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Abstract

Dialectical Behavior Therapy for Posttraumatic Stress Disorder (DBT-PTSD) is a trauma-focused therapy effectively reducing core PTSD symptoms such as intrusions, hyperarousal, and avoidance. Preliminary data indicate effects on elevated trauma-related emotions (e.g., guilt and shame) and possibly radical acceptance of the traumatic event. However, it is unclear if improvements in these variables are significant after controlling for changes in core PTSD symptoms and to which extent non-clinical levels are obtained. Forty-two individuals meeting the criteria for PTSD after childhood abuse participating in a three-month residential DBT-PTSD program were evaluated at the start of the exposure phase and at the end of the treatment. A non-clinical sample with a history of childhood abuse served as a reference for the investigated outcomes. Multivariate analyses of variance and multivariate analyses of covariance controlling for change in core PTSD symptoms were used to evaluate changes in a broad range of elevated trauma-related emotions (fear, anger, guilt, shame, disgust, sadness, and helplessness) and in radical acceptance. Both elevated trauma-related emotions and radical acceptance significantly improved during DBT-PTSD ($\Lambda = 0.34$, $p < 0.001$, $\eta^2 = 0.56$; $t_{40} = -5.66$, $p < 0.001$, SMD $= 0.88$) even after controlling for changes in PTSD symptoms ($\Lambda = 0.35$, $p < 0.001$, $\eta^2 = 0.65$; $\Lambda = 0.86$, $p = 0.018$, $\eta^2 = 0.14$). At the end of DBT-PTSD between 76.2% (guilt) and 31.0% (acceptance) of patients showed non-clinical levels of the investigated outcomes. To conclude, both trauma-related emotions and radical acceptance changed after the three-month residential DBT-PTSD program.

When Posttraumatic Stress Disorder (PTSD) was introduced in the Diagnostic and Statistical Manual of Mental Disorders (DSM) (American Psychiatric Association, 1980), it was classified as an anxiety disorder. In recent years, a broader range of emotions that are elevated in PTSD have been considered relevant. Consequently, PTSD was reclassified in the DSM-5, moving it from the anxiety disorders to a new category of trauma- and stressor-related disorders. The core symptom clusters are re-experiencing, avoidance, and hyperarousal. These constitute previous diagnoses of PTSD and were complemented by a diagnostic criterion comprising persistent negative affect, inability to experience positive affect, and distorted cognitions like self-blame (American Psychiatric Association, 2013). The ICD-11 proposes two distinct sibling conditions, PTSD and Complex PTSD (CPTSD), under the category 'disorders specifically associated with stress' (WHO, 2018). For a diagnosis of CPTSD the core symptoms of PTSD are required in addition to the following: 1) severe and pervasive problems in affect regulation; 2) persistent beliefs about oneself as diminished, defeated or worthless, accompanied by deep and pervasive feelings of shame, guilt or failure related to the traumatic event; and 3) persistent difficulties in sustaining relationships and in feeling close to others (WHO, 2018). In a recent study the highest conditional prevalence for PTSD was associated with kidnapping or rape, and the highest CPTSD rates were associated with childhood sexual abuse (CSA) (Maercker, Hecker, Augsburger, & Kliem, 2018).

The relevance of non-fear emotions in modern conceptualizations of PTSD is well supported: high levels of shame, guilt, anger, and disgust correlate with increased re-experiencing, avoidance, and hyperarousal (Badour, Feldner, Blumenthal, & Knapp, 2013; Orth & Wieland, 2006; Pugh, Taylor, & Berry, 2015; Rupp, Doebler, Ehring, & Vossbeck-Elsebusch, 2017; Saraiya & Lopez-Castro, 2016; Street, Gibson, & Holohan, 2005); elevated levels of shame and guilt are also associated with suicidal ideation (Bryan, Morrow, Etienne, & Ray-Sannerud, 2013; You, Talbot, He, & Conner, 2012).

Core symptoms of PTSD can be effectively treated by trauma-focused treatments:

Prolonged Exposure (PE), Narrative Exposure Therapy (NET), Cognitive Processing Therapy

(CPT), and Eye Movement and Desensitization and Reprocessing (EMDR) (Cusack et al.,

2016; Watts et al., 2013). However, while meta-analyses on trauma-focused treatment

showed large reductions in PTSD symptoms across different subgroups (Cusack et al., 2016;

Watts et al., 2013), meta-analyses specifically studying treatment effects in patients with

PTSD related to childhood abuse (CA) yielded only moderate effect sizes (Ehring et al.,

2014) and low recovery rates (Dorrepaal et al., 2014). Furthermore, studies on CA-related

PTSD often excluded patients with substance abuse, dissociative disorders, borderline per-

sonality disorder (BPD), or suicidality. Thus, specialized treatments for CA-related PTSD are

clearly needed—especially for patients with complex symptoms including emotion

dysregulation and comorbidities such as BPD (Dorrepaal et al., 2014). Treatments for abuse-

related PTSD (Cloitre, Petkova, Wang, & Lu, 2012; Harned, Korslund, & Linehan, 2014;

Steil, Dyer, Priebe, Kleindienst, & Bohus, 2011) emphasize the use of emotion regulation

strategies. In particular, Dialectical Behavior Therapy for Complex Posttraumatic Stress Dis-

order (DBT-PTSD) was tailored for patients with CPTSD related to CA, i.e. for patients with

severe emotion dysregulation, high levels of guilt, shame, self-contempt, self-harm, suicidal

ideation, dissociation, and interpersonal problems (Bohus et al., *in press*). The treatment prin-

ciples further described by Bohus and Priebe (2018) are as follows: DBT-PTSD is a multi-

component treatment following algorithms derived from DBT (Linehan, 1993). It includes

clear structures and a dynamic hierarchization of treatment focuses. A major element of DBT

are so-called "skills", i.e. short mental self-instructions aiming at interrupting and modifying

automatic appraisals and behavioral patterns. Skills can be further used to manage extreme

levels of distress that are often associated with dissociation. In patients with emotion regula-

tion difficulties, imagination of stressful life events often triggers dissociation that hampers

emotional learning (Krause-Utz et al., 2018). Accordingly, imaginal exposure was supplemented by anti-dissociative skills (skills-based exposure). Skills are further used to modulate over-activated emotions. Since standard DBT does not include elaborated trauma-specific interventions in sufficient detail, we supplemented DBT with trauma-focused cognitive and exposure-based interventions (Ehlers, Clark, Hackmann, McManus, & Fennell, 2005).

As outlined above, patients with CPTSD after CA suffer from severe negative self-concepts accompanied by deep and pervasive trauma-related emotions like guilt or shame. In accordance with Brewin (1996), we conceptualize these emotions as secondary emotions that are consequences of post-traumatic appraisals of the event. Assumptions like "it was all my fault", "I deserve what happened", or "something is wrong with me" are pseudo-causal explanations that may help to explain the inexplicable in the short-term. Guilt and shame might also help to decrease primary emotions that were present during the traumatic event such as helplessness, disgust, or fear. Accordingly, we assume that imaginal exposure of trauma-related primary lead to a better acceptance of these emotions. The emotional experience that the trauma - and its consequences - were not "my fault" should also lead to a significant decrease of secondary emotions like guilt or shame.

Furthermore, patients learn to process automatic thoughts and maladaptive trauma-related emotions from a more distant perspective. This leads to more control over the emotion-driven action tendencies and their replacement with functional behavior. Specific techniques used in DBT-PTSD are derived from both Acceptance and Commitment Therapy (ACT) (Hayes, Strosahl, & Wilson, 2011) and Compassion-Focused Therapy (CFT) (Gilbert, 2014). ACT provides helpful interventions for the recognition and implementation of values that improve the quality of life. Because the self-concept is often characterized by trauma-related emotions such as shame, guilt, self-hate, or disgust, many patients have difficulties dealing with themselves in a sympathetic and self-valuing manner. This is also frequently

reflected in interpersonal problems. In CFT, these difficulties are addressed through training of a compassionate perspective towards oneself and other people.

Both a pilot study (Steil et al., 2011) and an RCT (Bohus et al., 2013) showed the general safety and efficacy of DBT-PTSD. In the RCT, between-group effect-sizes with respect to the CAPS (i.e. PTSD core symptoms) were large (SMD = 1.35 vs a treatment-as-usual wait list condition) and statistically significant (Bohus et al., 2013). Pre- to post-treatment changes in radical acceptance—an important aspect of DBT-PTSD—have only been investigated in one study (Görg et al., 2017) yielding a moderate increase in radical acceptance from pre- to post-DBT-PTSD (SMD = 0.42). Empirical studies on DBT-PTSD and other trauma-focused treatments confirmed the change in non-fear-emotions including guilt and shame. With respect to trauma-related *guilt*, pre-to-post treatment decreases were reported in DBT-PTSD after CSA (Görg et al., 2017) in trauma- or present-focused group therapy for CSA (Ginzburg et al., 2009), in cognitive behavior therapy for women with intimate partner violence (Allard, Norman, Thorp, Browne, & Stein, 2016), in CPT and PE for female rape victims (Nishith, Nixon, & Resick, 2005), and in CPT for veterans (Held, Owens, Monroe, & Chard, 2017). These findings are complemented by other studies that reported decreases in trauma-related guilt in mixed PTSD samples receiving PE (Langkaas et al., 2017; Stapleton, Taylor, & Asmundson, 2006), Imagery Rescripting (IR) (Langkaas et al., 2017), EMDR (Stapleton et al., 2006), relaxation training (Stapleton et al., 2006), or imaginal exposure enhanced by IR (Arntz, Tiesema, & Kindt, 2007). Consistent with that, trauma-related self-blame changed significantly from pre- to post-IR for posttraumatic nightmares in a mixed trauma sample (Long et al., 2011). While non-significant, it tended to decrease in a sample with mixed trauma types receiving PE (Kumpula et al., 2017). Similarly, a study by Harned, Ruork, Liu, and Tkachuck (2015) reported significant decreases in both guilt and shame during exposure sessions from the start to the end of the exposure phase. The treat-

ment in this study combined DBT and PE for women with PTSD and BPD. This finding of decreased *shame* coincided with results reported for DBT-PTSD for CSA (Görg et al., 2017) as well as for PE and IR in a sample of PTSD patients after mixed traumatic events (Langkaas et al., 2017). Through these treatments, trauma-related shame decreased from pre- to post-treatment. Further studies investigated changes in different aspects of *anger*: Stapleton et al. (2006) found significant decreases in trauma-related anger in all treatment conditions (PE; EMDR; relaxation training) in a mixed trauma sample. Langkaas et al. (2017) also reported that internalized anger decreased significantly after both PE and IR. Consistent with these findings, in-session anger decreased significantly from pre- to post-exposure therapy in a military sample (Pitman, Orr, Altman, & Longpre, 1996). In patients with abuse-related PTSD, state anger decreased significantly after CPT (Galovski, Elwood, Blain, & Resick, 2014), Stress Inoculation Training, and PE (Cahill, Rauch, Hembree, & Foa, 2003), there were no significant reductions after PE in another study (Foa, Riggs, Massie, & Yarczower, 1995). Significant reductions in anger expression were observed after exposure therapy for PTSD related to CA (Cloitre et al., 2010). Finally, reductions in *sadness* were observed after exposure therapy in the military sample of Pitman et al. (1996) as were reductions in trauma-related *disgust* after DBT-PTSD for CSA (Görg et al., 2017).

However, despite the evidence indicating that trauma-related emotions decreased from pre- to post-treatment, the evidence for a substantial impact of treatments for CA-related PTSD on these emotions is limited. The few treatments that focus on PTSD related to CA remain inconclusive. While anger was investigated by Cloitre et al. (2010), shame and guilt were not. On the other hand, the evidence from the pilot study by Harned et al. (2014) is still very limited as for "the small sample size, which was further complicated by the higher than usual drop-out rate". While studies on DBT-PTSD suggested strong evidence for its general efficacy (Bohus et al., 2013; Steil et al., 2011), the potential impact on trauma-related emo-

tions and radical acceptance was only investigated in one small study (Görg et al., 2017), and this requires replication from an independent sample. Furthermore, it is unclear to what extent the trauma-related emotions post-treatment correspond to a non-clinical level.

Approaches proposed for comparing patients' scores with non-clinical values are either exclusively based on values observed in the non-clinical reference group or rely on relative approaches based on values in the patient and non-clinical reference groups (for a review see Bauer, Lambert, & Nielsen, 2004; Nasiakos, Cribbie, & Arpin-Cribbie, 2010). In the first type, an equivalence range (e.g., a multiple of the standard deviation around the mean in the non-clinical population) is defined. Particular scores falling within this range of equivalence are considered to be non-clinical, and scores outside this range are considered clinical (Bauer et al., 2004; Kendall, Marrs-Garcia, Nath, & Sheldrick, 1999; Nasiakos et al., 2010). An alternative approach is based on the relative probabilities of belonging to the patient group vs. the non-clinical group (Bauer et al., 2004; Jacobson & Truax, 1991) such as "criterion C" proposed by Jacobson and Truax (1991). This has been recommended for its robustness and empirically-supported validity.

Previous research on trauma-related emotions has not addressed the role of core PTSD symptoms. The literature summarized above does not exclude the possibility that therapies for PTSD primarily impact core symptoms while changes in trauma-related emotions may be an epiphenomenon related to modification of PTSD core symptoms. Clinically, it would be important to know whether trauma-related emotions can be addressed by treating core PTSD symptoms or—as recommended by Cloitre et al., 2012—additionally require specific interventions aiming at directly addressing dysfunctional emotions.

In summary, previous studies of trauma-focused treatments including DBT-PTSD reported decreases in several trauma-related emotions. However, important points have not been investigated or remain unclear. These points include the potentially confounding role of core

PTSD symptoms, a comparison of trauma-related emotions post-treatment with non-clinical

populations, and further data on change in radical acceptance.

Aims of this study

This study assessed the levels of trauma-related emotions in PTSD (fear, anger, guilt,

shame, disgust, sadness, and helplessness), and radical acceptance of the traumatic event at

the start of the exposure phase and at the end of residential DBT-PTSD. Our research had

three aims. First, to replicate and extend the respective results of Görg et al. (2017) in a larger

sample: We investigated whether trauma-related emotions and radical acceptance change

after DBT-PTSD. Second, we tested whether the hypothesized changes remain significant

after controlling for a change in core PTSD symptoms measured with the Davidson Trauma

Scale (DTS) (Davidson et al., 1997). Finally, we aimed to test how many patients show a

non-clinical level after DBT-PTSD with respect to acceptance and trauma-related emotions.

Methods

Participants

The patients were recruited from a three-month residential DBT-PTSD treatment pro-

gram at the Central Institute of Mental Health, Mannheim, Germany. Patients had to meet the

diagnosis of PTSD after CA. Exclusion criteria were acute alcohol or drug dependence,

schizophrenia, bipolar disorder, and medical contraindications to exposure (e.g., body mass

index ≤ 16). All participants gave written informed consent after three weeks in treatment. At

this time-point, patients committed to an individualized treatment plan including exposure.

By then, patients had also received sufficient psychoeducation on the trauma-related emo-

tions that were believed to be beneficial for the data quality due to frequent alexithymia in

PTSD (Becirovic, Avdibegovic, Softic, Mirkovic-Hajdukov, & Becirovic, 2017). The study

was conducted according to the Declaration of Helsinki and was approved by the Ethics

Committee of the Medical Faculty Mannheim, Heidelberg University. The trial was regis-

tered at the WHO Clinical Trials Registry Platform (DRKS00006226).

There were 110 patients treated during the study period, but 28 patients were not re-

cruited because they met exclusion criteria ($n = 1$), received other treatments ($n = 20$), had

insufficient German literacy ($n = 1$), or early drop-out ($n = 6$). Of the 82 patients who were

informed about the study, 60 patients agreed to participate. Of these, 18 were excluded (miss-

ing data, $n = 4$, drop out, $n = 1$, exclusion criteria fulfilled, $n = 2$, inclusion criteria not ful-

filled, $n = 3$, not receiving full DBT-PTSD, $n = 8$). The final sample included 42 patients

(90.5% female) with a mean age of 42.17 ($SD = 9.64$) years and 10.10 ($SD = 1.14$) years of

education. No significant differences between the patients from the final sample and those

who did not participate were detected. On average, patients provided the first questionnaire

after 34.19 days of the usual 90 days in treatment ($SD = 9.12$, median = 32.50). This corre-

sponds with the exposure-based interventions, which comprise the treatment phase of interest

as in this study.

On average, patients had a total of 2.00 ($SD = 1.01$) current co-occurring disorders in

addition to PTSD. The most frequent comorbidity was major depressive disorder affecting

73.8% ($n = 31$) of the sample followed by BPD (35.7%, $n = 15$). Two patients (4.8%) were

each diagnosed with dysthymia or somatoform disorder. Altogether, 90.5% ($n = 38$) of pa-

tients had been sexually abused—78.6% of the total sample ($n = 33$) before the age of 18.

Physical abuse was reported by 81.0% ($n = 34$) of patients with 78.6% of the total sample (n

$= 33$) before the age of 18. Overall, 71.4% ($n = 30$) of patients had been exposed to both

physical and sexual abuse at some point in their lives. A total of 90.5% received psychotropic

medication—mainly antidepressants (85.7%, mostly SSRIs). Other sample characteristics are

presented in Table 1.

Procedure

Patients were treated between 2014 and 2016 at the specialized trauma-unit of the Central Institute for Mental Health, Mannheim. All participants received residential DBT-PTSD, which has been described in detail elsewhere (Bohus et al., 2013; Bohus & Priebe, 2018). In short, DBT-PTSD consisted of several phases spread over 12 weeks. These phases include the following mandatory modules: psychoeducation and skills acquisition, skills-based exposure, radical acceptance, and psychosocial integration. These modules were supplemented by optional modules (e.g., to address trauma-related nightmares) that facilitates an adaptation to the diverse symptom constellations in CPTSD according to predefined rules. Skills were modified for the specific needs of traumatized clients and include: 1) mindfulness, 2) emotional regulation, 3) and distress tolerance skills. The final phase worked on personal goals that served to regain a life worth living. Supervision and consultation team meetings of therapists aimed to maintain treatment fidelity. In addition to specific trauma-focused therapy, patients could participate in general art therapy or could receive advice from social services. Treatment and assessments were provided by clinical psychologists with DBT-PTSD training who were supervised by one of the treatment developers.

Measures

Inclusion and exclusion criteria as well as co-occurring diagnoses were determined with the German version of the Structured Clinical Interview for DSM-IV (Wittchen, Wunderlich, Gruschwitz, & Zaudig, 1997). In addition, diagnosis of BPD was assessed with the International Personality Disorder Examination for ICD-10 (Mombour et al., 1996). Trauma-related emotions were rated on seven visual analogue scales each ranging from 0-100. These scales assessed trauma-related shame, guilt, disgust, anger, fear, helplessness, sadness, and radical acceptance. The emotion items were: "When I think of the traumatic event now, I feel [emotion]". For acceptance, the question was: "When I think of the traumat-

ic experience now, I can accept it as part of my life story." The severity of core PTSD symp-

toms was assessed by the Davidson Trauma Scale (DTS; Davidson et al., 1997). It consists of

17 items rating the frequency and severity PTSD symptoms and showed good test-retest reli-

ability (.86), good convergent validity with other PTSD symptom scales, and sensitivity to

treatment response. The DTA authors defined the clinical cut-off as 40 (Davidson et al.,

1997). Cronbach's α of the DTS in this study was .93. Trauma history was assessed via a

questionnaire that required patients to indicate if they had experienced one of the following

traumatic events: sexual abuse, physical abuse, suicide, or homicide of a close person, war,

imprisonment, torture, accidents, or natural disasters.

Data analysis

Significance testing of changes in trauma-related emotions and radical acceptance was

carried out from repeated measures multivariate analyses of variance (MANOVA). To test

our second hypothesis, a repeated-measure multivariate analysis of covariance (MANCOVA)

was computed, controlling for changes in the DTS. The third hypothesis explored to which

degree the patients' trauma-related emotions and acceptance post treatment would show

levels comparable to a non-clinical population. Since the trauma-related emotions in our

study explicitly refer back to a traumatic event, reference values were sought from a sample

representing a population with the same past trauma experience but not suffering from PTSD.

We used the data from a subsample published by Rausch et al. (2016) who tested healthy

traumatized women with a history of CA before the age of 18 without having developed

PTSD, any other lifetime axis I disorder, or BPD as a reference for our sample. Although the

data from the non-clinical population were not part of our study, they were sufficient to

define cut-offs between clinical and non-clinical levels of emotions (and radical acceptance)

via the criteria of Kendall et al. (1999) and Jacobson and Truax (1991). According to Kendall

the cut-off is defined as $mean_{reference\ group} +/-1SD_{reference\ group}$ for each of the trauma-

related emotions and for radical acceptance, respectively, where the non-clinical data serve as the reference group. According to Jacobson & Truax (1991), the cut-off is defined as the point that is equally likely for a score to be drawn from the clinical (our patient sample at the start of the exposure phase) or the non-clinical data (the sample from Rausch et al., 2016). Effect sizes were computed as η^2 and as standardized mean differences (*SMD*). The η^2 can be interpreted as the proportion of explained variance; by convention, *SMDs* of 0.2, 0.5, and 0.8 correspond to small, medium, and large effects (Cohen, 1988). Individual changes for each trauma-related emotion were illustrated with Bertin plots. SPSS v. 21 was used for descriptive and inferential statistics; Bertin plots were realized in R (v. 3.1.3).

Results

According to the MANOVA (included all trauma-related negative emotions investigated in this sample), these emotions clearly changed from the start of the exposure phase to the end of DBT-PTSD (Wilks' $\Lambda = 0.34$, $p < .001$, $\eta^2 = 0.56$) even after controlling for the change in the total DTS score (Wilks' $\Lambda = 0.65$, $p < .001$, $\eta^2 = 0.35$).

The decline encompassed a wide range of trauma-related emotions illustrated in Figure 1, Table 2, and Supplement 2: The change was statistically significant for all emotions except anger. The effect-sizes were large for all emotions except anger and sadness (i.e., for shame, guilt, helplessness, fear, and disgust). Average DTS scores at the start and end of DBT-PTSD were 88.30 (*SD* = 22.96) and 61.97 (*SD* = 26.85). Changes in all emotions but anger were positively and significantly correlated with changes in the DTS. Inter-correlations between changes in emotions were positive except for a non-significant negative association between anger and guilt (see Supplement 1). When controlling for changes in the DTS total score, changes in trauma-related emotions were significant for all variables except anger and sadness (see Table 2). Radical acceptance increased significantly over time ($t_{40} = - 5.66$, $p < .001$, SMD = 0.88); this remained statistically significant after controlling for changes in the

DTS total score (Wilks' $\Lambda = 0.86$, $p = .018$, $\eta^2 = 0.14$). A post-hoc power analysis (setting α at 0.05, 1-β at 0.80, and assuming a correlation between pre- and post-measures of r = .50) indicated that the study was adequately powered to detect effect sizes of $\eta^2 \geq .06$.

Supplement 2 indicates that the average levels of trauma-related emotions at the start of the exposure phase differed from respective levels in the non-clinical reference group and approached non-clinical reference values by the end of DBT-PTSD. Table 2 shows the percentage of participants' emotions falling into the non-clinical range (according to Kendall et al. (1999)) by the end of treatment ranged from 47.6% (for sadness) to 76.2% (for guilt). The respective percentages on the basis of the criterion of Jacobson and Truax (1991) ranged from 35.7% (for anger) to 81.0% (for guilt). This indicates that by the end of treatment, 81.0% of patients had achieved a level of trauma-related guilt that resembled the non-clinical control group rather than the baseline values of the patient group.With respect to radical acceptance, the criterion by Kendall et al. (1999) was fulfilled by 31.0% of the patients, and the criterion by Jacobson and Truax (1991) was fulfilled by 38.1% of the patients. The percentages of patients who met the Kendall criterion at the start of the exposure phase ranged from 7.3% to 54.8% (see Table 2).

Discussion

Main findings and comparison to prior research

We investigated levels of trauma-related emotions and of radical acceptance in patients with PTSD related to CA pre- and post-DBT-PTSD. Overall, patients reported statistically significant decreases in trauma-related emotions and increases in radical acceptance. Anger was the only outcome measure that did not improve in a statistically significant way. Changes in guilt, shame, disgust, fear, helplessness, and radical acceptance were significant when controlling for changes in core PTSD symptoms. This indicates that a relevant proportion of change in trauma-related emotions and radical acceptance was not driven by a change

in core PTSD symptoms. Depending on the outcome variable, 31.0 to 76.2% showed a non-clinical level after treatment (Kendall et al., 1999) i.e., post-treatment scores of these participants were similar to the traumatized but non-clinical reference sample.

The decrease in trauma-related emotions is in line with prior research. Changes were most pronounced for trauma-related shame and guilt ($SMD = 1.5$ for both emotions). The results complement earlier studies regarding similar changes (Allard et al., 2016; Arntz, Tiesema, & Kindt, 2007; Cloitre et al., 2010; Ginzburg et al., 2009; Görg et al., 2017; Harned et al., 2015; Held et al., 2017; Langkaas et al., 2017; Long et al., 2011; Nishith et al., 2005). The large effects with respect to shame and guilt in our study may reflect the attention to these emotions in DBT-PTSD. Guilt is addressed as a secondary emotion, which helps to reduce the experience of helplessness (Bohus & Priebe, 2018). In particular, DBT-PTSD applies both cognitive interventions according to Ehlers et al. (2005) and skills according to Linehan (1993) to address shame and guilt. During skill-assisted exposure, patients were repeatedly asked to test their hypotheses about their own responsibility, their faults, and their contributions to the abuse. This procedure might explain the change in secondary guilt cognitions (e.g., "this happened since I am bad and seductive") and related emotions (guilt and shame).

The fact that changes in trauma-related anger were least obvious may relate to functional aspects of trauma-related anger (Langkaas et al., 2017); this anger might result from a decrease in inappropriate self-blame (patients realizing that the perpetrator is responsible for the traumatic event, not themselves). The notion that a change in dysfunctional cognitions often results in appropriate anger directed to the perpetrator is substantiated in a study by Kleim, Graham, Bryant, and Ehlers (2013) in non-clinical traumatized controls with prior exposure to assault or motor vehicle accidents: These participants also reported feelings of anger in response to the intrusive experience although the level of self-reported anger was significantly lower than levels reported in patients with PTSD.

It is also not surprising that some patients experience high levels of sadness at the end of the three-month treatment. Radical acceptance of the traumatic event is frequently accompanied by appropriate sadness. Future studies should test whether sadness is reduced in follow-up studies. Significant increases in radical acceptance with a large effect size ($SMD = 0.88$) extends the findings of an earlier study that reported moderate but non-significant increases in radical acceptance from the start to the end of DBT-PTSD (Görg et al., 2017).

The study further extended previous findings because it showed that a relevant proportion of change in trauma-related emotions and radical acceptance is not merely an epiphenomenal effect following changes in core PTSD symptoms. Finally, this is the first study to show that a substantial proportion of patients showed a non-clinical level of trauma-related emotions by the end of the treatment—especially for guilt and shame (76.2% and 69.0%, respectively).

Limitations and strengths of the study

Although treatments for PTSD have shown general efficacy (Cusack et al., 2016; Watts et al., 2013), there is a need to better characterize efficacy profiles of available treatments. Efficacy profiles of PTSD treatments are relevant because modern conceptualizations of PTSD include a wide spectrum of conditions. Notably, the DSM-5 (American Psychiatric Association, 2013) and the ICD-11 (WHO, 2018) included non-fear emotions among diagnostic criteria. The ICD-11 conceptualization of CPTSD lists "deep and pervasive feelings of shame, guilt, or failure related to the traumatic event," among characteristics separating CPTSD from PTSD. Shame and guilt are the trauma-related emotions that decreased the most after treatment with DBT-PTSD. Future research is clearly warranted to investigate the impact of DBT-PTSD and of other treatments for different trauma-related emotions. Patients reported different profiles of trauma-related emotions that might require specifically tailored

interventions depending on which emotions are most pronounced. Empirically-based decision rules should guide differential indications (Deisenhofer et al., 2018).

Implications for future research and clinical practice

Although treatments for PTSD have shown general efficacy (Cusack et al., 2016; Watts et al., 2013), there is a need to better characterize efficacy profiles of available treatments. Efficacy profiles of PTSD treatments are relevant, since modern conceptualizations of PTSD account for a wide spectrum of conditions. Notably, the DSM-5 (American Psychiatric Association, 2013) and the ICD-11 (WHO, 2018) included non-fear emotions among diagnostic criteria. The ICD-11 conceptualization of CPTSD lists "deep and pervasive feelings of shame, guilt, or failure related to the traumatic event," among characteristics separating CPTSD from PTSD. Shame and guilt are the trauma-related emotions which decreased most after treatment with DBT-PTSD. Future research is clearly warranted to investigate the impact of DBT-PTSD and of other treatments for different trauma-related emotions. Patients reported different profiles of trauma-related emotions which might require specifically tailored interventions depending on which emotions are most pronounced. Empirically-based decision rules should guide differential indication (Deisenhofer et al., 2018).

Conclusion

Trauma-related emotions and radical acceptance changed from the start of the exposure phase to the end of the three-month residential DBT-PTSD. A high proportion of change in these variables cannot be explained by changes in core PTSD symptoms alone. The most encouraging results were observed with respect to trauma-related guilt and shame given that most patients reached a non-clinical level with respect to these emotions.

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Table 1. Patient Characteristics (N=42).

	Mean	SD	Range
Age in years	42.17	9.64	23-60
Years in school	10.10	1.14	8-12
DTS at intake	88.39	23.24	29-128
Weeks in therapy	11.95	1.48	8-14
	n		% Total sample
Sexual abuse	38		90.5%
…before age 18yrs	33		78.6%
…after age 18yrs	15		35.7
Physical abuse	34		81.0
…before age 18yrs	33		78.6
…after age 18 yrs	7		16.7
Accident	4		9.5
Suicide/homicide	5		11.9
War/Torture/Imprisonment	1		2.4
Borderline Personality Disorder	15		35.7
Major Depressive Disorder	31		73.8
Anxiety Disorders	7		16.7
Eating Disorders	9		21.4
Antidepressants	36		85.7
Neuroleptic medication	17		40.5
Mood stabilizer	18		42.9
Other psychotropic medication	16		38.1

Table 2. Descriptives, test statistics, and standardized mean of the difference (SMD[1]). Comparison between patients at the start of the exposure and at the end of DBT-PTSD with and without controlling for change in the Davidson Trauma Scale (DTS).

		Start	End	Start vs. end	Start vs. end controlling for DTS change	% showing a non-clinical level		
						J&T (1991)	Kendall et al. (1999)	
							Start	End
Fear	N	38	38	$t = 8.79$**	*Wilk's $\Lambda = 0.63$***	63.2%	10.5%	55.3%
	M	73.16	25.53	*SMD* = 1.43				
	SD	26.11	26.07					
Helplessness	N	37	38	$t = 7.10$**	*Wilk's $\Lambda = 0.77$***	55.3%	10.8%	50.0%
	Mean	74.59	30.00	*SMD* = 1.17				
	SD	28.05	29.68					
Disgust	N	42	42	$t = 5.99$**	*Wilk's $\Lambda = 0.90$**	50.0%	23.8%	64.3%
	Mean	63.57	33.33	*SMD* =				
	SD	28.70	31.05	0.92				
Guilt	N	42	42	$t = 9.90$**	*Wilk's $\Lambda = 0.56$***	81.0%	11.9%	76.2%

	Mean	59.29	11.19	$SMD = 1.53$				
	SD	31.19	16.11					
Shame	N	42	42	$t = 9.57**$	$Wilk's\ \Lambda = 0.60**$	69.0%	11.9%	69.0%
	Mean	75.71	25.48	$SMD = 1.48$				
	SD	30.30	26.98					
Anger	N	42	42	$t = 0.78$	$Wilk's\ \Lambda = 0.97$	35.7%	54.8%	59.5%
	Mean	43.33	39.29	$SMD = 0.12$				
	SD	35.11	32.11					
Sadness	N	42	42	$t = 2.33*$	$Wilk's\ \Lambda = 1.00$	47.6%	28.6%	47.6%
	Mean	62.38	49.52	$SMD = 0.36$				
	SD	30.19	30.84					
Radical Acceptance	N	41	42	$t = -5.66**$	$Wilk's\ \Lambda = 0.86*$	38.1 %	7.3%	31.0%
	Mean	22.20	55.95	$SMD = 0.88$				
	SD	24.75	30.37					

[1]*SMDs* of 0.2, 0.5, and 0.8 correspond to small, medium, and large effects. Significant on the level of *<.05 (two-tailed) **<.01 (two-tailed)
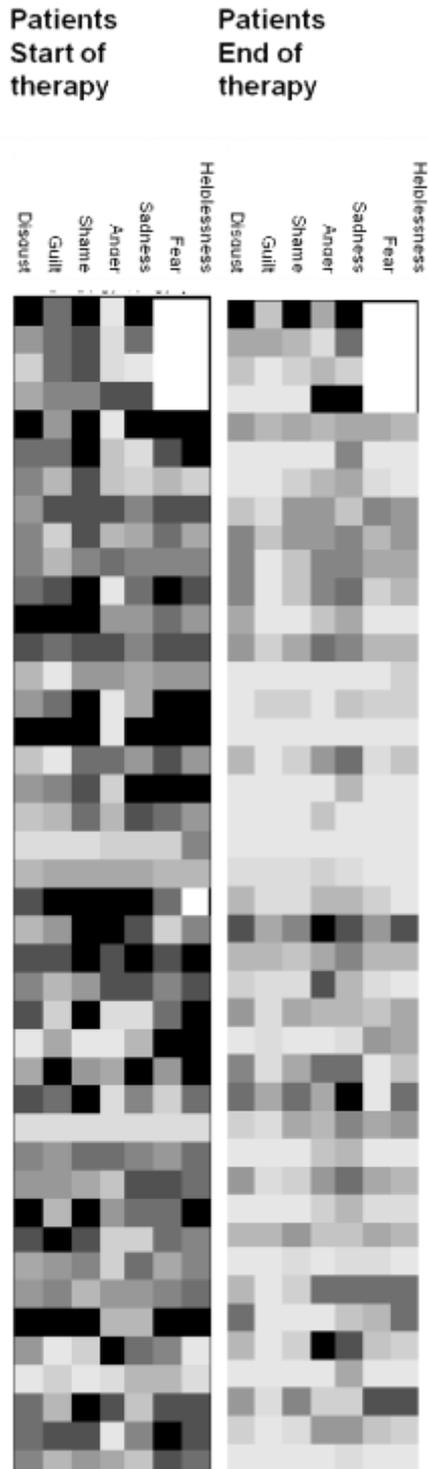
Figure 1. Bertin plots for the intensity ratings of each negative trauma-related emotion at the start of the exposure therapy phase and at the end of DBT-PTSD. Each row refers to one person while each column represents one specific emotion. The color code ranges from light grey (low ratings) to black (high ratings) and white signifies missing observations.