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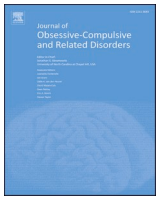

Exploring the Peaks and Potholes: Understanding positive and negative effects of concentrated exposure treatment for obsessive-compulsive disorder

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ABSTRACT

The Bergen 4-Day Treatment offers brief concentrated exposure with response prevention (cERP) for obsessive-compulsive disorder (OCD). To date, this intervention has primarily been studied in Norway, and no study has been done on its side effects. We tested the safety, feasibility, and effectiveness of cERP in Germany and compared cERP to a historical inpatient control group.

Thirty-three patients with OCD were treated with cERP. We assessed severity of OCD (primary outcome: Y-BOCS), depression, global functioning, self-esteem, self-efficacy, experiential avoidance, and quality of life at baseline (t0), two weeks after t0 (t1), and three months after t1 (t2). Side effects were assessed at t1 and t2. The changes in OCD were compared to a matched historical inpatient control group ($n = 33$) treated at the same site.

The cERP group improved over time, with a large effect size in OCD symptoms and other outcome measures. Improvement of OCD symptoms over treatment was superior in the cERP group compared to the historical control group, with a medium effect size for OCD symptoms. 53–56% of the participants reported at least one side effect (e.g., exhaustion). cERP is safe and effective in the treatment of OCD and can be successfully implemented in Germany.

1. Introduction

With an estimated lifetime prevalence of 1–3% (Fawcett et al., 2020; Kessler et al., 2012), obsessive-compulsive disorder (OCD) is a common mental disorder. It affects not only the people diagnosed with OCD (e.g., their quality of life, Coluccia et al., 2016; Hauschildt et al., 2010; Macy et al., 2013) but also their relatives (Cicek et al., 2013). Finally, OCD has high social costs (Hollander et al., 2016), with a recent estimate of £4.7 bn for the United Kingdom alone (Kochar et al., 2023). Effective treatment of OCD is, therefore, of great importance, both for affected individuals and for society.

According to international guidelines (e.g., National Institute for Health and Care Excellence (NICE), 2005; Voderholzer et al., 2022), the treatment of choice for OCD is cognitive-behavioral therapy (CBT) with exposure and response prevention (ERP). During ERP, therapists support their patients in systematically exposing themselves to feared situations or thoughts while refraining from compulsive behavior that is aimed at reducing discomfort momentarily (Foa & Kozak, 1997). Studies have shown that ERP can be successfully implemented in different settings and formats (for a meta-analysis, see Olatunji et al., 2013).

However, not all patients benefit sufficiently from ERP treatment; some patients drop out, and some are reluctant to undergo ERP or only partially respond to ERP treatment (Leeuwerik et al., 2019; Olatunji et al., 2010). While early dropping out or reluctance has been associated with comorbid depression or lack of motivation (Leeuwerik et al., 2019; Moritz et al., 2019), many people with psychological problems also do not seek treatment due to fear of stigmatization (Belloch et al., 2009; Glazier & Wetterneck, 2015). Fear of stigmatization may particularly apply to treatments of long duration as patients may have to explain their absence during treatments. To narrow the treatment gap, it is

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necessary to explore alternative treatment options and formats for people with OCD.

One alternative format for ERP-based treatment is “high-intensity” treatment, referring to a high frequency of therapy/ERP sessions. In one of the first studies to explore the effect of high-frequency ERP, Abramowitz et al. (2003) compared an intensive (15 daily 2 h exposure sessions over 3 weeks) with a "twice-weekly" variant (eight weeks of twice-weekly 2 h exposure sessions plus one telephone contact). Both treatment variants led to a significant improvement in obsessive-compulsive symptoms (OCS) with high effect sizes at the end of therapy. For more studies on intensive CBT for youth or adults, see the systematic review and meta-analysis by Jónsson et al. (2015).

Researchers in Norway have developed a high-frequency or “concentrated” brief ERP (cERP) format, the Bergen-4-day treatment (B4DT). Exposure-based treatment is offered in a concentrated format over four consecutive days by a team of therapists (1:1 ratio of patients to therapists). It represents a combination of group and individual therapy as the individually tailored exposure tasks are conducted in individual sessions and patients reflect upon their experiences several times a day in the group. Learning how other people successfully confront their fears and compulsions, as well as the short treatment duration, motivates patients to engage in exposures, counteracts therapy drop-outs, and reduces fear of stigmatization. For a detailed description of the intervention, see Hansen et al. (2018, 2019) and Havnen et al. (2013, 2014).

Regarding effectiveness, several uncontrolled studies from the treatment developers have shown strong effects and high response and remission rates, with up to 70% of the patients being categorized as remitted (≤12 points on the Yale-Brown Obsessive Compulsive Scale [Y-BOCS]) one to four years after treatment (Hansen et al., 2018, 2019). Moreover, treatment effects have been shown to be superior (Hansen et al., 2018) in comparison to the effects of CBT reported in meta-analyses (Öst et al., 2015). Effectiveness has also been confirmed in difficult-to-treat patients, that is, patients with relapse or non-response after treatment (Kvale et al., 2020), and there is first evidence that treatment response is associated with treatment adherence (Tjelle et al., 2021). The only randomized controlled trial (RCT) on the intervention, by Launes et al. (2020), compared the B4DT with a self-help intervention and a waitlist condition. Although B4DT was superior in a decrease of OCS compared to the waitlist and self–help condition, with large between-group effect sizes (Cohen’s d = 2.57–3.86) from pre- to post-treatment, the trial has several limitations. First, the developers conducted the intervention, potentially producing allegiance effects (Dragioti et al., 2015). Second, each group’s sample size was small (i.e., $n = 16$). Third, randomization was not optimal, with numerical discrepancies in comorbidity (e.g., depressive disorders) and age at OCD onset. Fourth, the control groups were waitlist and self-help, which are not the most effective treatments for OCD. Thus, more studies are needed to further evaluate this promising treatment, particularly its effects compared to other effective treatment formats. However, RCTs are resource intensive and are associated with several other challenges, such as reduced generalizability and external validity, as patients willing to be randomized and/or undergo experimental treatment may favor participating in RCTs (Wasmann et al., 2019).

Besides efficacy, the systematic assessment of side effects (SE) in psychotherapy research has been advocated by the Lancet Psychiatry Commission (Holmes et al., 2018) and others. SE in psychotherapy refer to unwanted treatment reactions (e.g., symptom deterioration, occurrence of new symptoms, negative effects on relationships with others) caused by correctly applied treatment and can be distinguished from malpractice and unethical behavior caused by incorrectly applied treatment. Generally, the assessment of SE in psychotherapy is scarce, especially in the psychological treatment of OCD (Moritz et al., 2015). One of the few exceptions is an online study by Moritz et al. (2015), in which 93% of the participants with OCD reported at least one SE after psychotherapy. SE may be more frequent in concentrated formats of exposure treatment. As discussed by Silver et al. (2023), B4DT may be considered a last-resort intervention for many patients with OCD, and it carries a significant risk of dissatisfaction as an adverse outcome, particularly if patients’ high expectations for rapid improvement are not entirely met.

Up until now, however, the SE of concentrated exposure treatment have only been investigated in people with anxiety disorders, with 42% of the patients experiencing SE as measured by the Inventory for the Balanced Assessment of Negative Effects of Psychotherapy (INEP) in a recent study by Heinig et al. (2023). Exploring and transparently communicating negative SE of treatments might reduce therapists’ concerns (Heinig et al., 2023) and work against the “public relation problem” that has been associated with ERP (Olatunji et al., 2009). Negative beliefs about exposure treatment in OCD are rather common among therapists and contribute to its underuse (e.g., Jelinek et al., 2024).

The aim of the current study was to test the safety, feasibility, and effectiveness of brief cERP. We investigated whether the results for effectiveness of cERP could be (1) replicated at a German site over a follow-up period of three months and (2) extended by comparing cERP treatment results to treatment results of a historical inpatient control group. Based on previous uncontrolled studies (Davíðsdóttir et al., 2019; Hansen et al., 2018; Kvale et al., 2018; Launes et al., 2019), we hypothesized large within-group effect sizes for the decrease in OCD symptomatology (Y-BOCS, primary outcome) from baseline ($T0_{cERP}$) to post-assessment ($T1_{cERP}$) and from baseline ($T0_{cERP}$) to three months follow-up assessment ($T2_{cERP}$). Secondary outcome parameters were the changes in self-reported obsessive-compulsive symptoms, depression, self-esteem, quality of life, and experience avoidance/psychological flexibility as well as general level of functioning. All measured variables have been shown to improve across treatment for OCD. We planned to compare the changes in OCD symptoms and treatment satisfaction from the concentrated treatment with those of a historical inpatient control group treated in the same hospital. Based on previous results (Hansen et al., 2018), we expected that the effects of cERP at post-treatment would be superior to the results of the historical inpatient controls.

As safety measures, we assessed SE and symptom deterioration (according to the reliable change index [RCI]) after cERP. There is a lack of evidence for negative SE (including symptom deterioration) after cERP in OCD, and we hypothesized that cERP in the study would be safe, that is, that SE (as measured by the Short Inventory of the Assessment of Negative Effects (SIAN), Dietrichkeit et al., 2021) and clinically significant symptom deterioration (as measured by the RCI) would be marginal. We expected these results to be comparable to exposure therapy in anxiety disorders (Heinig et al., 2023). Regarding feasibility, we measured patient satisfaction (CSQ), expecting positive subjective appraisals of brief cERP.

2. Materials and methods

2.1. Study design and procedure for the intervention group

Individuals with OCD were recruited via the Department for Psychiatry and Psychotherapy of the University Medical Center Hamburg-Eppendorf between September 5, 2022, and June 6, 2023, to participate in brief cERP. The inclusion criteria were (a) diagnosis of OCD (according to the the Mini-International Neuropsychiatric Interview (MINI), Sheehan et al., 1998), (b) age between 18 and 75, (c) no history of a psychotic disorder (including mania), (d) no current acute suicidality or substance dependency, (e) no pharmacological treatment or stable medication for at least six weeks, and (f) provision of informed consent.

In total, 34 patients fulfilled the inclusion criteria and were scheduled for treatment with cERP in Hamburg, Germany. Two patients were not able to start scheduled treatment due to their contamination-related OCD. These two patients did not live in Hamburg and were overstrained

with external accommodations. One of these two patients was re-scheduled and was able to participate three months later, and the other was considered a drop-out, leading to a total sample of 33 patients.

Patients were between 19 and 67 years old ($M = 35.45$, $SD = 12.94$). The majority were female (60.6 %, $n = 20$). In total, 36.4% ($n = 12$) worked full-time (part-time: $n = 5$; 15.2%, in training or studying: $n = 7$, 21.1%; unemployed: $n = 3$, 9.1%; retired: $n = 1$, 3%). All patients had at least a secondary school certificate, and 19 (57.6%) had at least a bachelor's degree. In total, 57.6% of participants were married or in a stable partnership. The age of onset of OCD varied between 5 and 33 years ($M = 17.88$ years, $SD = 7.43$). A minority of the sample had an early onset of OCD (39.4%; i.e., before the age of 15). The duration of OCD was approx. 18 years ($M = 17.94$). Comorbid depression, based on the MINI, was frequent, with 26 patients (78.8%) fulfilling the criteria for a current ($n = 6$) or lifetime depressive disorder. Regarding medication, 19 participants (57.6%) were not taking psychotropic medication, 13 (39.4%) were taking antidepressants (primarily selective serotonin reuptake inhibitors), and one person was taking antidepressants in combination with an antipsychotic agent.

Participants were assessed at baseline ($T0_{cERP}$), at post ($T1_{cERP}$, two weeks after $T0_{cERP}$), and at follow-up three months after $T1_{cERP}$ ($T2_{cERP}$). The study was conducted in compliance with the Declaration of Helsinki (World Medical Association, 2013), approved by the local ethics committee (#LPEK-0512), and preregistered with the German clinical trials registry (#DRKS00030022).

2.2. Historical control group (HC)

Thirty-three people diagnosed with OCD (according to the MINI, Sheehan et al., 1998)] who underwent inpatient treatment at the OCD and anxiety ward of the University Medical Center Hamburg-Eppendorf and were assessed during other trials (Miegel et al., under review) were selected based on sociodemographic criteria (i.e., age, gender, baseline Y-BOCS score, OCD content) to match the intervention group. Inpatients were assessed after admission (baseline) to the ward and eight weeks later (post-assessment) with the Y-BOCS, the Obsessive-Compulsive Inventory-Revised (OCI-R), the Rosenberg Self-Esteem Scale (RSE), and the World Health Organization Quality of Life Questionnaire (WHOQOL-BREF). The duration of OCD was approx. 16 years ($M = 15.78$). Comorbid depression, based on the MINI, was frequent, with all 33 patients fulfilling the criteria for a current ($n = 25$) or lifetime depressive disorder. Regarding medication, 27 participants (81.8%) were taking psychotropic medication.

2.3. Intervention

2.3.1. Brief concentrated exposure treatment (cERP): Bergen-4-day treatment (B4DT)

The B4DT was used as the brief cERP. It is described in detail elsewhere (Havnen et al., 2013, 2014). The B4DT is an exposure-based treatment conducted on four consecutive days in a group of patients by a matching number of therapists. The first day in the group setting is dedicated to manualized psychoeducation and planning of exposure sessions. On the second and third days, patients engage in exposures specifically tailored to their needs, with each patient receiving individual support from a therapist across a variety of OCD-provoking situations and continuing to self-expose themselves at home in the mornings and evenings of these days (a total exposure of approximately 20h). During these exposure days, the group gathers to share their progress and the challenges of exposure training. On the afternoon of the third day, family members and caregivers are invited to a psychoeducation session on understanding OCD and how they can best support their relatives' efforts. On the fourth day, the patients are taught strategies for maintaining their behavioral changes, and further self-guided exposures are planned for the following 30 days. A booster session with a therapist is offered three months after treatment. All therapists were trained by BH and KH.

2.3.2. Inpatient treatment of the historical inpatient control group

During their stay on the specialized ward for anxiety and OCD, patients received a standardized intensive CBT-based inpatient (or residential) treatment program. This consisted of individual CBT therapy sessions (including ERP with therapist-assisted exposure sessions), medication, one virtual reality (VR) exposure treatment session to teach the exposure rationale, various specialized groups (e.g, the MCT-OCD, Jelinek et al., 2018), and non-disorder-specific groups such as social skills training and occupational therapy. ERP was a key element of the inpatient treatment, with inpatients performing in total between 2 and 220 h of ERP during their inpatient stay (median = 21 h, $M = 42.33$).

2.4. Measures

2.4.1. Primary outcome

We used the German version of the Y-BOCS (Goodman et al., 1986; Hand & Büttner-Westphal, 1991) to measure the severity of OCD. It consists of 10 items that are scored from 0 to 4. Internal consistency (Goodman et al., 1989) was confirmed with Cronbach's $\alpha = 0.80$ for the German version (Jacobsen et al., 2003). All Y-BOCS interviews were conducted by trained and supervised staff not involved in the cERP treatment. Interrater reliability was good, with ICC = 0.871, $CI_{95\%}$ [0.719–0.961], and Cronbach's $\alpha = .894$.

2.4.2. Secondary outcomes

We used the German version of the Obsessive-Compulsive Inventory-Revised (OCI-R, Foa et al., 2002; German version: Gönner et al., 2007) as a secondary measure for the severity of OCD. This 18-item scale's total score ranges from 0 to 72, with higher scores indicating greater severity. It is sensitive to change (Abramowitz et al., 2005) and has good psychometric properties for both the total scale and the subscales (Abramowitz & Deacon, 2006; Gönner et al., 2008; Huppert et al., 2007). In the present study, internal consistency was also good, with a Cronbach's α of 0.789.

We used quality of life as a secondary outcome, measured by the global item of the World Health Organization Quality of Life Questionnaire (WHOQOL–BREF, German version: Angermeyer et al., 2000; English verison: Skevington et al., 2004). Quality of life is measured on a five-point Likert scale ranging from 5 = *very good* to 1 = *very bad*.

The Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001; German version: Löwe et al., 2004) was used to assess comorbid depression as a secondary outcome. The PHQ-9 is a well-known self-report scale for the evaluation of depression symptoms. Its nine items are measured on a four-point Likert scale, with each item being rated on a scale from 0 to 3 and total scores ranging from 0 to 27. It has been shown to possess excellent internal consistency (Cronbach's $\alpha = 0.86$–0.89) and good criteria validity (Kroenke et al., 2001). In the present study, internal consistency was also good, with a Cronbach's α of 0.84.

To measure self-esteem as a secondary outcome, we used the Rosenberg Self-Esteem Scale (RSE, Rosenberg, 1965), a valid and reliable scale consisting of ten items assessed on a scale from 1 to 4 with total scores ranging from 10 to 40 (with higher scores indicating higher self-esteem). In the present study, internal consistency was excellent, with a Cronbach's α of 0.908.

We employed the Brief Experiential Avoidance Questionnaire (BEAQ, Gámez et al., 2014; German version: Schaeuffele et al., 2022) to assess experiential avoidance. The 15-item questionnaire is a short form of the Multidimensional Experiential Avoidance Questionnaire (MEAQ), which has been shown to have good internal consistency and validity (Schaeuffele et al., 2022). It is rated on a six-point scale ranging from 1 = *strongly disagree* to 6 = *strongly agree*. In the present study, internal consistency was also good, with a Cronbach's α of 0.85.

The General Self-Efficacy Scale (GSES, Schwarzer & Jerusalem, 2003) was used to measure self-efficacy. The GSES measures subjective

Table 1
Description of the cERP and the historical inpatient control sample.

	cERP (n = 33)	Historical inpatient controls (HIS)(n = 33)	Statistics
Gender			
female	20 (60.6%)	16 (48.5%)	$\chi^2(1) = 0.978$, $p = .323$
male	13 (39.4%)	17 (51.5%)	
Age in years	35.46 (12.94)	32.79 (12.06)	$t(64) = 0.866$, $p = .390$
Education			
≥ 12 years of school	30 (90.9%)	23 (71.9%)	$\chi^2(1) = 3.910$, $p = .048$
< 12 years of school	3 (9.1%)	9 (28.1%)	
Illness duration	17.94 (14.73)	15.78 (12.86)	$t(59) = 0.608$, $p = .546$
Medication status			
Medicated	17 (51.5%)	27 (81.8%)	$\chi^2(1) = 6.818$, $p = .009$
Non-medicated	16 (48.5%)	6 (18.2%)	
Y-BOCS total score	25.18 (3.96)	24.39 (6.79)	$t(51.50) = 0.576$, $p = .567$
OCI-R	24.67 (9.20)	27.39 (12.07)	$t(59.79) = 1.033$, $p = .306$
OCD content*			
contamination	14 (50.0)	14 (50.0)	$\chi^2(1) = 1.000$, $p = 1.00$
checking	14 (53.8)	12 (46.2)	$\chi^2(1) = 0.614$, $p = 0.801$
symmetry	7 (58.3)	5 (41.7)	$\chi^2(1) = 0.407$, $p = 0.751$
taboo thoughts	24 (57.1)	18 (42.9)	$\chi^2(1) = 2.357$, $p = 0.125$

Notes. OCD = obsessive compulsive disorder. cERP = concentrated exposure and response prevention.
Y-BOCS = Yale-Brown Obsessive Compulsive Scale. OCI-R = Obsessive-Compulsive Inventory-Revised. *According to the Y-BOCS checklist.

controllability and general competence expectations. We applied the 10-item short version for overall self-efficacy, which uses a four-point rating scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *agree*, 4 = *strongly agree*). The GSES has shown good internal consistency (Cronbach's α = 0.82–0.86). In the present study, internal consistency was good, with a Cronbach's α of 0.846.

The Global Assessment of Functioning (GAF, APA, 1994) scale was used to measure patients' overall psychosocial functioning, including psychological, social, and occupational functioning. The GAF is rated on a scale from 1 = *persistent danger of severely hurting oneself or others* to 100 = *superior functioning in a wide range of activities*.

2.4.3. Side effects (SE)

We assessed SE with the SIAN (Dietrichkeit et al., 2021), a questionnaire which was developed based on the structure of the Inventory for the Assessment of Negative Effects of Psychotherapy (INEP; Ladwig et al., 2014) at $T1_{cERP}$ and $T2_{cERP}$. We modified the items for the current study; that is, we specifically mentioned the name of the intervention in each item (i.e., "… due to the B4DT…") and adjusted the items related to psychopathology to OCD symptomatology (e.g., "my intrusive thought" instead of "my depression"). The final questionnaire had a total of 21 items, with 13 items rated on a seven-point bipolar scale (agreement/disagreement from −3 to +3) and eight items rated on a four-point scale (1 = *true*, 2 = *somewhat true*, 3 = *somewhat not true*, 4 = *not true*). To count the number of SE, we coded values for items 1 to 13 from −3 to −1 (=agreement) as well as for items 14 to 21 for values 1 and 2 (1 = *true*, 2 = *rather true*) as "yes" (=1), indicating the occurrence of an SE. All other values were coded 0 and were not coded as SE. All items are displayed in e-supplements A and B. In the present study, internal consistency was good, with a Cronbach's α of 0.931.

The symptoms assessed with the SIAN include both OCD-related and general psychopathological symptoms (e.g., helplessness, guilt, rumination) as well as items regarding social context (i.e., coming across to others and relationship with others). Some items that might not apply to all participants could be answered with "does not apply." The internal consistency (n = 32), with Cronbach's $\alpha_{t2} = 0.908$, was excellent in our sample. The quantity of the SE overall, as well as for each item, was calculated for assessment at post-assessment ($T1_{cERP}$) and at three-month follow-up ($T2_{cERP}$).

2.4.4. Feasibility

The Client Satisfaction Questionnaire–8 (CSQ–8; Attkisson, 1982; German version [ZUF-8]: Schmidt & Wittman, 2008) was employed to measure the patients' subjective appraisal of the brief cERP at post-assessment ($T1_{cERP}$). The eight-item scale is rated on a four-point Likert scale with scores ranging from 8 to 32 (higher scores indicate higher satisfaction). It has good internal consistency (Cronbach's α = .83–0.93) and moderate convergent validity (Attkisson, 1982; Kriz et al., 2008). In the present study, internal consistency was good, with a Cronbach's α of 0.857.

2.5. Sample size

For sample size, we calculated that the sample size for the dependent sample t-test should be at least 59, aiming for a test power of 0.85 and an alpha level of 0.05 (two-tailed) with a large effect size (f = 0.40). To account for potential drop-outs, we aimed at a sample size of 33 patients in each group.

2.6. Data analysis

To test change in primary and secondary outcomes, we planned repeated measure analyses of variance (ANOVA) and Student's t-test for dependent samples. For comparison between the intervention group (cERP) and the historical inpatient control group (HIS), we planned analyses of covariance (ANCOVA) with the group as the between-subject factor (cERP vs. HIS). Assessment points differed between samples, with the cERP group being assessed at baseline ($T0_{cERP}$), post-treatment ($T1_{cERP}$; 14 days after $T0_{cERP}$), and three months later ($T2_{cERP}$) and the HIS group being assessed at baseline ($T0_{HIS}$) and eight weeks later (post; $T1_{HIS}$). To compare treatment effects of cERP and inpatient treatment (historical controls), we compared the change in HIS group ($T0_{HIS}$ to $t1_{HIS}$) to the change in the brief cERP group for the time intervals (1) $T0_{cERP}$ to $T1_{cERP}$ and (2) $T0_{cERP}$ to $T2_{cERP}$. All analyses used baseline scores as covariates (to control for regression to the mean (Barnett et al., 2005; Rausch et al., 2003).

Also, we calculated response (≥35% decline on the Y-BOCS) and remission rates (≤12 points on the Y-BOCS total score) according to the international consensus (Mataix-Cols et al., 2016). Symptom deterioration was calculated using the RCI as described by Jacobson and Truax (1991).

We report effect sizes using partial eta squared for ANOVAs, referring to $\eta_p^2 \approx .01$ as small, $\eta_p^2 \approx 0.06$ as medium, and $\eta_p^2 \approx 0.14$ as large effect sizes, based on Kinnear and Gray (2009). For the t-test, we report Cohen's d, following the parameters of Cohen (1988) for small ($d \approx 0.2$), medium ($d \approx 0.5$), and large ($d \approx 0.8$) effect sizes.

Table 2a
Means (standard deviations) in primary and secondary outcome parameters.

		cERP		Historical controls (HIS)	
		M (*SD*)		*M* (*SD*)	
	Baseline ($T0_{cERP}$) $n = 33$	Post ($T1_{cERP}$) $n = 33$	Follow-up ($T2_{cERP}$) $n = 32$	Baseline ($T0_{HIS}$) $n = 33$	Post ($T1_{HIS}$) $n = 33$
Y-BOCS - total sccore*	25.18 (3.96)	15.24 (5.63)	13.84 (7.08)	24.39 (6.79)	17.94 (7.79)
Y-BOCS - oobsessions	12.48 (2.31)	8.06 (2.66)	7.03 (3.69)	12.85 (3.64)	9.49 (3.81)
Y-BOCS -ccompulsions	12.70 (1.94)	7.18 (3.39)	6.81 (3.80)	11.55 (4.73)	8.45 (4.74)
OCI-R	24.67 (9.19)	11.79 (5.64)	13.25 (6.92)	27.40 (12.07)	20.91 (12.35)[a]
GAF	64.64 (13.51)	75.82 (12.87)	78.87 (13.19)	–	–
PHQ-9	9.91 (5.36)	6.39 (5.30)	6.22 (4.19)	-	-
	Baseline ($T0_{cERP}$) $n = 32$	Post ($T1_{cERP}$) $n = 32$	Follow up ($T2_{cERP}$) $n = 31$	Baseline ($T0_{HIS}$) $n = 33$	Post ($T1_{HIS}$) $n = 33$
RSE	25.56 (3.09)	24.93 (2.40)	25.29 (2.57)	27.14 (7.23)[b]	26.87 (7.72)
BEAQ	49.97 (12.36)	44.00 (8.46)	43.45 (9.81)	-	-
GSES	23.97 (4.53)	28.31 (4.40)	28.16 (6.16)	–	-
WHOQOL-BREF	2.88 (0.87)	3.66 (0.60)	3.53 (0.84)	2.33 (1.11)	3.41 (0.84)

Notes. * primar outcome. cERP = concentrated exposure and response prevention. Y-BOCS = Yale-Brown Obsessive Compulsive Scale. OCI-R = Obsessive Compulsive Disorder-Revised. GAF = Global Assessment of Functioning. PHQ-9 = Patient-Health-Questionnaire-9. RSE = Rosenberg Self-Esteem Scale. BEAQ = Experiential Avoidance. GSES = General Self-Efficacy Scale. WHOQOL-BREF = global item of the World Health Organization Quality of Life Questionnaire.

3. Results

3.1. Sample characteristics

By design, patients treated with brief cERP did not differ from the HIS in age, gender, illness duration, OCD symptomatology at baseline (as measured by the Y-BOCS and the OCI-R), or OCD content (see Table 1). Samples differed in years of school education (a higher proportion of patients with more years of school education in the brief cERP than in the historical control group), current or lifetime diagnosis of depression (all historical inpatient controls (HC)[HC] were diagnosed with a current or lifetime depressive disorder, but only 79% of the cERP sample, $\chi^2\,(1) = 7.831, p = .005$), and medication status (more historical controls than brief cERP patients were being medicated).

3.2. Effectiveness

3.2.1. Within-group effects

As can be seen in Tables 2a-c and Fig. 1, the brief cERP group improved over time, with large effect sizes in the primary (Y-BOCS) and secondary outcome measures (OCI-R, GAF, PHQ-9, GSES, quality of life). Effect sizes for improvement in self-esteem (RSE) and experiential avoidance (BEAQ) were small to moderate.

3.2.2. Between-group effects

Improvement over treatment was superior in the brief cERP group compared to the HIS group with medium size for the primary outcome (Y-BOCS total score; see Fig. 1). For secondary outcomes, a large effect size was found for improvement in self-assessed OCD symptomatology

Table 2b
Analyses for primary and secondary outcomes within the intervention group.

	t-test	*t*-test	ANOVA
	$T0_{cERP}$ vs. $T1_{cERP}$	$T0_{cERP}$ vs. $T2_{cERP}$	
Y-BOCS - total score (primary outcome)	$t(32) = 11.717, p < .001,$ $d = 2.040, CI_{95\%}$ [1.431, 2.637]	$t(31) = 9.536, p < .001,$ $d = 1.686, CI_{95\%}$ [1.137, 2.223]	$F(1.68, 52.09) = 77.8, p < .001, \eta_p^2 = 0.715$
Y-BOCS - obsessions	$t(32) = 10.897, p < .001, d = 1.897, CI_{95\%}$ [1.317, 2.466]	$t(31) = 8.315, p < .001, d = 1.470, CI_{95\%}$ [0.961, 1.967]	$F(1,523, 47.209) = 59.891, p < .001, \eta_p^2 = 0.659$
Y-BOCS - compulsions	$t(32) = 10.208, p < .001,$ $d = 1.777, CI_{95\%}$ [1.220, 2.323]	$t(31) = 8.970, p < .001$ $d = 1.586, CI_{95\%}$ [1.056, 2.104]	$F(2,62) = 63.721, p < .001, \eta_p^2 = 0.673$
OCI-R	$t(32) = 7.579, p < .001,$ $d = 1.319, CI_{95\%}$ [0.845, 1.783]	$t(31) = 6.753, p < .001,$ $d = 1.194, CI_{95\%}$ [0.732, 1.644]	$F(1.629, 50.496) = 42.679, p < .001,$ $\eta_p^2 = 0.579$
GAF	$t(32) = 8.083, p < .001$ $d = -1.407, CI_{95\%}$ [-1.885, −0.917]	$t(31) = 7.975, p < .001$ $d = -1.410, CI_{95\%}$ [-1.896, −0.912]	$F(2,62) = 44.252,$ $p < .001, \eta_p^2 = 0.588$
PHQ-9	$t(32) = 4.775, p < .001,$ $d = 0.831, CI_{95\%}$ [0.429, 1.223]	$t(31) = 5.398, p < .001,$ $d = 0.954, CI_{95\%}$ [0.529, 1.368]	$F(2,62) = 16.860$ $p < .001, \eta_p^2 = 0.352$
RSE	$t(31) = 1.360, p = .092,$ $d = 0.240, CI_{95\%}$ [-0.113, 0.590]	$t(30) = 0.312$, p = .378, $d = 0.056, CI_{95\%}$ [-0.297, 0.408]	$F(1.520, 45.595) = 0.874, p = .397, \eta_p^2 = 0.028$
BEAQ	$t(31) = 3.289, p = .003, d = 0.581, CI_{95\%}$ [0.202, 0.953]	$t(30) = 3.393, p = .002, d = 0.609, CI_{95\%}$ [0.221, 0.989]	$F(1.652, 49.566) = 9.240, p < .001, \eta_p^2 = 0.235$
GSES	$t(31) = 6.619, p < .001, d = -1.170,$ $CI_{95\%}$ [−1.616, −0.713]	$t(30) = 4.541, p < .001, d = -0.816, CI_{95\%}$ [−1.218, −0.403]	$F(2,60) = 18.564, p < .001, \eta_p^2 = 0.382$
WHOQOL-BREF	$t(31) = 6.256, p < .001, d = 1.106, CI_{95\%}$ [−1.542, −0.659]	$t(30) = 4.768, p < .001, d = 0.856, CI_{95\%}$ [−1.264, −0.438]	$F(2,60) = 20.492, p < .001, \eta_p^2 = 0.406$

Notes. cERP = concentrated exposure and response prevention. Y-BOCS = Yale-Brown Obsessive Compulsive Scale. OCI-R = Obsessive Compulsive Disorder-Revised. GAF = Global Assessment of Functioning. PHQ-9 = Patient-Health-Questionnaire-9. RSE = Rosenberg Self-Esteem Scale. BEAQ = Experiential Avoidance. GSES = General Self-Efficacy Scale. WHOQOL-BREF = global item of the World Health Organization Quality of Life Questionnaire.

Table 2c
Analyses for primary and secondary outcomes between the intervention group and the historical control group.

	ANCOVA	
	$T0_{cERP}$ to $T1_{cERP}$ vs. $T0_{HIS}$ to $T1_{HIS}$	$T0_{cERP}$ to $T2_{cERP}$ vs. $T0_{HIS}$ to $T1_{HIS}$
Y-BOCS - Total Score (primary outcome)	$F(1, 62) = 6.709$, $p = .012$, $\eta_p^2 = 0.098$	$F(1, 63) = 4.109$, $p = .047$, $\eta_p^2 = 0.061$
Y-BOCS - Obsessions	$F(1, 62) = 6.764$, $p = .012$, $\eta_p^2 = 0.098$	$F(1, 63) = 2.842$, $p = .097$, $\eta_p^2 = 0.043$
Y-BOCS - Compulsions	$F(1, 62) = 4.984$, $p = .030$, $\eta_p^2 = 0.074$	$F(1, 63) = 4.070$, $p = .048$, $\eta_p^2 = 0.061$
OCI-R	$F(1, 61) = 8.768$, $p = .004$, $\eta_p^2 = 0.126$	$F(1, 62) = 14.187$, $p < .001$, $\eta_p^2 = 0.186$
GAF	-	-
PHQ-9	-	-
RSE	$F(1, 56) = 0.649$, $p = .424$, $\eta_p^2 = 0.011$	$F(1, 57) = 1.475$, $p = .230$, $\eta_p^2 = 0.025$
BEAQ	-	-
GSES	-	-
WHOQOL-BREF	$F(1, 61) = 0.282$, $p = .597$, $\eta_p^2 = 0.005$	$F(1, 62) = 1.287$, $p = .261$, $\eta_p^2 = 0.020$

Notes. cERP = concentrated exposure and response prevention. Y-BOCS = Yale-Brown Obsessive Compulsive Scale. OCI-R = Obsessive Compulsive Disorder-Revised. GAF = Global Assessment of Functioning. PHQ-9 = Patient-Health-Questionnaire-9. RSE = Rosenberg Self-Esteem Scale. BEAQ = Experiential Avoidance. GSES = General Self-Efficacy Scale. WHOQOL-BREF = global item of the World Health Organization Quality of Life Questionnaire. ANCOVA: All analyses used baseline scores as covariates.

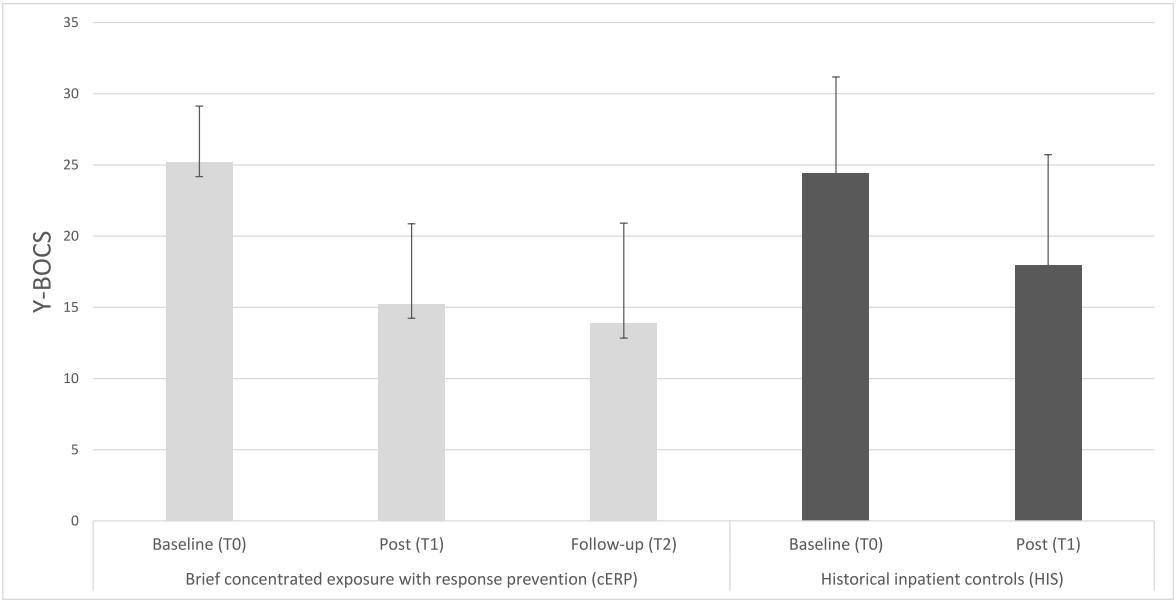

Fig. 1. Means and standard deviations of the brief concentrated exposure with response prevention (cERP) at baseline (T0), post-assessment 2 weeks later (T1) and follow-up assessment three months later (T2) and the historical inpatient control sample at baseline (T0) and post-assessment 8 weeks later (T1).

(OCI-R). The effect size for the changes in self-esteem and quality of life was small. Results are displayed in Tables 2a, 2b, and 2c.

3.2.3. Response and remission rates

In Table 3, response and remission rates are displayed for the patients in the brief cERP group for different time points (52–63% responder, 33–47% in remission) and the HIS group (36% responder, 24% in remission). Response and remission rates tended to be larger in the cERP than in the HIS group (the latter were receiving inpatient treatment) when rates at the three-month follow-up assessment for the brief cERP group ($T2_{cERP}$) were compared to rates at the eight weeks after baseline assessment for the HIS group ($T1_{HIS}$). Rates were similar between groups for the brief cERP group. Rates right after treatment ($T1_{cERP}$, 14 days after baseline) were chosen and compared to rates at the eight weeks after baseline assessment for the HIS group ($T1_{HIS}$).

3.3. Safety

3.3.1. Side effects (SE)

At $T1_{cERP}$ and $T2_{cERP}$, 53–56% of the participants reported at least one SE, agreeing fully or partially to at least one item, and 25–28% agreed to a single item. On average the participants reported 1–2 SE ($T1_{cERP}$: $M = 1.88$, $SD = 3.55$; $T2_{cERP}$: $M = 1.34$, $SD = 1.99$). Being exhausted after exposure sessions (38.2%) and being disappointed about not feeling better yet (17.6%) were expressed most frequently at $T1_{cERP}$ (for details, see e-supplements A and B). The most frequently reported

Table 3
Numbers (percent) of patients classified as responders (≥35% reduction in the Y-BOCS) or as in remission (≤12 points in the Y-BOCS).

	cERP		Historical Controls	Statistics	
	$T1_{cERP}$ $n = 33$	$T2_{cERP}$ $n = 32$	$T1_{HIS}$ $n = 33$	$T1_{cERP}$ *vs.* $T1_{HIS}$	$T2_{cERP}$ *vs.* $T1_{HIS}$
Responder	17 (51.5%)	20 (62.5%)	12 (36.4%)	χ^2 (1) = 1.538, $p = .215$	χ^2 (1) = 4.440, $p = .035$
In remission	11 (33.3%)	15 (46.9%)	8 (24.2%)	χ^2 (1) = 0.665, $p = .415$	χ^2 (1) = 3.640, $p = .056$

Notes. cERP = concentrated exposure and response prevention. Y-BOCS = Yale-Brown Obsessive Compulsive Scale. HIS = historical inpatient control group.

SE at $T2_{cERP}$ were worries about how they came across to others (38.2%) and unpleasant feelings such as grief, disgust, or guilt (26.5%), as well as negative relationships with others (20.6%).

3.3.2. Symptom deterioration (RCI)

According to the RCI, no significant deterioration, according to the RCI, appeared from $T0_{cERP}$, to $T1_{cERP}$ and from $T0_{cERP}$ to $T2_{cERP}$ in the Y-BOCS score.

3.3.3. Feasibility: treatment satisfaction (CSQ-8)

Treatment satisfaction with the brief cERP as measured with the CSQ–8 was generally high (total score: $M = 29.30$, $SD = 3.06$). For example, all patients evaluated the quality of the brief cERP as either "excellent" or "good" and confirmed that they would recommend brief cERP to a friend with similar problems (ratings either "yes, definitely" or "yes, I think so").

4. Discussion

The aim of the current study was to test the safety, feasibility, and effectiveness of brief cERP by conducting an uncontrolled pilot study and comparing cERP treatment results to treatment results of a historical inpatient control group.

For safety, we assessed side effects (SE) of brief cERP. SE have generally been neglected in psychotherapy research (Moritz et al., 2015) and, until this study, had never been assessed in cERP for OCD. As expected, SE were generally low in brief cERP for OCD, with an average of 1–2 SE at post-assessment and three months later and with 53–56% of the patients reporting at least one SE at either T1 or T2. The most frequently reported SE, were being exhausted after exposure sessions and worries about how they came across to others. This largely corresponds to 42% of the patients with anxiety disorders experiencing SE after intensified exposure, as measured by the INEP in a recent study by Heinig et al. (2023). According to Linden et al. (2018), SE are unwanted events that are temporally contingent on and preferably causally related to the treatment process, and they also occur during correctly executed treatment. By assessing the SE shortly after the treatment, which supervised clinicians performed to ensure that the treatment was carried out correctly, at post-assessment the SE measured in the current study are most likely related to brief cERP and no other factors (Linden et al., 2018). Still, after more time had passed since the end of treatment, patients reported more SE (such as negative feelings, negative impact on relationships, and worries about how they came across to others) at the three-month follow-up assessment. Due to the short duration of the treatment (four days), some SE inevitably needed time to occur, especially if they involved interactions with other people. Still, the total percentage of people experiencing SE remained similar between post-treatment and follow-up. As a further measure of safety, we measured symptom deterioration (assessed by the RCI) and found no clinically significant symptom deterioration, which underlines the safety of brief cERP.

Regarding feasibility, we measured patient satisfaction using the CSQ, showing high rates of satisfaction with an average total score of 29.30 ($SD = 3.06$). These findings are largely similar to those reported in Norwegian samples; for example, a mean satisfaction score of 29.5 ($SD = 2.7$) was reported by Launes et al. (2019). Thus, our results further support the acceptance of the treatment.

Primary and secondary outcome measures also improved over brief cERP treatment. Effect sizes were large for improvement in OCS (primary outcome: Y-BOCS, secondary outcome: OCI-R), global functioning (GAF), depression (PHQ-9), self-efficacy (GSES), and quality of life (global item of the WHOQOL–BREF), with a Cohen's of up to $d = 2.040$, $CI_{95\%}$ [1.431, 2.637] for the total score of the Y-BOCS. However, effect sizes are below the effect sizes reported by the developers of the intervention in this format. Similarly, our response and remission rates at three-month follow-up are 62.5% and 46.9%, lower than the approx. 70% reported in Norwegian and Icelandic samples (e.g. (Davíðsdóttir et al., 2019; Hansen et al., 2018; Kvale et al., 2018). However, they are similar to results in a difficult-to-treat sample (Kvale et al., 2020), in which remission rates were between 56.5% (post-treatment) and 47.9% (12-month follow-up), and they are above the remission rates of 28% reported in recent a Finnish study using the same brief cERP treatment (Silver et al., 2023).

First, allegiance effects need to be discussed, which always occur when a treatment is applied by its developers. In the current study the developers of the B4DT conducted the clinical training of the therapists and provided supervision, but they did not conduct the therapy themselves, making allegiance effects less likely. Second, the screening and treatment preparation phase may have differed from previous studies, with motivation and readiness for change being assessed and prepared differently before the start of cERP (compare Silver et al. (2023). In line with this argument, the clinical training in cERP (B4DT) focused on the delivery of the four-day intervention, not the selection of patients and treatment preparation process, potentially leaving room for improvement in this pre-treatment phase. Generally, research is necessary to identify 'best-fit' indicators for different treatment formats.

As in many pilot studies aiming at testing the feasibility and safety of an unestablished intervention, inclusion of patients is maximized in terms of clinical experience with the intervention and may attract patients seeking a last-resort intervention who have a potentially higher risk of disappointment (Silver et al., 2023). Descriptively, at 57% the percentage of patients experiencing obsessions in the form of taboo thoughts was rather large. While we were able to match OCD contents between the cERP and the HIS groups, the challenges of including these patients in health care (Besiroglu et al., 2004; García-Soriano et al., 2014) and conducting ERP in this patient group have been outlined previously (e.g., Bruce et al., 2018). Moreover, it has been described that the observed duration of untreated illness (DUI) is particularly high among patients with taboo thoughts (Dell'Osso et al., 2014) and that a longer DUI is associated with a worse long-term outcome (Perris et al., 2023). Potentially, the high percentage patients with taboo thoughts may have negatively affected treatment responses in our sample.

To compensate for the uncontrolled design, we compared the cERP group's data to a historical sample treated in the same clinic, which showed superiority of the cERP with moderate to large effect sizes for improvement in OCS in comparison to inpatient treatment. In a previous publication by Hansen et al. (2018), results of an uncontrolled study were mathematically compared to effects of CBT reported in a meta-analyses (Öst et al., 2015), which summarize many different formats of CBT and settings. Up until now, brief cERP has only been compared in an RCT with a self-help intervention and a waiting condition, with rather weak control conditions and suboptimal randomization (see introduction). Using a matched historical inpatient sample that was treated at the same site is a rather strong and effective active control condition, despite certain limitations that are outlined in the following section.

The several limitations of the current study mainly refer to the use of a historical control group. First, the comparability of the two samples should be discussed. Our control samples represent a sample of patients receiving inpatient (or residential) treatment. This includes inpatients receiving ERP and other interventions during treatment (e.g., occupational therapy). Still, ERP was the main focus of treatment, and the ERP dose was numerically similar between the two groups, with approximately 20 h ERP during B4DT and an average of 21 h of ERP in the inpatient sample. Even so, we cannot attribute all treatment effects of the inpatient stay to ERP as the patients' treatment was multifaceted.

Moreover, the two samples may be from different populations. Although carefully matched, the two samples differed in years of school education (a higher proportion of patients had more years of school education in the cERP than in the historical control group), medication status (more historical controls than cERP patients were being medicated), and diagnosis of depression (more patients with a current or

lifetime diagnosis of depression in the inpatient group). This may point to rather complex and severe cases in the control group. Generally, inpatient treatment may include more complex and severe cases than outpatient treatment. However, this is not necessarily the case. Inpatient or residential treatment may also be indicated in Germany if no specialized OCD treatment is locally available and/or would require a long waiting time. Unfortunately, this is often the case for OCD patients because ERP treatment is unavailable and underused in Germany (Jelinek et al., 2024; Moritz et al., 2019; Voderholzer et al., 2015), forcing patients to seek help in a ward specializing in exposure treatment.

Additionally, a substantial proportion of the B4DT patients was recruited via our inpatient ward, potentially leading to more complex cases in this group, too (see discussion above on a difficult-to-treat sample (Kvale et al., 2020). In conclusion, while our use of a historical control group is of value, it does have limitations and does not meet the high standards of an RCT; the current results need to be interpreted against the background of a potential selection bias. Second, side effects were not measured in the historical control group. Thus, we were not able to compare the groups on all measures. Third, assessment times differed between the intervention group and the historical control group.

Fourth, we did not compare the treatments regarding costs. We can assume that B4DT offers significant savings as long-term, residential/inpatient therapies require sustained resource allocation over extended periods, driving up direct and indirect costs for healthcare systems. If B4DT, by contrast, achieves comparable outcomes in a fraction of the time, as suggested by the current evidence, fewer days of illness, for example, would allow a faster return to the workplace and reduce indirect health costs. Moreover, B4DT's concentrated treatment nature allows it to transcend geographical barriers. Patients outside the typical catchment area can access treatment, making specialized care more accessible to those who might otherwise face logistical and financial challenges (e.g., including longer travel times to receive treatment).

In addition to the limitations regarding the control group, we only included a rather short-term follow-up interval. Also, our small sample size is limited, which is important in such a heterogeneous disorder as OCD and we used a previous version of the OCI-R, in which the neutralizing items were found to have problematic psychometric properties; this version also includes hoarding items, which the DSM-5 does not identify as diagnostic of OCD. Future studies should consider using the OCI-12 version (Abramovitch et al., 2021).

5. Conclusions

Our results confirmed that cERP is safe, feasible, and effective in the treatment of individuals with OCD and has marginal negative side effects (e.g., exhaustion). Future research should thus include a randomized controlled design and should also investigate factors of the mechanism contributing to the efficacy and effectiveness of the treatment (Tjelle et al., 2021), including the role of the selection process and pre-treatment phase.

CRediT authorship contribution statement

Lena Jelinek: Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Anna Serve:** Writing – review & editing, Project administration, Formal analysis. **Saskia Pampuch:** Writing – review & editing, Project administration, Formal analysis. **Jakob Scheunemann:** Writing – review & editing, Project administration, Methodology, Investigation, Conceptualization. **Josephine Schultz:** Writing – review & editing, Project administration. **Franziska Miegel:** Writing – review & editing, Resources, Methodology, Funding acquisition, Conceptualization. **Bjarne Hansen:** Writing – review & editing, Supervision, Funding acquisition. **Kristen Hagen:** Writing – review & editing, Supervision. **Frances Bohnsack:** Writing – review & editing, Resources, Project administration, Investigation, Funding acquisition. **Jürgen Gallinat:** Writing – review & editing, Resources, Conceptualization. **Amir H. Yassari:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization.

Statement of ethics

This study protocol was reviewed and approved by the local ethics committee of the center for psycho social medicine, approval number #LPEK-0512. Consent to participate statement: Written informed consent was obtained from all participants to participate in the study.

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Declaration of competing interest

Lena Jelinek, Anna Serve, Saskia Pampuch, Jakob Scheunemann, Frances Bohnsack, Josephine Schultz, Franziska Miegel, Kristen Hagen, Jürgen Gallinat, and Amir H. Yassari report no conflict of interest. Bjarne Hansen developed the B4DT.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jocrd.2024.100913.

Data availability

The data that support the findings of this study are available from the corresponding author upon request.

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