

Research Paper: Distress Tolerance, Impulsivity, and Aggression: The Role of Emotional Dysregulation and Reward Sensitivity in Individuals With Borderline Personality Disorder Features



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ABSTRACT

Objective: Borderline Personality Disorder (BPD) is one of the most severe psychiatric disorders. This study aimed to predict distress tolerance, impulsivity, and aggression based on emotional dysregulation and reward sensitivity among individuals with BPD features.

Methods: The study population was undergraduate students of Shahid Beheshti University, Tehran City, Iran, in the academic year 2017-18. A total of 1005 male and female students were chosen based on the available sampling method and were screened according to the personality assessment inventory-borderline scale. Finally, 146 subjects (50 males and 96 females) could reach the second phase of the research, and all of them completed the difficulties in emotion regulation scale, distress tolerance scale, Balloon analog risk task as well as aggression questionnaire. To analyze the data, we used multivariate regression analysis.

Results: Results of the current research showed that emotional dysregulation and its components had a predictive role in distress tolerance and aggression. On the other hand, only reward sensitivity could have an essential role in predicting impulsivity in individuals with BPD features.

Conclusion: This study reflects the remarkable role of emotional regulation mechanisms in distress tolerance and aggression, and in contrast, the role of biological mechanisms such as sensitivity to reward in impulsivity among individuals with BPD features. Furthermore, the present research results can have clinical implications considering both etiology and treatment of BPD patients.

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Highlights

- Emotional dysregulation and its all components played a pivotal role in predicting distress tolerance as well as aggression.
- Reward sensitivity as a biological mechanism showed a remarkable effect in impulsivity among individuals with Borderline personality disorder features.

Plain Language Summary

The results of this study showed the importance of emotional regulation in diagnostic symptoms such as aggression and distress tolerance in comparison to the role of biological factors in predicting impulsivity. Therefore, we can consider clinical implications according to the current findings.

1. Introduction

Borderline Personality Disorder (BPD) is one of the most severe psychiatric conditions, with a high prevalence of between 1% and 3% in the general population (Trull, Jahng, Tomko, Wood, & Sher, 2010). According to the DSM-5 diagnostic criteria, the impairments of interpersonal functioning, affective dysregulation, and impulsivity are major symptom clusters in this disorder (American Psychiatric Association, 2013). Additionally, BPD patients suffer from low distress tolerance when exposed to environmental stressors (Borinovalova, Matusiewicz, & Rojas, 2011). Distress tolerance refers to individuals' capacity to resist unpleasant mental states (Leyro, Zvolensky, & Bernstein, 2010), which is reported to be remarkably low in BPD patients. Furthermore, conducting harmful behaviors such as impulsivity is considered a consequence of low distress tolerance among BPD patients. In this regard, impulsivity has also been suggested as an essential clinical symptom in this disorder (Paris, Gunderson, & Weinberg, 2007), which includes actions that are dangerous and disproportionate to the situation, performed carelessly, and usually with negative consequences (Evenden, 1999).

High-risk driving, drug and alcohol abuse, unprotected sexual relations, overeating, and gambling are some of the impulsive behaviors in BPD patients (American Psychiatric Association, 2013). On the other hand, impulsivity can also trigger aggressive actions in these individuals (Goodman & New, 2000). Aggression against oneself (non-suicidal self-harm behaviors or suicide attempts) and aggression against others (outspokenness, intense conflict, throwing objects at others) are other major symptoms of this disorder (Sansone & Sansone,

2012), which create many problems for patients and those around them. Therefore, identifying psychological and biological mechanisms that underlie distress tolerance, impulsivity, and aggression is necessary for improving treatment in BPD patients.

In this regard, emotional dysregulation is proposed as a psycho-biological mechanism. Linehan (1993) considers it as frequent fluctuations in emotions, extreme emotional responsiveness to events, and intense emotional experience. Several studies have focused on the role of emotional dysregulation in aggressive behavior (Scott, Stepp, & Pilkonis, 2014; Martino et al., 2015), impulsivity (Baer et al., 2018; Sebastian et al., 2014; Chapman, Leung, & Lynch, 2008), and psychological distress (Dixon-Gordon, Turner, Rosenthal, & Chapman, 2017; Ebner-Priemer et al., 2008) in BPD patients and psychiatric disorders (Jakubczyk et al., 2018; Muratori, Pisano, Milone, & Masi, 2017).

However, there are conflicting studies in the field of emotional regulation strategies in BPD patients that should be addressed. Research suggests that some adaptive coping strategies may exacerbate negative emotional states and physiological arousal. Additionally, it increases emotional distress in these patients. The results of the Dixon-Gordon study (Dixon-Gordon et al., 2017) showed that BPD patients in suppression state versus emotional acceptance showed decreased emotional anger, decreased postural anger, and decreased heart rate. It has also been suggested that the suppression strategy in reducing negative emotions is more effective than the acceptance strategy and reduces irritating thoughts related to stimuli (Evans, Howard, Dudas, Denman, & Dunn, 2013). In this case, a study (Kuo, Fitzpatrick, Krantz, & Zeifman, 2018) showed that high-intensity BPD patients reported increased positive emotions and decreased internal urge to engage in dysfunctional behaviors following emotional suppression

rather than emotional observation. In contrast, low-intensity BPD patients showed more negative emotions and risk-taking behaviors following a suppression state.

Apart from psychological factors, biological mechanisms have recently found a salient place in the psychopathology of mental disorders. Dysfunctional responses to reward are proposed to underlie and persist in abnormality (Vollum et al., 2007). Hence, Reward Sensitivity (RS) is considered a biological factor, which refers to seek conditional and unconditional rewarding stimuli (Dawe, Gullo, & Loxton, 2004). Additionally, extreme values of sensitivity to reward can be pointed out as a risk factor for psychological disorders (Berenson et al., 2020; Bijtebier et al., 2009). Research on the general population (Simons, Sittad, Simons, & Hansen, 2018; Allen, & Gabbay, 2013), patients diagnosed with major depressive disorder (Buckner, Keough, & Schmidt, 2007), and substance abuse disorder (Bornovalova, Gratz, Daughters, Hunt, & Lejuez, 2012) has shown that emotional distress is associated with a higher risk of appetitive behaviors. Rewarding behaviors to reduce negative emotions seem to be an indicator of people who have low distress tolerance. This group uses maladaptive strategies that quickly reduce negative emotionality (Simons & Gaher, 2005). On the other hand, research that can show the relationship between distress tolerance and rewarding behaviors in BPD patients has not been performed and needs to be investigated.

In the context of BPD, the impulsivity of these patients, which is characterized by behavioral disinhibition, choosing instant pleasures, and the tendency to devalue long-term rewards, is associated with reward sensitivity (Lawrence, Allen, & Chanen, 2010; Krause-Utz et al., 2016; Volker et al., 2009). Results of a meta-analysis study by using temporal delay discounting task, reversal learning, and Iowa gambling task showed that BPD patients experience altered subjective valuation of outcomes in the context of appetitive stimuli, prefer immediate rewards to delayed ones, and frequently make harmful decisions (Paret, Jennen-Steinmetz, & Schmahl, 2016). Additionally, research on several psychiatric disorders (Curry et al., 2018; Martino et al., 2015) shows a link between reward-seeking and impulsive behaviors. On the contrary, a study (Lawrence et al., 2010) has been demonstrated that although BPD patients show devaluation of delayed rewards compared with healthy controls, they are no different from the healthy group when responding to rewarding stimuli.

Studies among adolescents and students have also shown that aggression or being in an angry state are associated with a tendency to be engaged in rewarding behaviors and ap-

proach motivation (Bossuyt, Moors, & De Houwer, 2014; Drmas, 2020; Zhao, Kirwen, Johnson, & Vigo, 2017). Preferring instant rewards to delayed choices, approach motivation towards anger-related stimuli, and venting internal anger by aggressive attempts are usually observed in individuals with high sensitivity to reward in angry conditions. However, examining this relationship in BPD patients is a research gap that the present study addresses.

According to the consistent and inconsistent studies in the research literature, as well as the lack of integrated research that can simultaneously examine psychological and biological mechanisms involved in BPD patients, the present study intends to clarify these mechanisms. It identifies which factor plays a prominent role in this group. Moreover, the current study predicts distress tolerance, impulsivity, and aggression based on emotional dysregulation and reward sensitivity in individuals with BPD features.

2. Methods

The method of the present study is descriptive and correlational. The statistical population of the present study was undergraduate students of Shahid Beheshti University, Tehran City, Iran, in the academic year 2017-2018. A total of 1005 male and female students were chosen by an available sampling method. In the second phase of the research, 180 subjects with a score equal to 37 or above on the Personality Assessment Inventory-Borderline subscale (PAI-BOR) were chosen by purposive sampling method. The sample size was calculated by G*Power software in correlational studies. Thirty subjects were excluded from the study due to the lack of cooperation, and 4 subjects were excluded due to their incomplete questionnaires. Finally, 146 participants (50 males and 96 females) entered the second phase of the research.

The inclusion criteria consisted of being an undergraduate student at Shahid Beheshti University in 2017-2018 (except psychology or consulting students). According to the PAI-BOR, they must have a score equal to 37 or above and participate in the first and second research phases. The exclusion criteria were no use of the substance and antipsychotic medication. These items were asked in an interview conducted by a trained clinical psychologist.

Study instruments

Personality Assessment Inventory-Borderline Subscale (PAI-BOR)

This scale consists of 24 items representing four basic symptoms in BPD patients, including emotional instabil-

ity, self-harm/impulsivity, interpersonal relationships, and identity problems. It has a cut-point of 37 and above (Morrey, 1991). Some studies have pointed out the validity and reliability of this scale for being used in non-clinical samples (Trull, 1995). This scale has been translated in Iran, and its validity and reliability have been estimated by Esmacilian, Dehghani, Košter and Hoorelbeke (2019). In this case, after translating the questionnaire, its content validity was evaluated by experts in this field using Content Validity Index (CVI) and Content Validity Ratio (CVR). The results showed that the questions utilized in the questionnaire are useful, clear, and relevant. Besides, the convergent and divergent validity of the questionnaire and the fit indices in AMOS software were examined. The results showed that Combined Reliability (CR) was established for all subscales (CR>0.7). Necessary and sufficient conditions for construct validity were also established. This scale also indicates the desired internal consistency (the Cronbach alpha=0.75). In the present study, The Cronbach alpha value was 0.84.

Difficulties in Emotion Regulation Scale (DERS)

Difficulties in Emotion Regulation Scale (DERS) is a 36-item self-reported scale that examines the patterns of emotion regulation in individuals and has 6 components: non-acceptance of emotional responses, targeted behavior difficulties, impulse control difficulties, lack of emotional awareness, limited access to emotional regulation strategies, and lack of emotional clarity (Gratz, & Roemer, 2004). Gratz and Roemer reported the internal consistency of this scale by the Cronbach alpha value of 0.93 for the whole scale and 0.85, 0.89, 0.86, 0.80, 0.88, and 0.84 for its subscales, respectively. In Iran, Azizi, Mirzaei, and Shams (2010) have reported the Cronbach alpha value of 0.92 for this scale. In the current study, the Cronbach alpha was found 0.93.

Distress Tolerance Scale (DTS)

The Distress Tolerance Scale (DTS) was developed by Simons and Gaher (2005) and includes 15 items with four components of tolerance, evaluation, absorption, and adjustment. The internal consistency of this scale was estimated by the Cronbach alpha method for subscales of tolerance, evaluation, absorption, and adjustment as 0.72, 0.82, 0.78, and 0.70, respectively, and 0.82 for the whole scale. This questionnaire was used for the first time in Iran by Kakabraei and Azami (2017). The reliability by internal consistency method was found 0.71 for the whole subscale, 0.54 for the tolerance subscale, 0.42 for absorption, 0.56 for evaluation, and 0.58 for adjustment. In the current sample, the Cronbach alpha value was found 0.81.

Balloon Analog Risk Task (BART)

The Balloon Analog Risk Task (BART) was first introduced in 2002 by Lejuez et al. (2002). This computer test examines the possibility of risk-taking in real situations and measures the functional and also dysfunctional risk-taking strategies in person. The test has been designed so that the subject's initial risk-taking is accompanied by reward. His uncontrolled risk-taking is accompanied by losses (profit and loss in the form of hypothetical rewards or fines).

How to Perform BART

In the BART test, a balloon is displayed on the computer monitor, next to which there are buttons that each time it is pressed, the diameter of the balloon increases by one degree (about 0.3cm). Each time the balloon is inflated, 5000 tomans of money is added to the reserve of a temporary fund. When the balloon inflates more than a certain amount, it pops and disappears with a "pop" sound, and the money stored in the temporary box is lost. Instead of inflating more balloons at each stage of the test, the participant can transfer the saved money to the main box by pressing another button shown on the screen. The next uninflated balloon will be given to him/her (The total number of balloons is 30). The probability of a balloon exploding is based on a random selection from a sequence of numbers from 1 to 128 (selecting any number is equivalent to bursting a balloon). So that if the number 1 is chosen randomly for the first inflation of the balloon (probably 1/128), the balloon will explode at the same stage. But if another number is selected from the set of numbers 2 to 128, that number will be removed from the set of numbers.

The balloon does not burst, but the probability of random selection of the number 1 increases to 2/128 next time. This probability will be 1 in the 128 choices. Each time the balloon is inflated, it increases the likelihood of bursting and reduces the relative amount of profit earned, so that, for example, inflating for the second time only risks 500 RLL can be a profit equal to 100%. But inflating for 500 times 25000 RLL in the temporary fund endangers, and only 500 RLL, equivalent to 1.6%, goes to the person. This seems to be true even in the real world of risk.

Furthermore, the test is designed to increase the amount of money received exponentially each time it blows after the 50th load. Accordingly, each time the balloon is inflated after the 50th load, instead of an increase of 500 RLL, it will be accompanied by an increase equivalent to 1000 RLL for each inflation, which is the same amount

up to the 60 times, but from inflating 60 to 70, 1500 RLL. Increase from 70 to 80, 2000 RLL, and so on until the end (every 10 more blows adds more money to the person's temporary fund). This is because as the probability of a balloon exploding at inflations above 50, more rewards are needed to motivate the person to continue to take risks. This test measures the reward sensitivity of the subject.

In BART, The Following Values Are Considered as Test Scores

1. Adjusted score: Equivalent to the average number of times an inflated balloon is pumped. This variable is the main test score and the subject's risk-taking and impulsivity index.

2. The number of balloons that have been inflated more than 50 times. This variable is considered as an indicator of reward sensitivity and reward stability.

3. The Average number of pumps in post-burst attempts. This variable is added by [Nasri, Nazari, Mighani, Shahrokhi, and Goudarzi \(2018\)](#) to examine punishment sensitivity in the subjects because the bursting of a balloon can be considered as a punishment. This variable has not been studied in the present study.

Aggression Questionnaire

The aggression questionnaire is a 29-item questionnaire developed by [Buss and Perry \(1992\)](#) and measures four aspects of aggression, physical aggression, verbal aggression, anger, and hostility. The internal consistency values of this questionnaire calculated by the Cronbach alpha method for the subscales of physical aggression, verbal aggression, anger, and hostility are 0.85, 0.72, 0.83, 0.77, respectively, and for the total score is 0.89. Also, to measure its reliability by test-retest method, [Buss and Perry \(1992\)](#) found the correlation coefficient of 0.80 for the physical aggression subscale, 0.76 for the verbal aggression, 0.72 for the anger, 0.72 for the hostility, and 0.80 for the whole scale. [Samani \(2007\)](#) has reported the reliability by the test-retest method as 0.74 for anger, 0.78 for physical aggression, 0.68 for verbal aggression, and 0.68 for hostility. The Cronbach alpha values of 0.83, 0.79, 0.77, and 0.70 were estimated for subscales. In the present study, the Cronbach alpha was found 0.84.

Study procedure

To carry out the first phase of the research, we obtained the approval of the distribution of the questionnaire among the students from Shahid Beheshti University's

Research Ethics Committee. PAI-BOR was given to undergraduate students whose majors were not psychology and counseling (due to the potential bias). Besides, they were asked to enter their contact number to establish communication and record the research's second phase. The questionnaires were collected from 1005 subjects, and after making sure that the desired number of subjects was reached (based-on the cut-point of 37 or above), the second phase of the research began. Then, the subjects were called and given a brief explanation about their responses to the screening scale, alongside the need for the second phase of the research. Those individuals were asked to refer to the Educational Sciences and Psychology Faculty of Shahid Beheshti University. At this phase, 30 subjects were unwilling to cooperate, and therefore the study began with 150 participants. The inclusion and exclusion criteria were applied to all subjects. Finally, after the study, the questionnaires were evaluated, and 4 subjects were excluded from the study due to their incomplete questionnaires. Subsequently, scores of 146 subjects were analyzed.

This study was approved by Shahid Beheshti University Research Ethics Committee. Written consent was obtained from all participants. They were assured that their responses would remain confidential. Moreover, the participants were informed that they can get the results after the completion of the research.

Data analysis was conducted in SPSS V. 20. In descriptive statistics methods, frequency, mean, and standard deviation were reported. Multivariate regression analysis was used to assess research hypotheses.

3. Results

Descriptive statistics and the results of multivariate regression analysis are presented in [Tables 1, 2, and 3](#).

According to [Table 3](#), skewness and kurtosis values were used to examine the regression assumption based on the normality of the research variables. Then the Variance Inflation Factor (VIF) and tolerance index were applied to analyze the linear relationships between the independent variables. According to the values of skewness and kurtosis (under 1.96), VIF (under 5), and tolerance index (between 1 and 0), it can be put forward that regression assumptions have been observed. Afterward, multivariate regression analysis was performed by inter-method. The results are shown in [Tables 4, 5, and 6](#), respectively.

As seen in [Table 4](#), the multiple correlation coefficient of predictor variables (components of emotional dys-

regulation and reward sensitivity) with distress tolerance is equal to 0.703, and the coefficient of determination is 0.494, which is significant according to ANOVA test results (19.274) at the significance level of <0.0001. This means that components of emotional dysregulation and reward sensitivity explain 49.4% variance of distress tolerance on the whole. Regression coefficient results also show the strongest predictors of distress tolerance were limited access to emotion regulation strategies ($\beta = -0.344$) and none-acceptance of emotional responses ($\beta = -0.308$), respectively. Other components did not play a predictive role in this regression model.

Table 5 shows the multiple correlation coefficient of predictor variables (components of emotional dysregulation and reward sensitivity) with impulsivity of 0.925 and the coefficient of determination of 0.856, which is significant based on the F factor (117.247) at the significance level of <0.0001. This finding states that 85.6% variance of impulsivity can be explained by components

of emotional dysregulation and reward sensitivity. On the other hand, according to regression coefficients, the only predictor of impulsivity was reward sensitivity ($\beta = 0.914$). Components of emotional dysregulation did not have an essential role in impulsivity.

According to Table 6, the multiple correlation coefficient of predictor variables with aggression is 0.397. The coefficient of determination is equal to 0.158, which is significant according to F at the significance level of <0.001. This result puts forward that the components of emotional dysregulation and reward sensitivity together account for 15.8% of the variance in aggression. Also, according to regression coefficients, the only predictor of aggression was impulse control difficulties. Other components did not predict aggression.

On the other hand, the MANOVA (Multivariate Analysis of Variance) method was used to analyze the effect of BPD features severity on participants' performance

Table 1. Demographic indicators of participants

Participants	Mean±SD	N
Male	20.66±1.54	50
Female	20.75±1.81	96
Total	20.72±1.72	146

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Table 2. Descriptive statistics of the research variables (N=146)

Variables	Mean±SD
Emotional dysregulation	108.93±20.66
Non-acceptance of emotional responses	17.12±5.92
Targeted behavior difficulties	17.78±4.36
Impulse control difficulties	18.74±4.96
Lack of emotional awareness	16.21±4.22
Limited access to emotional regulation strategies	24.97±6.42
Lack of emotional clarity	14.33±4.33
Reward sensitivity	8.44±6.64
Distress tolerance	38.83±9.93
Impulsivity	45.61±18.77
Aggression	90.77±14.89

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Table 3. Statistical assumptions of regression analysis

Variables	Collinearity Indicators		Tolerance	Skewness	Kurtosis
	Variance Inflation Factor				
None-acceptance of emotional responses	1.507		0.664		
Targeted behavior difficulties	2.470		0.405		
Impulse control difficulties	2.219		0.451		
Lack of emotional awareness	1.305		0.766		
Limited access to regulation strategies	2.040		0.490		
Lack of emotional clarity	1.506		0.664		
Reward sensitivity	1.056		0.947	0.264	-1.20
Emotional dysregulation				-0.412	-0.31
Distress tolerance				0.629	1.18
Impulsivity				0.339	-0.44
Aggression				0.410	0.12

in research variables. MANOVA analysis based on the Lambda effect ($P=0.213$) showed that the severity of features did not impact the participants' responses (Table 7).

4. Discussion

The current study examined the roles of emotional dysregulation and reward sensitivity in predicting distress tolerance, impulsivity, and aggression among individuals with BPD features.

As predicted, the first result showed among the components of emotional dysregulation, only two components of limited access to emotional regulation strategies and non-acceptance of emotional responses had predictive roles in distress tolerance. Linehan's Biosocial theory supported this result and showed that emotional dysregulation of BPD patients, as an underlying factor, makes these patients use maladaptive coping strategies such as rumination and suppression in the face of distressing emotional states (Linehan, 1993). In line with Carpenter and Trull (2013), emotional dysregulation is an inability to cope with distress and negative affectivity. People with

Table 4. Summary results of multivariate regression analysis for predicting distress tolerance

Predictor Variable	R	R ²	F	Sig.	β	t	Sig.
None-acceptance of emotional responses					-0.308	-4.142	0.0001
Targeted behavior difficulties					-0.082	-0.865	0.388
Impulse control difficulties					-0.135	-1.498	0.136
Lack of emotional awareness	0.703	0.494	19.274	0.0001	-0.097	-1.399	0.164
Limited access to emotional regulation strategies					-0.344	-3.973	0.000
Lack of emotional clarity					0.067	0.907	0.366
Reward sensitivity					-0.006	-0.102	0.919

Table 5. Summary results of multivariate regression analysis for predicting impulsivity

Predictor Variables	R	R ²	F	Sig.	β	t	Sig.
None-acceptance of emotional responses					0.011	0.277	0.782
Targeted behavior difficulties					0.012	0.230	0.818
Impulse control difficulties					0.013	0.271	0.787
Lack of emotional awareness	0.925	0.856	117.24	0.000	-0.047	-1.282	0.202
Limited access to emotional regulation strategies					-0.037	-0.805	0.422
Lack of emotional clarity					-0.031	-0.791	0.431
Reward sensitivity					0.914	27.553	0.0001

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low distress tolerance that have elevated difficulties in emotional regulation are at risk to be engaged in destructive behaviors such as drunkorexia to suppress aversive emotional states (Laghi, Pompili, Bianchi, Lonigro, & Baiocco, 2020). Accordingly, BPD patients have difficulties tolerating the distress and affective disturbances when following their targets (Carpenter & Trull, 2013).

Moreover, these patients consider distress unacceptable and intolerable and show hyper-reactivity to stressors (Reilly & Hines, 2017). These individuals avoid experiencing negative emotionality and subsequently use maladaptive regulatory strategies (non-acceptance of emotional responses) to alleviate distress. Although these strategies can decrease BPD patients' distress in the short term, they may exacerbate negative emotions, increase psychological distress and make one incapable of tolerating distress in the long term.

In this regard, this finding supported prior research (Kuo et al., 2018) and shows that subclinical BPD patients experience emotional distress after suppression conditions, consistent with the current study. Unexpectedly, the results of this study did not support the link between reward sensitivity and distress tolerance. This result is inconsistent with several studies (Simons et al., 2018; Buckner et al., 2007; Allen & Gabbay, 2013; Boronova et al., 2012), stating rewarding behaviors may reduce distress and negative emotions and make one capable of tolerating them in the short term. The difference between clinical samples may explain inconsistent findings. The reported studies in the field of distress tolerance and reward sensitivity have been done on a healthy group, major depressive disorder patients, and substance use disorder. There has not been any research aiming to assess the role of reward sensitivity in negative emotional conditions in the BPD group.

Table 6. Summary results of multivariate regression analysis for predicting aggression

Predictor Variable	R	R ²	F	Sig.	β	t	Sig.
None-acceptance of emotional responses					-0.011	-0.111	0.912
Targeted behavior difficulties					0.012	-0.341	0.734
Impulse control difficulties					-0.042	2.987	0.003
Lack of emotional awareness	0.397	0.158	3.694	0.001	0.348	0.478	0.634
Limited access to emotional regulation strategies					0.043	1.271	0.206
Lack of emotional clarity					-0.136	-1.414	0.160
Reward sensitivity					0.008	0.105	0.917

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Table 7. The multivariate analysis of variance method for analyzing the severity of borderline personality disorder symptoms on the responses of subjects

Dependent Variables	Effect	Mean Square	F	Sig.
	Lambda		1.442	0.213
Emotional dysregulation		1641.362	3.923	0.050
Reward sensitivity		9.565	0.215	0.643
Distress tolerance		89.298	0.904	0.343
Impulsivity		4.928	0.014	0.906
Aggression		198.597	0.894	0.346

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Additionally, it can be pointed out that the experienced distress in BPD patients is more context-dependent. As suggested in Linehan's theory, these patients show extreme emotional responses to environmental triggers (Linehan, 1993). Hence, their intense negative emotionality cannot reduce only by rewarding actions. Consistent with the theory of emotional waterfalls (Selby et al., 2008), BPD patients experience cognitive and emotional conflict with the situation and extreme values of emotionality when they are exposed to environmental triggers. On the other hand, the second result showed that none of the emotional dysregulation components predicted impulsivity. By contrast, only reward sensitivity had a pivotal role in predicting impulsivity in individuals with BPD symptoms.

As predicted, BPD patients with impulsivity characteristics prefer immediate rewards to delayed ones (Lawrence et al., 2010; Berenson et al., 2016). These patients tend to choose smaller-sooner rewards rather than larger-later options (Marshall & Kirkpatrick, 2015), suggesting high sensitivity to reward and low sensitivity to loss and punishment in this group. In support of this, instant decision-making in the BPD group may be owing to over-response to positive reinforcers. In other words, when these patients are exposed to pleasurable hallmarks in an environment, they encounter processing changes with a bias towards high-risk and high-gain options and eventually conduct high-risk behaviors (Kirkpatrick et al., 2007). Overall, it can be argued that impulsive BPD patients have difficulty resisting rewarding behaviors (Berenson et al., 2020) that lead to behaving unreservedly in an environment that has immediate gains.

The final result of the present study showed that among the components of emotional dysregulation, only impulse control difficulties predict aggression. This result was supported by research (Terzi et al., 2017; Cooper,

Wood, Orcutt, & Albino 2003) proposed that impulsivity and weakness in impulse control, along with emotional regulation deficits in BPD patients, can cause involvement in destructive and aggressive behaviors. Additionally, impulse control difficulties can mediate the link between boredom and aggression. The experience of boredom may trigger a pressured feeling that leads to impulsivity (Isacescu, Struk, & Dankert, 2017; Gratz, & Roemer, 2004), and aggressive behaviors following impulsivity are considered the regulatory strategy to tackle negative emotionality (Cao & An, 2019; Biolcati, Manchini, & Trombini, 2018). In line with previous research, lack of inhibitory control may present itself in aggressive behaviors such as risky driving or other destructive actions (Hoptman & Javitt, 2020; Barati, Pourshahbaz, Nosratabadi, & Mohammadi, 2020). Moreover, the inability to control impulses serves as a critical factor to aggressive actions against oneself and others under the emotional arousal conditions in BPD patients. Aggressive behaviors such as cutting their bodies, burning themselves with a cigarette, banging their heads as self-directed aggression, or physical and verbal aggression related to others, are attempts that the BPD patients perform to deal with painful internal feelings.

On the contrary, the results of this study showed no link between reward sensitivity and aggression. This finding was inconsistent with studies that suggest being in an angry condition leads to prefer immediate rewards to delayed ones (Zhao et al., 2017; Bossuyt et al., 2014; Drnas, 2020). The discrepancies in the above studies may be a consequence of the difference between the clinical study groups. Because reported studies have been done on healthy students and children group, and, in contrast, there has not been any research to examine the relationship between reward-seeking and aggression in BPD patients. Besides, the nature of aggression in the

BPD group may be interpreted as an explanation for the inconsistency of the existing findings. This explanation seems plausible based on Kernberg (2004), who states that BPD patients suffer from excessive aggression. These patients have emotional regulatory deficits and may use verbal or physical aggression to vent their internal anger. The severity of anger and rage in BPD patients leads to destructive behaviors such as self-harm, which aim to vent aversive inner anger and alleviate stress not getting pleasure. Accordingly, it is reasonable to assume that aggressive behaviors may not have a rewarding value by themselves in BPD patients.

5. Conclusion

BPD is a heterogeneous psychiatric disorder, which can have complex causes against diverse diagnostic symptoms. This study found that emotional dysregulation had a remarkable role in distress tolerance and aggression. Besides, impulsivity was only determined by reward sensitivity, that both are proposed as biological mechanisms. Therefore, the present study results can have clinical implications considering both etiology and treatment of BPD patients. Hence, more focus is necessary on psychological interventions based on emotional regulation in treating symptoms related to negative emotionality. Also, the importance of biological treatments such as medication in the field of impulsive and destructive behaviors can be pointed out as practical benefits of the current research.

However, this research has several limitations that need to be considered in future studies. The dropout of participants and lack of cooperation in the second phase of the study are limitations of the present research. Hence, future studies may need a larger sample to examine the variables. Conducting the current study among individuals with BPD features instead of BPD patients can affect the generalizability of the findings to the clinical population. Further investigations should be undertaken in the BPD group. Additionally, this research emphasizes the correlational relationships between variables, which does not allow making causal inferences. Therefore, subsequent studies based on causality can help researchers to understand better the link between reported variables in the context of BPD patients.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles were considered in the current research. Written informed consent was obtained from all

participants, and they were assured about the confidentiality of their information.

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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