

Title: The role of emotion regulation strategies and dissociation in non-suicidal self-injury for women with
borderline personality disorder and comorbid eating disorder

Authors: María V. Navarro-Haro (Clinical Psychologist)¹, Inga Wessman, M.S. (Graduate student)⁴,
Cristina Botella (Full Professor of Clinical Psychology)^{2,3}, Azucena García-Palacios (Abnormal
Psychology Professor).^{2,3}

Institutions: 1. Cipro Hospital General de Catalunya-Institut Trastorn Limit (Spain); 2. Universitat Jaume I
(Spain); 3. Ciber Fisiopatología Obesidad y Nutrición (CB06/03 Instituto Salud Carlos III,
Spain); 4. University of Iceland (Iceland)

Abstract

Different dysfunctional emotion regulation strategies are observed in patients with borderline personality disorder (BPD) with comorbid eating disorders (ED) who report non-suicidal self-injury (NSSI). The objective of this study was to investigate the relationship of two well-defined emotion regulation strategies (i.e. expressive suppression and cognitive reappraisal) and dissociation with NSSI. The participants were sixty-eight women diagnosed with BPD and comorbid ED. A cross-sectional research design was used, and clinical interviews and self-report questionnaires were administered to collect data. Multiple regression was conducted to analyze the relationship of two emotion regulation strategies and dissociation with NSSI. According to the results, for low cognitive reappraisal scores, an increase in dissociation leads to an increase in NSSI; however, as cognitive reappraisal increases, higher dissociation is associated with fewer NSSI. When expressive suppression is low, an increase in cognitive reappraisal is associated with a decrease in NSSI; however, as suppression increases, a higher cognitive reappraisal has less effect on decreasing NSSI. These findings indicate that cognitive reappraisal reduces the harmful effects that dissociation has on NSSI and that expressive suppression interferes with the beneficial effects of cognitive reappraisal on NSSI. Therefore, targeting expressive suppression before cognitive reappraisal is conducted may enhance treatment outcomes for patients with BPD and comorbid ED.

Keywords: borderline personality disorder, non-suicidal self-injury, expressive suppression, cognitive reappraisal, dissociation.

Introduction

Borderline Personality Disorder (BPD) and Eating Disorders (EDs) present high rates of comorbidity and their co-occurrence leads to severe clinical presentations. A meta-analysis showed high rates of comorbidity between BPD and eating disorders (EDs): bulimia nervosa (21%) and binge eating disorder (9%), and lower rates of anorexia nervosa restricting subtype (3%) (Cassin, & von Ranson, 2005). Studies that focused on ED subtypes found higher comorbidity between purgative subtype of anorexia nervosa and bulimia nervosa and BPD (Diaz-Marsa, Carrasco, & Saiz, 2000; Fahy & Eisler, 1993; Garner & Sackeyfio, 1993). Co-occurrence of BPD in EDs is associated with major distortion in eating attitudes, history of frequent hospitalisations, and non-suicidal and suicidal behaviours (APA, 2006; Ben-Porath, Wisniewski, & Warren, 2009; Chen et al., 2009) as well as poor treatment outcomes (e.g. Westen & Harnden-Fischer, 2001). These data encourage the need to study the factors that contribute to the maintenance of BPD and EDs and its comorbidity.

Difficulties in regulating emotions are considered a core feature of borderline personality disorder (BPD; i.e., Crowell, Beauchaine, & Linehan, 2009; Linehan et al., 1993a; McGlashan et al., 2005) as well as of other emotional disorders such as eating disorders (EDs), and anxiety and depressive disorders (Ellard, Fairholme, Boisseau, Farchione, & Barlow, 2010). A study comparing participants diagnosed of EDs, major depression disorder (MDD), and BPD with healthy controls revealed that more difficulties in emotion regulation were reported in the clinical groups than by healthy controls. However, no difference in emotion dysregulation was found between the clinical groups (Svaldi, Griepenstroh, Tuschen-Caffier, & Ehring, 2012). Thus, emotion dysregulation may be considered a transdiagnostic risk and/or maintenance factor of EDs, MDD, and BPD rather than being disorder-specific.

Despite the well-known adverse effects of several emotion regulation strategies on functioning, there is little research into the commonly-used strategies in clinical populations. Gross and John (2003) identified two well-defined and commonly-used emotion regulation strategies in non-clinical populations.

The first strategy, *cognitive reappraisal*, is defined as a form of cognitive change that involves reinterpreting the meaning of a potentially emotion-eliciting situation and thereby changing the trajectory of an emotional response (Lazarus & Alfert, 1964). The second strategy, *expressive suppression*, is a form of response modulation that involves voluntarily inhibiting ongoing emotion-expressive behavior (Gross & John, 2003). Gross and John studied individual differences in the use of these two emotion regulation strategies and how they relate to healthy adaptation in the general population. They found that, although participants who used *expressive suppression* showed much less expressive behavior, they experienced greater negative affect than participants who used cognitive reappraisal. Using expressive suppression implies an effort to change response tendencies as they arise continually, and also creates a discrepancy between internal and external experiences. This process leads to "negative feelings about the self and alienating the individual from others, impeding the development of emotionally close relationships" (John & Gross, 2004). By contrast, the use of cognitive reappraisal decreased both the experiential aspect and the behavioral expression of undesired emotions and it is associated with less negative affect, higher interpersonal functioning and wellbeing (Gross & John, 2003). In addition, Abramowitz, Tolin, and Street (2001) showed that deliberate efforts to suppress thoughts lead to an increase in their frequency, which might ultimately cause an increase in emotion regulation psychopathology. In summary, the research literature suggests that although expressive suppression is likely to reduce distress temporarily, the long-term effects of experiential avoidance as an emotion regulation strategy may be an increased psychopathology. Cognitive reappraisal as an emotion regulation strategy has been less studied in clinical populations.

BPD features are also associated with the use of escape and avoidance strategies to cope with undesired thoughts and emotions (e.g., Bijttebier & Vertommen, 1999; Chapman, Specht, & Cellucci, 2005). Experiential avoidance is broadly defined as attempts to avoid or escape thoughts, images, emotions, memories, physical sensations, or other internal experiences, even when this strategy, causes behavioral harm in the long-term (Hayes, Strosahl, & Wilson, 1999). According to the research literature,

thought suppression—a strategy to escape or avoid undesired internal experiences—is a significant mediator between undesired affect reactivity and intensity and BPD symptomatology, even after controlling for a history of childhood sexual abuse (Rosenthal, Cheavens, Lejuez, & Lynch, 2005; Rosenthal et al., 2008). Another study revealed a positive association between the frequency of using emotional suppression or experiential avoidance and BPD severity (Chapman, Rosenthal, & Leung, 2009). These studies confirm that experiential avoidance is associated with maladaptive functioning in individuals with BPD.

Non-suicidal self-injury (NSSI) has been defined as the deliberate, self-inflicted destruction of body tissue without suicidal intent and for purposes not socially sanctioned (International Society for the Study of Self-Injury, [ISSI], 2007). NSSI is one of the most common dysfunctional behaviors in BPD, with prevalence rates of up to 84% (Clarkin, Widiger, Frances, Hurt, & Gilmore, 1983; McGlashan et al., 2005). The occurrence of NSSI in patients with eating disorders (EDs) is also common, ranging between 25.4% and 55.2% (Muehlenkamp, Claes, Peat, Smits, & Vandereycken, 2011; Svirko & Hawton, 2007). One of the most important functions of self-injury is alleviating negative emotions (Klonsky & Muehlenkamp, 2007; Nock & Prinstein, 2004). In patients with BPD research suggests that NSSI may be considered a maladaptive coping strategy (Welch, Linehan, Sylvers, Chittams, & Rizvi, 2008). In a research study the tendency to suppress unpleasant thoughts and/or emotions has been associated with a higher use of NSSI among incarcerated women with BPD but not among non-BPD individuals (Chapman et al., 2005). Moreover, in two other studies results showed that NSSI is seen as a means of providing relief from undesired thoughts and/or emotions (Chapman, Gratz, & Brown, 2006) or to escape from or avoid undesired emotions, situations, or aversive tension (Kleindienst et al., 2008) among BPD population. In addition, affect dysregulation, affective lability as well as dissociation are some of the factors that appear to positively influence the relationship between EDs and NSSI (Kostro, Lerman, & Evelyn, 2014). Considering these findings, NSSI may be maintained by a difficulty in regulating emotions in both BPD and comorbid EDs.

Dissociative symptoms (e.g., detachment from physical and emotional experiences) are also highly present in BPD and may influence psychological reactions to emotional stimuli (e.g., Barnow et al., 2010; Korzekwa, Dell, Links, Thabane, & Fougere, 2009; Stiglmayr, Braakmann, Haaf, Stieglitz, & Bohus, 2003). Research has demonstrated that if dissociation functions as a conditioned emotion regulation strategy, it becomes an automatized response to even minor stressors, which interferes with the processing of emotional information (e.g., Oathes & Ray, 2008; Schore, 2009). Leibenluft, Gardner, and Cowdry (1987) suggested that individuals with BPD can experience dissociation as a dysphoric state or maybe they are in a dissociated state when they self-injure. Research results support the later claim, higher dissociation scores have been associated with individuals who reported self-injury (Paris, 2005; Zweig-Frank, Paris, & Guzder, 1994). Furthermore, laboratory studies have revealed reduced pain sensitivity in BPD patients who self-injure under stress conditions (e.g., Bohus et al., 2000; Schmahl et al., 2006; Shearer, 1994), and self-reported pain insensitivity and dissociative features are positively correlated (Ludaescher et al., 2007). These findings suggest that dissociation can be seen as an experiential avoidance strategy that may decrease awareness or processing of pain (and maybe other emotions) in individuals with BPD when they self-injure.

Considering the aforementioned, the importance of studying the effects of specific emotion regulation strategies and dissociation on NSSI is evident. The purpose of the current analysis was to examine the relationship of two emotion regulation strategies (i.e., expressive suppression and cognitive reappraisal) and dissociation with NSSI in women with BPD and comorbid ED. Since NSSI may be considered a maladaptive coping strategy that temporarily reduces undesired thoughts and/or emotions, and dissociation is commonly reported when individuals with BPD and ED self-injure, we expected to find interaction effects between emotion regulation strategies and dissociation on NSSI. We hypothesized that expressive suppression will be related to an increase in dissociation and NSSI, whereas cognitive reappraisal will be related with a decrease in dissociation and NSSI. The results of this study

could contribute to a better understanding of NSSI in women with BPD and comorbid ED, which may inform treatment planning and result in better treatment outcomes for these patients.

Methods

Participants

Participants were recruited from a private clinic specializing in personality disorders and EDs. A total of 131 participants were screened for inclusion and exclusion criteria, which were part of a clinical trial evaluating a treatment for BPD and comorbid ED. The clinical research ethics review board at the clinical center approved this study. After giving a full description of the study, a written informed consent was obtained from all participants. The inclusion criteria for the clinical trial were: 1) meeting DSM-IV diagnostic criteria for BPD as assessed by the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First, Gibbon, Spitzer, Williams, Benjamin, 1997); 2) meeting DSM-IV diagnostic criteria for ED as assessed by the Eating Disorders Clinical Interview (Perpiñá, Botella, and Baños, 2006), which is a semi-structured diagnostic interview; and 3) being 18 years or older. The exclusion criteria consisted of: 1) meeting current DSM-IV diagnostic criteria for alcohol or other psychoactive substance dependence; 2) a current DSM-IV diagnosis of bipolar I disorder and/or a psychotic disorder; and/or 3) a current organic disease that could interfere with the possibility of receiving psychological treatment. Of the 131 screened participants, 20 participants were excluded due to one of the following two reasons: 1) did not meet inclusion criteria (n=5), or 2) refused to participate (n=15). The day hospital patients and inpatients (n=20) were excluded for the current analysis, and only the outpatient sample (n=91) was selected to maintain a homogeneous group. All outpatients were women with a mean age of 27.48 years (SD = 8.92). Table 1 shows demographic characteristics for the selected sample (i.e., sex, marital status, educational level, and employment status). Also, frequencies and percentages for relevant clinical characteristics

can be seen in Table 1 (i.e., comorbid disorders, and substance use). Clinician's view of the patient's global functioning and severity of psychopathology was assessed by the GAF (Global Assessment of Functioning, DSM-IV-TR) and the item of Severity Perceived by the Clinician (from The BPD Clinical Data Inventory). The means for the total sample were 41.28 for the GAF and 6.65 for the Severity Perceived by the Clinician, thus indicating serious impairment in functioning and symptoms severity.

Study design and procedure

Outpatients meeting the inclusion and exclusion criteria described above completed self-report measures assessing emotion regulation strategies, dissociation, and NSSI within 7 to 10 days after being screened into the clinical trial study. Self-report measures were completed in individual assessment sessions under the supervision of the private clinic personnel. Ten clinicians with training and experience in the structured interviews used (SCID-II and Eating Disorders Clinical Interview) performed the interviews. All of them had a master's degree in clinical psychology and five of them a Ph.D. and extensive experience in the assessment and treatment of ED and BPD.

Instruments

For the purpose of the current work—i.e., to examine the relationship of two emotion regulation strategies and dissociation with NSSI—questionnaires measuring emotion regulation, dissociation, and NSSI were utilized for the statistical analysis. The *Dissociative Experience Scale* (DES-II; Carlson & Putnam, 1992) was used to assess dissociative symptoms and the *Emotion Regulation Questionnaire* (ERQ; Gross & John, 2003) to assess emotion regulation.

The BPD Clinical Data Inventory (Garcia-Palacios, 2005, *unpublished work*) was a clinical document used by the clinician to gather information about the total number of NSSI

episodes in the past 6 months and another clinical information that includes: multiaxial assessment (DSM-IV-TR, APA, 2000), duration of the disorder, frequency of suicidal behavior and other dysfunctional behaviors (binging, substance abuse, etc.), frequency of hospitalizations, prescribed medication, and previous treatments. It also contains a scale to measure severity of the psychopathology of the primary disorder (0=without symptoms; 2=mild; 4=moderate; 6=severe; 8=very severe). As for the NSSI this instrument assessed deliberately injuring oneself without suicidal intent, including behaviours like self-cutting, hitting, burning, scratching, etc. We used the clinical history documents of the participants as well as the participants' reports to assess NSSI. As mentioned before clinicians were experts in the assessment and treatment of BPD and ED and they were trained to include these behaviours and not behaviours with suicidal intent as NSSI. We measured NSSI in the last six months because the patients were going to receive a psychological treatment for six months and we wanted to explore the pre-post differences in the same time frame.

DES-II is a 28-item self-report questionnaire that measures the degree of dissociative experiences (Carlson & Putnam, 1992). Each item measures the percentage of time an individual experiences dissociative symptoms (i.e., ranging from 0 to 100%). Total scores are obtained by summing the percentage of each item belonging to a particular subscale and dividing by the number of items. The DES-II contains three subscales that measure different types of dissociative experiences: (1) amnesic dissociation (e.g., memory loss); (2) absorption and imaginative involvement (e.g., daydreaming); and (3) depersonalization and derealization (e.g., identity confusion). The following are examples of items on the DES-II: Driving your car and suddenly realizing that you don't remember all or part of the trip; finding that you are able to ignore pain; and hearing voices inside your head telling you to do things. Research results indicate that the DES-II has acceptable reliability (i.e., ranging from .85 to .95) and convergent validity (i.e., .96) in both clinical and non-clinical samples (Ellason, Ross, & Mayran, 1991).

The ERQ is a 10-item self-report measure that assesses individual differences in the habitual use of cognitive reappraisal and expressive suppression to regulate emotions (Gross & John, 2003). Each item is measured on a seven-point Likert scale (i.e., ranging from strongly disagree to strongly agree). The ERQ consists of two subscales, cognitive reappraisal (six items) and expressive suppression (four items). Cognitive reappraisal is a form of cognitive change that involves reinterpreting the meaning of a potentially emotion-eliciting situation and thereby changing the trajectory of an emotional response. For example, during an admission interview for graduate school, one might view the interview as an opportunity to find out how much one likes the school, rather than as a test of one's worth. Expressive suppression is a form of response modulation that involves voluntarily inhibiting ongoing emotion-expressive behavior. For example, one might keep a poker face while holding a great hand during a card game. Research results indicate that the ERQ has adequate psychometric properties in the general population, in one study the alpha reliability was .79 for reappraisal, .73 for suppression, and .69 for both scales; and the convergent and discriminant validity was good (Gross & John, 2003). The ERQ showed also good psychometric properties for our sample: the alpha coefficients were .75 for reappraisal, .76 for suppression, and .69 for the total scale.

Statistical analysis

Multiple regression was used to analyze the relationship of two emotion regulation strategies (i.e., expressive suppression and cognitive reappraisal) and dissociation with NSSI. An appropriate model was selected by comparing the model fit criteria, or the AIC (Akaike Information Criterion), and significance tests results for main and interaction effects between models.

Prior to regression analysis, the positively-skewed NSSI data was transformed in order to meet statistical assumptions for linear regression, that is, normality, linearity, homoscedasticity, no outliers, and multicollinearity. According to the maximum likelihood

estimation, the optimal transformation to reduce non-normality, non-linearity, heteroscedasticity, and outliers (i.e., the statistical assumptions that were violated due to the positively-skewed NSSI data) was logarithmic transformation. Therefore, logarithmically transformed NSSI data was used for subsequent statistical analysis. Multicollinearity was not of great concern since bivariate correlations between cognitive reappraisal, expressive suppression, and dissociation were not high (i.e., ranging from .008 to .321). Tolerance values ranged from .86 to .96, indicating that between 86 to 96% of the available information was used in calculating the parameter estimates, confidence intervals, and significance tests for each predictor variable, which is considered adequate (see Table 2).

Results

Due to missing data, mostly for NSSI, 23 cases were deleted and a total of 68 cases were included in the final analysis. Of the total sample, 38,9% had engaged in NSSI during the previous six months of treatment. As shown in Table 3, the mean number of NSSI episodes for the people who engaged in NSSI ($M=2.04$; i.e., untransformed NSSI data) in the past six months was fairly low for patients diagnosed with BPD and comorbid ED. However, the number of NSSI in the previous six months ranged from 5 to 24, explaining the rather large standard deviation ($SD=4.52$). The overall mean for dissociation ($M=23.81$) is below the clinical cut-off point for BPD (i.e., $M=30$). However, there is a great deal of variability in the total scores on the DES-II scale ($SD=18.70$). The total score for cognitive reappraisal is 21.12 (scores range from 6 to 42) and for expressive suppression is 13.71 (scores range from 4 to 28), which are both moderate total scores. The standard deviation for the total scores on both emotion regulation subscales is also rather large.

The final model includes the main effects of cognitive reappraisal, expressive suppression, and dissociation; and the interaction effects between reappraisal and expressive suppression, and dissociation and cognitive reappraisal. The AIC value for the final model ($AIC=44.54$) was about two points lower than for models including other main and interaction effects (the AIC for those models ranged from 46.10–47.57; see Table 4). In general, a model with a lower AIC is believed to be a better fit, and a two point difference in AIC is considered meaningful (see Table 4). The explained variance for the final model is 44.5%, meaning that dissociation, cognitive reappraisal, and expressive suppression (including interaction effects) explain 44.5% of the variance in NSSI.

As shown in Table 5 a significance test for the interaction between cognitive reappraisal and expressive suppression is significant at $\alpha=0.05$ level, but not for the interaction between dissociation and cognitive reappraisal. However, the AIC scores indicate that a model with both

interaction effects is a better fit than a model with only the significant interaction effect. Therefore, both interaction effects (i.e., cognitive reappraisal and expressive suppression, and dissociation and cognitive reappraisal) were included in the final model.

As shown in Figure 1, for low cognitive reappraisal scores, an increase in dissociation is associated to an increase in NSSI; however, as cognitive reappraisal increases, a higher dissociation is related with fewer NSSI. The wide confidence interval shows that there is a lot of uncertainty about the relationship between dissociation and NSSI for high cognitive reappraisal. However, considering the upper limit of the confidence interval the effect of dissociation on NSSI is not as great for high reappraisal as for low reappraisal. For low expressive suppression scores, an increase in cognitive reappraisal is associated to a decrease in NSSI; however, as expressive suppression increases, a higher cognitive reappraisal is less effective in decreasing NSSI.

Discussion

The purpose of the current study was to explore the interaction effects between emotion regulation strategies and dissociation on NSSI. The results show that expressive suppression is related to an increase in NSSI. In addition, the level of expressive suppression determines the effect cognitive reappraisal has on NSSI (and vice versa). An increase in expressive suppression interferes with the beneficial effects that cognitive reappraisal has on NSSI. This finding supports previous research showing that the use of escape and avoidance emotion regulation strategies, specifically expressive suppression, is associated with a higher frequency of NSSI in individuals with BPD (Chapman et al., 2005); but it also goes a step further by showing that expressive suppression interferes with the ability to reinterpret the meaning of a situation that elicits an undesired emotion. The second interaction shows that an increase in dissociation is to some degree related to an increase in NSSI. This finding is in accordance with research results showing that patients with BPD who self-injure have higher

dissociation scores (Paris, 2005; Zweig-Frank et al., 1994). However, the level of cognitive reappraisal determines the effect of dissociation on NSSI (and vice versa). An increase in cognitive reappraisal reduces the harmful effects that dissociation has on NSSI.

One of the more relevant concepts related to BPD is *pervasive emotion dysregulation* developed by Marsha Linehan (Linehan, Bohus and Lynch, 2007). Emotion dysregulation is defined as “the inability... to change or regulate emotional cues, experience, actions, verbal responses, and/or nonverbal expressions under normative conditions” (Linehan et al., 2007, p. 583). Emotion dysregulation is pervasive when it occurs across a wide range of emotions and contexts. This concept entails a heightened vulnerability to emotional stimuli, intense emotional reactions and slow return to emotional baseline. Some of its characteristics are: experiencing aversive emotions, inability to regulate intense arousal, difficulties drawing attention away from emotional stimuli, failures in information processing, difficulties in inhibiting impulsive behaviors, problems organizing activities addressed to non-mood-dependent goals, and tendency to dissociate under high stress. These characteristics could be related with expressive suppression, cognitive reappraisal, dissociation, and NSSI. One way of dealing with aversive and intense emotions is to suppress them. This is achieved by the use of impulsive behaviors like substance intake, or by the involvement in NSSI; also, dissociation is a way to escape or suppress aversive emotions. It is therefore expected that expressive suppression and dissociation are related with increases in NSSI. Also, some of the characteristics of pervasive emotion regulation are related with impairment in cognitive reappraisal (difficulties drawing attention away from emotional stimuli, failures in information processing, and problems organizing activities addressed to non-mood-dependent goals). Our findings indicate that an increase in expressive suppression interferes with the beneficial effects that cognitive reappraisal has on NSSI. This could mean that the strategies used to suppress aversive emotions (including NSSI) worsen the ability to use cognitive reappraisal strategies.

The practical implications of these findings are that cognitive reappraisal training could decrease the effects of dissociation, which could be viewed as a form of emotional escape or avoidant behavior, on NSSI in patients with BPD and comorbid ED. Cognitive reappraisal involves being aware of the emotion (i.e., not escaping or avoiding the emotion) in order to appraise its meaning. Dialectical behavior therapy (DBT) skills, specifically mindfulness and emotion regulation skills, are designed to help patients gain awareness of internal (and external) experiences and understand the meaning of emotions. Linehan has also recently developed a specific emotion regulation skill called "checking the facts" which involves cognitive reappraisal. This skill aims to change the emotional reaction of an event by objectively evaluating the facts of the emotional event and then changing the distorted appraisals and assumptions of the event to fit the facts (Linehan, 2015). In other words, DBT skills are designed to help patients to stop experientially avoiding undesired internal experiences and change the emotional reactions by checking the actual facts and changing distorted appraisals to fit those facts. These strategies promote cognitive reappraisal. Therefore, it would be worth exploring the role of cognitive reappraisal in the efficacy and effectiveness of DBT.

Another conclusion that can be extracted from the findings is that when patients with BPD and comorbid ED use expressive suppression strategies, cognitive reappraisal training could be less effective in decreasing NSSI. Therefore, it might be necessary to target expressive suppression before cognitive reappraisal is conducted. This is congruent with the notion of working on the suppression pattern in order to be able to reappraise the emotional experience. In other words, it is necessary to target suppression prior to cognitive reappraisal. Primarily, DBT skills training (Linehan, 1993b) is focused on promoting mindfulness and awareness of experiences. Mindfulness skills are the first strategies taught in DBT skills training, which involves teaching patients to observe, describe and participate in their experiences by focusing on one thing mindfully, being non-judgmental, and doing what is effective. One of the most

fundamental learning processes in DBT is that acceptance will lead to change, that is, change is not possible if not founded in acceptance (Linehan, 1993a). These findings suggest the value of exploring the role of cognitive reappraisal, expressive suppression, and dissociation in the efficacy and effectiveness of evidence-based treatment interventions for BPD and comorbid ED.

It is important to highlight that the emotion regulation strategies and dissociation (including interaction effects) explained 44.5% of the variance in NSSI, which is a great deal and in accordance with the conceptualization of NSSI as a maladaptive coping strategy related with difficulties in emotion regulation (Welch et al., 2008). Research into multiple types of experiential avoidance strategies would elucidate the regulation strategies commonly used by individuals with BPD and the relationship of these various strategies with NSSI. Another interesting future research direction would be to explore if the same relationships holds over time, that is, before, during, and after a psychological treatment.

Despite these interesting results, there are methodological limitations to this research. First, emotion regulation strategies and dissociation were assessed by self-report, which may not reflect the participant's actual experience and behavior. Another limitation is that the sample was composed of only women; therefore, no assumptions can be made about the relationship of emotion regulation strategies and dissociation with NSSI in men. Nonetheless, this is consistent with the higher prevalence of BPD and ED diagnoses in women versus men (Hudson, Hiripi, Pope, & Kessler, 2007; Skodol et al., 2002). Finally, a possible bias that can also affect the results of this paper was the high number of deleted cases.

In conclusion, these findings support the importance of exploring emotion regulation strategies and dissociation when treating NSSI in patients with BPD and comorbid ED. The results highlight that cognitive reappraisal reduces the effect that dissociation has on NSSI and that expressive suppression decreases the effect that cognitive reappraisal has on NSSI, which in turn, suggests that expressive suppression should be targeted before cognitive reappraisal is conducted.

Acknowledgements

The research presented in this paper was funded by Ministerio de Economía y Competitividad, Spain, proyectos de investigacion fundamental no orientada (PSI2010-21423/PSIC), Plan de Formación de la investigacion en la Universitat Jaume I (P11B2005-32), and by Generalitat Valenciana, Redes de Excelencia ISIC (ISIC/2012/012).

References

- Abramowitz, J., Tolin, D., & Street, G. (2001). Paradoxical effects of thought suppression: A meta-analysis of controlled studies. *Clinical Psychology Review, 21*, 683–703.
- Barnow, S., Arens, E., Sieswerda, S., Dinu-Biringer, R., Spitzer, C., & Lang, S. (2010). Borderline personality disorder and psychosis: A review. *Current Psychiatry Reports, 12*, 186–195.
- Bohus, M., Limberger, M., Ebner, U., Glocker, F. X., Schwarz, B., Wernz, M., & Lieb, K. (2000). Pain perception during self-reported distress and calmness in patients with borderline personality disorder and self-mutilating behavior. *Psychiatry Research, 95*(3), 251–260.
- Bijttebier, P., & Vertommen, H. (1999). Coping strategies in relation to personality disorders. *Personality and Individual Differences, 26*, 847–856.
- Carlson, E. B., & Putnam, F. W. (1992). *Manual for the Dissociative Experiences Scale*. Unpublished manuscript, Department of Psychology, Beloit College, Beloit, WI.
- Clarkin, J., Widiger, T., Frances, A., Hurt, S., & Gilmore, M. (1983). Prototypic typology and the borderline personality disorder. *Journal of Abnormal Psychology, 92*, 263–275.
- Chapman, A. L., Gratz, K. L., & Brown, M. Z. (2006). Solving the puzzle of deliberate self-harm: The experiential avoidance model. *Behaviour Research and Therapy, 44*, 371–394.
- Chapman, A. L., Specht, M. W., & Cellucci, A.J. (2005). Borderline personality disorder and deliberate self-harm: Does experiential avoidance play a role? *Suicide and Life Threatening Behavior, 35*, 388–399.
- Chapman, A.L., Rosenthal, M. Z., & Leung, D. (2009). Emotion suppression and borderline personality disorder: An experience-sampling study. *Journal of Personality Disorders, 23*, 27–45.
- 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.
- Ellason, J.W., Ross, C.A., Mayran, L.W, & Sainton, K. (1991). Convergent validity of the new form of the DES. *Dissociation, 11*(2), 101–103.

- Ellard, K. K., Fairholme, C. P., Boisseau, C. L., Farchione, T. J., & Barlow, D. H. (2010). Unified protocol for the transdiagnostic treatment of emotional disorders: Protocol development and initial outcome data. *Cognitive and Behavioural Practice*, *17*, 88-101.
- First, M. B., Gibbon, M., Spitzer, R. L., Williams, J. B. W., & Benjamin, L. S. (1997). *Structured Clinical Interview for DSM-IV Axis II Personality Disorders, (SCID-II)*. Washington, D.C.: American Psychiatric Press, Inc.
- Gross, J. J. (1998). Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology*, *74*, 224–237.
- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*, 348–362.
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and Commitment Therapy: An Experiential Approach to Behavior Change*. New York: Guilford Press.
- Hudson, J. I., Hiripi, E., Pope, H. G., & Kessler, R. C. (2007). The Prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biological Psychiatry*, *61*(3), 348–358.
- International Society for the Study of Self-Injury, ISSS (2007). Recovered from <http://itriples.org/iss-aboutself-i.html> on November, 29, 2013.
- Kostro, K., Lerman, J. B., & Attia, E. (2014). The current status of suicide and self-injury in eating disorders: a narrative review. *Journal of Eating Disorders*, *2*, 19.
- Klonsky, E. D., & Muehlenkamp, J. J. (2007). Self-injury: A research review for the practitioner. *Journal of clinical Psychology*, *63*(11), 1045–1056.
- Kleindienst, N., Bohus, M., Ludäscher, P., Limberger, M. F., Kuenkele, K., Ebner-Priemer, U. W., ... Schmahl, C. (2008). Motives for non-suicidal self-injury among women with borderline personality disorder. *The Journal of Nervous and Mental Disease*, *196*(3), 230–236.
- Korzekwa, M. I., Dell, P. F., Links, P. S., Thabane, L., & Fougere, P. (2009). Dissociation in borderline personality disorder: A detailed look. *Journal of Trauma and Dissociation*, *10*, 346–367.

- Lazarus, R. S., & Alfert, E. (1964). Short-circuiting of threat by experimentally altering cognitive appraisal. *Journal of Abnormal Psychology, 69*, 195–205.
- Linehan, M. M. (1993a). *Cognitive-behavioral treatment of borderline personality disorder*. New York: Guilford.
- Linehan, M. M. (1993b). *Skills training manual for treating Borderline Personality Disorder*. New York: Guilford Press. Translated into Spanish by Paidós (2003).
- Leibensluft, E., Gardner, D. L., & Cowdry, R. W. (1997). The inner experience of the borderline self-mutilator. *Journal of Personality Disorders, 1*, 317–324.
- Ludascher, P., Bohus, M., Lieb, K., Philipsen, A., Jochims, A., & Schmahl, C. (2007). Elevated pain thresholds correlate with dissociation and aversive arousal in patients with borderline personality disorder. *Psychiatry Research, 149*, 291–296.
- McGlashan, T. H., Grilo, C. M., Sanislow, C. A., Ralevski, E., Morey, L. C., Gunderson, J. G., ... Pagano, M. (2005). Two-year prevalence and stability of individual DSM-IV criteria for schizotypal, borderline, avoidant, and obsessive-compulsive personality disorders: Toward a hybrid model of axis II disorders. *The American Journal of Psychiatry, 162*(5) 883–889.
- Muehlenkamp, J.J., Claes, L., Smits, D., Peat, C.M., & Vandereycken, M. (2011). Non-suicidal self-injury in eating disordered patients: A test of a conceptual model. *Psychiatry Research, 188*(1), 102–108.
- Nock, M. K., & Prinstein, M. J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology, 72*, 885-890.
- Oathes, D. J., & Ray, W. J. (2008). Dissociative tendencies and facilitated emotional processing. *Emotion, 8*, 653–661.
- Paris J. (2005). Understanding self-mutilation in borderline personality disorder. *Harvard Review of Psychiatry, 13*, 179–185.
- Perpiñá, C., Botella, C., & Baños, R.M. (2006). Evaluación de los trastornos alimentarios. In V. Caballo (ed.), *Manual para la evaluación cognitivo-conductual de los trastornos psicológicos*. Madrid: Pirámide.

- 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. *Behavior Research and Therapy, 43*, 1173–1185.
- Rosenthal, M. Z., Gratz, K., Kosson, D. S., Lejuez, C. W., Cheavens, J. S., & Lynch, T. R. (2008). Borderline personality disorder and emotional functioning: A review of the research literature. *Clinical Psychology Review, 28*, 75–91.
- Schmahl, C., Bohus, M., Esposito, F., Treede, R. D., Di, S. F., Greffrath, W., ... Seifritz, E. (2006). Neural correlates of antinociception in borderline personality disorder. *Archives of General Psychiatry, 63*(6), 659–667.
- Shearer, S. L. (1994). Phenomenology of self-injury among inpatient women with borderline personality disorder. *The Journal of Nervous and Mental Disease, 182*, 424–526.
- Schore, A. N. (2009). Relational trauma and the developing right brain: An interface of psychoanalytic self psychology and neuroscience. *Annals of the New York Academy of Sciences, 1159*, 189–203.
- Skodol, A. E., Gunderson, J. G., Pfohl, B., Widiger, T. A., Livesley, W. J., & Siever, L. J. (2002). The borderline diagnosis. I: Psychopathology, comorbidity, and personality structure. *Biological Psychiatry, 51*, 936-50.
- Stiglmayr, C. E., Braakmann, D., Haaf, B., Stieglitz, R. D., & Bohus, M. (2003). Development and characteristics of Dissociation-Tension-Scale acute (DSS-Akute) [in German]. *Psychotherapie, Psychosomatik, Medizinische Psychologie, 53*, 287–294.
- Svaldi, J., Griepenstroh, J., Tuschen-Caffier, B., & Ehring, T. (2012). Emotion regulation deficits in eating disorders: A marker of eating pathology or general psychopathology? *Psychiatry Research, 197*, 103–111.
- Svirko, E., & Hawton, K. (2007). Self-injurious behavior and eating disorders: The extent and nature of the association. *Suicide and Life-Threatening Behavior, 37*, 409–421.
- Welch, S. S., Linehan, M. M., Sylvers, P., Chittams, J., & Rizvi, S. L. (2008). Emotional responses to self-injury imagery among adults with borderline personality disorder. *Journal of Consulting and Clinical Psychology, 76*(1), 45–51.

Zweig-Frank, H., Paris, J., & Guzder, J. (1994). Psychological risk factors for dissociation and self-mutilation in female patients with personality disorders. *Revue Canadienne De Psychiatrie*, 39, 259–65.