. BSL-23 scores were entered as the dependent variable; the treatment arm was the between-subject factor and time (pre- and post-intervention) was the within-subject factor. Cohen´s effect sizes were also calculated. Reliable and clinically significant improvements (RC and CSC, respectively) regarding the main outcome measure (BSL-23) were calculated for the ITT sample following Jacobson and Truax (1991) criteria. Treatment response (i.e. RC) was calculated in order to determine the percentage of patients who reliably improved after both interventions. The formula was as follows:

$$RCI = \frac{X_{pre} - X_{post}}{S_{diff}}, \qquad \text{where}$$

$$Sdiff = \sqrt{2 * (SE)^2} \qquad \text{and}$$

$$SE = SD * \sqrt{1 - r_{tt}}$$

X_{pre} = group mean at the beginning of treatment

X_{post} = group mean at the end of treatment

SD = Standard deviation

r_{tt} = Reliability of the measurement instrument (Cronbach`s alpha)

To calculate the standard error (SE), we referred to a reference population of BPD outpatients (Soler et al., 2013, *SD* = 17.94, Cronbach`s alpha = 0.95). To establish whether responsive

participants reached remission criteria and considering that non-patient normative data is not available for the BSL-23, CSC was defined as reaching a level of functioning in post-treatment greater than two standard deviations below the pre-treatment sample mean (CSC cutoff = 35.88).

Two repeated-measures ANOVAs were conducted for secondary variables: decentering (with EQ scores) and mindfulness facets (using FFMQ subscales scores). *Post hoc* analyses were carried out when significant interactions were found. A lineal regression model was performed to explore the predictive effect of changes in EQ and FFMQ upon changes in BSL-23 scores. All data was analyzed with IBM PASW v.19. The Level of significance was set at 0.05 (two-tailed).

Results

Demographic and clinical characteristics of enrolled participants are shown in Table 2. Comparisons between the two groups indicated no mean differences at pre intervention in either clinical or demographic data. Most participants were women (86%), with a mean age of 30 years. All participants were Caucasian. All participants in both groups had at least one comorbid Axis I diagnosis, including anxiety disorders, major depressive disorder and substance abuse. Among Axis II disorders, 31% of the sample had a comorbid cluster C diagnosis, followed by cluster A (30%) and cluster B (26%). Most of the sample was under pharmacological treatment, mainly antidepressants and benzodiazepines.

TABLE 2

The dropout rate for mindfulness was higher than in the control group

(41% vs.19%; see Figure 1 for reasons to dropouts). Frequency of sessions completion is the following: in the M group 32 completed 1 session, 28 completed 2 sessions, 25 completed 3 sessions, 24 completed 4 sessions, 21 completed 5 sessions, 20 completed 6 and 7 sessions, and 19 completed 8, 9 and 10 sessions. In the IE group 32 completed 1 session, 31 completed 2, 3 and 4 sessions, 30 completed 5 sessions, 29 completed 6 sessions, 26 completed 7 sessions, and 25 completed 8, 9 and 10 sessions. Time to treatment dropout did not differ significantly between groups ($p = .07$, see Figure 2 Kaplan-Meier survival analysis).

INSERT FIGURE 2 AROUND HERE

For BSL-23 scores, the repeated measures ANOVA showed a significant interaction of treatment group × time in both ITT [$F(2, 62) = 13.05, p = .001$, CI 95% (0.38, 1.41), $d = 0.90$)] and PP sample [$F(2, 42) = 18.93, p < .0001$, CI 95% (0.65, 1.96), $d = 1.32$)]. See Figure 3. *Post hoc* analysis on the ITT sample showed that the mindfulness group improved significantly on BSL-23 scores [t(31) = 3.92, p = .0004], whereas the IE group did not [t(31) = −1.06, p = .29].[1] Table 3 shows pre-post intervention scores on BSL-23 (*M* and *SD*), group × time interactions and Cohen's d for ITT and PP samples.

TABLE 3 / FIGURE 3

Clinical change was calculated for BSL-23 scores (only in the ITT sample). For a patient to be regarded as having responded to treatment, the difference between pre- and post-treatment mean scores had to exceed 11.12 points. In the M group, 12 participants (40%) showed response rates after treatment, whereas only 4 participants (13%) in the IE group showed a reliable reduction. Of those 12 participants in the M group, 5 (42%) reached a significant clinical change (CSC cutoff = 35.88). Of the subjects in

the IE group who displayed a reliable reduction, only 1 also fulfilled criteria for remission.

A significant group × time interaction was found for EQ scores in both the ITT [$F(2, 62) = 6.03, p = .017$, CI 95% (0.11, 1.11), $d = 0.61$] and PP [$F(2, 42) = 12.19, p = .001$, CI 95% (0.41, 1.68), $d = 1.06$] samples. A significant increase in decentering was observed for the mindfulness group: ITT [$t(31) = −5.57, p = <0.001$] and PP [$t(18) = −9.85, p<.0001$]. No significant pre-post differences were observed for the IE group [ITT $t(31) = −1.06, p = .29$; PP $t(24) = −1.06, p = .29$].

The multivariate repeated measures ANOVA using FFMQ scores yielded a significant group × time interaction in the PP sample [$F(5,38) = 2.51, p = .047$]. *Post hoc* analyses showed an improvement in the mindfulness group on two FFMQ facets: Describing [$t(18) = −2.72, p = .01$] and Non-Judging [$t(18) = −3.53, p = .002$]. Although the interaction of the univariate analysis for Non-Reacting was not significant, pre-post comparison showed a significant pre-post difference in the mindfulness group [$t(18) = −6.60, p = .000003$]. No significant pre-post comparisons in regard to FFMQ subscales were found for the IE group (data not shown). A repeated measures MANOVA was also performed in the ITT sample, but the significant group × time interaction was not maintained [$F(5,58) = 2.22, p = .31$]. Analyses of secondary outcomes are detailed in Table 4.

TABLE 4

To determine to what extent changes in decentering and mindfulness facets were predictors of changes in borderline symptoms, a forward stepwise multiple linear regression model was performed. Changes in BSL-23 (Δ BSL-23) were

entered as the predicted variable. Predicting variables were: treatment group, changes in EQ (Δ EQ), and changes in describe and non-judge facets from the FFMQ (Δ Describe and Δ Non-Judge). Changes in EQ explained 27% of the variance ($B = -1.59$, $SE = .33$, $\beta = -1.33$, p = .00018), and when the treatment group was added the explained variance increased significantly to 34.5% ($B = -10.71$, $SE = 4.03$, $\beta = -10.71$, p = .010; F-change ($df_1 = 62$; $df_2 = 61$) = 7.05, $p = 0.01$). None of the other factors were able to significantly improve the prediction.

Discussion

The present study is a preliminary investigation to determine the efficacy of mindfulness training as an intervention to treat BPD symptoms. Compared to IE, we found that mindfulness training was more efficacious in reducing BPD severity. Amelioration of borderline symptoms after the mindfulness intervention was both statistically as well as clinically significant, as evidenced by a response rate of 40% (versus 13% in the IE group). In addition to borderline core symptomatology, mindfulness also improved decentering and some mindfulness facets (i.e. non-judging and describing). By contrast, no such improvement was observed in participants who received IE skills. Interestingly, the findings of the regression model may be consistent with the possibility that changes in decentering precede the reduction in symptom severity in the M group.

Our results show that borderline symptoms diminished significantly in participants who received mindfulness training, as evidenced by higher response rates in the mindfulness group. This large decrease in borderline symptoms after mindfulness training –in contrast to the control intervention–

supports the mindfulness-deficit model of BPD (Peters et al., 2013; Wupperman et al., 2008). Additionally, such benefits may explain why mindfulness skills are the most widely practiced among the whole DBT skills package (Lindenboim et al., 2007; Stepp et al., 2008). By contrast, BPD symptoms were not significantly improved after IE training. To date, there is no evidence on the specific effects of stand-alone IE skills, although one might expect that IE training may have greater impact on social abilities than on other core BPD symptoms. Therefore, the lack of improvement after IE observed here could be due to the fact that interpersonal symptoms were not directly measured. On the other hand, the sequence in which skills are taught during standard DBT's skills training (i.e., mindfulness precedes all the other skills) may impact on the efficacy of IE. Indeed, in our study, skills training was randomized in such a way that half of the patients received IE while the other half received mindfulness, so the probable benefits of receiving mindfulness before IE training could not be assessed. It is noteworthy that the high effect size observed for mindfulness could also be explained by the small effect size observed for IE.

Together, these data could be valuable when choosing the treatment curricula in clinical settings in which the use of standard DBT may be especially challenging. In line with the dismantling study published by Linehan et al. (2015) in which DBT skills training as a stand-alone treatment was compared to standard DBT and to individual DBT, a dismantling study of DBT skills training might be of value. If the four DBT modules were assessed in a dismantling study, it could help mental health professionals to tailor interventions to reduce BPD symptoms by identifying the contributions of each module versus the "combined effect" of

the four modules. Another closely related aspect involving standard DBT is the duration of the interventions. Our findings demonstrate that a 10-week intervention can improve symptoms in a population with severe symptomatology, confirming previous evidence on the efficacy of brief interventions for BPD (e.g., Soler et al., 2009; Stoffers et al., 2012). This does not mean that BPD treatment should be restricted to10-weeks, but rather this underscores the need to evaluate the possibility of shortening skills training without affecting its efficacy.

Although the reduction in BPD symptoms through mindfulness training is encouraging, this result has to be interpreted cautiously, for several reasons. First, the dropout rate was higher in the mindfulness group (40% vs. 19% for the control group). The dropout rate in this study was also higher than the ones reported previously for mindfulness training [e.g., 30%; (Soler et al., 2012)]. Differences in retention rates between the two study groups cannot be attributed to baseline differences between completers and non-completers, as they were comparable on all relevant characteristics (data not shown). In addition, reasons for treatment's termination were similar for both groups, with the exception of abandonment after the first session, which was greater in the mindfulness group. The better retention in the IE group could be explained by the perception that the content of the intervention is more directly related to typical BPD symptoms. Given that mindfulness does not imply a direct modification of symptoms but rather promote a new attitude towards these symptoms, the connection between mindfulness practice and symptom improvement may not be explicit enough to engage participants into the training. Other reasons for the higher

dropout rate in the mindfulness group could include motivational aspects, an unwillingness to tolerate emotional distress (Kröger, Harbeck, Armbrust, & Kliem, 2013), or difficulties in practicing formal mindfulness meditation (Dimidjian & Linehan, 2003). Nevertheless, it is relevant to mention that the statistical significance of pre-post treatment changes in BSL-23 was also maintained in the analysis of the ITT sample, in which participants who dropped out were considered to have not responded to treatment.

Similarly, mindfulness training was associated with improvements in decentering, whereas IE training did not induce any such changes. Moreover, changes in decentering seemed to be a predictor for reduced symptoms. Although our analyses may not be sufficient to conclude that decentering enhancement is a mechanism of change of mindfulness training, as proposed by (Hayes-skelton, Calloway, Roemer, & Orsillo, 2015), our results do support this hypothesis, entailing relevant clinical implications. Enhancement of decentering might diminish maladaptive strategies such as avoidance or suppression (Hayes-skelton et al., 2015), and this may be particularly important in the treatment of BPD given that a major target of mindfulness practice is to teach the patient how to constrain mood-dependent behaviors (Linehan, 1993b).

Other mindfulness capabilities were measured by the FFMQ (Baer et al., 2006). The analyses conducted in the per-protocol sample showed that not all facets improved with mindfulness training. However, two facets showed notable improvement: non-judging the inner experience, and describing. The decrease in judgmental tendencies could be related to gains in acceptance, a critical component of mindfulness practice (Bishop et al., 2004).

Acceptance is often impaired in BPD populations (Peters et al., 2013; Wupperman et al., 2008), in part due to the frequent presence of traumatic and invalidating experiences (e.g., Linehan1993a; Martín-Blanco et al., 2014). Improvements in describing –a skill that is characteristic of the DBT framework– are also relevant, as previous evidence has linked the ability to describe with enhanced emotion regulation (Creswell, Way, Eisenberger, & Lieberman, 2007). However, the fact that statistical significance was not maintained in ITT analyses (versus the PP analysis) compromises these results, indicating that more research is warranted to verify the effects of mindfulness training on these two facets.

Although the results of this randomized study are encouraging with regards to the effectiveness of mindfulness training in reducing BPD symptoms and increasing decentering, these findings must be interpreted with caution. The main limitation of our study is the number of dropouts, which was higher than the attrition rate expected in power calculations, and therefore may have biased the estimation of treatment effects. Notwithstanding this caveat and the relatively small sample size, the statistical improvements in both the ITT and PP samples, the large effect sizes (ITT sample $d = 0.90$), and the reliability indices and clinically significant changes make our findings robust. Even when mixed models (not reported here) were run to account for the missing data the effect size was still significant and clinically relevant. Another limitation of the present study is the absence of a treatment adherence measure (TAM), in part because no validated TAM is available in Spanish. However, we mitigated the lack of a TAM by ensuring supervision of treatment sessions by other team members. Additionally, we did not assess patient preferences for the two intervention modalities, and this could be a possible source of bias (Mott, Koucky, & Teng, 2015). Future studies should also consider the amount and frequency of practice as a variable that could be related to the efficacy of the skills training. Another potential limitation is that the therapists were not completely blinded to the study hypothesis. In addition, since self-report instruments were used as outcome measures, our results may be more representative of a subjective improvement rather than an actual decrease in symptoms; nevertheless, it is worth mentioning that BSL-23 has high convergent validity compared to clinician-administered instruments for rating BPD, such as the DIB-R (Soler et al., 2013). Finally, the absence of follow-up assessments does not allow us to draw conclusions with regards to the temporal stability of our findings. Future studies should investigate if the efficacy of mindfulness training is long-standing and whether treatment engagement depends on individual characteristics not assessed in this study. Identifying these characteristics is important to apply mindfulness-based prescriptions that better fit the individuals.

In summary, the results of this preliminary clinical trial suggest that mindfulness training is an efficacious treatment approach to reduce borderline symptoms. In spite of the preliminary nature of our study, the clinical implications of these results are promising. This study suggests that the benefits of mindfulness practice may go beyond core borderline psychopathology by also increasing mindfulness-related components as decentering or the capacity for non-judging. Specifically, improvements in decentering could be clinically valuable

in this patient population. Given the differential impact of mindfulness versus interpersonal effectiveness training on borderline symptoms, it would be interesting to focus future studies on exploring the specific targets of the various DBT skills and on unraveling the active components of DBT skills training. Further research is also needed to determine if increases in decentering underlie the beneficial effect of mindfulness training in BPD populations.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

References

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Washington, DC: American Psychiatric Publishing.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, *13*(1), 27–45. doi:10.1177/1073191105283504

Barrachina, J., Soler, J., Campins, M. J., Tejero, A., Pascual, J. C., Alvarez, E., … Pérez Sola, V. (2004). Validation of a Spanish version of the Diagnostic Interview for Bordelines-Revised (DIB-R). *Actas Españolas de Psiquiatría*, *32*(5), 293–8.

Bender, D. S., Dolan, R., Skodol, A. E., Sanislow, C. A., Dyck, I. R., McGlashan, T. H., … Gunderson, J. G. (2001). Treatment utilization by patients with personality disorders. *American Journal of Psychiatry*, *158*(2), 295–302. doi:http://dx.doi.org/10.1176/appi.ajp.158.2.295

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., … Devins, G. (2004). Mindfulness : A Proposed Operational Definition. *Clinical Psychology: Science and Practice*, *11*(3), 230–241. doi:10.1093/clipsy/bph077

Bohus, M., Kleindienst, N., Limberger, M. F., Stieglitz, R.-D., Domsalla, M., Chapman, A. L., … Wolf, M. (2008). The Short Version of the Borderline Symptom List (BSL-23): Development and Initial Data on Psychometric Properties. *Psychopathology*, *42*(1), 32–39. doi:10.1159/000173701

Cebolla, A., Garcia Palacios, A., Soler, J., Guillén, V., Baños, R., & Botella, C. (2012). Psychometric properties of the Spanish validation of the Five Facets of Mindfulness Questionnaire (FFMQ). *The European Journal of Psychiatry*, *26*(2), 118–126. doi:10.4321/S0213-61632012000200005

Creswell, J. D., Way, B. M., Eisenberger, N. I., & Lieberman, M. D. (2007). Neural correlates of dispositional mindfulness during affect labeling. *Psychosomatic Medicine*, *69*(6), 560–5. doi:10.1097/PSY.0b013e3180f6171f

Dimidjian, S., & Linehan, M. M. (2003). Defining an Agenda for Future Research on the Clinical Application of Mindfulness Practice. *Clinical Psychology: Science and Practice*, *10*, 166–171. doi:10.1093/clipsy/bpg019

Feliu-Soler, A., Pascual, J. C., Borràs, X., Portella, M. J., Martín-Blanco, A., Armario, A., … Soler, J. (2014). Effects of Dialectical Behaviour Therapy-Mindfulness Training on Emotional Reactivity in Borderline Personality Disorder: Preliminary Results. *Clinical Psychology & Psychotherapy*, *21*(4), 363–370. doi:10.1002/cpp.1837

Fresco, D. M., Moore, M. T., van Dulmen, M. H. M., Segal, Z. V, Ma, S. H., Teasdale, J. D., & Williams, J. M. G. (2007). Initial psychometric properties of the experiences questionnaire: validation of a self-report measure of decentering. *Behavior Therapy*, *38*(3), 234–46. doi:10.1016/j.beth.2006.08.003

Gibbon, M., & Spitzer, R. L. (1997). *User's guide for the structured clinical interview for DSM-IV axis II personality disorders: SCID-II.* Washington, DC: American

Psychiatric Publishing.

Gómez-Beneyto, M., Villar, M., Renovell, M., Pérez, M., Herández, M., & Leal, C. (1994). The diagnosis of personality disorder with a modified version of the SCID-II in a Spanish clinical sample. *Journal of Personality Disorders*, *8*, 104–10. doi:10.1521/pedi.1994.8.2.104

Hayes-skelton, S. A., Calloway, A., Roemer, L., & Orsillo, S. M. (2015). Decentering as a Potential Common Mechanism Across Two Therapies for Generalized Anxiety Disorder. *Journal of Consulting and Clinical Psychology*, *83*(2), 395-404. doi:http://dx.doi.org/10.1037/a0038305

Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology*, *59*, 12–19. doi:10.1037//0022-006X.59.1.12

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York, NY: Delacorte.

Kröger, C., Harbeck, S., Armbrust, M., & Kliem, S. (2013). Effectiveness, response, and dropout of dialectical behavior therapy for borderline personality disorder in an inpatient setting. *Behaviour Research and Therapy*, *51*(8), 411–6. doi:10.1016/j.brat.2013.04.008

Leichsenring, F., Leibing, E., Kruse, J., New, A. S., & Leweke, F. (2011). Borderline personality disorder. *The Lancet*, *377*(9759), 74–84. doi:10.1016/S0140-6736(10)61422-5

Lieb, K., Zanarini, M. C., Schmahl, C., Linehan, M. M., & Bohus, M. (2004). Borderline personality disorder. *Lancet*, *364*(9432), 453–61. doi:10.1016/S0140-6736(04)16770-6

Lindenboim, N., Comtois, K. A., & Linehan, M. M. (2007). Skills Practice in Dialectical Behavior Therapy for Suicidal Women Meeting Criteria for Borderline Personality Disorder. *Cognitive and Behavioral Practice*, *14*(2), 147–156. doi:10.1016/j.cbpra.2006.10.004

Linehan, M. M. (1993a). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: Guilford Press.

Linehan, M. M. (1993b). Skills training manual for treating borderline personality disorder. Guilford Press.

Linehan, M. M. (2003). *From Chaos to Freedom Set*. Seattle, WA: Behavioral Technology Transfer Group.

Linehan, M. M. (2004). Wise mind: Being Able to Drop in. Seattle, WA: Behavioral Technology Transfer Group.

Linehan, M. M. (2014). *DBT Skills Training Manual* (2nd Edition.). New York, NY: Guilford Press.

Linehan, M. M., Korslund, K. E., Harned, M. S., Gallop, R. J., Lungu, A., Neacsiu, A. D., … Murray-gregory, A. M. (2015). Dialectical Behavior Therapy for High Suicide Risk in Individuals With Borderline Personality Disorder A Randomized Clinical Trial and Component Analysis. *JAMA*,*72*(5), 475-782. doi:10.1001/jamapsychiatry.2014.3039

Little, R., & Rubin, D. (1987). *Statistical Analysis with Missing Data*. New York, NY: John A. Wiley & Sons, Inc.

Martín-Blanco, A., Soler, J., Villalta, L., Feliu-Soler, A., Elices, M., Pérez, V., … Pascual, J. C. (2014). Exploring the interaction between childhood maltreatment and temperamental traits on the severity of borderline personality disorder. *Comprehensive Psychiatry*, *55*(2), 311–8. doi:10.1016/j.comppsych.2013.08.026

Mott, J., Koucky, E., & Teng, E. (2015). The Impact of Patient Preference on Mental Health Treatment: A Methodological Critique and Suggestions for Future Research. *European Journal for Person Centered Healthcare*, *3*(1), 26–36.

Pérez Gálvez, B., García Fernández, L., de Vicente Manzaro, M., & Olivera Valenzuela, M. (2010). Validation of the Psychiatric Diagnostic Screening Questionnaire (PDSQ) in a Spanish sample of alcoholic patients. *Adicciones*, *22*, 199–206.

Peters, J. R., Eisenlohr-moul, T. A., Upton, B. T., & Baer, R. A. (2013). Nonjudgment as a moderator of the relationship between present-centered awareness and borderline features : Synergistic interactions in mindfulness assessment. *Personality and Individual Differences*, *55*(1), 24–28. doi:10.1016/j.paid.2013.01.021

Sachse, S., Keville, S., & Feigenbaum, J. (2011). A feasibility study of mindfulness-based cognitive therapy for

individuals with borderline personality disorder. *Psychology and Psychotherapy*, *84*(2), 184–200. doi:10.1348/147608310X516387

Soler, J., Franquesa, A., Feliu-Soler, A., Cebolla, A., Garcia-Campayo, J., Tejedor, R., … Portella, M. J. (2014). Assesing decentering: Validation, psychometric properities and clinical usefulness of the Experiences Questionnaire in a Spanish sample. *Behavior Therapy, 45*(6), 863-871. doi:http://dx.doi.org/10.1016/j.beth.2014.05.004

Soler, J., Pascual, J. C., Tiana, T., Cebrià, A., Barrachina, J., Campins, M. J., … Pérez, V. (2009). Dialectical behaviour therapy skills training compared to standard group therapy in borderline personality disorder: a 3-month randomised controlled clinical trial. *Behaviour Research and Therapy*, *47*(5), 353–8. doi:10.1016/j.brat.2009.01.013

Soler, J., Valdepérez, A., Feliu-Soler, A., Pascual, J. C., Portella, M. J., Martín-Blanco, A., … Pérez, V. (2012). Effects of the dialectical behavioral therapy-mindfulness module on attention in patients with borderline personality disorder. *Behaviour Research and Therapy*, *50*(2), 150–7. doi:10.1016/j.brat.2011.12.002

Soler, J., Vega, D., Feliu-Soler, A., Trujols, J., Soto, A., Elices, M., … Pascual, J. C. (2013). Validation of the Spanish version of the Borderline Symptom List, short form (BSL-23). *BMC Psychiatry*, *13*, 139. doi:10.1186/1471-244X-13-139

Stepp, S. D., Epler, A. J., Jahng, S., & Trull, T. J. (2008). The effect of dialectical behavior therapy skills use on borderline personality disorder features. *Journal of Personality Disorders*, *22*(6), 549–63. doi:10.1521/pedi.2008.22.6.549

Stoffers, J., Völlm, B. A., Rücker, G., Timmer, A., Huband, N., & Lieb, K. (2012). Psychological therapies for people with borderline personality disorder (Review). In *Cochrane Database of Systematic Reviews* (Cochrane D.). John Wiley & Sons. doi:10.1002/14651858.CD005652

Valentine, S. E., Bankoff, S. M., Poulin, R. M., Reidler, E. B., & Pantalone, D. W. (2015). The Use of Dialectical Behavior Therapy Skills Training as Stand-Alone Treatment: A Systematic Review of the Treatment Outcome Literature. *Journal of Clinical Psychology*, *71*(1), 1–20. doi:10.1002/jclp.22114

Wupperman, P., Fickling, M., Klemanski, D. H., Berking, M., & Whitman, J. B. (2013). Borderline personality features and harmful dysregulated behavior: the mediational effect of mindfulness. *Journal of Clinical Psychology*, *69*(9), 903–11. doi:10.1002/jclp.21969

Wupperman, P., Neumann, C. S., & Axelrod, S. R. (2008). Do deficits in mindfulness underlie borderline personality features and core difficulties? *Journal of Personality Disorders*, *22*(5), 466–82. doi:10.1521/pedi.2008.22.5.466

Wupperman, P., Neumann, C. S., Whitman, J. B., & Axelrod, S. R. (2009). The role of mindfulness in borderline personality disorder features. *The Journal of Nervous and Mental Disease*, *197*(10), 766–71. doi:10.1097/NMD.0b013e3181b97343

Zanarini, M., Gunderson, J. G., Frankenburg, F. R., & Chauncey, D. L. (1989). The revised diagnostic interview for borderlines: discriminating BPD from other axis II disorders. *Journal of Personality Disorders*, *3*(1), 10–18. doi:10.1521/pedi.1989.3.1.10

Zimmerman, M., & Mattia, J. I. (2001). The Psychiatric Diagnostic Screening Questionnaire: development, reliability and validity. *Comprehensive Psychiatry*, *42*(3), 175–89. doi:10.1053/comp.2001.23126

Footnote

[1] When mixed models were run findings were almost the same: $F = 9.88$; $df = 1, 105.92$; $p = 0.002$; Cohen's $d = 0.78$, 95% CI [0.26-1.28].

Acknowledgements

Table 1

Summary of the skills training curriculum for both interventions

	Mindfulness	Interpersonal Effectiveness
1	Overview of skills training/biosocial theory of BPD. Overview of mindfulness skills: Orienting participants to M practice.	Overview of skills training/biosocial theory of BPD. Overview of IE skills: Orienting participants to IE practice.
2	States of the mind: Emotion mind, reasonable mind and wise mind. Examples for practicing wise mind: breath in "wise mind", breath out "letting go".	Clarifying goals of IE, deciding the importance of the three effectiveness types. Factors reducing IE.
3	What and How skills: Overview. Observe. FP examples (external observation): Observing the breath, observing sounds, observing a physical sensation. IP example: observing a landscape.	Objective effectiveness: DEAR MAN (Describe, Express, Assert, Reinforce, Stay Mindful, Appear confident, Negotiate)
4	Observe / One-Mindfully. FP example: Observing thoughts (internal observation). IP examples for practicing one mindfully: Cleaning the house, washing dishes.	
5	Describe/Non-Judge. FP examples: Describing thoughts, physical sensations. IP examples for practicing describing/ non-judgmentalness: Describing a person's face, describing a landscape, counting judgments -replacing them with non-judgmental descriptions of the dislike or the negative consequences-.	Relationship effectiveness: GIVE (be Gentle, act Interested, Validate, Easy manner)
6	Participating / Being effective. FP examples: Mindful dancing/ group walking meditation. IP examples: Dance, sing, go running, group games.	
7	Choosing to accept: Turning the mind.	Self-respect effectiveness: FAST (be Fair, no Apologies, Stick to values, be Truthful).
8	Learning to respond wisely and effectively to events: Willingness over willfulness.	
9	Accepting with the body: Half-smile	Evaluating options: how intensely to ask or say no.
10	Summary of the training.	Summary of the training.

FP = Formal Practice. IF = Informal Practice. M = mindfulness. IE = interpersonal effectiveness

Table 2

Baseline demographic and clinical characteristics by group

Variable	Mindfulness (n=32)		Interpersonal Effectiveness (n=32)		X^2	t	p
Demographic Characteristics							
Gender, n (% of females)	27	(84.4)	28	(87.5)	.13	---	.71
Age, mean (SD)	31.56	(7.25)	31.72	(6.82)	---	.09	.93
Education, n (%)							
Primary	7	(22.6)	6	(19.4)	1.77	---	.43
Secondary	13	(41.9)	18	(58.1)			
University	11	(35.5)	7	(22.6)			
Marital Status, n (%)							
Single	20	(62.5)	16	(50.0)	1.73	---	.42
Married/Stable couple	9	(28.1)	14	(43.8)			
Separated/Divorced	3	(9.4)	2	(6.2)			
Clinical Characteristics							
DIB-R total score, mean (SD)	7.90	(1.04)	8.03	(1.56)	---	.39	.69
BSL-23, mean (SD)	45.87	(19.60)	49.40	(20.03)	---	.71	.47
Current Axis I diagnoses, n (%)							
Any anxiety disorder	26	(81.2)	29	(90.6)	1.16	---	.28
Major depressive disorder	20	(62.5)	24	(75.0)	1.16	---	.28
Any substance abuse disorder	20	(62.5)	24	(77.4)	1.66	---	.19
Bulimia	14	(43.8)	17	(53.1)	.56	---	.45
Axis II diagnoses, n (%)							
Cluster A diagnoses	10	(37.0)	9	(30.6)	.32	---	.57
Other Cluster B diagnoses	7	(25.9)	10	(33.3)	.37	---	.54
Cluster C diagnoses	10	(37.0)	10	(33.3)	.08	---	.77
Pharmacological Treatment, n (%)							
Antidepressant	25	(83.3)	17	(65.5)	2.39	---	.12
Benzodiazepines	15	(50.0)	14	(53.8)	.08	---	.77
Antipsychotics	13	(43.3)	11	(42.3)	.01	---	.93
Mood Stabilizers	5	(16.7)	2	(7.7)	1.02	---	.31

Note. DIB-R =Diagnostic Interview for Borderlines Revised. BSL-23 =Borderline Symptom List 23.

Table 3

Per protocol and intention to treat analyses of primary outcome (BSL-23) by group

	Intention To Treat [a] (BSL-23)							Per Protocol [b] (BSL-23)						
	Pre		Post		Group x Time Interaction		Cohen's d [95% CI]	Pre		Post		Group x Time Interaction		Cohen`s d [95% CI]
	M	*SD*	*M*	*SD*	*F*	*p*		*M*	*SD*	*M*	*SD*	*F*	*p*	
Mindfulness	45.87	19.60	33.46*	20.97	13.05	.001	0.90 [0.38, 1.41]	48.94	18.04	28.08*	19.23	18.93	<.0001	1.32 [0.65, 1.96]
Interpersonal Effectiveness	49.40	20.03	52.50	18.10				49.20	20.42	53.16	17.88			

Note. BSL-23 = Borderline Symptom List -23. [a] n = 32 in each group. [b] n = 19 in the mindfulness group and n = 25 in the interpersonal effectiveness group. M = Mean. SD = Standard Deviation. Effect sizes refer to pre- and post-treatment differences. *Pre- and post-intervention *post-hoc* t-tests, *p*<.0001.

Table 4

Analyses of secondary outcomes (EQ and FFMQ) by group

Analysis / Variable	Mindfulness				Interpersonal Effectiveness				Group x Time interaction		Cohen's d [95% CI]
	Pre		Post		Pre		Post		F	p	
	M	SD	M	SD	M	SD	M	SD			
Intention to Treat [a]											
EQ	22.96	6.02	27.81	6.68	24.71	7.64	25.96	6.02	6.03	.017	0.61 [0.11, 1.11]
FFMQ											
Observe	24.78	6.44	26.40	4.75	25.06	6.49	25.34	6.38	.90	.34	0.24 [−0.26, 0.73]
Describe	21.40	8.52	24.50	6.70	22.18	7.62	22.15	6.86	3.65	.06	0.48 [−0.03, 0.97]
Act with awareness	16.90	5.57	18.56	5.95	19.09	7.14	19.75	5.92	.58	.44	0.19 [−0.30, 0.68]
Non-Judge	16.59	5.85	19.93	7.44	16.87	5.41	17.53	6.49	3.20	.08	0.45 [−0.05, 0.94]
Non-React	14.00	4.61	16.90	4.48	13.90	5.61	15.59	3.92	1.25	.26	0.28 [−0.22, 0.77]
Per Protocol [b]											
EQ	22.26	4.81	30.42*	4.59	25.08	8.60	26.68	7.15	12.19	.001	1.06 [0.41, 1.68]
FFMQ											
Observe	24.57	8.03	27.31	5.47	24.92	7.08	25.28	6.95	1.33	.25	0.35 [−0.26, 0.94]
Describe	20.52	9.81	25.73*	6.82	22.36	8.02	22.32	7.08	5.11	.03	0.69 [0.06, 1.29]
Act with awareness	17.57	6.66	20.36	6.38	19.20	7.72	20.04	6.23	1.04	.31	0.31 [−0.30, 0.90]
Non-Judge	16.68	6.23	22.31*	7.79	17.08	5.88	17.92	7.11	5.24	.03	0.84 [0.21, 1.45]
Non-React	13.89	5.03	18.78**	3.76	13.84	6.29	16.00	4.24	3.51	.07	0.57 [−0.05, 1.17]

Note. EQ = Experiences Questionnaire. FFMQ = Five Facet Mindfulness Questionnaire. [a] n = 32 in each group. [b] n = 19 in the mindfulness group and n = 25 in the interpersonal effectiveness group. M = Mean. SD = Standard Deviation. Effect sizes refer to pre- and post-treatment differences. * Pre- and post-intervention post-hoc t-tests,

*p=.01, **p<.000.
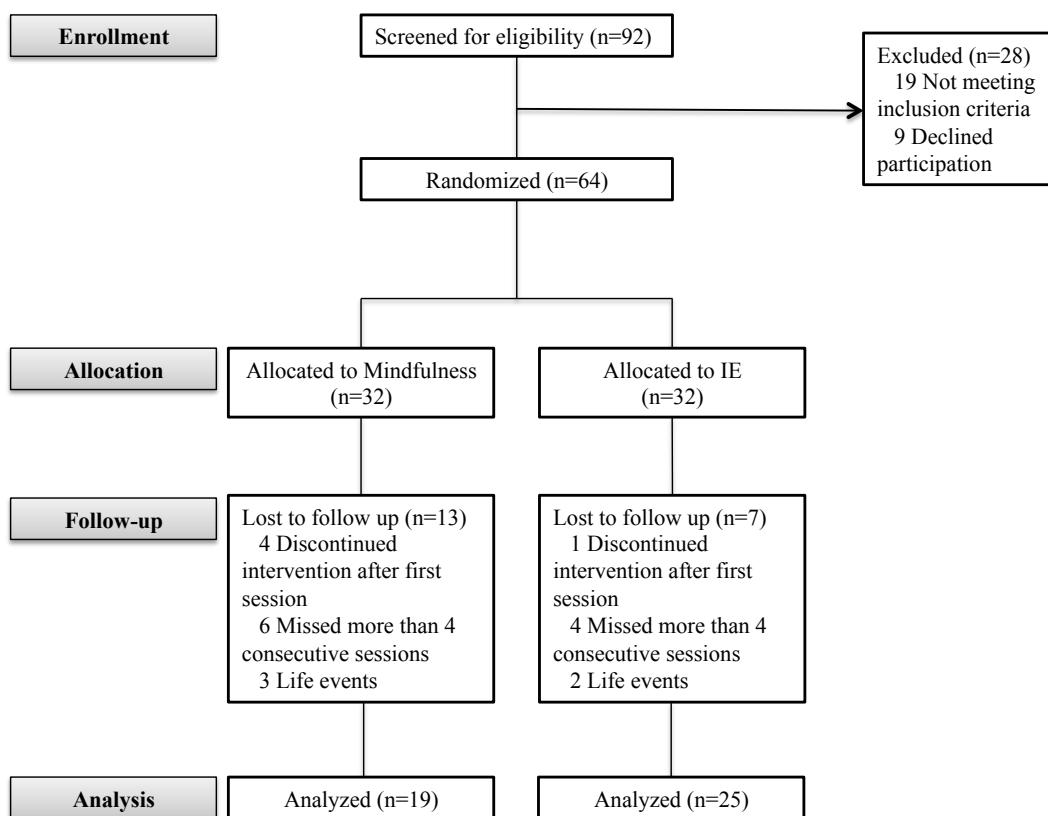
Fig. 1 Consolidated Standards for reporting Trials (CONSORT) showing the flow of participants through the study. ITT = intention to treat. PP = per protocol.
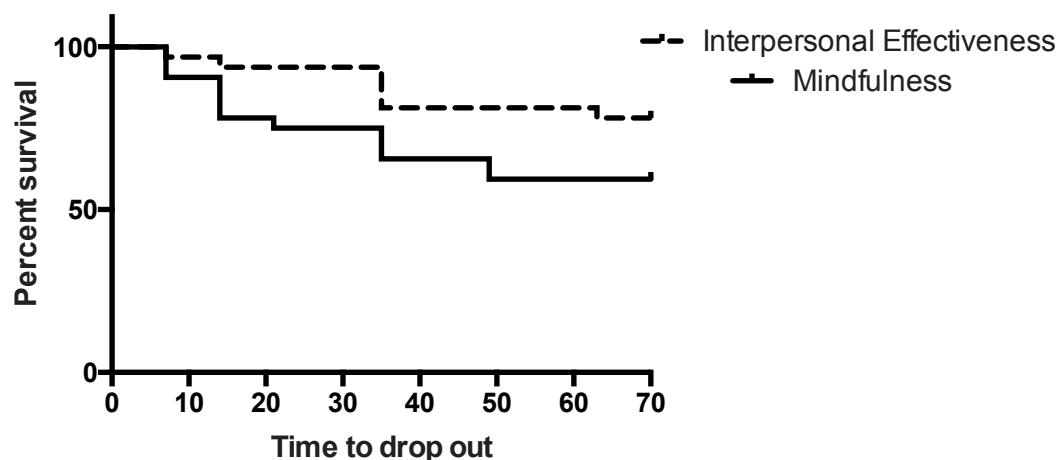
Fig. 2 Figure shows survival analysis for time to drop out. The treatment period was 10 weeks (i.e., 70 days).
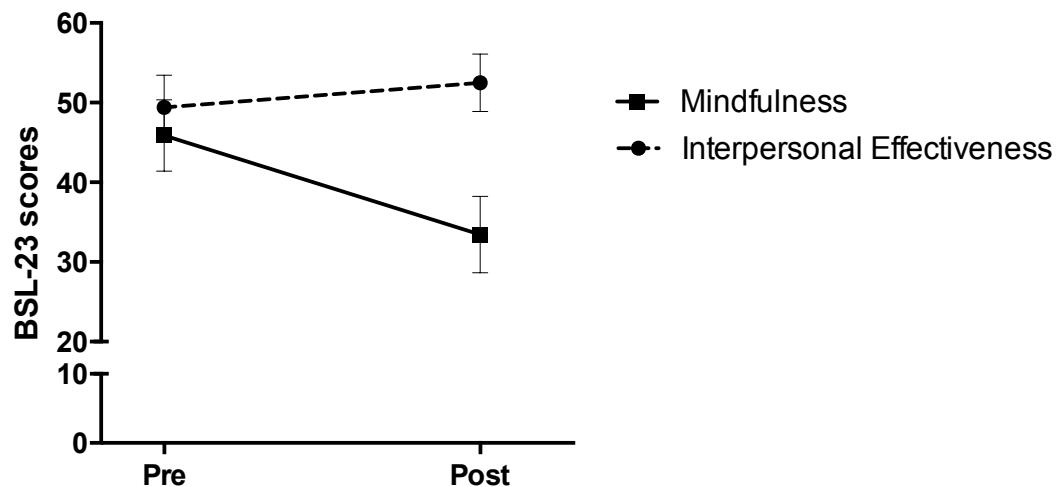
Fig. 3 Differences between mindfulness group and interpersonal effectiveness group in the primary outcome measure: BSL-23. Figure shows mean scores and standard error measures in the ITT sample. Repeated measures ANOVA group × time effect: $F(1,62) = 13.05$, $p = .001$.

Soler J, Elices M, Pascual JC, Martin-Blanco A, Feliu-Soler A, Carmona C, Portella MJ. (2016). Effects of mindfulness training on different components of impulsivity in borderline personality disorder: Results from a pilot randomized study. *Borderline Personality Disorder and Emotion Dysregulation, 3,* 1-10.

Borderline Personality Disorder
and Emotion Dysregulation

RESEARCH ARTICLE　　　　　　　　　　　　　　　　　　　　　　**Open Access**

CrossMark

Effects of mindfulness training on different components of impulsivity in borderline personality disorder: results from a pilot randomized study

Joaquim Soler[1,2,5*†], Matilde Elices[1,2,3,4†], Juan C. Pascual[1,2,3], Ana Martín-Blanco[1,2,3], Albert Feliu-Soler[1,2,3],
Cristina Carmona[1,3] and Maria J. Portella[1,2,3]

Abstract

Background: Impulsivity is considered a core characteristic of borderline personality disorder (BPD). Previous research on the effects of mindfulness training (MT) has shown that it might modify impulsivity-related aspects of BPD. Therefore, the aim of this study was to investigate the impact of MT on various facets of impulsivity in BPD patients.

Methods: Subjects with BPD diagnosis ($n = 64$) were randomly assigned to 10 weeks of MT ($n = 32$) or interpersonal effectiveness skills training (IE; $n = 32$). All participants were assessed pre- and post-intervention with a self-reported measure of impulsivity and five behavioral neuropsychological tasks to evaluate response inhibition, tolerance for delay rewards, and time perception.

Results: An interaction effect of time × group was only observed for some of the behavioral paradigms used. Participants in the MT group improved their ability to delay gratification and showed changes in time perception, consistent with a decrease in impulsivity. No differences were observed between treatments in terms of trait impulsivity and response inhibition.

Conclusions: Mindfulness training might improve some aspects of impulsivity but not others. Further study is warranted to better determine the effects of mindfulness training on the components of impulsivity.

Trial registration: ClinicalTrials.gov Identifier: NCT02397031.

Keywords: Borderline personality disorder, Mindfulness, Impulsivity, Time perception, Delayed reward, Response inhibition

Background

Impulsivity is a distinctive feature of borderline personality disorder (BPD) [1]. Among the diagnostic criteria for BPD, the impulsivity domain encompasses some of the most severe characteristics of the disorder, including non-suicidal self-injury, suicide attempts, substance abuse, and difficulties in controlling anger [2].

The construct of impulsivity is multifaceted and is often used to refer both to a personality trait and a component of neuropsychological functioning. Therefore, it can be studied through a variety of methods, depending on which aspect is evaluated [3]. From a personality trait perspective, impulsive individuals are characterized by desinhibition, a drive to act, and low levels of conscientiousness [3]. Trait impulsiveness is usually assessed by self-reported questionnaires such as the Barrat Impulsivity Scale (BIS-11) [4]. Studies that have assessed trait impulsivity in BPD samples have reported higher BIS-11 scores in BPD subjects compared to healthy controls [5, 6] and to other clinical

* Correspondence: jsolerri@santpau.cat
†Equal contributors
[1]Servei de Psiquiatria, Hospital de la Santa Creu i Sant Pau, Av. Sant Antoni
Mª Claret 167, 08025 Barcelona, Spain
[2]Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM),
Institut d'Investigació Biomèdica - Sant Pau (IIB-Sant Pau), Barcelona, Spain
Full list of author information is available at the end of the article

Soler *et al. Borderline Personality Disorder and Emotion Dysregulation* (2016) 3:1

Page 2 of 10

populations [7, 8]. The neuropsychological aspects of impulsivity can be assessed with several different behavioral tasks. In general, studies using these paradigms in BPD samples have also reported alterations in several domains. For example, subjects with BPD performed worse than healthy controls in paradigms that require withholding a specific behavioral response (i.e., response inhibition paradigms) [6, 9] and worse in tasks of time estimation [10]. Impulsivity can be also measured through reward-discounting models, which rely on the tenet that impulsive individuals prefer smaller immediate rewards, rather than larger delayed rewards [11–13]. Studies using these paradigms have also shown that BPD individuals are more impulsive than healthy controls [14, 15].

Despite the evidence supporting impulsivity-related alterations in BPD, few studies have been carried out to assess the effectiveness of psychological interventions to modify impulsivity. Among the available psychotherapeutic approaches for BPD, mindfulness may be especially effective in changing impulsivity-related parameters. Mindfulness training is a core component of dialectical behavior therapy (DBT) [16], which is the treatment with the greatest amount of empirical support for BPD to date [17]. The ultimate aim of mindfulness practice is to achieve a state of participation with awareness, since the opposite –participation without awareness– is characteristic of impulsive behaviors [18]. Through mindfulness practice, participants learn to observe and notice their experiences without reacting to them in an impulsive manner [18, 19]. Mindfulness encourages subjects to differentiate between "responding" to an event, and "reacting" to it; while reacting to events implies being carried away by the urge to act, responsiveness requires the ability to prioritize long-term goals over short-term ones [20]. Being able to do so might increase self-control, facilitate more flexible responses to events, and might also improved the ability to delay immediate gratification [21]. There is also previous evidence indicating that mindfulness training could have an effect on time perception [22, 23], as the moment-by-moment awareness cultivated in mindfulness could modify the subjective perception of time.

Correlational research has confirmed the inverse association between mindfulness and impulsivity in BPD [24, 25]. However, there is little evidence on the effects of mindfulness-based interventions on impulsivity. The research that is available shows that BPD patients trained in mindfulness display an overall improvement (versus control interventions) in the continuous performance test (CPT-II) [26]. In that study, changes in specific CPT-II parameters (hit rate, commissions, and a composite impulsivity index) explained the benefits of mindfulness training for reduced impulsivity. Nevertheless, no definitive conclusions about the impact of mindfulness on impulsivity can be drawn from that study due to its

preliminary, non-randomized design and non-active intervention control group.

In this context, we designed the present study to better understand the effects of mindfulness training on impulsivity variables. To that end, 64 individuals with BPD diagnosis were randomized to 10 weeks of either mindfulness training or another active intervention. Impulsivity was measured before and after treatment. As part of a broader view of the impulsivity construct and to examine changes from both subjective and neuropsychological perspectives, a variety of behavioral tasks and self-report instruments were included as outcome measures. Behavioral tasks assessed 3 different aspects of impulsivity: response inhibition, tolerance for delayed rewards and time estimation. Trait impulsivity was assessed using a self-reported scale. Based on previous findings [26], and considering that mindfulness efficacy has been mainly established on the grounds of non-active comparisons [27], we tested mindfulness training against another psychotherapeutic group intervention (i.e., interpersonal effectiveness training – IE-). Several reasons accounted for the election of IE as the control group: 1) contrasting mindfulness to another psychotherapeutic intervention would be more rigorous than comparing it to a non-active condition such as waiting list, 2) as both interventions were delivered in the same dose (2.5 h each week, during 10 weeks) and with the same group format, these variables (i.e., therapy dose and format) were controlled, and 3) in comparison with the other two modules of DBT (i.e., emotion regulation and distress tolerance), IE has the least overlap with mindfulness in regard to its contents, so as to expect differential effects. We hypothesized that mindfulness training would result in significantly larger improvements in impulsivity versus controls, both from trait and neuropsychological perspectives.

Method
Trial design and procedures
This was a pilot randomized, two-arm (Mindfulness and IE) study. The data presented here was obtained in a pilot randomized clinical trial exploring the effects of MT versus IE on core borderline symptoms and mindfulness-related capacities (Elices, Pascual, Portella, Feliu-Soler, Martin-Blanco, Carmona, Soler: Impact of mindfulness training on borderline personality disorder: A pilot randomized trial, submitted). (Elices et al. Impact of mindfulness training on borderline personality disorder: A pilot randomized trial, Submitted). (. Here, we report secondary data from this trial. The study was approved by the ethics committee of the Hospital de la Santa Creu i Sant Pau and carried out in accordance with the Declaration of Helsinki. Participants were informed of the study procedures and signed informed consent prior to randomization.

Patients were allocated to either mindfulness or IE training. Research Randomizer software was used to obtain randomization sets (www.randomizer.org). Sixteen sets of 4 numbers each were generated. To ensure the same number of subjects in each group, random allocation was forced and thus, each group comprised 8 individuals. The team responsible for enrolment was blind to randomization. To guarantee that participants met inclusion criteria, trained psychiatrists and psychologists blinded to the treatment assignment conducted the clinical interviews. All assessments were collected at the research centre in the presence of a supervising psychologist from our unit.

Participants

Participants were recruited from the outpatient BPD Unit at the Department of Psychiatry from the Hospital de la Santa Creu i Sant Pau from December 2011 to May 2014. A total of 92 participants were screened for eligibility and 64 were randomized, 32 to each treatment group (Fig. 1). Inclusion criteria included fulfillment of BPD diagnostic criteria (two diagnostic interviews: the Structured Clinical Interview for DSM-IV Axis II Disorders [SCID-II] and the Diagnostic Interview for Borderlines Revised [DIB-R]) and aged from 18–45 years (inclusive). Participants were excluded if they: a) had a diagnosis of drug-induced psychosis, organic brain syndrome, bipolar or psychotic disorder or mental retardation; b) were participating in any sort of

psychotherapy during the study or had participated in DBT skills groups in the past. Patients who were under pharmacological treatment were included into the study, although changes in type or dose were not allowed.

Treatment conditions

Interventions consisted of group therapy sessions of 120 min each. Participants in both conditions attended group therapy on a weekly-basis for 10 weeks. Both interventions were conducted in agreement with the DBT skills-training manual [28], with the exception that the mindfulness intervention included formal mindfulness practices. Each skill was trained separately during the clinical trial to ensure no overlap between the various DBT skills modules. Each session followed the same structure: 1) review of homework, 2) presentation and practice of a new skill and 3) new homework assignment. In accordance with the DBT framework, skills training in both groups included step-by-step instructions for each skill, rehearsal exercises, and role-playing. To provide feedback and supervision, other team members followed group sessions via a close-circuit television. Video cameras transmitted a signal but did not record.

Mindfulness skills

Two different sets of mindfulness skills (denominated "what" and "how" skills) were taught [28]. "What" skills refer to what is being trained during mindfulness
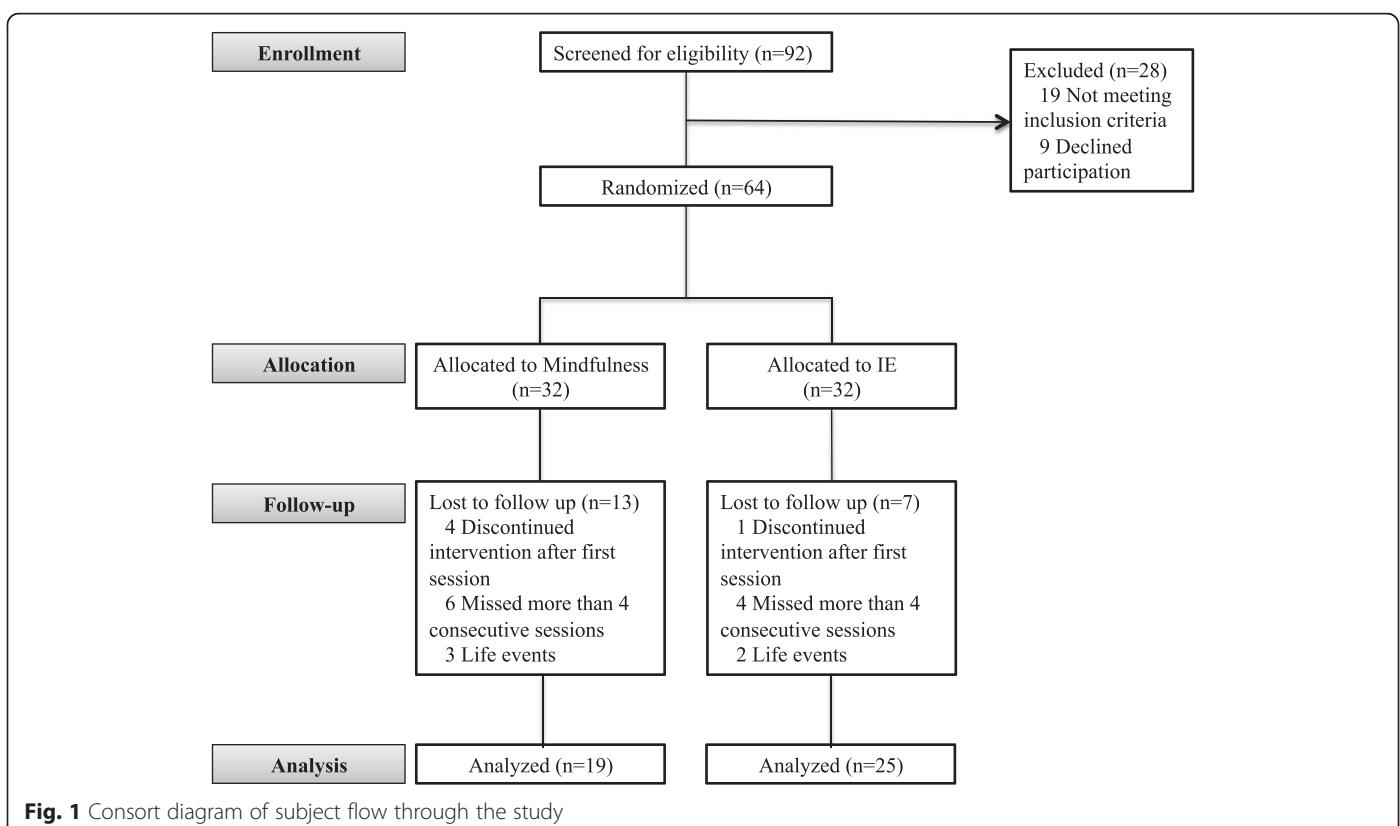
Fig. 1 Consort diagram of subject flow through the study

Soler *et al. Borderline Personality Disorder and Emotion Dysregulation* (2016) 3:1

Page 4 of 10

(observe, describe and participate) and "how" skills refer to the attitudinal component of the practice (non-judgmental attitude, focusing on one thing at a time, and being effective). Other mindfulness skills oriented to increasing acceptance of painful life events and emotions were also taught. Formal mindfulness exercises were taught, including: observing the breath, observing sounds, describing thoughts, and physical sensations and walking meditation. Exercises were practiced first during the session, and then at home. All participants received a CD with all formal meditations for home practice. Participants were instructed to decide wisely (i.e., using wise mind) the length of home-practice that was most appropriate for them. The therapist encouraged participants to practice for as long as they could and formal practice was monitored and reinforced in each group session.

Interpersonal effectiveness skills

The aim of these skills is to teach patients how to act more effectively in interpersonal interactions, to achieve their own goals without damaging relationships without losing self-respect. For that purpose, core skills of this module include: objective effectiveness, relationship effectiveness, and self-respect effectiveness [28]. In addition, skills aimed at improving the patient's ability to ask others to do things or to say no to unwanted requests were also taught.

Instruments
Diagnostic instruments

The SCID-II [29, 30] and DIB-R [2, 31] were used to ensure an accurate BPD diagnosis, as well as to screen for other personality disorders. The Spanish SCID-II is a good instrument to discriminate between Axis II personality disorders with good inter-rater reliability (Kappa of .85). The DIB-R provides BPD diagnosis over the last two years, with scores ranging from 0 to 10 (the cut-off point for BPD diagnosis in the Spanish version is 6). The DIB-R has shown good psychometric properties for internal consistency (Cronbach's alpha: .89), sensitivity (.81) and specificity (.94). To screen for current Axis I disorders, patients completed the Psychiatric Diagnostic Screening Questionnaire (PDSQ) [32]. The PDSQ is answered in a yes/no format and contains 13 sub-scales screening for several Axis I diagnosis.

Self-reported impulsivity

The BIS-11 was used to assess trait impulsivity [4]. The BIS is a 30-item scale presented on a four-point Likert scale (1 = rarely/never to 4 = always) that measures three aspects of impulsivity: (1) motor impulsiveness (acting without forethought); (2) attentional impulsiveness (the tendency to make quick, non-reflexive decisions); and

(3) non-planning impulsiveness (failure to prepare for future events).

Laboratory tasks
Response inhibition

To evaluate response inhibition, subjects underwent the Continuous Performance Test-II (CPT-II) [33] and the GoStop Impulsivity Paradigm [13]. In the CPT-II, participants are instructed to press the "space" bar whenever a letter appears on the computer screen, except when the letter X is display. The entire task includes six blocks, each of which includes 20-trial sub-blocks. The following CPT-II parameters were selected to represent impulsivity indexes [35]: (1) response style (β), in which higher β values indicate a more cautious response style; (2) commissions, which are responses given to non-targets and (3) hit reaction time, which is the average speed of correct responses. A composite impulsivity index was also calculated to provide a general measure of impulsivity [34]. This impulsivity index was calculated as: (1 / hit reaction time) × (commissions / omissions). Additionally, CPT-II profiles (i.e., the attention deficit/hyperactivity disorder [ADHD] clinical profile index) were used to obtain a measure of ADHD symptomatology.

The GoStop Impulsivity Paradigm is designed to assess the capacity to inhibit an already initiated response [13]. The task presents three trial types: 1) non-stop (go); 2) stop; and 3) novel trials. In a non-stop trial, a number identical to the previous number is presented in black. A stop trial presents a stimuli that matches the one before it, but it changes from black to red, and a novel trial consists of a different, random number: 5-digit numbers appear on the screen and subjects have to either respond (by pressing a key) if a "go" signal is presented, or withhold the response if a "stop trial" or a "novel trial" is being presented. Responses have to be made while the stimulus is still on the screen. Two primary dependent measures can be derived from this task: 1) failure to inhibit responses: number of responses made on strop trials divided by the total number of stop trials and 2) latency to respond: length of time between the onset of the go stimulus and a response.

Tolerance for delayed reward

Two laboratory tasks assessed tolerance for delayed rewards: the two choice impulsivity paradigm (TCIP) and the single key impulsivity paradigm (SKIP) [13]. In the TCIP, two different shapes appear on the computer monitor, and participants must choose one of them (by clicking with the mouse). Each shape is associated with a different delay-reward contingency; one shape is associated with a shorter delay and a smaller reward (5 points and 5 sec), and the other with a longer delay and a bigger reward (15 points, 15 s). Once the participant has

chosen one of each figures, the reward (points) earned appear on the screen. Impulsive participants are characterized by a preference for smaller-sooner rewards instead of larger-later rewards. The number of immediate choices was used as the dependent variable, the higher the number of immediate choices, the higher the impulsivity. Like the TCIP, the SKIP also evaluates tolerance for delayed rewards. The main difference between these two tasks is that the SKIP is a free-operant procedure, meaning that participants are free to make as many responses as they want, taking into consideration that the longer the time between consecutive responses, the bigger the reward. A counter at the bottom of the screen shows the participant the number of points received with each response, thus allowing the subject to infer that faster responses receive fewer points. Another counter (at the top of the screen) shows the total points earned. The total number of responses made during the session are analyzed, with more responses associated with greater impulsivity.

Time perception

The Time Paradigm test [35] was used to assess time estimation. In this task, participants press a key to start a timer and are told to press it again when they think that 1 min has passed. The task includes 5 trials; after each trial, the real time elapsed is shown on the screen, providing subjects with feedback on performance. The average of time estimated was used as the dependent variable.

Statistical analyses

Patient demographic and baseline characteristics were compared using the chi-square test (or Fisher's exact test if frequencies were < five) for categorical variables and *t*-test for continuous variables. Normal distributions were tested by visual inspection and a normality test (Kolmogorov-Smirnov, $p < .05$); for non-normal distributions, the variables were log-transformed. All analyses were performed in the completer population, defined as patients who completed the treatment according to the study protocol. Participants who missed more than 4 consecutive sessions or who abandoned after the first session were considered non-completers.

To explore associations between self-reported and neuropsychological impulsivity measures, Pearson's correlations were calculated. For this correlation analysis, Bonferroni's correction was used to control for multiple comparisons.

To evaluate treatment impact on self-report impulsivity, a repeated-measures multivariate analysis of variance (MANOVA) was performed, entering each of the BIS-11 subscale scores as dependent variables and the treatment arm (MT and IE) as the between-subject factor, and time

(pre-and post-intervention) as the within-subject factor. To assess the treatment effects on neuropsychological impulsivity another repeated-measures MANOVA was performed as follows: CPT-II (commissions, HitRT, response style and impulsivity index), SKIP (number of immediate choices), TCIP (total number of responses) and TIME (time estimation mean) variables were entered as dependent variables, treatment arm was the between-subject factor, and time (pre-post intervention) was the within-subject factor. If significant main effects were observed, post-hoc group comparisons were computed using the *t*-test. Secondarily, to explore whether ADHD symptoms might have influenced the results, the CPT-II clinical confidence index was included as a covariate for both repeated-measure MANOVAs. This index provides an estimate of the probability that any given CPT II result resembles that of a clinical profile. All analyses were conducted with SPSS for Windows, Version 19.

Results

Sample characteristics

Most participants in both groups were women (17 and 24, respectively, in the M and IE groups). The mean age was 32.41 years ($SD = 7.41$). In the DIB-R, the mean score was 7.98 ($SD = 1.25$) indicating a severe BPD profile. Current co-morbidities with Axis I diagnosis, as well as with other personality disorders, were common. The majority of patients were under pharmacological treatment, with SSRI, benzodiazepines and antipsychotics being the most commonly prescribed medications. No baseline differences between groups were found, except for "response style" on the CPT-II (mindfulness group: $M = -2.78$, $SD = 2.03$, IE group: $M = -1.54$, $SD = 1.84$, $t(1,42) = -2.08$, $p = .04$). Table 1 provides a detailed description of demographic and clinical variables by group.

Attrition along treatment

Only 19 of the 32 subjects in the mindfulness group completed treatment versus 25 of 32 in the control group. Some participants in both groups were unable to continue treatment due to incompatibility with work schedules (see Fig. 1). No statistical differences between groups in time to treatment dropout were found [Kaplan-Meier survival analyses: ($X^2 = 3.13$, $df(1)$, $p = 0.07$)].

Correlations between self-reported and behavioral impulsivity measures

As detailed in Table 2 no significant correlations were found between behavioral (CPT-II, TIME paradigm, SKIP and TCIP) and self-reported impulsivity (BIS-11). Although the motor subscale of the BIS-11 correlated significantly with the commissions index of the CPT-II

Soler *et al. Borderline Personality Disorder and Emotion Dysregulation* (2016) 3:1

Page 6 of 10

Table 1 Demographic data and clinical characteristics of the sample by treatment group

	Mindfulness (n = 19)		Interpersonal effectiveness (n = 25)		X^2/F	t	p
Demographics							
Gender n, (% females)	17	(90.0)	24	(96.0)	.72		.57
Age, M (SD)	32.95	(7.48)	32.00	(7.49)		−.41	.68
Years of education, M (SD)	12.44	(3.97)	11.41	(3.20)		−.92	.35
Marital status n, (% not married)	13	(68.4)	12	(48.0)	2.53		.28
Clinical characteristics							
DIB-R total score, M (SD)	7.71	(.98)	8.17	(1.40)		1.16	.25
Presence of Axis I co-morbidities, n (%)							
- Anxiety Disorders	17	(89.5)	19	(76.0)	1.31		.25
- Major Depressive Disorder	13	(68.4)	16	(64.0)	.09		.75
- Bulimia Nervosa	12	(63.2)	9	(36.0)	3.19		.07
- Substance Abuse Disorder	11	(57.9)	20	(80.0)	2.53		.11
Other PD diagnosis n, (%)	9	(64.3)	16	(80.0)	1.04		.31
Pharmacological treatment							
- SSRI n, (%)	15	(78.9)	14	(66.7)	.75		.38
- Benzodiazepines n, (%)	9	(47.4)	12	(57.1)	.38		.53
- Mood stabilizers n, (%)	2	(10.5)	1	(4.8)	.47		.48
- Antipsychotics n, (%)	8	(42.1)	9	(42.9)	.00		.96

Note. DIB-R Diagnostic Interview for Borderlines Revised, *PD* Personality Disorders, *SSRI* Selective serotonin reuptake inhibitor, *M* Mean, *SD* Standard Deviation

($r = .27$, $p = <.05$), this significance did not remain after applying Bonferroni's correction.

Self-reported impulsivity

For BIS-11 scores, the repeated measure MANOVA showed no significant main effect of time (pre vs. post) × group (M vs. IE) [$F(3,40) = .85$, $p = .47$]. A main effect of time was found [$F(3,40) = 4.60$, $p = .007$], specifically for the motor sub-scale [$F(1, 43) = 9.20$, $p = .004$] and

Table 2 Pearson correlations between neuropsychological measures (CPT-II, Time Paradigm, SKIP and TCIP) and self-reported impulsivity (BIS-11 subscales)

	BIS-11		
	Attentional	Motor	Non-planning
CPT-II			
Comissions	.11	.27*	.23
HitRT	.04	−.22	−.07
Response Style	.05	−.03	−.10
Impulsivity Index	.01	.23	.07
Time Paradigm	.10	−.01	−.10
SKIP	−.03	−.05	−.13
TCIP	.06	.06	.15

Note. BIS 11 Barrat Impulsiveness Scale, *CPT – II* Continuous Performance Test, *Hit RT* Hit Reaction Time, *SKIP* Single Key Impulsivity Paradigm, *TCIP* Two Choice Impulsivity Paradigm
*p < .05

for the non-planning factor [$F(1, 43) = 8.51$, $p = .006$]. To explore pre-post differences in each group, t-tests for related samples (Mpre vs. Mpost and IEpre vs. IEpost) were run. Results indicate that all BIS-11 subscales improved after mindfulness training: [Motor factor: $t(18) = 2.33$, $p = .03$, Attentional factor: $t(18) = 2.18$, $p = .04$, Non-Planning $t(18) = 5.17$, $p = <0.001$], whereas no significant pre-post differences were found in the IE group. See Table 3. In the repeated measures MANCOVA in which the CPT-II clinical confidence index was used as a covariate, the covariate was significant [$F(3, 39) = 4.95$, $p = .005$]. The main effect of time remained significant [$F(3, 39) = 3.67$, $p = .020$], but only for the motor factor [$F(1, 43) = 9.82$, $p = .003$]. See Additional file 1: Table S1.

Laboratory tasks

Most participants failed to follow the instructions of the GoStop impulsivity paradigm (i.e., many participants made 100 % right responses, which means that they responded when the number was not on the screen anymore, violating the instructions of the task), therefore the data was not suitable for statistical analysis. As a consequence, the following laboratory tasks were included in the statistical analyses: CPT-II, SKIP, TCIP and time paradigm scores. The repeated measures MANOVA showed a significant effect of time [$F(7, 36) = 2.37$, $p = .04$] for time paradigm scores [$F(1, 43) = 7.89$,

Soler *et al. Borderline Personality Disorder and Emotion Dysregulation* (2016) 3:1

Page 7 of 10

Table 3 Comparison of outcome measures (BIS-11, CPT-II, Time Paradigm, SKIP and TCIP) between participants assigned to mindfulness training (*n* = 19) and participants assigned to interpersonal effectiveness training (*n* = 25)

	Mindfulness				Interpersonal effectiveness				Time	Group	Group × Time	Cohen's d [95 % CI]
	Pre		Post		Pre		Post					
	M	SD	M	SD	M	SD	M	SD	p	p	p	
BIS-11												
Motor	18.10	3.52	15.78*	4.76	19.20	4.14	17.28	5.66	.004	.30	.77	−0.09 [−0.68, 0.51]
Attentional	19.68	2.90	18.26*	3.03	18.76	3.56	18.36	3.23	.07	.63	.30	0.32 [−0.29, 0.91]
Non-planning	23.73	6.34	21.05**	5.83	24.32	7.12	23.48	5.56	.006	.41	.13	−0.46 [−1.06, 0.15]
CPT-II												
Response Style	.72	1.20	.97	1.07	.22	.40	.30	.77	.21	.02	.50	0.22 [−0.38, 0.81]
Commissions	11.25	9.25	9.68	7.77	14.88	8.01	13.30	7.19	.09	.12	.97	0.00 [−0.60, 0.60]
Hit RT	418.30	64.60	449.03	80.08	395.27	84.27	402.95	68.31	.50	.10	.39	0.37 [−0.24, 0.97]
Impulsivity Index	26.87	5.61	24.52*	5.68	29.23	6.98	28.00	6.35	.01	.11	.23	−0.26 [−0.85, 0.34]
Time Paradigm	56.64	24.75	68.13*	32.12	51.86	12.45	53.27	12.34	.007	.11	.034	0.66 [0.04, 1.27]
SKIP	1.19	.61	1.01	.65	.96	.67	.99	.57	.35	.44	.18	0.40 [−0.21, 1.00]
TCIP	1.32	.52	1.01*	.58	1.11	.55	1.24	-56	.21	.96	.003	0.95 [0.31, 1.57]

Note. M Mean, *SD* Standard Deviation, *BIS – 11* Barrat Impulsiveness Scale, *CPT – II* Continuous Performance Test, *Hit RT* Hit Reaction Time, *SKIP* Single Key Impulsivity Paradigm, *TCIP* Two Choice Impulsivity Paradigm. Group by time interactions refers to univariate effects, *T*- test **p* < .05, ***p* < .01. Effect sizes refer to pre- and post-treatment differences

p = .007], the CPT-II impulsivity index [*F*(1, 43) = 7.33, *p* = .010], and HitRT [*F*(1, 43) = 4.15, *p* = .048]. Additionally, a significant main effect of time × group was found [*F*(7, 36) = 3.27, *p* = .009], specifically for TCIP scores [*F*(1, 43) = 9.91, *p* = .003] and scores on the time paradigm [*F*(1, 43) = 4.81, *p* = .034]. Post hoc analysis revealed significant differences in the mindfulness group: TCIP [t(18) = 2.05, *p* = .05] and time paradigm [t(18) = −3.04, *p* = .007], but not in the IE group. When exploratory *t*-test analysis were ran, participants allocated to MT showed improvements in the impulsivity index of the CPT-II [t(18) = 2.44, *p* = .025], in contrast to those receiving IE (See Table 3). In the rm-MANCOVA using the clinical index of the CPT-II as co-variate, the significant main effect of time × group remained significant [*F*(7, 35) = 3.34, *p* = .008], whereas the significant main effect of time did not [*F*(7, 35) = .67, *p* = .69]. The co-variate was not significant [*F*(7, 35) = 1.60, *p* = .16]. See Additional file 1: Table S1, Fig 2.

Discussion

The aim of the present study was to investigate the effects of mindfulness training on several impulsivity-related variables in patients with BPD. To account for the complexity of the impulsivity construct, we used a multi-modal impulsivity assessment before and after the interventions. The main findings were that, versus the control condition, mindfulness training produces significant changes (i.e., improvement) in subjective time perception and also increases tolerance for delay rewards. By contrast, mindfulness training did not yield any significant changes in self-reported impulsivity and response inhibition.

We found that MT had no significant effect on self-reported impulsivity, as evidenced by a lack of differences between groups on BIS-11 scores. Notwithstanding those results, exploratory analyses showed that participants allocated to MT improved on the three BIS-11 subscales (motor, attentional, and non-planning). These exploratory results are in line with the findings reported by Sachse, Keville and Feigenbaum [36], who also reported some improvement on these subscales after MT.

Mindfulness did have a significant effect on the capacity for delaying rewards. This finding is clinically relevant, as some maladaptive behaviors (e.g., substance abuse and self-injury) are especially linked to the inability to delay gratification [37–40]. Mindfulness practice seems to facilitate the decrease of internally-driven behaviours as individuals became less influenced by mood and urges. This is consistent with the activation of "wise mind" a mental state in which long-term consequences of behaviors are prioritized [18]. Contrary to the results on the TCIP, no significant improvements were found in the SKIP, the other paradigm used to assess tolerance for delayed rewards. It is possible that the free-operant nature of the SKIP could explain why impulsive responses were more difficult to withhold on this task versus the TCIP, thus resulting in no significant improvement in this task. It is worth mentioning that no significant correlations were found between TCIP and SKIP scores (data not reported here).

In contrast to a former study of our group [26], no significant improvements were found in regard to response inhibition. This could be related to the specific
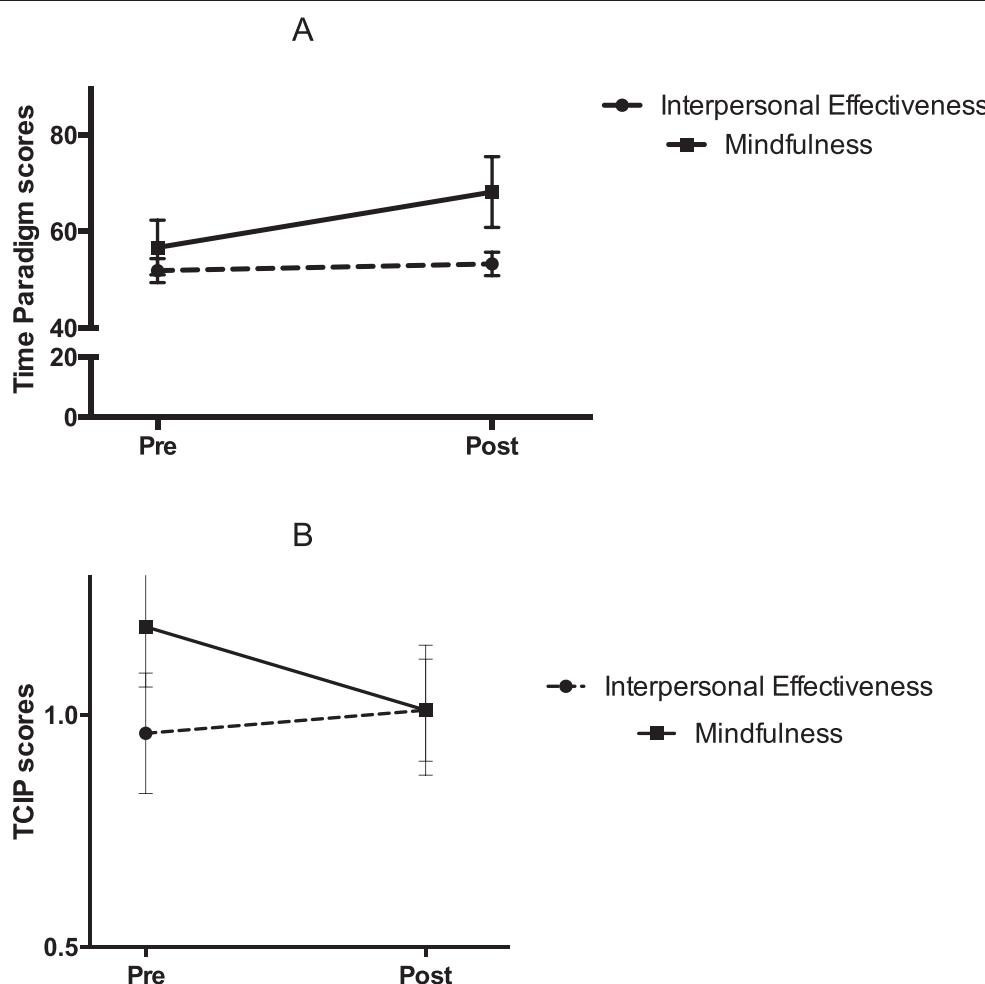
Fig. 2 a Time (pre vs. post) × group (mindfulness and interpersonal effectiveness) effects for two choice impulsivity paradigm (TCIP) scores in patients with borderline personality disorder (BPD). Values are shown as means with standard errors represented by vertical bars. Differences in pre – post mean values in the mindfulness group were significant: *p = .003. **b** Time (pre vs. post) × group (mindfulness and interpersonal effectiveness) effects for time paradigm scores in patients with borderline personality disorder (BPD). Values are shown as means with standard errors represented by vertical bars. Differences in pre – post mean values in the mindfulness group were significant: *p = .034

characteristics of this sample. One could think that high co-morbidities with bulimia nervosa and substance abuse (see Table 1) and low co-morbidities with ADHD, could explain why delay of gratification was improved after mindfulness, whereas response inhibition was not. This argument has to be taken with caution since ADHD was not directly assessed. However, the profiles obtained in the CPT-II lead us to think that ADHD symptomatology was not predominant in our sample (according to the CPT-II clinical confidence index, approximately 14 % of the whole sample displayed a profile that corresponds to an ADHD profile at 70 %). Future studies are needed to investigate the impact of MT on different BPD-profiles (i.e., with different co-morbidities).

Mindfulness also had an effect on time perception, as MT participants displayed a significant lengthening of their subjective sense of time. In line with our results, previous studies have reported an overestimation of time duration in samples of healthy controls who practiced

mindfulness [22] and in samples with extensive meditative experience [23, 43]. This could be linked to the flow of meditative practice [42, 43], as mindfulness fosters a particular way of relating to the experience [20, 21]. During mindfulness practice, inner and outer stimuli are processed more closely and more carefully, and as a consequence of this particular manner of paying attention, the flow of information processed became denser, explaining this change in time perception [42]. On this basis, it seems that the outcomes on the Time Paradigm in our study may be related to the practice of formal mindfulness exercises rather than informal mindfulness skills. Nevertheless, the association between amount/frequency of practice and our outcomes was not analyzed and therefore future studies are warranted to explore this.

The use of IE skills as a control condition also deserves a comment. The IE training was selected as the control intervention primarily—as mentioned in the

Soler *et al. Borderline Personality Disorder and Emotion Dysregulation* (2016) 3:1

Page 9 of 10

introduction—because of the lack of content overlap between IE and MT. For the purposes of this study, subjects in the IE group were completely naïve to mindfulness training and vice-versa. This design differs from standard DBT, in which some mindfulness training is delivered before IE training, and therefore IE skills might be "affected" by mindfulness. Dismantling studies of DBT skills training are necessary to determine if there is a benefit in delivering mindfulness skills before the other modules and to assess if the clinical gains of IE training could be enhanced if mindfulness skills are taught before them.

Finally, some limitations of the study need to be stress out. The main limitation is the number of dropouts (40 % in the MT group vs. 19 % in the IE group). Several factors may explain this higher dropout rate in the MT group, including motivational aspects, unwillingness to tolerate emotional distress, or difficulties in practicing formal mindfulness exercises [44]. It is also possible that the link between mindfulness practice and symptom amelioration was not explicit enough to motivate patients to continue with treatment. By contrast, patients in the IE training group might have found that content to be more closely connected to the major problems of BPD, thus explaining the better retention rate. Other factors that limit the generalizability of our findings include the presence of co-existing impulsivity-related disorders (e.g., substance abuse, eating disorders), the absence of a formal ADHD diagnosis, and the high percentage of patients under psychotropic medications. Moreover, we do not know if the frequency and length of mindfulness practice is related to the decrease in impulsivity.

Conclusions
The findings presented here suggest that mindfulness training has an impact on some but not all aspects of impulsivity. Participants in the mindfulness training group improved their ability to delay gratification, a clinically relevant finding given that low tolerance for delayed rewards is closely associated with certain maladaptive behaviors (e.g., self-injury, substance abuse) in BPD patients. In addition, mindfulness training induced significant changes in time perception, a finding that is also consistent with decreased impulsivity. Our findings need to be further replicated in larger samples to better determine the specific impact of mindfulness on the different components of impulsivity.

Additional file

Additional file 1: Comparison of outcome measures (BIS-11, CPT-II, Time Paradigm, SKIP and TCIP) between participants assigned to mindfulness training (*n* = 19) and participants assigned to interpersonal effectiveness training (*n* = 25) using the clinical confidence index of the CPT-II as covariate. (DOCX 89 kb)

Author details
[1]Servei de Psiquiatria, Hospital de la Santa Creu i Sant Pau, Av. Sant Antoni Mª Claret 167, 08025 Barcelona, Spain. [2]Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Institut d'Investigació Biomèdica - Sant Pau (IIB-Sant Pau), Barcelona, Spain. [3]Departament de Psiquiatria i Medicina Legal, Universitat Autònoma de Barcelona, Barcelona, Spain. [4]Programa de Cognición, Instituto de Fundamentos y Métodos en Psicología. Facultad de Psicología, Universidad de la República, Montevideo, Uruguay. [5]Departament de Psicologia Clínica i de la Salut, Universitat Autònoma de Barcelona, Barcelona, Spain.

References
1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. American Psychiatric Publishing;Whashigton, DC; 2013.
2. Zanarini M, Gunderson JG, Frankenburg FR, Chauncey DL. The revised diagnostic interview for borderlines: discriminating BPD from other axis II disorders. J Pers Disord. 1989;3:10–8.
3. Sebastian A, Jacob G, Lieb K, Tüscher O. Impulsivity in Borderline Personality Disorder: A Matter of Disturbed Impulse Control or a Facet of Emotional Dysregulation? Curr Psychiatry Rep. 2013;15:339.
4. Patton JH, Stanford MS, Barratt E. Factor structure of the Barratt impulsiveness scale. J Clin Psychol. 1995;51:768–74.
5. Cackowski S, Reitz A-C, Ende G, Kleindienst N, Bohus M, Schmahl C, et al. Impact of stress on different components of impulsivity in borderline personality disorder. Psychol Med. 2014;1–12.
6. Rentrop M, Backenstrass M, Jaentsch B, Kaiser S, Roth A, Unger J, et al. Response inhibition in borderline personality disorder: performance in a Go/Nogo task. Psychopathology. 2008;41:50–7.
7. Henry C, Mitropoulou V, New AS, Koenigsberg HW, Silverman J, Siever LJ. Affective instability and impulsivity in borderline personality and bipolar II disorders: similarities and differences. J Psychiatr Res. 2001;35:307–12.
8. Lampe K, Konrad K, Kroener S, Fast K, Kunert HJ, Herpertz SC. Neuropsychological and behavioural disinhibition in adult ADHD compared to borderline personality disorder. Psychol Med. 2007;37:1717–29.
9. Coffey SF, Schumacher JA, Baschnagel JS, Hawk LW, Holloman G. Impulsivity and risk-taking in borderline personality disorder with and without substance use disorders. Personal Disord. 2011;2:128–41.
10. Berlin HA, Rolls ET. Time perception, impulsivity, emotionality, and personality in self-harming borderline personality disorder patients. J Pers Disord. 2004;18:358–78.
11. Ainslie G. Specious reward: a behavioral theory of impulsiveness and impulse control. Psychol Bull. 1975;82:463–96.

12. Mischel W, Shoda Y, Rodriguez ML. Delay of gratification in children. Science. 1989;244:933–8.
13. Dougherty DM, Mathias CW, Marsh DM, Jagar A a. Laboratory behavioral measures of impulsivity. Behav Res Methods. 2005;37:82–90.
14. Bornovalova M, Lejuez CW, Daughters SB, Zachary Rosenthal M, Lynch TR. Impulsivity as a common process across borderline personality and substance use disorders. Clin Psychol Rev. 2005;25:790–812.
15. Dougherty DM, Bjork JM, Huckabee HC, Moeller FG, Swann AC. Laboratory measures of aggression and impulsivity in women with borderline personality disorder. Psychiatry Res. 1999;85:315–26.
16. Linehan MM. Cognitive-behavioral treatment of borderline personality disorder. New York, NY: Guilford Press; 1993.
17. Stoffers J, Völlm BA, Rücker G, Timmer A, Huband N, Lieb K. Psychological therapies for people with borderline personality disorder (Review). Cochrane Database Syst Rev. Cochrane D. John Wiley & Sons; 2012.
18. Linehan MM. DBT Skills Training Manual. 2nd ed. New York, NY: Guilford Press; 2014.
19. Baer RA, Smith GT, Hopkins J, Krietemeyer J, Toney L. Using self-report assessment methods to explore facets of mindfulness. Assessment. 2006;13:27–45.
20. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness. New York, NY: Delacorte; 1990.
21. Shapiro S, Carlson LE, Astin J, Freedman B. Mechanisms of mindfulness. J Clin Psychol. 2006;62:373–86.
22. Kramer RSS, Weger UW, Sharma D. The effect of mindfulness meditation on time perception. Conscious Cogn. 2013;22:846–52.
23. Droit-Volet S, Fanget M, Dambrun M. Mindfulnes meditation and relaxation training increases time sensitivity. Conscious Cogn. 2015;31:86–97.
24. Giluk TL. Mindfulness, Big Five personality, and affect: A meta-analysis. Pers Individ Dif Elsevier Ltd. 2009;47:805–11.
25. Peters JR, Erisman SM, Upton BT, Baer RA, Roemer L. A Preliminary Investigation of the Relationships Between Dispositional Mindfulness and Impulsivity. Mindfulness (N Y). 2011;2:228–35.
26. Soler J, Valdepérez A, Feliu-Soler A, Pascual JC, Portella MJ, Martín-Blanco A, et al. Effects of the dialectical behavioral therapy-mindfulness module on attention in patients with borderline personality disorder. Behav Res Ther. 2012;50:150–7.
27. Khoury B, Lecomte T, Fortin G, Masse M, Therien P, Bouchard V, et al. Mindfulness-based therapy: a comprehensive meta-analysis. Clin Psychol Rev. 2013;33:763–71.
28. Linehan MM. Skills training manual for treating borderline personality disorder. Guilford Press; New York, NY; 1993.
29 Gibbon M, Spitzer RL. User's guide for the structured clinical interview for DSM-IV axis II personality disorders: SCID-II. First MB, editor. American Psychiatric Publishing;Washigton, DC; 1997.
30. Gómez-Beneyto M, Villar M, Renovell M, Pérez M, Herández M, Leal C. The diagnosis of personality disorder with a modified version of the SCID-II in a Spanish clinical sample. J Pers Disord. 1994;8:104–10.
31. Barrachina J, Soler J, Campins MJ, Tejero A, Pascual JC, Alvarez E, et al. Validation of a Spanish version of the Diagnostic Interview for Bordelines-Revised (DIB-R). Actas españolas Psiquiatr. 2004;32:293–8.
32. Pérez Gálvez B, García Fernández L, de Vicente MM, Olivera VM. Validation of the Psychiatric Diagnostic Screening Questionnaire (PDSQ) in a Spanish sample of alcoholic patients. Adicciones. 2010;22:199–206.
33. Conners C, Conners CPT. II, for Windows. North Tonawada, NY: Multi-Health Systems; 2000.
34. Riccio CA, Reynolds CR, Lowe P, Moore J. The continuous performance test: a window on the neural substrates for attention? Arch Clin Neuropsychol. 2002;17:235–72.
35. Dougherty DM, Bjork JM, Harper RA, Marsh DM, Moeller FG, Mathias CW, et al. Behavioral impulsivity paradigms: a comparison in hospitalized adolescents with disruptive behavior disorders. J Child Psychol Psychiatry. 2003;44:1145–57.
36. Sachse S, Keville S, Feigenbaum J. A feasibility study of mindfulness-based cognitive therapy for individuals with borderline personality disorder. Psychol Psychother. 2011;84:184–200.
37. Coffey SF, Gudleski GD, Saladin ME, Brady KT. Impulsivity and rapid discounting of delayed hypothetical rewards in cocaine-dependent individuals. Exp Clin Psychopharmacol. 2003;11:18–25.
38. Kollins SH. Delay discounting is associated with substance use in college students. Addict Behav. 2003;28:1167–73.
39. Kane T, Loxton NJ, Staiger PK, Dawe S. Does the tendency to act impulsively underlie binge eating and alcohol use problems? An empirical investigation. Pers Individ Dif. 2004;36:83–94.
40. Mathias CW, Dougherty DM, James LM, Richard DM, Dawes M a, Acheson A, et al. Intolerance to delayed reward in girls with multiple suicide attempts. Suicide Life Threat Behav. 2011;41:277–86.
41. Wittmann M, Otten S, Schötz E, Sarikaya A, Lehnen H, Jo H, et al. Subjective expansion of extended time-spans in experienced meditators. Front Psychol. 2015;5:1586.
42. Siegel DJ. The Mindful Brain: Reflection and Attunement in the Cultivation of Well-Being. New York, NY: WW Norton & Company; 2007.
43. Csikszentmihalyi M. Flow: The psychology of optimal experience. New York, NY: HarperPerennial; 1991.
44. Kröger C, Harbeck S, Armbrust M, Kliem S. Effectiveness, response, and dropout of dialectical behavior therapy for borderline personality disorder in an inpatient setting. Behav Res Ther. 2013;51:411–6.

4. DISCUSIÓN GENERAL

4. DISCUSIÓN GENERAL

El objetivo general de la presente tesis ha sido investigar las características de la disregulación emocional y el mindfulness disposicional en pacientes con TLP, así como explorar la eficacia de una intervención en mindfulness. Para ello, se realizaron cuatro estudios, dos focalizados en la caracterización del trastorno y otros dos enfocados en su tratamiento. A continuación discutiremos los hallazgos más relevantes.

Estudios de caracterización: estudios 1 y 2

Los resultados del estudio 1 confirman la primera hipótesis de esta tesis y señalan, en concordancia con estudios previos (Ebner-Priemer et al., 2007; Jacob et al., 2009; Kuo & Linehan, 2009), que la disregulación emocional del TLP se caracterizaría principalmente por una alta emocionalidad basal negativa. Este estado emocional basal podría ser consecuencia de la tendencia a la rumiación (e.g., Abela, Payne, & Moussaly, 2003) y de la activación de emociones secundarias (Linehan, 1993a), que favorecen la escalada y la prolongación en el tiempo de la emoción. Este hallazgo resalta la importancia de dedicar esfuerzos terapéuticos en mejorar el estado emocional basal. En este sentido, la TDC, propone habilidades de regulación emocional dentro de las que se incluyen habilidades para disminuir la vulnerabilidad emocional y las emociones secundarias, haciendo énfasis,

simultáneamente, en aumentar las emociones positivas.

Por otra parte, los resultados de este primer estudio no confirman la segunda hipótesis de la tesis. De forma inesperada y en contraposición al modelo planteado por Linehan (1993a), los sujetos con TLP no mostraron una mayor reactividad (ni a nivel subjetivo ni fisiológico) ante los estímulos inductores de emociones discretas. Hallazgos similares ya habían sido descritos en estudios previos, en los que incluso se había observado una hipo-reactividad fisiológica (Herpertz et al., 2000) similar a la que observamos en nuestro estudio en relación a los estímulos inductores de tristeza, miedo e ira para los que se observó una disminución de la frecuencia cardíaca en el grupo de pacientes con TLP. Aunque no se encontraron diferencias entre los pacientes que recibían tratamiento con antipsicóticos y benzodiacepinas, respecto a los que no, es probable que el tratamiento farmacológico influya en la reactividad fisiológica. De todas formas, parecería ser que los pacientes con TLP sí presentan una hiperreactividad emocional ante estímulos relacionados con experiencias traumáticas, confirmándose la tercera hipótesis de la tesis. Este hallazgo es interesante puesto que parece señalar una relación particular entre la hiperreactividad emocional y determinado tipo de estímulos. Estudios previos han mostrado que los pacientes con TLP presentan un procesamiento emocional diferente a los CS en relación a estímulos vinculados con situaciones de abandono, rechazo, ira, auto-lesiones y falta de empatía (Lobbestael & Arntz, 2010; Schmahl et al., 2004). Mientras que algunos estudios han encontrado una mayor reactividad fisiológica ante este tipo de estímulos (Lobbestael & Arntz, 2010; Schmahl et al., 2004), nuestros resultados indican una mayor reactividad solamente a nivel subjetivo. Estas diferencias entre estudios podrían explicarse por el tipo de estímulo utilizado, ya que es posible que los fragmentos de películas no sean suficientemente potentes como para lograr una respuesta exagerada, mientras que, por ejemplo, la exposición a memorias autobiográficas sí lo sea (Schmahl et al., 2004). Las características de la muestra también deben ser consideradas a la hora de interpretar estos hallazgos, ya que sería esperable que los participantes con antecedentes traumáticos mostraran una respuesta emocional más exagerada ante la exposición a estos estímulos.

Como comentamos en la introducción de la tesis, los sujetos con TLP presentan niveles inferiores de mindfulness en comparación con controles, sin embargo, hasta el momento no se han realizado estudios para explorar cuales podrían ser los factores que expliquen estos déficits. Con la intención de abordar esto, en el segundo estudio se investigó la relación entre rasgos temperamentales, la presencia de experiencias traumáticas en la infancia y el mindfulness disposicional en pacientes con TLP. Corroborando parcialmente la cuarta hipótesis de la tesis, parecería ser que en sujetos con TLP la capacidad de mindfulness se relacionaría inversamente con algunos rasgos temperamentales biológicos como el neuroticismo y la impulsividad, y en menor medida, con eventos vitales estresantes. Específicamente, la faceta de "actuación consciente" se relacionó con neuroticismo y abuso sexual, y neuroticismo, impulsividad y abuso sexual fueron variables predictoras

de la capacidad de "no-juzgar". De forma inesperada, de los cinco tipos de experiencias traumáticas evaluadas por el CTQ-SF, sólo se encontró una correlación significativa –e inversa– entre abuso sexual y dos facetas del FFMQ. Considerando que el abuso sexual suele acompañarse de otras formas de abuso, por ejemplo, abuso emocional, es llamativo que sólo el primero haya correlacionado significativamente con el mindfulness. En concreto, respecto al abuso emocional, existe un estudio previo en el que se encontró una correlación entre esta forma de abuso y bajas puntuaciones en "actuación consciente" (Michal et al., 2007). Tomando en cuenta estos datos y considerando también el alto porcentaje de sujetos del estudio con puntuaciones altas en abuso emocional (i.e., 65%), hubiéramos esperado encontrar alguna asociación entre estas variables. De todas formas, y como puntualizamos anteriormente, la literatura en relación a esta tema es escasa y por tanto, existen pocos datos previos con los que comparar nuestros hallazgos.

El neuroticismo parecería afectar la capacidad de actuación consciente y junto con la impulsividad, contribuiría a la tendencia a juzgar las experiencias, una característica de los sujetos con TLP, asociada también a la gravedad del trastorno (Eisenlohr-Moul et al., 2015). El neuroticismo se asocia a un alto grado de afectividad negativa, rumiación y depresión, mientras que una alta capacidad de mindfulness implica lo opuesto, es decir, una buena regulación emocional (Giluk, 2009). Algo similar ocurre con la impulsividad, también opuesta a la capacidad de mindfulness. A pesar de lo interesante de estos resultados, debemos destacar que el diseño correlacional del estudio es una limitación que impide establecer relaciones causales entre las variables estudiadas.

Aunque nuestros resultados no demuestran una correlación significativa entre la mayoría de las sub-escalas del CTQ-SF y las facetas del FFMQ, sería interesante explorar en futuros estudios si las intervenciones basadas en mindfulness podrían ser especialmente eficaces para sujetos con TLP y experiencias traumáticas infantiles. Como proponen algunos autores (e.g., Holzel et al., 2011), la práctica de mindfulness tiene un alto componente de exposición emocional, facilitando la aceptación, el descentramiento y la no-oposición, factores clave para un adecuado reprocesamiento del trauma. De hecho, estudios realizados en otras poblaciones clínicas sugieren que el haber sufrido experiencias traumáticas en la infancia sería un factor predictor de una buena respuesta terapéutica a intervenciones basadas en mindfulness (Williams et al., 2014) y por tanto son necesarios futuros estudios que busquen esclarecer esto en el TLP.

Tanto los resultados del estudio 1 como del estudio 2, podrían dar lugar a futuros trabajos. Por ejemplo, a la luz de los hallazgos del estudio 1, sería interesante comparar la reactividad emocional de un grupo de pacientes con diagnóstico de TLP y experiencias traumáticas infantiles y un grupo con TLP sin estas experiencias. Esta comparación permitiría determinar con mayor precisión la influencia de los eventos traumáticos en la reactividad emocional. De la misma forma, la relación entre experiencias traumáticas y capacidad de mindfulness también podría estudiarse en estos dos grupos. De hecho, sería interesante poder evaluar

las asociación entre mindfulness y experiencias traumáticas en pacientes con TLP y diagnóstico de TEPT comórbido, ya que esta población podría presentar un perfil distinto al obtenido en el estudio 2.

Estudios de intervención: estudios 3 y 4

A pesar del uso extendido del mindfulness en el tratamiento del TLP, los estudios en los que se han evaluado específicamente sus efectos son escasos. Con la intención de aportar evidencia en este aspecto, en los estudios 3 y 4 de esta tesis se evaluó la eficacia de una intervención en mindfulness de 10 semanas sobre distintos aspectos de la sintomatología límite.

Los resultados del estudio 3 confirman la quinta hipótesis de esta tesis, indicando que, en comparación con una intervención de igual dosis y duración terapéutica (i.e., el módulo de efectividad interpersonal de la TDC), el entrenamiento en mindfulness resultó más eficaz para reducir la sintomatología asociada al trastorno. Esta mejora no sólo se evidenció a través de una disminución significativa en las puntuaciones del BSL-23 (escala de psicopatología característica del TLP), sino a través de índices de mejoría clínica. Considerando la muestra total (intención de tratamiento, n = 32 por grupo), un 40% de los pacientes en el grupo de mindfulness respondieron al tratamiento, mientras que solo el 13% de los participantes del grupo de IE podrían calificarse como respondedores. Estos resultados ofrecerían una explicación a estudios previos en los que se señala que las habilidades de mindfulness –junto con las de tolerancia al malestar– son las habilidades que más practican los pacientes (Lindenboim et al., 2007; Stepp et al., 2008), indicando que esta preferencia podría estar asociada a una mayor utilidad clínica respecto a otras habilidades de la TDC.

Además de esta mejoría global en la sintomatología límite, los pacientes asignados a la intervención de mindfulness también mostraron un aumento de la capacidad de decentering y de algunas facetas del mindfulness (no-juzgar y describir; estudio 3). Así como una disminución de la impulsividad reflejada en el desempeño en algunas de las pruebas utilizadas (i.e., Time Paradigm y TCIP; estudio 4). El aumento de la capacidad de decentering es importante, ya que la capacidad de distanciarse de los propios contenidos mentales se relaciona inversamente con índices psicopatológicos (Soler et al., 2014; Teasdale et al., 2002) y positivamente con procesos saludables como la auto-regulación, la flexibilidad psicológica y la exposición (Baer et al., 2006). Aunque la metodología de nuestro estudio no permite determinar mecanismos de acción, trabajos previos han señalado que el aumento del decentering subyace a la eficacia de distintas intervenciones terapéuticas y por tanto, no es exclusivo de las intervenciones basadas en mindfulness (Hayes-skelton, Calloway, Roemer, & Orsillo, 2015). .

En el FFMQ se observaron cambios en dos facetas particularmente importantes para el TLP: "describir" y "no-juzgar". La disminución de la tendencia a juzgar es particularmente

importante en pacientes con TLP, ya que ésta ha sido relacionada no sólo con el desarrollo de emociones secundarias (Linehan, 1993a), sino también con la gravedad del trastorno (Eisenlohr-Moul et al., 2015). Teniendo en cuenta las diferencias pre-post en el grupo de mindfulness, también observamos una disminución en la faceta de "no-reaccionar" del FFMQ. En conjunto, tanto los cambios en "no-juzgar", como los cambios en "no-reaccionar" indicarían un aumento de la aceptación (Baer et al., 2006), qué, en el caso particular de nuestro estudio, podría haberse potenciado por la inclusión de las habilidades de aceptación radical de la realidad. Estas habilidades pertenecen al módulo de tolerancia al malestar, pero como propone la autora de la terapia son la continuación natural de las habilidades de mindfulness ya que hacen especial hincapié en el aspecto actitudinal de la práctica, estrechamente relacionado a las habilidades "cómo" (Linehan, 2014). De hecho, resultados no publicados sugieren que una baja capacidad de aceptación sería común al TLP y otros trastornos mentales, lo que enfatiza la necesidad de trabajar estas habilidades (Tejedor, Pascual, Carmona, Elices, Martín-Blanco, & Soler: "Mindfulness traits across several mental disorders". Submitted). A pesar de lo interesante de estos resultados es importante considerarlos con cautela ya que estas significaciones se observan solamente en la sub-muestra de participantes que completan ambas intervenciones (n = 19 para el grupo de mindfulness y n = 25 para el grupo de EI).

Es interesante puntualizar que si bien la intervención en mindfulness fue más eficaz que la intervención control en la reducción de sintomatología límite, el porcentaje de abandonos fue mayor en este grupo que en el grupo control (40% vs. 19%). Este porcentaje es sensiblemente superior al reportado habitualmente en poblaciones con TLP (alrededor de un 30%; Kröger, Harbeck, Armbrust, & Kliem, 2013), habiendo distintas explicaciones posibles a este fenómeno. Teniendo en cuenta que la práctica de mindfulness no implica la modificación directa de los síntomas, sino que se focaliza en construir una nueva relación con ellos, la conexión entre la práctica de mindfulness y la mejoría de los síntomas relevantes en el TLP, puede no ser lo suficientemente explícita como para motivar al paciente a la práctica diaria. Es posible que algunos participantes no hubiesen percibido una conexión clara entre los objetivos del tratamiento y los propios objetivos terapéuticos y por tanto, hubiesen abandonado la intervención. Los abandonos también podrían relacionarse con una simple falta de motivación para la terapia o con el hecho de que el entrenamiento en mindfulness incluyera prácticas formales que pueden resultar especialmente desafiantes para pacientes con TLP (Dimidjian & Linehan, 2003). En este sentido, el refuerzo de la práctica por parte del clínico es de gran importancia, así como la adaptación de la misma a las características paciente, para realizar una exposición gradual e impedir así el abandono de la práctica.

En el estudio 4 se confirma la séptima hipótesis de la tesis, ya que observamos mejorías en algunas variables asociadas a la impulsividad: la estimación temporal y la capacidad para tolerar recompensas demoradas. Parecería ser que la práctica de mindfulness promueve un

enlentecimiento subjetivo del tiempo (Droit-Volet, Fanget, & Dambrun, 2015; Kramer, Weger, & Sharma, 2013; Wittmann et al., 2015) que puede ser consecuencia de un procesamiento de la experiencia más lento, más detallado, más curioso y atento (Csikszentmihalyi, 1991; Siegel, 2007). Por otro lado, el aumento en la tolerancia a las recompensas demoradas podría ser un hallazgos con implicaciones clínicas importantes, ya que una baja tolerancia para demorar recompensas ha sido asociada a distintas conductas desadaptativas como el abuso de sustancias, los atracones o las autolesiones (Coffey et al., 2003; Kane et al., 2004; Kollins, 2003). Son necesarios nuevos estudios para determinar si este aumento de tolerancia a la gratificación demorada observada en un contexto experimental se correlaciona con una disminución de las conductas impulsivas típicas del trastorno (e.g., consumo de tóxicos, autolesiones).

Teniendo en cuenta el carácter multi-factorial del constructo impulsividad, no es de extrañar que no se hayan observado mejorías estadísticamente significativas en todas las pruebas administradas. A diferencia de un estudio previo (Soler et al., 2012), en el estudio 4 no se observaron mejorías significativas en la capacidad de inhibir respuestas medida a través del CPT-II. Algunas diferencias entre ambos estudios, como el grupo comparativo o la ausencia de randomización en el estudio del 2012, podrían explicar esta discrepancia.

Los resultados de los estudios 3 y 4 aportan evidencia en relación a la eficacia del mindfulness para el TLP. El hecho de que no se hayan encontrado diferencias significativas pre y post intervención en el grupo de EI no implica que esta intervención no produzca ningún efecto terapéutico. Para determinar si existe una eficacia diferencial de las distintas habilidades de la TDC y para evaluar los targets terapéuticos específicos de cada módulo, son necesarios estudios en los que se comparen los distintos módulos entre sí. También son necesarios futuros trabajos para determinar la relación entre la frecuencia de práctica de las habilidades y el éxito terapéutico, un aspecto que no hemos evaluado en los estudios de 3 y 4 de esta tesis.

Aunque los resultados de los estudios de intervención son prometedores en cuanto a la eficacia del mindfulness para el TLP, es indispensable realizar más estudios para conocer cuales son los predictores de eficacia del mindfulness en el TLP, así como para determinar también cuales son los predictores de adherencia al tratamiento. A pesar de los últimos avances, hacen falta estudios controlados que comparen el mindfulness con otras intervenciones eficaces para el TLP (Khoury et al., 2013) para poder determinar si existe una superioridad de esta intervención en relación a otras y, si es así, determinar cuáles son los mecanismos de cambio del mindfulness y sus targets específicos.

En resumen, los hallazgos obtenidos en la presente tesis aportan evidencia empírica al estudio de la disregulación emocional y el mindfulness disposicional en pacientes con TLP. Asimismo, aportan evidencia de la eficacia de una intervención en mindfulness como abordaje terapéutico. Los hallazgos obtenidos apoyarían sólo parcialmente la teoría biosocial de Linehan (Linehan, 1993a), ya que, si bien confirman la elevada intensidad

basal negativa de los pacientes con TLP, al mismo tiempo desestiman la idea de una hiperreactividad emocional generalizada. En contraposición a las explicaciones teóricas, parecería ser que la hiperreactividad emocional se asociaría específicamente a estímulos relacionados con experiencias traumáticas que frecuentemente implican problemáticas a nivel interpersonal. Aunque este tipo de experiencias ambientales parecería tener un alto impacto sobre la disregulación emocional, no se asociarían al mindfulness disposicional del TLP. A la luz de estos resultados, existiría una correlación entre ciertos rasgos temperamentales, específicamente el neuroticismo y la impulsividad y el mindfulness disposicional. Finalmente, nuestros hallazgos corroboran la eficacia del mindfulness como intervención para disminuir algunos de los síntomas característicos del trastorno y aumentar las capacidades de mindfulness.

5. CONCLUSIONES

5. CONCLUSIONES

1. Los sujetos con TLP presentan, en comparación con CS, una elevada intensidad basal de emociones negativas.

2. Los sujetos con TLP no presentan, en comparación con CS, una reactividad emocional elevada en respuesta a estímulos inductores de emociones discretas.

3. Los sujetos con TLP muestran una mayor reactividad emocional ante estímulos inductores de emociones complejas y relacionados con experiencias traumáticas, al compararlos con CS.

4. El abuso sexual y los rasgos temperamentales de neuroticismo e impulsividad – pero no su interacción – se asocian a déficits en algunas facetas de mindfulness, específicamente actuación consciente y no-juzgar.

5. Los pacientes con TLP que reciben una intervención en mindfulness muestran mejorías significativas en la sintomatología característica del trastorno, en comparación con los pacientes asignados a una intervención control.

6. El entrenamiento en mindfulness produce un aumento significativo de la capacidad de decentering y de dos facetas del mindfulness: no-juzgar y describir.

7. Los pacientes que recibieron entrenamiento en mindfulness presentan una disminución de la impulsividad asociada a cambios en la estimación temporal subjetiva y a la tolerancia para las recompensas demoradas.

6. LÍNEAS DE INVESTIGACIÓN FUTURAS

6. LÍNEAS DE INVESTIGACIÓN FUTURAS

A partir de los resultados de esta tesis podemos plantear algunas líneas de investigación a desarrollarse en el futuro:

- Futuros estudios podrían explorar si el mindfulness podría ser útil como estrategia de regulación emocional, sobre todo para aquellos pacientes con diagnóstico de TLP y eventos traumáticos en la infancia. La relación entre la sintomatología nuclear del TLP y los déficits en las habilidades de mindfulness aún debe ser investigada. Conocer la relación entre las facetas del mindfulness y la inestabilidad afectiva característica del TLP, es relevante para establecer hipótesis más firmes acerca de sí los déficits en mindfulness son característicos del TLP como afirman algunos autores (e.g., Wupperman et al., 2008), o si estos son secundarios a la disregulación emocional.

- Realizar estudios de desmantelamiento del entrenamiento en habilidades de la TDC sería interesante pare conocer cuales son los componentes activos y el target específico de cada módulo.

- Se necesitan estudios que permitan determinar con mayor precisión cuáles son los mecanismos de cambio de las intervenciones en mindfulness en el TLP.

- Es relevante conocer las variables predictoras de adherencia al mindfulness en el TLP. Esto permitiría mejorar los tratamientos disponibles y determinar qué sub-grupo de pacientes se beneficiaría específicamente de esta intervención evitando las altas tasas de abandono observadas.

7. BIBLIOGRAFÍA

A

Ainslie, G. (1975). Specious reward: a behavioral theory of impulsiveness and impulse control. *Psychological Bulletin, 82*(4), 463–496.

Akiskal, H. S. (2004). Demystifying borderline personality: critique of the concept and unorthodox reflections on its natural kinship with the bipolar spectrum. *Acta Psychiatrica Scandinavica, 110*(6), 401–407.

American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders (DSM-III)* (3rd ed.). Washington, DC: American Psychiatric Publishing.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Washington, DC: American Psychiatric Publishing.

Arntz, A., Appels, C., & Sieswerda, S. (2000). Hypervigilance in borderline disorder: a test with the emotional Stroop paradigm. *Journal of Personality Disorders, 14*(4), 366–373.

B

Baer, R. a, Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report: the Kentucky inventory of mindfulness skills. *Assessment, 11*(3), 191–206.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*(1), 27–45.

Barrachina, J., Soler, J., Campins, M. J., Tejero, A., Pascual, J. C., Alvarez, E., … Pérez Sola, V. (2004). Validation of a Spanish version of the Diagnostic Interview for Bordelines-Revised (DIB-R). *Actas Españolas de Psiquiatría, 32*(5), 293–8.

Barratt, E. . (1983). The biological basis of impulsiveness: the significance of timing and rhythm disorders. *Personality and Individual Differences, 4*(4), 387–391.

Bateman, A. W., & Fonagy, P. (2004). Mentalization-based treatment of BPD. *Journal of Personality Disorders, 18*(1), 36–51.

Battle, C. L., Shea, M. T., Johnson, D. M., Yen, S., Zlotnick, C., Zanarini, M. C., … Morey, L. C. (2004). Childhood maltreatment associated with adult personality disorders: findings from the Collaborative Longitudinal Personality Disorders Study. *Journal of Personality Disorders, 18*(2), 193–211.

Beck, A. T., Freeman, A., & Davis, D. (1990). *Cognitive therapy of personality disorders*. New York, NY: Guilford Press.

Bender, D. S., Dolan, R., Skodol, A. E., Sanislow, C. A., Dyck, I. R., McGlashan, T. H., … Gunderson, J. G. (2001). Treatment utilization by patients with personality disorders. *American Journal of Psychiatry, 158*(2), 295–302.

Bergomi, C., Ströhle, G., Michalak, J., Funke, F., & Berking, M. (2013). Facing the Dreaded: Does Mindfulness Facilitate Coping with Distressing Experiences? A Moderator Analysis. *Cognitive Behaviour Therapy, 42*(1), 21–30.

Berlin, H. a, & Rolls, E. T. (2004). Time perception, impulsivity, emotionality, and personality in self-harming borderline personality disorder patients. *Journal of Personality Disorders, 18*(4), 358–78.

Berlin, H. A., Phil, D., Rolls, E. T., Sc, D., Iversen, S. D., & Ph, D. (2005). Borderline Personality Disorder, Impulsivity, and the Orbitofrontal Cortex. *American journal of psychiatry, 162*(12), 2360–2373.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., … Devins, G. (2004). Mindfulness : A Proposed Operational Definition. *Clinical Psychology: Science and Practice, 11*(3), 230–241.

Bliss, S., & McCardle, M. (2013). An Exploration of Common Elements in Dialectical Behavior Therapy, Mentalization Based Treatment and Transference Focused Psychotherapy in the Treatment of Borderline Personality Disorder. *Clinical Social Work Journal, 42*(1), 61–69.

Blum, N., Pfohl, B., John, D. St., Monahan, P., & Black, D. W. (2002). STEPPS: A cognitive-behavioral systems-based group treatment for outpatients with borderline personality disorder—a preliminary report. *Comprehensive Psychiatry,*

43(4), 301–310.

Bohus, M., Kleindienst, N., Limberger, M. F., Stieglitz, R.-D., Domsalla, M., Chapman, A. L., … Wolf, M. (2008). The Short Version of the Borderline Symptom List (BSL-23): Development and Initial Data on Psychometric Properties. *Psychopathology*, *42*(1), 32–39.

Bornovalova, M. A., Gratz, K. L., Delany-Brumsey, A., Paulson, A., & Lejuez, C. W. (2006). Temperamental and environmental risk factors for borderline personality disorder among inner-city substance users in residential treatment. *Journal of Personality Disorders*, *20*(3), 218–231.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness : Theoretical Foundations and Evidence for its Salutary Effects. *Psychological Inquiry*, *18*(4), 211–237.

C

Cackowski, S., Reitz, A.-C., Ende, G., Kleindienst, N., Bohus, M., Schmahl, C., & Krause-Utz, A. (2014). Impact of stress on different components of impulsivity in borderline personality disorder. *Psychological Medicine*, 1–12.

Carter, G. L., Willcox, C. H., Lewin, T. J., Conrad, A. M., & Bendit, N. (2010). Hunter DBT project: randomized controlled trial of dialectical behaviour therapy in women with borderline personality disorder. *The Australian and New Zealand Journal of Psychiatry*, *44*(2), 162–73.

Chapman, A. L., Leung, D. W., & Lynch, T. R. (2008). Impulsivity and Emotion Dysregulation in Borderline Personality Disorder. *Journal of Personality Disorders*, *22*(2), 148–164.

Chiesa, A., Calati, R., & Serretti, A. (2011). Does mindfulness training improve cognitive abilities? A systematic review of neuropsychological findings. *Clinical Psychology Review*, *31*(3), 449–64.

Coffey, S. F., Gudleski, G. D., Saladin, M. E., & Brady, K. T. (2003). Impulsivity and rapid discounting of delayed hypothetical rewards in cocaine-dependent individuals. *Experimental and Clinical Psychopharmacology*, *11*(1), 18–25.

Coffey, S. F., Schumacher, J. a, Baschnagel, J. S., Hawk, L. W., & Holloman, G. (2011). Impulsivity and risk-taking in borderline personality disorder with and without substance use disorders. *Personality Disorders*, *2*(2), 128–41.

Collishaw, S., Pickles, A., Messer, J., Rutter, M., Shearer, C., & Maughan, B. (2007). Resilience to adult psychopathology following childhood maltreatment: Evidence from a community sample. *Child Abuse & Neglect*, *31*(3), 211–229.

Conners, C. (2000). Conners CPT II for Windows. North Tonawada, NY: Multi-Health Systems.

Creswell, J. D., Way, B. M., Eisenberger, N. I., & Lieberman, M. D. (2007). Neural correlates of dispositional mindfulness during affect labeling. *Psychosomatic Medicine*, *69*(6), 560–5.

Crowell, S. E., Beauchaine, T. P., & Linehan, M. M. (2009). A biosocial developmental model of borderline personality: Elaborating and extending Linehan's theory. *Psychological Bulletin*, *135*(3), 495–510.

Csikszentmihalyi, M. (1991). *Flow: The psychology of optimal experience*. New York, NY: HarperPerennial.

D

Davidson, R. J. (1998). Affective style and affective disorders: Perspectives from affective neuroscience. *Cognition & Emotion*, *12*(3), 307–330.

Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F., … Sheridan, J. F. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine*, *65*(4), 564–570.

Dimidjian, S., & Linehan, M. M. (2003). Defining an Agenda for Future Research on the Clinical Application of Mindfulness Practice. *Clinical Psychology: Science and Practice*, *10*, 166–171.

Doll, A., Sorg, C., Manoliu, A., Wöller, A., Meng, C., Förstl, H., … Riedl, V. (2013). Shifted intrinsic connectivity of central executive and salience

network in borderline personality disorder. *Frontiers in Human Neuroscience, 7*, 727-740.

Domes, G., Winter, B., Schnell, K., Vohs, K., Fast, K., & Herpertz, S. C. (2006). The influence of emotions on inhibitory functioning in borderline personality disorder. *Psychological Medicine*, *36*(8), 1163–72.

Dougherty, D. M., Bjork, J. M., Huckabee, H. C., Moeller, F. G., & Swann, A. C. (1999). Laboratory measures of aggression and impulsivity in women with borderline personality disorder. *Psychiatry Research*, *85*(3), 315–26.

Droit-Volet, S., Fanget, M., & Dambrun, M. (2015). Mindfulness meditation and relaxation training increases time sensitivity. *Consciousness and Cognition, 31*, 86–97.

E

Ebner-Priemer, U. W., Badeck, S., Beckmann, C., Wagner, A., Feige, B., Weiss, I., … Bohus, M. (2005). Affective dysregulation and dissociative experience in female patients with borderline personality disorder: a startle response study. *Journal of Psychiatric Research*, *39*(1), 85–92.

Ebner-priemer, U. W., Santangelo, P., Kleindienst, N., Tuerlinckx, F., Oravecz, Z., Bohus, M., & Kuppens, P. (2015). Unraveling Affective Dysregulation in Borderline Personality Disorder : A Theoretical Model and Empirical Evidence. *Journal of Abnormal Psychology*, *124*(1), 186–198.

Ebner-Priemer, U. W., Welch, S. S., Grossman, P., Reisch, T., Linehan, M. M., & Bohus, M. (2007a). Psychophysiological ambulatory assessment of affective dysregulation in borderline personality disorder. *Psychiatry Research*, *150*(3), 265–75.

Ebner-Priemer, U. W., Welch, S. S., Grossman, P., Reisch, T., Linehan, M. M., & Bohus, M. (2007b). Psychophysiological ambulatory assessment of affective dysregulation in borderline personality disorder. *Psychiatry Research*, *150*(3), 265–75.

Eisenlohr-Moul, T. a., Peters, J. R., Chamberlain, K. D., & Rodriguez, M. a. (2015). Weekly Fluctuations in Nonjudging Predict Borderline Personality Disorder Feature Expression in Women. *Journal of Psychopathology and Behavioral Assessment*, 1–9.

F

Feliu-Soler, A., Pascual, J. C., Borràs, X., Portella, M. J., Martín-blanco, A., Armario, A., … Pérez, V. (2014). Effects of Dialectical Behaviour Therapy-Mindfulness Training on Emotional Reactivity in Borderline Personality Disorder: Preliminary Results. *Clinical Psychology & Psychotherapy*, *21*(4), 363-370.

Fitzpatrick, S., & Kuo, J. R. (2015). A comprehensive examination of delayed emotional recovery in borderline personality disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, *47*, 51–59.

G

Gabbard, G. O. (2007). Do all roads lead to Rome? New findings on borderline personality disorder. *The American Journal of Psychiatry*, *164*(6), 853–5.

Gibbon, M., & Spitzer, R. L. (1997). *User's guide for the structured clinical interview for DSM-IV axis II personality disorders: SCID-II*. Washington, DC: American Psychiatric Publishing.

Giluk, T. L. (2009). Mindfulness, Big Five personality, and affect: A meta-analysis. *Personality and Individual Differences*, *47*(8), 805–811.

Golier, J. a, Yehuda, R., Bierer, L. M., Mitropoulou, V., New, A. S., Schmeidler, J., … Siever, L. J. (2003). The relationship of borderline personality disorder to posttraumatic stress disorder and traumatic events. *The American Journal of Psychiatry*, *160*(11), 2018–2024.

Gomà-i-Freixanet, M., Soler, J., Valero, S., Pascual, J. C., & Perez, V. (2008). Discriminant validity of the ZKPQ in a sample meeting BPD diagnosis vs. normal-range controls. *Journal of Personality Disorders*, *22*(2), 178–90.

Gómez-Beneyto, M., Villar, M., Renovell, M., Pérez, M., Herández, M., & Leal, C. (1994). The diagnosis of personality disorder with a modified version of the SCID-II in a Spanish clinical sample. *Journal of Personality Disorders*, *8*, 104–10.

Gratz, K. L., Rosenthal, M. Z., Tull, M. T., Lejuez, C. W., & Gunderson, J. G. (2010). An experimental investigation of emotional reactivity and delayed emotional recovery in borderline personality disorder: the role of shame. *Comprehensive Psychiatry*, *51*(3), 275–85.

Gunderson, J. G., Stout, R. L., McGlashan, T. H., Shea, M. T., Morey, L. C., Grilo, C. M., … Skodol, A. E. (2011). Ten-Year Course of Borderline Personality Disorder: Psychopathology and Function From the Collaborative Longitudinal Personality Disorders Study. *Archives of General Psychiatry*, *68*(8), 827–837.

H

Hayes-skelton, S. A., Calloway, A., Roemer, L., & Orsillo, S. M. (2015). Decentering as a Potential Common Mechanism Across Two Therapies for Generalized Anxiety Disorder. *Journal of Consulting and Clinical Psychology*, *83*(2), 395–404.

Hazlett, E. a, Speiser, L. J., Goodman, M., Roy, M., Carrizal, M., Wynn, J. K., … New, A. S. (2007). Exaggerated affect-modulated startle during unpleasant stimuli in borderline personality disorder. *Biological Psychiatry*, *62*(3), 250–5.

Hecht, K. F., Cicchetti, D., Rogosch, F. a., & Crick, N. R. (2014). Borderline personality features in childhood: The role of subtype, developmental timing, and chronicity of child maltreatment. *Development and Psychopathology*, *26*(03), 805–815.

Henry, C., Mitropoulou, V., New, a S., Koenigsberg, H. W., Silverman, J., & Siever, L. J. (2001). Affective instability and impulsivity in borderline personality and bipolar II disorders: similarities and differences. *Journal of Psychiatric Research*, *35*(6), 307–12.

Herpertz, S. C., Kunert, H. J., Schwenger, U. B., & Sass, H. (1999). Affective responsiveness in borderline personality disorder: a psychophysiological approach. *The American Journal of Psychiatry*, *156*(10), 1550–6.

Herpertz, S. C., Werth, U., Lukas, G., Qunaibi, M., Schuerkens, A., Kunert, H. J., … Sass, H. (2001). Emotion in criminal offenders with psychopathy and borderline personality disorder. *Archives of General Psychiatry*, *58*(8), 737–745.

Herpertz, S., Schwenger, U. B., Kunert, H. J., Lukas, G., Gretzer, U., Nutzmann, J., … Sass, H. (2000). Emotional responses in patients with borderline as compared with avoidant personality disorder. *Journal of Personality Disorders*, *14*(4), 339–351.

Holzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How Does Mindfulness Meditation Work? Proposing Mechanisms of Action From a Conceptual and Neural Perspective. *Perspectives on Psychological Science*, *6*(6), 537–559.

J

Jacob, G. A., Gutz, L., Bader, K., Lieb, K., Tüscher, O., & Stahl, C. (2010). Impulsivity in borderline personality disorder: impairment in self-report measures, but not behavioral inhibition. *Psychopathology*, *43*(3), 180–8.

Jacob, G. a, Hellstern, K., Ower, N., Pillmann, M., Scheel, C. N., Rüsch, N., & Lieb, K. (2009). Emotional reactions to standardized stimuli in women with borderline personality disorder: stronger negative affect, but no differences in reactivity. *The Journal of Nervous and Mental Disease*, *197*(11), 808–15.

Jain, S., Shapiro, S. L., Swanick, S., Roesch, S. C., Mills, P. J., Bell, I., & Schwartz, G. E. R. (2007). A randomized controlled trial of mindfulness meditation versus relaxation training: effects on distress, positive states of mind, rumination, and distraction. *Annals of Behavioral Medicine*, *33*(1), 11–21.

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of

attention. *Cognitive, Affective & Behavioral Neuroscience*, *7*(2), 109–19.

Jha, A. P., Stanley, E. a, Kiyonaga, A., Wong, L., & Gelfand, L. (2010). Examining the protective effects of mindfulness training on working memory capacity and affective experience. *Emotion*, *10*(1), 54–64.

K

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York, NY: Delacorte.

Kane, T. a., Loxton, N. J., Staiger, P. K., & Dawe, S. (2004). Does the tendency to act impulsively underlie binge eating and alcohol use problems? An empirical investigation. *Personality and Individual Differences*, *36*(1), 83–94.

Kernberg, O. (1967). Borderline personality organization. *American Psychoanalytic Association*, *15*, 641–685.

Kernberg, O. (1984). *Severe personality disorders: Psychotherapeutic strategies*. New Haven, CT: Yale UP.

Kollins, S. H. (2003). Delay discounting is associated with substance use in college students. *Addictive Behaviors*, *28*(6), 1167–1173.

Koons, C. R., Robins, C. J., Tweed, J. L., Lynch, T. R., Gonzalez, A. a., Morse, J. Q., … Bastian, L. a. (2001). Efficacy of dialectical behavior therapy in women veterans with borderline personality disorder. *Behavior Therapy*, *32*, 371–390.

Kramer, R. S. S., Weger, U. W., & Sharma, D. (2013). The effect of mindfulness meditation on time perception. *Consciousness and Cognition*, *22*(3), 846–52.

Kroll, J. (1993). *PTSD/borderlines in therapy: Finding the balance*. New York, NY, US: W W Norton & Co.

Kunert, H. J., Druecke, H. W., Sass, H., & Herpertz, S. C. (2003). Frontal lobe dysfunctions in borderline personality disorder? Neuropsychological findings. *Journal of Personality Disorders*, *17*(6), 497–509.

Kuo, J. R., & Linehan, M. M. (2009). Disentangling emotion processes in borderline personality disorder: physiological and self-reported assessment of biological vulnerability, baseline intensity, and reactivity to emotionally evocative stimuli. *Journal of Abnormal Psychology*, *118*(3), 531–44.

L

Lampe, K., Konrad, K., Kroener, S., Fast, K., Kunert, H. J., & Herpertz, S. C. (2007). Neuropsychological and behavioural disinhibition in adult ADHD compared to borderline personality disorder. *Psychological Medicine*, *37*(12), 1717–29.

Lang, P., Bradley, M. M., & Cuthbert, B. N. (1999). International affective picture system (IAPS): Instruction manual and affective ratings. The center for research in psychophysiology, University of Florida.

Laporte, L., Paris, J., Guttman, H., & Russell, J. (2011). Psychopathology, childhood trauma, and personality traits in patients with borderline personality disorder and their sisters. *Journal of Personality Disorders*, *25*, 448–462.

Leichsenring, F., Leibing, E., Kruse, J., New, A. S., & Leweke, F. (2011). Borderline personality disorder. *The Lancet*, *377*(9759), 74–84.

Limberg, A., Barnow, S., Freyberger, H. J., & Hamm, A. O. (2011). Emotional vulnerability in borderline personality disorder is cue specific and modulated by traumatization. *Biological Psychiatry*, *69*(6), 574–82.

Lindenboim, N., Comtois, K. A., & Linehan, M. M. (2007). Skills Practice in Dialectical Behavior Therapy for Suicidal Women Meeting Criteria for Borderline Personality Disorder. *Cognitive and Behavioral Practice*, *14*(2), 147–156.

Linehan, M. M. (1993a). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: Guilford Press.

Linehan, M. M. (1993b). Skills training manual for treating borderline personality disorder. Guilford Press.

Linehan, M. M. (2014). *DBT Skills Training Manual* (2nd Edition.). New York, NY: Guilford Press.

Linehan, M. M., Armstrong, H. E., Suarez, A., Allmon, D., & Heard, H. L. (1991). Cognitive-Behavioral Treatment of Chronically Parasuicidal Borderline Patients. *Archives of General Psychiatry*, *48*(12), 1060-1064.

Linehan, M. M., Bohus, M., & Lynch, T. R. (2007). Dialectical Behavior Therapy for Pervasive Emotion Dysregulation. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 581–605). New York, NY: Guilford Press.

Linehan, M. M., Comtois, K. A., Murray, A. M., Brown, M. Z., Gallop, R. J., Heard, H. L., … Lindenboim, N. (2006). Two-year randomized controlled trial and follow-up of dialectical behavior therapy vs therapy by experts for suicidal behaviors and borderline personality disorder. *Archives of General Psychiatry, 63*(7), 757–66.

Linehan, M. M., Dimeff, L. a., Reynolds, S. K., Comtois, K. A., Welch, S. S., Heagerty, P., & Kivlahan, D. R. (2002). Dialectical behavior therapy versus Comprehensive Validation Therapy plus 12-step for the treatment of opioid dependent women meeting criteria for borderline personality disorder. *Drug and Alcohol Dependence*, *67*(1), 13–26.

Linehan, M. M., Korslund, K. E., Harned, M. S., Gallop, R. J., Lungu, A., Neacsiu, A. D., … Murray-gregory, A. M. (2015). Dialectical Behavior Therapy for High Suicide Risk in Individuals With Borderline Personality Disorder A Randomized Clinical Trial and Component Analysis. *JAMA, 72(5)*, 475–482.

Linehan, M. M., Schmidt, H., Dimeff, L. A., & Comtois, K. A. (1999). Dialectical Behavior Therapy for patients with borderline personality disorder and drug-dependence. *The American Journal of Addictions*, *8*, 279–292.

Linehan, M. M., Tutek, D. a., Heard, H. L., & Armstrong, H. E. (1994). Interpersonal outcome of cognitive behavioral treatment for chronically suicidal borderline patients. *American Journal of Psychiatry*, *151*(12), 1771–1776.

Lobbestael, J., & Arntz, A. (2010). Emotional, cognitive and physiological correlates of abuse-related stress in borderline and antisocial personality disorder. *Behaviour Research and Therapy*, *48*(2), 116–24.

Lobbestael, J., Arntz, A., & Bernstein, D. P. (2010). Disentangling the relationship between different types of childhood maltreatment and personality disorders. *Journal of Personality Disorders*, *24*(3), 285–95.

Loranger, A. ., Sartorius, N., Andreoli, A., Berger, P., Buchheim, P., Channabasavanna, S. M., & Regier, D. . (1994). he international personality disorder examination: The World Health Organization/Alcohol, Drug Abuse, and Mental Health Administration international pilot study of personality disorders. *Archives of General Psychiatry*, *51*(3), 215–224.

Lutz, A., Slagter, H. a, Dunne, J. D., & Davidson, R. J. (2008). Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences*, *12*(4), 163–9.

Lynch, T. R., Chapman, A. L., Rosenthal, M. Z., Kuo, J. R., & Linehan, M. M. (2006). Mechanisms of Change in Dialectical Behavior Therapy : Theoretical and Empirical Observations. *Journal of Clinical Psychology*, *62*(4), 459–480.

M

Mathias, C. W., Dougherty, D. M., James, L. M., Richard, D. M., Dawes, M. a, Acheson, A., & Hill-Kapturczak, N. (2011). Intolerance to delayed reward in girls with multiple suicide attempts. *Suicide & Life-Threatening Behavior*, *41*(3), 277–86.

McMain, S. F., Links, P. S., Gnam, W. H., Guimond, T., Cardish, R. J., Korman, L., & Streiner, D. L. (2009). A randomized trial of dialectical behavior therapy versus general psychiatric management for borderline personality disorder. *The American Journal of Psychiatry*, *166*(12), 1365–74.

McTeague, L. M., Lang, P. J., Laplante, M., Cuthbert, B. N., Shumen, J. R., & Bradley, M. M. (2010). Aversive imagery in posttraumatic stress disorder: Trauma, recurrence, comorbidity, and

physiological reactivity. *Biological Psychiatry*, *67*(4), 346–356.

Michal, M., Beutel, M. E., Jordan, J., Zimmermann, M., Wolters, S., & Heidenreich, T. (2007). Depersonalization, mindfulness, and childhood trauma. *The Journal of Nervous and Mental Disease*, *195*(8), 693–696.

Minzenberg, M. J., Fan, J., New, A. S., Tang, C. Y., & Siever, L. J. (2009). Frontolimbic structural changes in borderline personality disorder. *Journal of Psychiatric Research*, *42*(9), 727–733.

Mischel, W., Shoda, Y., & Rodriguez, M. L. (1989). Delay of gratification in children. *Science*, *244*(4907), 933–938.

N

Neacsiu, A. D., Rizvi, S. L., & Linehan, M. M. (2010). Dialectical Behavior Therapy Skills Use as a Mediator and Outcome of Treatment for Borderline Personality Disorder. *Behavior Research and Therapy*, *48*(9), 832–839.

New, A. S., Hazlett, E. a, Buchsbaum, M. S., Goodman, M., Mitelman, S. a, Newmark, R., … Siever, L. J. (2007). Amygdala-prefrontal disconnection in borderline personality disorder. *Neuropsychopharmacology : Official Publication of the American College of Neuropsychopharmacology*, *32*(7), 1629–40.

P

Paris, J. (2000). Childhood precursors of borderline personality disorder. *Psychiatric Clinics of North America*, *23*(1), 77–88.

Paris, J. (2010). Effectiveness of different psychotherapy approaches in the treatment of borderline personality disorder. *Current Psychiatry Reports*, *12*(1), 56–60.

Paris, J., & Zweig-Frank, H. (2001). A 27-year follow-up of patients with borderline personality disorder. *Comprehensive Psychiatry*, *42*(6), 482-487.

Paris, J., Zweig-Frank, H., Ng Ying Kin, N. M. .,

Schwartz, G., Steiger, H., & Nair, N. P. (2004). Neurobiological correlates of diagnosis and underlying traits in patients with borderline personality disorder compared with normal controls. *Psychiatry Research*, *121*(3), 239–252.

Pasieczny, N., & Connor, J. (2011). The effectiveness of dialectical behaviour therapy in routine public mental health settings: An Australian controlled trial. *Behaviour Research and Therapy*, *49*(1), 4–10.

Patton, J. H., Stanford, M. S., & Barratt, E. (1995). Factor structure of the Barratt impulsiveness scale. *Journal of Clinical Psychology*, *51*, 768–774.

Pérez, V., Barrachina, J., Soler, J., Campins, M. J., Puigdemont, D., & Álvarez, E. (2007). The clinical global impression scale for borderline personality disorder patients (CGI- BPD): A scale sensible to detect changes. *Actas Españolas de Psiquiatría*, *35*(0), 229–235.

Peters, J. R., Eisenlohr-moul, T. A., Upton, B. T., & Baer, R. A. (2013). Nonjudgment as a moderator of the relationship between present-centered awareness and borderline features : Synergistic interactions in mindfulness assessment. *Personality and Individual Differences*, *55*(1), 24–28.

Portella, M. J., Soler, J., Tejero, A., Barrachina, J., Tiana, T., Pascual, J. C., … Pérez, V. (2011). Slow processing in borderline personality disorder: the emotional Stroop paradigm. *Actas Españolas de Psiquiatría*, *39*(6), 356–62.

Reisch, T., Ebner-Priemer, U. W., Tschacher, W., Bohus, M., & Linehan, M. M. (2008). Sequences of emotions in patients with borderline personality disorder. *Acta Psychiatrica Scandinavica*, *118*(1), 42–8.

R

Rentrop, M., Backenstrass, M., Jaentsch, B., Kaiser, S., Roth, A., Unger, J., … Renneberg, B. (2008). Response inhibition in borderline personality disorder: performance in a Go/Nogo task. *Psychopathology*, *41*(1), 50–7.

Rosenthal, M. Z., Gratz, K. L., Kosson, D. S., Cheavens, J. S., Lejuez, C. W., & Lynch, T. R. (2008). Borderline personality disorder and emotional responding: a review of the research literature. *Clinical Psychology Review*, *28*(1), 75–91.

Ruocco, A. C., Amirthavasagam, S., & Zakzanis, K. K. (2012). Amygdala and hippocampal volume reductions as candidate endophenotypes for borderline personality disorder: a meta-analysis of magnetic resonance imaging studies. *Psychiatry Research*, *201*(3), 245–52.

S

Salvador, R., Vega, D., Pascual, J. C., Marco, J., Canales-Rodríguez, E. J., Aguilar, S., … Pomarol-Clotet, E. (2014). Converging Medial Frontal Resting State and Diffusion-Based Abnormalities in Borderline Personality Disorder. *Biological Psychiatry*, 1–10.

Scheel, C. N., Schneid, E. M., Tuescher, O., Lieb, K., Tuschen-Caffier, B., & Jacob, G. A. (2013). Effects of shame induction in borderline personality disorder. *Cognitive Therapy and Research*, *37*(6), 1160–1168.

Schmahl, C. G., Elzinga, B. M., Ebner, U. W., Simms, T., Sanislow, C., Vermetten, E., … Bremner, J. D. (2004). Psychophysiological reactivity to traumatic and abandonment scripts in borderline personality and posttraumatic stress disorders: a preliminary report. *Psychiatry Research*, *126*(1), 33–42.

Sebastian, A., Jacob, G., Lieb, K., & Tüscher, O. (2013). Impulsivity in Borderline Personality Disorder: A Matter of Disturbed Impulse Control or a Facet of Emotional Dysregulation? *Current Psychiatry Reports*, *15*(2), 339.

Shapiro, S. ., Carlson, L. E., Astin, J. ., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology*, *62*(3), 373–386.

Siegel, D. J. (2007). *The Mindful Brain: Reflection and Attunement in the Cultivation of Well-Being*. WW Norton & Company.

Sieswerda, S., Arntz, A., & Wolfis, M. (2005).

Evaluations of emotional noninterpersonal situations by patients with borderline personality disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, *36*(3), 209–225.

Skodol, A. E., Siever, L. J., Livesley, W. J., Gunderson, J. G., Pfohl, B., & Widiger, T. A. (2002). The borderline diagnosis II: biology, genetics, and clinical course. *Biological Psychiatry*, *51*(12), 951–963.

Soler, J., Franquesa, A., Feliu-Soler, A., Cebolla, A., Garcia-Campayo, J., Tejedor, R., … Portella, M. J. (2014). Assesing decentering: Validation, psychometric properities and clinical usefulness of the Experiences Questionnaire in a Spanish sample. *Behavior Therapy*, *45*(6), 863-871.

Soler, J., Pascual, J. C., Tiana, T., Cebrià, A., Barrachina, J., Campins, M. J., … Pérez, V. (2009). Dialectical behaviour therapy skills training compared to standard group therapy in borderline personality disorder: a 3-month randomised controlled clinical trial. *Behaviour Research and Therapy*, *47*(5), 353–8.

Soler, J., Valdepérez, A., Feliu-Soler, A., Pascual, J. C., Portella, M. J., Martín-Blanco, A., … Pérez, V. (2012). Effects of the dialectical behavioral therapy-mindfulness module on attention in patients with borderline personality disorder. *Behaviour Research and Therapy*, *50*(2), 150–7.

Soler, J., Vega, D., Feliu-Soler, A., Trujols, J., Soto, A., Elices, M., … Pascual, J. C. (2013). Validation of the Spanish version of the Borderline Symptom List, short form (BSL-23). *BMC Psychiatry*, *13*, 139.

Spataro, J., Mullen, P. E., Burgess, P. M., Wells, D. L., & Moss, S. A. (2004). Impact of child sexual abuse on mental health: prospective study in males and females. *British Journal of Psychiatry*, *184*, 416–421.

Stanford, M. S., & Barratt, E. S. (1996). Verbal skills, finger tapping, and cognitive tempo define a second-order factor of temporal information processing. *Brain and Cognition*, *31*(1), 35–45.

Stein, K. F. (1996). Borderline Personality Disorder. *Archives of Psychiatric Nursing, 10*(1), 32–40.

Stepp, S. D., Epler, A. J., Jahng, S., & Trull, T. J. (2008). The effect of dialectical behavior therapy skills use on borderline personality disorder features. *Journal of Personality Disorders*, *22*(6), 549–63.

Stern, A. (1938). Psychoanalytic investigation of and therapy in the borderline group of neuroses. *Psychoanalytic Quarterly*, *7*, 467–489.

Stiglmayr, C. E., Grathwol, T., Linehan, M. M., Ihorst, G., Fahrenberg, J., & Bohus, M. (2005). Aversive tension in patients with borderline personality disorder: A computer-based controlled field study. *Acta Psychiatrica Scandinavica*, *111*(5), 372–379.

Stoffers, J., Völlm, B. A., Rücker, G., Timmer, A., Huband, N., & Lieb, K. (2012). Psychological therapies for people with borderline personality disorder (Review). In *Cochrane Database of Systematic Reviews* (Cochrane D.). John Wiley & Sons.

T

Teasdale, J. D., Moore, R., Hayhurst, H., Pope, M., Williams, S., & Segal, Z. V. (2002). Metacognitive awareness and prevention of relapse in depression: empirical evidence. *Journal of Consulting and Clinical Psychology*, *70*(2), 275–287.

Teasdale, J. D., Segal, Z. V, & Williams, J. M. G. (1995). How does cognitive therapy prevent depressive relapse and why should attentional control training help? *Behavior Research and Therapy*, *33*, 25–39.

Teasdale, J. D., Segal, Z. V, Williams, J. M., Ridgeway, V. a, Soulsby, J. M., & Lau, M. a. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology*, *68*(4), 615–623.

Tebartz van Elst, L., Hesslinger, B., Thiel, T., Geiger, E., Haegele, K., Lemieux, L., … Ebert, D. (2003). Frontolimbic brain abnormalities in patients with borderline personality disorder. *Biological Psychiatry*, *54*(2), 163–171.

Torgersen, S., Kringlen, E., & Cramer, V. (2001). The prevalence of personality disorders in a community sample. *Archives of General Psychiatry*, *58*(6), 590–6.

Turner, R. . (2000). Naturalistic evaluation of dialectical behavior therapy-oriented treatment for borderline personality disorder. *Cognitive and Behavioral Practice*, *7*(4), 413–419.

V

Valentine, S. E., Bankoff, S. M., Poulin, R. M., Reidler, E. B., & Pantalone, D. W. (2015). The Use of Dialectical Behavior Therapy Skills Training as Stand-Alone Treatment: A Systematic Review of the Treatment Outcome Literature. *Journal of Clinical Psychology*, *71*(1), 1–20.

Verheul, R., Van Den Bosch, L. M. C., Koeter, M. W. J., De Ridder, M. a J., Stijnen, T., & Van Den Brink, W. (2003). Dialectical behaviour therapy for women with borderline personality disorder: 12-month, randomised clinical trial in The Netherlands. *The British Journal of Psychiatry : The Journal of Mental Science*, *182*, 135–40.

W

Wedig, M. M., Silverman, M. H., Frankenburg, F. R., Reich, D. B., Fitzmaurice, G., & Zanarini, M. C. (2012). Predictors of suicide attempts in patients with borderline personality disorder over 16 years of prospective follow-up. *Psychological Medicine*, *42*(11), 2395–2404.

Wender, P. (1977). The contribution of the adoption studies to an understanding of the phenomenology and etiology of borderline schizophrenia. In *Borderline personality disorders: the concept, the syndrome, the patient* (pp. 255–269).

Widom, C. S., Czaja, S. J., & Paris, J. (2009). A prospective investigation of borderline personality disorder in abused and neglected children followed up into adulthood. *Journal of Personality Disorders*, *23*(5), 433–446.

Williams, J. M. G., Crane, C., Barnhofer, T., Brennan, K., Danielle, S., Fennell, M. J. V, …

Russell, I. T. (2014). Mindfulness-Based Cognitive Therapy for Preventing Relapse in Recurrent Depression: A Randomized Dismantling Trial. *Journal of Consulting and Clinical Psychology*, *82*(2), 275–286.

Wilson, S. T., Stanley, B., Oquendo, M. a, Goldberg, P., Zalsman, G., & Mann, J. J. (2007). Comparing impulsiveness, hostility, and depression in borderline personality disorder and bipolar II disorder. *The Journal of Clinical Psychiatry*, *68*(10), 1533–9.

Wittmann, M., Otten, S., Schötz, E., Sarikaya, A., Lehnen, H., Jo, H., … Meissner, K. (2015). Subjective expansion of extended time-spans in experienced meditators. *Frontiers in Psychology*, *5*, 1586.

Wolf, R. C., Sambataro, F., Vasic, N., Schmid, M., Thomann, P. A., Bienentreu, S. D., & Wolf, N. D. (2011). Aberrant connectivity of resting-state networks in borderline personality disorder. *Journal of Psychiatry & Neuroscience : JPN*, *36*(6), 402–11.

Wupperman, P., Fickling, M., Klemanski, D. H., Berking, M., & Whitman, J. B. (2013). Borderline personality features and harmful dysregulated behavior: the mediational effect of mindfulness. *Journal of Clinical Psychology*, *69*(9), 903–11.

Wupperman, P., Neumann, C. S., & Axelrod, S. R. (2008). Do deficits in mindfulness underlie borderline personality features and core difficulties? *Journal of Personality Disorders*, *22*(5), 466–82.

Wupperman, P., Neumann, C. S., Whitman, J. B., & Axelrod, S. R. (2009). The role of mindfulness in borderline personality disorder features. *The Journal of Nervous and Mental Disease*, *197*(10), 766–71.

Y

Young, J. E., Klosko, J. S., & Weishaar, M. E. (2003). *Schema therapy: A practitioner`s guide*. Guilford Press.

Z

Zaheer, J., Links, P. S., & Liu, E. (2008). Assessment and Emergency Management of Suicidality in Personality Disorders. *Psychiatric Clinics of North America*, *31*(3), 527–543.

Zanarini, M. C. (1993). Borderline Personality Disorder as an impulse spectrum disorder. In J. Paris (Ed.), *Borderline personality disorder: Etiology and treatment* (pp. 67–86). Washington, DC: American Psychiatric Press.

Zanarini, M. C. (2000). Childhood experiences associated with the development of borderline personality disorder. *Psychiatric Clinics of North America*, *23*(1), 89–101.

Zanarini, M. C., & Frankenburg, F. R. (2001). Attainment and maintenance of reliability of axis I and II disorders over the course of a longitudinal study. *Comprehensive Psychiatry*, *42*(5), 369–374.

Zanarini, M. C., Frankenburg, F. R., Khera, G. S., & Bleichmar, J. (2001). Treatment histories of borderline inpatients. *Comprehensive Psychiatry*, *42*(2), 144–150.

Zanarini, M. C., Frankenburg, F. R., Reich, D. B., & Fitzmaurice, G. (2012). Attainment and stability of sustained symptomatic remission and recovery among patients Comparison Subjects : A 16-year Prospective Follow-up Study. *American Journal of Psychiatry*, *169*(5), 476–483.

Zanarini, M. C., Frankenburg, F. R., Reich, D. B., Silk, K. R., Hudson, J. I., & McSweeney, L. B. (2007). The subsyndromal phenomenology of borderline personality disorder: a 10-year follow-up study. *American Journal of Psychiatry*, *164*(6), 929–935.

Zanarini, M. C., Frankenburg, F. R., Ridolfi, M. E., Jager-Hyman, S., Hennen, J., & Gunderson, J. G. (2006). Reported childhood onset of self-mutilation among borderline patients. *Journal of Personality Disorders*, *20*(1), 9–15.

Zanarini, M., Gunderson, J. G., Frankenburg, F. R., & Chauncey, D. L. (1989). The revised diagnostic interview for borderlines: discriminating BPD from other axis II disorders. *Journal of Personality Disorders*, *3*(1), 10–18.