



The mediating effect of difficulties in emotion regulation on the association between childhood maltreatment and borderline personality disorder

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ABSTRACT

Background: Childhood maltreatment and difficulties in emotion regulation are common in patients with Borderline Personality Disorder (BPD) and Depressive Disorders (DD).

Objective: This study examines differences between patients with BPD and patients with DD, regarding childhood maltreatment and difficulties in emotion regulation as well as the mediating effect of different aspects of emotion regulation deficits on the association between childhood maltreatment and BPD-symptoms.

Method: A total of 305 participants, 177 with BPD and 128 with DD completed an assessment including the Childhood Trauma Questionnaire (CTQ), the Emotion Regulation Scale (DERS), the Brief Symptom Inventory (BSI), and the Structured Clinical Interview for DSM-IV (SCID). Data was analyzed using multiple analyses of variances and mediation analyses.

Results: Patients with BPD reported more childhood maltreatment and more difficulties in emotion regulation than patients with DD. When general symptom severity, age, and gender were included in the analysis as covariates only group differences regarding 'impulse control difficulties' ($F(1,299) = 38.97, p < .001, \eta_p^2 = .115$), 'limited access to emotion regulation strategies' ($F(1,299) = 4.66, p = .032, \eta_p^2 = .015$), and 'lack of emotional clarity' ($F(1,299) = 9.38, p = .002, \eta_p^2 = .030$) remained statistically significant. A mediation analysis, including above-mentioned covariates, indicated an association between emotional abuse and BPD-symptoms, which was mediated by difficulties in emotion regulation (indirect effect $B = .012, 95\% CI [.001; .031], R^2 = .429$). Subscale analyses revealed 'impulse control difficulties' as the aspect of difficulties in emotion regulation that has the greatest impact on this association ($B = .021, 95\% CI [.003; .045]$).

Conclusions: Patients with BPD display more childhood maltreatment and difficulties in emotion regulation than patients with DD. Difficulties in emotion regulation, especially difficulties in impulse control, seem to play an important role in the association between childhood emotional abuse and BPD-symptoms.

El efecto mediador de las dificultades en la regulación emocional sobre la asociación entre el maltrato infantil y el trastorno límite de personalidad

Antecedentes: El maltrato infantil y las dificultades en la regulación emocional son frecuentes en pacientes con trastorno límite de personalidad (TLP) y pacientes con trastornos depresivos (TD).

Objetivo: Este estudio examina las diferencias entre pacientes con TLP y pacientes con TD, en cuanto al maltrato infantil y las dificultades en la regulación de las emociones, así como el efecto mediador de diferentes aspectos de los déficits en la regulación de las emociones sobre la asociación entre el maltrato infantil y los síntomas del TLP.

Método: Un total de 305 participantes, 177 pacientes con TLP y 128 pacientes con TD completaron una evaluación que incluyó el Cuestionario de Trauma Infantil (CTQ), la Escala de Regulación de las Emociones (DERS), el Inventario Breve de Síntomas (BSI) y la Entrevista Clínica Estructurada para DSM-IV (SCID). Los datos se analizaron mediante múltiples análisis de variaciones y análisis de mediación.

Resultados: Los pacientes con TLP informaron más maltrato infantil y más dificultades en la regulación de las emociones que los pacientes con TD. Cuando la gravedad de los síntomas generales, la edad y el sexo se incluyeron en el análisis como covariables, solo las diferencias de grupo con respecto a las 'dificultades de control de impulsos' ($F(1,299) = 38,97, p < .001, \eta_p^2 = .115$), 'acceso limitado a estrategias de regulación de las emociones' ($F(1,299) = 4.66, p = .032, \eta_p^2 = .015$) y 'falta de claridad emocional' ($F(1,299) = 9.38, p = .002, \eta_p^2 = .030$) permanecieron estadísticamente significativas. Un análisis de mediación, incluidas las covariables antes mencionadas, indicó una

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关键词

边缘性人格障碍; 情绪调节; 童年期虐待; 重度抑郁障碍; 情绪滥用; 冲动控制

HIGHLIGHTS

- Patients with BPD report more childhood maltreatment and more emotion regulation difficulties than patients with DD and difficulties in emotion regulation, specifically impulse control, play an important role in the association between childhood emotional abuse and BPD symptoms.

asociación entre el abuso emocional y los síntomas del TLP, que fue mediada por dificultades en la regulación de las emociones (efecto indirecto $B = .012$, IC del 95% [.001; .031], $R^2 = .429$). Los análisis de subescalas revelaron “dificultades de control de impulsos” como el aspecto de las dificultades en la regulación de las emociones que tiene el mayor impacto en esta asociación ($B = .021$, IC del 95% [.003; .045]).

Conclusiones: Los pacientes con TLP presentan más maltrato infantil y dificultades en la regulación de las emociones que los pacientes con TD. Las dificultades en la regulación de las emociones, especialmente las dificultades en el control de los impulsos, parecen jugar un papel importante en la asociación entre el abuso emocional infantil y los síntomas del TLP.

情绪调节困难对童年期虐待与边缘性人格障碍之间关联的中介作用

背景: 边缘性人格障碍 (BPD) 患者和抑郁障碍 (DD) 患者经常报告有童年期虐待和情绪调节困难。
目的: 本研究探讨了BPD患者与DD患者在童年期虐待和情绪调节困难, 以及情绪调节缺陷不同方面对童年期虐待和BPD症状之间关联的中介作用的差异。

方法: 共有305名参与者, 177名BPD患者和128名DD患者完成了一项评估, 包括儿童创伤问卷 (CTQ), 情绪调节量表 (DERS), 简要症状量表 (BSI) 和DSM-IV结构化临床访谈 (SCID)。数据分析使用方差多重分析和中介分析。

结果: 与DD患者相比, BPD患者报告了更多的童年期虐待和情绪调节困难。当将一般症状的严重程度, 年龄和性别以协变量纳入分析时, 只有“冲动控制困难” ($F(1,299) = 38.97, p < .001, \eta_p^2 = .115$), “有限的情绪调节策略” ($F(1,299) = 4.66, p = .032, \eta_p^2 = .015$) 和“缺乏情感清晰度” ($F(1,299) = 9.38, p = .002, \eta_p^2 = .030$) 的组间差异仍在统计上显著。纳入上述协变量的一项中介分析表明, 情绪滥用与BPD症状之间存在关联, 由情绪调节困难所中介 (间接效应 $B = .012$, 95%CI [.001; .031], $R^2 = .429$)。分量表分析显示, “冲动控制困难”是情绪调节困难中对这种关联影响最大的一个方面 ($B = .021$, 95% CI [.003; .045])。

结论: BPD患者比DD患者表现出更多的童年期虐待和情绪调节困难。情绪调节困难, 尤其是冲动控制方面的困难, 似乎在童年期情绪虐待与BPD症状之间的关联中起着重要作用。

1. Introduction

Childhood maltreatment has been identified as a risk factor for Borderline Personality Disorder (BPD) (Ibrahim, Cosgrave, & Woolgar, 2018; Lobbestael, Arntz, & Bernstein, 2010). Indeed, a substantial number of patients with BPD report having experienced childhood maltreatment (McFetridge et al., 2015; Temes et al., 2017; Zanarini et al., 1997). However, various studies indicate that childhood maltreatment is also a risk factor for other mental health disorders such as depressive disorders (DD) (Isvoranu et al., 2016; Nelson, Klumpp, Doebler, & Ehring, 2017; Tognin et al., 2020; Vallati et al., 2020), which are among the most prevalent mental health disorders. Several studies found elevated scores of self-reported childhood maltreatment in patients with DD compared to healthy controls (Brakemeier et al., 2018; Carvalho Fernando et al., 2014; Kaczmarczyk, Wingenfeld, Kuehl, Otte, & Hinkelmann, 2018; Meinert et al., 2019).

Different types of childhood maltreatment often co-occur and psychiatric symptom severity across disorders seems to increase with the number and severity of experienced maltreatment types (Brodbeck et al., 2018; Cecil, Viding, Fearon, Glaser, & McCrory, 2017; Zanarini et al., 2002). Emotional abuse and neglect are associated with more severe depressive symptoms (Struck et al., 2020) and the severity of experienced sexual abuse has been linked to the severity of BPD symptomatology (Sansone, Songer, & Miller, 2005; Zanarini et al., 2002). There are few studies investigating the differences between patients with depression and patients with BPD regarding

childhood maltreatment. Carvalho Fernando et al. (Carvalho Fernando et al., 2014) only found higher scores of emotional abuse in patients with BPD compared to patients with Major Depressive Disorder (MDD) whereas Brakemeier et al. (Brakemeier et al., 2018) found higher scores on all kinds of childhood maltreatment in patients with BPD compared to patients with MDD.

But not every child that experiences traumatic events develops BPD (Laporte, Paris, Guttman, & Russell, 2011) and there is evidence against a direct causal relationship between childhood maltreatment and BPD (Bornovalova et al., 2013). It has been hypothesized that difficulties in emotion regulation may explain the association between childhood maltreatment and BPD (Carvalho Fernando et al., 2014; Kuo, Khoury, Metcalfe, Fitzpatrick, & Goodwill, 2015; Rosenstein et al., 2018). Difficulties in emotion regulation are indeed seen as a core feature of patients suffering from BPD (Rosenthal et al., 2008). However, severe difficulties in emotion regulation have also been found in MDD (Becerra et al., 2013; Carvalho Fernando et al., 2014; Ehring, Fischer, Schnulle, Bösterling, & Tuschen-Caffier, 2008) and it has been discussed that MDD could be a consequence of emotion regulation deficits (Ehring et al., 2008). Until today, there is limited research on the differences between patients with BPD and patients with MDD regarding emotion regulation deficits. Fernandez et al. (Fernandez et al., 2007) could not find any differences between patients with BPD and MDD regarding

difficulties in emotion regulation measured by the total score of the Difficulties in Emotion Regulation Scale (DERS), subscale analyses were not performed in this study. Identifying differences in emotion regulation deficits across disorders could help to optimize emotion regulation skills training for different patient groups.

According to Gratz and Roemer (Gratz & Roemer, 2004), emotion regulation includes the awareness and understanding of emotions, the acceptance of emotions, the ability to control impulsive behaviours, and flexibility to use appropriate emotion regulation strategies in order to meet personal goals and situational demands. As adaptive emotion regulation skills are developed early in childhood in interaction with primary caregivers (Calkins & Hill, 2007), early traumatization could prevent the learning of awareness of emotions and the development of functional emotion regulation strategies. This is in line with the biosocial developmental model of BPD by Linehan (Linehan, 2014), which underpins one of the main evidence-based treatments for BPD, Dialectical Behaviour Therapy (DBT). Linehan theorized that BPD develops against the background of an interaction between biological vulnerability (i.e. high emotional reactivity) and an invalidating environment (childhood maltreatment). Linehan's skills deficit model states that in this environment, patients with BPD could not learn how to adequately regulate their emotions and most of the BPD-symptoms (e.g. self-injury, suicidality, substance abuse, dissociation) are viewed as dysfunctional attempts to deal with emotional distress. Emotion regulation skills could therefore be an important pathway through which childhood maltreatment leads to BPD.

There are some studies that have investigated the hypothesis that the association between childhood maltreatment and the development of BPD could be mediated by difficulties in emotion regulation: Gratz et al. (Gratz, Tull, Baruch, Bornovalova, & Lejuez, 2008) found, that emotion dysregulation fully mediated the relationship between maltreatment and BPD symptom count in substance users, as well as the relationship between emotional abuse in particular and BPD diagnostic status. Carvalho Fernando et al. (Carvalho Fernando et al., 2014) found an association between both emotional abuse and emotional neglect and difficulties in emotion regulation as well as an association between emotional abuse, difficulties in emotion regulation, and symptom severity in BPD patients. Kuo et al. (Kuo et al., 2015) found an indirect path between childhood emotional abuse and BPD symptoms through emotion regulation difficulties in a sample of undergraduate students. These findings were replicated in a clinical sample by Rosenstein et al. (Rosenstein et al., 2018): They found that emotional abuse was related to BPD symptoms, both directly and

through difficulties with emotion regulation. In these studies, the mediating effects of different aspects of emotional dysregulation were not investigated. Knowledge about which specific aspects of difficulties in emotion regulation has the most important impact on the relationship between childhood maltreatment and BPD symptomatology could help further our knowledge of the development and treatment of BPD.

In order to investigate this issue, it is necessary to compare patients with BPD to patients with other mental health disorders. Because depression is one of the most prevalent mental disorders, we decided to start this investigation by comparing BPD to patients with DD using two large samples of two randomized controlled trials (Fassbinder et al., 2018; Schaich et al., 2018). The aim of the present study was to expand the existing knowledge from previous studies of (1) differences between patients with a primary diagnosis of BPD and patients with DD who did not meet the criteria for BPD regarding childhood maltreatment and difficulties in emotion regulation and (2) the mediating effect of different aspects of difficulties in emotion regulation on the association between childhood maltreatment and BPD symptoms. Based on the literature, we hypothesized that patients with BPD would display more childhood maltreatment and more difficulties in emotion regulation than patients with DD. Also, we hypothesized that difficulties in emotion regulation would have a mediating effect on the association between childhood maltreatment and BPD symptoms, and that some aspects of emotion regulation difficulties would influence this relationship more than others.

2. Materials and methods

2.1. Participants

For the analyses we used the baseline data of 305 patients emerging from two clinical randomized controlled trials investigating psychotherapy outpatient treatment programmes for patients with BPD (PRO*BPD) and MDD (PRO*MDD) (Fassbinder et al., 2018; Schaich et al., 2018). All participants were patients recruited within the outpatient clinic of the Department of Psychiatry and Psychotherapy, University of Lübeck in Germany. Participants were included in the analyses for this manuscript if (1) they had a primary diagnosis of BPD or a DD (MDD or dysthymia) (2) were 18 years of age or older and (3) had read and signed an informed consent form. Exclusion criteria were intellectual deficits (IQ < 85), insufficient language skills, a lifetime diagnosis of a psychotic disorder, acute suicidality requiring inpatient treatment, and acute substance dependency (according to DSM-5) that required detoxification treatment. For detailed information on the

recruitment and diagnostics see the study protocols of the two trials (Fassbinder et al., 2018; Schaich et al., 2018). In the analyses of this study all patients that completed the baseline assessments and gave informed consent were included, regardless of whether they were randomized to treatment, dropped out, or were excluded later.

The patients from the PRO*MDD trial included in the analyses all met the criteria for a DD (47.7% MDD, 2.3% dysthymia, 49.2% double depression) but none met the criteria for BPD. The patients from PRO*BPD trial included in the analyses all met the criteria for a BPD. As comorbid DD are frequent among patients with BPD, 66.1% of the patients in the PRO*BPD trial also met the criteria for a current DD (19.8% MDD, 12.4% dysthymia, 33.9% double depression) and 90.4% met criteria for a lifetime DD.

2.2. Measures

2.2.1. Mental health disorders

Mental health disorders were assessed using the German version of the Structured Clinical Interview for DSM-IV (SCID-I and II-Interview) (Wittchen et al., 1997; Wittchen, Zaudig, & Fydrich, 1997). The SCID used in this study was based on the DSM-IV classification system (Association, 2013), as the German version of the SCID for DSM-5 was not yet available. The number of BPD symptoms was defined as the number of BPD criteria patients met in the SCID-II interview.

2.2.2. Childhood trauma experiences

All participants completed the German version of the Childhood Trauma Questionnaire (CTQ) (Bernstein et al., 2003; Klinitzke, Romppel, Häuser, Brähler, & Glaesmer, 2012), which assesses five domains of childhood maltreatment experiences ('emotional abuse', 'physical abuse', 'sexual abuse', 'emotional neglect' and 'physical neglect'). Each CTQ scale consists of five items. The scores of each scale range between 5 ('none or minimal') to 25 ('severe to extreme'). Both the original and the German versions have good psychometric properties (Bernstein et al., 2003; Klinitzke et al., 2012).

2.2.3. Difficulties in emotion regulation

Difficulties in emotion regulation was assessed using the Difficulties in Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004). The DERS assesses both overall difficulties in emotion regulation as well as difficulties on six subscales with different aspects of emotional dysregulation ('non-acceptance of negative emotions', 'difficulties engaging in goal-directed behaviour', 'impulse control difficulties', 'lack of emotional awareness', 'limited access to emotion regulation

strategies' and 'lack of emotional clarity'). The DERS has high internal consistency, good test-retest reliability, and adequate predictive and construct validity (Ehring et al., 2008; Gratz & Roemer, 2004).

2.2.4. General symptom severity

General symptom severity was assessed using the Brief Symptom Inventory (BSI) (Franke & Derogatis, 2000), a short form of the SCL-90-R which has good psychometric properties (Boulet & Boss, 1991).

2.3. Statistical analysis

All statistical analyses were performed using SPSS version 25 for Windows (SPSS Inc., USA). Statistical tests were evaluated as two-sided tests with a significance level of $p \leq .05$. In the case of individual missing values on a subscale of the assessed measures, these missing values were substituted by the individual mean of the items of the scale (Downey & King, 1998). In order to compare differences in emotion regulation as well as childhood maltreatment of patients with and without a diagnosis of BPD, we used multiple analyses of variances (MANOVAs) with BPD diagnosis (BPD/No-BPD) as the fixed factor and the subscales of the CTQ and the DERS respectively as the criterion. Multiple analyses of covariance (MANCOVA) were used to correct possible confounding variables such as global symptom severity, age, and gender. Partial eta-squared values were reported as a measure of effect size ($\eta_p^2 \approx .01$ indicating a small, $\eta_p^2 \approx .06$ a medium and $\eta_p^2 \approx .14$ a large effect size).

Following these analyses, we conducted mediation analyses via an ordinary least squares path analysis using a bootstrapping approach with mediation process facilitated by the PROCESS macro version 2.16 (Bolin & Hayes, 2014; Hayes & Rockwood, 2017). The bootstrapping calculation provides a test of significance for indirect effects. Bias corrected standard errors and confidence intervals were generated using 5000 bootstrapped samples. A significant mediation effect is considered to be present when the confidence interval for the estimation for the indirect effect does not contain 0. The independent variables were the CTQ subscale scores, the dependent variable was the number of BPD symptoms and the DERS total score and the subscale scores of the DERS respectively were the putative mediating variables.

Mediation analyses have been criticized because the mediator is often conceptually related to the independent or dependent variable. It is therefore recommended to perform a factor analysis to ascertain the discriminant validity of M and X and the discriminant validity of M and Y (Zhao, Lynch, & Chen, 2010). We have therefore conducted two factor analyses: one with all the items of the DERS (M) and the CTQ (X) and one with all the items of the DERS (M) and the BPD-criteria (Y). These factor analyses indicated that none of the items of the DERS loaded on either the CTQ or the BPD-criteria, and

neither the CTQ nor the BPD-criteria loaded on the DERS (see supplemental material).

3. Results

3.1. Demographic and clinical characteristics of the sample

Table 1 provides detailed statistics of the demographic and clinical characteristics of the sample. The BPD subsample included more female participants and patients in the BPD subsample were younger than patients in the DD subsample. Also, patients in the BPD subsample displayed more Axis I and II disorders and a higher score on the BSI Global Severity Index than DD patients.

3.2. Differences between patients with BPD and patients with DD regarding childhood maltreatment

Patients in the BPD subsample experienced more childhood maltreatment than patients in the DD subsample. A MANOVA revealed higher scores for patients with BPD on all subscales of the CTQ: 'emotional abuse' ($F(1, 300) = 91.31, p < .001, \eta_p^2 = .233$), 'physical abuse' ($F(1, 300) = 26.92, p < .001, \eta_p^2 = .082$), 'sexual abuse' ($F(1, 300) = 35.56, p < .001, \eta_p^2 = .106$), 'emotional neglect' ($F(1, 300) = 44.41, p < .001, \eta_p^2 = .129$) and 'physical neglect' ($F(1, 300) = 32.09, p < .001, \eta_p^2 = .097$). Including general symptom severity as measured by the BSI Global Severity Index, age and gender as covariates yielded essentially the same results (see Table 2).

3.3. Differences between patients with BPD and patients with DD regarding difficulties in emotion regulation

Patients in the BPD subsample displayed more difficulties in emotion regulation than patients in the DD subsample. A MANOVA revealed higher scores for

patients with BPD on the subscales 'non-acceptance of negative emotions' ($F(1, 297) = 11.41, p = .001, \eta_p^2 = .036$), 'difficulties engaging in goal-directed behavior' ($F(1, 297) = 9.25, p = .003, \eta_p^2 = .030$), 'impulse control difficulties' ($F(1, 297) = 75.24, p < .001, \eta_p^2 = .199$), 'limited access to emotion regulation strategies' ($F(1, 297) = 32.512, p < .001, \eta_p^2 = .097$) and 'lack of emotional clarity' ($F(1, 297) = 35.42, p < .001, \eta_p^2 = .105$). There was no difference between the BPD and the DD subsample regarding the lack of emotional awareness subscale of the DERS. When general symptom severity as measured by the BSI Global Severity Index, age and gender were included in the analysis as covariates, only group differences regarding the subscales 'impulse control difficulties' ($F(1, 299) = 38.97, p < .001, \eta_p^2 = .115$) 'limited access to emotion regulation strategies' ($F(1, 299) = 4.66, p = .032, \eta_p^2 = .015$) and 'lack of emotional clarity' ($F(1, 299) = 9.38, p = .002, \eta_p^2 = .030$) were still statistically significant (see Table 2).

3.3.1. Primary Mediation analyses

Mediation effects of difficulties in emotion regulation on the associations between different kinds of childhood maltreatment and the number of Borderline Personality Disorder symptoms

In the full sample, significant associations of all of the CTQ subscales with number of BPD symptoms were found (direct effects: emotional abuse: $B = .211, p < .001$, physical abuse: $B = .152, p < .001$, Sexual abuse: $B = .140, p < .001$, emotional neglect: $B = .139, p < .001$, physical neglect: $B = .194, p < .001$). A significant part of the associations between most of the CTQ subscales and number of BPD symptoms were mediated through the total DERS score (indirect effects: emotional abuse: $B = .051, 95\% CI [.029; .080]$, sexual abuse: $B = .048, 95\% CI [.012; .091]$, emotional neglect: $B = .041, 95\% CI [.015; .073]$, physical neglect: $B = .042, 95\% CI [.003; .088]$).

However, when general symptom severity, age and gender were included into the analyses as covariates, only the indirect effect of difficulties in emotion regulation on the association between the CTQ-subscale 'emotional abuse' and number of BPD symptoms remained significant (direct effect: $B = .187, p < .001$; indirect effect $B = .012, 95\% CI [.001; .031]$). The mediation model explained 42.9% of the variance. This implies that a higher total score on emotional abuse was associated with more difficulties in emotion regulation, which in turn was associated with more BPD symptoms (see Figure 1). Table 3 provides full statistics for the mediation model.

3.3.2. Subscale Mediation Analyses

Mediation effect of specific aspects of difficulties in emotion regulation on the associations between

Table 1. Demographic and clinical characteristics of the sample.

	Group				Test Statistic
	BPD ($n = 177$)		DD ($n = 128$)		BPD vs DD
	n	%	n	%	χ^2_1
Female	141	79.70	70	54.7	21.84***
	M	SD	M	SD	U
Age	33.25	10.57	41.34	13.07	7262.50***
					χ^2_{10}
Axis I Diagnoses	3.97	1.98	2.90	1.37	37.97***
					χ^2_6
Axis II Diagnoses	2.34	1.10	.65	.74	158.78***
	M	SD	M	SD	$T_{301.507}$
BSI Global Severity Index	1.92	.71	1.49	.55	5.91***

*** $p \leq .001$. n = sample size. M = Mean. SD = Standard Deviation. χ^2 = Chi²-Test. U = Mann-Whitney U-Test. T = T-Test. BPD: patients with a diagnosis of Borderline Personality Disorder, DD: depressive patients without a diagnosis of Borderline Personality Disorder. Axis I diagnoses: number of Axis I diagnoses (incl. DD). Axis II diagnoses: number of Axis II diagnoses (incl. BPD). BSI = Brief Symptom Inventory

Table 2. Self-reported childhood maltreatment and difficulties in emotion regulation.

	Group				BPD vs DD	
	BPD (n = 174)		DD (n = 128)		Test Statistic	Effect Size
	M	SD	M	SD	$F_{1,297}$	η_p^2
Childhood Trauma Questionnaire						
Emotional Abuse	16.99	5.40	11.07	5.22	61.35***	.171
Physical Abuse	10.19	5.46	7.33	3.52	25.37***	.079
Sexual Abuse	9.18	5.51	6.02	2.75	24.68***	.077
Emotional Neglect	17.93	5.22	13.81	5.41	40.11***	.119
Physical Neglect	11.26	4.21	8.67	3.49	24.04***	.075
	M	SD	M	SD	$F_{5,293}$	η_p^2
Total Score	65.55	19.47	46.91	15.91	14.52***	.199
	BPD (n = 176)		DD (n = 128)		BPD vs DD	
	M	SD	M	SD	$F_{1,299}$	η_p^2
Difficulties in Emotion Regulation Scale						
Non-acceptance of negative emotions	20.67	6.38	18.30	5.53	.47	.002
Difficulties engaging in goal-directed behaviour	19.71	4.05	18.29	3.98	1.68	.006
Impulse control difficulties	19.32	5.56	14.11	4.60	38.97***	.115
Lack of emotional awareness	21.20	4.38	21.49	4.19	.09	.000
Limited access to emotion regulation strategies	29.91	6.55	25.67	6.19	4.66*	.015
Lack of emotional clarity	18.49	4.49	15.52	4.04	9.38**	.002
	M	SD	M	SD	$F_{6,294}$	η_p^2
Total Score	130.66	21.27	114.00	17.71	7.49***	.133

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$; n = sample size. M = Mean. SD = Standard Deviation. η_p^2 = partial eta squared. BPD = patients with a diagnosis of Borderline Personality Disorder. DD = depressive patients without a diagnosis of Borderline Personality Disorder. Values are corrected for age and gender and BSI Global Severity Index.

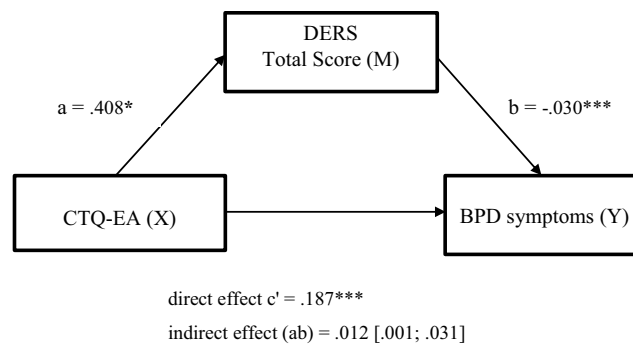


Figure 1. Mediation model of the effect of emotional abuse (X) on BPD symptoms (Y) through difficulties in emotion regulation (M). * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$. CTQ-EA = Childhood Trauma Questionnaire, subscale 'emotional abuse'. DERS = Difficulties in Emotion Regulation Scale. BPD = Borderline Personality Disorder. Values are corrected for age and gender and BSI Global Severity Index.

Table 3. Summary of the mediation analysis: unstandardized coefficients and associated standard errors ($n = 284$).

	Total effect		Mediation analysis			
	CTQ-EA → BPD symp.		CTQ-EA → DERS		CTQ-EA & DERS → BPD symp.	
	B	SE	B	SE	B	SE
Constant	1.195	.880	89.341	6.094	-1.504	1.147
DERS					-.030***	.009
CTQ-EA	.200***	.027	.408*	.189	.187***	.027
Indirect effect of CTQ through DERS on BPD						
$B = .012$, $SE = .008$, 95% CI [.001; .031]						
Explained variance 42.9%, $F_{5,278} = 41.85$, $p < .001$						

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$. BPD symp. = symptoms of Borderline Personality Disorder. CTQ-EA = Childhood Trauma Questionnaire, subscale 'emotional abuse'. DERS = Difficulties in Emotion Regulation Scale. SE = standard error. Values are corrected for age and gender and BSI Global Severity Index.

different kinds of childhood maltreatment and the number of Borderline Personality Disorder symptoms

Follow-up mediation models of each of the six subscales of the DERS revealed that the association between

the CTQ subscales 'emotional abuse' and 'sexual abuse' and number of BPD symptoms were mediated only through the DERS subscales 'difficulties engaging in goal-directed behaviour' (emotional abuse: $B = -.014$,

95% *CI* [-.033; -.003], sexual abuse: $B = -.012$, 95% *CI* [-.033; -.001]), 'impulse control difficulties' (emotional abuse: $B = .056$, 95% *CI* [.032; .087], sexual abuse: $B = .056$, 95% *CI* [.025; .100]) and 'lack of emotional clarity' (emotional abuse: $B = .016$, 95% *CI* [.003; .037], sexual abuse: $B = .014$, 95% *CI* [.001; .041]).

The association between the CTQ subscale 'physical abuse' and the number of BPD symptoms was mediated only through the DERS subscale 'difficulties engaging in goal-directed behaviour' ($B = -.012$, 95% *CI* [-.033; -.001]) and 'impulse control difficulties' ($B = .030$, 95% *CI* [.001; .063]).

The association between the CTQ subscale 'physical neglect' and 'emotional neglect' BPD symptoms was mediated only through the DERS-subscale 'impulse control difficulties' (physical neglect: $B = .042$, 95% *CI* [.020; .094], emotional neglect: $B = .041$, 95% *CI* [.015; .071]) and 'lack of emotional clarity' (physical neglect: $B = .014$, 95% *CI* [.001; .039], emotional neglect: $B = .013$, 95% *CI* [.002; .036]).

However, when general symptom severity, age and gender were included into the analysis as covariates, only the indirect effect of the DERS-subscale 'impulse control difficulties' on the association between 'emotional abuse' and number of BPD-symptoms remained significant ($B = .021$, 95% *CI* [.003; .045]) (see [Table 4](#) and [Figure 2](#)).

4. Discussion

Using two large sample of patients with BPD and DD, we found that BPD patients reported more childhood maltreatment than patients with DD, specifically regarding 'impulse control difficulties', 'limited access to emotion regulation strategies', and 'lack of emotional clarity'. We were able to replicate earlier findings that emotional regulation deficits mediate the association between childhood emotional abuse and BPD symptoms. In addition, we demonstrated for the first time that this mediation can best be explained by difficulties with impulse control.

In our sample, patients with BPD reported more childhood maltreatment than patients with DD. This is in line with previous research. (Battle et al., 2004; Brakemeier et al., 2018). However, a substantial number patients with DD that were assessed in this study also reported childhood maltreatment. This is in line with prior research findings indicating that patients with DD also report elevated levels of childhood maltreatment (Brakemeier et al., 2018; Carvalho Fernando et al., 2014). In fact, Carvalho Fernando et al. (Carvalho Fernando et al., 2014) did not find any differences between patients with MDD and BPD regarding the scores on all of the CTQ subscales except the emotional abuse subscale. However, compared to their study and most other studies investigating childhood maltreatment in patients with BPD (Bøen et al., 2015; Bungert et al., 2015; Ferrer et al., 2017; Nicol, Pope, Romaniuk,

& Hall, 2015), BPD patients in our sample reported higher scores on the CTQ while the depressed patients in our study reported similar (Carvalho Fernando et al., 2014; Kaczmarczyk et al., 2018; Meinert et al., 2019) or only slightly higher scores (Opel et al., 2014; Wessel, Meeren, Peeters, Arntz, & Merckelbach, 2001), compared to data on depressive patients of other studies. This indicates that patients with BPD in our study reported exceptionally high levels of childhood maltreatment. Brakemeier et al. (Brakemeier et al., 2018) also found differences between patients with BPD and depressive patients regarding all CTQ subscales. Both BPD and MDD patients recruited for their study displayed similar scores on the CTQ as our patients.

Although difficulties in emotion regulation are considered a core feature of BPD, severe difficulties in emotion regulation have been found in patients with MDD as well (Becerra et al., 2013); Carvalho Fernando et al., 2014; Ehring et al., 2008).

In our study, BPD patients showed greater difficulties in emotion regulation (DERS total score: 131 ± 21) compared to patients with DD (DERS total score: 114 ± 18). However, the deficit in emotion regulation in the DD subsample is also substantial. This becomes apparent when the results are compared with the sample of undergraduate students from the initial validation study of the DERS (Gratz & Roemer, 2004) (DERS total score of 114 ± 18 compared to 78 ± 21 for female and 81 ± 19 for male students). Also, for all DERS subscales, scores for both BPD and DD patients were much higher when compared to the sample of Gratz and Roemer (Gratz & Roemer, 2004). However, in our sample, patients with BPD displayed especially more difficulties in impulse control, less access to emotion regulation strategies, and a greater lack of emotional clarity than patients with DD.

These results relate well to Linehan's biosocial theory (Linehan, 2014) in which an interaction of biological vulnerability (e.g. high impulsivity and emotional reactivity) and an invalidating environment (indicated by the higher CTQ scores in the BPD subsample) may lead to certain emotion regulation deficits: the ability to classify emotions may not have been sufficiently learned and is therefore reduced (assessed with the DERS subscale 'lack of emotional clarity'), patients may have developed the belief that there is little that can be done to regulate emotions effectively (assessed with the DERS subscale 'limited access to emotion regulation strategies') and impulsivity may have become even more pronounced (assessed with the DERS subscale 'difficulties in impulse control').

In contrast to our results, Carvalho Fernando et al. (Carvalho Fernando et al., 2014) did not find a difference between patients with BPD and MDD regarding difficulties in emotion regulation. This might be due to the fact that the total DERS score of the

Table 4. Summary of the mediation analysis of DERS subscales: unstandardized coefficients and associated standard errors ($N = 303$).

Mediation analysis					
	Outcome DERS subscales				
	CTQ-EA → DERS Non Acceptance				
	<i>B</i>	<i>SE</i>	$F_{4,298}$	<i>p</i>	R^2
Constant	10.697	1.848			
CTQ-EA	.021	.057	17.725	.712	.192
CTQ-EA → DERS Goals					
	<i>B</i>	<i>SE</i>			
Constant	15.244	1.268			
CTQ-EA	.040	.039	12.006	.309	.139
CTQ-EA → DERS Impulse Control					
	<i>B</i>	<i>SE</i>			
Constant	9.331	1.683			
CTQ-EA	.113*	.052	24.59	.031	.248
CTQ-EA → DERS Awareness					
	<i>B</i>	<i>SE</i>			
Constant	20.430	1.425			
CTQ-EA	.013	.044	1.939	.763	.025
CTQ-EA → DERS Strategies					
	<i>B</i>	<i>SE</i>			
Constant	20.918	1.896			
CTQ-EA	.081	.059	30.72	.169	.292
CTQ-EA → DERS Clarity					
	<i>B</i>	<i>SE</i>			
Constant	12.033	1.360			
CTQ-EA	0.044	.042	19.461	.295	.207
Outcome BPD symptoms					
	<i>B</i>	<i>SE</i>			
Constant	-.196	1.220			
DERS Non Acceptance	-.011	.030			
DERS Goals	-.063	.047			
DERS Impulse Control	.188	.032			
DERS Awareness	.020	.034			
DERS Strategies	-.008	.035			
DERS Clarity	.054	.039			
Indirect Effects					
	<i>B</i>	<i>SE</i>	<i>CI</i>		
Total	.020	.011	[.001; .045]		
DERS Non Acceptance	-.000	.002	[-.007; .002]		
DERS Goals	-.003	.004	[-.015; .002]		
DERS Impulse Control	.021	.011	[.003; .045]		
DERS Awareness	.000	.002	[-.002; .006]		
DERS Strategies	-.001	.004	[-.011; .005]		
DERS Clarity	-.002	.004	[-.001; .014]		

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$. BPD = Borderline Personality Disorder. CTQ-EA = Childhood Trauma Questionnaire, subscale 'emotional abuse'. DERS = Difficulties in Emotion Regulation Scale. SE = standard error. Values are corrected for age and gender and BSI Global Severity Index.

patients with DD in our study was only slightly higher than the DERS total score of the MDD patients in the study of Carvalho Fernando et al. (Carvalho Fernando et al., 2014) while the DERS total score of the BPD sample in our study was higher than the DERS total score of the BPD sample in their study (Brockmeyer et al., 2014; Mennin, McLaughlin, & Flanagan, 2009; Tull, Barrett, McMillan, & Roemer, 2007).

Both BPD patients and depressed patients without BPD included in our study showed similar or even

higher scores on the DERS subscales than BPD (Fletcher, Parker, Bayes, Paterson, & McClure, 2014; Goodman et al., 2014) or depressed (Becerra et al., 2013); Brockmeyer et al., 2012; Visted et al., 2019) patients in other studies respectively. This might be due to the fact that both the depressed patients without BPD as well as the BPD sample included in this study displayed high symptom severity and comorbidity, as the study took place in a university hospital that treats patients with chronicity and complex symptomatology.

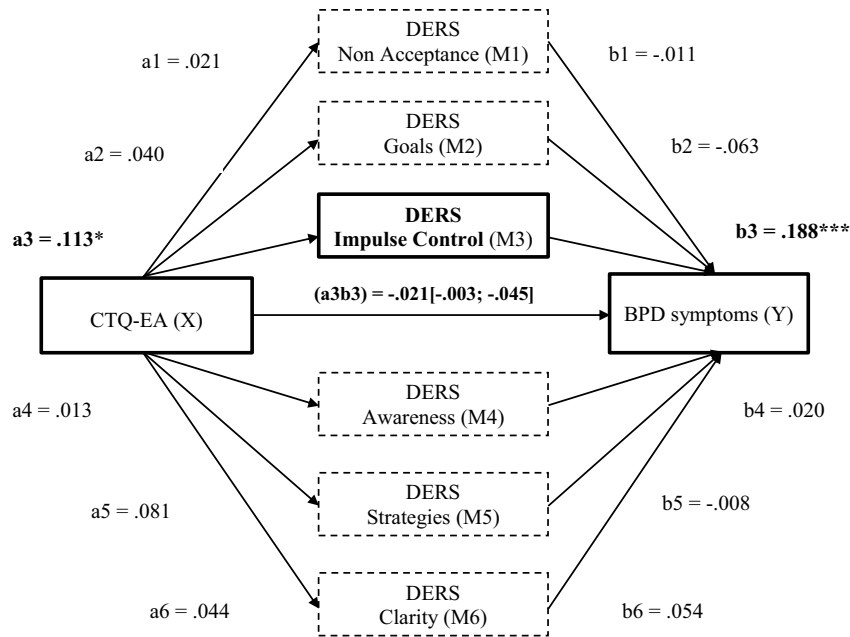


Figure 2. Multiple mediation model of the effect of emotional abuse (X) on BPD symptoms (Y) through different aspects of difficulties in emotion regulation (M1-M6). * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$. CTQ-EA = Childhood Trauma Questionnaire, subscale 'emotional abuse'. DERS = Difficulties in Emotion Regulation Scale. BPD = Borderline Personality Disorder. Significant indirect paths are boldfaced. Values are corrected for age and gender and BSI Global Severity Index.

Interestingly, regarding the DERS subscales 'lack of emotional awareness', 'difficulties engaging in goal directing behavior', and 'non-acceptance of emotions', there was no difference between the two groups in our study. As we couldn't find any other studies directly comparing the DERS subscales of BPD patients with patients with DD, these findings need to be replicated in other samples. If confirmed, these results suggest that different patterns of emotion regulation deficits characterize BPD and DD. This has important implications for the optimization of the treatment: In the case of BPD, emotion regulation deficits are already well-addressed in DBT (Linehan, 2014), the most applied treatment for BPD. Here, acquisition of functional emotion regulation skills is the main focus of treatment. As such, DBT includes a specific emotion regulation module which addresses all deficits in emotion regulation measured by the subscales of the DERS. Impulse control difficulties, limited access to emotion regulation strategies as well as lack of emotional clarity are also further addressed in the modules awareness and distress tolerance. However, DBT is a complex treatment and such information about prominent emotion regulation deficits might help to concentrate on the most important treatment techniques and skills. Existing evidence-based treatments for depression such as Behavioural Activation (Martell, Dimidjian, & Herman-Dunn, 2013) also include some strategies to optimize emotional regulation difficulties (such as promoting emotional awareness and opposite action). However, learning more about specific difficulties of emotion regulation in depression could help to develop and optimize specific therapeutic interventions to target these difficulties.

In our study, difficulties in emotion regulation mediated the association between the CTQ subscale 'emotional abuse' and BPD symptoms. Carvalho Fernando et al. (Carvalho Fernando et al., 2014) also found that difficulties with emotion regulation influenced the association between the CTQ subscale 'emotional abuse' and BPD-symptomatology in the BPD subgroup. Rosenstein et al. (Rosenstein et al., 2018) found that the subscale 'emotional abuse' was related to BPD symptoms both directly and through difficulties with emotion regulation. The mediating effects of the DERS subscales were not explored in these studies.

In our study, a subscale analysis revealed the DERS subscale 'difficulties in impulse control' to be the aspect of difficulties in emotion regulation with the strongest impact on the association between emotional abuse and BPD symptoms. There have been only a few studies investigating specific kinds of difficulties in emotion regulation. Some studies found a relationship between lack of emotional clarity and BPD (Leible & Snell, 2004; Vine & Aldao, 2014). Salsman and Linehan (Salsman & Linehan, 2012) found an indirect effect of the subscales 'lack of emotional clarity', 'limited access to emotion regulation strategies' and 'difficulties engaging in goal-directed behavior' on BPD symptoms but no effect of the 'difficulties in impulse control' subscale of the DERS. However, this study was conducted in a sample of undergraduate students and not in a clinical sample of patients with BPD. There is one other study that found the strongest associations between the DERS subscales 'impulse control difficulties' and 'limited

access to emotion regulation strategies' and BPD symptomatology (Glenn & Klonsky, 2009). Laporte et al. (Laporte et al., 2011) investigated patients with BPD and their sisters and found that impulsivity predicted symptom severity more than experienced trauma did. Therefore, not difficulties in emotion regulation in general, but difficulties with impulse control specifically, might be the mediating factor of interest. Further research, ideally prospective, is necessary to confirm this finding. Learning about which emotion regulation difficulties mediate this relationship between emotional abuse and the development of BPD symptoms could help to develop specific emotion regulation skills training for individuals at risk.

While our sample size was relatively large compared to other studies in the field, the cross-sectional design of the study did not allow a temporal precedence of the mediator before the dependent variable. This is often regarded as a prerequisite if one wants to firmly establish the causal effect of a mediating variable (Kazdin, 2007). Yet, most empirical tests of mediation utilize cross-sectional data (Maxwell & Cole, 2007). Correlational evidence from these cross-sectional studies is often regarded as a useful first step in a series of projects aimed at establishing the causal effect of a mediating variable (Hayes & Rockwood, 2017; Kazdin, 2007). Therefore, our study can be a starting point for future longitudinal studies, where data of maltreatment in childhood should be collected prospectively.

This study only investigated the mediating effect of certain aspects of difficulties in emotion regulation on the relationship between childhood maltreatment and symptoms of BPD using the DERS subscales. Further mediating variables, such as dissociative symptoms, which are also considered to be an emotion regulation deficit, were not investigated in this study. Dissociative symptoms are common in BPD (Černis et al., 2021; Maldonato, Sperandeo, Moretto, & Dell'Orco, 2018; Sar, Akyuz, Kugu, Ozturk, & Ertem-Vehid, 2006) as well as in DD (Sar, Akyüz, Öztürk, & Alioğlu, 2013) and also seem to be associated with childhood maltreatment (Belli, Ural, Sagaltici, Solmaz, & Akbudak, 2020; Sar et al., 2006, 2013; Tschoeke, Bichescu-Burian, Steinert, & Flammer, 2021). Research investigating the mediating effect of other variables, such as dissociative symptoms could further our knowledge on BPD.

In this study, we assessed difficulties in emotion regulation using the subscales of the DERS. However, emotion regulation is a broad topic and can also be conceptualized, assessed and explained in many other ways. Just to name one, Attachment Theory, which also has strong ties to childhood maltreatment, has become a prominent conceptual framework for understanding emotion regulation and dysregulation (Mikulincer, Shaver, & Pereg, 2003; van Dijke & Ford, 2015). These aspects were not addressed in our study and much more

can be done to understand the nature of emotion regulation and its interplay with childhood maltreatment and BPD. Further in-depth investigation of single aspects of difficulties in emotion regulation can help explain their role in the development of BPD.

In this study we compared patients with BPD to patients with DD. However, childhood maltreatment is a risk factor for a wide range of mental health disorders and emotional dysregulation is a prevalent feature of various disorders. In order to deepen our understanding of the role that specific aspects of emotion regulation have on the relationship between childhood maltreatment and the development of BPD, these relationships need to be explored across a wider range of psychiatric diagnoses.

Another limitation of this study concerns generalizability, as this study examined help-seeking outpatients of a specialized clinical service that treats patients with complex symptomatology and high comorbidity. Therefore, the included study population probably displays higher symptom severity, chronicity, and comorbidity than the general outpatient population in Germany. It should also be noted that participants in the BPD-subgroup displayed more comorbid disorders and higher symptom severity than participants in the DD-sample. In our analyses, we controlled for general symptom severity assessed by the BSI Global Severity Score. However, other difficulties associated with comorbid disorders may confound the results which is important to control for in future research.

Also, participants in the BPD-sample were mainly female whereas the gender of the participants in the DD-sample was equally distributed. This is important to keep in mind as females are more at risk for certain types of abuse, (Häuser, Schmutzer, Brähler, & Glaesmer, 2011) and these results may therefore not be generalizable to male populations. The self-report measure used to assess emotion regulation deficits and especially childhood maltreatment can also be considered a limitation of this study, as retrospective self-reports on childhood maltreatment are prone to memory bias (Hardt & Rutter, 2004; Shaffer, Huston, & Egeland, 2008).

5. Conclusion

A substantial number of patients with BPD report childhood maltreatment. This study found a mediating effect of difficulties in emotion regulation on the association between emotional abuse and BPD symptoms. Subscale analyses revealed impulse control difficulties as the aspect of difficulties in emotion regulation that has the greatest impact on this association. Further research is necessary to confirm this finding. Disentangling this relationship

could further our knowledge of the development, prevention, and treatment of BPD.

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Ethics approval and consent to participate

The study was approved by the ethics committee of Lübeck University (PRO*BPD reference number: 13-005; PRO*MDD reference number: 16-176). Written informed consent was obtained from all participants prior to inclusion in the study.

Data sharing

In this study, data of outpatients of a mental health clinic were analyzed. In order to protect the privacy of these patients and ensure the secure storage of their data, we refrain from making the data freely available in a repository. Also, this was not clearly stated in the consent form. However, the data can be shared with researchers who provide a methodologically sound proposal to EF. Proposals may be submitted up to 36 months following publication of the main analysis and the decision will be made by the steering committee.

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No potential conflict of interest was reported by the author(s).

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Contributions

AS: drafting of the main body of the manuscript; conducting of statistical analysis; revising manuscript following feedback; involved in organization of logistics, data management and recruitment of patients; NA: involved in organization of logistics, data management and recruitment of patients, provided critical revision of the manuscript; SK: involved in organization of logistics, data management and recruitment of patients, provided critical revision of the manuscript; DAF: implementation of the two treatment programmes PRO*MDD and PRO*BPD in the outpatient clinic, provided

critical revision of the manuscript; SB: gave substantial input to interpretation of data and provided critical revision of the manuscript; US: initial conception and design of the studies PRO*MDD and PRO*BPD, provided critical revision of the manuscript. JPK: development of the PRO*MDD study protocol; statistical counseling; provided substantial input and critical revision of the manuscript; EF: Coordinating investigator; initial conception and design of the studies PRO*MDD and PRO*BPD; development of the PRO*MDD and PRO*BPD study protocol; provided substantial input and critical revision of the manuscript; All authors commented on the manuscript and approved the final manuscript.

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