Imagery Rehearsal Therapy in Addition to Treatment as Usual for Patients With Diverse Psychiatric Diagnoses Suffering From Nightmares: A Randomized Controlled Trial

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ABSTRACT

Objective: Nightmares are associated with psychopathology and daily distress. They are highly prevalent in a psychiatric population (30%). Currently, imagery rehearsal therapy (IRT) is the treatment of choice for nightmares. With IRT, the script of the nightmare is changed into a new dream, which is imagined during the day. However, the effects of IRT in a psychiatric population remain unknown. The aim of this study was to determine the effectiveness of IRT in a heterogeneous psychiatric population.

Method: Between January 2006 and July 2010, 90 patients with psychiatric disorders (*DSM-IV-TR*) were randomized to IRT or treatment-as-usual conditions. IRT consisted of 6 individual sessions added to the treatment as usual. Nightmare frequency was assessed using daily nightmare logs and the Nightmare Frequency Questionnaire. Nightmare distress was assessed using the Nightmare Distress Questionnaire and the Nightmare Effects Survey. General psychiatric symptoms were assessed using the Symptom Checklist-90 and a PTSD symptom questionnaire. Assessments were administered at the start of the trial, after the IRT and at follow-up 3 months later.

Results: IRT showed a moderate effect (Cohen $d = 0.5–0.7$, $P < .05$) on nightmare frequency, nightmare distress, and psychopathology measures compared with treatment as usual. These effects were largely sustained at the 3-month follow-up (Cohen $d = 0.4–0.6$, $P < .10$).

Conclusions: IRT is an effective treatment for nightmares among patients with comorbid psychiatric disorders and can be employed in addition to the on-going treatment.

Trial Registration: ClinicalTrials.gov identifier: NCT00291031

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Nightmares can cause great suffering because they disturb sleep[1] and affect daily functioning and overall well-being.[2] They are associated with psychopathologies such as mood disorders, anxiety disorders, posttraumatic stress disorder (PTSD),[2,3] psychosis, personality pathology,[4] suicide risk and suicidal ideation,[5] and substance abuse.[2,3] Two percent to 5% of the general adult population[6,7] and 30% of a psychiatric population[8] have 1 or more nightmares a week. Furthermore, individuals that have frequent nightmares have a higher risk of having a psychiatric disorder.[6]

Recent meta-analyses have shown that nightmares can be treated effectively with imagery rehearsal therapy (IRT).[9–11] During IRT, people are trained to change the storyline of their recurring nightmares "any way [they] wish" or into a new story with a better ending.[12] The "new dream" is imagined several times during the day. Most studies on IRT have been conducted with people with PTSD[13–15] or those who have been exposed to trauma.[14,16,17] These randomized trials with PTSD patients yielded positive results with moderate[11] to large effect sizes.[15] One study,[14] conducted with Vietnam War veterans with chronic nightmares, showed no difference between the experimental and treatment-as-usual groups. To date, no study has been conducted in a patient population with diverse psychiatric diagnoses. The aim of this study is to determine whether IRT is effective in reducing nightmares in the presence of comorbid psychiatric disorders.

METHOD

The study was approved by the accredited Medical Research Ethics Committee of Isala Clinics, Zwolle, The Netherlands, and was registered on ClinicalTrials.gov (identifier: NCT00291031). Participants were recruited between January 2006 and July 2010 from a patient population with moderate to severe psychiatric disorders being treated by GGz Centraal (specialist mental health care providers). The level of care varied from clinical psychotherapy, part-time psychotherapy, group therapy, and outpatient psychotherapy to regular outpatient counseling by a nurse, a medication consultation, or both. Patients were referred to the study by their treating practitioners. Potential participants received oral and written information about the study, after which written informed consent was obtained. However, participants were not informed about the specific technique of IRT, to minimize any bias from foreknowledge of the treatment. Inclusion criteria were nightmares had to occur a minimum of 3 times a month; nightmares had to be associated with daily distress; and patients had to be motivated to seek treatment for their nightmares. Exclusion criteria were previous IRT for nightmares, a psychotic disorder, acute psychiatric crisis, mental retardation or neuropsychiatric syndrome,

Clinical Points

- Prevalence of nightmares in the presence of comorbid psychiatric disorders is underestimated and usually recognized only in posttraumatic stress disorder.
- Nightmares appear to be an independent disorder and should be treated as such.
- Imagery rehearsal therapy for nightmares is effective for patients with diverse psychiatric diagnoses.

severe addiction problems, or insufficient mastery of the Dutch language.

Power

In the intervention study carried out by Krakow and colleagues,[15] an effect size of 0.8 was found with regard to the nightmare frequency. As the participants in this study also had other psychiatric disorders, a smaller effect size of 0.6 at posttreatment was expected. For this effect size, a sample size of 45 patients per condition was needed (power was 80% and 2-tailed significance level was .05).

Procedures and Randomization

Figure 1 illustrates a participant flowchart. First, baseline questionnaires were administered and participants started with their nightmare logs (baseline assessment 1). After 1 month of continuous nightmare recordings, the questionnaires were administered for a second time (baseline assessment 2). We administered 2 baseline assessments to control for the effect of registration of nightmares. After the second baseline assessment, participants were randomly assigned to the IRT treatment condition or the treatment-as-usual (TAU) control condition. Participants in the TAU condition were told they would receive the IRT after 6 months.

Participants were randomly assigned to either treatment or control conditions in blocks of 8 numbers in order of entry to the study.[18] The study condition was revealed to the research coordinator (A.M.vS.) and the participant at the second baseline assessment. Treatment as usual was continued for all participants.

Posttreatment assessments took place at the end of the IRT, 16 to 18 weeks after the first baseline, and at follow-up 3 months later. Participants in both conditions kept a daily nightmare log for 18 weeks from the first baseline to the posttreatment. They completed another 5 weeks of the daily nightmare log before the follow-up assessment.

Interventions

The first author (A.M.vS.) and the fourth author (V.I.S.) wrote a Dutch IRT manual for the therapists, which is now published as a Dutch IRT treatment manual for professional therapists[19] and includes a patient version with worksheets.[20] The intervention consisted of 6 individual 1-hour sessions of IRT at intervals of 2 weeks. The IRT protocol was largely based on the works of Bishay,[21] Marks,[22] and Krakow and colleagues,[12,15] in which the element of exposure was minimized as much as possible.

The outline of our protocol was as follows: in the first session, the rationale of IRT and the homework assignments were explained, and imagining a "safe or pleasant space" was practiced. The next session started with rehearsing the homework assignment. Participants were asked to write down their "least distressing" nightmare and change the script of the ending of this nightmare in such a way that the outcome would be satisfactory. Participants would then write down the changed version. Imagining this new dream was practiced during the session. The next 4 sessions were used to add more helpful elements to the new dream or to change other nightmares. In the sixth and final session, the IRT was evaluated and situations that could trigger nightmares and coping strategies were discussed.

The IRT therapists were graduate psychologists or psychotherapists. They were trained and supervised by the first author (A.M.vS.). Tape recordings of the sessions were judged independently by 2 raters to determine the therapists' adherence to the protocol. Participants were assigned to an IRT therapist depending on the therapist's availability.

For all participants, TAU consisted of individual psychotherapy, counseling, or psychiatric consultations. Most of the patients visited their treating practitioner once every 2 weeks. Nightmares were not addressed specifically in the regular therapy. The treating practitioners were aware of the fact that their patients were participating in the trial and knew to which condition they had been assigned. To control for possible enhancing effects of the TAU, the treating practitioners were instructed to abstain from addressing the nightmares in the regular therapy, as they had done before the patient entered the trial.

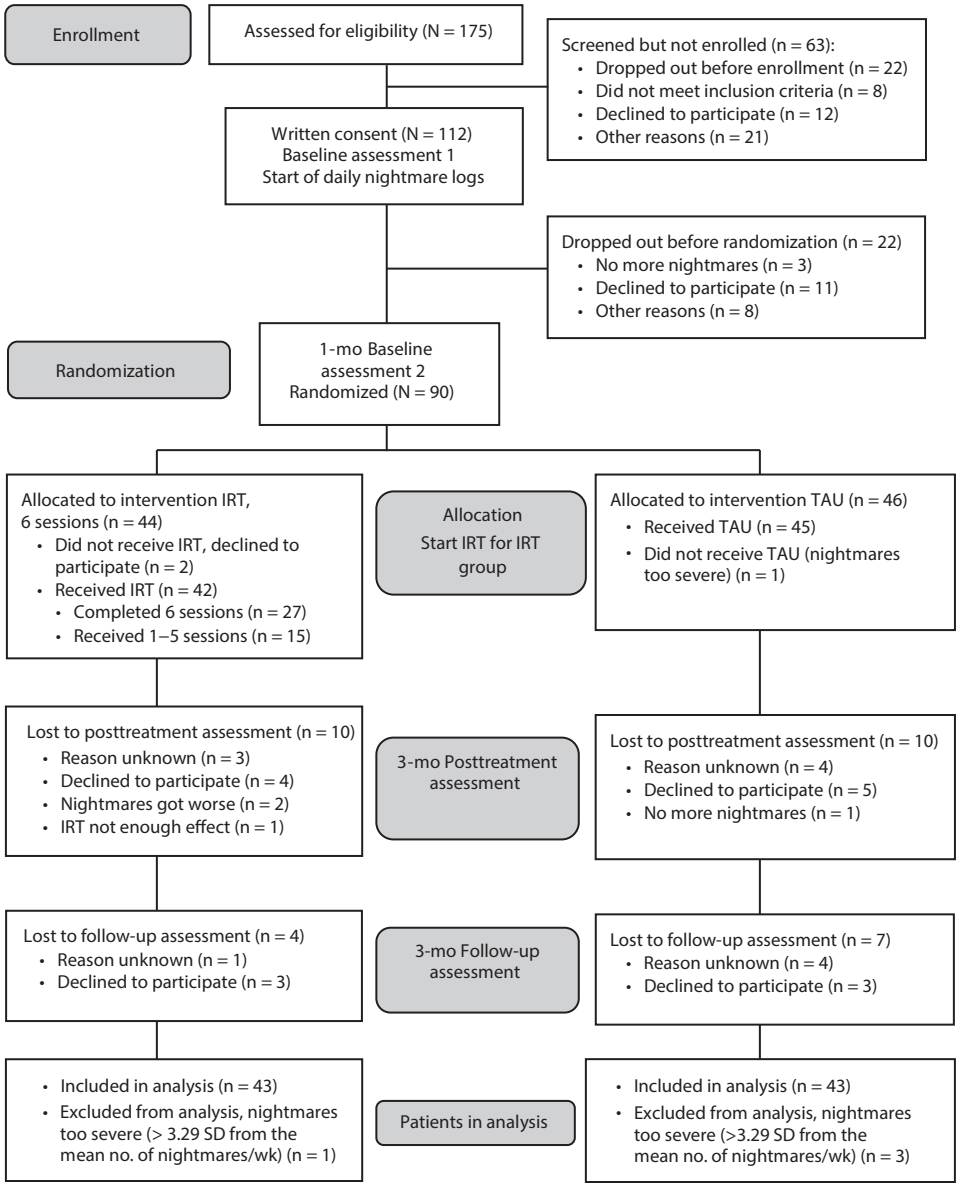
Nightmare Measures

Daily nightmare log. Nightmares were registered in the daily nightmare logs,[23,24] which recorded information about sleep quality during the previous night (on a scale from 0 to 10), the number of nightmares, the intensity of the emotions during the nightmare(s) (on a scale from 0 to 10), and the content of the nightmare(s). The participants used self-invented symbols for individual nightmares instead of writing down the whole nightmare every time it occurred. The daily nightmare log covered 7 days, and participants sent the completed logs to the research coordinator.

Nightmare Frequency Questionnaire. Nightmare frequency was also measured using a Dutch version of the Nightmare Frequency Questionnaire (NFQ),[25] which assesses "nights with nightmares" (per week, per month, and per year) and actual "number of nightmares" in the past 3 months. The NFQ was administered at pretreatment, at posttreatment, and with the follow-up measurements. The test-retest reliability data on the NFQ yielded weighted κ coefficients of 0.85 for nights and 0.90 for nightmares.[25]

Nightmare distress. The distress associated with nightmares was assessed using the Dutch version of the Nightmare Distress Questionnaire (NDQ).[26] The NDQ has an internal consistency ranging from 0.83 to 0.88.[26] The effect of nightmares on daily life was assessed with the Dutch

Figure 1. Study Design and Patients' Flow Through the Trial



Abbreviations: IRT = imagery rehearsal therapy, TAU = treatment as usual.

version of the Nightmare Effects Survey (NES), which has an internal consistency (Cronbach α) of 0.90.[27]

Psychopathology Measures

General psychopathology was assessed using the Dutch version of the Symptom Checklist-90 (SCL-90),[28] a questionnaire that is frequently used for several psychological complaints with good reliability and validity, an internal consistency (Cronbach α) of 0.88, and a test-retest reliability ranging from 0.74 to 0.80. The Dutch SCL-90 consists of 9 subscales: agoraphobia, anxiety, depression, somatization, interpersonal sensitivity-mistrust, cognitive performance deficits, acting-out hostility, sleep difficulties, and other.[28]

Symptoms of PTSD were assessed using the Self-Inventory List of PTSD Symptoms (*Zelfinventarisatielijst Posttraumatische Stressstoornis* [ZIL]),[29] a 22-item Dutch self-report inventory covering the specific symptoms of PTSD. It assesses the severity of PTSD symptoms in the last 4 weeks.[29] The reliability of the scale is good (Cronbach α varies from 0.90 to 0.94, and the instrument has a test-retest reliability of 0.92). A sensitivity of 0.86 and a specificity of 0.71 were found in relation to the Clinician-Administered PTSD Scale.[29] In the analysis, we removed item 7: "I had bad dreams." This left us with 21 items to assess PTSD symptoms other than nightmares.

Data Analysis

To test for within-group (time) and interaction effects (time × condition), we performed multilevel regression analyses with all dependent variables. Multilevel regression is an intention-to-treat analysis that handles missing data very

Table 1. Demographic and Clinical Characteristics of the Population

Characteristic	Imagery Rehearsal Therapy (n = 43)	Treatment as Usual (n = 43)	Analysis			
			χ^2	*t* Test	*df*	*P*
Age, mean (SD), y	37.6 (10.1)	34.4 (11.1)		1.377	84	.172
Sex, n (%)			0.000		1	1.000
Female	35 (81.4)	34 (79.1)				
Male	8 (18.6)	9 (20.9)				
Education, n (%)[a]			4.458		3	.216
Low	12 (27.9)	12 (27.9)				
Middle	11 (25.6)	4 (9.3)				
High	13 (30.2)	19 (44.2)				
Unknown	7 (16.3)	8 (18.6)				
Ethnicity, n (%)			0.816		1	.366
Dutch	35 (81.4)	38 (88.4)				
Non-Western immigrant	8 (18.6)	5 (11.6)				
Marital status, n (%)			0.048		1	.826
Single/not married	26 (60.5)	25 (58.1)				
Married/cohabiting	17 (39.5)	18 (41.9)				
Clinical features						
Primary diagnosis, n (%)			2.368		3	.500
Personality disorder	21 (48.8)	18 (41.9)				
Mood disorder	7 (16.3)	8 (18.6)				
Anxiety disorder including PTSD	9 (20.9)	6 (14.0)				
Other	6 (14.0)	11 (26.6)				
Number of *DSM-IV* classifications, n (%)						
1 Axis I disorder	10 (23.3)	11 (25.6)				
2 or more Axis I disorders	12 (27.9)	14 (32.5)				
Axis II + Axis I disorders	12 (27.9)	7 (16.3)				
Axis II disorder + more than 1 Axis I disorder	9 (20.9)	11 (25.6)				
DSM-IV-TR GAF score, mean (SD)	58.63 (7.16) (n = 40)	59.15 (8.80) (n = 41)		−0.292	79	.771
Psychoactive medication, n (%)	34 (79.1)	28 (65.1)	2.081		1	.149
Antidepressants	29 (85.3)[b]	27 (96.4)[c]				
Antipsychotics	10 (29.4)[b]	7 (25.0)[c]				
Anxiolytics (benzodiazepine) or hypnotics	21 (61.8)[b]	23 (82.1)[c]				
Other	7 (20.6)[b]	7 (25.0)[c]				
Duration of psychiatric treatment, mean (SD), y	3.2 (3.9)	4.0 (5.4)		−0.793	83	.430
Type of treatment			1.105		2	.575
Inpatient treatment, n (%)	2 (4.6)	1 (2.3)				
Treatments/wk, mean, h	24	24				
Day treatment	10 (23.3)	7 (16.3)				
Treatment/wk, mean (SD), min	412.0 (451.1)	591.8 (770.9)				
Outpatient treatment	31 (72.1)	35 (81.4)				
Treatment/wk, mean (SD), min	22.8 (18.3)	20.0 (12.8)				
Time since start of nightmares, mean (SD), y	15.0 (13.7)	10.6 (9.2)		1.735	73.46	.087

[a]Low: completed elementary school or lower vocational education; middle: completed high school or middle-level vocational education; high: completed pre-university, college, or university degree.
[b]Percentage of n = 34.
[c]Percentage of n = 28.
Abbreviations: GAF = Global Assessment of Functioning, PTSD = posttraumatic stress disorder.

well. This means that participants with only 1 measurement can be kept in the analysis.[30]

We found no baseline differences between the IRT and TAU groups (all *P* values > .05). However, in a logistic regression dropout analysis, we found that women were more likely to fill out the follow-up questionnaire in the TAU condition than men ($P = .008$). Therefore, we controlled for gender in the analyses. As the difference in nightmare duration between the 2 groups was marginally significant at $P < .10$, we decided to control for nightmare duration as well.

We calculated the Cohen *d* effect sizes on the observed data using $(M_{pre1} - M_{post1})/\sigma_{pooled}$. The between-group Cohen *d* values were calculated by the difference in change scores divided by the pooled standard deviation of the groups.[31] A significance level of $P < .05$ (2-tailed) was used throughout the study. Four participants were excluded from the analysis. They were considered to be outliers because of their high frequency nightmare scores at baseline (baseline *z* score > 3.29; Figure 1 flowchart). The nightmare frequency variable was log-transformed because of the skewness of this variable.

We also used multiple imputation to impute the missing posttreatment/follow-up values to see whether attrition influenced the follow-up scores.[32] However, multiple imputation is based on the "missing at random" assumption. Attrition in our study might be correlated to cases of failed or less effective treatment. For this reason, imputation may be too liberal and therefore we included those data with corresponding Cohen *d* as a comparison in the online supplement (see Supplementary eTable 1 at Psychiatrist.com).

For the daily nightmare logs, we used mean weekly scores. We calculated mean scores only if 5 or more days in 1 week were filled out. From all the nightmare logs, we could calculate means for only 50% of the weekly scores. Because we already had to impute the missing days for weeks with

Table 2. Observed Mean Pretreatment and Posttreatment Values With Corresponding Cohen *d* Effect Sizes on Nightmare Measures

		Baseline Assessment 2		Posttreatment (3 mo after baseline assessment)			Follow-Up (3 mo after posttreatment assessment)		
	Baseline Assessment 1				Cohen *d*			Cohen *d*	
Group	Mean (SD)	Mean (SD)	Time, Cohen *d*	Mean (SD)	Time	Time × Condition	Mean (SD)	Time	Time × Condition
Nightmare Frequency Questionnaire									
Nightmares/wk									
IRT	6.09 (4.19)	5.45 (4.78)	0.14	3.16 (3.41)	0.55***	−0.50*	2.33 (2.68)	0.81***	−0.39†
TAU	6.37 (5.09)	4.83 (3.05)	0.37	4.29 (3.92)	0.15*		3.15 (2.83)	0.57***	
Nights with nightmares/wk									
IRT	3.90 (2.03)	3.59 (1.99)	0.16	2.31 (1.85)	0.67***	−0.33, NS	2.01 (2.01)	0.79***	−0.32, NS
TAU	3.95 (1.51)	3.66 (1.61)	0.18	3.02 (1.79)	0.38**		2.41 (1.80)	0.73***	
Daily nightmare log									
No. of nightmares/wk									
IRT	NA	4.84 (3.16)	NA	3.48 (3.23)	0.43**	−0.10, NS	3.04 (2.99)	0.59***	−0.26, NS
TAU	NA	3.97 (2.11)	NA	2.77 (2.29)	0.55**		2.38 (2.43)	0.70***	
Nights with nightmares/wk									
IRT	NA	3.57 (2.08)	NA	2.77 (2.35)	0.36**	−0.11, NS	2.37 (2.07)	0.58***	−0.25, NS
TAU	NA	3.12 (1.52)	NA	2.36 (1.88)	0.45*		1.93 (1.99)	0.67**	
Quality of sleep (0–10)									
IRT	NA	4.98 (1.41)	NA	5.19 (1.35)	−0.15, NS	−0.09, NS	5.55 (1.53)	−0.39***	0.15, NS
TAU	NA	5.54 (1.08)	NA	5.90 (1.14)	−0.32, NS		5.97 (1.31)	−0.36, NS	
Nightmare Distress Questionnaire									
IRT	31.60 (7.10)	29.84 (7.88)	0.24	24.65 (10.31)	0.57***	−0.69**	22.61 (10.48)	0.78***	−0.57*
TAU	32.40 (7.35)	30.16 (6.57)	0.32	29.40 (9.69)	0.09, NS		26.56 (11.34)	0.39**	
Nightmare Effects Survey									
IRT	29.07 (8.82)	26.84 (9.15)	0.25	21.74 (11.50)	0.49***	−0.29, NS	18.21 (12.02)	0.81***	−0.47†
TAU	27.19 (9.34)	26.47 (8.30)	0.08	24.33 (10.94)	0.22, NS		21.44 (13.06)	0.46**	

*P < .05. **P < .01. ***P < .001. †P < .10 (2-tailed).
Abbreviations: IRT = imagery rehearsal therapy, NA=not applicable, NS = nonsignificant, TAU = treatment as usual.

only 5 scores, and because of the large amount of missing data, we decided not to impute these scores since we were not confident that the missing data would be rendered correctly by imputation.

RESULTS

Participant Characteristics

Participants in the IRT and TAU conditions did not differ significantly in terms of dropout rates ($\chi^2_2 = 0.94$, $P = .62$), nor did they differ in terms of their demographic and clinical characteristics (Table 1). Reasons for not adhering to the study protocol varied from aggravation of psychiatric symptoms, illness, or intensity of their present treatment to lack of motivation. Clinical characteristics were derived from the participants' medical records. However, for the Global Assessment of Functioning score, several medical records had missing data or were not up to date due to changes in software. Mean SCL-90 scores at the start of the trial indicated that the severity of psychopathology was above average to high in reference to a psychiatric norm group[28] (see Table 3). We compared the mean scores of the IRT condition on all dependent variables at the start of the trial between the completers (4 to 6 sessions of IRT) and the noncompleters (<4 sessions of IRT) and found no differences (P values > .05).

Baseline Assessment 1 to Baseline Assessment 2

Before treatment and randomization, the participants recorded their nightmares for 1 month in the daily nightmare logs (baseline assessment 1 to baseline assessment 2). There was a significant time effect after this month of recording for nightmares per week (NFQ) (Cohen $d = 0.25$, $t_{85} = 2.57$, $P = .012$), nightmare distress (NDQ) (Cohen $d = 0.28$, $t_{85} = 3.48$, $P = .001$), SCL-90 score (Cohen $d = 0.24$, $t_{85} = 2.23$, $P = .002$), and ZIL score (Cohen $d = 0.31$, $t_{84} = 3.32$, $P = .001$). The other variables, number of nights with nightmares (NFQ), and NES, showed no significant time effect (Table 2).

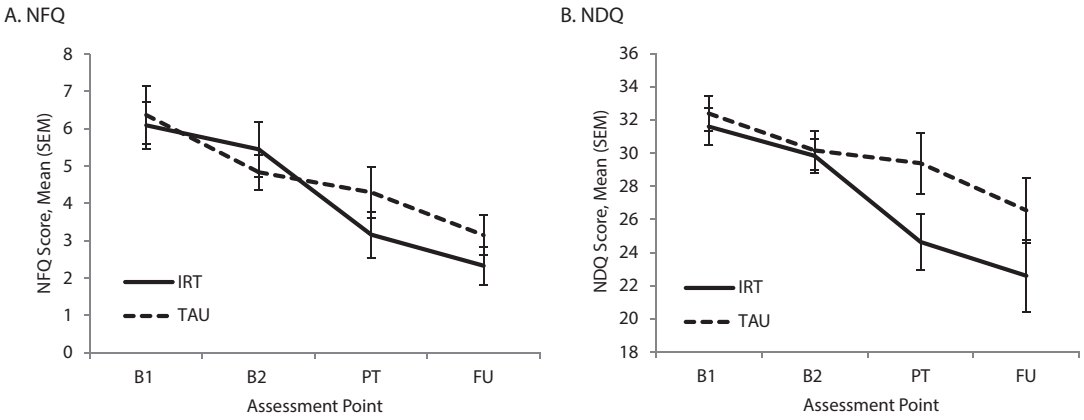
We compared the nightmare frequency per week in the daily nightmare logs (mean = 4.48, SD = 2.78) to the nightmare frequency on the NFQ (mean = 4.58, SD = 3.74) and found no significant difference in frequency ($t_{59} = 0.36$, $P = .72$).

Nightmare Outcomes Questionnaires

In the posttreatment assessment, we found a significant time effect for both conditions in terms of nightmare frequency and nights with nightmares (Cohen $d = 0.2$–0.7, $P < .05$). In the IRT group, we found significant time effects for the NDQ and NES (Cohen $d = 0.5$–0.6, $P < .01$). We observed nonsignificant time effects for the NDQ and NES scores in the TAU group ($P > .05$). We observed significant interaction effects (time × condition) for nightmare frequency (NFQ) (Cohen $d = 0.5$, $b = 0.35$, standard error [SE] = 0.17, $P < .05$) and nightmare distress (Cohen = 0.7, $b = 4.80$, SE = 1.76, $P < .01$) (Figure 2).

At the 3-month follow-up, the time effects remained significant for the IRT condition. However, in the TAU condition, we now observed significant time effects for nightmare frequency, NDQ *and* NES ($P < .01$). The

Figure 2. Changes in Observed Mean Scores and Standard Errors of the Mean (SEM) on the Nightmare Frequency Questionnaire (NFQ) and Nightmare Distress Questionnaire (NDQ)



Abbreviations: B1 = baseline assessment 1, B2 = baseline assessment 2, FU = follow-up assessment, IRT = imagery rehearsal therapy, PT = posttreatment assessment, TAU = treatment as usual.

Table 3. Observed Mean Pretreatment and Posttreatment Values With Corresponding Cohen *d* Effect Sizes on Psychopathology Measures

				Posttreatment (3 mo after baseline assessment)			Follow-Up (3 mo after posttreatment assessment)		
	Baseline Assessment 1	Baseline Assessment 2			Cohen *d*			Cohen *d*	
Group	Mean (SD)	Mean (SD)	Time, Cohen *d*	Mean (SD)	Time	Time × Condition	Mean (SD)	Time	Time × Condition
ZIL (PTSD symptoms inventory)[a]									
IRT	55.88 (11.76)	53.16 (9.42)	0.26	45.42 (13.41)	0.67***	0.69**	46.04 (13.23)	0.62***	0.60*
TAU	54.51 (11.39)	50.55 (12.36)	0.33	50.36 (14.04)	0.01, NS		49.59 (15.33)	0.07, NS	
SCL-90									
Total									
IRT	249.21 (58.21)	240.16 (57.19)	0.16	206.68 (67.32)	0.54***	−0.48*	213.36 (67.22)	0.43***	−0.37, NS
TAU	241.28 (62.94)	222.19 (59.91)	0.31	215.88 (72.34)	0.09, NS		206.85 (77.39)	0.22, NS	
Agoraphobia									
IRT	17.28 (7.23)	16.30 (7.10)	0.14	15.00 (7.14)	0.18†	0.25, NS	14.54 (6.95)	0.25**	0.34, NS
TAU	16.12 (6.11)	14.35 (5.80)	0.30	14.42 (7.37)	−0.01, NS		13.89 (8.50)	0.06, NS	
Anxiety									
IRT	29.91 (8.91)	28.44 (8.32)	0.17	23.97 (9.16)	0.51***	0.58*	24.96 (9.67)	0.39**	0.38, NS
TAU	28.93 (8.38)	26.79 (8.74)	0.25	26.45 (9.75)	0.04, NS		24.70 (10.52)	0.22, NS	
Depression									
IRT	50.16 (13.18)	49.81 (12.87)	0.03	40.55 (16.42)	0.63***	0.55*	43.68 (16.45)	0.42**	0.37, NS
TAU	49.35 (14.17)	44.49 (13.42	0.35	42.27 (15.05)	0.16, NS		41.22 (16.81)	0.21, NS	
Somatization									
IRT	32.30 (10.32)	30.58 (9.62)	0.17	26.77 (9.72)	0.39**	0.36, NS	27.86 (9.75)	0.28*	0.25, NS
TAU	31.12 (10.15)	27.80 (8.85)	0.35	27.42 (10.77)	0.04, NS		26.19 (10.31)	0.17, NS	
Cognitive performance deficits									
IRT	27.30 (6.83)	26.05 (7.40)	0.18	22.32 (7.46)	0.50**	0.28, NS	22.89 (7.45)	0.42**	0.26, NS
TAU	26.35 (8.07)	25.07 (8.04)	0.16	24.58 (9.76)	0.06, NS		23.48 (9.12)	0.18, NS	
Interpersonal sensitivity-mistrust									
IRT	47.51 (16.02)	44.88 (14.05)	0.17	40.06 (16.02)	0.32*	0.35, NS	40.64 (15.75)	0.28*	0.23, NS
TAU	45.30 (15.44)	42.91 (14.72)	0.16	42.36 (15.97)	0.04 NS		40.11 (16.93)	0.18, NS	
Acting-out hostility									
IRT	11.93 (4.51)	11.77 (4.88)	0.03	10.35 (4.30)	0.31*	0.20, NS	10.36 (4.47)	0.30*	0.38, NS
TAU	11.72 (4.99)	11.44 (4.35)	0.06	10.61 (4.30)	0.19 NS		10.59 (4.21)	0.20, NS	
Sleep difficulties									
IRT	11.42 (3.19)	10.86 (3.08)	0.18	8.39 (3.42)	0.76***	0.72**	7.82 (3.35)	0.95***	0.69**
TAU	10.98 (2.79)	9.60 (3.02)	0.47	9.24 (3.35)	0.11 NS		9.00 (3.22)	0.19, NS	
Other problems									
IRT	21.40 (6.68)	21.47 (6.93)	−0.01	19.26 (6.86)	0.32*	0.16, NS	20.61 (7.42)	0.12†	0.12, NS
TAU	21.42 (7.03)	19.74 (6.80)	0.24	18.52 (7.31)	0.17 NS		17.67 (7.35)	0.29, NS	

[a]Excluding the nightmare item.
*P < .05. **P < .01. ***P < .001. †P < .10 (2-tailed).
Abbreviations: IRT = imagery rehearsal therapy, NS = nonsignificant, TAU = treatment as usual, PTSD = posttraumatic stress disorder, SCL-90 = Symptom Checklist-90, ZIL = Self-Report Inventory List of PTSD Symptoms (Zelfinventarisatielijst Posttraumatische Stressstoornis).

interaction effect for nightmare distress remained significant (Cohen $d = 0.6$, $b = 3.89$, SE = 1.86, $P < .05$); however, the effect on nightmare frequency was only marginally significant (Cohen $d = 0.4$, $b = 0.37$, SE = 0.23, $P = .11$). In addition, there was also a marginally significant interaction effect with the NES (Cohen $d = 0.5$, $b = 4.06$, SE = 2.24, $P = .07$). See Supplementary eTables 2a, 2b, and 2c for all regression coefficients from the multilevel analyses.

We also imputed the missing data according to multiple imputation. There were negligible differences in Cohen *d* effect sizes based on the imputed dataset compared with the Cohen *d* effect sizes from the observed data (Supplementary eTable 1). We also analyzed the data of the study completers (4–6 sessions of IRT, completed posttreatment and follow-up assessments). There were negligible differences in Cohen *d* effect sizes based on the completers' dataset compared with the Cohen *d* effect sizes from the observed data (Supplementary eTable 3).

Daily Nightmare Logs

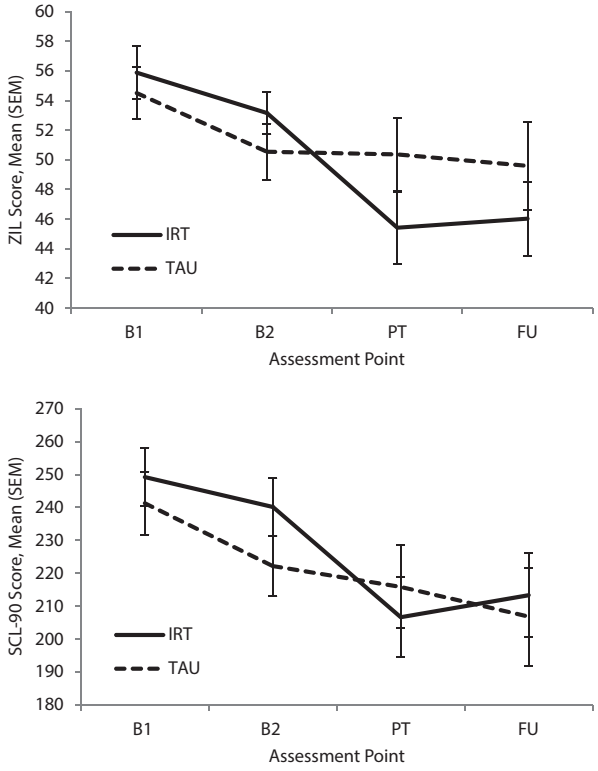
From baseline assessment 2 to posttreatment, both the IRT and the TAU conditions showed significantly ameliorated nightmare frequency (Cohen $d = 0.4–0.6$, $P < .01$) and nights with nightmares (Cohen $d = 0.4–0.5$, $P < .05$; see Table 2). Neither condition improved significantly in terms of sleep quality, and there were no interaction effects between the IRT and TAU conditions. At the 3-month follow-up, these effects slightly increased, and there was also a significant time effect for IRT on sleep quality (Cohen $d = 0.4$, $P < .01$). However, there were still no significant time × condition interactions (Supplementary eTable 2a).

Psychopathology Outcomes

In Table 3, the mean scores and Cohen *d* effect sizes are reported for the ZIL and the SCL-90, including the SCL-90 subscales. At posttreatment, we found a significant time effect for the IRT condition on the ZIL (Cohen $d = 0.7$, $P < .001$) and the SCL-90 (Cohen $d = 0.5$, $P < .001$). The TAU condition showed no significant time effects ($P > .05$). We also observed significant interaction effects (time × condition) for both the ZIL (Cohen $d = 0.7$, $b = 7.97$, SE = 1.88, $P < .01$) and the SCL-90 (Cohen $d = 0.5$, $b = 23.83$, SE = 11.59, $P < .05$).

At the 3-month follow-up, the time effects with the ZIL (Cohen $d = 0.6$, $P < .001$) and SCL-90 (Cohen $d = 0.4$, $P < .001$) remained significant for the IRT condition and nonsignificant for the TAU condition ($P > .05$). Again, we observed an interaction effect for the ZIL (Cohen $d = 0.6$, $b = 7.58$, SE = 1.95, $P < .05$; Figure 3). However, the interaction effect for the SCL-90 was no longer significant (Figure 3).

Figure 3. Changes in Mean Posttraumatic Stress Disorder (PTSD) Scores and Standard Errors of the Mean (SEM) on the ZIL[a] and Changes in Mean (SEM) Psychopathology Scores on the SCL-90



[a]Excluding the nightmare item.
Abbreviations: B1 = baseline assessment 1, B2 = baseline assessment 2, FU = follow-up assessment, IRT = imagery rehearsal therapy, PT = posttreatment assessment, SCL-90 = Symptom Checklist-90, TAU = treatment as usual, ZIL = Self-Report Inventory List of PTSD Symptoms (Zelfinventarisatielijst Posttraumatische Stressstoornis).

DISCUSSION

This randomized controlled trial showed a moderate effect of IRT in addition to TAU on nightmare frequency and nightmare distress, measured with questionnaires. This effect was demonstrated posttreatment and at a 3-month follow-up in a population with moderate to severe psychiatric disorders. In the daily nightmare logs, we found no effect differences between IRT and TAU. With regard to psychopathology outcomes, there was a moderate effect on PTSD symptoms at posttreatment and 3-month follow-up. There was also an effect on psychopathology at the posttreatment, but not at the 3-month follow-up.

The moderate effects of IRT on nightmare frequency and distress that we found are similar to those reported in other trials[17,33] and smaller than the comparatively large effect sizes found by Krakow and colleagues.[15] This difference may be explained by the fact that we had a heterogeneous sample of patients with diverse psychiatric diagnoses, whereas Krakow and colleagues[15] studied a more homogenous sample of young women who all had experienced sexual assault.

Furthermore, Krakow and colleagues[15] had a waiting-list control condition, in contrast to our control condition that received TAU, which is an active control condition. In addition to the TAU, participants in this condition also recorded their nightmares throughout the trial. Recording of nightmares in itself acts to diminish the frequency of nightmares.[34,35] Therefore it is to be expected that the TAU condition will also improve, and the overall effect

size difference between IRT and TAU is expected to be lower. Nevertheless, IRT significantly added to the TAU condition, particularly in the short term, across all variables (essential for treatment adherence) and in the long term for nightmare distress, which is considered by several researchers to be more relevant to mental health than nightmare frequency.[36,37] Cook and colleagues[14] found no effect of IRT on nightmare frequency (NFQ) compared with an active control condition, which was comparable to our control condition. This may be due to their study population: they worked with Vietnam War veterans with chronic and severe PTSD, who may constitute a specific and difficult population for whom 6 sessions of group IRT may not produce an effect large enough to be detectable.[14] Also, the IRT in their study was given in group sessions, whereas we had individual sessions, which are probably more effective.

This trial is the first study of the treatment of nightmares with IRT in a population of patients with complex psychiatric disorders. This population is heterogeneous with regards to *DSM-IV* classifications, and comorbidity is common. Most participants suffered from severe psychiatric disorders with 2 or more *DSM-IV* classifications. They were receiving long-term psychiatric treatment. Given the fact that most of the participants reported having nightmares since their childhood, the results of our trial are striking. This provides support for the notion that nightmares can and should be treated as an independent disorder.[3,38] It seems the population in this study is different from the study populations of previous studies with regard to the complexity of their psychopathology.[15,17] Many treatment studies are difficult to reconcile with daily practice in mental health care, where the "perfect" patient with only 1 clear-cut *DSM-IV* classification does not exist. Therefore, a major strength of this study is that it has good ecological validity. Therefore, we advocate adding IRT to regular treatment when nightmares are a problem for patients with psychiatric disorders.

A limitation of this study was that we had substantial missing data in the diary measures. We are not able to determine which measure, either diaries or questionnaires, was more accurate at posttreatment. However, this may not be important since in this study and in previous studies there was no difference in the frequency of reported nightmares between diary and questionnaire measures.[24,25]

Another limitation is that we do not know for sure the extent to which participants adhered to the treatment protocol, ie, the extent to which they were doing their homework assignments. Therefore, we are not able to determine the effect of *practicing* IRT. Also, we were not able to control for possible IRT therapist effects. Furthermore, both the treating practitioners and the participants were not blind to the study condition. This is an issue in most psychological treatment studies. We tried to minimize the effect by instructing the treating practitioners thoroughly, as well as by not informing the participants about the content of the IRT.

Future research should be focused on treatments that independently address psychopathology symptoms such as nightmares in populations of patients with psychiatric disorders and high comorbidity.[38] The current study shows that populations with severe comorbid psychopathology can obtain a clear benefit from symptom-based treatments. The patient groups should be large and described thoroughly in order to facilitate the analysis of potential moderator variables. Furthermore, dismantling studies are necessary to be able to draw methodologically reliable conclusions regarding the effective components of the psychological treatments of nightmares.[11]

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Supplementary material: See accompanying pages.

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Supplementary material follows this article.

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Supplementary Material

Article Title: Imagery Rehearsal Therapy in Addition to Treatment as Usual for Patients With Diverse Psychiatric Diagnoses Suffering From Nightmares: A Randomized Controlled Trial

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5. eTable 3 Completers' pre- post-treatment means with corresponding Cohen's *d* effect sizes on nightmare and secondary measures

Disclaimer

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Supplementary eTable 1: Imputed pre- post-treatment means with corresponding Cohen's *d* effect sizes on nightmare and secondary measures

		Baseline assessment 1		Baseline assessment 2			Post-treatment (3 months after baseline assessment)				Follow-up (3 months after post-treatment assessment)			
						Cohen's d			*Cohen's d*				*Cohen's d*	
	Group	Mean	(SD)	Mean	(SD)	Time	Mean	(SD)	Time	Time x group	Mean	(SD)	Time	Time x group
Nightmare Frequency Questionnaire - nightmares per week	IRT	6.09	(4.19)	5.45	(4.78)	0.14	3.22	(3.03)	0.56***	-0.52**	2.37	(2.32)	0.82***	-0.36†
	TAU	6.37	(5.09)	4.83	(3.05)	0.37	4.29	(3.55)	0.16*		3.20	(2.43)	0.59***	
Nightmare Frequency Questionnaire - nights with nightmares per week	IRT	3.90	(2.03)	3.59	(1.99)	0.16	2.39	(1.74)	0.64***	-0.33^{ns}	2.03	(1.78)	0.83***	-0.18^{ns}
	TAU	3.95	(1.51)	3.66	(1.61)	0.18	3.06	(1.68)	0.37***		2.46	(1.63)	0.74***	
Nightmare Distress Questionnaire	IRT	31.60	(7.10)	29.84	(7.88)	0.24	24.63	(8.90)	0.62***	-0.63**	22.58	(8.59)	0.88***	-0.50*
	TAU	32.40	(7.35)	30.16	(6.57)	0.32	29.40	(8.57)	0.10^{ns}		26.54	(9.12)	0.46**	
Nightmare Effects Survey	IRT	29.07	(8.82)	26.84	(9.15)	0.25	21.73	(9.87)	0.54***	-0.36^{ns}	18.15	(9.84)	0.91***	-0.43†
	TAU	27.19	(9.34)	26.47	(8.30)	0.08	24.31	(9.69)	0.24^{ns}		21.66	(10.50)	0.51**	
ZIL (PTSD symptoms Inventory)	IRT	59.33	(12.24)	56.56	(9.82)	0.25	48.11	(12.08)	0.77***	-0.61**	48.40	(11.37)	0.77***	0.54**
	TAU	58.00	(11.67)	53.62	(12.79)	0.36	53.21	(12.91)	0.03^{ns}		52.33	(12.91)	0.10^{ns}	
SCL-90 Total	IRT	249.21	(58.21)	240.16	(57.19)	0.16	206.89	(57.07)	0.58***	-0.52*	213.59	(54.12)	0.48***	-0.43^{ns}
	TAU	241.28	(62.94)	222.19	(59.91)	0.31	215.66	(63.27)	0.11^{ns}		206.64	(61.15)	0.26^{ns}	

Note: * = $P < 0.05$, ** = $P < 0.01$, *** = $P < 0.001$, † = $P < 0.10$ (two-tailed), ns = non significant; SCL-90 = Symptom Check List; IRT = imagery rehearsal therapy, TAU = treatment as usual.

Supplementary eTable 2a: Multilevel Regression: Time and Interaction Effects

	NFQ nightmares per week		NFQ nights with nightmares per week		DNL nightmares per week		DNL nights with nightmares per week		DNL quality of sleep	
	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)
Control variables										
Gender	-0.05	(0.23)ns	-0.27	(0.45)ns	n.a.		n.a.		n.a.	
Duration of nightmares	-0.01	(0.01)ns	-0.02	(0.02)ns	n.a.		n.a.		n.a.	
IRT										
Constant	0.47	(0.43)ns	3.21	(0.86)***	0.40	(0.16)*	3.56	(0.33)***	4.97	(0.22)***
Post-treatment	-0.65	(0.12)***	-1.25	(0.27)***	-0.53	(0.14)**	-0.86	(0.27)**	0.25	(0.16)ns
Follow-up	-0.95	(0.16)***	-1.56	(0.28)***	-0.63	(0.14)***	-1.24	(0.27)***	0.56	(0.15)***
dummy	-0.05	(0.19)ns	0.01	(0.39)ns	-0.15	(0.24)ns	-0.54	(0.50)ns	0.51	(0.33)ns
IRT × Post-treatment	0.35	(0.17)*	0.57	(0.37)ns	0.03	(0.21)ns	0.21	(0.40)ns	0.04	(0.24)ns
IRT × Follow-up	0.37	(0.23)ns	0.40	(0.39)ns	-0.01	(0.22)ns	0.29	(0.42)ns	-0.21	(0.25)ns
TAU										
Constant	0.42	(0.43)ns	3.22	(0.85)***	0.25	(0.18)ns	3.02	(0.37)***	5.48	(0.25)***
Post-treatment	-0.30	(0.12)*	-0.68	(0.26)**	-0.50	(0.16)**	-0.66	(0.30)*	0.29	(0.18)ns
Follow-up	-0.58	(0.16)***	-1.16	(0.28)***	-0.65	(0.17)***	-0.94	(0.32)**	0.35	(0.19)ns

Note. * = $P < 0.05$; ** = $P < 0.01$; *** = $P < 0.001$; ns = not significant; significance levels are not corrected for multiple testing. To test for Time and interaction effects (Time × Group), a multilevel regression analysis was conducted. The non-standardised regression coefficients are indicative of pre-post treatment changes. Four scores were excluded from the multilevel analyses because otherwise assumptions would be violated (z-score > |3.29|). IRT = imagery rehearsal therapy, TAU = treatment as usual; NFQ = Nightmare Frequency Questionnaire; DNL = Daily Nightmare Log.

Supplementary eTable 2b: Multilevel Regression: Time and Interaction Effects

	NDQ		NES		ZIL[a]	
	b	(SE)	b	(SE)	b	(SE)
Control variables						
Gender	-1.88	(2.21)ns	-2.49	(2.45)ns	1.16	(3.11)ns
Duration of nightmares	-0.02	(0.08)ns	-0.03	(0.08)ns	-0.12	(0.10)ns
IRT						
Constant	33.29	(4.25)***	31.77	(4.90)***	51.32	(5.97)***
Post-treatment	-5.30	(1.26)***	-4.98	(1.38)***	-7.97	(1.88)***
Follow-up	-7.40	(1.31)***	-8.97	(1.57)***	-7.58	(1.95)***
dummy	-0.19	(1.92)ns	-0.55	(2.11)ns	-3.02	(2.74)ns
IRT × Post-treatment	4.80	(1.76)**	2.40	(1.93)ns	7.18	(2.64)**
IRT × Follow-up	3.89	(1.86)*	4.06	(2.24)ns	6.73	(2.79)*
TAU						
Constant	33.48	(4.19)***	31.22	(4.75)***	48.30	(5.88)***
Post-treatment	-0.50	(1.23)ns	-2.57	(1.35)ns	-0.79	(1.85)ns
Follow-up	-3.51	(1.32)**	-4.91	(1.59)**	-0.85	(2.00)ns

Note. * = $P < 0.05$; ** = $P < 0.01$; *** = $P < 0.001$; ns = non significant; significance levels are not corrected for multiple testing. To test for Time and interaction effects (Time × Group), a multilevel regression analysis was conducted. The non-standardized regression coefficients are indicative of pre-post treatment changes. Four scores were excluded from the multilevel analyses because otherwise assumptions would be violated (z-score > |3.29|). IRT = imagery rehearsal therapy, TAU = treatment as usual; NDQ = Nightmare Distress Questionnaire; NES = Nightmare Effect Survey; ZIL[a] = Self-Report Questionnaire PTSD Symptoms, excluding the nightmare item.

Supplementary eTable 2c: Multilevel Regression: Time and Interaction Effects

	SCL90ago		SCL90anx		SCL90dep		SCL90som		SCL90cpd		SCL90ism		SCL90aoh		SCL90sld		SCL90oth		SCL90psneur	
	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)	b	(SE)
Control variables																				
Gender	2.08	(1.80)ns	4.46	(2.24)*	2.93	(3.61)ns	3.90	(2.45)ns	-0.44	(2.06)ns	-0.66	(3.85)ns	0.49	(1.10)ns	1.01	(0.77)ns	-1.05	(1.76)ns	12.50	(16.34)ns
Duration nightmares	0.00	(0.08)ns	-0.01	(0.08)ns	0.01	(0.12)ns	0.03	(0.08)ns	-0.06	(0.07)ns	-0.04	(0.13)ns	-0.02	(0.04)ns	-0.04	(0.03)ns	0.01	(0.06)ns	-0.12	(0.55)ns
IRT																				
Constant	12.52	(3.45)***	20.37	(4.29)***	44.50	(6.92)***	23.46	(4.69)***	27.72	(4.11)***	46.16	(7.37)***	10.94	(2.10)***	9.10	(1.48)***	23.35	(3.37)***	217.74	(31.28)***
Post-treatment	-1.45	(0.76)ns	-4.88	(1.21)***	-9.25	(2.14)***	-3.40	(1.14)**	-2.94	(1.06)**	-4.85	(1.97)*	-1.43	(0.65)*	-2.35	(0.48)***	-2.14	(0.91)ns	-32.74	(8.30)***
Follow-up	-2.42	(0.79)**	-4.11	(1.26)**	-7.10	(2.22)**	-2.63	(1.19)*	-2.86	(1.10)**	-4.18	(2.05)*	-1.61	(0.68)*	-2.94	(0.50)***	-1.58	(0.94)ns	-29.57	(8.63)***
dummy	-1.89	(1.52)ns	-1.59	(1.94)ns	-5.23	(3.16)ns	-2.59	(2.08)ns	-1.24	(1.77)ns	-2.15	(3.30)ns	-0.42	(0.96)ns	-1.39	(0.68)*	-1.69	(1.51)ns	-18.20	(14.01)ns
IRT × Post-treatment	1.13	(1.06)ns	3.81	(1.69)*	6.73	(2.99)*	2.49	(1.59)ns	2.08	(1.47)ns	4.02	(2.74)ns	0.60	(0.91)ns	2.04	(0.67)**	0.84	(1.26)ns	23.83	(11.59)*
IRT × Follow-up	1.43	(1.12)ns	2.19	(1.79)ns	4.08	(3.16)ns	1.57	(1.69)ns	1.46	(1.56)ns	2.42	(2.91)ns	1.12	(0.97)ns	2.19	(0.71)**	0.16	(1.34)ns	16.89	(12.28)ns
TAU																				
Constant	10.64	(3.39)**	18.78	(4.23)***	39.26	(6.82)***	20.87	(4.62)***	25.73	(3.88)***	44.01	(7.26)***	10.52	(2.07)***	7.71	(1.46)***	21.66	(3.32)***	199.54	30.82***
Post-treatment	-0.32	(0.74)ns	-1.07	(1.18)ns	-2.52	(2.09)ns	-0.91	(1.11)ns	-0.86	(1.03)ns	-0.83	(1.92)ns	-0.83	(0.64)ns	-0.31	(0.47)ns	-1.30	(0.88)ns	-8.91	(8.09)ns
Follow-up	-0.99	(0.80)ns	-1.92	(1.27)ns	-3.02	(2.25)ns	-1.06	(1.20)ns	-1.40	(1.11)ns	-1.76	(2.07)ns	-0.50	(0.69)ns	-0.76	(0.50)ns	-1.41	(0.95)ns	-12.68	(8.74)ns

Note. * = $P < 0.05$; ** = $P < 0.01$; *** = $P < 0.001$; ns = non significant; significance levels are not corrected for multiple testing. To test for Time and interaction effects (Time × Group), a multilevel regression analysis was conducted. The non-standardized regression coefficients are indicative of pre-post treatment changes. Four scores were excluded from the multilevel analyses because otherwise assumptions would be violated (z-score > |3.29|). IRT = imagery rehearsal therapy, TAU = treatment as usual; SCL-90 = Symptom Check List, SCL90ago = Symptom Check List subscale Agoraphobia, SCL90anx = Symptom Check List subscale Anxiety, SCL90dep = Symptom Check List subscale Depression, SCL90som = Symptom Check List subscale Somatization, SCL90cpd = Symptom Check List subscale Cognitive performance deficits, SCL90ism = Symptom Check List subscale Interpersonal sensitivity-mistrust, SCL90aoh = Symptom Check List subscale Acting-out hostility, SCL90sld = Symptom Check List subscale Sleep difficulties, SCL90oth = Symptom Check List subscale Other problems, SCL90psneur = Symptom Check List total score Psychoneuroticism

Supplementary eTable 3: Completers' pre- post-treatment means with corresponding Cohen's *d* effect sizes on nightmare and secondary measures

		Baseline assessment 2		Post-treatment (3 months after baseline assessment)				Follow-up (3 months after post-treatment assessment)			
						Cohen's d				*Cohen's d*	
	Group	Mean	(SD)	Mean	(SD)	Time	Time x group	Mean	(SD)	Time	Time x group
NFQ nightmares per week	IRT	5.68	(4.78)	3.38	(3.52)	0.54	0.56	2.74	(2.78)	0.74	0.34
	TAU	4.71	(3.25)	4.07	(3.37)	0.19		3.15	(2.83)	0.51	
NFQ nights with nightmares per week	IRT	3.77	(1.95)	2.48	(1.90)	0.67	0.48	2.35	(2.06)	0.71	0.20
	TAU	3.47	(1.50)	2.95	(1.82)	0.31		2.41	(1.80)	0.64	
Nightmare Distress Questionnaire	IRT	31.61	(8.27)	24.74	(10.07)	0.75	0.81	23.61	(11.00)	0.82	0.51
	TAU	30.19	(7.50)	29.58	(9.78)	0.07		26.56	(11.34)	0.38	
Nightmare Effects Survey	IRT	27.91	(7.63)	22.74	(10.98)	0.55	0.32	20.26	(11.53)	0.78	0.32
	TAU	26.44	(9.50)	24.04	(11.08)	0.23		21.44	(13.06)	0.44	
ZIL (PTSD symptoms inventory)	IRT	54.35	(7.98)	46.78	(12.55)	0.72	0.71	47.57	(13.91)	0.60	0.49
	TAU	49.73	(12.31)	50.53	(14.86)	-0.05		49.59	(15.33)	0.01	
SCL-90 Total	IRT	243.35	(58.15)	210.13	(69.84)	0.52	0.50	213.35	(71.71)	0.40	0.31
	TAU	217.37	(62.88)	213.15	(78.62)	0.06		206.58	(77.39)	0.13	
SCL-90 Agoraphobia	IRT	17.48	(6.14)	16.04	(7.50)	0.21	0.28	15.30	(7.24)	0.29	0.27
	TAU	14.74	(6.38)	15.00	(8.13)	-0.04		13.89	(8.50)	0.10	
SCL-90 Anxiety	IRT	29.52	(8.44)	24.39	(9.20)	0.57	0.68	25.52	(10.17)	0.41	0.33
	TAU	26.15	(9.26)	25.88	(10.23)	0.03		24.70	(10.52)	0.14	
SCL-90 Depression	IRT	51.39	(13.26)	41.70	(15.90)	0.66	0.62	44.43	(17.45)	0.42	0.30
	TAU	43.67	(15.18)	42.35	(16.63)	0.08		41.22	(16.81)	0.15	
SCL-90 Somatization	IRT	30.30	(9.04)	27.13	(10.04)	0.33	0.42	27.96	(10.08)	0.23	0.24
	TAU	26.78	(8.27)	26.69	(11.37)	0.01		26.19	(10.31)	0.05	
SCL-90 Cognitive performance deficits	IRT	25.52	(6.23)	23.04	(7.50)	0.36	0.26	22.57	(7.88)	0.38	0.26
	TAU	24.81	(8.50)	24.16	(10.08)	0.07		23.48	(9.12)	0.14	
SCL-90 Interpersonal sensitivity-mistrust	IRT	44.74	(14.73)	39.57	(16.44)	0.33	0.34	41.13	(16.61)	0.22	0.16
	TAU	41.52	(14.97)	41.62	(16.94)	-0.01		40.11	(16.93)	0.08	
SCL-90 Acting-out hostility	IRT	11.57	(5.47)	10.34	(4.76)	0.24	0.14	9.91	(4.28)	0.37	0.36
	TAU	10.81	(3.58)	10.38	(4.35)	0.11		10.59	(4.21)	0.05	
SCL-90 Sleep difficulties	IRT	10.91	(3.06)	8.65	(3.65)	0.67	0.51	8.17	(3.30)	0.79	0.58
	TAU	9.93	(2.77)	9.35	(3.38)	0.19		9.00	(3.22)	0.28	
SCL-90 Other problems	IRT	21.91	(8.03)	19.17	(7.38)	0.36	0.25	20.35	(7.67)	0.21	0.05
	TAU	18.96	(6.10)	17.73	(7.48)	0.18		17.67	(7.35)	0.17	

Note: Participants were considered completers if they had received at least four sessions of IRT, and for both IRT and TAU conditions completed the post treatment and follow-up assessments. IRT = imagery rehearsal therapy; TAU = treatment as usual; NFQ = Nightmare Frequency Questionnaire; SCL-90 = Symptom Check List.