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ORIGINAL RESEARCH

Rumination, posttraumatic stress disorder, and mood symptoms in borderline personality disorder

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Background: The interrelationship between mood disorders and borderline personality disorder (BPD) has been long debated in the literature. Increasing attention has also been paid to the relationship between posttraumatic stress disorder (PTSD) and BPD, as well as to the role of rumination in the development and severity of BPD. This study aims to evaluate the association of rumination, PTSD, and mood spectrum among patients with BPD with or without comorbid mood disorders.

Methods: Fifty patients with BPD and 69 healthy controls were assessed with the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders* 5, MoodSpectrum Self-Report (MOODS-SR), and Ruminative Response Scale (RRS).

Results: The BPD group was split into subjects with BPD+ mood disorder (MD) or BPD only) . PTSD-criteria fulfillment, MOODS, and RRS scores were significantly higher in both BPD subgroups than in controls, while BPD+MD patients scored significantly higher than the BPD-only group. RRS scores and PTSD-criteria fulfillment were significantly related to the presence of both BPD and BPD+MD, with no effect of MOODS-SR scores.

Conclusion: Our findings confirm the presence of a relationship between BPD and the PTSD spectrum, highlighting also a possible role of rumination in BPD psychopathology. Rumination and PTSD symptoms seem to prevail in the effect of mood spectrum in predicting BPD.

Keywords: ruminative thinking, borderline personality disorder, post-traumatic stress disorder, mood disorders

Introduction

Borderline Personality Disorder (BPD) is a serious mental illness characterized by unstable interpersonal relationships with sudden attachment, anxious dependence, and fear of being abandoned, together with affective instability, pervasive impulsiveness, recurrent self-injurious and suicidal behaviors, and threats.[1] Emotional dysregulation is often indicated as the core feature of BPD, arising from a biological vulnerability interacting with an invalidating childhood environment and stress or trauma.[2–4] The relevance of trauma to BPD psychopathogenesis is suggested by a large body of studies stressing that a significant percentage of BPD subjects report a history of childhood trauma,[5–11] generally being at high risk of traumatic exposure during their entire life span.[12–15] Besides providing further insight into the borderline construct, the association with trauma has also propelled interest in exploring the relationship between posttraumatic stress symptoms and BPD, with some authors arguing whether the borderline constellation of symptoms could pertain to a peculiar form of posttraumatic stress disorder

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(PTSD) called complex PTSD.[16,17] Interestingly, as growing attention was devoted to this topic, some authors pointed out how partial and subthreshold PTSD as well should deserve attention, since these may relate to levels of distress, impairment, and comorbidity in a dose-dependent manner, showing an association in particular with mood symptoms.[18–22]

Recent parallel research has also shone light on the potential role of rumination in BPD.[23–25] Rumination is a cognitive symptom related to negative emotional conditions, and is generally manifested as going over a problem or one's distress and possible causes and consequences, as opposed to its solutions.[26] Besides enhancing negative thinking, rumination has been shown to maintain, exacerbate, and predict depressive symptoms.[27–29] Moreover, in response to negative life events, rumination seems to increase the risk of experiencing depressive episodes and is positively related to the length and severity of a depressive episode.[27,30,31] Despite rumination usually being associated with depressive states, research on this topic has recently come across a variety of clinical conditions, including BPD, with most of the extant literature focusing so far on the relationship among rumination, BPD, and mood symptoms. Abela et al,[32] for example, found that BPD patients with comorbid major depressive disorder (MDD) have higher levels of depressive rumination than those with MDD only. Conversely, Watkins[33] reported a significant association between BPD features and rumination in patients with unipolar depressive disorders. Intriguingly, a growing literature is showing the importance of rumination in the development of psychopathological symptoms after exposure to trauma, raising the matter of the complex relationship among mood spectrum, rumination, and posttraumatic symptoms in patients suffering from BPD.

Based on this background, the aim of the present study was to evaluate the presence of PTSD symptoms, ruminative thinking and mood spectrum symptoms in a sample of BPD patients with or without comorbid mood disorder, as well as in a control (Ctl) group, with a specific focus on determining which of these dimensions is more associated with a diagnosis of BPD and on eventual differences between BPD patients with and without mood disorder.

Methods

Study sample

The sample included 50 patients with a clinical diagnosis of BPD, consecutively enrolled at three Italian university departments of psychiatry (Pisa, Brescia, and Siena) between May 2015 and April 2016. Exclusion criteria were age <18 years, language or intellectual impairment affecting the possibility to fulfill the assessments, and comorbidity with schizophrenia. A Ctl group of 69 healthy subjects with no current or lifetime mental disorders was also recruited at the same sites.

All subjects were assessed by means of the Structured Clinical Interview for the *Diagnostic and Statistical Manual of MentalDisorders* (DSM) 5,[34] in order to assess comorbid mental disorders or to confirm healthy Ctl status. Moreover, all participants were asked to fill in two self-report instruments: the Mood Spectrum Self-Report (MOODS-SR)[35–37] and the Ruminative Response Scale (RRS).[38] All assessments were conducted by psychiatrists trained in the use of the study instruments at the University of Pisa. The study was conducted in accordance with the Declaration of Helsinki. The ethics committee of Azienda Ospedaliero–Universitaria di Pisa approved all recruitment and assessment procedures. Eligible subjects provided written informed consent after receiving a complete description of the study and having the opportunity to ask questions.

Assessment instruments

Mood Spectrum Self-Report

The MOODS-SR is an instrument derived from the Structured Clinical Interview for MOODS, developed by the Psychiatric Clinic of Pisa University in collaboration with the University of Pittsburgh. It is aimed at providing a thorough dimensional assessment of the psychopathological continuum that includes and gives importance to all the features of mood disorders, including prodromal, typical, atypical, residual, and trait-like symptoms.[36,39] The questionnaire includes 161 dichotomous items (yes/no response), defined as present or absent for at least 3–5 days in the subject's life span. Items are grouped in three manic/hypomanic and three depressive domains (exploring for each pole the areas of mood, energy, and cognition). A further domain explores disturbances in rhythmicity (eg, changes in mood, energy, and physical well-being according to weather, season, and phase of menstrual cycle) and vegetative functions (including sleep, appetite, and sexual behavior).

Ruminative Response Scale

The RRS is a self-report instrument evaluating rumination.[38] It comprises 22 items rated on a 4-point scale measuring three different aspects of rumination. Eleven items are

included in the Brooding domain, addressing a tendency to dwell on one's negative mood and on the consequences of that mood (eg, thinking "What am I doing to deserve this?"). Five further items are included in the Reflection domain, addressing more active efforts to understand the reasons for one's mood (eg, analyzing recent events to try to understand why you are depressed). The remaining six items are meant to explore the Depression domain, focusing on depressive rumination.

Statistical analyses

Means ± SD of scale scores were compared between groups using ANOVA. Post hoc pairwise comparisons were performed using Tukey's test. Logistic regression analyses were used to evaluate potential predictors of a diagnosis of BPD. A first logistic regression was carried out using BPD diagnosis as the dependent variable and number of *Diagnostic and Statistical Manual of MentalDisorders* 5 PTSD criteria fulfilled and RRS-domain scores as independent variables. A second logistic regression analysis was conducted adding MOODS-SR depressive and manic component scores to the list of independent variables. Lastly, a third logistic regression was carried out using the number of PTSD criteria fulfilled, RRS-domain scores, and MOODS-SR depressive and manic component scores as independent variables and diagnosis of BPD with comorbid mood disorder (BPD+MD) as the dependent variable. Results were considered statistically significant at P=P=0.05. All data analysis was conducted using SPSS version 22.

Results

Sociodemographic and clinical characteristics of the study sample, including rates of comorbid disorders evaluated by means of the StructuredClinical Interview for the*Diagnostic and Statistical Manual of Mental Disorders* 5 have been reorted elsewhere.[40] Overall, 27 (54%) subjects in the BPD group had a comorbid mood disorder (BPD+MD), while the remaining 23 (46%) did not (BPD only). BPD+MD group included subjects with a diagnosis of bipolar disorder I (n=10) and II (n=6), MDD (n=9), and persistent depressive disorder (n=4). Two subjects received a diagnosis of both MDD and persistent depressive disorder. Comparisons among groups on RRS and MOODS-SR scores and number of PTSD criteria endorsed are shown in Table 1. All MOODS-SR and RRS scores were significantly greater in BPD+MD patients than in the Ctl group. BPD+MD patients also scored significantly higher than BPD-only patients on MOODS-SR and RRS total scales, on all MOODS-SR scores but depressive mood, and on all RRS scores but Brooding. The BPD-only group scored significantly higher than the Ctl groupon both MOODS-SR and RRS total, on Depressive energy and Depressive cognition domain scores of MOODS-SR, and Depression-subscale score of the RRS. Both BPD

Table 1 Characteristics of the study sample

	BPD+MD (n=27)	BPD only (n=23)	Ctl (n=69)	*F*	*p*
MOODS-SR					
Depressive mood	28.8±6.5	23±6.2	21.5±10.4	6.30	0.003[a]
Manic mood	11.1±6.2	6.9±4.3	4.6±4.5	16.56	<0.001[a,b]
Depressive energy	5.2±2.8	3.1±2.1	1.2±1.7	35.59	<0.001[a–c]
Manic energy	4.4±2.5	2.8±1.6	1.7±1.8	18.56	<0.001[a,b]
Depressive cognition	13.4±6.7	8.9±5.2	2.7±3.6	51.91	<0.001[a–c]
Manic cognition	7.5±5.2	2.9±2.6	2.6±3.0	18.92	<0.001[a,b]
Manic component	15.4±8.3	9.7±5.5	6.3±5.9	19.19	<0.001[a,b]
Depressive component	33.9±8.5	26.2±7.5	22.7±11.3	11.74	<0.001[a,b]
RRS					
Reflection	12.5±2.7	10±2.5	7.7±2.9	28.78	<0.001[a–c]
Brooding	14.0±3.1	12.6±3.1	8.2±2.4	52.46	<0.001[a,c]
Depression	36.2±7.6	28.1±7.2	19.1±5.7	69.18	<0.001[a–c]
PTSD criteria (DSM5)	3.5±0.9	2.8±1.2	0.9±1.0	71.60 (*df* 2,116 ()	<0.001[a–c]

Notes: [a]BPD+MD > Ctl P<P<0.05, [b]BPD+MD > BPD only P<P<0.05, [c]BPD only > Ctl P<P<0.05.

Abbreviations: BPD, borderline personality disorder; MD, mood disorder; Ctl, control; MOODS-SR, Mood Spectrum Self-Report; RRS, Ruminative Response Scale; DSM, *Diagnostic and Statistical Manual of Mental Disorders*.

+MD and BPD-only subjects reported a significantly greater number of PTSD criteria satisfied than Ctl subjects, with the BPD+MD group showing a significantly greater number of criteria compared to BPD-only group.

The results of the logistic regression conducted using BPD diagnosis as dependent variable and RRS-domain scores and number of PTSD criteria fulfilled as independent variables showed that RRS Depression and Brooding domain scores and the number of PTSD criteria endorsed were positively and significantly related to the diagnosis of BPD (Depression, β=0.38; OR 1.47; P=0.019; Brooding, β=0.19; OR =1.21; P=0.017; PTSD criteria: β=1.06; OR 2.87, P<0.001; Cox R^2=0.566, Nagelkerke R^2 =0.762; correct classification total percentage 87.1%). Reflection-domain scores of the RRS resulted in being a negative predictor of BPD status (β=−0.36, OR 0,70; P=0.047). After the addition of MOODS-SR manic and depressive scores to the independent-variable list, the RRS Brooding domain score and number of PTSD criteria fulfilled were still significantly related to BPD diagnosis, while RRS Depression and Reflection domain scores and MOODS-SR domain scores did not predict BPD status (Table 2).

Table 3 displays the results of logistic regression carried out using diagnosis of BPD+MD as dependent variable and RRS-domain scores, MOODS-SR manic and depressive component scores, and the number of PTSD criteria fulfilled as independent variables. The number of PTSD criteria and the RRS Depression score positively and significantly predicted BPD+MD diagnosis.

Discussion

The aim of the present study was to compare levels of rumination, mood-spectrum symptoms and PTSD symptoms among subjects with BPD with or without concurrent MD and healthy subjects, and to evaluate the extent to

Table 2 Logistic regression for predictors of BPD diagnosis (dependent variable)

	β (SE)	OR	95% CI	p
PTSD criteria (DSM5)*	1.020 (0.285)	2.772	1.585–4.850	0
RRS reflection	−0.342 (0.184)	0.710	0.495–1.020	0.064
RRS brooding	0.363 (0.165)	1.438	1.040–1.989	0.028
RRS depression	0.201 (0.087)	1.223	1.031–1.451	0.021
MOODS-SR manic component	0.018 (0.060)	1.018	0.905–1.145	0.767
MOODS-SR depressive component	−0.210 (0.049)	0.979	0.889–1.078	0.665
Constant	−7.515 (1.568)	0.001	-	0
Cox R^2 =0.563; Nagelkerke R^2 =0.759 Correct classification total percentage 87%				

Note: *Criteria fulfilled (one criterion excluded).
Abbreviations: BPD, borderline personality disorder; PTSD, posttraumatic stress disorder; DSM, *Diagnostic and Statistical Manual of Mental Disorders*; RRS, Ruminative Response Scale; MOODS-SR, Mood Spectrum Self-Report.

Table 3 Logistic regression for predictors of BPD+MD (dependent variable)

	β (SE)	OR	95% CI	P
PTSD criteria (DSM5)*	1.671 (0.625)	5.318	1.562–18.113	0.008
RRS reflection	−0.400 (0.315)	0.670	0.362–1.242	0.203
RRS brooding	0.281 (0.247)	1.324	0.815–2.150	0.257
RRS depression	0.357 (0.170)	1.428	1.024–1.992	0.036
MOODS-SR manic component	0 (0.104)	1.000	0.815–1.226	0.996
MOODS-SR depressive component	−0.670 (0.079)	0.936	0.801–1.092	0.399
Constant	−11.493 (3.235)	0	-	0
Cox R^2 =0.592; Nagelkerke R^2 =0.867 Correct classification total percentage 97.8%				

Note: *Criteria fulfilled (one criterion excluded).
Abbreviations: BPD, borderline personality disorder; MD, mood disorder; PTSD, posttraumatic stress disorder; DSM, *Diagnostic and Statistical Manual of Mental Disorders*; RRS, Ruminative Response Scale; MOODS-SR, Mood Spectrum Self-Report.

which these dimensions are associated with the diagnosis of BPD. Results showed that BPD patients had overall higher levels of rumination than subjects, with BPD+MD showing higher levels compared to BPD only. Similarly, BPD patients showed higher levels of mood spectrum symptoms than Ctl subjects on the MOODS-SR, with BPD+MD also exceeding BPD only on the total MOODS-SR scale, as well as on several domain scores. As expected, BPD patients, both with and without comorbid MD, showed a greater number of PTSD symptoms than healthy Ctl subjects. Interestingly, multivariate analyses showed that only PTSD symptoms and rumination significantly predicted BPD diagnosis, with a probability of being diagnosed with BPD increasing by 187% for every criterion of PTSD fulfilled and 47% for every additional point scored on the Brooding domain of the RRS, while no associations were found with MOODS-SR domain scores.

On one hand, our findings suggest the putative role of rumination in BPD psychopathology, while on the other they confirm and strengthen the relationship between trauma-related symptoms and BPD over and above the effect of mood-spectrum symptoms. While not included among the defining features of BPD, traumatic experiences, especially prolonged and occurring early in life, such as child abuse and neglect, are thought to play a significant role in the development of the borderline personality.[5,6,41] Intriguingly, in the last decade it has even been debated whether BPD should be added to the spectrum of trauma-related disorders, as the emerging clinical entity named complex PTSD closely resembles a borderline clinical picture, besides sharing a few neurobiological correlates with BPD.[16] Complex PTSD is indeed characterized by most of the core symptoms of PTSD, along with some BPD-like symptoms, such as affective dysregulation, disrupted beliefs about oneself as being diminished and worthless, difficulties in developing relationships, and feelings of guilt, shame, or failure,[16,42,43] somehow prompting the hypothesis that BPD might actually arise from a posttraumatic process developed upon a temperamental vulnerability, at least in those cases who report a history of traumatic exposure and suffering from posttraumatic symptoms.[44] In keeping with previous data,[45] our results seem to corroborate the potential role of posttraumatic symptoms in BPD, not only when full comorbidity with PTSD is diagnosed but also when only some PTSD-symptom criteria are fulfilled.

Our findings on rumination suggest that BPD diagnosis is significantly linked to brooding, which represents the more maladaptive aspect of rumination, oriented to self-criticism and reflecting a passive comparison of one's current situation with some unachieved standards.[46] Interestingly, a large body og literature indicates that emotional dysfunction in BPD patients may depend on a broad array of maladaptive cognitive processes, including rumination. The emotional cascade model of BPD, for example, proposes that negative affect in BPD patients is a trigger of rumination, which in turn intensifies the affect, inducing a vicious cycle and ultimately leading to dysregulated behavior that represents an attempt to distract attention from the negative affect.[47] Consistently with our findings, Selby et al[48] found in a large study sample a significant association between the severity of BPD symptoms and a composite rumination variable that included depressive brooding, anger rumination, and catastrophizing. Moreover, the rumination variable mediated the relationship between BPD symptoms and dysregulated behaviors, such as self-harm and binge eating. Our results are somewhat in line also with recent data from Peters et al,[49] who reported an association of BPD with specific styles and content of rumination. According to that study, rumination associated with BPD features seemed to be negative in valence and prolonged in time, with a focus on interpersonal themes, and including depressive brooding, anger, and stress-related ruminative thinking.[49] Moreover, it is noteworthy that as reported elsewhere,[40] a high rate (68%) of subjects in our sample had experienced physical or sexual abuse during their lifetime. According to previous literature, sexual abuse seems to show a particularly high correlation with rumination, while rumination seems to mediate the relationship between negative affect and the development of PTSD after interpersonal trauma, as well as social anxiety.[7,33,50,51] Intriguingly, another study stressed the link between rumination and alexithymia, with difficulties in identifying emotions, in mediating the relationship between negative affect and BPD symptoms, further highlighting the dimension of social impairment in these patients.[52] The present findings also add to previous findings, including one study from the same study sample showing higher levels of autism-spectrum symptoms in BPD patients compared to Ctl subjects, thus suggesting that rumination may be related to a subthreshold autism-spectrum sympthomatology.[40,53–56]

While the core emotional dysregulation of BPD patients has sometimes been considered part of the MD spectrum,[57–59] mood symptoms did not predict BPD

diagnosis in our sample, at least when rumination and PTSD symptoms were also taken into account. Given the high percentage of (MDs) in our sample (54%), we performed a logistic regression to explore predictive variables of the BPD+MD. Surprisingly, also in this case, mood-spectrum symptoms did not seem to be significantly predictive of PTSD criteria or RRS domains. This finding further confirms that rumination and PTSD symptoms might play a role on BPD psychopathology over and above the contribution of mood-spectrum symptoms and independently of comorbidity with MDs.

Our results must be considered in light of obvious limitations. First of all, the sample was small, and further studies with larger samples are needed to confirm our findings. Second, the cross-sectional design of the study and the lifetime assessment prevented us from elucidating the type of andf temporal sequence of the occurrence of trauma, posttraumatic symptoms, borderline symptoms, or rumination, such that any inference of causal relationships was not allowed. In particular, the lifetime assessment of posttraumatic symptoms did not allow evaluation of the differential impact of traumatic experiences occurring early in life or during adulthood. Third, the lack of a quantitative measure of BPD symptoms prevented us from evaluating the relationship between BPD-symptom severity and rumination or posttraumatic symptoms. Further, this was an exploratory study conducted with a small sample, and we did not differentiate in our analyses between subjects with or without current mood episodes, neither between subjects nor unipolar versus bipolar mood disorders. This may have greatly affected our results, considering also that the literature is currently stressing possible differences between bipolar disorders and MDD in respect to their relationship with PTSD, eventually depending also on current mood state. Further studies in larger samples and with longitudinal design are warranted to clarify relationships among MD, PTSD, rumination, and BPD.[60]

In the context of these limitations, our study highlights the potential role of trauma-related symptoms and rumination in BPD, suggesting the importance of carefully investigating both dimensions. A better understanding of the link between trauma and BPD, as well as recognizing the key role of ruminative thinking in these patients, may shed new light on the current understanding of both trauma- and stress-related disorders and personality disorders, adding new insights to the relationship between environmental stress and biological vulnerability in promoting psychopathology. From a clinical point of view, our results may also contribute to reconsideration and eventual improvement fo the targets for interventions in this patient population, which is often poorly responsive to available treatments.

Disclosure

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