

## **APPLICATION OF THE MINDFULNESS-BASED STRESS REDUCTION PROGRAM TO PATIENTS WITH BORDERLINE PERSONALITY DISORDER AND CHRONIC PAIN: A PILOT STUDY**

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### **Abstract**

Chronic pain has a high comorbidity with borderline personality disorder. The aim of this study was to apply and evaluate the effectiveness of the Mindfulness-Based Stress Reduction (MBSR) program in a group of patients with both diagnoses. Twenty-four patients participated, with a mean age of 41.83 years ( $SD= 10.35$ ), and a majority women (91.7%). The program consisted of eight sessions in which training in mindfulness is central, and was developed through formal practices (yoga, sitting meditation) or informal practices (mindfulness in activities of daily life) in which attitudes as acceptance and openness were promoted. In addition to the post-intervention evaluation, a 9-month follow-up was performed. The results showed improvements in the intensity and interference of pain, anxiety, some coping strategies (cognitive reappraisal, distraction, and mental self-control), mindfulness and quality of life. These results suggest the efficacy of the MBSR program in these patients.

KEY WORDS: *borderline personality disorder, mindfulness-based stress reduction, chronic pain, emotion dysregulation.*

### **Resumen**

El dolor crónico presenta una elevada comorbilidad con el trastorno límite de la personalidad. El objetivo de este trabajo fue aplicar y evaluar la eficacia del programa "Reducción del estrés basado en atención plena" (REBAP) en un grupo de pacientes con ambos diagnósticos. Participaron 24 pacientes, con una edad media de 41,83 años ( $DT= 10,35$ ), siendo la mayoría mujeres (91,7%). El programa constó de ocho sesiones, donde el entrenamiento en conciencia plena es central, y se desarrolló a través de prácticas formales (yoga, meditación sentado) o informales (atención plena en actividades de la vida diaria) en las que se fomentaban actitudes como la aceptación, actitud del principiante o la apertura. Además de la evaluación posintervención, se realizó un seguimiento a los 9 meses. Los resultados mostraron mejoras en la intensidad e interferencia del dolor, ansiedad, algunas estrategias de afrontamiento (reevaluación cognitiva, distracción y autocontrol mental), atención

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plena y calidad de vida. Estos resultados se mantuvieron a los 9 meses y sugieren la eficacia del programa REBAP en estos pacientes.

PALABRAS CLAVE: *trastorno límite de la personalidad, reducción del estrés basado en atención plena, dolor crónico, regulación emocional.*

## Introduction

Chronic pain is defined as a persistent pain, which can be continuous or recurrent and of sufficient duration and intensity to adversely affect a patient's well-being, level of function, and quality of life (Wisconsin Medical Society Task Force on Pain Management, 2004). In fact, in our society, it can be considered an epidemic that affects 17% of the Spanish population (Torralba *et al.*, 2014). The International Association for the Study of Pain (IASP) defines pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. This description incorporates an emotional and cognitive dimension into the experience of pain; that is to say, it considers the psychological aspects involved in chronic pain. In this sense, it is understood that neurobiological and psychological learning processes and social changes intervene in pain modulation and acquire greater importance as the pain becomes more chronic (González, 2014). Some of the psychological factors studied include emotions, cognitive factors, behaviors, and personality. Notably, personality has been studied as a mediator of chronic pain, and according to the results obtained in different studies, it plays a highly important role in the development and maintenance of this problem and contributes to explaining an adequate adjustment and management of some behaviors (Naylor *et al.*, 2017). As indicated in the literature, personality traits in patients with chronic pain condition the way they experience pain and could even influence the therapeutic result (Naylor *et al.*, 2017; Soriano & Monsalve, 2019). The most widely studied personality dimensions are neuroticism, which is associated to passive or insufficient treatment strategies, catastrophism (Anarte *et al.*, 2001; Soriano & Monsalve, 2005), and extraversion. The latter has been related to the use of distraction and self-affirmation strategies (Soriano *et al.*, 2010).

The literature reveals that chronic pain is related to personality disorders (Conrad *et al.*, 2007; Fischer-Kern *et al.*, 2010; Haggard *et al.*, 2008) and especially to borderline personality disorder (BPD) (Biskin, Frankenburg, Fitzmaurice & Zanarini, 2014; Sansone & Sansone, 2012), since as some researchers suggest "pain could be one more manifestation of the dysregulation disorder that these patients present" (Sansone & Sansone, 2009). As the literature points out, BPD patients are more likely to inform about their pain and how they experience it as being more severe than people with other personality disorders do (Biskin *et al.*, 2014). In addition, within the populations with chronic pain, complaints (for example, severe pain and related somatic complaints) are more frequent among people with strong BDP traits (Tragesser *et al.*, 2010). This association between BDP and chronic pain has been explained in the literature as being related to the emotional dysregulation component that is characteristic of BDP (Carpenter *et al.*, 2019; Reynolds *et al.*, 2018; Sansone & Sansone, 2007, 2012).

Given the level of seriousness and interference in daily functioning that people diagnosed with BPD and chronic pain can suffer, the development and application of effective treatments are proposed. Medical treatments for pain relief have made great advances and have helped millions of people; however, at times they can be ineffective. The recent discovery of the complexity of intervening mechanisms would justify the adoption of a multidisciplinary perspective that includes psychological treatments (Miró, 2003). One of these is Cognitive Behavioral Therapy (CBT), which is the most used psychological approach due to its effectiveness in chronic pain management (Fairbank *et al.*, 2005; Gatchel *et al.*, 2007), especially when it is combined with medical treatment (Moix & Casado, 2011). Nevertheless, in studies conducted to evaluate the effectiveness of this type of intervention, the effect sizes obtained by the CBT were shown to be small (Williams *et al.*, 2012). This could be related to the therapeutic effect of the psychological processes hypothesized in the traditional CBT model. From this perspective, the treatment mechanism is to change the content of pain related thoughts. However, it is not quite clear whether these thoughts must be modified to decrease pain perception or to improve functioning, and it has even been demonstrated that in some cases this can have paradoxical effects (McCracken & Vowles, 2014). This being the case, there is a need to look deeper into new psychological methods and procedures that enable people with chronic pain problems to cope better with their experience, thereby leading to the introduction of new models with principles that provide a different orientation. In this sense, a different focus would be third-generation therapies, which move away from the traditional CBT philosophy aimed at eliminating human discomfort. In contrast, third-generation therapies adopt an acceptance perspective of suffering as a condition inherent to human beings, teaching people how to change responses to symptoms rather than the symptoms themselves. They question the usefulness of analysis, of modifying thoughts and of problem solving as the predominant means for successfully coping with suffering and opt for more experiential methods (McCracken & Vowles, 2014). Ultimately, third generation therapies help people understand that striving to make discomfort (and in our case pain) to completely disappear is fruitless, and they propose a change that is directed more at acceptance. One technique that incorporates this type of therapy or intervention that can put people on the path to acceptance is full awareness or mindfulness. Mindfulness based interventions have demonstrated their effectiveness in different controlled and random studies on mental disorders as well as in different health conditions, among which is chronic pain (Anheyer *et al.*, 2017; Davis *et al.*, 2015; Errasti-Perez *et al.*, 2022; Hervas *et al.*, 2016; Jones *et al.*, 2015).

One of the mindfulness-based interventions most used for the treatment of chronic pain is the Mindfulness Based Stress Reduction (MBSR) (Kabat-Zinn, 1982). Created in 1979 by Jon Kabat-Zinn of the Medical Centre of the University of Massachusetts (USA), this program was developed to help people with pain and stress typical of determined chronic diseases. Its effectiveness has been demonstrated for tolerance of pain, chronic pain, stress, anxiety, depression as well as certain medical conditions such as cancer, epilepsy and HIV, among others (Anheyer *et al.*, 2017; Bertolin, 2015; Kabat-Zinn, 1982, MacCoon *et al.*, 2011; Melero *et al.*, 2022). For the author, the program's aim was not to eliminate pain,

but to help people relate to the experience and associated problems differently. Training in mindfulness or full awareness is central throughout the sessions, and is developed through formal practices (yoga, sitting meditation) or informal practices (full attention on daily life activities) where attitudes like acceptance, beginner's mind or opening-up are encouraged through three different types of practices: 1) *body scan*, this consists of lying in a supine position then gradually scanning your whole body, paying attention to corporal sensations while doing breathing and relaxation exercises; 2) *sitting or walking meditation*, this consists of paying attention to breathing or other perceptions while sitting or walking; and 3) *Hatha yoga*, this involves doing a series of gentle exercises slowly with the purpose of being attentive to each of the sensations experienced during the movement.

Mindfulness is one of the interventions that has also been applied in the treatment of personality disorders. To be exact, borderline personality disorders (BPD) have been treated through dialectical behavior therapy (DBT; Linehan, 1993), a program that has the most empirical support. Training in mindfulness is carried out in a group and is the first training strategy, since learning this leads to the acquisition of the rest of the techniques, such as emotional regulation.

To date, there are no studies on the application of a treatment program for patients with both diagnoses. Therefore, it is necessary to find out what forms of therapy would enable people diagnosed with BPD to cope better with pain. In this context, this paper proposes the application of a therapeutic program which enables coping in patients with both types of diagnoses. The therapeutic intervention proposed is the Mindfulness Based Stress Reduction Program (MBSR), which has been chosen on the basis of the following premises: 1) There is a high comorbidity among patients with pain problems and BPD. The high level of suffering from both disorders would partly explain denial and avoidance of suffering, so the treatment strategy would be oriented towards acceptance of private experience (pain, anxiety, etc.). 2) The key component of the program is mindfulness, which is a therapeutic strategy, which BPD patients have to be trained in (according to the DBT), given their tendency to avoid or flee from their "painful" experiences. 3) This program has been shown to provide most benefits in chronic pain problems in the short and medium term (Anheyer *et al.*, 2017; Bertolín, 2015; Kabat-Zinn, 1982, MacCoon *et al.*, 2011). It is also used in patients who suffer emotional problems; for example, recurrent depressive episodes, anxiety, or stress, which are also comorbid symptoms in the population with BPD diagnosis (Bertolín, 2015). 4) The program permits the inclusion of participants with a range of physical disorders. In addition, the pain experience of patients can be worked on regardless of whether there is a medical diagnosis or not. And 5) it is a psychoeducational intervention that must be conducted by a health professional who is legally qualified to do so. The patients that participate receive different specific treatments for the symptoms associated with BPD and which are required of a more generic and unspecific intervention program.

For this reason, the aim of this study is to apply the MBSR program in patients with chronic pain and BPD diagnoses, and to analyze the results of its application after the intervention and at a nine-month follow-up. After the application of the program, patients are expected to show: 1) Improvement in their perception of

quality of life and in their psycho-social adjustment; 2) reduction in the perception and interference of pain; 3) greater use of more adaptative coping strategies for pain management; 4) reduction in anxiety, depression, and stress symptomatology; and 5) increase in full attention.

## **Method**

### *Participants*

The sample included 24 patients diagnosed with BPD and a chronic pain disorder who were attending a specialist day care center for treating people with BPD. The total sample comprised mostly women (91.7%) with a mean age of 41.83 years (DT=10.35). 50% of the sample were single, 41.7% were married, and 8.3% were divorced. Regarding occupation, 66.7% had a disability, 25 % were unemployed, and 8.3% worked. 100% were diagnosed with BPD with at least one diagnosis of physical pain. The BPD and chronic pain diagnoses were made by psychiatry and psychology professionals, who worked in the center, following the criteria of the DSM-5 (APA, 2013) and the CIE-10. The most frequent diagnosis of chronic pain was fibromyalgia (33.3%), followed by migraines (16.7%), irritable bowel syndrome (8.3%), lumbago (8.3%), and within the same percentage (4.2%) were the following disorders: neurogenic pain from spinal cord injury, sciatica, diabetic neuropathy, chronic fatigue syndrome, erythematosus lupus, rheumatoid arthritis, cervicalgia, lumbago, and scoliosis.

In addition, given the conditions of the sample (BPD symptomatology), it was considered that they could suffer from a comorbid anxiety disorder, mood disorder, eating disorder or a substance related disorder. The analysis showed that for anxiety disorders, 19 people (79.2%) were not diagnosed with any type, 3 of them (12.5%) were diagnosed with a generalized anxiety disorder, 1 of them (4.2%) with obsessive compulsive disorder (OCD) % and another (4.2%) with a specific phobia. For mood disorders (bipolar is considered to be in this category for simplification), 14 of them (58.3%) were not diagnosed for any type, 6 people (25%) were diagnosed with major recurrent depressive disorder, 1 of them (4.2%) had a bipolar disorder and 3 people (12.5%) were diagnosed with dysthymia. For eating disorders, 16 people (66.7%) were not diagnosed with anything of this type, 1 of them (4.2%) was diagnosed with restrictive anorexia nervosa, another person (4.2%) was diagnosed with bulimia nervosa and 6 (25%) were diagnosed with an unspecified behavioral eating disorder.

To be able to participate in the program the following inclusion criteria were taken into consideration: patients had to meet the BPD diagnostic criteria according to DSM-5; be diagnosed with at least one chronic pain; be over 18; and to have previously been trained in mindfulness. The following exclusion criteria were also established: current diagnosis of substance consumption; to have a maximum level 5 (moderate-severe) in severity as perceived by the doctor; and non-occurrence of self-harming or suicide attempts in the last six months. The level of severity was established according to the fundamental components of maladaptive functioning,

such as: the ability to exercise control over impulses and emotions, to develop a sense of identity, or to maintain rewarding and long-lasting relationships. Answers were given on a scale of 0 to 10, where 0 corresponded to the minimum level of severity and 10 to the maximum.

Out of the 24 people who started the program, 4 left and did not fill out the questionnaires after the intervention, and 17 patients completed the battery of questionnaires in the follow up at 9 months.

### *Instruments*

- a) *Ad-hoc interview for clinical and sociodemographic variables.* In this ad-hoc interview, we gathered information about sociodemographic data, such as: age, civil status, occupation, and level of education. We also gathered clinical information: mental illness diagnosis and type of psychological treatment, previous training in mindfulness, current psychopharmacological treatment, number of hospital admissions and suicide attempts in the last six months as well as the total number of attempts, number of parasuicide attempts and their frequency, mood as perceived by the patient, efficacy for problem solving, and severity as perceived by the doctor. In addition, and in reference to the diagnosis of pain, they were asked about the duration of the problem, and the pharmacological and psychological treatments received.
- b) *Brief Pain Inventory (BPI; Cleeland, 1989).* The BPI is a multidimensional measure that is administered rapidly and has two subscales that quantify the intensity of the pain (4 items) and its interference in activities (7 items) in the patient's life (reactive dimension). Each of the items is scored on a scale of 0 (absence of pain/interference in daily life) to ten (the worst pain imaginable/maximum effect on daily life). The 11 items provide two summary scores for each of the two dimensions, which provide information about the level of intensity and interference (low, intermediate, high) (Badia et al., 2003). In this study, Cronbach's alpha reliability was .87 for the Intensity factor and .83 for the Interference factor.
- c) *Chronic Pain Coping Questionnaire ("Cuestionario de afrontamiento ante el dolor crónico", CAD; Soriano & Monsalve 2002).* This instrument evaluates the coping strategies that chronic pain patients adopt. It consists of 31 items which evaluate the actions taken by the patient when they are in pain and responses are given on a 5-point scale ("never", "a few times", "neither many nor a few", "many times", "always") according to the degree or frequency that the indicated strategies are performed. The coping strategies are divided into six subscales, which are: a) Religion, b) Catharsis, c) Distraction, d) Mental self-control, e) Self-affirmation and d) Search for information. The questionnaire has a stable and reliable structure and explains 63.8% of the variance with an internal consistency for each factor between .77 and .94 (Soriano & Monsalve, 2002). In this study, reliability for the six scales was: Religion ( $\alpha = .91$ ), Catharsis ( $\alpha = .88$ ), Distraction ( $\alpha = .90$ ), Self-affirmation  $\alpha = (0.86)$ , Search for information ( $\alpha = .66$ ), and Mental self-control ( $\alpha = .75$ ).

- d) *Emotion Regulation Questionnaire* (ERQ; Gross & John, 2003). This instrument includes emotional regulation strategies divided into two dimensions: Emotional suppression and Cognitive reappraisal. This questionnaire has 10 items, and the participants indicate their agreement with each statement on a scale of 1= totally disagree to 7= totally agree. The Emotional suppression scale comprises 4 items and asks participants how much they tend to inhibit their emotional expression. The Cognitive reappraisal scale comprises 6 items and asks participants how much they try to think about situations differently to change what they are feeling. The Spanish version of the ERQ was shown to have adequate psychometric properties, Cronbach's alpha being .79 for Cognitive reappraisal and .73 for Emotional suppression (Cabello *et al.*, 2013). In this study, Cronbach's alpha was .56 for the Cognitive reappraisal dimension and .71 for the Emotional suppression dimension.
- e) *Depression Anxiety Stress Scales* (DASS-21; Lovibond & Lovibond, 1995). The DASS-21 consists of three scales that measure the presence and intensity of emotional states: Stress, Anxiety, and Depression. Each item is answered according to the presence and intensity of each symptom during the last week on a Likert scale of 3-points, where 0= Not applicable to me and 3= Very applicable to me, or applicable most of the time. Each scale has seven items, and the total score is calculated by adding up the items belonging to the corresponding scale multiplied by two. In addition, the anxiety, depression, and stress parameters of this instrument can be classified into the following levels: normal, mild, moderate, severe, very severe. It was validated for the Spanish population by Bados, Solana and Andrés (2005), showing adequate psychometric properties with Cronbach's alpha values from .72 to .84. In this study, we obtained Cronbach's alpha coefficients ranging between .73 and .81. In our study, Cronbach's alpha was .85 for the Anxiety factor, .84 for the Depression factor and .73 for the Stress factor.
- f) *Five Facet Mindfulness Questionnaire* (FFMQ; Baer *et al.*, 2006). This questionnaire evaluates full attention and comprises five factors: 1) Observing, 2) Describing, 3) Acting with awareness, 4) Nonjudging 5) Nonreactivity. These factors are evaluated over 39 reverse and direct scored items answered on a five-point Likert scale which varies from 1= never or very rarely true to 5= very often or always true. It was adapted to Spanish by Cebolla *et al.* (2012), and adequate psychometric properties were obtained with a reliability index of .80 (Cebolla *et al.*, 2012). Cronbach's alpha reliability obtained in this study was .75 for the Observing factor, .88 for the Describing factor, .83 for the Acting with awareness factor, .74 for Nonjudging and .77 for Nonreactivity.
- g) *Mindful Attention Awareness Scale* (MAAS; Brown & Ryan, 2003). The MAAS evaluates the frequency of mindful state in daily life (a person's general ability to be attentive and aware in the present moment). This questionnaire has 15 items that are scored on a Likert scale ranging from 1 (almost always) to 6 (almost never). The final score is the arithmetic mean of the scores given for the items, where high scores would indicate a greater mindful state. The psychometric analyses of the Spanish version of the MAAS showed good

- properties in terms of validity as well as reliability (Cronbach's  $\alpha = .89$ ) (Soler et al., 2012). The reliability obtained in our study was Cronbach's alpha of .90.
- h) *Quality of Life Index* (QLI) (Mezzich et al., 1999). This index includes 10 items answered on a Likert scale from 1= bad to 10= excellent. According to the authors, the items represent 10 aspects relevant to the evaluation of the quality of life and were selected after an exhaustive review of 21 instruments for evaluating this construct. These aspects are Psychological well-being, Physical well-being, Self-care and independent functioning, Occupational functioning, Interpersonal functioning, Emotional and social support, Community and services support, Self-fulfilment or personal fulfilment, Spiritual satisfaction, and a Global valuation of the quality of life. Each item is valued by the subject according to their personal perspective in the present moment. This index has different qualities such as adequate applicability, reliability, and validity as well as being a brief and easy instrument to use. It can also provide measures of quality of life for both clinical and nonclinical populations and can evaluate aspects not only related to illness but health as well. The homogeneity of the questionnaire was shown to be good, obtaining an alpha coefficient of .79 in its adaptation for the Spanish population (Bulacio et al., 2004). In our study, Cronbach's alpha reliability was .81.
- i) *Psychosocial Adjustment to Illness Scale* (PAIS; Derogatis & López, 1983). The PAIS comprises 46 items with a Likert response scale of 4 points from 0= no problem to 4= many difficulties. It evaluates a decline or impact in seven psychosocial areas: Attitude towards healthcare, Professional/academic environment, Domestic environment, Sexual relations, Family relationships, Social environment, and Psychological distress. This instrument provides a global score of Psychosocial Adjustment, which is the sum of the scores of each subscale. The higher an individual's score is, the worse their psychosocial adjustment will be. In the Spanish version, internal consistency of these subscales was between .70 to .90 (Neipp, 2005). In this study, Cronbach's alpha reliability obtained for the different scales ranged between .64 and .90.

### *Procedure*

First a meeting was held with the day center managers to inform them about the study and to obtain their authorization. Afterwards, the patients from the center diagnosed with BPD and chronic pain were invited to participate. Participation in the study was voluntary and informed consent was obtained from the participants. When the application of the MBSR program was initiated, it coincided with the COVID-19 lockdown period. To overcome this difficulty, we decided to carry out the program online; however, 2 of the 26 patients who were apt to participate in the program left because they did not have access to the internet.

The therapist, who was specially trained and qualified in Mindfulness and BPD, formed two groups, a morning group and an afternoon group, which would maximize patients' availability according to their timetables. At the start of the intervention all the instruments were applied. In the post intervention evaluation, we were only able to obtain responses from 20 participants, because 4 left during



the intervention. At nine months, the follow-up evaluation was made, which 17 patients participated in.

The MBSR program applied was by Kabat-Zinn (1979), which is adapted from the manual *You are not your pain* (Burch & Penman, 2017) in order to be able to apply it to these patients. Table 1 shows the content of the eight sessions of the MBSR program.

**Table 1**  
Content of MBSR program sessions

Session 1. Mindfulness
<ul style="list-style-type: none"> <li>- Explanation about mindfulness</li> <li>- Explanations about pain: primary suffering primary, secondary suffering</li> <li>- Role of mindfulness in pain</li> <li>- Exercise: body scan.</li> <li>- Tasks to do at home</li> </ul>
Session 2. Role of thoughts and emotions in pain
<ul style="list-style-type: none"> <li>- Explanation of the influence of thoughts and emotions on perception of and coping with pain</li> <li>- Characteristics of the "doing" process and the "being" process</li> <li>- Exercise: breath as anchor</li> <li>- Tasks to do at home</li> </ul>
Session 3. Conscious and everyday movement of activities
<ul style="list-style-type: none"> <li>- Explanation of conscious movement</li> <li>- Mindfulness to achieve the expansion and contraction cycle</li> <li>- Exercise: conscious movement (yoga)</li> <li>- Role of activities journal</li> <li>- Tasks to do at home</li> </ul>
Session 4. Acceptance of stress and chronic pain
<ul style="list-style-type: none"> <li>- Role of accepting of suffering</li> <li>- Establishing a baseline according to activities journal</li> <li>- Exercise: compassionate acceptance meditation</li> <li>- Tasks to do at home</li> </ul>
Session 5. Reestablishing contact with pleasant aspects of life
<ul style="list-style-type: none"> <li>- Explanation for: "negativity bias"</li> <li>- Role of compassion and focusing on pleasant aspects</li> <li>- Exercise: treasure of pleasure meditation</li> <li>- Tasks to do at home</li> </ul>
Session 6. Cultivating a compassionate vision
<ul style="list-style-type: none"> <li>- Three systems of emotional regulation</li> <li>- Cultivating a compassionate vision towards life</li> <li>- Reestablishing baseline according to activities</li> <li>- Exercise: meditation to open your heart</li> <li>- Tasks to do at home</li> </ul>
Session 7. Establishing contact with other people
<ul style="list-style-type: none"> <li>- Roseto effect: an explanation about how cultivating human relationships protects people's health</li> <li>- Exercise: meditation for connection</li> <li>- Continue working on baselines</li> <li>- Exercise: three-minute breathing space meditation</li> <li>- Tasks to do at home</li> </ul>
Session 8: Summing up of program
<ul style="list-style-type: none"> <li>- Review of basic skills covered</li> <li>- Mindfulness toolbox</li> <li>- Letter remembering achievements and reasons for continuing to practice</li> </ul>

### Data analysis

The statistical analyses for this research, which were made using the statistical software SPSS (version 23), are described below. A descriptive analysis was made of the clinical and sociodemographic variables. To test assumption of normality, we used the Kolmogorov-Smirnov test with 95% level of confidence. To analyze the different temporal moments, we used Repeated Measures Anova. Pairwise comparisons were carried out with Bonferroni.

Effect sizes were calculated using partial eta-squared ( $\eta$ ). Partial eta-squared indicates the percentage of variance in the dependent variable attributable to a specific independent variable. A commonly used interpretation is to refer to effect sizes as small  $s$  ( $\eta = .2$ ), medium ( $\eta = .5$ ) and large ( $\eta = 0,8$ ), based on the reference points suggested by Cohen (1988).

## Results

### Analysis of pre and post-intervention differences

The results showed that both *intensity* of pain and its *interference* decreased significantly after the intervention and these differences were maintained in the follow-up. Effect size was medium for the Intensity variable ( $\eta = .45$ ) as well as for the Interference variable ( $\eta = .56$ ).

There were no significant differences with respect to the variables Stress, Anxiety, and Depression.

The results related to the evaluation of coping strategies showed that of the 6 subscales used to evaluate coping, only the *distraction* and *mental self-control* strategies showed significant changes after the intervention and in the follow-up, with a medium effect size for both ( $\eta = .42$  and  $\eta = .48$ , respectively).

The results did not show any significant differences in relation to changes in emotional regulation strategies evaluated through the two dimensions *emotional suppression* and *cognitive reappraisal* of the ERQ.

For mindfulness, evaluated through the MAAS, the results showed significant differences for *mindful state in daily life*, which increased significantly with a medium effect size ( $\eta = .41$ ). The results for all the factors of mindful state (Observing, Describing, Acting with awareness, Nonjudging, and Nonreactivity) showed significantly higher mean scores after the intervention. This also occurred in the follow-up for Nonjudging and Nonreactivity, with medium and large effect sizes.

On the other hand, no significant differences were found in *psychosocial adjustment*, evaluated through the PAIS and the dimensions: Attitude towards healthcare, Professional/academic environment, Domestic environment, Sexual relations, Family relationships, Social environment, and Psychological distress.

Finally, the results referring to the *Quality of Life Index* showed significant differences after the intervention and in the follow-up with a large effect size ( $\eta = .77$ ). Table 2 shows these results.

**Table 2**  
Analysis of pre-intervention and post-intervention differences (N= 20)

Instrument/variable	Pre M (DT)	Pos M (DT)	Follow-up M (DT)	F	Bonferroni post hoc	$\eta$
BPI						
Intensity	6.54 (1.75)	5.03 (2.02)	5.14 (1.73)	6.11*	T1>T2; T1>T3	.45
Interference	7.43 (1.68)	4.64 (2.49)	4.98(2.03)	9.68**	T1>T2; T1>T3	.56
DASS-21						
Stress	13.64 (4.21)	13.05 (5.03)	13.29(4.89)	0.18	-	-
Anxiety	12.35 (5.90)	10.52 (5.40)	11.76(5.27)	2.23	-	-
Depression	15.35 (4.64)	14.05 (5.14)	13.41(5.19)	1.16	-	-
CAD						
Religion	2.55 (1.55)	2.51 (1.49)	2.50(1.29)	0.23	-	-
Catharsis	2.23 (0.95)	2.48 (1.02)	2.25(0.90)	1.20	-	-
Distraction	2.61 (1.22)	3.55 (1.04)	3.21(1.02)	10.59**	T1<T2; T1<T3	.42
Self-control	2.05 (0.85)	2.97 (0.94)	3.24(0.86)	14.00***	T1<T2; T1<T3	.48
Self-affirmation	3.28 (1.13)	3.71 (0.84)	3.48(1.00)	2.70	-	-
Search for information	3.76 (0.79)	4.00 (0.93)	3.55(1.02)	2.30	-	-
MAAS	2.85 (1.00)	3.63 (0.82)	3.44(0.56)	15.27***	T1<T2; T1<T3	.41
ERQ						
Emotional suppression	16.00 (7.31)	15.29 (4.88)	17.76 (6.73)	0.93	-	-
Cognitive reappraisal	24.11 (7.20)	24.11 (7.20)	26.58(6.31)	1.61	-	-
FFMQ						
Observing	23.82 (5.51)	28.11 (5.32)	27.23(4.60)	9.63**	T1<T2; T1<T3	.56
Describing	20.64 (7.37)	24.64 (6.92)	22.52(5.00)	10.15**	T1<T2	.57
Awareness	19.05 (6.39)	24.29 (5.33)	22.05(3.83)	9.61**	T1<T2	.56
Nonjudging	15.58 (4.03)	22.29 (4.74)	20.47(4.45)	18.05***	T1<T2; T1<T3	.70
Nonreactivity	16.05 (3.96)	22.88 (4.38)	19.94(4.16)	11.48**	T1<T2; T2>T3	.60
PAIS						
Work environment	13.84 (3.64)	12.76 (3.72)	10.69(4.28)	5.12	-	-
Domestic environment	14.58 (4.35)	13.91 (2.90)	13.83 (4.89)	0.19	-	-
Sexual relations	11.78 (4.96)	11.50 (3.85)	11.21 (5.89)	0.09	-	-
Family relationships	4.52 (2.60)	4.52 (2.60)	5.00(3.29)	0.39	-	-
Social environment	14.06 (3.60)	12.06 (4.66)	13.62(4.55)	2.99	-	-
Psychological distress	15.35 (4.58)	15.05 (4.33)	14.41(4.96)	0	-	-
QLI	3.08 (1.04)	4.14 (1.04)	4.00(0.95)	25.1***	T1<T2; T1<T3	.77

Note: BPI= Brief Pain Inventory; DASS-21= Depression Anxiety Stress Scales; CAD= Chronic Pain Coping Questionnaire; MAAS= Mindful Attention Awareness Scale; ERQ= Emotion Regulation Questionnaire; FFMQ= Five Facet Mindfulness Questionnaire; PAIS= Psychosocial Adjustment to Illness Scale; QLI= Quality of Life Index.

## Discussion

The general aim of this Master's Final Project was to apply the MBSR program to BPD diagnosed patients with chronic pain, and to analyze the results after this intervention.

After the application of the program, these patients were expected to have improved in their perception of quality of life and psychosocial adjustment. For the latter, no significant differences were found, whereas for quality of life our results confirm an improvement after the intervention and in the follow-up at nine months. These results are coherent with the literature, which shows that the application of this program also leads to improvements in other health problems (Espejo & Conde, 2018; Pbert *et al.*, 2012; García & García, 2019).

The results of this investigation confirm the second hypothesis, which predicted a decrease in the perception of pain after the intervention. The results suggest that

combining the MBSR program with the other therapies improves perception of pain intensity and this reduction in pain would in turn improve interference in daily life. As explained in the introduction, certain psychological phenomena like anxiety, depression or negative thoughts would be related to a greater perception of pain intensity, and on occasions these attitudes can trigger, maintain, or exacerbate it. Therefore, for these people, who tend towards suffering and emotional and behavioral dysregulation, reducing pain experience would be fundamental to improving their psychological adjustment.

With respect to the third hypothesis, where a greater use of coping adjustment strategies was expected after the application of the program, the results show that only strategies related to distraction and mental self-control increased significantly. An increase in the use of these two strategies would be related to the intervention, and particularly with mindfulness training and its effect on metacognition and on decentering, understood as "the ability to focus nonjudgmentally on the present towards thoughts, emotions or other experiences" (Linares *et al.*, 2016). These results would also be coherent with the definition of mindfulness as a process "which involves self-regulation of attention" (Bishop *et al.*, 2004). This would be the case for distraction focused on participation in an activity and mental self-control focused on judgements and thoughts, both of which we consider to be useful strategies in managing the experience of pain. For instance, distraction can help patients to focus on other experiences and consequently decrease self-focusing on the symptom, while mental self-control would help to manage negative thoughts and judgements towards pain.

The strategies related to emotional regulation were expected to result in a significant decrease in the variable emotional suppression and an increase in the reappraisal variable; however, the results did not show any significant differences. One possible explanation for this result could be the high emotional dysregulation that these patients experience, and how mindfulness functions in them. If we look at the emotional regulation model by Gross and John (2003), it consists of five phases: 1) situation selection and identification, 2) situation modification, 3) attentional deployment, 4) cognitive change, and 5) emotional-response modulation. The first four steps are considered antecedent to the generation of emotional response, while the fifth is related to strategies focused on emotional response itself (Navarro *et al.*, 2018). On the basis of this explanation, in these patients, the program would have a greater effect on the first stages of emotional regulation. On the other hand, it would be necessary to provide other strategies that focus on emotional modulation, which would also be coherent with the DBT model by Lineham.

The fourth hypothesis established that a reduction in anxiety, depression and stress symptomatology is expected after the program is applied; however, no significant differences were found for any of these variables. These findings are different to those obtained in previous studies; for example, in the study by Kabat-Zinn (1982, 1985) or the one by Fjorback, Arendt, Ornbøl, Fink and Walach (2011), whose systematic review showed the program's effectiveness in reducing stress, anxiety and depression. In the context of the above explanation about the high emotional dysregulation experienced by these patients, it should be noted that the

program lasted two months and focused fundamentally on mindfulness skills, which would be insufficient to be able to address the emotional complexity experienced by BPD patients. In this sense, it would be ideal to extend the number of sessions to be able to introduce more specific tools to address emotional regulation.

The last hypothesis established that an increase in full attention is expected. In this case, for the frequency measure of mindful state in daily life (evaluated with MAAS) and the evaluation of the five factors (observing, describing, acting with awareness, nonjudging and nonreactivity), the results show a significant increase in this skill with a medium effect size, which is maintained in the follow up. This hypothesis, previously based on how training in this skill would achieve improvements in mindful state and each of its attitudes, would also be explained according to the Buddhist tradition by Kabat-Zinn (1982), which postulates that attitude and commitment through practices are fundamental to the acquisition of this skill (Miró, 2006). These results reveal that training in mindfulness through the MBSR would increase full attention; a psychological skill that has a huge clinical implication for patients with both diagnoses. It has an impact on the mechanisms involved in both, such as cognitive reappraisal, emotional state, problem behaviors or coping strategies.

In conclusion, the results of this study suggest that the application of the MBSR program in BPD patients with a chronic pain diagnosis could be useful to improve the following: their perceived quality of life, their participation in social activities, the use of pain coping strategies, a decrease in pain perception and its interference in their life, and their attentional capacity. These results reveal how important it is to continue researching into the relation between BPD and chronic pain. Further exploration into the explanatory factors would contribute to designing transdiagnostic programs for both pathologies and treatment programs where both diagnoses are addressed. In the same line, taking into account the relation between both problems and the psychological interference that pain can cause (even more so in people with BPD), we consider that the problem of chronic pain should not be ignored in therapy. That is to say, it should be treated as any other coping difficulty that people with BPD have so as to help them manage their perception as well as their psychological symptomatology.

Important clinical implications can be drawn from the results of this study; nevertheless, there are some limitations, which means the results should be interpreted carefully. One limitation is the variability in the diagnoses of pain that the patients presented and the heterogeneity of other comorbid psychological diagnoses. In addition, problems in the generalization of results could arise because the sample size was small and the sex variable was not equal, since most participants were women. Likewise, we used non-randomized sampling and we did not use a control group to be able to compare the results. Another important aspect is that the patients continued with their psychological and pharmacological treatment and specific programs at the same time as the MBSR program was applied, which makes it difficult to affirm that all the changes that took place were due to its application. We would also like to point out the limitation of the PAIS instrument, since some items related to the sexual or work context were not answered by the participants because they did not identify with them. Furthermore, it would have been of interest

if the evaluation had included instruments for analyzing the characteristic symptomatology of BPD. In this way, we could have obtained information about whether the program resulted in any type of change in the characteristics specific to these patients.

In this sense, it would be useful to develop more rigorous research which includes random trials, and a long-term follow-up with larger sample sizes and a more homogeneous participation of men and women.

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