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Response of young patients with probable ICD-11 complex PTSD to treatment with developmentally adapted cognitive processing therapy

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ABSTRACT

Background: ICD-11 features Complex Posttraumatic Stress Disorder (CPTSD) as a new diagnosis. To date, very few studies have investigated CPTSD in young patients, and there is a need for evidence on effective treatment.

Objective: The present study evaluates the applicability of developmentally adapted cognitive processing therapy (D-CPT) for CPTSD in young patients in a secondary analysis of the treatment condition of a randomized controlled trial (RCT) investigating the efficacy of D-CPT.

Methods: The D-CPT treatment group in the original study included 44 patients (14–21 years) with DSM-IV PTSD after childhood abuse. We used the ICD-11 algorithm to divide the sample into a probable CPTSD and a non-CPTSD group. We performed multilevel models for interviewer-rated and self-rated PTSD symptoms with fixed effects of group (CPTSD, non-CPTSD) and time (up to 12 months follow-up) and their interaction. Treatment response rates for both groups were calculated.

Results: Nineteen (43.2%) patients fulfilled criteria for probable ICD-11 CPTSD while 25 (56.8%) did not. Both CPTSD and non-CPTSD groups showed symptom reduction over time. The CPTSD group reported higher symptom severity before and after treatment. Linear improvement and treatment response rates were similar for both groups. D-CPT reduced symptoms of disturbances in self-regulation in both groups.

Discussion: Both, patients with and without probable ICD-11 CPTSD seemed to benefit from D-CPT and the treatment also reduced disturbances in self-regulation.

Conclusion: This study presents initial evidence of the applicability of D-CPT in clinical practice for young patients with CPTSD. It remains debatable whether CPTSD implies different treatment needs as opposed to PTSD.

Respuesta de pacientes jóvenes con probable TEPT Complejo según la CIE-11 al tratamiento con la terapia de procesamiento cognitivo adaptada según el desarrollo

Antecedentes: La CIE-11 presenta al Trastorno de Estrés Postraumático Complejo (TEPTC) como un nuevo diagnóstico. Hasta la fecha, muy pocos estudios han investigado el TEPTC en pacientes jóvenes y existe la necesidad de evidencia sobre un tratamiento efectivo.

Objetivo: El presente estudio evalúa la aplicabilidad de la Terapia de Procesamiento Cognitivo adaptada según el desarrollo (TPC-D) para el TEPTC en pacientes jóvenes en un análisis secundario de la condición de tratamiento de un ensayo clínico controlado y aleatorizado (ECA) que investiga la eficacia de la TPC-D.

Métodos: El grupo de tratamiento de la TPC-D en el estudio original incluyó 44 pacientes (14–21 años) diagnosticados con TEPT según el DSM-IV después del abuso infantil. Utilizamos el algoritmo de la CIE-11 para dividir la muestra en un grupo de TEPTC probable y otro grupo sin TEPTC. Realizamos modelos multinivel para los síntomas de TEPT, calificados por un entrevistador y por auto-reportes, con efectos fijos de grupo (TEPTC, sin TEPTC), de tiempo (hasta 12 meses de seguimiento) y su interacción. Se calcularon las tasas de respuesta al tratamiento para ambos grupos.

Resultados: 19 pacientes (43.2%) cumplieron los criterios de TEPTC probable, según la CIE11, mientras que 25 pacientes (56.8%) no lo hicieron. Tanto el grupo de TEPTC probable como el grupo sin TEPTC mostraron una reducción de síntomas con el tiempo. El grupo de TEPTC reportó una mayor severidad de síntomas antes y después del tratamiento. Las tasas de mejora

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Abuso infantil; adolescentes; terapia de procesamiento cognitivo; trastorno de estrés postraumático; TEPT complejo; TEPT; psicofisiología; respiración; estrés

关键词

虐待儿童; 青少年; 认知加工疗法; 创伤后应激障碍; 复杂性PTSD

HIGHLIGHTS

- We investigated the applicability of developmentally adapted cognitive processing therapy (D-CPT) to reduce PTSD symptoms in abused young patients with and without probable CPTSD.
- Findings showed significant reduction of PTSD symptoms in both groups and results remained stable over a 12-month follow-up period.

lineal y de respuesta al tratamiento fueron similares en ambos grupos. La TPC-D redujo los síntomas de alteraciones en la autorregulación en ambos grupos.

Discusión: Tanto los pacientes con y sin TEPTC probable según la CIE-11 parecían beneficiarse de la CPT-D y el tratamiento también redujo las alteraciones en la autorregulación.

Conclusión: Este estudio presenta evidencia inicial sobre la aplicabilidad de la TPC-D en la práctica clínica en pacientes jóvenes con TEPTC. Sigue siendo debatible si el TEPTC requiere diferentes necesidades de tratamiento en contraposición al TEPT.

可能患有ICD-11复杂性PTSD的年轻患者对发展适应性认知加工疗法的反应

背景: ICD-11具有复杂性创伤后应激障碍（CPTSD）作为新诊断。至今很少有研究对年轻患者的CPTSD进行研究, 因此需要有效治疗的证据。

目的: 本研究在一项考查发展适应性认知加工疗法（D-CPT）疗效的随机对照试验（RCT）治疗条件的二级分析中, 评估了D-CPT在年轻患者中的适用性。

方法: 原始研究中的D-CPT治疗组包括44例童年期虐待后的DSM-IV PTSD患者（14-21岁）。我们使用ICD-11算法将样本分为可能的CPTSD组和非CPTSD组。我们对访谈者评价和自我评价的PTSD症状和组别（CPTSD组、非CPTSD组）、时间（长达12个月的随访）的固定效应及其交互作用构建了多水平模型。计算了两组的治疗反应率。

结果: 19名（43.2%）患者符合可能的ICD-11 CPTSD标准, 而25名（56.8%）不符合。CPTSD组和非CPTSD组均表现出症状随时间减轻。CPTSD组报告了更高的治疗前后症状严重程度。两组的线性改善和治疗反应率相似。D-CPT减轻了两组自我调节障碍的症状。

讨论: 有无可能的ICD-11 CPTSD的患者似乎都从D-CPT中受益, 该治疗还减少了自我调节障碍。

结论: 本研究提供了D-CPT在年轻CPTSD患者临床实践中适用性的初步证据。CPTSD是否表明有与PTSD不同的治疗需求尚有争议。

The 11th version of the International Classification of Diseases (ICD-11; World Health Organization, 2018) contains reformulated criteria for Posttraumatic Stress Disorder (PTSD) and introduces Complex PTSD (CPTSD) as a separate diagnosis. PTSD criteria have been narrowed down to six core symptoms across the three clusters re-experiencing (intrusive memories, flashbacks or nightmares), avoidance (avoiding internal or external stimuli), and hyperarousal (hypervigilance or enhanced startle reaction to stimuli). CPTSD criteria combine PTSD with six additional symptoms in three domains of disturbances in self-organization (DSO): affective dysregulation (heightened emotional reactivity, or lack of emotions and dissociation), negative self-concept (feeling of shame, guilt or failure, or seeing oneself as diminished, defeated or worthless) and interpersonal problems (not feeling close to others, or difficulties sustaining relationships). For diagnosis, at least one symptom in each cluster is required. Both PTSD and CPTSD may follow on from one single or a series of traumatic events, and the criteria are intended for use in all age groups.

Prior to the introduction of ICD-11 CPTSD features, studies had discussed a complex form of PTSD. Different variants of the concept have been included in diagnostic manuals (for an overview see Brewin et al., 2017). ICD-11 is the first manual to utilize a hierarchical CPTSD approach building on PTSD.

Although CPTSD is proposed to be associated with childhood trauma (Karatzias et al., 2017), only few studies have focused on the impact of the new ICD-11 criteria in children and adolescents so far. A screening instrument for ICD-11 PTSD and

CPTSD has just recently been validated for young patients (Haselgruber, Sölva, & Lueger-Schuster, 2020) while the majority of studies used archival data to estimate CPTSD diagnosis (Eilers et al., 2020; Hérbert & Amédée, 2020; Perkonig et al., 2016; Sachser, Keller, & Goldbeck, 2017).

ICD-11 PTSD and CPTSD have been diagnosed in samples after single traumatic events (Elliott et al., 2020), miscellaneous events (Kazlauskas, Zelviene, Daniunaite, Hyland, & Cloitre, 2020; Sachser et al., 2017; Villalta et al., 2020) and childhood abuse (Eilers et al., 2020; Hérbert & Amédée, 2020). Most studies reported lower prevalence rates for CPTSD than for PTSD (Haselgruber et al., 2020; Hérbert & Amédée, 2020; Perkonig et al., 2016; Sachser et al., 2017) while others found higher rates for CPTSD (Eilers et al., 2020; Elliott et al., 2020). CPTSD was associated with higher comorbidity with other mental disorders (Haselgruber et al., 2020; Perkonig et al., 2016; Sachser et al., 2017), female gender, and higher impairment (Haselgruber et al., 2020; Perkonig et al., 2016). Individual studies found associations with experience of interpersonal violence (Sachser et al., 2017) or behaviour and emotion regulation problems (Haselgruber et al., 2020).

The construct validity of ICD-11 CPTSD has been examined with latent class analyses, latent profile analyses and factor analyses in various age groups using different questionnaires. Current publications debate whether the variety of statistical approaches backs the distinction between ICD-11 PTSD and CPTSD (Cloitre et al., 2020) or whether the database is not yet sufficient to prove construct validity (Ford, 2020). However,

construct validity is one of several criteria necessary to validate a new diagnosis. Another crucial aspect is the impact on treatment decisions (Reed, 2010). So far, there are still few data regarding this aspect. Two studies reported effectiveness of trauma-focused cognitive behavioural therapy (TF-CBT; Cohen, Mannarino, & Deblinger, 2006) in reducing PTSD and DSO symptoms in young patients with CPTSD in a sample of victims of sexual abuse (6–14 years, Hérbert & Amédée, 2020) and a sample of patients with miscellaneous traumatic events (7–17 years, Sachser et al., 2017).

Hérbert and Amédée (2020) compared outcomes of three groups: CPTSD, PTSD and a resilient group with low PTSD symptoms. PTSD symptoms improved with large effect size in the CPTSD group, medium effect size in the PTSD group and showed no change over the course of treatment in the resilient group. DSO symptoms in the CPTSD group did also improve with large effect size. PTSD symptoms improved with large effect sizes in both groups and DSO symptoms declined in the CPTSD group with medium to large effect sizes. Sachser et al. (2017) compared outcome of CPTSD to a PTSD group. PTSD symptoms improved with large effect sizes in both groups and DSO symptoms declined in the CPTSD group with medium to large effect sizes. In both samples, patients with CPTSD showed higher PTSD symptom severity both before and after treatment compared to the PTSD group.

In adult samples, a meta-analysis reported positive impact of trauma-focused therapies on DSO symptoms, whereby childhood abuse was associated with poor treatment response (Karatzias et al., 2019). In a recent randomized controlled trial (RCT), adult patients with childhood abuse-related PTSD and additional emotion dysregulation symptoms were treated effectively with two different trauma-focused approaches (Bohus et al., 2020).

Due to this limited evidence, treatment recommendations for CPTSD in young patients are still lacking. However, the position paper of the International Society for Traumatic Stress Studies (ISTSS) on CPTSD in children and adolescents suggests that adaptations of current trauma-focused treatments might be needed to target DSO symptoms (ISTSS Guidelines Committee, n.d.).

One trauma-focused therapy meeting this suggestion is the developmentally adapted cognitive processing therapy (D-CPT, Matulis, Resick, Rosner, & Steil, 2014) which was designed to address complex symptoms and PTSD in adolescents and young adults after childhood sexual and physical abuse. Cognitive processing therapy (CPT) is a predominantly cognitive therapy that was originally developed to treat PTSD in adult sexual assault survivors (Resick & Schnicke, 1992). While there is sufficient evidence of its efficacy

in adults (Asmundson et al., 2019), results for young patients are sparse (for an overview see Vogel & Rosner, 2020). The adapted protocol by Matulis et al. (2014) added three treatment phases to the CPT manual: focusing on building treatment motivation, training patients in emotion regulation, and working on developmental tasks (e.g., career, individuation, romantic relationships). Although the therapy was not developed specifically for CPTSD, it is reasonable to assume that D-CPT may be appropriate to treat this diagnosis. In the CPT protocol, symptoms of the DSO cluster negative self-concept are addressed. The manual focuses on cognitive restructuring and allows focusing on special themes like esteem in the last CPT phase. The additional D-CPT phases emotion regulation and developmental tasks address symptoms represented in the DSO clusters affect dysregulation and interpersonal problems. An uncontrolled pilot study (Matulis et al., 2014) and a RCT (Rosner et al., 2019) reported large effect sizes for D-CPT. Importantly, Rosner et al. (2019) also found greater improvement in PTSD symptoms and secondary outcomes (e.g., borderline symptom severity) in favour of D-CPT compared to a wait-list condition with treatment advice (WL/TA).

In summary of the above, ICD-11 will enable therapists to detect and focus on young patients meeting the new CPTSD diagnosis in clinical practice. However, no recommendations for feasible treatments have been made so far and research on this topic is still limited to one treatment manual, TF-CBT. Also, childhood abuse results in higher rates of PTSD than other types of traumatic events (Hyland et al., 2016) and is associated with the symptoms described for CPTSD such as problems in emotion regulation and interpersonal deficits (Maniglio, 2009). This study extends research on CPTSD treatment to a risk group of abused young patients and a treatment protocol designed to address complex symptoms that go beyond PTSD. We, therefore, investigate the applicability of D-CPT to reduce posttraumatic stress symptoms (PTSS) in patients with probable CPTSD.

1. Method

1.1. Participants

This study compared the response to D-CPT treatment of patients with and without probable ICD-11 CPTSD among a sample with DSM-IV PTSD. We used data from a multicenter RCT investigating the effectiveness of D-CPT for youth after childhood physical or sexual abuse (Rosner et al., 2019). The RCT included 88 participants and randomly allocated them to a treatment group or a WL/TA control group. Abuse-related DSM-IV PTSD, as a primary diagnosis, was required for inclusion. The diagnostic threshold of

the DSM-IV avoidance cluster was lowered in that study to two instead of three symptoms. Further inclusion criteria were sufficient German language skills, no or stable psychopharmacological medication, and stable living conditions. Exclusion criteria were severe suicidality, life-threatening self-harming behaviour within the previous six months, an IQ below 76, criteria of any pervasive developmental disorder, lifetime psychotic or bipolar disorder, current substance dependence (abstinence <6 months), a substance-induced disorder, or current psychotherapy.

The dataset for this analysis contained the 44 patients (female: $n = 39$, 88.7%) in the treatment group, aged 14 to 21 years ($M = 17.73$, $SD = 2.37$). They had experienced childhood physical abuse ($n = 33$, 75.0%) and/or childhood sexual abuse ($n = 37$, 84.1%). Table 1 gives a detailed sample description. All participants and legal guardians of minors gave their informed consent. Ethic committees at all study sites approved the study protocol.

1.2. Intervention and procedure

Participants received D-CPT treatment consisting of four phases: preparation and building treatment motivation, emotion regulation training, intensive CPT with approximately 15 sessions during four weeks including written trauma accounts and cognitive processing of the trauma, and work on developmental tasks (see Matulis et al., 2014, for a more detailed description). Altogether, the treatment consisted of 30 sessions with six optional additional sessions (e.g., caregiver session or crisis intervention) over a period of 16 to 20 weeks (Rosner et al., 2019). Trained interviewers collected data using structured interviews and self-rating questionnaires. For the current analysis, we used data from assessments at baseline (t0), after

treatment (t1), three months (t2), six months (t3), and 12 months (t4) after the end of treatment.

1.3. Measures

The *Clinician-Administered PTSD Scale for Children and Adolescents for DSM-IV* (CAPS-CA; Nader, Kriegler, Blake, & Pynoos, 2002; Steil & Füchsel, 2006) is a clinical interview assessing DSM-IV PTSD criteria. The frequency and intensity of symptoms are rated on separate 5-point scales (range 0–4). As suggested by the German interview guidelines (Steil & Füchsel, 2006), a symptom is recorded as present if frequency and intensity are both rated with at least 1 (meaning mild intensity and one or two occurrences in the course of the previous month). The total sum score of frequency and intensity ratings indicates the symptom severity of interviewer-rated PTSS (range 0–136).

The *University of California Los Angeles PTSD Reaction Index for DSM-IV* (UCLA-PTSD-RI; Ruf, Schauer, & Elbert, 2010; Steinberg, Brymer, Decker, & Pynoos, 2004) is a self-rating questionnaire of PTSS frequency during the previous month on a 5-point scale with 28 items (total sum score range 0–68) and a cut-off of 38 for clinically relevant symptom severity (Steinberg et al., 2004). To estimate CPTSD symptoms, a score of 3 ('much') or higher was seen as confirmation of the clinically relevant presence of a symptom as suggested by Steinberg et al. (2004).

The *Borderline Symptom List 23* (BSL-23; Bohus et al., 2009) is a self-rating questionnaire of 23 borderline symptoms during the previous week on a 5-point scale (total score range 0–92). In line with the threshold used for the UCLA-PTSD-RI, a symptom rated with a score of 3 ('much') or higher was considered to be relevant for CPTSD diagnosis.

Table 1. Sample description for total sample, CPTSD and non-CPTSD groups with comparison of CPTSD and non-CPTSD groups.

Characteristics	Total sample, $N = 44$	CPTSD group, $n = 19$	Non-CPTSD group, $n = 25$	p -Value
Age, M (SD)	17.73 (2.37)	17.63 (2.65)	17.80 (2.18)	.818
Female, n (%)	39 (88.64)	18 (94.74)	21 (84.00)	.370
Immigration background, n (%)	13 (29.55)	5 (26.32)	8 (32.00)	.749
Out-of-home placement or institutional care, n (%)	11 (25.00)	4 (21.05)	7 (28.00)	.731
History of at least one traumatic event, n (%)				
sexual violence	33 (75.00)	18 (94.74)	15 (60.00)	.013
physical violence	37 (84.09)	16 (84.21)	21 (84.00)	1.00
Comorbid disorders DSM-IV, n (%)				
1 or more comorbid disorders	34 (77.27)	17 (89.47)	17 (68.00)	.148
Borderline Personality Disorder	5 (37.68)	2 (10.53)	3 (12.00)	1.00
Mood disorder	21 (47.73)	11 (57.89)	10 (40.00)	.499
Anxiety disorder	14 (31.82)	8 (42.11)	6 (24.00)	.294
Nicotine dependence	11 (25.00)	5 (26.32)	6 (24.00)	1.00
Depressive symptom score (BDI), M (SD)	27.48 (12.41)	34.37 (11.61)	22.24 (10.43)	.002
Borderline symptom score (BSL-23), M (SD)	35.82 (21.09)	46.84 (20.13)	27.44 (17.98)	.001
History of at least one suicide attempt before treatment, n (%) ^a	14 (31.82)	8 (42.11)	6 (24.00)	.329
History of non-suicidal self-harm, n (%) ^a	32 (72.73)	17 (89.47)	15 (60.00)	.077
Psychotropic medication, n (%) ^b	7 (15.91)	2 (10.53)	5 (20.00)	.672

Abbreviations: BDI: Beck Depression Inventory; BSL-23: Borderline Symptom List-23; CPTSD: Complex Posttraumatic Stress Disorder; DSM-IV: Diagnostic and Statistical Manual of Mental Disorders 4th edition.

^amissing information: total sample $n = 1$ (2.27%), CPTSD group $n = 0$ (0.00%), non-CPTSD group $n = 1$ (4.00%).

^bmissing information: total sample $n = 9$ (20.45%), CPTSD group $n = 4$ (21.05%), non-CPTSD group $n = 5$ (20.00%).

The *Beck Depression Inventory II* (BDI-II; Beck, Steer, & Brown, 1996; Hautzinger, Keller, & Kühner, 2006) assesses self-reported depressive symptoms (21 items, total score range 0–63).

1.4. Statistical analyses

1.4.1. CPTSD criteria

To estimate CPTSD features, we used selected items from CAPS-CA, BSL-23 and UCLA-PTSD-RI representing these symptoms with thresholds for single items as described in the measures section. Ten of the twelve symptoms were mapped on matching items from CAPS-CA corresponding to both re-experiencing, avoidance, hyperarousal and affect dysregulation features and each one feature of negative self-concept and interpersonal problems of the ICD-11 CPTSD criteria. One symptom of negative self-concept ‘diminished, defeated or worthless’ was based on BSL-23 (item ‘I felt worthless’). One symptom of interpersonal problems ‘not feeling close to others’ was based on UCLA-PTSD-RI (item ‘feeling of detachment or estrangement from others’). A detailed listing of the matched items was published elsewhere (Eilers et al., 2020, online supplementary). In our DSM-IV PTSD sample, we estimated the number of participants additionally fulfilling the probable CPTSD criteria. The remaining patients were labelled ‘non-CPTSD’ group.

1.4.2. Treatment outcomes for probable CPTSD and non-CPTSD

Due to the hierarchical data structure, we used multi-level models to estimate the treatment response of CPTSD and non-CPTSD groups (main effects), and to test whether diagnosis of CPTSD would moderate the patients’ change in PTSS over time (group \times time interaction). First, the variance partitioning of the dependent variables and the possibility of multilevel models were estimated using interclass correlations (ICC) based on null models. Second, separate growth curve models were run for both dependent variables, interviewer-rated PTSS (CAPS-CA total symptom severity score for all assessment points), and self-rated PTSS (UCLA-PTSD-RI sum score for all assessment points). The models included a random intercept and slope and fixed effects of time (in weeks) and group (0 = non-CPTSD, 1 = CPTSD) and their interaction. We tested for age and gender as covariates by including them as fixed effects. Contribution of the covariates was evaluated based on the significance of fixed effects and model fit indicated with smaller values of the Akaike’s information criterion (AIC) and Bayesian information criterion (BIC). To quantify change over time, we calculated Cohen’s *d* effect sizes.

Hedge’s *g* was used to determine between-group effect sizes.

1.4.3. Treatment response rates

We calculated the per cent improvement in the CAPS-CA symptom severity score, and used Fisher’s exact test to compare treatment response rates between groups. Treatment response was defined as a reduction of 50% or more in the CAPS-CA symptom severity score (Blanchard & Schwarz, 1988; Steil & Füchsel, 2006). For this analysis, the last observation carried forward (LOCF) was used as a conservative approach for missing data. To obtain descriptive information about the effectiveness of D-CPT in changing DSO symptoms, we calculated the prevalence rates of CPTSD symptom clusters and probable CPTSD diagnosis at all assessment points. We used IBM SPSS statistics, version 25, for all analyses.

2. Results

2.1. Applying CPTSD criteria

Nineteen (43.2%) patients fulfilled the criteria for probable CPTSD and 25 (56.8%) patients were in the non-CPTSD group. Significantly, more CPTSD patients reported a history of sexual violence compared to the non-CPTSD group. The scores for depression and borderline symptoms were higher in the CPTSD group (Table 1).

2.2. Treatment effects

Of the 44 patients in the treatment group, 29 (65.9%) completed t1 and t2 assessments, 28 (63.36%) t3, and 22 (50.0%) t4. Numbers of assessment participants per group are displayed in Table 2. Chi-square tests revealed no differences in dropout rates among CPTSD and non-CPTSD groups. T1 measurement was reached $M = 29.38$ ($SD = 7.31$) weeks after t0, t2 at $M = 44.11$ ($SD = 12.12$) weeks, t3 at $M = 58.42$ ($SD = 11.96$) weeks, and t4 at $M = 87.49$ ($SD = 17.36$) weeks after t0. Means were higher in the non-CPTSD group regarding time to reach t1 (CPTSD: $M = 27.67$ weeks, $SD = 7.56$; non-CPTSD: $M = 30.61$ weeks, $SD = 7.10$). Means were higher in the probable CPTSD group regarding time to reach t4 (CPTSD: $M = 90.93$ weeks, $SD = 20.96$; non-CPTSD: $M = 84.63$ weeks, $SD = 14.00$) and number of additional sessions (CPTSD: $M = 2.63$, $SD = 2.45$; non-CPTSD: $M = 1.83$, $SD = 1.18$). Differences between groups were not significant.

Interviewer-rated and self-rated PTSS, as measured by CAPS-CA and UCLA-PTSD-RI sum scores, are presented in Table 2. At baseline, the means of UCLA-PTSD-RI were above clinical cut-off in the CPTSD

Table 2. Symptom scores of PTSS for the total sample, CPTSD and non-CPTSD groups before (t0), after treatment (t1) and three months (t2), six months (t3), and 12 months (t4) after treatment with effect sizes of differences between CPTSD and non-CPTSD groups.

		Total sample (N= 44)		CPTSD group (n= 19)		Non-CPTSD group (n= 25)		Effect size, Hedges <i>g</i>
		<i>n</i>	<i>M</i> (<i>SD</i>)	<i>n</i>	<i>M</i> (<i>SD</i>)	<i>n</i>	<i>M</i> (<i>SD</i>)	
CAPS-CA interviewer-rated PTSS	t0	44	65.61 (23.55)	19	78.42 (18.60)	25	55.88 (22.48)	0.97
	t1	29	24.66 (21.16)	12	35.17 (24.55)	17	17.24 (15.11)	0.92
	t2	29	25.90 (25.42)	13	35.85 (30.45)	16	17.81 (17.56)	0.75
	t3	28	24.07 (29.19)	13	36.77 (35.47)	15	13.07 (16.88)	0.88
	t4	22	19.68 (21.84)	10	26.20 (26.52)	12	14.25 (16.25)	0.56
UCLA-PTSD-RI self-reported PTSS	t0	44	41.20 (11.03)	19	47.84 (7.87)	25	36.16 (10.50)	1.23
	t1	27	18.11 (14.36)	12	26.75 (15.28)	15	11.20 (9.19)	1.27
	t2	25	16.12 (15.32)	12	23.50 (17.70)	13	9.31 (8.82)	1.03
	t3	26	18.15 (17.66)	13	24.46 (21.51)	13	11.85 (10.03)	0.75
	t4	21	14.76 (15.06)	10	19.00 (19.57)	11	10.91 (8.64)	0.55

Abbreviations: CAPS-CA: Clinician-Administered PTSD Scale for Children and Adolescents; CPTSD: Complex PTSD; ICD-11: International Classification of Diseases-11; PTSS: Posttraumatic stress symptoms, UCLA-PTSD-RI: University of California at Los Angeles PTSD Reaction Index.

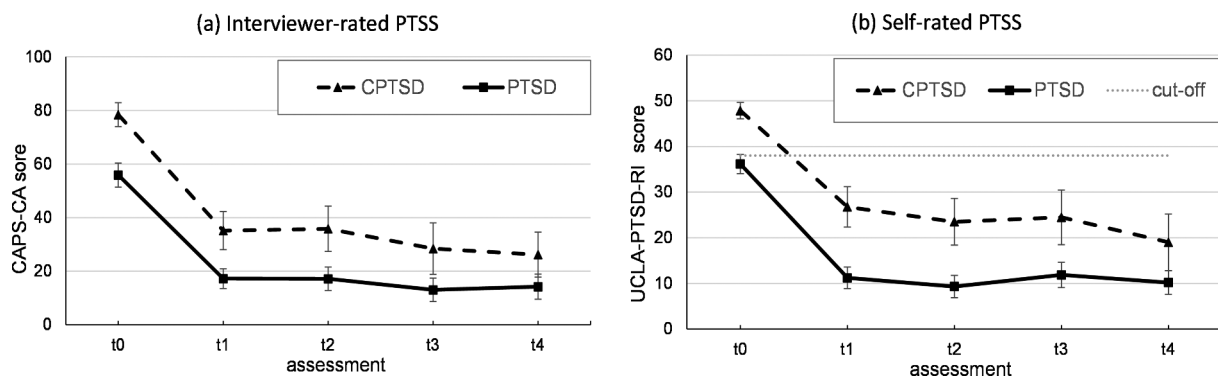


Figure 1. (a) Interviewer-rated posttraumatic stress symptoms (PTSS) measured by CAPS-CA and (b) self-rated PTSS measured by UCLA-PTSD-RI of participants at pretreatment (t0), posttreatment (t1), three months (t2), six months (t3), and 12 month (t4) after treatment for CPTSD and non-CPTSD groups. Error bars resemble standard errors. The UCLA-PTSD RI cut-off score of 38 represents clinically relevant symptom severity (Steinberg et al., 2004). Abbreviations: CAPS-CA: Clinician-Administered PTSD Scale for Children and Adolescents; CPTSD: Complex Posttraumatic Stress Disorder; UCLA-PTSD-RI: University of California at Los Angeles PTSD Reaction Index.

Table 3. Multilevel analysis of the influences of covarying level 2 variable diagnosis group (CPTSD, non-CPTSD) on change over time (in weeks): fixed effects.

		β	SE	<i>df</i>	<i>F</i>
CAPS-CA	Time	-0.58	0.09	30.83	43.68**
	Group (CPTSD/non-CPTSD)	20.98	6.36	47.69	10.87**
	Group x time interaction	0.05	0.13	28.42	0.14
UCLA-PTSD-RI	Time	-0.33	0.06	28.80	28.92**
	Group (CPTSD/non-CPTSD)	11.63	3.32	45.01	12.24**
	Group x time interaction	0.05	0.09	27.05	0.36

Abbreviations: CAPS-CA: Clinician-Administered PTSD Scale for Children and Adolescents; CPTSD: Complex Posttraumatic Stress Disorder; ICD-11: International Classification of Diseases-11; UCLA-PTSD-RI: University of California at Los Angeles PTSD Reaction Index.

** $p < .01$; * $p < .05$.

group and near cut-off in the non-CPTSD group. After treatment, the UCLA-PTSD-RI means for both groups were lower than the cut-off and remained so until t4 (Figure 1).

Both groups showed large effect sizes for symptom reduction between t0 and t1 for CAPS-CA (CPTSD: $d = 2.16$, non-CPTSD: $d = 1.39$) and UCLA-PTSD-RI (CPTSD: $d = 1.80$, non-CPTSD: $d = 1.66$).

To test for an interaction between change over time and group, we performed multilevel models. ICC indicated the possibility of multilevel models as a large proportion of variance was located at the between-

subject level (CAPS-CA: ICC = 0.39, UCLA-PTSD-RI: ICC = 0.37). Age and gender did not contribute as covariates and were not included in the model for clarity and shortness. The growth curve model for interviewer-rated PTSS showed significant symptom reduction over time and significant mean differences between groups (Table 3). CAPS-CA scores had an average differential weekly decline of -0.58 points ($SE = 0.09$, $p < .001$) across all assessment points. The probable ICD-11 CPTSD group scored an average of 20.98 points ($SE = 6.36$, $p < .001$) higher than the non-CPTSD group. Concerning group x time interaction,

the slopes of linear improvement did not differ between groups ($p = .715$). Hence, group membership did not predict symptom improvement over time.

The results for self-rated PTSS showed a similar pattern (Table 3). UCLA-PTSD-RI scores fell by an average of -0.33 ($SE = 0.06$, $p < .001$) points weekly, and the probable ICD-11 CPTSD group reported overall higher scores with an average of 11.63 ($SE = 3.32$, $p < .001$) points higher than the non-CPTSD group. Linear improvement did not differ between groups either, as group x time interaction was not significant ($p = .602$).

2.3. Treatment response

The response rates of interviewer-rated PTSS remained stable over the posttreatment period in both groups (CPTSD, t0 to t1: 47.4%, t0 to t4: 47.4%; non-CPTSD, t0 to t1: 52.0%, t0 to t4: 56.0%). Fisher's exact tests revealed no difference in the proportion of treatment response between groups at any assessment point.

Table 4 presents the prevalence rates and proportions of participants fulfilling single clusters of ICD-11 PTSD and DSO for probable CPTSD and non-CPTSD groups. Rates of ICD-11 PTSD and DSO symptoms decreased over time in both groups. Regarding probable CPTSD diagnosis, one participant in the non-CPTSD group temporarily fulfilled the CPTSD criteria at t1 but no longer met the full criteria from t2 to t4. In the CPTSD-group, two patients still met the probable CPTSD criteria at t2. One of them did not participate at t1. However, both no longer met the diagnostic threshold at t3 and t4.

Results of all analyses were similar for adapted symptom scores calculated without the items used for the estimation of CPTSD-diagnosis (online supplementary tables R1-R3).

3. Discussion

This study investigated the applicability of D-CPT to reduce PTSS in young patients with CPTSD after childhood sexual or physical abuse. A large number of our sample fulfilled probable CPTSD criteria. They showed major reductions in interviewer-rated and self-rated symptom severity over the course of treatment. Reductions remained stable over time. Patients with probable CPTSD reported higher symptom severity than the non-CPTSD group at all assessment points. Slopes of PTSS reduction and treatment response rates were similar in patients with and without probable CPTSD. D-CPT targeted both: ICD-11 PTSD and DSO symptom clusters.

All patients in our sample had experienced childhood abuse. The large proportion of patients with

Table 4. Number and proportion of patients (CPTSD and non-CPTSD groups) fulfilling ICD-11 PTSD and DSO clusters by assessment point.

ICD-11 cluster	t0, n(%)		t1, n(%)		t2, n(%)		t3, n(%)		t4, n(%)	
	CPTSD, n= 19	non-CPTSD, n= 25	CPTSD, n= 12	non-CPTSD, n= 16	CPTSD, n= 12	non-CPTSD, n= 13	CPTSD, n= 13	non-CPTSD, n= 13	CPTSD, n= 10	non-CPTSD, n= 11
PTSD										
Re-experiencing	19 (100.00)	22 (88.00)	8 (66.67)	7 (43.75)	8 (66.67)	4 (30.77)	9 (69.23)	3 (23.08)	4 (40.00)	4 (36.36)
Avoidance	19 (100.00)	24 (96.00)	8 (66.67)	6 (37.50)	7 (58.33)	2 (15.38)	5 (38.46)	2 (15.38)	2 (20.00)	2 (18.18)
Hyperarousal	19 (100.00)	13 (52.00)	4 (33.33)	6 (37.50)	3 (25.00)	3 (23.08)	5 (38.46)	2 (15.38)	3 (30.00)	2 (18.18)
DSO										
Affect dysregulation	19 (100.00)	20 (80.00)	3 (25.00)	5 (31.25)	5 (41.67)	2 (15.38)	6 (46.15)	4 (30.77)	3 (30.00)	0 (0.00)
Negative self-concept	19 (100.00)	15 (60.00)	4 (33.33)	3 (18.75)	4 (33.33)	1 (7.69)	5 (38.46)	3 (23.08)	3 (30.00)	2 (18.18)
Interpersonal problems	19 (100.00)	17 (68.00)	5 (41.67)	3 (18.75)	6 (50.00)	3 (23.08)	4 (30.77)	3 (23.08)	4 (40.00)	1 (9.09)
Probable CPTSD diagnosis	19 (100.00)	0 (0.00)	1 (8.33)	1 (6.25)	2 (12.33)	0 (0.00)	2 (15.38)	0 (0.00)	0 (0.00)	0 (0.00)

Non-CPTSD group corresponds to PTSD diagnosis according to DSM-IV criteria.

Abbreviations: CPTSD: Complex PTSD; DSO: disturbances in self-regulation; ICD-11: International Classification of Diseases-11; PTSD: Posttraumatic Stress Disorder; t0: pretreatment, t1: posttreatment, t2: three-month follow-up, t3: six-month follow-up, t4: twelve-month follow-up.

probable CPTSD in our sample is in line with previous research suggesting that interpersonal violence is associated with complex symptoms (Sachser et al., 2017). Our study adds new information to findings on group differences. Compared to the non-CPTSD group, CPTSD was associated with a higher prevalence of histories of sexual violence and higher scores of depressive and borderline symptoms. However, the comparability of results is limited as studies on CPTSD in young patients are heterogeneous in terms of sample characteristics and subgroup formation.

D-CPT was effective in reducing PTSS in patients with probable CPTSD. Slopes of symptom decline were similar compared to the non-CPTSD group while patients in the CPTSD group reported higher scores at all assessment points. D-CPT was especially designed to treat adolescents and young adults with abuse-related PTSD and additional complex symptoms (Matulis et al., 2013). In our study, treatment with D-CPT showed large effect sizes in symptom reduction not only for patients with DSM-IV PTSD but also with probable ICD-11 CPTSD. This treatment protocol seems to effectively address DSO symptoms and D-CPT may be eligible for young patients with CPTSD. These findings are in line with the results of Sachser et al. (2017) and Hérbert and Amédée (2020). All three studies used archival data to estimate CPTSD diagnosis. Sachser et al. (2017) and Hérbert and Amédée (2020) examined somewhat younger samples (Sachser et al., 2017: 7–17 years, $M=13.05$; Hérbert & Amédée, 2020: 6–14 years, $M=9.56$) treated with TF-CBT, a manual with smaller treatment dose and weekly caretaker involvement. Both TF-CBT and D-CPT are phase-based treatments and were also effective in reducing DSO symptoms. Our study furnishes additional evidence of the stability of treatment effects with a longer assessment period up to 12 months after the end of treatment and a trauma-focused manual for youth and young adults.

In our sample, patients in the non-CPTSD group, representing DSM-IV PTSD diagnosis, did also fulfill single ICD-11 PTSD and DSO clusters while not meeting the entire criteria set for probable CPTSD. Applying ICD-11 criteria, few patients in the non-CPTSD group met the diagnostic threshold in the hyperarousal cluster. Prevalence of ICD-11 PTSD and DSO symptoms declined over the course of treatment and follow-up assessments in both of our groups. This is in line with studies reporting positive impacts of trauma-focused therapies on adult patients with PTSD and additional DSO symptoms (Bohus et al., 2020; Karatzias et al., 2019). Hence, these findings may indicate that the provision of trauma-focused treatments is suitable for ICD-11 DSO symptoms. Further research has to examine the benefit of additional treatment phases. However, the provision of treatment

components targeting DSO symptoms solely to patients with diagnosed CPTSD would possibly neglect DSO symptoms in young traumatized patients who do not meet the full CPTSD criteria.

3.1. Strengths and limitations

This study is the first one to examine the treatment of probable ICD-11 CPTSD in a treatment-seeking sample of abused adolescents and young adults and over a follow-up assessment period up to twelve months after the end of treatment. Change of DSO symptoms was calculated for both groups. Furthermore, patients were included up to the age of 21 to ensure external validity for the German healthcare system, where child and adolescent therapists treat patients up to this age.

This study has several limitations. We could not diagnose CPTSD using a single valid and reliable clinical interview at study intake. We mapped diagnosis based on selected items from interviewer ratings and self-reports and were able to draw the majority of symptoms from a clinical interview. However, we cannot preclude a self-report bias in the two symptoms estimated with BSL-23 and UCLA-PTSD-RI items. In addition, both self-report questionnaires do not assess the association of symptoms with the traumatic event. The re-experiencing symptoms in the ICD-11 criteria differ from the DSM-IV criteria assessed with the CAPS-CA. In the ICD-11, intrusive memories and flashbacks are presented as one symptom (Maercker et al., 2013; World Health Organization, 2018) while they were two separate symptoms in DSM-IV. To provide a good representation of this symptom, we decided to measure memories and flashbacks with two items from CAPS-CA. Based on these limitations, prevalence rates and group differences can only be interpreted as estimates. So far, this procedure is comparable to most published studies on group differences and treatment implications in young patients with CPTSD (Perkonig et al., 2016; Sachser et al., 2017). PTSS measures in our study follow the DSM-IV definition. This may differ from ICD-11 PTSS and could therefore affect the reliability of results on treatment effects in the CPTSD group. Hence, it is hard to estimate whether the results are limited to the questionnaires we used. CAPS-CA and UCLA-PTSD-RI symptom scores included all items of the respective measures and thereby items used to estimate CPTSD diagnosis. Even though we tested for the stability of the results with adapted symptom scores excluding the items used for estimation of CPTSD diagnosis, we cannot completely exclude an influence of our methodological approach on differences in symptom severity. However, this procedure of PTSS assessment based on DSM-IV criteria is comparable to other publications using archival data (Hérbert & Amédée, 2020; Sachser et al., 2017).

Furthermore, the small sample size and, consequently, the small number of patients in each group limits the power of statistical tests and the generalizability of results. The small sample did also not allow for a multilevel model including a non-linear slope and tests of group differences regarding change in DSO symptoms. Post and follow-up assessments had large dropout rates. Even though we adjusted our analyses accordingly by choosing multilevel models and conservative approaches to data replacement, this limitation must be borne in mind when interpreting the results.

4. Conclusions

Our results indicate that D-CPT effectively reduces PTSS in abused young patients with probable CPTSD. The stability of improvement after therapy indicates that treatment with D-CPT might prevent chronic symptoms. Our findings should encourage practitioners to treat young patients suffering from CPTSD.

It remains debatable whether different treatment approaches for ICD-11 CPTSD and PTSD are necessary. Future research should examine and compare the effectiveness of trauma-focused treatments in young patients with CPTSD diagnosed using clinical interviews. Furthermore, studies should examine whether treatment dose or additional treatment phases especially designed for DSO clusters generate additional benefits for patients with CPTSD and PTSD.

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Data availability statement

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available.

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