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Imagery Rescripting as a stand-alone treatment for posttraumatic stress disorder related to childhood abuse: A randomized controlled trial

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ABSTRACT

Background and objectives: Posttraumatic stress disorder (PTSD) related to childhood abuse (CA) is associated with high symptom complexity. This study examined the efficacy of Imagery Rescripting (ImRs) as a stand-alone treatment versus a sequenced approach with Skills training in Affective and Interpersonal Regulation (STAIR) followed by ImRs for CA-related PTSD.

Methods: Outpatients of two mental health clinics with CA-related PTSD (N = 61) were randomly assigned to ImRs (16 sessions; n = 21), STAIR/ImRs (8 STAIR-sessions followed by 16 ImRs-sessions; n = 20), or Waitlist (8 weeks; n = 20). Patients of the waitlist condition were also randomized to the two active conditions for comparison of STAIR/ImRs (total n for this condition = 31) and ImRs (total n for this condition = 30) and started treatment after waitlist completion. Assessments took place at pre-treatment, after each treatment phase and at 12-week post-intervention follow-up. PTSD symptoms and diagnosis were primary outcome measures, and depression, emotion regulation and interpersonal functioning were secondary outcomes.

Results: ImRs showed greater reduction of PTSD severity (effect sizes [ES] 1.40–1.63) than STAIR (ES, 0.23–0.33) as compared to waitlist. When comparing STAIR/ImRs and ImRs directly, (i.e. including re-randomized Waitlist-patients), PTSD symptoms reduced significantly (within condition ES, 1.64–2.10) and improved further to 12-week follow-up (within-condition ES, 2.33–2.66), with no significant difference between both conditions (between-condition ES, 0.21–0.45). Loss of PTSD diagnosis was achieved by 70% in the ImRs condition and 86% in the STAIR/ImRs condition.

Limitations: The sample size was relatively small.

Conclusions: Results show that ImRs is an effective treatment for CA-related PTSD, whereby the current data do not convincingly show an additive effect of STAIR.

1. Introduction

PTSD related to childhood abuse (CA) is often associated with impairments in emotion regulation, interpersonal functioning, and high comorbidity rates in addition to the core PTSD symptoms (Cloitre, Miranda, Stovall-McClough, & Han, 2005; Cutajar et al., 2010; Gilbert et al., 2009). While trauma-focused treatments for CA-PTSD have shown to be superior to non-trauma-focused protocols (e.g. Ehring et al., 2014), active, trauma-focused treatments of CA-related PTSD face a number of challenges such as high dropout ranging from 30% to 40% (Imel, Laska, Jakupcak, & Simpson, 2013; Keefe et al., 2018; McDonagh et al., 2005), and relatively modest recovery and improvement rates ranging from 44% to 67% (Bradley, Greene, Russ, Dutra, & Westen, 2005; Dorrepaal et al., 2014). Therefore, the development of treatments that are specifically tailored to this group may be promising in order to improve treatment efficacy. With its focus on not only the traumatic experience itself but also on the meaning of these experiences ImRs is a promising method for the treatment of childhood traumas. In ImRs, the patient first imagines (parts of) the traumatic experience and subsequently imagines different intervening actions and outcomes (Arntz & Weertman, 1999; Smucker & Dancu, 1999). In this way, ImRs limits exposure to the trauma memory, possibly making it more tolerable for patients. At the same time it facilitates changes to trauma-related memory representations and (self-) appraisals, and enables the expression of suppressed emotions and

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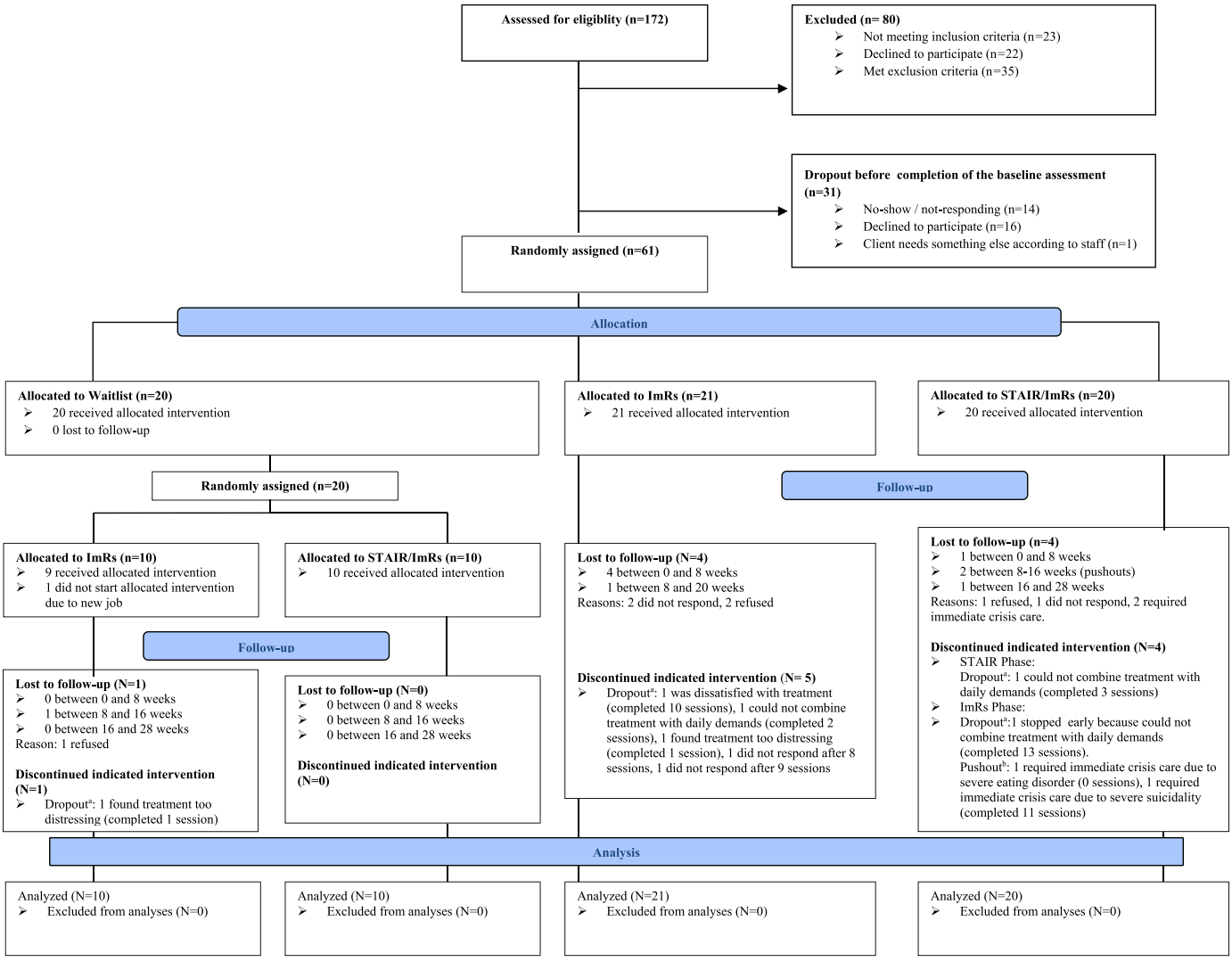

Fig. 1. Recruitment Flow Diagram.
[a] Dropout is defined as the termination of treatment or study participation on the participants' request.
[b] Pushout is defined as the termination of treatment or study participation on the request of treatment or research staff.

action tendencies in order to relinquish dysfunctional emotion regulation strategies and interpersonal schemas (Arntz, 2012; Hackmann, 2011). Several case series (Arntz, Sofi, & van Breukelen, 2013; Grunert, Smucker, & Christianson, 2007; Grunert, Smucker, Weis, & Rusch, 2003) and two controlled studies (Alliger-Horn, Zimmermann, & Mitte, 2015; Arntz, Tiesema, & Kindt, 2007) found large effects of ImRs on PTSD in mixed trauma samples. Only one case series (Raabe, Ehring, Olff, & Kindt, 2015) and one randomized controlled trial comparing ImRs to eye movement desensitization and reprocessing (EMDR) (Boterhoven de Haan et al., 2020) focused exclusively on CA-related PTSD, also finding large effects. The first aim of this study was to assess the efficacy of ImRs as stand-alone treatment in CA-related PTSD in a randomized controlled trial with a waitlist control group.

Due to the typically high dropout rates from trauma-focused interventions (Bradley et al., 2005) and the high symptom complexity in CA-related PTSD, some authors recommend sequential, multicomponent treatments with a preparatory phase focusing on emotion regulation and/or interpersonal skills before applying trauma-focused techniques in CA-related PTSD (Cloitre et al., 2011; Ford, 2015). The inclusion of a preparation phase is based on the premise that improvement of emotion regulation and/or interpersonal functioning is needed first in order to increase the patients' capacity and safety to tolerate and benefit from subsequent trauma-focused treatment, and that these improvements are best achieved through interventions specifically designed to target these domains (Cloitre, Cohen, & Koenen, 2006; Ford, 2015). Sequential treatments have indeed shown to be effective for CA-related PTSD, e.g. DBT-PTSD (Bohus et al., 2013; Steil, Dyer, Priebe, Kleindienst, & Bohus, 2011), and STAIR-MPE (Cloitre et al., 2010; Cloitre, Koenen, Cohen, & Han, 2002). Drop-out rates are possibly lower than in immediate trauma-focused treatment (Cloitre et al., 2010; McDonagh et al., 2005). While based on these findings sequential treatments appear to be effective in treating CA-PTSD, a meta-analysis shows that this is also the case for immediate trauma-focused treatments (Ehring et al., 2014). So far, direct comparisons between phase-based and immediate trauma-focused treatments are sparse and results are inconclusive. One dismantling study found larger symptom reductions for a combined treatment of STAIR followed by PE compared to the separate components (Cloitre et al., 2010), while two studies found no added value of sequential treatments for STAIR/PE compared to PE (Oprel et al., 2021) and STAIR/EMDR compared to EMDR (van Vliet et al., 2021) Therefore, as a second aim, we investigated whether a sequential treatment of STAIR/ImRs is more effective than ImRs alone. We hypothesized that (1) ImRs would be efficacious at immediate outcome when delivered to patients with CA-related PTSD compared to a waitlist control group, and

(2) trauma-focused treatment (ImRs) with the addition of a skills training focusing on emotion regulation and interpersonal functioning (STAIR/ImRs) would be more effective in reducing PTSD-symptoms than trauma-focused treatment alone (ImRs) at immediate outcome and 12 weeks follow-up.

2. Method

2.1. Design

This study is an RCT with 3 arms: (1) STAIR plus ImRs (STAIR/ImRs), (2) ImRs only (ImRs), and (3) Waitlist (WL). Patients assigned to the WL were subsequently randomized over the two active conditions (see Fig. 1). After inclusion of each patient, the first randomization was carried out by a computerized program (ALEA) on a 1:1:1 basis using stratified block sizes for gender that randomly varied between 3 and 6 patients. For patients randomized to the waitlist, the second randomization was conducted on a 1:1 basis, also using stratified, randomly varying block sizes with a maximum block size of 4 patients. The randomization blocks were programmed and randomization of the participants was performed after inclusion at the Department of Biostatistics at the Faculty of Medicine at the University of Amsterdam. A log file of all randomizations was kept on a server at that department and was released to the investigators after completion of the trial. Patients were assigned to therapists based on therapist availability.

Based on the effect sizes of the STAIR/Exposure and Support/Exposure treatment found by Cloitre et al. (Cloitre et al., 2010) we expected a moderate effect size. With an expected small to medium effect size ($f = 0.18$) for a between (STAIR/ImRs vs ImRs) by within (pre-post; $r = 0.50$) interaction between the active conditions, a power of .90 and an α level of 0.05, we had calculated a required sample size of 82 patients. However, due to a reorganization at one of the treatment sites and despite extending the inclusion period, inclusion progressed too slowly to achieve the intended number and had to be terminated after the inclusion of 61 patients. Post hoc analysis shows that with 61 patients, $\alpha = 0.05$, and a CAPS test-retest correlation of 0.50 (Blake et al., 1995) we achieved a power of 79% to detect an effect size of $f = 0.18$, and 90% to detect an effect size of $f = 0.21$.

2.2. Participants

Participants were regular outpatients attending two mental health institutions in Amsterdam (PuntP and Sinaicenter). Inclusion criteria were (1) age 18–65 years, and (2) a primary diagnosis of PTSD (according to DSM-IV) related to a history of repeated childhood sexual and/or physical abuse before the age of 15.

Exclusion criteria were (1) a DSM-IV (4th ed.; American Psychiatric Association, 2000) diagnosis of substance or alcohol dependence not in full remission for at least 6 months, (2) significant cognitive impairment defined as an estimated IQ < 85 based on school-education level, (3) psychotic or bipolar disorder, (4) use of benzodiazepines, (5) life-threatening self-harm or suicide attempts during the previous 12 weeks, (6) current assaults or threats causing current physical or emotional harm, (7) unstable living circumstances, (8) a full diagnosis of antisocial personality disorder, and (9) having received trauma-focused therapy within 6 months prior to entering the study. For a description of how these criteria were assessed, see Supplemental Material Online (Part 1).

Concurrent psychopharmacological treatment with medication other than benzodiazepines was allowed as long as patients had been on a stable dose for at least 6 weeks prior to entering the study, and that the dose was maintained during treatment.

All procedures involving patients were approved by the medical ethics committee of the University of Amsterdam, project number 2009-CP-877.

2.3. Measures

Primary outcomes were the Clinician-Administered PTSD Scale (CAPS-IV; Blake et al., 1995) and the Posttraumatic Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997). The CAPS-IV provides a PTSD symptom severity score and allows assessing the presence vs. absence of a PTSD diagnosis. PTSD severity was rated for the last month. When examining whether diagnostic criteria for PTSD were fulfilled, symptoms were considered as present if they occurred at least once a month (frequency >0) and had at least a medium intensity score (intensity >1). CAPS questions were applied to a maximum of 3 index traumas. (For further description of how index traumas were specified, see Supplemental Material Online, Part 1). The PDS is a 17-item self-report scale assessing the severity of DSM-IV PTSD symptoms over the previous month.

Secondary outcome measures were the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996), the Dissociation Questionnaire (DIS-Q; Vanderlinden, Van Dyck, Vandereycken, & Vertommen, 1993), the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), and the Inventory of Interpersonal Problems (IIP-32; Vanheule, Desmet, & Rosseel, 2006). In order to measure feelings of anger, shame and guilt, we added three items to the PDS ("Feeling guilty about the things that happened", "Feeling ashamed of what happened", "Feeling angry about what happened"). The additional items were not included in the PDS symptom severity score. For an overview of additional outcome measures administered in this study, but not reported in the current manuscript, see Supplemental Material Online (Part 2). Outcome measures were administered at baseline, after waitlist (for waitlist participants), after each treatment, and at follow-up (12 weeks post-intervention). Due to the varying treatment duration, the time points and number of assessments varied per condition, i.e. for the ImRs-condition assessments were at baseline (T0), after 8 weeks (T1) and after 20 weeks (T2); for STAIR/ImRs at baseline (T0), after 8 weeks (T2), after 16 weeks (T3) and after 28 weeks (T4); for WL/ImRs at baseline (T0), after 8 weeks WL (T1), after 16 weeks (T2) and at 28 weeks (T3), and for WL/STAIR/ImRs at baseline (T0), after 8 weeks (T1), after 16 weeks (T2), after 24 weeks (T3) and after 36 weeks (T4). See also the lower chart in Fig. 3.

Assessors were psychologists with a master's degree working at the behavioral treatment science lab (Psypoli) of the University of Amsterdam. The assessors had no contact with the therapists as assessments took place at another location than the treatment facility. Assessors were blinded to treatment allocation and assessment point (except for baseline assessment). At the beginning of each post-assessment, assessors emphasized the importance of blinding and reminded participants not to reveal the treatment condition. Interrater reliability was not formally assessed, but monitored through weekly supervision led by the first author. In these meetings an audio recording of a random assessment of that week was rated by each assessor. Deviating scores were discussed but not adjusted in the original assessment as the first author was not blind to treatment condition. Diagnoses other than PTSD were determined with the Dutch versions of the Structured Clinical Interview for the DSM-IV SCID-I (van Groenestijn, Akkerhuis, Kupka, Schneider, & Nolen, 1999); and SCID-II (Weertman, Arntz, & Kerkhofs, 2000).

2.4. Procedure

Recruitment took place at two outpatient treatment centers from November 2011 until October 2015 and consisted of 3 steps (screening, baseline-assessment, and a feasibility assessment) until randomization (see Fig. 1). The feasibility assessment was added in order to prevent dropout due to practical (i.e. scheduling) reasons. This assessment consisted of a 45-min interview between patient and the prospective therapist in order to check whether scheduling of the treatment sessions was possible. When both, therapist and patient confirmed that delivery of the treatment was feasible, randomization took place. Waitlist

STAIR
The first 4 sessions of STAIR focus on emotion regulation, i.e. identifying and labeling feelings, emotion management, distress tolerance, acceptance of feelings and increase capacity of experiencing positive emotions. The last 4 sessions are directed at the identification of trauma-related interpersonal schemas and their impact on current relationships and view of self, exploration and alteration of maladaptive schemas, effective assertiveness, flexibility in interpersonal relations and enhancing compassion for self and others. The 60-minute sessions follow the same format: psychoeducation about the impact of the trauma on the targeted skill, demonstration and in session-practice of the skill and homework exercises in order to apply the skills in daily life.

ImRs
In the first ImRs session, therapist and patient compose a list of traumatic situations and perform a pilot ImRs with non-traumatic material. In Sessions 2 to 16, ImRs is applied to process trauma memories.
The ImRs procedure consists of 3 phases: in Phase 1, patients are asked to imagine a traumatic childhood experience as vividly as possible from the child's perspective, with their eyes closed. As soon as strong trauma-related emotions are triggered, therapist and patient move to the next phase. In Phase 2, patients enter the image as an adult who witnesses the situation, and are prompted to intervene and do whatever they think is necessary. This is followed by Phase 3, in which patients imagine the scene again as a child, and experience the adult's intervention developed in Phase 2 from the child's perspective. Patients can ask for additional interventions until the child feels safe and is satisfied with the intervention.

Fig. 2. Descriptions of imagery rescripting (ImRs) and skills training in affective and interpersonal regulation (STAIR).

patients had no contact with their therapist during the waitlist period. All participants were provided with a contact number for crisis care, following standard protocol of the treatment sites (for further details of the recruitment procedure, see Supplemental Material Online, Part 3). Written informed consent was obtained from all patients.

2.5. Treatment

STAIR consisted of 8 weekly 60-min sessions and followed the STAIR manual (Cloitre et al., 2006); (see Fig. 2). ImRs was delivered in 16 twice-weekly 90-min sessions. The ImRs procedure was based on Arntz and Weertman (1999; see Fig. 2).

STAIR and ImRs sessions were audiotaped, and patients were asked to listen to the recording once between sessions. During the 12-week follow-up period, therapist and patient had one 30-min appointment via telephone, scheduled to take place 6 weeks into the follow-up period. Treatment was delivered by 11 clinical psychologists (1 male, 10 female) with an average of 12.7 (SD = 6.38) years of experience in trauma-focused treatment. Six therapists had been trained in STAIR in a 1-day workshop led by the developer of the STAIR Manual (Marylene Cloitre). The other five therapists had been trained in a 1-day training by two experienced study therapists and the first author (S.R.). For ImRs, therapists had received a 1-day workshop by the fourth author (A.A.). Participants and staff members were instructed not to start any other form of psychological treatment and to keep medication unchanged until completion of the follow-up period.

2.6. Supervision and treatment integrity

Therapists attended weekly group supervision (60 min) led by the third author (L.M.). If necessary, additional supervision was provided by telephone or e-mail. All treatment sessions were audio recorded. Based on the average of the total scores of two blind, graduate-level raters trained by the first author adherence was rated to be good to excellent with 90.84% (SD = 13.05) of all elements delivered for STAIR and 86.51% (SD = 25.96) for ImRs. Competence (1 = intervention not provided to 4 = intervention provided well) was also rated as high, with an average rating of 3.4 (SD = 0.43) for STAIR and 3.49 (SD = 0.92) for ImRs. Interrater reliability was excellent for STAIR (adherence: ICC = 0.957, $p < .001$; competence: ICC = 0.950, $p < .001$) and ImRs (adherence: ICC = 0.995, $p < .001$; competence: ICC = 0.992, $p < .001$). In both conditions, no elements of the other intervention or additional techniques were detected.

2.7. Statistical analysis

Analyses were conducted with Statistical Software SPSS 24.0 (SPSS, Inc., Chicago). Continuous variables were analyzed on an intent-to-treat basis using linear mixed models analysis (LMM) as this is the recommended technique for intent-to-treat analyses of data sets with missing values (Schafer & Graham, 2002; Twisk, de Boer, de Vente, & Heymans, 2013). For repeated measures, unstructured covariance was used. For comparison of the immediate effects of the 3 treatment components (WL vs STAIR vs ImRs) we report fixed effects of time and time-by-condition. For the primary outcome measures we performed a sensitivity analysis, using the same model but using individual treatment duration (in weeks) as time, instead of a pre-post coding (0,1). For the pre-post comparison of WL versus STAIR versus ImRs time points T0 and T1 were used (see paragraph 2.3 for the time points of assessment per condition). [1]

For the comparison of the two active treatment conditions (STAIR/ImRs vs ImRs), we combined participants of the STAIR/ImRs with the WL/STAIR/ImRs condition and participants of the ImRs-condition with

[1] Please note that the assessment point for the pre-post comparison of STAIR versus ImRs versus WL deviates from the trial registration on clinicaltrials.gov which says baseline to 16 weeks. This was due to a typing error in the registration process. The study protocol was approved for baseline to 8 weeks by the medical ethical committee of the University of Amsterdam.

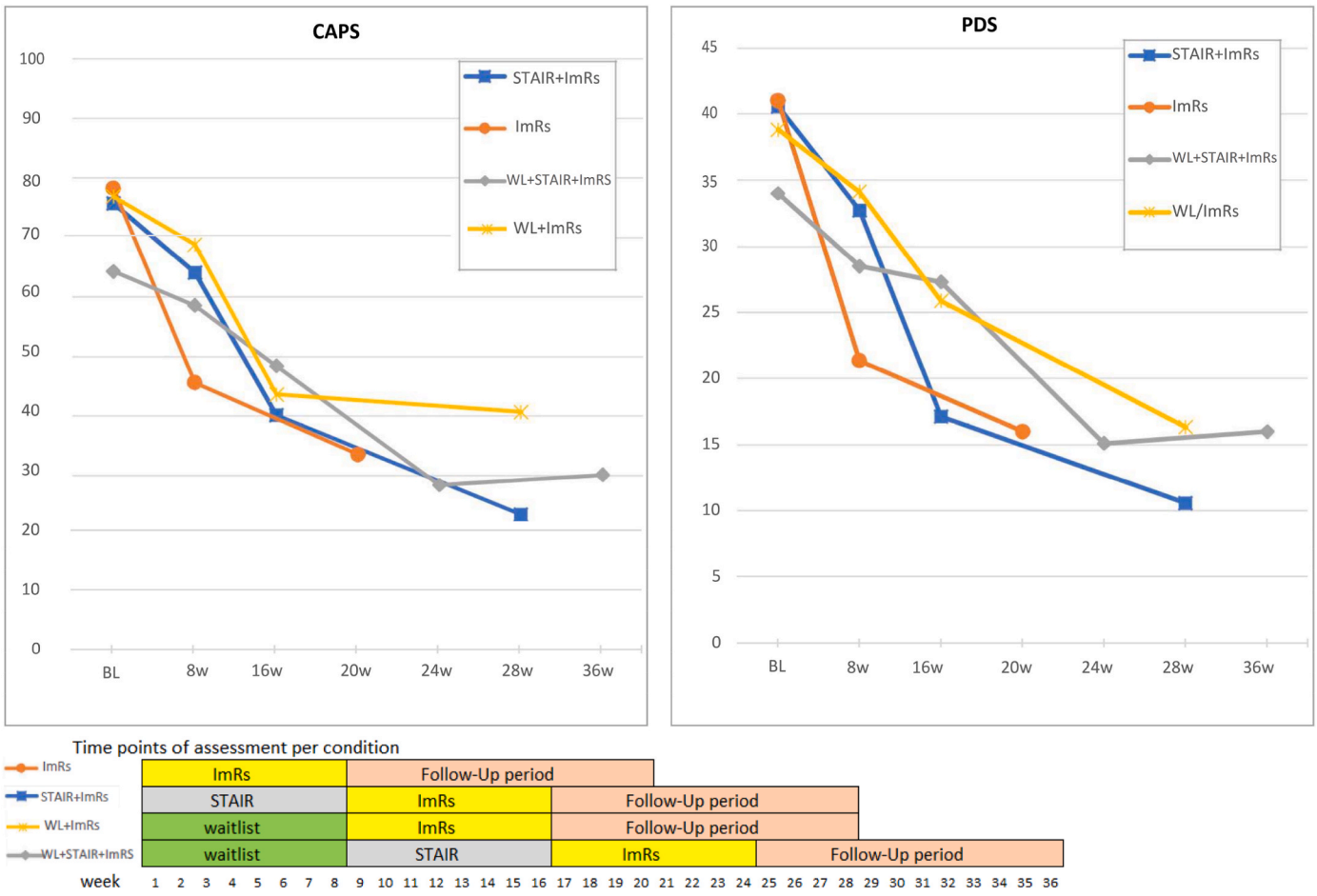

Fig. 3. Development of mean clinical (CAPS) and self-reported (PDS) severity ratings for patients' PTSD-symptoms in each condition throughout the study. STAIR + ImRs, skills training in affective and interpersonal regulation plus Imagery Rescripting; lmRs, Imagery Rescripting, WL, Waitlist control, BL, Baseline.

the WL/ImRs condition. We compared pre-post changes, using LMM, with unstructured covariance structure for the repeated part. Centered condition (−0.5, 0.5), pre-post (0,1) and their interaction were fixed predictors. For the pre-follow-up analyses, the same LMM-procedure was used. For pre-test, the following assessment points per condition were used: ImRs and STAIR/ImRs (T0), WL/ImRs and WL/STAIR/ImRs (T1). The following assessment points per condition were recoded as post-test: ImRs (T1), STAIR/ImRs (T2), WL/ImRs (T2), WL/STAIR/ImRs (T3). For follow-up (i.e. 12 weeks after completion of the treatment) the following assessment points were used: ImRs (T2), STAIR/ImRs (T3), WL/ImRs (T3), WL/STAIR/ImRs (T4).

In order to detect whether the ImRs component in the STAIR/ImRs condition was more effective than in the ImRs-only condition, we performed a sensitivity analysis on the pre-post ImRs assessments with centered condition (coded −0.5 [ImRs], 0.5 [STAIR/ImRs]), pre-post (0,1), and condition by time as predictors. As 20 participants were first on WL, we did another sensitivity analysis controlling for WL (coded −0.5, 0.5) and WL by time (0,1) interaction.

Conventional between- and within group effect sizes were computed using Cohen's *d* (Cohen, 1988) based on LMM treatment effect estimates and SDs of the baseline values. For the LMM fixed effects we also report effect sizes $r = t/\sqrt{(t2 + df)}$. Baseline differences in demographic and clinical characteristics were analyzed using analysis of variance and χ^2-tests.

3. Results

3.1. Patient sample

Fig. 1 shows the CONSORT flow diagram. Table 1 presents participants' baseline and clinical characteristics. Physical and sexual abuse was reported by 52.5% of the participants, 31.1% reported sexual abuse only and 16.4% physical abuse only. As there were potentially relevant differences between conditions in educational level and number of previous treatments, we ran sensitivity analyses with these variables as covariates. Results showed that both variables had no additional effect on outcome either assessed by CAPS or PDS.

After randomization, 6 out of 31 patients (19%) in the ImRs-condition and 4 out of 30 patients in the STAIR/ImRs condition (13%) discontinued treatment (see Fig. 1). The difference in drop out was not significant. The mean number of ImRs sessions was 13 and not significantly different between active treatment conditions.

3.2. Treatment outcome

Primary Outcome. Table 2 and Fig. 3 show the observed mean CAPS and PDS scores for all assessment points. ImRs was superior to WL and STAIR in the reduction of primary outcomes (pre-to post-treatment), with large effect sizes. STAIR did not differ significantly from WL (Table 3). When controlling for individual treatment duration, ImRs still showed significantly larger reductions than WL and STAIR.

Outcomes of the comparison between STAIR/ImRs and ImRs are summarized in Table 3. On all outcome measures, the main time effects

Table 1
Baseline demographic and clinical characteristics.

Characteristic	Active treatment versus WL			STAIR/ImRS vs ImRs		Total Sample
	ImRs	STAIR + ImRs	Waitlist	STAIR/ ImRs	ImRs	
	(N = 21)	(N = 20)	(N = 20)	(N = 30)	(N = 31)	(N = 61)
Age, mean (SD), y	35.4 (10.7)	36.8 (10.3)	35.5 (11.8)	36.1 (10.9)	35.6 (10.8)	35.9 (10.7)
Seks, No. (%)						
Male	3 (14)	2 (10)	2 (10)	3 (10)	4 (13)	7 (12)
Female	18 (86)	18 (90)	18 (90)	27 (90)	27 (87)	54 (89)
Education, No. (%)[a]						
Low	0 (0)	0 (0)	1 (5)	0 (0)	1 (3)	1 (2)
Middle	8 (38)	16 (80)	10 (50)	22 (73)	12 (39)	34 (56)
High	13 (62)	4 (20)	9 (45)	8 (27)	18 (58)	26 (42)
Employment status, No. (%)						
Student/ Employed	7 (33)	11 (55)	12 (60)	17 (57)	13 (42)	30 (49)
Unemployed	4 (19)	4 (20)	2 (10)	6 (20)	4 (13)	10 (16)
Sick leave	10 (48)	5 (25)	6 (30)	7 (23)	14 (45)	21 (34)
Trauma History (Childhood), No. (%)						
Sexual abuse	7 (33)	7 (35)	5 (25)	9 (30)	10 (32)	19 (31)
Physical abuse	6 (29)	2 (10)	2 (10)	3 (10)	7 (23)	10 (16)
Sexual and physical abuse	8 (38)	11 (55)	13 (65)	18 (60)	14 (45)	32 (53)
Axis-I comorbidity (current)[b] No. (%)						
Depressive disorder	12 (57)	16 (80)	9 (45)	17 (57)	15 (48)	37 (61)
Generalized anxiety disorder	0 (0)	1 (5)	3 (15)	1 (3)	2 (6)	4 (7)
Social phobia	5 (24)	6 (30)	5 (25)	6 (20)	7 (23)	16 (26)
Panic disorder	5 (24)	3 (15)	4 (20)	3 (10)	6 (19)	12 (20)
Obsessive Compulsive Disorder	1 (5)	1 (5)	2 (10)	1 (3)	1 (3)	4 (7)
Somatoform disorder	1 (5)	3 (15)	1 (5)	4 (13)	1 (3)	5 (8)
Substance/ alcohol abuse	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	1 (2)
Eating disorder	4 (19)	3 (15)	1 (5)	3 (10)	4 (13)	8 (13)
Axis-II comorbidity, No. (%)						
None	15 (71)	15 (75)	17 (85)	24 (80)	23 (74)	47 (77)
Avoidant	5 (24)	4 (20)	1 (5)	5 (17)	5 (16)	10 (16)
Borderline	1 (5)	1 (5)	2 (10)	1 (3)	2 (7)	4 (7)
Narcissistic	1 (5)	0 (0)	0 (0)	0 (0)	1 (3)	1 (2)
Psychotropic medication at baseline, No. (%)	7 (33)	5 (25)	4 (20)	7 (23)	10 (32)	16 (26)
Number of treatments before baseline, mean (SD)	2.5 (1.8)	1.4 (1.2)	1.8 (1.2)	1.5 (1.3)	2.3 (1.5)	1.9 (1.5)
Number of trauma-focused treatments before baseline, mean (SD)	0.3 (0.5)	0.2 (0.4)	0.3 (0.6)	0.2 (0.4)	0.35 (0.6)	0.26 (0.5)
Number of other treatments before baseline, mean (SD)	2.2 (1.8)	1.2 (1.2)	1.5 (1.1)	1.4 (1.3)	1.9 (1.6)	1.6 (1.4)

[a] Lower indicates primary education or lower general secondary education; middle, intermediate vocational education or higher high school level; high, higher vocational education or university.

[b] For ImRs vs STAIR vs WL diagnosis at T0 is reported. For STAIR/ImRs versus ImRs diagnosis at T0 is reported for patients in the STAIR/ImRs and ImRs condition and diagnosis at T1 for patients in the WL/STAIR/ImRs and WL/ImRs conditions (see Fig. 1).

were significant with further improvement at 12 weeks post-intervention follow-up. There were no differences in improvement between the two treatment conditions. Sensitivity analyses indicated that results were robust when controlling for having initially been allocated to waitlist (see Table 3).

For all analyses testing the effects of the treatment conditions on loss of the PTSD diagnosis, patients who did not meet full diagnostic criteria for PTSD anymore after completion of the WL were excluded (30%). Results showed that 11 of 22 patients in the ImRs condition (50%) no longer met criteria for PTSD compared to 16 of 23 patients in the STAIR/ImRs condition (70%) at post-treatment. At 12-week post-intervention follow-up, 70% (16 of 23) of the ImRs condition and 86% (18 of 21) of the STAIR/ImRs condition achieved a negative PTSD diagnostic status. Both conditions did not differ significantly in loss of diagnosis (post-treatment: OR, 0.41; 95% CI, 0.122–1.39; $p = .15$; Follow-up: OR, 0.36; 95% CI, 0.08–1.63; $p = .19$).

Secondary Outcome. On the guilt, shame and anger items added to the PDS, ImRs showed significantly larger improvement than STAIR and WL (Table 3). STAIR did not differ significantly from WL. Improvement of dissociative symptoms (DisQ) and emotion regulation difficulties (DERS) was significantly larger for ImRs compared to WL, but not when compared to STAIR (Table 3). There were no significant time x condition effects on self-reported depression symptoms (BDI) or interpersonal functioning (IIP-32). When comparing STAIR/ImRs and ImRs, there were no differences in improvement between the two treatment conditions on any secondary outcome measure (Table 3). Table 2 shows the observed means and SD for all secondary outcome measures. Sensitivity analyses indicated that the results were robust when controlling for having initially been allocated to waitlist (see Supplemental Material Online, Part 4).

4. Discussion

Results indicated that ImRs achieved a significantly higher symptom reduction in CA-related PTSD than STAIR and WL. A dosage-effect (i.e. ImRs-patients had received twice as many sessions than STAIR-patients) at that time point of assessment cannot be ruled out. However, when directly comparing the two active treatment conditions (ImRs versus STAIR/ImRs), there was no difference in improvement of PTSD symptoms, diagnostic status, or any of the secondary outcomes at post-treatment and 12-week post-intervention follow-up. Although STAIR/ImRs consisted of 8 sessions more than the ImRs condition, we found no difference in effect size between the ImRs phase of the STAIR/ImRs condition and the ImRs-only condition. Dividing the effect size for STAIR/ImRs and for ImRs by the number of sessions, more improvement per session is achieved in ImRs than in STAIR/ImRs. Importantly, treatment effects persisted over time and are comparable to other effective trauma-focused methods (Bradley et al., 2005). Dropout rates were in the lower range (16.4%) and did not differ significantly between treatment conditions. This indicates that a phased treatment may not always be necessary to lower drop-out rates, and that ImRs may be well suited as a stand-alone treatment for CA-related PTSD.

Interestingly, ImRs also achieved large effects on improvement of emotion regulation, which is specifically targeted by STAIR. One explanation might be that emotion regulation cannot only be improved by instructing patients to use skills but that the process of change of meanings inherent in ImRs and the reduction of re-experiencing may be an alternative pathway (Arntz, 2012). In addition, ImRs may improve

Table 2
Observed Means and Standard Deviations of Intent-To-Treat Sample of Patients with PTSD related to Childhood Abuse.

Outcome Measure	Treatment Components vs Waitlist						Active Treatments			
	ImRs (N = 21)		STAIR (N = 20)		Waitlist (N = 20)		STAIR/ImRs (N = 30)[a]		ImRs (N = 31)[a]	
	n	mean (SD)	*n*	mean (SD)	*n*	mean (SD)	*n*	mean (SD)	*n*	mean (SD)
Clinician Administered PTSD-Scale										
Pre-treatment[b]	21	78.2 (14.6)	20	75.6 (14.6)	20	70.5 (19)	30	69.9 (19.47)	31	75.2 (18.69)
Post-treatment[c]	17	45.6 (32.03)	19	64.1 (26.49)	20	63.7 (24.22)	28	35.9 (28.65)	25	45 (30.64)
12-week follow-up[d]		–		–		–	26	26 (23.32)	25	36.1 (28.88)
Posttraumatic Diagnostic Scale										
Pre-treatment[b]	21	41 (9.64)	20	40.6 (9.06)	20	36.4 (10.21)	30	36.5 (11.26)	30	38.9 (10.3)
Post-treatment[c]	17	21.4 (17.14)	19	32.7 (15.71)	19	31.2 (11.08)	28	16.4 (14.7)	25	22.8 (15.84)
12-week follow-up[d]		–		–		–	26	12.7 (12.75)	25	16.1 (14.96)
Dissociation Questionnaire										
Pre-treatment[b]	21	2.3 (0.81)	20	2.2 (0.67)	20	2.0 (0.76)	30	2.1 (0.73)	30	2.2 (0.8)
Post-treatment[c]	17	1.6 (0.43)	19	2 (0.63)	19	1.9 (0.8)	28	1.6 (0.62)	25	1.6 (0.52)
12-week follow-up[d]		–		–		–	26	1.5 (0.58)	25	1.5 (0.5)
Beck Depression Inventory										
Pre-treatment[b]	21	34.7 (15.92)	20	34.4 (12.11)	20	31.1 (12.12)	30	30.8 (13.67)	30	32.8 (14.72)
Post-treatment[c]	17	18.9 (16.63)	19	24.7 (14.86)	19	25.8 (12.75)	28	14.4 (15.03)	25	18.2 (15.3)
12-week follow-up[d]		–		–		–	26	13.6 (14.35)	25	13.7 (16)
Difficulties in Emotion Regulation Scale										
Pre-treatment[b]	21	110.7 (22.5)	20	109.7 (24.8)	20	102.2 (21.4)	30	103.7 (27.4)	30	108.7 (20.2)
Post-treatment[c]	17	88.5 (30)	19	100.2 (26.8)	19	97.4 (23.5)	28	77.5 (25.7)	25	92.6 (29.5)
12-week follow-up[d]		–		–		–	26	75.8 (22.5)	25	86.5 (27.6)
Inventory of Interpersonal Problems										
Pre-treatment[b]	21	49.5 (20.75)	20	50.5 (23.8)	20	46.8 (20.32)	30	47 (25.29)	30	54 (20.42)
Post-treatment[c]	17	39 (26.13)	19	45 (28.35)	19	51.7 (25.77)	28	33.7 (24.65)	25	42.1 (25.1)
12-week follow-up[d]		–		–		–	26	32.4 (23.13)	25	44 (22.94)

[a] Condition includes re-randomized WL-patients (N = 10 per condition).
[b] For ImRs vs STAIR vs WL scores at T0 is reported. For STAIR/ImRs versus ImRs scores at T0 is reported for patients in the STAIR/ImRs and ImRs condition and scores at T1 for patients in the WL/STAIR/ImRs and WL/ImRs conditions.
[c] For ImRs vs STAIR vs WL scores at T1 are reported. For STAIR/ImRs versus ImRs scores are reported at T3 for patients in the STAIR/ImRs and WL/ImRs condition, at T2 for patients in the ImRs and at T4 for patients in the WL/STAIR/ImRs condition.
[d] Follow-up scores were reported for 12 weeks after treatment completion.

emotion regulation by (a) creating a corrective experience and facilitating the expression of both positive and negative emotions, (b) improving the acceptance of these emotions and (c) facilitating a shift from negative to positive emotions by the specific actions performed during ImRs.

A strength of this study is the naturalistic setting. Participants were regular referrals in two mental health institutions and were treated by the regular therapist staff within the context of routine clinical care. The sample reflects the symptom complexity and clinical comorbidity clinicians encounter in routine care practice, thus allowing for the generalisability of the results. The trial demonstrates the efficacy, safety and tolerability of ImRs and does not support the view that a sequential treatment (STAIR/ImRs) is more effective for CA-related PTSD than a stand-alone trauma-focused treatment. Still, it is important to note that our results are only specific for the combination of STAIR with ImRs.

Several limitations of this study need to be acknowledged. An obvious limitation is that the trial was completed with a smaller sample size than initially planned, which could have lowered the chance to observe an additional effect of STAIR. Still, post-hoc power analysis showed acceptable power to detect (hypothesized) small-to medium-sized effects for the primary outcomes. However, the sample might have been underpowered, and an undetected, small difference favouring STAIR/ImRs cannot be ruled out when replicated in a larger sample. What is more effective, 8 sessions STAIR plus 16 sessions ImRs, or 24 sessions ImRs, is an important issue for future research. Nevertheless, we found less effects of STAIR than in earlier studies (Cloitre et al., 2010; MacIntosh, Cloitre, Kortis, Peck, & Weiss, 2018; Weiss, Azevedo, Webb, Gimeno, & Cloitre, 2018) which is similar to findings reported in two recent studies that found no added effect of STAIR on PE (Oprel et al., 2021) and EMDR (van Vliet et al., 2021). This is an interesting finding and asks for further examination: it might indicate that STAIR is not easily disseminated or that its effect depends on context or further developments of trauma-focused interventions or differences in health care systems.

Another limitation is the re-randomization of the waitlist participants over the active treatment conditions. Given the time difference in treatment initiation after randomization a possible time-effect cannot be ruled out. However, we performed sensitivity analyses to control for time-delay of the waitlist condition, which showed robustness of the outcomes. It should also be noticed that in comparison to the naturalistic waitlist of 5–6 months at our health care institutions, an 8-weeks waitlist time delay was relatively short.

Because of the naturalistic setting of this study and the aim to keep the waitlist for patients as short as possible we limited the waitlist to 8 weeks instead of 16 weeks. The consequence was that the assessment points varied over time between conditions which made a direct comparison in the timeline between the ImRs-component of STAIR/ImRs with the ImRs-alone condition impossible. A sensitivity analysis focusing on a possible potentiation effect of STAIR on ImRs indicated no difference relative to ImRs-only. Still, given the absence of a direct comparison and the relatively small sample size an undetected difference cannot entirely be ruled out.

Compared to other PTSD-treatment studies (e.g. Arntz et al., 2007; Boterhoven de Haan et al., 2020) symptom-reduction in the waitlist-group was – though not significant – quite large. This effect may be best explained by the possibility that the feasibility meeting with the therapist before waitlist commenced elicited feelings of hope or a positive expectancy bias in the patients which may have led to a mild symptom reduction during the waitlist period. On the other hand, our waitlist might have better controlled for nonspecific expectancy effects than waitlists that do not involve patients meeting their therapist.

The addition of single-items for the assessment of guilt, shame and anger to the PDS may be considered as problematic. In a recent similar trial, however, colleagues correlated the single items anger, guilt, shame and disgust with more extensive, validated measures of the (respective) constructs and found that these items were related to their counterparts,

Table 3
Primary and Secondary Outcome Measure Analyses: Comparisons among a) Patients with Posttraumatic Stress Disorder Randomly Assigned to Skills Training in Affective and Interpersonal Regulation (STAIR), Imagery Rescripting (ImRs), or Waitlist (WL)[a], and b) Patients with Posttraumatic Stress Disorder Randomly Assigned to STAIR + ImRs and (ImRs)[b].

Analysis and Measure	Analysis					Effect Size		
Mixed-regression repeated measures analyses	B	95% CI (B)	t	df	p	r[c]	d[d]	Within condition d[e]
Comparison STAIR vs ImRs vs WL								
Primary Outcome Measures								
Clinician Administered PTSD Scale for DSM-IV (CAPS)								
Time (pre to post)[f]	−6.90	−18.49 to 4.69	−1.19	53.28	0.238	0.16	0.43	
Time x condition								
STAIR versus WL	−5.31	−21.91 to 1.28	−0.64	53.38	0.524	0.09	0.33	
ImRs versus WL	−26.54	−43.60 to 9.48	−3.12	53.65	0.003	0.39	1.64	
ImRs versus STAIR	−21.23	−38.49 to −3.98	−2.47	53.72	0.017	0.32	1.31	
Change (pre-post)								
STAIR	−12.21							0.75
ImRs	−33.44							2.07
Waitlist	−6.90							0.43
Posttraumatic Diagnostic Scale								
Time (pre to post)[f]	−5.70	−12.55 to 1.15	−1.67	52.70	0.101	0.22	0.59	
Time x condition								
STAIR versus WL	−2.27	−11.96 to 7.41	−0.47	52.70	0.639	0.06	0.23	
ImRs versus WL	−13.61	−23.53 to −3.69	−2.75	53.37	0.008	0.35	1.40	
ImRs versus STAIR	−11.33	−21.25 to −1.41	−2.29	53.37	0.026	0.30	1.17	
Change (pre to post)								
STAIR	−7.97							0.82
ImRs	−19.31							1.99
Waitlist	−5.70							0.59
Sensitivity Analyses of Primary Outcomes								
Clinician Administered PTSD Scale for DSM-IV (CAPS-IV)								
Time (individual; change per week)[g]	−0.86	−2.34 to 0.61	−1.17	53.26	0.246	0.16	0.05	
Time individual x condition								
STAIR versus WL	−0.68	−2.80 to 1.44	−0.64	53.36	0.523	0.09	0.04	
ImRs versus WL	−3.41	−5.66 to −1.17	−3.05	53.66	0.004	0.38	0.21	
ImRs versus STAIR	−2.73	−5.01 to −0.45	−2.41	53.72	0.020	0.31	0.17	
Posttraumatic Diagnostic Scale (PDS)								
Time (individual; change per week)[g]	−0.71	−1.59 to 0.16	−1.65	52.64	0.106	0.22	0.07	
Time individual x condition								
STAIR versus WL	−0.30	−1.53 to 0.94	−0.48	52.64	0.634	0.07	0.03	
ImRs versus WL	−1.74	−3.04 to −0.43	−2.67	53.36	0.010	0.34	0.18	
ImRs versus STAIR	−1.44	−2.75 to −0.14	−2.21	53.36	0.031	0.29	0.15	
Secondary Outcome Measures								
Posttraumatic Diagnostic Scale (guilt)[h]								
Time (pre to post)[f]	−0.24	−0.79 to 0.313	−0.87	52.88	0.39	0.12	0.25	
Time x condition								
STAIR versus WL	−0.03	−0.81 to 0.75	−0.08	52.88	0.94	0.01	0.03	
ImRs versus WL	−1.55	−2.35 to −0.76	−3.93	54.56	<0.001	0.47	1.64	
ImRs versus STAIR	−1.52	−2.32 to −0.73	−3.85	54.56	<0.001	0.46	1.61	
Change (pre to post)								
STAIR	−0.27							0.29
ImRs	−1.79							1.90
Waitlist	−0.24							0.25
Posttraumatic Diagnostic Scale (shame)[h]								
Time (pre to post)[f]	−0.28	−0.86 to 0.23	−0.98	53.73	0.332	0.13	0.29	
Time x condition								
STAIR versus WL	−0.11	−0.92 to 0.71	−0.26	53.73	0.8	0.04	0.11	
ImRs versus WL	−1.29	−2.12 to −0.46	−3.12	54.89	0.003	0.39	1.34	
ImRs versus STAIR	−1.19	−2.02 to −0.36	−2.87	54.89	0.006	0.36	1.23	
Change (pre to post)								
STAIR	−0.39							0.40
ImRs	−1.57							1.63
Waitlist	−0.28							0.29
Posttraumatic Diagnostic Scale (anger)[h]								
Time (pre to post)[f]	0.03	−0.48 to 0.53	0.104	53.49	0.918	0.01	0.03	
Time x condition								
STAIR versus WL	−0.42	−1.13 to 0.29	−1.18	53.49	0.243	0.16	0.43	
ImRs versus WL	−1.46	−2.18 to −0.73	−4.03	54.47	<0.001	0.48	1.50	
ImRs versus STAIR	−1.04	−1.76 to −0.31	−2.88	54.47	0.006	0.36	1.07	
Change (pre to post)								
STAIR	−0.39							0.40
ImRs	−1.43							1.48
Waitlist	0.03							0.03
Dissociation Questionnaire (DIS-Q)								
Time (pre to post)[f]	−0.11	−0.36 to 0.14	−0.88	54.16	0.383	0.12	0.15	
Time x condition								
STAIR versus WL	−0.17	−0.52 to 0.18	−0.96	54.16	0.343	0.13	0.23	
ImRs versus WL	−0.48	−0.84 to −0.13	−2.71	55.71	0.009	0.34	0.65	

(*continued on next page*)

Table 3 (*continued*)

Analysis and Measure	Analysis					Effect Size		
Mixed-regression repeated measures analyses	B	95% CI (B)	t	df	p	r[c]	d[d]	Within condition d[e]
ImRs versus STAIR	−0.32	067 to 0.04	−1.77	55.71	0.083	0.23	0.42	
Change (pre to post)								
STAIR	−0.28							0.37
ImRs	−0.59							0.80
Waitlist	−0.11							0.15
Beck Depression Inventory (BDI-II)								
Time (pre to post)[f]	−5.43	−12.42 to 1.57	−1.56	53.00	0.125	0.21	0.40	
Time x condition								
STAIR versus WL	−4.15	−14.04 to 5.73	−0.84	53.00	0.403	0.12	0.31	
ImRs versus WL	−9.08	−19.16 to 1.00	−1.81	54.29	0.077	0.24	0.68	
ImRs versus STAIR	−4.92	−15.00 to 5.16	−0.98	54.29	0.332	0.13	0.37	
Change (pre to post)								
STAIR	−9.58							0.71
ImRs	−14.51							1.08
Waitlist	−5.43							0.40
Difficulties in Emotion Regulation Scale (DERS)								
Time (pre to post)[f]	−5.20	−15.10 to 4.69	−1.06	52.61	0.296	0.14	0.23	
Time x condition								
STAIR versus WL	−4.70	−18.70 to 9.29	- 0.68	52.61	0.503	0.09	0.21	
ImRs versus WL	−15.40	−29.75 to −1.05	−2.15	53.08	0.036	0.28	0.68	
ImRs versus STAIR	−10.69	−25.05 to 3.66	−1.5	53.08	0.141	0.20	0.47	
Change (pre to post)								
STAIR	−9.91							0.44
ImRs	−20.60							0.91
Waitlist	−5.20							0.23
Inventory of Interpersonal Problems (IIP-32)								
Time (pre to post)[f]	4.30	−5.58 to 14.19	0.87	52.48	0.386	0.12	−0.21	
Time x condition								
STAIR versus WL	−10.23	−24.2 to 3.76	−1.45	52.48	0.148	0.20	0.49	
ImRs versus WL	−13.84	−28.20 to 0.52	−1.93	52.81	0.058	0.26	0.66	
ImRs versus STAIR	−3.61	−17.97 to 10.74	−0.51	52.81	0.616	0.07	0.17	
Change (pre to post)								
STAIR	−5.92							0.28
ImRs	−9.54							0.45
Waitlist	4.30							−0.21
b) Comparison STAIR + ImRs versus ImRs								
Mixed-regression repeated measures analyses	B	95% CI (B)	t	df	p	r[c]	d[i]	Within condition d[j]
Primary Outcome Measures								
Clinician Administered PTSD Scale for DSM-IV								
Time-by-condition								
Time (pre to post)[k]	−32.56	−40.20 to −24.93	−8.56	52.27	<0.001	0.76		2.01
STAIR + ImRs versus ImRs	−2.88	−18.41 to 12.38	−0.38	52.27	0.71	0.05	0.18	
Time (pre to follow up)[l]	−41.36	−48.83 to −33.90	−11.12	51.75	<0.001	0.84		2.56
STAIR + ImRs versus ImRs	−3.38	−18.31 to 11.56	−0.45	51.75	0.65	0.06	0.21	
Change pre to postk								
ImRs	−31.12	−42.19 to −20.05	−5.64	52.49	<0.001			1.92
STAIR + ImRs	−34.00	−44.51 to −23.50	−6.49	51.98	<0.001			2.10
Change pre to follow up[l]								
ImRs	−39.68	−50.31 to −29.04	−7.49	52.02	<0.001			2.45
STAIR + ImRs	−43.05	−53.54 to −32.57	−8.24	51.46	<0.001			2.66
Posttraumatic Diagnostic Scale								
Time-by-condition								
Time (pre to post)[k]	−18.11	−22.61 to −13.61	−8.06	54.20	<0.001	0.74		1.86
STAIR + ImRs versus ImRs	−4.34	−13.35 to 4.66	−0.97	54.20	0.34	0.13	0.45	
Time (pre to follow up)[l]	−23.18	−27.29 to −19.07	−11.32	52.37	<0.001	0.84		2.39
STAIR + ImRs versus ImRs	−1.05	−9.27 to 7.17	−0.26	52.37	0.80	0.04	0.11	
Change pre to post[k]								
ImRs	−15.94	−22.45 to −9.42	−4.91	54.78	<0.001			1.64
STAIR + ImRs	−20.28	−26.50 to −14.06	−6.54	53.51	<0.001			2.09
Change pre to follow up[l]								
ImRs	−22.66	−28.51 to −16.80	−7.76	52.57	<0.001			2.33
STAIR + ImRs	−23.71	−29.47 to −17.94	−8.25	52.15	<0.001			2.44
Sensitivity Analyses of Primary Outcome Measures								
Clinician Administered PTSD Scale for DSM-IV								
Time-by-condition (ImRs-only)[m]								
Time (pre to post)[k]	−26.70	−34.32 to −19.07	−7.02	53.18	<0.001	0.69		1.65
STAIR + ImRs versus ImRs	8.72	−6.53 to 23.98	1.15	53.18	0.257	0.16	−0.54	
Time (pre to follow up)[l]	−35.48	−42.89 to −28.06	−9.60	52.61	<0.001	0.80		2.19
STAIR + ImRs versus ImRs	8.45	−6.37 to 23.28	1.14	52.61	0.258	0.16	−0.52	
Change pre to post[k]								
ImRs	−31.06	−42.09 to −20.02	5.64	53.73	<0.001			1.92
STAIR + ImRs	−22.33	−32.87 to −11.80	−4.25	52.46	<0.001			1.38
Change pre to follow up[l]								
ImRs	−39.70	−50.23 to −29.17	−7.56	53.17	<0.001			2.45

(*continued on next page*)

Table 3 (*continued*)

Analysis and Measure	Analysis					Effect Size		
Mixed-regression repeated measures analyses	B	95% CI (B)	t	df	p	r[c]	d[d]	Within condition d[e]
STAIR + ImRs	−31.25	−41.69 to −20.81	−6.01	51.99	<0.001			1.93
Time-by-condition Controlled for waitlist[n]								
Time (pre to post)[k]	−31.52	−39.63 to −23.41	−7.80	51.04	<0.001	0.74		1.95
STAIR + ImRs versus ImRs	−2.97	−18.32 to 12.39	−0.39	51.09	0.70	0.05	0.18	
Time (pre to follow up)[l]	−38.55	−45.93 to −31.17	−10.50	49.65	<0.001	0.07		2.38
STAIR + ImRs versus ImRs	−3.42	−17.65 to 10.82	−0.48	49.96	0.63	0.07	0.21	
Change pre to postk								
ImRs	−30.04	−41.54 to −18.53	−5.24	51.25	<0.001			1.86
STAIR + ImRs	−33.00	−43.82 to −22.19	−6.13	50.80	<0.001			2.04
Change pre to follow up[l]								
ImRs	−36.85	−47.21 to −26.48	−7.14	49.99	<0.001			2.03
STAIR + ImRs	−40.26	−50.40 to −30.12	−7.98	49.60	<0.001			2.22
Posttraumatic Diagnostic Scale								
Time-by-condition (ImRs only)[m]								
Time (pre to post)[k]	−15.12	−19.13 to −11.12	−7.58	53.65	<0.001	0.72		1.56
STAIR + ImRs versus ImRs	1.35	−6.65 to 9.36	0.34	53.65	0.736	0.05	−0.14	
Time (pre to follow up)[l]	−19.98	−23.67 to −16.28	−10.86	51.53	<0.001	0.83		2.06
STAIR + ImRs versus ImRs	5.22	−2.16 to 12.61	1.42	51.53	0.162	0.19	−0.54	
Change pre to post[k]								
ImRs	−15.80	−21.59 to −10.02	−5.48	54.29	<0.001			1.63
STAIR + ImRs	−14.45	−19.98 to −8.92	−5.24	52.84	<0.001			1.49
Change pre to follow up[l]								
ImRs	−22.59	−27.84 to −17.33	−8.63	51.93	<0.001			2.33
STAIR + ImRs	−17.37	−22.55 to −12.18	−6.72	51.10	<0.001			1.79
Time-by-condition Controlled for waitlist[n]								
Time (pre to post)[k]	−16.25	−20.85 to −11.65	−7.09	51.82	<0.001	0.70		1.67
STAIR + ImRs versus ImRs	−4.82	−13.52 to 3.88	−1.11	52.10	0.27	0.15	0.50	
Time (pre to follow up)[l]	−21.26	−25.22 to −17.30	−10.78	49.30	<0.001	0.84		2.19
STAIR + ImRs versus ImRs	−1.39	−9.03 to 6.24	−0.37	49.81	0.72	0.05	0.14	
Change pre to post[k]								
ImRs	−13.84	−20.36 to −7.32	−4.26	52.33	<0.001			−1.42
STAIR + ImRs	−18.66	−24.80 to −12.52	−6.10	51.49	<0.001			−1.92
Change pre to follow up[l]								
ImRs	−20.53	−26.13 to −14.99	−7.42	49.63	<0.001			−2.12
STAIR + ImRs	−21.95	−27.39 to −16.52	−8.12	49.47	<0.001			−2.26
Secondary Outcome measures								
Dissociation Questionnaire								
Time-by-condition								
Time (pre to post)[k]	−0.53	−0.69 to −0.36	−6.32	56.43	<0.001	0.64		0.70
STAIR + ImRs versus ImRs	0.07	−0.26 to 0.40	0.42	56.43	0.68	0.06	−0.09	
Time (pre to follow up)[l]	−0.61	−0.79 to −0.43	−6.85	54.41	<0.001	0.68		0.82
STAIR + ImRs versus ImRs	0.09	−0.27 to 0.45	0.48	54.41	0.63	0.07	−0.12	
Change pre to post[k]								
ImRs	−0.56	−0.80 to −0.32	−4.70	57.72	<0.001			0.75
STAIR + ImRs	−0.49	−0.72 to −0.26	−4.24	55.02	<0.001			0.66
Change pre to follow up[l]								
ImRs	−0.66	−0.91 to −0.40	−5.16	54.87	<0.001			0.88
STAIR + ImRs	−0.57	−0.82 to −0.32	−4.52	53.94	<0.001			0.76
Beck Depression Inventory								
Time-by-condition								
Time (pre to post)[k]	−14.81	−18.94 to 10.68	−7.19	53.31	<0.001	0.70		1.10
STAIR + ImRs versus ImRs	−2.57	−10.83 to 5.69	−0.62	53.31	0.54	0.09	0.19	
Time (pre to follow up)[l]	−17.30	−21.85 to −12.75	−7.64	51.07	<0.001	0.73		1.29
STAIR + ImRs versus ImRs	1.97	−7.13 to 11.07	0.44	51.07	0.67	0.06	−0.15	
Change pre to post[k]								
ImRs	−13.53	−19.50 to −7.56	−4.54	54.04	<0.001			1.01
STAIR + ImRs	−16.10	−21.81 to −10.39	−5.66	52.45	<0.001			1.20
Change pre to follow up[l]								
ImRs	−18.29	−24.77 to −11.81	−5.66	51.37	<0.001			1.36
STAIR + ImRs	−16.32	−22.70 to −9.93	−5.13	50.75	<0.001			1.22
Posttraumatic Diagnostic Scale (guilt)								
Time-by-condition								
Time (pre to post)[k]	−1.43	−1.77 to −1.10	−8.55	56.16	<0.001	0.75		1.51
STAIR + ImRs versus ImRs	−0.05	−0.72 to 0.62	−0.15	56.16	0.88	0.02	0.05	
Time (pre to follow up)[l]	−1.60	−1.91 to −1.29	−10.39	53.41	<0.001	0.82		1.69
STAIR + ImRs versus ImRs	−0.06	−0.68 to 0.56	−0.20	53.41	0.84	0.03	0.06	
Change pre to post[k]								
ImRs	−1.41	−1.89 to −0.92	−5.84	57.46	<0.001			1.49
STAIR + ImRs	−1.46	−1.92 to −0.99	−6.26	54.75	<0.001			1.54
Change pre to follow up[l]								
ImRs	−1.57	−2.01 to −1.13	−7.17	53.87	<0.001			1.66
STAIR + ImRs	−1.63	−2.07 to −1.20	−7.53	52.94	<0.001			1.72
Posttraumatic Diagnostic Scale (shame)[i]								
Time-by-condition								

(*continued on next page*)

Table 3 (*continued*)

Analysis and Measure	Analysis					Effect Size		
Mixed-regression repeated measures analyses	B	95% CI (B)	t	df	p	r[c]	d[d]	Within condition d[e]
Time (pre to post)[k]	−1.26	−1.58 to −0.93	−7.75	56.18	<0.001	0.72		1.30
STAIR + ImRs versus ImRs	0.11	−0.54 to 0.76	0.35	56.18	0.73	0.05	−0.12	
Time (pre to follow up)[l]	−1.42	−1.76 to −1.09	−8.55	55.49	<0.001	0.75		1.47
STAIR + ImRs versus ImRs	0.22	−0.44 to 0.89	0.67	55.49	0.50	0.09	−0.23	
Change pre to post[k]								
ImRs	−1.31	−1.78 to −0.85	−5.63	57.30	<0.001			1.36
STAIR + ImRs	−1.20	−1.65 to −0.75	−5.33	54.91	<0.001			1.24
Change pre to follow up[l]								
ImRs	−1.54	−2.01 to −1.06	−6.49	55.91	<0.001			1.59
STAIR + ImRs	−1.31	−1.78 to −0.84	−5.61	55.05	<0.001			1.36
Posttraumatic Diagnostic Scale (anger)[i]								
Time-by-condition								
Time (pre to post)[k]	−1.20	−1.55 to −0.85	−6.81	54.89	<0.001	0.68		1.22
STAIR + ImRs versus ImRs	0.18	−0.52 to 0.89	0.52	54.89	0.60	0.07	−0.19	
Time (pre to follow up)[l]	−1.42	−1.75 to −1.09	−8.65	53.04	<0.001	0.76		1.45
STAIR + ImRs versus ImRs	0.07	−0.59 to 0.72	0.20	53.04	0.84	0.03	−0.07	
Change pre to post[k]								
ImRs	−1.29	−1.80 to −0.78	−5.11	56.22	<0.001			1.32
STAIR + ImRs	−1.11	−1.60 to −0.62	−4.52	53.46	<0.001			1.13
Change pre to follow up[l]								
ImRs	−1.45	−1.92 to −0.98	−6.22	53.40	<0.001			1.48
STAIR + ImRs	−1.38	−1.85 to −0.92	−6.01	52.68	<0.001			1.41
Difficulties in Emotion Regulation Scale (DERS)								
Time-by-condition								
Time (pre to post)[k]	−20.37	−27.5 to −13.25	−5.74	52.53	<0.001	0.62		0.90
STAIR + ImRs versus ImRs	−9.94	−24.20 to 4.31	−1.40	52.53	0.168	0.19	0.44	
Time (pre to follow up)[l]	−24.16	−32.00 to −16.33	−6.19	51.67	<0.001	0.65		1.07
STAIR + ImRs versus ImRs	−4.72	−20.39 to 10.95	−0.61	51.67	0.548	0.08	0.21	
Change pre to post[k]								
ImRs	−15.40	−25.72 to −5.08	−2.99	53.07	0.004			0.68
STAIR + ImRs	−25.34	−35.18 to −15.51	−5.17	51.88	<0.001			1.12
Change pre to follow up[l]								
ImRs	−21.80	−32.96 to −10.65	−3.92	52.01	<0.001			0.96
STAIR + ImRs	−26.52	−37.53 to −15.52	−4.84	51.32	<0.001			1.17
Inventory of Interpersonal Problems (IIP-32)								
Time-by-condition								
Time (pre to post)[k]	−12.26	−18.61 to −5.91	−3.87	53.75	<0.001	0.47		0.58
STAIR + ImRs versus ImRs	−1.87	−14.57 to 10.84	−0.29	53.75	0.770	0.04	0.09	
Time (pre to follow up)[l]	−12.04	−18.59 to −5.50	−3.69	52.27	0.001	0.45		0.57
STAIR + ImRs versus ImRs	−2.92	−16.01 to 10.17	−0.45	52.27	0.656	0.06	0.14	
Change pre to postk								
ImRs	−11.33	−20.52 to −2.13	−2.47	54.32	0.017			0.54
STAIR + ImRs	−13.19	−21.97 to −4.42	−3.02	53.06	0.004			0.63
Change pre to follow up[l]								
ImRs	−10.58	−19.91 to −1.26	−2.28	52.55	0.027			0.50
STAIR + ImRs	−13.51	−22.69 to −4.32	−2.95	51.97	0.005			0.64

[a] Data represent all models with random intercept and fixed time effects; bold indicates significance.

[b] Data represent all models with random intercept and fixed time effects (at center level); bold indicates significance; condition was coded as 0.5 for condition STAIR + ImRs,- 0.5 for condition ImRs.

[c] Data represent the effect size (r) expressing the change effect as estimated in the mixed regression analysis, $r = t/\sqrt{(t^2 + df)}$.

[d] Data represent the effect size (Cohen's d) expressing the change effect at the 8 week post assessment as related to the baseline standard deviation ("d_{RAW}", see Feingold, 2009), with standard deviation from the baseline values; positive values indicate more improvement and negative values less improvement.

[e] Data represent the effect sizes of change over 8 weeks with Cohen's d per condition.

[f] The time effect is that of the primary reference category, the 8-week waitlist condition. Time coded as 0 (pre) and 1 (post).

[g] The time-effect is that of the primary reference category, the 8-week waitlist condition compared to the number of individual number of sessions in case of early completion according to study-guidelines. Time coded in weeks (per individual).

[h] Extra added item to the PDS (not used for computation of the PDS total-score).

[i] Data represent the effect size (Cohen's d) expressing the change effect at post assessment and 12-week post -intervention follow-up as related to the baseline standard deviation ("d_{RAW}", see Feingold, 2009); positive values indicate more improvement and negative values less improvement.

[j] Data represent the effect sizes of change with Cohen's d per condition from baseline to post-assessment and baseline to follow-up (at center level); condition was coded as 0.5 for STAIR + ImRs, −0.5 for ImRs.

[k] The time effect is the mean time effect of the 2 conditions; a dummy variable for condition (coded −0.5 for ImRs and 0.5 for STAIR + ImRs) was used as covariate.

[l] The time effect is the mean time effect of the 2 conditions; condition was centered (−0.5 for ImRs, 0.5 for STAIR + ImRs) and used as covariate.

[m] The time effect is the mean time effect of the ImRs-phase of the two conditions.

[n] Data represent all models with fixed time effects; bold indicates significance; condition was coded as −0.5 for STAIR + ImRs, 0.5 for ImRs; waitlist was coded as −0.5 for STAIR + ImRs and ImRs, 0.5 for WL-STAIR + ImRs and WL-ImRs.

supporting the validity of these items (Rameckers, van Emmerik, Grasman, & Arntz, 2022). Similarly, validity studies on single-item assessment of emotions, such as happiness (Abdel-Khalek, 2006), anxiety and depression (Turon et al., 2019) and emotional exhaustion (West, Dyrbye, Satele, Sloan, & Shanafelt, 2012) show good concurrent and discriminant validity when compared with more extensive, validated domain-specific questionnaires. Based on these findings we believe that the straightforward assessment of the basic emotions guilt, shame and

anger provides sufficiently reliable and valid results and that reporting the outcomes is of clinical interest.

One last limitation is that interrater reliability was not formally assessed. However, interrater-agreement was monitored and maintained through weekly supervision.

In sum, this study demonstrates that ImRs as stand-alone treatment is an effective and tolerable method for the treatment of CA-related PTSD and can be relatively easily implemented in routine clinical care. A sequential treatment (STAIR/ImRs) may not lead to superior effects, but this question may need further investigation in a larger sample.

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CRediT authorship contribution statement

Sandra Raabe: Conceptualization, Methodology, Investigation, Project administration, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Thomas Ehring:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Loes Marquenie:** Resources, Project administration, Supervision. **Arnoud Arntz:** Supervision, Formal analysis, Writing – review & editing. **Merel Kindt:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Declaration of competing interest

SR and LM received income for training of postgraduates in the method of Imagery Rescripting. AA has published on Imagery Rescripting and occasionally gives workshops on Imagery Rescripting. The remuneration for these workshops goes to the University of Amsterdam to support research. TE and MK do not have any conflict of interest to declare.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jbtep.2022.101769.

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