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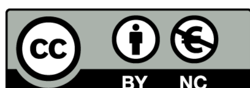

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CLINICAL RESEARCH ARTICLE

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Trait dissociation in borderline personality disorder: influence on immediate therapy outcomes, follow-up assessments, and self-harm patterns

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ABSTRACT

Background: Dissociative symptoms are suggested to compete with the effectiveness of psychotherapeutic treatment and frequently co-occur with early life trauma and self-harm patterns, including self-injury, suicidal ideation, and suicide attempts, which are characteristic for borderline personality disorder (BPD).
Objective: We explore the connections between dissociation and other BPD features like self-harm and childhood traumatization and examine the impact of trait dissociation on both immediate and follow-up psychotherapy outcomes.
Method: In this naturalistic prospective evaluation study, we investigated psychopathology including general psychological distress (SCL-90), depression (BDI-II), and borderline-specific pathology (BSL) in 131 patients with BPD pre and post of a certified 8-week inpatient Dialectical Behaviour Therapy (DBT), as well as 3- and 6-month post inpatient treatment. Prior to therapy, we evaluated trait dissociation (Dissociative Experience Scale), early life trauma (Childhood Trauma Questionnaire), and self-harm patterns (clinical interview). We performed a network analysis to explore the interplay between dissociation, self-harm, and childhood traumatization. To analyse the influence of dissociation on treatment outcomes, we employed linear mixed models.
Results: Psychopathology (SCL-90, BDI-II and BSL) exhibited significant reductions at post-treatment and follow-up assessments when compared to baseline measurements. Higher levels of trait dissociation were consistently related to higher psychopathology but did not suggest poorer symptom reduction during DBT. However, trait dissociation predicted reduced 6-month follow-up benefits from DBT, regardless of the baseline symptom burden. The network analysis revealed a close association between self-injury and derealization/depersonalization, while the frequency of suicide attempts was more closely connected to childhood emotional abuse, which was identified as a central node of the network.
Conclusions: Dissociation was not related to poorer outcomes regarding inpatient DBT. However, trait dissociation predicted reduced follow-up benefits, highlighting the need to address dissociation during psychotherapeutic interventions. Based on the estimated network structure, treating dissociative symptoms could potentially mitigate self-injury while especially childhood emotional abuse was linked with suicide attempts.

Rasgo de disociación en el trastorno límite de la personalidad: influencia en los resultados inmediatos de la terapia, las evaluaciones de seguimiento y los patrones de autolesión

Antecedentes: Se ha sugerido que los síntomas disociativos compiten con la eficacia del tratamiento psicoterapéutico y con frecuencia coocurren con traumas de la vida temprana y patrones de autolesión, incluyendo autolesiones, ideación suicida e intentos de suicidio, que son característicos del trastorno límite de la personalidad (TLP).
Objetivo: Exploramos las conexiones entre la disociación y otros rasgos del TLP como la autolesión y la traumatización infantil y examinamos el impacto del rasgo disociación en los resultados de la psicoterapia inmediata y de seguimiento.
Método: En este estudio naturalístico de evaluación prospectiva, investigamos la psicopatología incluyendo el malestar psicológico general (SCL-90), la depresión (BDI-II), y la patología borderline específica (BSL) en 131 pacientes con TLP antes y después de una Terapia Dialéctica Conductual (DBT por sus siglas en inglés) certificada de ocho semanas en régimen de hospitalización, así como tres y seis meses después del tratamiento en régimen de hospitalización. Antes de la terapia, evaluamos la disociación de rasgos (Escala de

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Borderline personality disorder; dialectic behaviour therapy (DBT); trait dissociation; self-harm; childhood traumatization

PALABRAS CLAVE
Trastorno límite de la personalidad; terapia dialéctica conductual (DBT); rasgo de disociación; autolesiones; traumatización infantil

HIGHLIGHTS

- Patients with elevated trait dissociation (DES $\geq$ 20) were younger, had more frequent diagnoses of PTSD, self-injury (both lifetime and within the past year), and made suicide attempts earlier in life, but showed no increase in comorbid depression or alcohol abuse compared to those with lower dissociation scores.
- According to results from a network analysis, focusing on dissociative symptoms could potentially directly alleviate self-injury, whereas suicide attempts and suicidal ideation were only indirectly associated with dissociation but emotional and sexual abuse.
- Trait dissociation did not indicate worse symptom reduction during an inpatient DBT treatment, but it predicted diminished medium-term benefits from DBT at follow-up, irrespective of initial

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Experiencia Disociativa), el trauma de las primeras etapas de la vida (Cuestionario de Trauma Infantil) y los patrones de autolesión (entrevista clínica). Para analizar la influencia de la disociación en los resultados del tratamiento, empleamos modelos lineales mixtos.
Resultados: La psicopatología (SCL-90, BDI-II y BSL) mostró reducciones significativas en las evaluaciones post-tratamiento y de seguimiento en comparación con las mediciones basales. Los niveles más altos de rasgo de disociación se relacionaron consistentemente con una psicopatología más alta, pero no sugirieron una menor reducción de los síntomas durante la DBT. Sin embargo, el rasgo de disociación predijo una reducción de los beneficios de la DBT durante los 6 meses de seguimiento, independientemente de la carga sintomática basal. El análisis de la red reveló una estrecha asociación entre la autolesión y la desrealización/despersonalización, mientras que la frecuencia de intentos de suicidio estaba más estrechamente relacionada con el abuso emocional en la infancia, que fue identificado como un nodo central de la red. Conclusiones: La disociación no se relacionó con peores resultados en relación con la DBT hospitalaria. Sin embargo, el rasgo de disociación predijo menores beneficios en el seguimiento, destacando la necesidad de abordar la disociación durante las intervenciones psicoterapéuticas. Sobre la base de la estructura de red estimada, el tratamiento de los síntomas disociativos podría mitigar potencialmente las autolesiones, mientras que el abuso emocional infantil en particular se relacionó con los intentos de suicidio.

symptom severity, emphasizing the importance of addressing dissociation during psychotherapeutic interventions.

1. Introduction

Dissociation is a sophisticated psychological phenomenon that allows the human mind to cope with overwhelming experiences (Boon et al., 2013). This process involves the interruption or disturbance of physiological interconnections among mental functions, encompassing specific aspects of one's thoughts, memory, identity, and consciousness (Spiegel et al., 2011). In Borderline Personality Disorder (BPD), 'transient, stress-induced experiences of threat' or 'severe dissociative symptoms' are considered core symptoms (Lyssenko et al., 2018) and hold a highly predictive value for the development of BPD (Maldonato et al., 2018).

Approximately 70% of individuals with BPD experience moderate to severe dissociative phenomena along with more pronounced BPD symptoms (Jaeger et al., 2017). The occurrence of dissociation as a temporary symptom (state dissociation) is particularly prominent in individuals who exhibit a stable, high predisposition to dissociate (trait dissociation) (Krause-Utz et al., 2021). The differentiation between trait and state dissociation is essential for achieving a nuanced understanding, as these phenomena may not necessarily occur simultaneously within an individual (Salmon et al., 2023). Dissociation can further be understood as a disruption or separation from certain mental processes, involving both detachment and compartmentalization (Holmes et al., 2005). Detachment refers to alterations in consciousness, where individuals experience derealization – a sense of detachment from reality – and depersonalization – a feeling of emotional or bodily detachment from oneself. Compartmentalization, on the other hand, refers to a loss of voluntary control over mental processes that are normally controllable, such as in amnesia or conversion symptoms. In these cases, functions like memory, emotions, or cognition become split off from conscious awareness without a noticeable change in the overall state of consciousness. In individuals with BPD, dissociative symptoms such as detachment from reality (derealization) and self-detachment (depersonalization) are particularly relevant (Sar et al., 2017). The tendency towards dissociation is multifaceted; however, existing literature suggests that early life experiences, such as childhood trauma, significantly influence the development of dissociative symptoms in later years (Aksen et al., 2021; Schimmenti & Caretti, 2016). Childhood traumatization, which has been shown to be linked to enduring dysregulation of the humans' stress system (De Bellis & Zisk, 2014) is a prevalent factor in BPD. It is closely associated with the severity of BPD symptoms (Regier et al., 2013; Zanarini et al., 2006) and BPD frequently co-occurs with Posttraumatic Stress Disorder (Pagura et al., 2010). Notably, patients with a dual diagnosis often continue to meet the criteria for BPD even after their PTSD has gone into remission, and they are also at a higher risk of developing PTSD again later in life (Ford & Courtois, 2021). A predisposition to dissociation may be a key factor linking these two disorders. However, the precise mechanisms connecting dissociative detachment symptoms and other BPD symptoms to traumatization remain unclear.

Besides a PTSD diagnosis, self-harm including self-injury, suicide attempts, and suicidal ideation show an association with dissociation across various psychiatric disorders, which is particularly prominent in individuals with BPD (Calati et al., 2017; Perez et al., 2020; Sommer et al., 2021). Dissociation might adopt a mediating role between trauma and non-suicidal self-injury (NSSI; Rossi et al., 2019) as traumatization co-occurs with difficulties in regulating emotions, leading to heightened and prolonged states of inner tension in BPD, which could drive self-harming behaviours. Childhood trauma has been associated with intense emotional pain and low self-compassion (Dye, 2018; Pohl et al., 2021). This implies that dissociation could play an important role

in regulating and/or experiencing emotions, and self-harm might be an attempt to deal with dissociative experiences (Reitz et al., 2015). Integrating these findings into a cohesive theoretical framework, we assume that individuals may develop dissociation as a coping mechanism, particularly for situations experienced as traumatic, which allow them to detach from overwhelming and unbearable inner psychological states. This detachment can further complicate self-regulation process, leading some individuals to engage in self-harm or other dysfunctional behaviour as a way to cope with these distressing feelings and reclaim a sense of control over their bodies and emotions. Moreover, self-harm could serve as a temporary relief from emotional numbness and feelings of detachment which are particularly prominent in BPS (Krause-Utz et al., 2021), providing a brief reconnection to their physical self and emotions. Understanding how these factors interconnect could help in developing effective therapeutic interventions. However, the relationship between BPD features, childhood trauma, and dissociation is only sparsely understood. Moreover, there is a lack of research on how self-injury and other self-harm patterns such as suicidal ideation and suicide attempts relate to dissociation (Rossi et al., 2019).

Psychotherapeutic interventions are the gold standard for the treatment of patients with BPD (Storebø et al., 2020) focusing on the reduction of dysfunctional behaviours such as self-harm, with Dialectic Behavioural Therapy (DBT) emerging as a particularly successful therapeutic approach in this regard (DeCou et al., 2019). Understanding and focusing on traumatic invalidation as a form of emotional abuse is considered a crucial element of DBT (Linehan, 1993). Investigating the impact of dissociation on therapy outcomes in BPD, Kleindienst et al. (2011) found that high trait dissociation was related to poorer follow-up improvement 1 month after discharge from a 3-month inpatient DBT programme. Another study with a small sample (N = 24) investigated the influence of state and trait dissociation on the therapeutic outcome directly after discharge of a 3-month outpatient DBT programme designed for the treatment of patients with posttraumatic stress disorder (PTSD). Whereas the therapeutic outcome (PTSD symptoms) was negatively influenced by state dissociation, no association emerged between trait dissociation and the effectiveness of psychotherapy (Kleindienst et al., 2016). A meta-analysis examining 21 primary treatment studies in PTSD found no evidence that trait dissociation is associated with reduced effectiveness of psychotherapeutic interventions (Hoeboer et al., 2020). This implies that the definition of dissociation as well as the assessment time point need to be considered when investigating the effect of dissociation on psychotherapy. Moreover, a randomized controlled trial showed a large and significant drop in both the intensity and duration of dissociative symptoms during DBT (Kleindienst et al., 2021).

1.1. Study aim and hypotheses

This study aims to shed light on dissociative symptoms in patients with BPD that participated in a certified inpatient DBT programme. Our first aim is to explore, how dissociative symptoms in patients with BPD interact with other BPD symptoms using both self-reports and a clinical interview at a cross-sectional level. This analysis also examines the association of these symptoms with demographic and health characteristics, as well as broader psychopathology. Furthermore, the study delves into the relationships between self-harm patterns, traumatic childhood experiences, and dissociative symptoms through network analysis, providing a more detailed understanding of how these factors might be interconnected. Our second aim is to investigate the influence of trait dissociation on the pre-to-post-treatment improvement and on 3- and 6-month follow-up outcomes of the inpatient DBT programme.

2. Methods

Data were collected as part of a naturalistic study conducted at the Department of Psychiatry and Psychotherapy III of Ulm University Clinic to evaluate the inpatient DBT programme. The OSF preregistration document provides further details about the study (https://osf.io/dfq9y/?view_only=4c19b891bb6448009b22f60b2552bd73). Eight to twelve patients (age > 18) pass through the programme in 8–10 weeks with DBT group therapy (270 min per week: mindfulness, emotion regulation, distress tolerance, interpersonal skills, education regarding BPD) and individual therapy (two sessions: 30 and 50 min/week).

2.1. Sample

All patients diagnosed with BPD who took part in the Inpatient DBT programme between January 2021 and June 2023 were eligible for the study, only one participant declined to participate. Figure 1 illustrates the participant flow through the response rates for the assessments upon admission (T0), discharge (T1), and 3 (T2), and 6 months (T3) after the end of therapy. A total of 131 patients provided written informed consent in accordance with the Declaration of Helsinki and the study has been carried out in accordance with ethical guidelines. Diagnoses of BPD were confirmed by a trained psychiatrist using the semi-structured 'International Personality Disorder Examination' for ICD-10 (IPDE, Loranger et al., 1997). All participants analysed at discharge and follow-up completed at least 2 weeks of the inpatient DBT programme, including the behavioural analysis at the beginning of the DBT programme to analyse problematic behaviours. Mean duration of treatment was 51.4 days (SD = 18.69) with

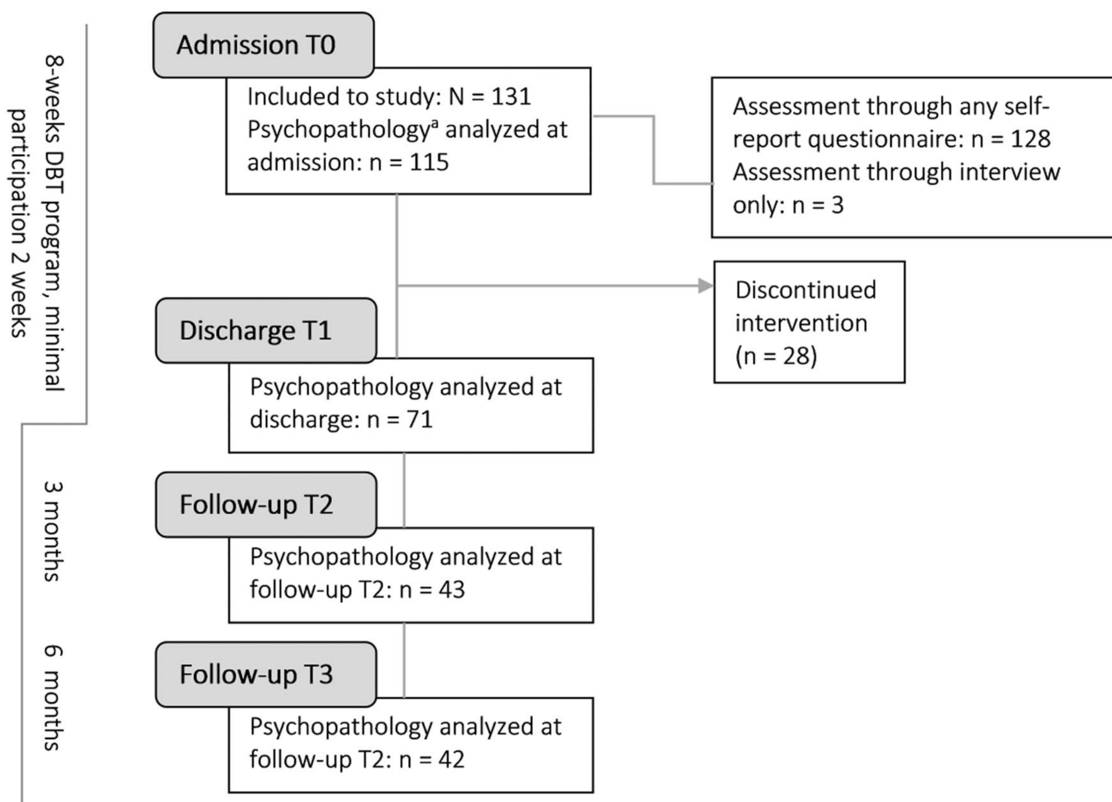

Figure 1. Participant flow chart.

a dropout rate of 21.4% ($N = 28$) after a mean treatment duration of 24.7 days ($SD = 18.13$) in the DBT programme (T1). Most of the study participants were female ($N = 114$, 87%), followed by male ($N = 14$, 10.7%) and transgender participants (female-to-male; $N = 3$, 2.3%). The mean age at study entry was 26.2 years ($SD = 8.82$ years, range: 18–61). 86.3% ($N = 113$) of the sample had at least one further psychiatric diagnosis, with Depression and Posttraumatic Stress Disorder representing the most common comorbid diagnoses according to ICD-10. Patients were additionally treated with medication, mainly antidepressants to address affective symptoms and sleep disorders. After the exclusion of patients with incomplete questionnaires or too many missing data, 106 patients could be included into the analyses of effects of trait dissociation on symptom reduction.

2.2. Instruments

Three self-report instruments were administered at baseline (T0), the end of treatment (T1), 3- and (T2) 6-month (T3) follow-up to investigate psychopathology and its changes: General psychological distress was evaluated using the Global Severity Index of the German 90-item version of the Symptom Checklist-90-Revised (SCL-90-R; Franke, 2000). Current depressive symptoms were measured with the German version of Beck's Depression Inventory, second edition (BDI-II, Hautzinger et al., 2006). To assess BPD symptoms in the past week, we included the short version of the German Borderline Symptom List (BSL-23; Bohus et al., 2009), which comprises 23 items.

Furthermore at baseline, participants completed the German adaption of the Dissociative Experiences Scale, second version with 28 items (DES-II; Freyberger et al., 1998), the German short form of the childhood trauma questionnaire with 28 items (CTQ; Bernstein et al., 2003; Wingenfeld et al., 2010), and a subset of questions from the Indicators of Rehabilitation Status (IRES-3; Bührlen et al., 2005) questionnaire to assess indicators of quality of life. The DES-II is a well-established, self-report inventory to measure trait dissociation by asking about the degree of agreement from 0% to 100% regarding 28 statements. It provides a total score and three subscales: amnestic dissociation (1), absorption/imaginative involvement (2), and depersonalization/derealization (3). Utilizing a cut-off-score of 20 (Steinberg et al., 1991), we aimed to distinguish individuals with mild/severe (≥20) levels of dissociation from individuals with low (<20) dissociation. The CTQ enables participants to rate the incidence and severity of traumatic childhood and adolescence experiences (<18 years) on five dimensions including emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical

neglect. Including three questions screening for the likelihood of underreporting traumatic experiences, 28 questions are asked using a 5-point Likert scale ('never true' [1] to 'very often true' [5]). The IRES-3 was developed and validated in Germany to collect information about health-related quality of life with 144 items (Bührlen et al., 2005). In this study, 14 selected items were assessed to investigate subjective health, social support and professional activity of which three are presented in Table 1.

Psychologists holding a master's degree or trained students of medicine in a higher semester (>6th semester) conducted a clinical interview with study participants at T0. Six relevant topics were covered: employment, medical and therapeutic pretreatment, dissociation (existence of dissociative symptoms, frequency of dissociative symptoms, daily constraints due to dissociative experiences; explanation of dissociation: see supplements), substance abuse, other dysfunctional behaviour (i.e. risky behaviour), and self-harm (number of self-injuries during the last year, lifetime self-injuries, frequency of suicidal ideation during the past 6 months, lifetime suicide attempts, age of first suicide attempt).

2.3. Statistical analyses

Data processing and statistical analyses were performed using Rstudio Version 4.3.1 (R Core Team, 2023). Missing values were treated according to the guidelines of the respective test psychological manuals. We did not replace missing data of individuals at follow-up assessments. If patients indicated a range of values in the clinical interview, we used the mean value. The threshold of statistical significance was set to $p < .05$.

2.3.1. Trait dissociation and sociodemographic variables/psychopathology

Differences between patients with mild/severe trait dissociation (DES $\geq$ 20) and low trait dissociation (DES < 20) were analysed with independent two-sided *t*-tests for continuous variables and *chi*-square tests for categorical variables. We applied robust *t*-tests with 20% trimmed means using the R-package 'WRS2' (Mair et al., 2022) for data violating testing assumptions and report robust test results if we found differences in statistical significance.

2.3.2. Exploratory network analysis

A Gaussian Graphical Model (Lauritzen, 1996) was used to conduct a cross-sectional network analysis including (1) the three DES subscales (amnestic dissociation, imagination/absorption, depersonalization/derealization), (2) the five subscales of the CTQ (emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect), and (3) four measures of self-harm (lifetime self-injury, self-injuries during the last year, suicidal ideation during the last 6 months, lifetime suicide attempts). Since the self-harm variables did not follow a normal distribution, we used Spearman correlations for the analysis. Missing values were replaced with multiple imputations using the R package 'mice' (van Buuren & Groothuis-Oudshoorn, 2011). Accuracy and stability estimations were carried out as follows: 95% confidence intervals (CIs) of the edge weights were obtained through bootstrapping (1000 iterations), and the correlation stability coefficient (CS) for centrality indices was estimated with values exceeding 0.5 implying adequate stability (Epskamp & Fried, 2018). Detailed information about network stability is described elsewhere (Epskamp & Fried, 2018).

2.3.3. Effect of dissociation on immediate and follow-up therapy outcomes

To investigate a selection bias, we compared follow-up responders (T2, T3) to non-responders and compared their psychopathology (SCL-90, BDI-II, BSL) and the DES sum score at baseline using independent two-sided *t*-tests. Linear mixed-effect models were used to estimate the mean change of psychopathology (GSI SCL-90, BDI-II sum score, BSL mean sum score) depending on the assessment time point, comparing baseline (T0) to each follow-up (T1, T2, T3) in a first step to analyse whether the DBT programme was effective on its own (Model 1). In the second step (Model 2), we included dissociation (DES sum score; continuous variable) and the dissociation by time interaction (T1, T2, T3) as fixed effects into the models. We computed a third model (Model 3) that incorporated the relevant psychopathological factors at baseline, given the significance of baseline symptom severity as a predictor of treatment outcome (Barnicot et al., 2012). The models were analysed via the 'lme4' R-package (Bates et al., 2018) and included random intercepts for participants. We applied 1000 resamples of bootstrapping with bias-corrected and accelerated confidence intervals (BCa CIs) for unstandardized beta values to provide robust statistics (Mason et al., 2021).

3. Results

3.1. Trait dissociation and sociodemographic variables

81% ($N = 104$) of the participants indicated during the interview (T0) that they had experienced a dissociative episode before. 52% ($N = 65$) of participants reported daily constraints due to dissociative states. Patients experienced on average 3.39 ($SD = 3.47$) dissociative episodes per week. The mean DES score at baseline was 26.63 ($SD = 19.32$). Around 55% ($N = 58$) of the

Table 1. Demographic and health characteristics such as psychological distress of patients scoring mild to severe (DES ≥ 20) vs. low (DES < 20) in trait dissociation.

	DES < 20 (*N* = 48)	DES ≥ 20 (*N* = 58)	t/X^2	*p*	Cohen's *d*/*V* [95%CI]
Demographic characteristics					
Age [*M* (*SD*)]	30.27 (9.92)	23.33 (6.94)	4.23	<.001***	0.82 [0.42, 1.23]
Female [*N* (%)]	41 (85.42)	52 (89.65)	0.45	.797 ns	0.06 [0.01, 0.26]
Unmarried [*N* (%)]	39 (82.98)	50 (94.34)	3.28	.070 ns	0.18 [0.01, 0.36]
Higher education [*N* (%)]	13 (27.66)	16 (28.07)	0.01	.963 ns	0.01 [−0.04, 0.19]
Unemployed, past 6 months [*M* (*SD*)][b]	0.73 (1.25)	1.30 (1.49)	−2.03	.045*	−0.41 [−0.82, −0.01]
Health characteristics					
Illness (days), past 6 months [*M* (*SD*)] [b]	59.88 (78.50)	100.54 (87.16)	−2.09	.039*	−0.49 [−0.96, −0.02]
Life satisfaction, past 4 weeks [*M* (*SD*)] [b]	1.60 (1.28)	1.62 (1.19)	−0.07	.937 ns	−0.02 [−0.42, 0.38]
Drop out of current inpatient treatment	13 (27.08)	10 (17.24)	1.30	.254 ns	0.11 [−0.03, 0.28]
Number of comorbid diagnoses [*M* (*SD*)]	1.40 (0.94)	1.64 (0.99)	−1.29	.202 ns	−0.25 [−0.64, 0.13]
• Posttraumatic Stress Disorder [*N* (%)]	8 (16.67)	30 (51.72)	14.04	<.001***	0.36 [0.19, 0.53]
• Depression [*N* (%)]	33 (68.75)	40 (68.97)	0.01	.981 ns	0.01 [−0.04, 0.20]
• Substance Use Disorder [*N* (%)]	11 (22.92)	9 (15.52)	0.93	.332 ns	0.09 [−0.04, 0.27]
Lifetime Alcohol abuse [*N* (%)]	24 (51.06)	38 (65.52)	2.24	.134 ns	0.15 [−0.02, 0.33]
Lifetime Drug intake [*N* (%)]	25 (53.19)	45 (77.59)	6.95	.008**	0.26 [0.07, 0.45]
Risky behaviour past 6 months [*N* (%)]	23 (48.94)	47 (81.03)	12.04	<.001 ***	0.34 [0.15, 0.52]
Suicidal ideation past 6 months [*M* (*SD*)]	3.92 (2.73)	3.88 (2.50)	0.07	.941 ns	0.01 [−0.41, 0.44]
Nr. of Lifetime self-injury [*M* (*SD*)] [a]	58.26 (42.86)	382.5 (340.40)	3.19	.003* [a]	0.48 [0.28, 0.89]
Nr. of self-injury past year [*M* (*SD*)]	32.19 (61.09)	92.38 (157.78)	−2.42	.018*	−0.48 [−0.89, −0.08]
Age first suicide attempt [*M* (*SD*)]	22.52 (9.86)	15.86 (2.95)	3.88	<.001***	0.98 [0.48, 1.52]
Nr. of suicide attempts [*M* (*SD*)]	2.51 (4.31)	2.86 (4.27)	−0.52	.604 ns	−0.10 [−0.50, 0.29]

Note: Effect size *d* according to Cohen: small effect *d* = 0.2, medium effect *d* = 0.50, large effect *d* = 0.80 (Cohen, 1988**). Cramer's *V* with *df* = 1: small effect *V* = 0.10, medium effect *V* = 0.30, large effect *V* = 0.50. Higher education: Degree that entitles one to study (at least 12 school years). Unemployed past 6 months: ranges from 0–4 (0 = 'never', 4 = '3–6 months'). Life satisfaction past 4 weeks: ranges from 1–7 (1 = 'completely unsatisfied', 7 = 'completely satisfied'). Nr. = number. Alcohol abuse: Ever had more than 5 alcoholic beverages. Drug abuse: Ever taken any drugs. Risky behaviour includes for instance speeding or other unsafe driving, unprotected sex or sex with strangers, binge eating. Suicidal ideation past 6 months: Frequency per week.
[a]Shows results of the robust *t*-test with 20% trimmed means as testing assumptions were violated and statistical significance differed from traditional *t*-test results. Descriptives show trimmed means and standard deviations.
[b]Items of the IRES-3 – questionnaire about health-related quality of life. Unemployed, past 6 months: Higher values indicate a longer duration of unemployment (1 = never, 2 = up to 1 month, 3 = 1–3 months, 4 = 3–6 months).
* Indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$. ns = not significant.

sample had a DES score above 20 ($M = 40.38$, $SD = 15.53$), and 37.7% ($N = 40$) exhibited a DES score above the proposed cut-off of 30 for clinically relevant dissociation. Table 1 displays demographic and health characteristics of patients scoring above and below the DES cut-off of 20 ($M = 10.01$; $SD = 5.13$). Patients with a DES score ≥ 20 stated a mean of 1.05 ($SD = 1.18$) dissociative episodes per week whereas patients with a DES score < 20 experienced 3.24 ($SD = 2.17$; $t = 3.23$, $p = .002$) episodes.

3.2. Exploratory network analysis

Figure 2 shows the estimated network of dissociation (DES-II subscales), childhood traumatization (CTQ subscales), and self-harm (clinical interview) (see Table S1 for descriptives). Out of the possible 66 pairwise associations, 23 (35%) resulted in non-zero edges, that were all positively related to each other. The strongest edges emerged within the subscales 'absorption/imaginative involvement' (DES2) and 'depersonalization/derealization' (DES3) for the category dissociation, between the assessments for 'number of self-injuries during the last year' (SH1) and 'lifetime self-injuries' (SH2) for the category self-harm, and between the subscales 'physical abuse' (CTQ3) and 'physical neglect' (CTQ5) for the category childhood traumatization.

The association between the symptom categories dissociation and childhood traumatization was low and primarily emerged for the subscales 'absorption/imaginative involvement' (DES2) and 'emotional abuse' (CTQ1). The 'frequency of suicidal ideations' (SH3) was merely linked to 'sexual abuse' (CTQ3) and 'self-injury during the past year' (SH1) and thus only loosely integrated in the network. The 'number of suicide attempts' (SH4) showed a connection to 'emotional abuse' (CTQ1) and was only indirectly linked to dissociation via 'lifetime self-injury' (SH2). 'Lifetime self-injury' (SH2) and 'self-injury during the past year' (SH1) show a direct connection to 'derealization/depersonalization' (DES3). The variables 'absorption/imaginative involvement' (DES2), 'depersonalization/derealization' (DES3), 'emotional abuse' (CTQ1), and 'physical neglect' (CTQ5) were the most central variables in terms of strength indicating that these symptoms have strong direct connections to neighbouring symptoms. CTQ1, CTQ3 and CTQ5 were most central in terms of closeness indicating that these variables are quickly affected by other variables and vice versa, regardless of a direct connection. Moreover, DES2, SH2 and CTQ1 were most central in terms of betweenness pointing towards a meaningful function in connecting variables of the network and increasing the distance between many variables if dropped out. The strength metric and

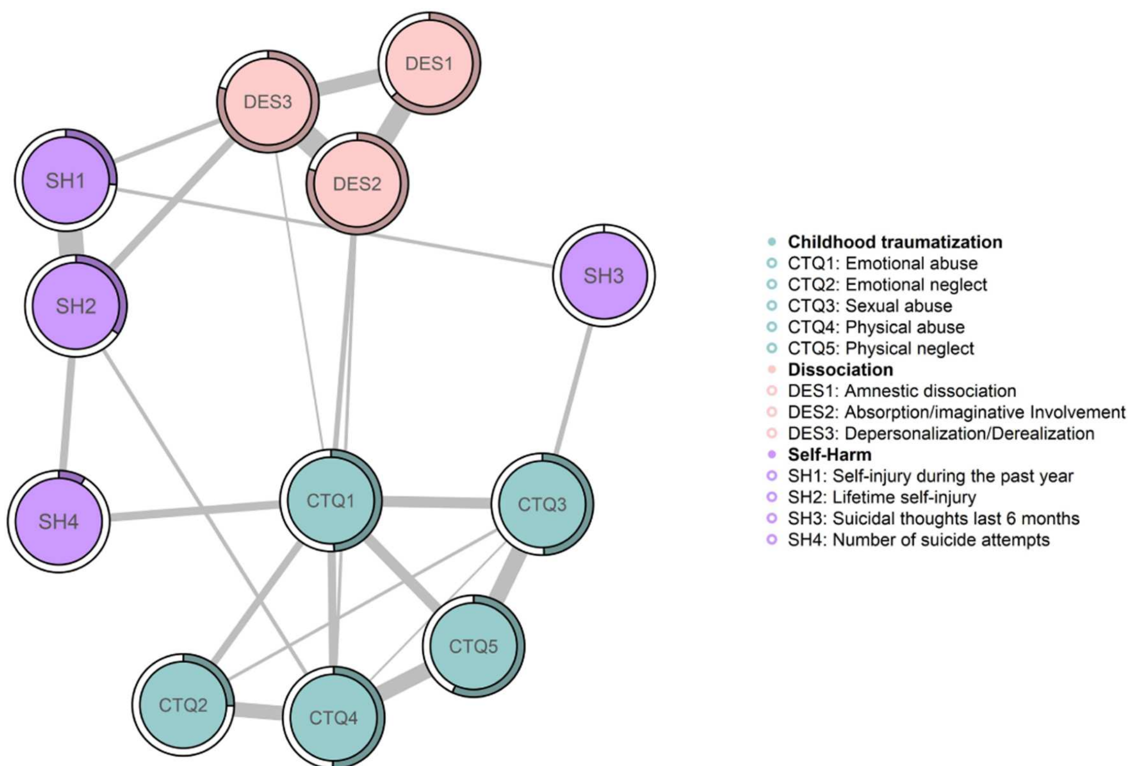

Figure 2. Estimated regularized partial network of variables representing the three symptom/aetiology categories dissociation, childhood traumatization, and self-harm (nodes) using Spearman correlations. Solid lines (edges) show positive associations (partial correlations) between these nodes. As spurious connections might arise and cause problems in terms of the network interpretability the 'least absolute shrinkage and selection operator' (LASSO; Friedman et al., 2008) was implemented to shrink small edges to zero. The tuning parameter (λ) was set by applying the Extended Bayesian Information Criterion (EBIC). The thickness and saturation of edges are an indicator for the strength of the associations between symptoms quantified with strength centrality metric using the most common aspects of centrality: Strength (i.e. how strongly a node is directly connected to other nodes), Closeness (i.e. the average distance of a node to all other nodes in the network), and Betweenness (i.e. number of times a node lies on the shortest path between any two other nodes) (Hevey, 2018). The grey area in the rings around the nodes depicts predictability; the variance of a given node is explained by all its neighbours (Haslbeck & Fried, 2017).

their stability is reported in the Supplements (Figure S1). The average predictability of nodes was 0.44, indicating that on average 44% of the variation in one node is explained by its direct neighbouring nodes. The highest predictability within our categories was found for DES2 (80%), CTQ5 (57%), and SH2 (34%).

The correlation stability coefficient (CS; i.e. number of cases that can be dropped from the sample to retain, with 95% probability, a correlation of at least 0.7) for the strength centrality metric exceeded the recommended cut-off of 0.5 (CS = 0.60) suggesting a reliable estimation. The confidence intervals around the edge weights were large and most of the confidence intervals overlapped, indicating that their order should be interpreted with caution (Figure S2). Bootstrapped difference tests between edges indicated no significant differences between edges of self-harm variables and childhood traumatization or dissociation compared to other node edges of the network (Figure S3). Bootstrapped difference tests for strength showed that the most central variables (DES2, DES3) revealed a significantly higher strength than SH1, SH3, and the SH4 but not SH2. CTQ1 and CTQ5, which were also high in their strength had significantly greater strength than SH1, SH3, but not SH1, SH2 (Figure S4).

3.3. Effect of dissociation on immediate and follow-up therapy outcomes

We found no significant differences in psychopathology between responders to follow-up (T2, T3) and non-responders (SCL-90, BDI-II and BSL: $p > .005$), but trait dissociation at baseline was significantly lower in follow-up responders ($n = 32$; $M = 20.03$, $SD = 12.87$) than in non-responders ($n = 73$; $M = 29.69$, $SD = 21.03$; $t = 2.88$; $p = .005$). We found a significant reduction in the SCL-90, BDI, and BSL-23 scores at all measurement time points (T1, T2, T3) compared to baseline, except for the BSL-23 three months after the DBT programme (Model 1), which generally supports the effectiveness of our DBT programme (Tables S2–S4).

3.3.1. General psychological distress, SCL-90

Figure 3 illustrates the predictions of Models 2 and 3, which examine the influence of dissociation on treatment outcomes at discharge and follow-up

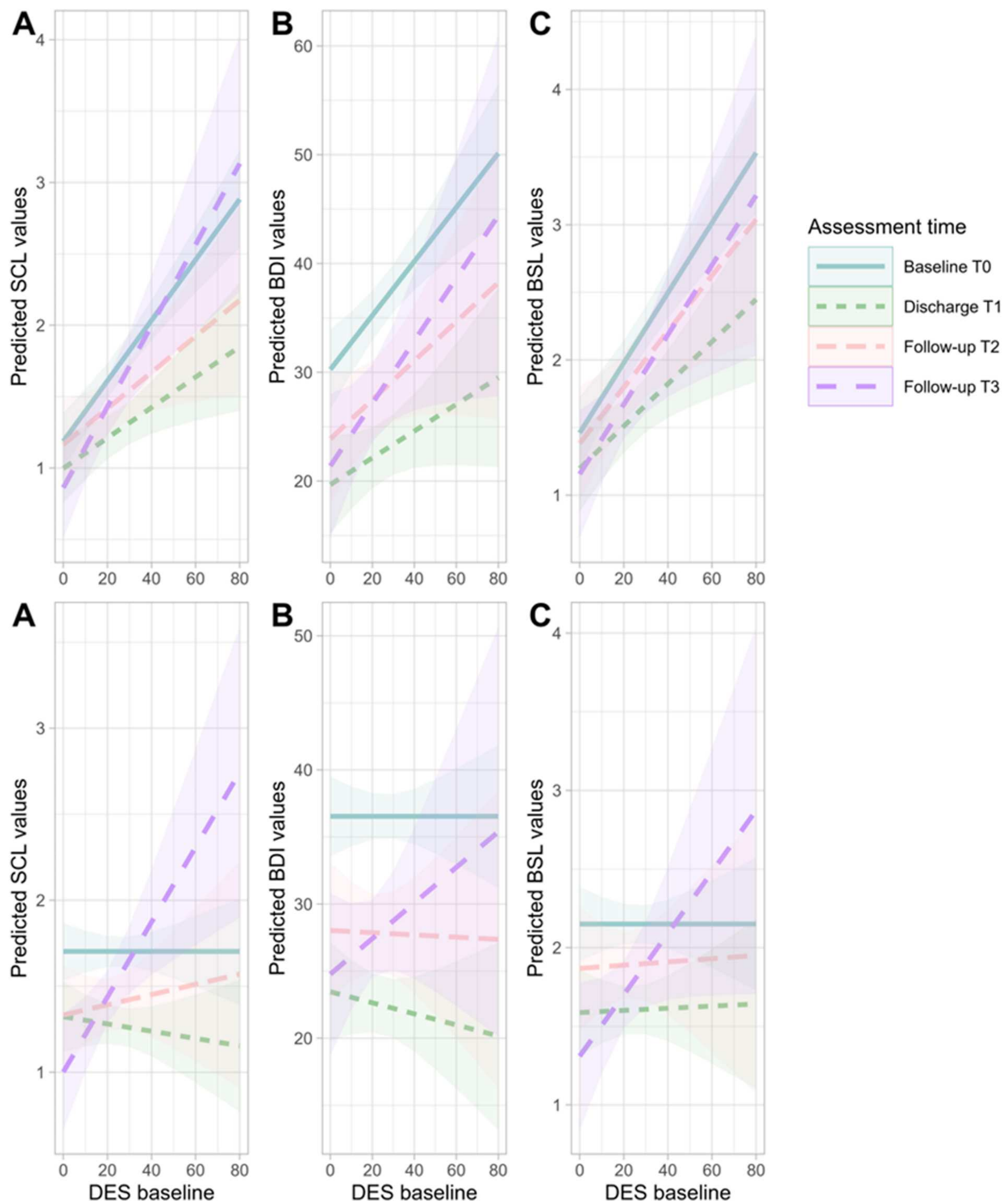

Figure 3. The upper figures illustrate predictions of Model 2 which examine the influence of dissociation on treatment outcomes (psychopathology ~ trait dissociation *assessment time) and the lower figures represent Model 3, accounting for the baseline symptom burden (depression ~ trait dissociation *assessment time + baseline symptom severity*assessment time) for general psychological distress (SCL-90; A), depression (BDI-II; B), and borderline-specific symptoms (BSL; C). Upper Figures (Model 2) show that dissociation maintains a robust significant correlation with all the psychopathology variables throughout all assessment time points. The association between trait dissociation and various levels of psychopathology appears most pronounced during the 6-month follow-up (T3), while it becomes less conspicuous upon discharge after DBT (T1). The lower figures (Model 3) reveal that psychopathology at the 6-month follow-up (T3) tends to be higher in patients with elevated trait dissociation levels at baseline, while it does not exert an impact on the level of depression at discharge (T1) and subsequent follow-up assessments (T2, T3).

assessments. Including the DES score and the DES score by assessment time interaction (Model 2) showed that there was a large effect of higher DES scores on higher SCL-90-R GSI scores ($\beta = 0.54$, 95% CI [0.39, 0.69], $b = 0.02$, BCa CI 95% [0.02, 0.03], $p < .001$), independent of the assessment time point. Follow-up SCL-90-R GSI scores (T1, T2, T3) did not significantly differ from the baseline score controlling for the DES score. We found a significant interaction between the DES score and the end of treatment, T1

($\beta = -0.27$, 95% CI [−0.47, −0.06], $b = -0.01$, BCa CI 95% [−0.02, 0.00], $p = .008$), indicating that the DES score had a lower influence on the SCL-90-R GSI score at T1 as compared to the baseline measure, although it was not substantiated by the BCa CI. There was no significant interaction between the DES score and the assessment time points T2, T3 (Table S5). The inclusion of baseline symptom burden (Model 3, Table S8) showed that higher baseline psychopathology is associated with greater reductions in SCL-90 scores over time at T1, T2, and T3. Moreover, Model 3 revealed a significant interaction of dissociation and the follow-up after 6 months: Those patients with high trait dissociation at the beginning of therapy had higher SCL scores at T3 indicated by a large effect ($\beta = 0.56$, 95% CI [0.18, 0.94], $b = 0.02$, BCa CI 95% [0.01, 0.04], $p = .006$).

3.3.2. Depression, BDI-II

Including the DES score and its interaction with the assessment time point (Model 2) showed that higher DES scores were associated with higher BDI-II scores supported by a medium effect ($\beta = 0.34$, 95% CI [0.19, 0.49], $b = 0.25$, BCa CI 95% [0.12, 0.36], $p < .001$), independent of the assessment time point. Follow-up BDI-II scores (T1, T2, T3) did significantly differ from the baseline measure even when controlling for the DES score, but none of the interactions of the DES score with the assessment time point was significant (Table S6). Including baseline symptom burden showed that higher psychopathology at the beginning of therapy was associated with lower BDI scores at T1 and T3. Dissociation did not significantly interact with any of the assessment time points, indicating that high trait dissociation before therapy (T0) did not influence depressive symptoms at discharge and follow-up (Table S9).

3.3.3. Borderline-specific symptoms, BSL-23

The model including trait dissociation (Model 2), shows that higher DES scores strongly predict higher BSL-23 scores ($\beta = 0.51$, 95% CI [0.35, 0.66], $b = 0.03$, BCa CI 95% [0.02, 0.03], $p < .001$). Borderline-specific symptoms at T1, T2 and T3 did not differ from T0 when controlling for trait dissociation. None of the assessment time points (T1, T2, T3) exhibited a significant interaction with the DES score; however, our data suggested a slight decrease in the influence of dissociation on borderline symptoms throughout therapy (DES × Assessment time T1; Table S7). Baseline symptom burden (Model 3) significantly interacted with the improvement at T1, and T3, showing that those patients with higher psychopathology before therapy experienced a greater symptom reduction. DES scores significantly interacted with the improvement at T3, indicating that high trait dissociation predicts higher psychopathology 6 months after therapy ($\beta = 0.38$, 95% CI [−0.02, 0.79], $b = 0.02$, BCa CI 95% [0.01, 0.04], $p = .044$) (Table S10).

Detailed information about linear mixed-effects models is presented in the supplementary material (Table S2–Table S10).

4. Discussion

The present study aimed to shed light on the role of trait dissociation in BPD. We examined demographic and core health characteristics of patients scoring mild/severe vs. low in trait dissociation and explored relations between self-harm, childhood trauma, and trait dissociation. Additionally, we investigated how trait dissociation influences psychotherapeutic treatment effects at discharge, and 3-and 6-month follow-up measures of an inpatient DBT programme. We found that high trait dissociation is associated with various adverse health outcomes and that there exist tight associations of self-injury with trait dissociation, while suicidality seems to be more closely linked to childhood traumatization. We found no evidence that trait dissociation negatively affects DBT treatment; however, trait dissociation might predict reduced medium-term benefits of DBT in terms of greater general psychological distress and more borderline-specific symptoms, regardless of the baseline symptom burden.

Our findings are consistent with studies suggesting that depending on the definition of dissociation, one-third to one-quarter of BPD patients experience significant dissociative phenomena (Spitzer et al., 2021). The variability of prevalence rates likely results from the various definitions of dissociation, as flashbacks, amnesia, emotional numbness, and analgesia can be defined as dissociative phenomena in BPD (Krause-Utz et al., 2017), while other definitions focus on feelings of alienation, such as derealization or depersonalization, which might be particularly relevant in the context of BPD (Sar et al., 2017). Patients with elevated trait dissociation (DES ≥ 20) were younger, more frequently unemployed or on sick leave during the half year before therapy and reported more risky behaviour and drug intake. In patients with elevated trait dissociation, the diagnosis of a PTBS, lifetime self-injury and self-injuries during the past year were more frequent compared to the participants with lower scores, whereas we did not find more frequent comorbid depression or alcohol abuse. Age at first suicide attempt was markedly lower in the DES ≥ 20 group than in the DES < 20 group. This is in line with previous research showing that dissociation relates to adverse health outcomes and increased symptom burden (Jaeger et al., 2017; Sommer et al., 2021; Spitzer et al., 2021). Notably, findings are in line with Schäfer et al. (2010) showing that compared to mere alcohol abuse, especially drug intake relates to

dissociation. In addition, the authors pointed towards the link between younger age and dissociation, suggesting that drug abuse might be prevalent in younger individuals affected by childhood trauma, particularly emotional abuse. Unemployment and sickness before therapy might relate to other findings showing that patients suffering from dissociative disorder struggle with concentrating and engaging in goal-directed behaviours (Nester et al., 2022). Moreover, dissociation may contribute to emotion regulation difficulties, or the reverse, potentially leading to self-harm and other risky behaviours, both of which can sustain psychopathology (Nester et al., 2022). Interestingly, we did not find a difference in life satisfaction between individuals with mild/severe trait dissociation and those with low trait dissociation. An association between reduced quality of life and dissociative symptoms was, however, suggested previously (Prasko et al., 2016) when employing more objective assessment methods related to life quality. Mere subjective assessments as used in our study might be biased by dissociative experiences themselves, that might impair interoceptive processes (Cavicchioli et al., 2021).

Previous studies making use of the network approach found associations between sexual abuse and self-injury in a nonclinical sample (Misiak et al., 2023) as well as a connection between self-injury and dissociation in a sample of mental health services users (Fung et al., 2023). In our study, particularly emotional and sexual abuse such as physical neglect emerged as central nodes, highlighting their significant roles in the aetiology of BPD. Accordingly, a previous network analysis revealed emotional abuse as the most central node connecting other types of childhood trauma to BPD characteristics (Schulze et al., 2022). This discovery aligns with early theories of BPD, emphasizing the role of sexual abuse in its development, as well as Linehan's well-known assertion regarding 'invalidating environments' as a key component in the aetiology of BPD (Winsper, 2018). Addressing traumatic invalidation as a very common form of emotional abuse is crucial in DBT, which therefore focuses on validating individual's emotions and experiences (Linehan, 1993). The central role of emotional abuse in the network might explain part of the strategies success.

Identity disturbance which might arise when dissociation significantly impairs an individual's ability to harmonize mental functions (Boon et al., 2013) hereby linking emotional abuse to affective instability as a core BPD symptom (Schulze et al., 2022). A meta-analysis investigating individuals who experienced childhood trauma found the highest dissociation scores in those who experienced sexual and physical abuse and assumed that the violation of bodily integrity is extremely threatening to survival from an evolutionary perspective (Vonderlin et al., 2018). Moreover, sexual and physical aspects of traumatization could impair body–mind connectivity which affects emotional regulation (Schmitz et al., 2021). However, childhood traumatization in our study exhibited a weak connection to dissociation with only emotional abuse being linked to absorption/imaginative involvement. This might support theories of a multifaceted genesis of the propensity for dissociation involving emotion dysregulation, sleep, alexithymia, negative affect, impulsivity, and neuroticism (Aksen et al., 2021).

Our finding that dissociation, especially derealization/depersonalization, is associated with lifetime self-injury and self-harm during the past year replicates a previous study with college students (Brickman et al., 2014), showing that dissociation is significantly related to the frequency of self-injury. Additionally, the indirect link between self-injury and emotional abuse through dissociation aligns with results by Perez et al. (2020), indicating that dissociation moderates the correlation between fathers' invalidating behaviours and self-injury. The finding may support theories that one purpose of self-injury may be to alleviate dissociative experience and distress stemming from traumatic childhood experiences, suggesting that childhood traumatization may underlie certain self-injury behaviours (Briere & Gil, 1998). However, the still relatively modest correlation between dissociation and self-injury underscores the necessity to identify additional variables that contribute to self-harm, as done in Brickman et al.'s study (2014) where impulsivity, chronic emptiness, and identity disturbance were revealed as predictors for self-injury. In our network analysis, lifetime self-injury was the best predictor for self-injury during the last year which is in line with Fox et al. (2015). Moreover, we could confirm a connection of suicide attempts and self-injury. Interestingly, suicidal behaviours were not directly associated with dissociation in the network analysis, but emotional and sexual abuse. Previously described associations between dissociation and suicide attempts (Calati et al., 2017; Sommer et al., 2021) may thus be mediated by third-party variables like emotional abuse, lifetime self-injury or other symptoms, with depression potentially playing a crucial role (Bertule et al., 2021).

While we found a link between suicide attempts and self-injury, suicidal ideation showed only low associations to other variables of the network, but was directly linked to sexual abuse. The mere cognitive nature of suicidal ideation as a strategy to regain a sense of control (Bertule et al., 2021) over various symptoms, might set it aside from actual self-harm actions regarding regulating dissociation.

The robust and strong connection between dissociation and heightened psychopathology including general psychological distress, depression, as well as borderline-specific symptoms is concordant with the

transdiagnostic perspective of dissociation (Ellickson-Larew et al., 2020). The strong correlation between dissociation and mental health issues may stem from its influence on fundamental psychological processes, such as cognition, emotions, and interoception. Moreover, dissociation co-occurs with avoidance behaviour which has been suggested as a basic mechanism perpetuating psychopathology (Cavicchioli et al., 2021; Ellickson-Larew et al., 2020).

Opposed to dissociative phenomena, psychotherapy aims to integrate the affective, cognitive behavioural and physiological system within a person, which also sheds light on our and other studies, showing that trait dissociation might exert a negative impact on long-term psychotherapeutic treatment outcomes (Zanarini et al., 2011). However, trait dissociation did not impair the immediate effects of DBT in the studied sample. As dissociation was classified as therapy-damaging behaviour in our programme, patients were regularly encouraged to perform behavioural analyses of situations with even mildly intense dissociative states and to use skills to counteract dissociative phenomena. This may have attenuated negative effects of dissociation on therapeutic outcomes. Moreover, individuals with high levels of dissociation may be more motivated to engage in the therapeutic process as they encounter increased distress. A study examining the impact of mentalization-based therapy in BPD supports this assumption, as it found that more dissociative symptoms heightened the probability of therapy completion (Barnicot & Crawford, 2019).

Thus, our findings might encourage focusing on strategies to deal with dissociation also in relapse prevention and in daily life in BPD patients with high trait dissociation. While there are some strategies and guidelines for addressing dissociation during therapy, only a few of the suggested methods specifically targeting dissociation are evidence-based (Brand et al., 2019). A strategy to enhance the effectiveness of DBT therapy for individuals with dissociative tendencies might involve a stronger emphasis on mentalization, a critical component of social cognition inversely linked to dissociative symptoms (Wagner-Skacel et al., 2022). Improvement of mentalization skills correlates with enduring therapeutic progress over the long-term (De Meulemeester et al., 2018) and dissociation might especially relate to internalizing psychopathology characterized by inward-focused experiences (Ellickson-Larew et al., 2020) that might be addressed with mentalization by getting a deeper understanding of own thoughts, emotions, and internal processes. On the other hand, more intense dissociation was linked with a higher frequency of PTSD diagnoses, so enhancing DBT with traumafocused strategies could also help to reduce dissociation (Bohus et al., 2020). Our inpatient DBT programme incorporates trauma-specific interventions, potentially explaining why dissociation did not adversely affect symptom reduction. Other psychotherapeutic treatment methods for dissociation include psychoeducation, self-monitoring, anti-dissociative techniques, and emotion regulation skills (Bohus et al., 2004, 2020; Brand et al., 2019; Zerubavel & Messman-Moore, 2015), whereas options for pharmacological treatment options remain limited (Sutar & Sahu, 2019).

Overall, our findings indicate that trait dissociation is associated with poorer health outcomes, increased self-harm, emotional abuse, and reduced follow-up effectiveness of DBT treatment. This raises questions about the relationships among these factors. We propose that dissociation hinders the inherent capacity to synthesize life experiences into a cohesive framework, which is crucial for nurturing a stable yet adaptable personality characterized by self-compassion (Boon et al., 2013). Specifically, impaired self-esteem, closely linked to traumatic invalidation as a key form of emotional abuse may lead to affective instability (Kockler et al., 2022) and increased dissociation, which could explain the association we found between emotional abuse and self-harm behaviour in our network analysis. When not learning to associate emotional states due to traumatic invalidation, dissociation may occur and lead to the creation of uncomfortable and uncategorizable psychological states by causing cognitive and emotional disturbances in an individual's awareness of their psychological states, increasing the likelihood of maladaptive coping strategies such as self-harm, risky behaviour, or substance abuse. These dysfunctional coping mechanisms can trigger negative emotions over the long term (Spitzer et al., 2015) and maintain blind spots regarding one's inner psychological states, perpetuating further maladaptive behaviours. This may also explain why individuals with a high symptom burden particularly benefit from DBT, as the programme specifically targets traumatic invalidation and seeks to modify dysfunctional behaviours. However, these individuals may experience worse medium-term outcomes as the initial treatment effects diminish.

4.1. Limitations and future research

Several limitations of this study need to be considered. First, we used a naturalistic study design with advantages regarding external validity and reduced risk of a reactivity bias but also the lack of a systematic control with clear disadvantages upon determining causalities. Future research could address this gap by investigating DBT treatment outcomes with systematic allocation to treatment groups considering dissociation. Second, in this study, we did not measure the probable influence of DBT treatment on state or trait dissociative symptoms and only assessed trait dissociation before therapy via questionnaire. In addition, the network analysis relies on cross-sectional

baseline data, which limits the ability to draw causal inferences. This design captures correlations at a single point in time rather than dynamic relationships, potentially obscuring the temporal nature of symptoms and behaviours. For a more comprehensive understanding of interacting symptoms, inclusion of repeated assessments of both trait and state dissociation would be feasible. Moreover, the multifaceted and intricate nature of dissociation, which lacks a precise and universally agreed-upon definition (Giesbrecht et al., 2008) remains a fundamental issue persisting in the investigation of this phenomenon. Third, our follow-up data are biased by the fact that responders to follow-up were characterized by significantly lower trait dissociation upon admission. Thus, the significance of our data on treatment success is limited regarding highly dissociative individuals, affecting the generalizability of our findings. Fourth, our dataset exhibited a relatively high number of missing values, which could introduce biases into the multiple imputation process we utilized to replace missing data in the network analyses.

5. Conclusion

Our study results emphasize the importance of focusing on dissociative symptoms in patients with BPD particularly regarding follow-up therapy outcomes. Treating dissociative symptoms could potentially mitigate self-harm patterns, particularly self-injury and in the context of early traumatization, dissociation and self-harm, focusing on emotional abuse might be particularly effective.

Disclosure statement

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

Generative artificial intelligence (AI) statement

This manuscript was enhanced for grammar and readability using OpenAI's ChatGPT (version January 2024). Generative AI was employed to refine language clarity and coherence without altering the scientific content.

Author note

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Data availability statement

The data or materials reported here are available on reasonable request from the corresponding author, the study was not preregistered.

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