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Research paper

# Borderline personality features in relationship to childhood trauma in unipolar depressive and bipolar disorders

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ABSTRACT

*Background:* Childhood trauma, including emotional neglect, emotional abuse, physical abuse, and sexual abuse, may contribute to borderline personality features like affective instability, identity problems, negative relationships, and self-harm. This study aims to explore how different types of childhood trauma affect these features in bipolar versus unipolar depressive disorders.

*Methods:* We included 839 participants of the Netherlands Study of Depression and Anxiety (NESDA) with a lifetime diagnosis of major depressive disorder single episode (MDD—S; $N = 443$), recurrent major depressive disorder (MDD-R; $N = 331$), or bipolar disorder (BD; $N = 65$). Multivariate regression was used to analyze data from the Childhood Trauma Interview and borderline features (from the self-report Personality Assessment Inventory).

*Results:* On average, participants were 48.6 years old (SD: 12.6), with 69.2 % being women, and 50.3 % of participants assessed positive for childhood trauma. Adjusted analyses revealed that participants diagnosed with BD, followed by MDD-R, exhibited the highest number of borderline personality features. Additionally, within the entire group, a strong association was found between childhood trauma, especially emotional neglect, and the presence of borderline personality features.

*Conclusion:* Given the high prevalence of childhood trauma and borderline personality features, screening for these factors in individuals with mood disorders is crucial. Identifying these elements can inform and enhance the management of the often fluctuating and complex nature of these comorbid conditions, leading to more effective and tailored treatment strategies.

## 1. Background

Bipolar disorder (BD) and major depressive disorder (MDD) are mood disorders characterized by episodic disturbances in mood resulting in reduced participation in activities of daily life. A recent general population study among adults aged 18–75 in the Netherlands (NEMESIS-3) found a lifetime prevalence of MDD of 24.9 % and of BD of 2.1 %, and a 12-month prevalence of respectively 8.5 % and 1.2 % (ten Have et al., 2024). Personality disorders often co-occur with mood disorders. A meta-analytic review of 122 studies found that individuals with BD had a 42 % risk, and those with MDD had a 45 % risk of having at least one personality disorder (Friborg et al., 2014). Predominantly cluster B and C personality disorders were prevalent in BD, while cluster C personality disorders dominated in MDD. Borderline personality disorder was prevalent in BD (16–22 %) (Friborg et al., 2014), and conversely, the prevalence of BD among with individuals with a borderline personality disorder was 18.5 % (Fornaro et al., 2016).

Several studies demonstrated that comorbidity with a borderline personality disorder (BPD) negatively impacts illness course, treatment response, and suicidal behavior in MDD and BD (George et al., 2003; Riemann et al., 2017; Esposito et al., 2024; Zimmerman et al., 2014). A previous analysis within the current NESDA cohort showed that

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borderline personality features (BPF) were positively associated with impaired daily functioning and more severe symptoms in individuals with depressive and anxiety disorder (Distel et al., 2016), but did not include those with BD. A prospective study in which 223 BPD patients with co-occurring mood disorder ($n = 161$ MDD and $n = 62$ BD) were assessed over a period of 10 years concluded that BPD and mood disorders had significant reciprocal effects, delaying each disorder's time to remission (Gunderson et al., 2014). Notably, the severity of BPF was identified as the most significant predictor of poor functioning in MDD and BD (Thompson et al., 2020; Soloff et al., 2000; Soloff and Chiappetta, 2012; Latalova et al., 2013; Amore et al., 2014; Kohling et al., 2015; Soderholm et al., 2020). Research indicates that the impact of BPD is more negative in BD compared to MDD. For example, Söderholm et al. (Soderholm et al., 2020) found that the lifetime prevalence of suicide attempts in patients with BD with comorbid BPD (90.9 %) was twice as much compared to MDD patients with comorbid BPD (44.4 %).

Most studies on the influence of BPD as a comorbid condition have traditionally used a categorical classification. However, there is increasing recognition that BPF, even in the absence of a full BPD diagnosis, can also have an adverse effect. This understanding has led to a growing consensus towards adopting a dimensional perspective of personality features (Widiger, 2007). Consequently, several alternative dimensional models have been proposed to capture the spectrum and their impact (Trull and Widiger, 2013).

Childhood trauma (CT), including sexual and physical abuse, is associated with a wide range of severe physical and psychological problems, including self-injury and suicidality (Gladstone et al., 2004; Soloff et al., 2002). A systematic review found that aversive childhood experiences increased the risk for various health outcomes, drug abuse, and violence (Hughes et al., 2017). According to biosocial model of Linehan (Linehan, 1993), BPD is primarily a disorder of emotion dysregulation and arises from transactions between individuals with biological vulnerabilities and specific environmental influences. Linehan proposed that the development of BPD occurs in an invalidating developmental context. CT is strongly associated with BPD and BPF (Herman et al., 1989; Venta et al., 2012; Tyrka et al., 2009; Weaver and Clum, 1993), with emotional abuse being a key factor (Yuan et al., 2023a; Yuan et al., 2023b). Results of a meta-analysis showed that individuals with BPD were 13.9 times more likely to report childhood adversity than non-clinical controls, with emotional abuse and neglect showing the largest effects (Porter et al., 2020). In patients with MDD, CT has been associated with more severe depressive symptomatology (Kuzminskaite et al., 2022; Fan et al., 2021), a higher suicide risk (de Mattos et al., 2016), and more emotion regulation difficulties (Carvalho Fernando et al., 2014). Again emotional trauma seems to play a central role in understanding the relationship between CT and MDD (de Mattos et al., 2016). In patients with BD, CT has been associated with more (severe) clinical presentation, including earlier onset, increased suicide attempts, substance misuse, anxiety, depression, and illness duration (Wrobel et al., 2022; Aas et al., 2016; Li et al., 2023).

In summary, several studies highlight the negative and lasting effects of CT within patients with MDD and BD. Therefore, the current study aims: (1) to compare the number of BPF among individuals with a lifetime single episode major depressive disorder (MDD-SE), recurrent major depressive disorder (MDD-R), and bipolar disorder (BD); (2) to study the link between CT and BPF in these diagnostic groups; (3) to study the relationship between the types of CT and BPF.

## 2. Methods

### 2.1. Sample

This study used data from The Netherlands Study of Depression and Anxiety (NESDA), a multi-site naturalistic, prospective cohort study with measurement points at baseline and at the 2-, 4-, 6-, and 9-year follow-up of a large cohort of individuals with depressive and anxiety disorders, also including participants with incident bipolar disorder. Aim of the NESDA is to describe the long-term consequences of these disorders. The Composite Interview Diagnostic Instrument (CIDI; lifetime version 2.1) was used to diagnose mood and anxiety disorders according to DSM-IV criteria (American Psychiatric Association et al., 2000). Exclusion criteria were: (1) having a primary clinically overt diagnosis not subject of NESDA which will largely affect course trajectory (bipolar disorder, psychotic disorder, obsessive compulsive disorder, or severe addiction disorder), and (2) not being fluent in Dutch to ensure validity and reliability of data. Detailed descriptions of the rationale, design, and methods for NESDA study is given elsewhere (Penninx et al., 2008).

As the Personality Assessment Inventory – Borderline Features (PAI-BOR) was only introduced at the 6 year follow-up of NESDA, this wave served as baseline for the present study. We included only participants with valid measurements on PAI-BOR ($n = 2069$), We defined the occurrence of a hypo/manic episode and MDD based on DSM-IV criteria and used all CIDI interviews in prior waves (the MDD CIDI section was included at baseline, 2, 4 and 6 year follow-up, the BD CIDI section was included at 2, 4 and 6 year follow-up). Ethical Committees of all participating universities provided their approval, and all participants gave written informed consent.

### 2.2. Measures

#### 2.2.1. Demographic variables

Age, gender, and years of education were assessed.

#### 2.2.2. Mental disorder

The World Health Organization World Mental Health Composite International Diagnostic Interview (CIDI, version 2.1) was used at baseline and 2, 4 and 6 year follow-up to assess mental disorders according to the definitions and criteria of ICD-10 and DSM-IV. CIDI is designed for the use in epidemiological and intercultural studies as well as for clinical and research purposes. The CIDI is currently the most widely used fully structured diagnostic interview in psychiatric epidemiologic research (Kessler and Ustun, 2004). Various publications reported the validity of the CIDI diagnostic assessment when compared to a clinical interview (Kessler and Ustun, 2004; Kessler et al., 2004; Haro et al., 2006). Participants who had only one depressive episode between inclusion and the 6-year follow-up measurement were coded as major depression disorder single episode (MDD—S). Participants who had a depressive episode at 2 or more waves were classified as major depression disorder recurrent (MDD-R). The presence of a hypomanic or manic episode according to DSM-IV, measured by the CIDI section on BD at any measurement leads to classification BD.

#### 2.2.3. History of suicide attempts and age of onset

Prior suicide attempts were assessed at baseline and at 2, 4 and 6 year follow-up using the first five items of the Scale for Suicide Ideation (SSI) (Beck et al., 1979). History of suicide was defined as any attempt for suicide at any time of inclusion. Age of onset is assessed at baseline.

#### 2.2.4. Childhood trauma

The presence of childhood trauma (CT) was assessed at baseline using the Childhood Trauma Interview (CTI). The CTI is a structured interview designed to assess four types of CT prior to the age of age 16: emotional neglect, emotional abuse, physical abuse, and sexual abuse. Each CT type is answered with "no" or "yes". In addition, a frequency indication is given as (0) - "never", (1) - "once or sometimes", and (2) - "regularly, often, or very often" (range 0–2). A continuous cumulative CT severity score (range 0–8) is calculated as the sum of the number of types and frequency of CT, with a higher score indicating more severe CT (Hovens et al., 2010; Wiersma et al., 2009). The CTI has been shown to perform well psychometrically in the past (Fink et al., 1995; Hovens et al., 2012; Spinhoven et al., 2014).

#### 2.2.5. Borderline personality features (BPF)

The PAI-BOR (Morey, 1991) was used to assess presence and severity of borderline symptoms. PAI-BOR is a 24-item self-report clinical inventory for BPD symptomatology on a continuous 4-point Likert scale from 0 (false) to 3 (very true). The 24 items have been classified into four main domains each representing one of the main features of BPD: affective instability (BOR-A) assessing lack of regulation of emotional responses, identity disturbance (BOR—I) assessing uncertainty about important life issues and a general lack of purpose, unstable relationships (BOR—N) reflects a past of intense, ambivalent relationships and self-harming behavior (BOR—S) measuring impulsiveness with an associated neglect of possible negative consequences. Each subdomain is represented by 6 items in the PAI-BOR, accumulating to a total score (BOR-TOT). Several studies in both clinical (Stein et al., 2007) and non-clinical (Trull, 1995; Trull et al., 1997) samples demonstrated good psychometric properties, although it has been debated whether proposed 4-factor structure is appropriate (Jackson and Trull, 2001). For this study, the Dutch translation of the PAI-BOR was used. The internal consistency of the Dutch PAI-BOR is good (α = 0.81). The test-retest correlation at six months is 0.78. Cronbach's alpha of the four subscales from PAI-BOR within our sample was 0.79.Thus, BPD features in the general population can be reliably assessed with the Dutch version of the PAI-BOR (Distel et al., n.d.).

#### 2.2.6. Severity of depressive symptoms

The severity of depressive symptoms was assessed with the Inventory of Depressive Symptomatology (IDS) (Rush et al., 1996). Using 30 items answered on a 4-point Likert scale, the participant can indicate how severe the depressive symptoms were in the past week. The 30 items cover all DSM-IV criterion symptom domains of major depression and associated symptoms. Research on psychometric properties of the IDS showed that it has a good reliability (α = 0.86) (Rush et al., 1996).

### 2.3. Statistical analysis

Differences across three symptomatic groups (MDD—SE, MDD-R, and BD) regarding sociodemographic characteristics, clinical characteristics, and BPF were examined by using chi-square analyses for dichotomous variables and analyses of variance (ANOVA) for continuous variables. The mean PAI-BOR scores across all symptomatic groups were compared with analysis of covariance (ANCOVA) adjusted for sex, age and education level as well as the four subscales: affective instability (AI), identity problems (IP), negative relationship (NR), self-harm/impulsivity (SH) as the dependent variable and diagnostic status as independent variable. Group differences in the presence of CT in general between the symptom groups were analyzed using analysis of covariance (ANCOVA) again with sex, age and education level as covariates. SPSS v29.0 (IBM) for windows was used to analyze data. Furthermore we analyzed differences between traumatized and non-traumatized participants with regard to BPF for all three diagnostic groups, as well as correlations between BPF and the four different CT types (emotional neglect, emotional abuse, physical abuse, and sexual abuse) by comparing the three groups through linear regression analysis, adjusting for age, sex and years of education, using the "stats" (version 4.3.1) and "forestplot" (version 3.1.1) packages for R statistical software were used (v4.2.2; R Core Team, 2022). In forest plots analyses on standardized values are presented, to enable direct comparison of effects sizes among the groups.

## 3. Results

### 3.1. Sociodemographic and clinical characteristics

A total of 839 participants were included in the analyses, of whom 443 had a life-time MDD—SE diagnosis, 331 had a MDD-R diagnosis and 65 had a BD diagnosis. The mean age of all participants was 48.6 (SD = 12.6) years, ranging between 23 and 71 years. The majority of participants were female 581 (69.2 %), and the mean years of attained education was 12.9 (SD = 3.2) years. Table 1 shows the sociodemographic and clinical characteristics of the various diagnostic groups. The severity of depressive symptoms measured with IDS varied significant among diagnostic groups. The IDS severity scores showed a ranking order where the MDD-SE group had lower scores, followed by the MDD-R group, and the BD group having the highest scores. The group differences between MDD-S vs. MDD-R as well as MDD-S vs. BD were significant ($p < .01$), but the difference between MDD-R and BD was not significant ($p = .06$).

### 3.2. Borderline personality features across clinical groups

After adjusting for covariates, gender, age, education level and severity of depressive symptoms, we found significant differences in the mean total BPF as well as that of the four subdomains between the different diagnostic groups. The highest number of BPF (PAI-BOR total) was observed within the participants with BD (mean = 27.1; SD = 0.4), followed by MDD-R (mean = 20.7; SD = 0.4), and finally MDD-SE (mean = 17.9; SD = 0.4). There was a significant effect of diagnostic

**Table 1**
Sociodemographic and clinical characteristics of the sample.

| | Major Depressive Disorder, single episode (MDD-SE) (*N* = 443) | Major Depressive Disorder, recurrent (MDD-R) (*N* = 331) | Bipolar Disorder (BD) (*N* = 65) | *p* value |
|---|---|---|---|---|
| Sociodemographic | | | | |
| Sex (% females) | 69.1 | 72,3 | 55.4 | .03 |
| Age (years), mean (SD) | 42.9 (12.9) | 42.6 (12.3) | 39.8 (12.0) | .18 |
| Education (years), mean (SD) | 12.7 (3.2) | 12.2 (3.3) | 11,8 (3.5) | .024 |
| Clinical characteristic | | | | |
| Depressive Symptoms Inventory of Depression Symptoms, mean (SD) | 11.9 (8.2) | 22.9 (11.4) | 26.5 (14.8) | <.001 |
| Bipolar I n(%) | n/a | n/a | 42 (64.6) | |
| Any history of suicide n(%) | 39 (8.8) | 65 (19.6) | 22 (33.8) | <.001 |
| Age of onset of psychopathology mean (SD) | 36.2 (11.8) | 36.8 (12.1) | 35.9 (10.7) | .79 |
| Any anxiety comorbidity n(%) | 254 (57.3) | 291 (87.9) | 53 (81.5) | <.001 |
| Borderline Features | | | | |
| PAI-BOR total, mean (SD) | 15.3 (7.9) | 23.3 (8.8) | 31.8 (12.6) | <.001 |
| Affective Instability (SD) | 4.8 (2.9) | 7.5 (3.3) | 9.9 (3.7) | <.001 |
| Identity Problems (SD) | 3.6 (2.7) | 6.3 (3.4) | 8.2 (4.2) | <.001 |
| Negative Relationship (SD) | 5.0 (2.9) | 7.1 (3.2) | 8.5 (4.0) | <.001 |
| Self-Harm (SD) | 1.9 (2.1) | 2.4 (2.2) | 5.3 (3.8) | <.001 |
| Childhood trauma (CT) | | | | |
| CT n (%) | 197 (44.5) | 86 (56.2) | 39 (60.0) | .001 |
| Emotional Neglect n (%) | 156 (35.2) | 159 (48.0) | 35 (53.8) | <.001 |
| Emotional Abuse n (%) | 79 (17.8) | 104 (31.4) | 22 (33.9) | <.001 |
| Physical Abuse n (%) | 43 (9,7) | 53 (16.0) | 19 (29.2) | <.001 |
| Sexual Abuse n (%) | 68 (15.4) | 62 (18.7) | 12 (29.2) | .43 |

group on mean level of total BPF after adjusting for covariates, F(2, 830) = 40.7, $p < .001$ Results of pairwise comparison are illustrates in Table 2.

### 3.3. Prevalence of borderline personality features among diagnostic groups with or without childhood trauma

After adjusting for covariates, gender, age, and education level the results of the analysis showed a consistent pattern (Fig. 1). Within each diagnostic category, participants with a history of CT consistently showed higher average scores for BPF than those without such a history. Moreover, there was a noticeable increase in mean BPF scores, progressing from participants with MDD-SE, through those with MDD-R, and peaking in the BD group.

### 3.4. Relationship between childhood trauma type and borderline personality features

Emotional neglect was the most common CT ($n = 350$; 15.5 %), followed by emotional abuse ($n = 250$; 9.1 %), sexual abuse ($n = 142$; 6.3 %) and finally physical abuse ($n = 115$; 5.1 %). After adjusting for covariates, gender, age, and education level correlation The correlation between the different types of CT and the PAI-BOR total score as well as three of four domains of BPD also showed a consistent pattern (Fig. 2). Emotional neglect was the most strongly associated factor, with both the total PAI-BOR score and its subscale scores, followed by emotional abuse, physical abuse, and sexual abuse. However, this pattern in the domain of self-harm did not hold true.

## 4. Discussion

Previous findings from NESDA showed that participants with current MDD and comorbid anxiety disorder had significantly more borderline personality features (BPF) than participants with anxiety disorder or MDD without this comorbidity (Distel et al., 2016). In our present study we extended these findings by showing that participants with a lifetime diagnosis of BD had more BPF compared to both single episode and recurrent MDD. These results were consistent across all four subscales of the PAI-BOR. The lowest number of BPF was found in participants with a history of single episode MDD. Our findings of a higher prevalence in BD than in MDD are in line with results of a meta-analytic review of 122 studies (Friborg et al., 2014).

In all three diagnostic groups (MDD-SE, MDD-R, and BD) it was observed that individuals with a history of any form of childhood trauma (CT) showed more BPF than those without a history of CT. This confirms findings from previous studies on the relationship between CT and psychopathology, reporting that CT was significantly associated with depressive and anxiety symptoms (Kuzminskaite et al., 2022; Hovens et al., 2010), schizophrenia (Zhang et al., 2023), and high-risk substance use and addiction (Cabanis et al., 2021). Studies comparing patients with borderline personality disorder (BPD) and those with BD found that BPD patients had higher childhood trauma indexes compared to BD patients (Jaworska-Andryszewska and Rybakowski, 2022; Mazer et al., 2019). A closer look on CT within our study revealed that emotional neglect in particular has a high correlation with BPF. Other studies also found that emotional maltreatment has a central role in the development of BPD (Yuan et al., 2023b; Porter et al., 2020; You et al., 2022), and is also associated with severe social anxiety symptoms in adulthood [30] and longer illness duration in BD, and more mood episodes in BD (Li et al., 2023). These results underscore the profound and multifaceted impact of CT on mental health, highlighting the necessity for a nuanced understanding of individual trauma histories in stress-related disorders and treatment planning. Therefore, integrating a trauma-informed approach in mental health care is critical, not only for accurate diagnosis but also for effective management and treatment of these conditions.

Interestingly, in contrast to the other dimensions of the PAI-BOR, there was a clear distinction between MDD and BD with regard to those items of the PAI-BOR relating to 'self-harm' (Table 1). Since five of these six items refer to impulsive behavior (2×), spending money (2×), and recklessness (1×), this may be explained by the manic pole of BD.

Effects of CT on the development and maintenance of BPD have been the subject of numerous research studies in the past (Yuan et al., 2023a). There are also findings reporting differences in the prevalence of CT between patients with BD and BPD (Jaworska-Andryszewska and Rybakowski, 2022). Less is known about the association between CT and BPF among different groups of patients with a mood disorder. Our study added novel insights by comprehensively examining cross-sectional associations between CT, borderline personality features within patients with MDD-SE, MDD-R, and BD. Nevertheless our study has several limitations. First, although NESDA covers a wide range of mood disorders, the proportion of participants with BD was notably low since the primary focus of NESDA was on MDD and anxiety disorders, and participants with a clear history of a bipolar episode were excluded at baseline. Patients who developed (hypo-)manic episodes during follow-up, have been diagnosed as BD. Based on these original inclusions criteria, it is possible that our BD group is not fully representative for BD patients in general. Furthermore, the low sample size of BD may have implications on the validity of the data. Second, it is important to note that this is a cross-sectional analysis, which limited our ability to track the progression of BPF over time.

The results of our study may have implications for clinical practice. The evidence of high levels of BPF and the impact of childhood trauma suggests the need for tailored treatment approaches in addition to the management of mood disorder. Since the clinical presentation of mood disorders, and particularly BD, may in part resemble BPF, this may distract from conditions that need a more psychotherapeutic approach (Simonsen et al., 2019). Recommended psychological therapies for trauma related disorders include trauma-focused cognitive behavioral therapy (CBT) and eye movement desensitization reprocessing (EMDR). Subsyndromal BPF that cannot be classified as full borderline

**Table 2**
Pairwise comparison of borderline features across the three diagnostic groups.

| PAI-BOR scale | Diagnostic group | | Mean difference | CI 95 % lower | CI 95 % upper | P value |
|---|---|---|---|---|---|---|
| PAI BOR total | BD | MDD-SE | 9.2 | 7.1 | 11.2 | <0.001 |
| | BD | MDD-R | 6.4 | 4.5 | 8.4 | <0.001 |
| | MDD-R | MDD-SE | 2.7 | 1.6 | 3.9 | <0.001 |
| Affective | BD | MDD-SE | 2.8 | 2.1 | 3.6 | <0.001 |
| Instability | BD | MDD-R | 1.7 | 1.0 | 2.5 | <0.001 |
| | MDD-R | MDD-SE | 1.1 | 0.7 | 1.5 | <0.001 |
| Identity | BD | MDD-SE | 2.0 | 1.2 | 2.7 | <0.001 |
| Problems | BD | MDD-R | 1.1 | 0.4 | 1.8 | 0.002 |
| | MDD-R | MDD-SE | 0.9 | 0.4 | 1.3 | <0.001 |
| Negative | BD | MDD-SE | 1.8 | 1.0 | 2.4 | <0.001 |
| Relationship | BD | MDD-R | 1.0 | 0.2 | 1.8 | 0.01 |
| | MDD-R | MDD-SE | 0.8 | 0.4 | 1.3 | <0.001 |
| Self-Harm | BD | MDD-SE | 2.5 | 1.9 | 3.1 | <0.001 |
| | BD | MDD-R | 2.5 | 2.0 | 3.2 | <0.001 |
| | MDD-R | MDD-SE | −0.1 | −0.4 | 0.3 | 0.733 |

| Borderline Features | Groups | Trauma | Unadjusted | Adjusted |
|---|---|---|---|---|
| **PAI–BOR total** | MDD–SE | No childhood trauma | 13.9 (95% CI: 12.9; 15.0) | 15.6 (95% CI: 14.5; 16.7) |
| | MDD–SE | Childhood trauma | 17.0 (95% CI: 15.8; 18.2) | 18.4 (95% CI: 17.2; 19.5) |
| | MDD–R | No childhood trauma | 21.7 (95% CI: 20.3; 23.1) | 20.8 (95% CI: 19.4; 22.1) |
| | MDD–R | Childhood trauma | 24.5 (95% CI: 23.3; 25.8) | 23.0 (95% CI: 21.8; 24.3) |
| | BD | No childhood trauma | 29.5 (95% CI: 26.2; 32.8) | 26.4 (95% CI: 23.2; 29.5) |
| | BD | Childhood trauma | 33.4 (95% CI: 30.7; 36.1) | 31.8 (95% CI: 29.2; 34.3) |
| **Affective Instability** | MDD–SE | No childhood trauma | 4.3 (95% CI: 4.0; 4.7) | 4.8 (95% CI: 4.4; 5.2) |
| | MDD–SE | Childhood trauma | 5.4 (95% CI: 5.0; 5.9) | 5.9 (95% CI: 5.5; 6.3) |
| | MDD–R | No childhood trauma | 6.9 (95% CI: 6.4; 7.4) | 6.6 (95% CI: 6.1; 7.1) |
| | MDD–R | Childhood trauma | 7.9 (95% CI: 7.5; 8.4) | 7.5 (95% CI: 7.1; 8.0) |
| | BD | No childhood trauma | 8.8 (95% CI: 7.6; 10.0) | 7.7 (95% CI: 6.6; 8.9) |
| | BD | Childhood trauma | 10.5 (95% CI: 9.6; 11.5) | 10.1 (95% CI: 9.2; 11.0) |
| **Identity Problems** | MDD–SE | No childhood trauma | 3.3 (95% CI: 2.9; 3.7) | 3.8 (95% CI: 3.4; 4.2) |
| | MDD–SE | Childhood trauma | 3.9 (95% CI: 3.4; 4.3) | 4.3 (95% CI: 3.9; 4.7) |
| | MDD–R | No childhood trauma | 5.9 (95% CI: 5.4; 6.4) | 5.5 (95% CI: 5.0; 6.0) |
| | MDD–R | Childhood trauma | 6.6 (95% CI: 6.2; 7.1) | 6.1 (95% CI: 5.6; 6.5) |
| | BD | No childhood trauma | 8.3 (95% CI: 7.1; 9.5) | 7.2 (95% CI: 6.1; 8.4) |
| | BD | Childhood trauma | 8.1 (95% CI: 7.1; 9.1) | 7.6 (95% CI: 6.6; 8.5) |
| **Negative Relationships** | MDD–SE | No childhood trauma | 4.5 (95% CI: 4.1; 4.9) | 4.9 (95% CI: 4.5; 5.3) |
| | MDD–SE | Childhood trauma | 5.6 (95% CI: 5.1; 6.0) | 5.8 (95% CI: 5.4; 6.3) |
| | MDD–R | No childhood trauma | 6.5 (95% CI: 6.0; 7.0) | 6.3 (95% CI: 5.8; 6.8) |
| | MDD–R | Childhood trauma | 7.5 (95% CI: 7.1; 8.0) | 7.1 (95% CI: 6.6; 7.5) |
| | BD | No childhood trauma | 7.5 (95% CI: 6.3; 8.7) | 6.8 (95% CI: 5.7; 8.0) |
| | BD | Childhood trauma | 9.2 (95% CI: 8.3; 10.2) | 8.8 (95% CI: 7.8; 9.7) |
| **Self–harm** | MDD–SE | No childhood trauma | 1.8 (95% CI: 1.5; 2.1) | 2.0 (95% CI: 1.7; 2.3) |
| | MDD–SE | Childhood trauma | 2.1 (95% CI: 1.8; 2.4) | 2.3 (95% CI: 2.0; 2.6) |
| | MDD–R | No childhood trauma | 2.4 (95% CI: 2.0; 2.8) | 2.4 (95% CI: 2.0; 2.7) |
| | MDD–R | Childhood trauma | 2.5 (95% CI: 2.1; 2.8) | 2.3 (95% CI: 2.0; 2.7) |
| | BD | No childhood trauma | 5.0 (95% CI: 4.1; 5.8) | 4.6 (95% CI: 3.7; 5.5) |
| | BD | Childhood trauma | 5.5 (95% CI: 4.8; 6.2) | 5.3 (95% CI: 4.6; 6.0) |

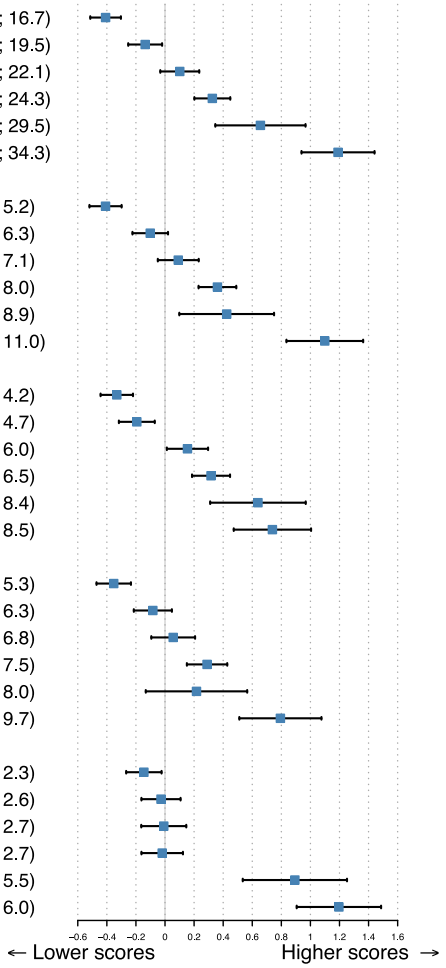


**Fig. 1.** Borderline features (PAI BOR total and subscale scores) across diagnostic groups, comparing those with and without a history of childhood trauma.

personality disorder (BPD) according DSM-5, may still have an impact on the course of the mood disorder. Numerous psychotherapies for mood disorders have been investigated over the past decades (Picardi and Gaetano, 2014), and overall there are no significant differences between the efficacy of these treatments (Cuijpers et al., 2020). In order to achieve a further improvement in people presenting with mood disorders, personalized treatments are needed (Sampogna et al., 2024).

In conclusion, our study sheds light on the complex interplay between BPF, childhood trauma, and mood disorder. We observed an escalating trend in the prevalence of BPF and CT from single episode MDD to recurrent MDD and then to lifetime BD. These findings highlight the need for clinicians to consider these factors into their diagnostic and treatment approaches.

## Abbreviations

| | |
|---|---|
| AI | affective instability |
| BD | bipolar disorder |
| BPD | borderline personality disorder |
| BPF | borderline personality features |
| IP | identity problems |
| NR | negative relationship |
| SH | self-harm |

## Consent for publication

Consent to publish has been obtained from all participants.

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## Ethics approval

The study protocol of NESDA was approved by the Medical Ethical Committee of the Vrije Universiteit (VU) Medical Centre and medical ethical committees of the participating universities.

| Borderline Features | Trauma–type | Unadjusted beta | Adjusted beta | p–value |
|---|---|---|---|---|
| **PAI BOR total** | emotional neglect | 0.16 (95% CI: 0.10; 0.22) | 0.14 (95% CI: 0.09; 0.20) | p<0.001 |
| | psychological neglect | 0.14 (95% CI: 0.08; 0.20) | 0.10 (95% CI: 0.05; 0.16) | p<0.001 |
| | physical abuse | 0.10 (95% CI: 0.04; 0.16) | 0.07 (95% CI: 0.02; 0.13) | p=0.01 |
| | sexual abuse | 0.07 (95% CI: 0.01; 0.12) | 0.05 (95% CI: 0.00; 0.11) | p=0.06 |
| **Affective Instability** | emotional neglect | 0.16 (95% CI: 0.10; 0.22) | 0.15 (95% CI: 0.09; 0.21) | p<0.001 |
| | psychological neglect | 0.11 (95% CI: 0.05; 0.17) | 0.09 (95% CI: 0.03; 0.15) | p=0.002 |
| | physical abuse | 0.10 (95% CI: 0.04; 0.16) | 0.09 (95% CI: 0.03; 0.15) | p=0.003 |
| | sexual abuse | 0.04 (95% CI: −0.02; 0.10) | 0.04 (95% CI: −0.02; 0.10) | p=0.20 |
| **Identity Problems** | emotional neglect | 0.09 (95% CI: 0.03; 0.15) | 0.08 (95% CI: 0.02; 0.13) | p=0.01 |
| | psychological neglect | 0.09 (95% CI: 0.03; 0.15) | 0.05 (95% CI: 0.00; 0.11) | p=0.07 |
| | physical abuse | 0.04 (95% CI: −0.02; 0.10) | 0.02 (95% CI: −0.04; 0.07) | p=0.59 |
| | sexual abuse | 0.02 (95% CI: −0.04; 0.08) | 0.01 (95% CI: −0.05; 0.07) | p=0.80 |
| **Negative Relationships** | emotional neglect | 0.18 (95% CI: 0.12; 0.24) | 0.16 (95% CI: 0.09; 0.22) | p<0.001 |
| | psychological neglect | 0.19 (95% CI: 0.13; 0.26) | 0.15 (95% CI: 0.09; 0.21) | p<0.001 |
| | physical abuse | 0.12 (95% CI: 0.06; 0.18) | 0.09 (95% CI: 0.03; 0.15) | p=0.005 |
| | sexual abuse | 0.10 (95% CI: 0.04; 0.17) | 0.08 (95% CI: 0.02; 0.14) | p=0.01 |
| **Self harm** | emotional neglect | 0.06 (95% CI: −0.01; 0.12) | 0.05 (95% CI: −0.01; 0.11) | p=0.13 |
| | psychological neglect | 0.03 (95% CI: −0.03; 0.10) | 0.00 (95% CI: −0.06; 0.07) | p=0.96 |
| | physical abuse | 0.05 (95% CI: −0.02; 0.11) | 0.03 (95% CI: −0.04; 0.09) | p=0.43 |
| | sexual abuse | 0.05 (95% CI: −0.01; 0.12) | 0.05 (95% CI: −0.01; 0.11) | p=0.12 |

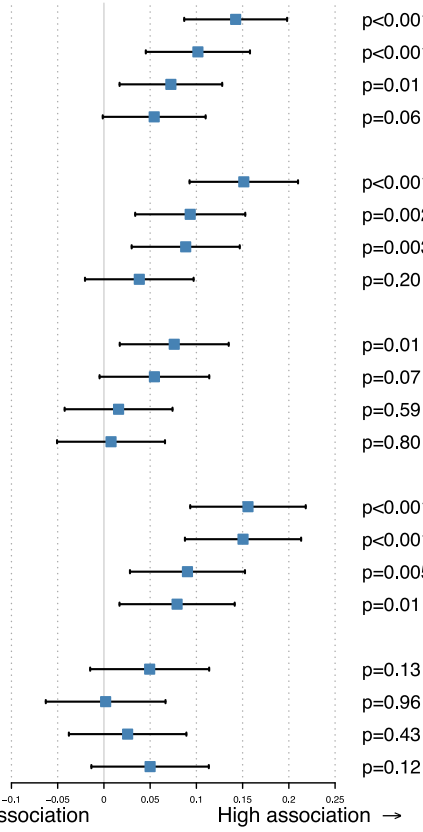


**Fig. 2.** Correlations of all possible combinations between types of childhood trauma and borderline personality features.

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The supporters had no role in the design, analysis, interpretation, or publication of this study.

## CRediT authorship contribution statement

**Georg Riemann:** Writing – original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Melissa Chrispijn:** Writing – review & editing, Supervision, Conceptualization. **Ralph W. Kupka:** Writing – review & editing, Supervision, Conceptualization. **Brenda W.J.H. Penninx:** Writing – review & editing, Conceptualization. **Erik J. Giltay:** Writing – review & editing, Methodology, Formal analysis, Conceptualization.

## Declaration of competing interest

The authors declare that they have no competing interests.

## Data availability

All data generated or analyzed during this study are included in this paper.

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Not applicable.

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