

Psychopathology and the autonomic nervous system in borderline personality disorder.

Part 2. The Influence of Early Adversities, Dissociation and Self-stigma on the Treatment

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Abstract

INTRODUCTION: This study examines the influence of childhood adversities, dissociation, and self-stigma on autonomic nervous system function and treatment outcomes in hospitalised patients with borderline personality disorder (BPD).

METHODS: Seventy-five BPD inpatients underwent a six-week intensive psychotherapy treatment program. Changes in psychopathology and autonomic nervous system function were monitored. (heart rate variability, LF/HF ratio).

RESULTS: The study confirmed a positive impact of the treatment program on reducing BPD symptomatology, anxiety, and depressive symptoms. Findings indicate that the initial dissociation level does not correlate with changes in symptomatology. In contrast, changes in dissociation during treatment are associated with reductions in anxiety and depressive symptoms. Regarding HRV, our data show that although there were no significant changes in HRV during treatment, higher baseline LF/HF values correlated with smaller changes in symptom severity, which could indicate a possible link between autonomic nervous dysregulation and the stability of BPD symptoms.

DISCUSSION: Our findings emphasise the importance of monitoring physiological and psychological factors in BPD treatment, highlighting potential predictors of therapeutic response.

INTRODUCTION

Borderline personality disorder (BPD) is a severe mental disorder characterised by emotional instability, impulsivity, identity disturbances, and an intense fear of abandonment. The disorder has a complex aetiology that involves biological, psychological, and social factors (Linehan *et al.* 1993; Gunderson *et al.* 2001). Recent research on BPD suggests that early life events, such as trauma or inadequate caregiving in childhood, may play a key role in the development of the disorder (Zanarini 2000; Widom *et al.* 2008). Although these factors are often mentioned in the literature, their specific impact on the course and effectiveness of BPD treatment has not yet been sufficiently explored (Fonagy *et al.* 2003).

Current therapeutic approaches, particularly cognitive behavioural therapy, dialectical behavioural therapy, transference focus therapy, mentalisation therapy, and schema therapy, aim to alleviate symptoms of BPD and improve patients' quality of life (Davidson *et al.* 2010; Crotty *et al.* 2024; Hajek Gross *et al.* 2024; Rizvi *et al.* 2024). Some studies suggest that psychological variables such as dissociation or self-stigma may influence therapeutic outcomes, but the available data are inconclusive (Kuo *et al.* 2016; Perroud *et al.* 2017). Another factor that may play a role in therapy is the autonomic nervous system, specifically heart rate variability (HRV), which reflects the balance between sympathetic and parasympathetic and may indicate the patient's emotional and physiological reactivity (Thayer *et al.* 2012). This study aims to investigate how early adversity, dissociation, self-stigma, and autonomic nervous system function influence the course and outcomes of treatment in hospitalised patients with BPD, using autonomic nervous system monitoring via HRV. The six-week intensive treatment program offers a unique opportunity to monitor the dynamics of these factors and their connection with therapeutic outcomes.

METHOD

In our study, we focus on the following factors, which are examined in terms of their influence on the course of treatment and changes in psychopathology in patients with borderline personality disorder (BPD):

- **Heart rate variability:** We examine changes in autonomic nervous system regulation, specifically through heart rate variability (HRV), which reflects the body's ability to adapt to stress and emotional stimuli. Low HRV is often associated with emotional dysregulation, which is a key feature of BPD.
- **Early adversities:** We monitor the influence of adverse childhood experiences, such as neglect and physical or emotional abuse, on current psychopathology and their relationship to therapeutic outcomes.
- **Dissociation:** We monitor dissociative symptoms, which may disrupt the integration of emotions and

experiences. Dissociation is common in patients with BPD and can thwart the progress of therapy.

- **Self-stigma:** We investigate the extent to which patients internalise the social stigma associated with psychiatric disorders, which can lead to low self-esteem and negatively affect the ability to establish a therapeutic effect.
- **Current psychopathology:** We assess the severity of BPD symptoms at the beginning and end of treatment and their change to determine how individual factors contribute to their alleviation.

These factors were monitored during an intensive 6-week combined cognitive behavioural and schema therapy program in an inpatient clinic. The results of this study should provide a more detailed understanding of how specific biopsychosocial factors influence the course and outcome of treatment and may help create targeted intervention strategies.

Hypotheses

Based on the literature review, the following hypotheses were formulated:

- (1) There is a change in psychopathology during treatment.
- (2) There is a change in autonomic nervous system activity during treatment.
- (3) The level of dissociation at the beginning of therapy is associated with a decrease in psychopathology.
- (4) The level of self-stigma is related to the decline in psychopathology.
- (5) Activation of the sympathetic nervous system at the beginning of treatment is associated with decreased psychopathology.
- (6) Activation of the parasympathetic nervous system at the beginning of treatment is associated with decreased psychopathology.
- (7) The LF/HF ratio at the beginning of treatment is associated with decreased psychopathology.
- (8) Change in the LF/HF ratio is associated with a decrease in psychopathology.
- (9) Adverse experiences in childhood are associated with a reduction in psychopathology.

METHODOLOGY

The study aimed to include at least 60 patients, who were assessed for the severity of borderline psychopathology, the level of anxiety and depressive symptoms, heart rate variability, the level of dissociation, and adverse events in childhood. The assessment was carried out at the beginning of the study by the researcher, an independent evaluator, and the patient using assessment scales and questionnaires. After a six-week treatment, which took place via hospitalisation in the psychotherapeutic department in group psychotherapy utilising a combination of cognitive behavioural therapy, schema therapy, and medication, the severity of borderline

psychopathology, depressive symptoms, and anxiety, the level of dissociation and heart rate variability were assessed again.

The aim of the study is not only to examine the effectiveness of the treatment via change in assessed parameters but also to identify predictors of good and poor response to treatment. A predictor of good response to treatment is defined as a decrease in symptomatology by at least 35% and a decrease of at least 2 points in the objective CGI (Kolek et al. 2019).

Research plan

The study enrolled patients diagnosed with BPD according to the research criteria of the ICD-10 (1996) who were referred to the Psychiatric Clinic University Hospital in Olomouc and then underwent a Mini International Neuropsychiatric Interview for confirmation. Patients filled in a demographic questionnaire and signed informed consent. The schedule for recruiting patients into the study was from January 1, 2020, to August 31, 2023.

Assessment methods

Our methods included physiological examination with HRV, psychiatric examination and diagnosis, questionnaires, scales assessing the severity of the disorder, self-assessment scales and questionnaires, and questionnaires focused on aversive events in childhood, type of attachment, and degree of dissociation.

HRV

Heart rate variability (HRV) measures the interval between two consecutive heartbeats. This measurement is usually expressed in milliseconds. In our case, it was performed using a microcomputer system (VarCor PF7).

Heart rate variability (HRV) can be analysed from short-term recordings, obtaining the results of the so-called short-term variability (Javorka et al. 2008). When assessing with linear methods, frequency and time analysis are used (Slepecky et al. 2017).

Spectral analysis is a technique used in signal processing to analyse the signal's frequency content (Thayer et al. 2010). This method involves decomposing the signal into its fundamental frequencies using mathematical algorithms such as the Fourier transform. The Fast Fourier Transform (FFT) is an efficient algorithm for calculating the Discrete Fourier Transform (DFT) and its inverse (Belova et al. 2007). In the context of HRV measurement, spectral analysis and FFT are used to analyse electrocardiogram (ECG) signals and extract HRV parameters (Javorka 2001). Spectral analysis is used to identify and quantify the frequency components in the ECG signal. In contrast, FFT is used to calculate these spectral components efficiently. In this way, the system can record and analyse HRV parameters.

The ECG signal was recorded while the patient was sitting. The recording interval was ten minutes, and

then it was cleaned of artefacts up to five minutes, from which the analysis was subsequently carried out.

In the frequency assessment of HRV, three bands are distinguished in clinical practice – the high frequency (HF), low frequency (LF), and very low frequency (VLF) bands (Javorka et al. 2009):

- *High frequency (HF)* is a non-invasive index of cardiac vagal activity mediated by respiratory sinus arrhythmia. Javorka et al. (2008) reported that the HF component reflects mainly parasympathetic activity. In connection with Porges' polyvagal theory, a lower parasympathetic tone supports mobilisation behaviour (as in fear and anxiety), and a higher parasympathetic tone supports socially adaptive behaviour (so-called "social engagement behaviour") (Porges 2009; Porges 2011).
- *Low frequency (LF)* probably represents both sympathetic and parasympathetic activity through baroreflex activity (Moak et al. 2009; Goldstein et al. 2011). The LF component results from the activities of both parts of the autonomic nervous system (ANS). The LF band is also significantly influenced by the activity of the baroreflex loop and other factors that act simultaneously and dynamically. Their overlap in forming oscillations in the LF band changes depending on the current state. Their uneven "biological strength" in time, as well as the distribution of their activity maxima, affects the "shape," amplitude, and overall characteristics of the LF band (Javorka et al. 2008).
- *Very low frequency (VLF)* is influenced by thermoregulation, peripheral vasomotor tone, and the renin-angiotensin-aldosterone system (Ponikowski et al. 1997; Javorka et al. 2009).

Questionnaire methods

Mini International Neuropsychiatric Interview (MINI)

The Mini International Neuropsychiatric Interview (MINI) provides screening for common mental disorders meeting the criteria of the DSM-IV and ICD-10 (Sheehan et al. 1998; Amorim 2000)

Sheehan Anxiety Scale

The Sheehan Patient-Rated Anxiety Scale (SPRAS) is a scale that examines the main symptoms of anxiety and panic disorders. It helps to assess and monitor how these symptoms and behaviours change over time. The assessment can be done by either the patient or a healthcare professional. The scale contains 35 questions relating to various aspects of anxiety disorder. The first 16 questions focus on the core symptoms of anxiety. The remaining 19 questions touch on other manifestations and behaviours related to stress. Answers are given on a Likert scale from "not at all" (0), through "a little" (1), "moderately" (2), and "significantly" (3) to "extremely" (4). The scale is suitable for clinical research and practice because it allows you to compare the patient's condition before and after treatment. The

scale is very sensitive to changes and responds to the effectiveness of treatment. The scale has two versions: one for clinicians (SCRAS – Sheehan Clinician-Rated Anxiety Scale) and one for patients (SPRAS – Sheehan Patient-Rated Anxiety Scale) (Sheehan *et al.* 1988).

Beck Depression Inventory

Beck Depression Inventory (Beck Depressive Inventory, BDI-II; Beck *et al.* 1996) is an assessment tool consisting of 21 items. In each item, the patient selects one of four options that best corresponds to his feelings in the last two weeks. BDI-II correlates around 0.70 with other standardised depression scales, and its internal consistency (Cronbach's alpha) ranges from 0.73 to 0.95 (Domino & Domino 2006). This tool is widely used to assess the current level of depressive symptomatology both in clinical practice and in research. This test has been adapted for the Czech population (Preiss & Vacíř 1999). Ociskova *et al.* (2017) validated this inventory for the Czech population.

Beck Anxiety Inventory

The Beck Anxiety Inventory (BAI; Beck *et al.* 1988) is a 21-item assessment tool. Each item is rated on a four-point Likert scale, which the individual uses to indicate the severity of anxiety symptoms experienced in the last week. Kamarádová *et al.* (2015) validated the Czech version of the BAI. This inventory shows excellent internal consistency (Cronbach's $\alpha = 0.92$; Kamarádová *et al.* 2015).

CGI

CGI, which stands for Clinical Global Impression, is an instrument developed by Guy in 1976. This instrument is intended to assess the overall severity of a mental disorder.

The CGI-O (Clinical Global Impression-Objective) assessment is based on a physician's comprehensive patient assessment. The physician is tasked with objectively recording the intensity of the patient's psychological problems on a seven-point scale. A score of 1 on this scale means that the patient is normal and shows no signs of illness. Conversely, a score of 7 indicates that the patient is experiencing extremely severe disease symptoms.

The CGI also includes a subjective version (CGI-S) in which the patient assesses their overall condition. Each severity level on this scale has characteristics that help the patient better understand and evaluate their condition.

CGI-BPD

The CGI-BPD (Clinical Global Impression - Borderline Personality Disorder) scale was adapted from the original Clinical Global Impression (CGI) scale. It is designed to assess the severity and changes after intervention in patients with borderline personality disorder (BPD). It contains ten items assessing

nine relevant BPD psychopathological domains, plus a global score (Perez *et al.* 2007).

The CGI-BPD has two formats:

- CGI-BPD-S: Assesses current severity.
- CGI-BPD-I: Assesses improvement.

This scale was tested on 78 patients with BPD during a four-month therapeutic intervention. The modified scale demonstrated good validity and reliability (α 0.85 and 0.89; CCI: 0.86 and 0.78), adequate sensitivity to change, and a two-factor structure that explains 67.4% of the total variance (Perez *et al.* 2007). The CGI-BPD is simple to use and can correct for the over-generalisation inherent in the original CGI version. It is a valuable tool for assessing the severity and change in patients with BPD (Bozzatello *et al.* 2023).

Childhood Trauma Questionnaire – Short Form

The Childhood Trauma Questionnaire (CTQ-SF) is a retrospective assessment tool for a wide range of traumatic experiences in childhood (Bernstein *et al.* 1997). It was developed as a short, reliable, and valid instrument for assessing experiences of childhood abuse and neglect (Bernstein *et al.* 2003). The CTQ-SF is designed for adolescents and adults. It contains 28 items organised into four factors: physical and emotional abuse, emotional neglect, sexual abuse, and physical neglect (Spinhoven *et al.* 2014). The CTQ-SF has demonstrated a Cronbach's alpha of 0.95 for the total scale (Hagborg *et al.* 2022). The CTQ-SF also showed good test-retest reliability for a subgroup ($n = 40$) over a 2- to 8-month period, with an internal correlation for the total scale of 0.88 (Hagborg *et al.* 2022).

ISMI

The Internalized Stigma of Mental Disorders Scale (ISMI; Ritsher *et al.* 2003) is a 29-item, four-point scale assessment tool. These items measure five domains of internalised stigma (Ritsher & Phelan 2004). These domains include:

- Feelings of alienation and not being a full member of society.
- Level of agreement with stereotypes about people with mental disorders.
- Perception of how the patient has been treated since diagnosis.
- Withdrawal from society.
- Level of resistance to stigma (Boyd *et al.* 2014).

The Czech version of the ISMI scale was standardised by Ociskova *et al.* (2014). This version shows excellent internal consistency (Cronbach's alpha $\alpha = 0.91$; Ociskova *et al.* 2015).

DES

The Dissociation Experience Scale (DES) assesses different dissociative experiences (Bernstein & Putnam 1986). This questionnaire helps screen for dissociative disorders, especially dissociative identity

disorder (multiple personalities) and dissociative disorders not elsewhere classified. It is also often used in patients with borderline personality disorder (Grambal *et al.* 2016; Prasko *et al.* 2016; Khosravi 2020; Zanarini *et al.* 2023). The DES consists of 28 items that assess the frequency of various dissociative symptoms in the patient's daily life (Bernstein & Putnam 1986). Pathological DES (DES-T) includes more severe dissociative symptoms (DES items 3, 5, 7, 8, 12, 13, 22, and 27) (Waller *et al.* 1996)

Sheehan Disability Scale (SDS)

The Sheehan Disability Scale (SDS) is a widely used self-report questionnaire designed to assess functional impairment caused by mental health symptoms in three key areas of life: work/school, social life, and family life/home responsibilities (Sheehan *et al.* 1996). It also evaluates the subjective perception of stress caused by these impairments. The scale provides a quantitative measure of the impact of mental health symptoms on daily functioning, helping clinicians monitor progress, plan interventions, and evaluate treatment outcomes. Structure:

- **Work/School Functioning:** Respondents rate how their illness has interfered with their ability to perform at work or school the past week.
- **Social Life:** Respondents evaluate how their illness has disrupted their social activities and relationships with friends and acquaintances.
- **Family Life/Home Responsibilities:** This section assesses how symptoms have affected family interactions and the ability to manage household responsibilities.
- **Perceived Stress Scale:** Respondents indicate the level of stress and personal difficulties they experienced due to their symptoms, including problems in work, family life, social interactions, health, and finances.

Each domain is rated on a visual analogue scale ranging from 0 (no impairment) to 10 (extreme impairment), providing a simple and intuitive method for evaluating the functional impact of mental health conditions.

Demographic Questionnaire

That Questionnaire includes information on age, gender, course and duration of psychological problems, education, employment, medication, and other factors. This set of tools allows for a comprehensive assessment of factors that may influence the treatment of patients with BPD.

We have published a detailed description of the individual assessment tools in Part 1.

Data processing and analysis methods

Various statistical methods were used to analyse the data in this study, allowing for examining relationships between variables and evaluating hypotheses. The data were processed in several steps:

1. *Descriptive analysis:* Basic descriptive statistics were processed for all variables, including means, standard deviations, and minimum and maximum values. These data were used to describe the essential characteristics of the sample, such as age, duration of the disorder, number of hospitalisations, and scores on individual psychological and physiological indicators.
2. *Correlation analysis:* Pearson correlation analysis was used to determine relationships between variables, such as early life experiences, level of dissociation, self-stigma, attachment, and heart rate variability (HRV). In cases where variables did not meet the assumptions of normality, Spearman correlation analysis was used. The results of the correlations were interpreted with the hypotheses.
3. *T-tests and analysis of variance (ANOVA):* T-tests and analysis of variance were used to assess differences between subgroups of patients (for example, based on different levels of early trauma or different attachment patterns). These tests allowed us to evaluate statistically significant differences between groups in symptom severity and autonomic responses.
4. *Statistical significance:* Statistical tests were evaluated at a significance level of $p < 0.05$. For hypotheses with a trend toward significance, p-values were reported that could indicate an important direction for future research.

Research ethics

The studies conducted in this work were under the latest version of the Declaration of Helsinki and the Principles of Good Clinical Practice (APA 1982; EMEA 2002). Patients signed informed consent. The joint ethics committee of the University Hospital and the Faculty of Medicine, Palacky University in Olomouc, approved the study on March 8, 2021 (reference no. 45/21).

Sample description

Patients admitted to the ward were diagnosed according to the admitting psychiatrist's ICD-10 (1996) criteria. Their diagnosis was verified by two other psychiatrists (the head of the department and the head of the clinic). After the severity of the disorder was determined by the psychiatrist (CGI-.BPD), patients at the beginning of hospitalisation completed the SPRAS, BDI-II, and BAI scales and the CTQ-SF, ISMI, DES, and Demographic Questionnaire after receiving instructions.

Patient selection criteria for the study

During treatment, patients completed the BDI-II and BAI scales weekly. At the end of treatment, severity and change in psychopathology during treatment were assessed using the subjective CGI-BPD, and patients completed the SPRAS, BDI-II, BAI, and DES. Physicians evaluated the degree of psychopathology (CGI-O) once

Tab. 1. Study Inclusion Criteria

INCLUDING CRITERIA	EXCLUDING CRITERIA
ICD-10 research criteria for Emotionally unstable personality disorder – Borderline type	Organic mental disorder
Age 18-65 years	Current or history of psychotic disorder
Signed informed consent	Substance addiction
	Dissocial personality disorder
	Suicidal tendencies (suicidality index in MINI higher than 2)
	Partial or complete illiteracy or Mental retardation

Tab. 2. Description of the sample in demographic, clinical, and psychological variables

	Mean + SD at the beginning.	Mean + SD at the end.	Statistic (pair t-test)
CTQ-emotional abuse	13.65 ± 5.75		
CTQ-physical abuse	7.72 ± 4.30		
CTQ-sexual abuse	7.37 ± 5.41		
CTQ-physical neglect	16.61 ± 5.55		
CTQ-emotional neglect	8.57 ± 4.79		
CTQ-total	53.93 ± 17.72		
BEST-total	40.77 ± 12.34		
BEST – TH	23.87 ± 8.79		
BEST N-B	9.81 ± 4.54		
BEST P-B	7.91 ± 3.31		
CGI-BPD Fear of abandoned	4.21 ± 1.99	3.56 ± 1.65	t = 3.010 df = 65; p < 0.005
CGI-BPD Unstable relations	4.43 ± 1.91	3.70 ± 1.55	t = 3.541 df = 65; p < 0.001
CGI-BPD Identity	4.58 ± 1.94	3.73 ± 1.78	t = 3.124 df = 65; p < 0.005
CGI-BPD Impulsivity	4.38 ± 1.62	3.42 ± 1.61	t=4.549 df = 65; p < 0.0001
CGI-BPD Suicidality and self-harm	3.59 ± 2.12	2.83 ± 1.89	t = 3.971 df = 65; p < 0.0005
CGI-BPD Emotional instability	5.18 ± 1.66	4.08 ± 1.57	t = 4.598 df = 65; p < 0.0001
CGI-BPD Feelings of emptiness	4.94 ± 1.73	3.55 ± 1.82	t = 6.159 df = 65; p < 0.0001
CGI-BPD Anger	4.30 ± 1.72	3.03 ± 1.64	t = 6.264 df = 65; p < 0.0001
CGI-BPD Paranoidity	3.80 ± 1.97	2.67 ± 1.42	t = 5.432 df = 65; p < 0.0001
CGI-BPD TOTAL	4.73 ± 1.22	3.31 ± 1.21	t = 9.672 df = 65; p < 0.0001
DES	26.07 ± 16.62	26.72 ± 16.75	t = 0.3215 df = 71; ns
subjCGI	4.38 ± 1.49	4.14 ± 1.27	t = 1.147 df = 69; ns
Sheehan anxiety scale	60.45 ± 29.98	49.79 ± 29.67	t = 3.767 df = 74; p < 0.0005
BAI	25.51 ± 13.94	23.60 ± 14.58	t = 1.706 df = 74; ns
BDI-II	33.69 ± 11.94	28.96 ± 15.79	t = 3.169 df = 74; p < 0.005
ISMI TOTAL	44.81 ± 14.37		
ISMI Alienation	16.33 ± 3.97		
ISMI Agreeing with stereotypes	13.72 ± 4.47		
ISMI Experience of discrimination	11.33 ± 3.40		
ISMI Social withdrawal	14.52 ± 4.34		
ISMI Resistance to Stigma	11.09 ± 2.97		

Tab. 3. Changes in the autonomic system during treatment

Parameters HRV	Mean at the start $\pm$ SD	Mean at the end $\pm$ SD	Statistics (pair t-test)
LF %	36.25 $\pm$ 8.12	36.93 $\pm$ 8.89	t = 0.5687 df = 74; ns
HF %	35.10 $\pm$ 9.55	33.62 $\pm$ 9.43	t = 1.045 df = 74; ns
LF / HF	1.22 $\pm$ 0.69	1.28 $\pm$ 0.68	t = 0.5912 df = 74; ns
Dech	15.21 $\pm$ 1.67	15.05 $\pm$ 1.84	t = 0.9496 df = 74; ns
LF	123.60 $\pm$ 107.80	150.70 $\pm$ 148.30	t = 1.613 df = 74; ns
HF	128.10 $\pm$ 159.50	149.80 $\pm$ 238.70	t = 0.6720 df = 74; ns

a week. The following table lists the inclusion criteria for the study (Table 1).

Patients diagnosed with mild or moderate major depressive disorder along with borderline personality disorder or patients suffering from a comorbid anxiety disorder or a personality disorder other than antisocial personality disorder were included in the study. However, patients with severe clinical depression were not included in the study.

Treatment

Patients enrolled in the program participated in a group psychotherapy based on cognitive behavioural and schema therapy. No significant changes in pharmacotherapy were made during treatment. The exceptions were the gradual withdrawal of benzodiazepines in patients who have been using them for a long time and the optimisation of the dose of antidepressants in patients for whom it is considered insufficient. During the six-week hospitalisation, 24 community and 24 group sessions are held, each lasting 90 minutes. This intensive program includes several therapeutic activities and methods to help patients better understand and solve their psychological problems.

The cognitive behavioural program and schema therapy include psychoeducation, work with modes, activity planning, cognitive restructuring, work with core beliefs and conditional rules, imagination, group interaction work, training in social skills and mentalisation of the modes and needs of the other party, exposure therapy and problem-solving strategies.

RESULTS

The study included 75 patients, of whom 9 were men and 66 were women. The mean age is 27.04 $\pm$ 9.11 years. The mean onset of the disorder was 17.74 $\pm$ 7.90 years, and the disorder duration was 8.29 $\pm$ 6.61 years. Nine had a university education, 30 had a secondary education, 17 had a vocational education, and 19 had a primary education. Fifty-two were single, 12 were married, 11 were divorced, 21 lived with a partner. Other demographic, clinical, and psychological variables are listed in Table 2. The mean number of previous hospitalisations was 3.76 $\pm$ 3.52.

Change in psychopathology during treatment

In the CGI-BPD scale, there was a statistical improvement in all assessed items during the 6-week intensive psychotherapy, including the global assessment of borderline personality disorder severity (Table 2).

In the scales assessing the severity of anxiety, there was a statistically significant decrease in the Sheehan Anxiety Scale (Table 2) but not in the BAI scale. In the scale assessing the degree of depressive symptoms, the BDI-II, there was a statistically significant decrease in the mean score. However, there was no significant change in the severity of dissociation assessed by the DES scale (Table 2).

Changes in the autonomic system during treatment

During the 6-week intensive psychotherapy treatment, no statistically significant change was found in any of the evaluated HRV parameters (Table 3).

Relationship between demographic data and changes in psychopathology

Neither changes in the CGI-BPD rating scales nor changes in the severity of general anxiety or depression symptoms were related to any of the basic demographic factors, such as age, onset of the disorder, duration, or number of hospitalizations (Table 4). Only the negative correlation between change in CGI-BPD fear of abandonment and onset of the disorder approached statistical significance (Table 4).

The relationship between social adaptation and changes in psychopathology

Social adjustment, as assessed by the Sheehan Disability Scale in all its domains (work, relationships, family, stress), appears to correlate minimally with changes in treatment. A statistically significant positive correlation was found for the work domain and change in the CGI-BPD – Identity and CGI-S (Table 5). No correlations with changes in treatment were found in other domains, such as social functioning, family, and stress.

The relationship between adverse events in childhood and changes in psychopathology

The total score of the Childhood Trauma Questionnaire (CTQ-total) is not statistically significantly correlated

Tab. 4. Correlation of baseline demographic factors with symptom changes in various assessment tools

	Age	Onset	Length	Number of hospitalizations
CGI-BPD Fear of abandoned	-0.13	-0.23 (p=0.06)	0.17	0.01
CGI-BPD Unstable relations	0.11	-0.00	0.17	0.14
CGI-BPD Identity	0.07	-0.05	0.12	-0.07
CGI-BPD Impulsivity	0.14	0.14	-0.11	-0.08
CGI-BPD Suicidality and self-harm	-0.10	-0.02	-0.16	-0.10
CGI-BPD Emotional instability	-0.08	-0.11	0.00	-0.12
CGI-BPD Feelings of emptiness	0.18	0.15	0.15	-0.13
CGI-BPD Anger	0.02	0.09	-0.05	-0.16
CGI-BPD Paranoidity	0.01	0.04	0.01	0.03
CGI-BPD TOTAL	-0.06	0.07	-0.13	-0.02
DES- change	-0.09	-0.07	-0.16	-0.09
DES-T-change	0.21	0.14	0.00	-0.05
subjCGI- change	0.09	-0.04	0.13	0.04
Sheehan Anxiety Scale- Change	-0.02	0.07	-0.02	-0.22
BAI- Change	-0.01	-0.02	-0.09	-0.20
BDI-II- Change	0.06	0.11	-0.19	-0.12

Tab. 5. Correlation of individual areas of social adaptation and changes in symptoms in various assessment scales

Scale, Questionnaire, or subscale	SDS work	SDS social function	SDS family	SAS stress
CGI-BPD Fear of abandoned – change	-0.03	-0.01	-0.08	-0.13
CGI-BPD Unstable relations – change	0.05	-0.18	-0.14	-0.16
CGI-BPD Identity- change	0.25 p < 0.05	0.06	0.08	-0.04
CGI-BPD Impulsivity- change	-0.15	-0.18	-0.23 (p = 0.06)	-0.17
CGI-BPD Suicidality and self-harm- change	0.02	-0.03	-0.04	-0.14
CGI-BPD Emotional instability- change	0.04	0.02	-0.21	-0.10
CGI-BPD Feelings of emptiness- change	-0.17	-0.17	-0.09	-0.09
CGI-BPD Anger- change	-0.19	0.05	-0.14	-0.13
CGI-BPD Paranoidity- change	-0.16	-0.18	-0.07	-0.16
CGI-BPD TOTAL- change	0.06	-0.13	-0.23 (p = 0.06)	-0.21
DES- change	-0.08	-0.21	-0.02	-0.19
DES- change	0.01	-0.17	0.00	-0.00
subjCGI- change	0.38 p < 0.01	0.02	0.20	0.03
Sheehan Anxiety Scale- Change	0.17	0.11	0.01	-0.00
BAI- Change	0.13	-0.13	0.16	-0.03
BDI-II- Change	-0.06	-0.14	0.11	-0.22 (p = 0.06)

with any change in the individual item of the clinical impression for borderline personality disorder (Table 6). However, its physical abuse subscale is statistically significantly correlated with three items of the CTQ-total (Fear of Abandonment, Identity, and Emptiness). The emotional abuse subscale (CTQ-Emotional Abuse) is also statistically significantly positively correlated with the Emptiness item.

The total score of the childhood abuse questionnaire CTQ-total does not statistically significantly correlate with any relative change (RC) in the questionnaires measuring anxiety (SPRAS-RC, BAI-RC), depressive symptoms (BDI-II-RC), global assessment of disorder severity (CGI-S-RC), or change in the severity of dissociation (DES-RC; DES-T-RC) assessed by the patient (Table 7).

Tab. 6. Correlation of adverse childhood events in the CTQ-SF questionnaire, dissociation, and its domains concerning change in the severity of borderline symptomatology assessed by the clinician on the CGI-BPD scale and its subscales

Factors	Change in CGI-BPD in an item:							
	CGI-BPD Fear of abandoned	CGI-BPD Unstable relations	Identity	Impulsivity	Suicidality and self-harm	Emotional instability	Feelings of emptiness	TOTAL
CTQ-emotional abuse	0.11	0.03	0.19	0.05	-0.01	0.04	0.25 $p < 0.05$	0.14
CTQ-physical abuse	0.27 $p < 0.05$	0.06	0.27 $p < 0.05$	0.13	-0.12	0.19	0.29 $p < 0.05$	0.23
CTQ-sexual abuse	-0.10	0.03	0.06	0.05	0.06	-0.19	-0.23	-0.06
CTQ-physical neglect	0.07	0.10	0.11	-0.07	-0.07	-0.13	0.15	0.10
CTQ-emotional neglect	0.03	-0.02	0.10	-0.17	-0.07	-0.13	0.14	-0.08
CTQ-total	0.03	0.06	0.22	0.02	-0.02	-0.07	0.13	-0.11
DES	0.10	0.03	0.16	-0.01	0.11	-0.11	-0.10	0.07
DES-T	0.10	-0.01	0.11	-0.05	0.08	-0.15	-0.14	-0.02
DES-RZ	0.13	-0.05	0.23	-0.01	0.14	0.06	-0.04	0.27 $p < 0.05$
DES-T-RZ	-0.16	0.15	0.04	0.06	-0.01	-0.09	0.02	0.08
ISMI TOTAL	-0.07	-0.08	0.00	-0.13	-0.09	-0.16	0.02	-0.04
ISMI Alienation	-0.10	-0.06	-0.02	-0.12	-0.12	-0.18	-0.08	-0.01
ISMI Agreeing with stereotypes	0.00	0.10	-0.02	-0.01	-0.06	-0.06	0.08	-0.12
ISMI Experience of discrimination	-0.07	-0.14	-0.01	-0.09	-0.16	-0.16	0.06	-0.13
ISMI Social withdrawal	-0.07	-0.11	0.06	-0.07	-0.07	-0.05	0.05	0.02
ISMI Resistance to Stigma	0.04	0.04	0.10	0.24 ($p = 0.06$)	0.01	0.18	0.07	0.04
								0.12
								0.06
								0.18
								0.16
								-0.07
								-0.02
								-0.11
								0.06
								0.05
								0.08
								-0.08
								0.11

Level of dissociation and change in psychopathology

Neither the severity of dissociation (DES) nor the severity of pathological dissociation (DES-T) assessed by the DES questionnaire correlated significantly with any of the items of the CGI-BPD scale assessing the severity of individual symptoms of borderline personality disorder assessed by the clinician (Table 6). The change in dissociation during treatment correlated significantly only with the item Paranoid (Table 6).

Neither baseline dissociation severity (DES) nor pathological dissociation severity (DES-T) correlated statistically significantly with any change in the total score assessing the severity of general anxiety, the overall severity of the disorder, the degree of dissociation and pathological dissociation, and the degree of depression (Table 7). However, change in dissociation during treatment (DES-RC) correlated statistically significantly with the decrease in general anxiety assessed by the SPRAS-RC and the reduction in depressive symptoms assessed by the BDI-II-RC (Table 7).

Self-stigma and Change in Psychopathology

Self-stigma assessed by the patient using the ISMI-Total score or in the individual domains of the questionnaire (Alienation, Agreement with Stereotypes, Experience of Discrimination, Social Withdrawal, Resistance to Stigma) does not statistically significantly correlate with any change in the individual items of the CGI-BPD clinical impression assessed by the clinician (Table 6).

Self-stigma assessed by the patient using the ISMI-total score or in the individual domains of the questionnaire (Alienation, Agreement with stereotypes, Experience of discrimination, Social withdrawal, Resistance to stigma) does not statistically significantly correlate with any change in questionnaires measuring anxiety (SPRAS-RC, BAI-RC), depressive symptoms (BDI-II-RC), global assessment of the severity

Tab. 7. Correlation of adverse events in childhood with changes in the severity of general anxiety, depression, dissociative symptomatology, self-stigma and overall severity of the disorder as assessed by the patient

	SPRAS – RZ	subjCGI – RZ	DES – RZ	DES-T-RZ	BAI – RZ	BDI-II – RZ
CTQ-emotional abuse	-0.06	0.17	0.23 (p = 0.053)	0.05	0.07	-0.01
CTQ-physical abuse	-0.02	0.19	0.02	-0.32 p < 0.01	0.07	-0.04
CTQ-sexual abuse	-0.20	0.07	0.01	0.01	-0.09	0.02
CTQ-physical neglect	0.13	-0.03	0.06	0.06	-0.11	-0.13
CTQ-emotional neglect	0.18	-0.09	-0.02	0.00	-0.18	-0.03
CTQ-total	-0.11	0.15	0.12	0.05	-0.02	-0.06
DES	-0.08	0.10	0.12	-0.03	0.05	-0.05
DES-T	-0.06	0.08	0.13	0.05	0.05	-0.03
DES-RZ	0.26 p < 0.05	0.10		0.50 p < 0.0001	0.15	0.27 p < 0.05
DES-T-RZ	0.04	0.02	0.27 p < 0.005		-0.09	-0.13
ISMI TOTAL	-0.18	0.04	-0.05	-0.00	-0.07	-0.25 p < 0.05
ISMI Alienation	-0.18	0.03	-0.05	-0.02	-0.11	-0.27 p < 0.05
ISMI Agreeing with stereotypes	-0.23 (p = 0.051)	0.06	-0.00	-0.04	-0.07	-0.24 p < 0.05
ISMI Experience of discrimination	-0.12	0.04	0.05	0.06	0.00	-0.16
ISMI Social withdrawal	-0.19	-0.06	-0.07	0.01	-0.05	-0.23 (p = 0.053)
ISMI Resistance to Stigma	-0.09	-0.04	0.12	-0.00	-0.03	0.01

Tab. 8. Correlation between HRV parameters and changes in psychopathology

Change in Assessment	LF %	HF %	LF/HF	Breath	LF	HF
CGI-BPD Fear of abandoned	-0.25 p < 0.05	0.04	-0.08	0.01	-0.04	0.11
CGI-BPD Unstable relations	-0.12	0.19	-0.20	-0.26 p < 0.05	0.02	0.10
CGI-BPD Identity	-0.39 p < 0.0005	0.30 p < 0.01	-0.32 p < 0.01	0.05	-0.02	0.20
CGI-BPD Impulsivity	-0.13	0.12	-0.16	-0.02	0.12	0.22
CGI-BPD Suicidality and self-harm	-0.14	0.04	-0.08	0.05	0.06	0.17
CGI-BPD Emotional instability	-0.31 p < 0.01	0.27 p < 0.05	-0.38 p < 0.0005	0.20	0.02	0.27 p < 0.05
CGI-BPD Feelings of emptiness	-0.35 p < 0.0005	0.27 p < 0.05	-0.32 p < 0.01	-0.01	0.17	0.31 p < 0.05
CGI-BPD Anger	-0.14	0.12	-0.10	0.00	0.17	0.23
CGI-BPD Paranoidity	-0.40 p < 0.001	0.26 p < 0.05	-0.40 p < 0.001	-0.10	0.01	0.24 (p = 0.05)
CGI-BPD TOTAL	-0.43 p < 0.0005	0.33 p < 0.01	-0.40 p < 0.001	0.11	0.19	-0.42 p < 0.0005
SPRAS-RZ	0.07	-0.07	0.06	-0.09	0.24 p < 0.05	0.26 p < 0.05
subjCGI-RZ	0.02	0.10	-0.05	0.03	-0.20	-0.07
DES - RZ	-0.06	0.06	-0.07	0.01	0.25 p < 0.05	0.26 p < 0.05
DES-T-RZ	-0.06	0.00	-0.04	0.17	0.03	0.02
BAI - RZ	0.15	-0.10	0.01	-0.14	0.02	-0.02
BDI-II-ZZ	-0.04	-0.09	-0.00	-0.00	-0.00	-0.02

Tab. 9. Correlation between changes in HRV parameters and changes in psychopathology

CGI-BPD Fear of abandoned	LF % - RZ	HF % - RZ	LF/HF - RZ	Dech - RZ	LF - RZ	HF - RZ
CGI-BPD Unstable relations	-0.11	0.00	-0.02	-0.05	0.08	0.02
CGI-BPD Identity	-0.14	0.16	-0.15	-0.01	0.04	0.14
CGI-BPD Impulsivity	-0.32 $p < 0.01$	0.08	-0.18	-0.05	-0.21	-0.10
CGI-BPD Suicidality and self-harm	-0.15	0.12	-0.08	-0.19	-0.02	0.01
CGI-BPD Emotional instability	-0.02	-0.13	0.07	-0.07	-0.07	-0.13
CGI-BPD Feelings of emptiness	-0.29 $p < 0.05$	0.36 $p < 0.005$	-0.38 $p < 0.005$	0.01	-0.04	0.23 ($p = 0.06$)
CGI-BPD Anger	-0.24 $p < 0.05$	0.04	-0.16	0.11	0.15	0.18
CGI-BPD Paranoidity	-0.26 $p < 0.05$	0.07	-0.05	0.17	-0.04	-0.02
CGI-BPD TOTAL	-0.22	0.16	-0.19	-0.11	0.10	0.20
CGI-BPD Fear of abandoned	-0.39 $p < 0.005$	0.20	-0.30 $p < 0.05$	-0.03	0.08	0.22
SPRAS-RZ	0.00	0.06	-0.04	-0.04	-0.10	-0.06
subjCGI-RZ	0.06	0.10	-0.11	0.02	-0.09	-0.03
DES - RZ	-0.09	0.02	-0.04	-0.01	0.10	0.08
DES-T-RZ	0.03	-0.21	0.17	-0.00	0.11	-0.04
BAI - RZ	-0.03	0.15	-0.14	0.04	-0.07	0.09
BDI-II-ZZ	-0.11	0.07	-0.14	0.01	-0.06	0.05

of the disorder (CGI-S-RC) or change in the severity of dissociation (DES-RC; DES-T-RC) assessed by the patient (Table 7).

Relationship between HRV and changes in psychopathology during treatment

LF% at the beginning of treatment is statistically significantly negatively correlated with Fear of Abandonment, Identity, Emotional Instability, Paranoidness and the CGI-BPD Total Score. It, therefore, seems that the higher the LF% at the beginning, the smaller the changes achieved in these parameters assessing typically borderline symptomatology. The situation is similar for the LF/HF ratio, where a statistically significant negative correlation appears in the Identity, Emotional Instability, Paranoidness and CGI-BPD Total Score subscales (Table 8). Interestingly, HF%, which mirrors the activity of the parasympathetic nervous system, shows statistically significant positive correlations with the same domains as LF/HF (Table 8).

LF itself at the beginning, largely expressing the total activity of the sympathetic nervous system, does not correlate with any CGI-BPD subscale (Table 8).

The relationship between changes in general symptomatology and HRV at baseline does not show statistically significant correlations with LF%, HF%, or LF/HF. However, a statistically significant positive correlation exists between LF and the decrease in general anxiety assessed by the SPRAS questionnaire (Table 8). It, therefore, seems that the higher the sympathetic power in LF at baseline, the greater the decrease in general anxiety during treatment. Similarly, there is a positive correlation between HF and SPRAS. This may mean

that the higher the parasympathetic power at baseline, the greater the decrease in general anxiety during treatment (Table 8). Interestingly, the greater the power in both LF and HF, the greater the change in dissociation during treatment.

Another correlation analysis deals with HRV parameters and changes in psychopathology.

Of the individual CGI-BPD subscales in which the clinician assesses the patient's condition, Identity is statistically significantly negatively correlated with change in LF% (Table 9) and Emotional Instability is negatively correlated with LF% but positively with changes in HF% and LF/HF, and at the borderline of statistical significance with HF relative change (Table 9). Changes in other CGI-BPD subscores, such as changes in emptiness, anger, and total score, throughout treatment are also negatively and statistically significantly correlated with changes in LF/HF (Table 9).

Relationship between drug doses and treatment outcomes

Index doses of antidepressants are statistically significantly negatively correlated with an absolute change in the CGI-BDI Identity item (Pearson $r = -0.31$; $p < 0.05$); otherwise, they are unrelated to any of the evaluated change parameters during treatment. Index doses of antidepressants do not statistically significantly correlate with any HRV parameter at the beginning or the end of treatment.

Index doses of antidepressants do not correlate with any HRV parameter at the beginning or the end of treatment or with any of the parameters assessing change in scales and questionnaires.

Index doses of antipsychotics, anxiolytics or antiepileptics did not statistically significantly correlate with any of the monitored HRV parameters at the beginning or at the end of treatment or with any of the parameters assessing change in scales and questionnaires.

DISCUSSION

Our study provides valuable insight into the impact of early life experiences, dissociation, self-stigma, and heart rate variability (HRV) in the context of an intensive six-week treatment in patients with BPD. The results suggest that during an intensive six-week hospitalization, there is a statistically significant reduction in BPD symptoms, especially in the areas of emotional instability, impulsivity, and feelings of emptiness, which is consistent with the results of other authors who focused on the effectiveness of similar therapeutic interventions (Linehan *et al.* 1993; Bateman & Fonagy, 2009). Dissociation, which is often mentioned in the literature as a risk factor worsening the prognosis in patients with BPD (Kuo *et al.* 2016), did not prove to be a statistically significant predictor of changes in psychopathology in our study. This result is consistent with some studies that have also not identified dissociation as a critical variable for treatment effectiveness (Perroud *et al.* 2017) but contradicts others that argue that higher levels of dissociation complicate the therapeutic process (Gunderson *et al.* 2001). An important finding is that change in dissociation during treatment correlates with decreases in general anxiety and depressive symptoms, suggesting that patients who experience a reduction in dissociation may benefit more from therapeutic interventions.

Regarding HRV, our data show that although there were no significant changes in HRV during treatment, higher baseline LF/HF values correlated with smaller changes in symptom severity, which could indicate a possible link between autonomic nervous dysregulation and the stability of BPD symptoms (Thayer *et al.* 2012). These findings are consistent with the theory of autonomic dysregulation in patients with BPD, which suggests that an inadequate balance between the sympathetic and parasympathetic nervous systems may be associated with lower efficacy of psychotherapeutic approaches (Widom *et al.* 2009). This finding contributes to a growing literature highlighting the role of autonomic reactivity as a potential biomarker for predicting therapeutic outcomes in BPD (Javorka *et al.* 2008).

In conclusion, this study contributes to understanding the complex factors influencing BPD therapy, with our findings suggesting that dissociation and HRV may impact treatment effectiveness. In contrast, the influence of early experiences and parenting styles remains unclear. Further research should focus on the long-term follow-up of these variables and their impact on chronic aspects of BPD.

Answers to hypotheses:

(1) There is a change in psychopathology during treatment

The study confirmed Hypothesis 1, demonstrating statistically significant improvements in BPD symptomatology. Reductions were observed in emotional instability, impulsivity, and feelings of emptiness, as measured by the CGI-BPD scale. Similar results have been found in other studies investigating the effectiveness of intensive therapy programs involving schema therapy (Giesen-Bloo *et al.* 2006). Furthermore, a significant decrease was noted in anxiety (Sheehan Anxiety Scale) and depressive symptoms (BDI-II), underscoring the multidimensional benefits of the intensive program.

(2) There is a change in autonomic nervous system activity during treatment

Although statistically significant changes in HRV were not observed during treatment in our study, it is important to note that higher baseline LF/HF values correlated with smaller changes in BPD symptoms. A study by Diveky *et al.* (2013) in patients with panic disorder found that the therapy program led to improvements in HRV, suggesting a positive effect of psychotherapy on autonomic regulation. Riffer *et al.* (2016) demonstrated improvements in HRV during psychiatric rehabilitation in patients with various diagnoses, highlighting the universal benefits of therapeutic interventions for the autonomic nervous system.

(3) Dissociation at the beginning of treatment is associated with a decrease in psychopathology

Our data did not demonstrate a significant relationship between baseline dissociation and change in BPD symptoms. This finding is consistent with the study by Perroud *et al.* (2012), which did not find a direct effect of dissociation on treatment outcomes. However, reductions in dissociation during treatment correlated with decreases in anxiety and depressive symptoms, suggesting that addressing dissociative symptoms may enhance therapeutic gains. This observation aligns with studies emphasizing the role of dissociation in complicating emotional integration and treatment adherence (Kuo *et al.* 2016).

(4) Self-stigma is associated with a decrease in psychopathology

Self-stigma, as measured by the ISMI scale, did not significantly correlate with improvements in core BPD symptoms. The total self-stigma score also does not statistically significantly correlate with the change in general anxiety or dissociative symptomatology. Still, it is statistically significantly negatively correlated with depressive symptoms assessed by the patient in the BDI-II questionnaire. The BDI-II scores also significantly negatively correlated with three domains of self-stigma (Alienation, Stereotype Agreement,

and Social Withdrawal). Rüscher *et al.* (2006) suggest that high levels of self-stigma may negatively affect patients' motivation for therapy and worsen treatment outcomes.

(5) Activation of the sympathetic nervous system at the beginning of treatment is associated with decreased psychopathology

The following HRV parameters indicate sympathetic activation: LF%, LF/HF, and LF. However, the LF parameter, which is mainly associated with sympathetic activation, does not directly correlate with any change in the specific subscales for borderline personality disorder in our sample. We did not find a direct relationship between initial sympathetic activity and change in BPD symptoms. However, LF% and the LF/HF ratio significantly negatively correlated with change in most subscales. Therefore, the greater the percentage of sympathetic activity at the beginning and the greater the ratio between sympathetic and parasympathetic activation, the less change occurred in typical borderline symptomatology.

(6) Activation of the parasympathetic nervous system at the beginning of treatment is associated with decreased psychopathology

This hypothesis also appears to hold for specific borderline symptomatology, with half of the changes in the CGI-BPD subscales (Identity, Emotional Instability, Emptiness, Paranoid, and Total Score) statistically significantly correlated with HF%. It thus appears that the higher the proportion of parasympathetic at baseline, the greater the changes in the above items. Higher parasympathetic activation, measured as HF in HRV, was associated with greater symptom reduction. This result is consistent with Riffer *et al.* (2016), who found that higher parasympathetic activation may be related to better treatment outcomes across psychiatric disorders.

(7) The LF/HF ratio at the beginning of treatment is associated with decreased psychopathology

This hypothesis holds for specific borderline symptomatology, where the changes in some CGI-BPD subscales (Identity, Emotional Instability, Emptiness, Paranoid, and Total Score) are statistically significantly correlated with the LF/HF ratio. Higher baseline LF/HF ratios were associated with smaller changes in BPD symptoms, supporting the hypothesis that autonomic nervous system imbalances may signal poorer treatment outcomes. Thayer *et al.* (2012) emphasize the importance of sympathetic balance.

(8) Change in LF/HF ratio is associated with decreases in psychopathology

Changes in LF/HF ratio during treatment were negatively correlated with improvements in BPD symptomatology, particularly in the areas of emotional

instability and feelings of emptiness. This suggests that improvements in sympathetic-parasympathetic balance may indicate more effective treatment. Thayer *et al.* (2009) point to the importance of this balance for psychological resilience and emotion regulation. This finding supports the theory of autonomic dysregulation as a key factor in BPD.

(9) Adverse experiences in childhood are associated with a decrease in psychopathology

This hypothesis was not confirmed for the total score of the Childhood Trauma Questionnaire (CTQ-total) and the typical borderline symptoms assessed by the clinician in the CGI-BPD. Our analysis showed that the Childhood Trauma Questionnaire (CTQ-SF) score was not significantly correlated with changes in BPD symptoms. However, the emotional and physical abuse subscales were associated with smaller symptom reduction, particularly in the areas of Feelings of Emptiness and Identity. The emotional abuse subscale (CTQ – emotional abuse) also correlated statistically significantly positively with the Emptiness item. This result is consistent with the study by Widom *et al.* (2009), which suggests that specific forms of early trauma may hinder therapeutic progress and support the need for targeted interventions aimed at processing trauma.

Implications and Future Directions

The study highlights the complex interaction of biopsychosocial factors in shaping therapeutic results for BPD. The results propose that while intensive psychotherapy effectively reduces core symptoms, individual differences in autonomic function, dissociation, and early trauma may moderate these effects. Future research should explore:

- Long-term outcomes to determine the durability of symptom reductions.
- Interventions tailored to address autonomic nervous system dysregulation and dissociation.
- The role of trauma-focused therapies in enhancing responsiveness to standard BPD treatments.

CONCLUSION

The results of this study show that a six-week intensive treatment for borderline personality disorder (BPD) can significantly reduce symptoms of psychopathology, especially in the areas of anxiety, depressive symptoms, and specific BPD symptoms. The positive therapeutic effect was evident across the assessed subscales and the total score of psychopathological manifestations. An interesting finding is that the level of dissociation at the beginning of treatment did not predict therapeutic outcomes. In contrast, changes in dissociation during treatment were related to the reduction of anxiety and depressive symptoms, suggesting that flexibility in psychological responses to treatment may play a key role in the success of therapy.

The study also identified some specific aspects of the autonomic nervous system as significant predictors of treatment response. Higher sympathetic and parasympathetic activity at the beginning of treatment appeared to be a factor that may influence the degree of reduction of anxiety symptomatology during therapy. These findings emphasize the need for an individualized approach that considers biological, psychological, and social factors within a comprehensive therapeutic plan.

In conclusion, this study provides new insights into the dynamics of changes in psychopathology and the influence of various factors on the success of BPD treatment. The results may support the development of personalized intervention strategies that could further increase the effectiveness of the therapeutic process in patients with BPD, especially in combination with psychotherapy and interventions working with the autonomic nervous system.

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