

A Controlled Study of Imagery Rehearsal for Chronic Nightmares in Sexual Assault Survivors With PTSD: A Preliminary Report

Barry Krakow,^{1-4,9} Michael Hollifield,^{3,5} Ron Schrader,⁶ Mary Koss,⁷ Dan Tandberg,² John Lauriello,³ Leslie McBride,² Teddy D. Warner,³ Diana Cheng,² Tonya Edmond,⁸ and Robert Kellner³

Imagery-rehearsal therapy for chronic nightmares was assessed in a randomized, controlled study of sexual assault survivors with posttraumatic stress disorder (PTSD). Nightmares, sleep quality, and PTSD were assessed at baseline for 169 women, who were randomized into two groups: treatment (n = 87) and wait-list control (n = 82). Treatment consisted of two 3-hr sessions and one 1-hr session conducted over 5 weeks. Of 169 participants, 91 women (Treatment, n = 43, Control, n = 48) completed a 3-month follow-up and 78 did not. At follow-up, nightmare frequency and PTSD severity decreased and sleep quality improved in the treatment group with small to minimal changes in the control group. Treatment effects were moderate to high (Cohen's d ranged from 0.57 to 1.26). Notwithstanding the large dropout rate, imagery-rehearsal therapy is an effective treatment for chronic nightmares in sexual assault survivors with PTSD and is associated with improvement in sleep quality and decreases in PTSD severity.

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¹University of New Mexico Health Sciences Center, Albuquerque, New Mexico.

²Department of Emergency Medicine, University of New Mexico, New Mexico.

³Department of Psychiatry, University of New Mexico, New Mexico.

⁴Sleep and Human Health Institute, Albuquerque, New Mexico.

⁵Department of Family/Community Medicine, University of New Mexico, New Mexico.

⁶Department of Mathematics and Statistics, University of New Mexico, New Mexico.

⁷Arizona Health Sciences Center, The University of Arizona, Tucson, Arizona.

⁸Albuquerque Rape Crisis Center, Albuquerque, New Mexico.

⁹To whom correspondence should be addressed at Sleep and Human Health Institute, 4775 Indian School Road NE Suite 305, Albuquerque, New Mexico 87110; e-mail: bkrakow@salud.unm.edu.

Chronic nightmares are listed in DSM-IV (American Psychiatric Association [APA], 1994) and in International Classification of Sleep Disorders (American Sleep Disorders Association [ASDA] 1991) as a distinct disorder; however, prevailing data on nightmares from general population studies (Bliwise, 1996; Klink & Quan, 1987) have not clarified the extent to which chronic nightmare disorder occurs independent of comorbid psychiatric disturbances, such as anxiety, mood, or posttraumatic stress disorders (PTSD). Indeed, distinguishing nightmares as a separate disorder is a debatable point. For example, nightmares are traditionally viewed as uncontrollable processes that spring from the unconscious mind as a manifestation of unresolved conflict often resulting from earlier traumatic experiences (Hartmann, 1984; Lansky, 1995; Mack, 1974), and the treatment of choice is psychodynamic psychotherapy. A more recent view implies that although nightmares represent "unfinished business" (Foa, Rothbaum, & Steketee, 1993), desensitizing the trauma survivor to prior traumatic experiences will lead to decreases in disturbing dreams. Both of these therapy approaches support the view that nightmares represent a *symptom* of a deeper problem (not a distinct disorder) and therefore, not surprisingly, neither approach targets nightmares for treatment.

In addition to these two perspectives, there is evidence that a chronic nightmare disorder can also function like an independent sleep disorder because nightmares produce symptoms similar to psycho-physiological insomnia, a common sleep disorder. Psycho-physiological insomnia is predicated on two diagnostic constructs: (1) Daytime psychosocial impairment is directly attributed to the sleep problem and (2) Learned sleep-preventing associations are the primary fuel that sustains the sleep problem (ASDA, 1991). Chronic nightmare sufferers attribute daytime impairment to their nightmares by noting increased stress from daytime recall of dream content, increased fatigue from a poor night of sleep perceived to be caused by bad dreams, and increased worries about mental health because of bizarreness and strong negative affect in their bad dreams (Haynes & Mooney, 1975; Hersen, 1971; Krakow & Neidhardt, 1992). Learned sleep-preventing associations are also common in nightmare sufferers. They can include conditioned responses, such as fear of the bed and bedroom; fear of going to sleep; and fear of returning to sleep, following an awakening from a bad dream, and sleep-antagonistic behaviors, such as watching television and keeping the lights on in the bedroom; irregular sleep schedules; and ultimately developing the belief that if one sleeps poorly, then one must be a poor sleeper (Cellucci & Lawrence, 1978b; Haynes & Mooney, 1975; Hersen, 1971; Kales et al., 1980; Krakow, Tandberg, Barey, & Scriggins, 1995).

This sleep-oriented construct is of particular clinical interest because treatment of nightmares with cognitive-behavioral techniques have not only markedly decreased the frequency of disturbing dreams, but, in a few controlled studies, nightmare sufferers have also self-reported decreases in daytime anxiety and depression as well as improvements in overall sleep quality (Kellner, Neidhardt, Krakow, & Pathak, 1992; Krakow, Kellner, Pathak, & Lambert, 1995; Neidhardt,

Krakow, Kellner, & Pathak, 1992). One explanation for such treatment outcomes is that nightmares have the potential to be viewed as learned behaviors, like psycho-physiological insomnia, or, in the terminology of a cognitive-restructuring framework, catastrophizing responses to a distorted perception of threat (Beck, 1976).

The two most commonly investigated nightmare treatment techniques are desensitization procedures (often coupled with relaxation) (Cellucci & Lawrence, 1978a; Kellner et al., 1992; Miller & DiPilato, 1983) and imagery rehearsal (Kellner et al., 1992; Krakow, Kellner, et al., 1995; Neidhardt et al., 1992), which involves story line alteration of the nightmare in the waking state, followed by rehearsal of the new set of images. Both techniques have consistently demonstrated nightmare frequency reductions between 65 and 75% from baseline. Desensitization techniques require relatively higher doses of exposure whereas imagery rehearsal requires relatively lower doses.

Notwithstanding the brevity, potency, and potential cost-effectiveness of these approaches to nightmare treatment, the impact of such therapies on the disturbing dreams of PTSD patients remains to be investigated. As frequent nightmares often function as an important intrusive component of a patient's re-experiencing phenomenon (Kilpatrick et al., 1998; Ross, Ball, Sullivan, & Caroff, 1989; van der Kolk, Blitz, Burr, Sherry, & Hartmann, 1984), second only to recurrent intrusive memories of the trauma, it would be worthwhile to learn whether or not imagery rehearsal can decrease bad dreams in PTSD patients, and whether or not such reductions would be accompanied by clinically meaningful improvements in sleep complaints and PTSD distress. The current controlled evaluation attempts to address these questions. Our hypothesis was that reports of nightmares would decrease in a sample of sexual assault survivors with PTSD who received imagery rehearsal therapy compared with a wait-list control group. Our secondary hypothesis was that decreases in disturbing dreams would be accompanied by self-reported improvements in sleep quality and in PTSD symptoms.

Method

Recruitment of Sample and Intake Process

The study was approved by the Human Research and Review Committee at the University of New Mexico Health Sciences Center. After a complete description of the study, participants provided oral and written consent. Only women were included and they were recruited primarily within the Albuquerque area from numerous sources including local advertisements, public service announcements, newspaper articles, posters and flyers (44% of sample); private therapists (23%); Albuquerque Rape Crisis Center (20%); University Mental Health Center (7%); sleep disorders centers and University Emergency Department (6%). Exclusion criteria eliminated individuals suffering from acute intoxication or acute psychosis.

Inclusion criteria included age 18 or older, female, complaints of nightmares at least once a week for greater than 6-month duration, insomnia and PTSD or post-traumatic stress symptoms coupled with clear Criterion A trauma link(s) (APA, 1994). At intake, 169 participants completed an extensive list of psychometric instruments and standardized questionnaires, administered in a personal interview after which they were randomized into a treatment group ($n = 87$) or a wait-list control group ($n = 82$).

The mean time to initiation of treatment was 6 weeks. Control group contact was limited to brief phone calls and letters to remind them of future appointments, to monitor them for suicidality, and to encourage participation so that they could eventually receive treatment in the cross-over design protocol at 6 months. Both treatment and control group participants were mailed a brief, 3-month follow-up packet; 91 of 169 participants completed them, and 78 were lost to follow-up. These 78 women included 44 who had been randomized into treatment and 34 who had been randomized into the wait-list control. Most of these women were lost to follow-up early in the program, usually within the first month following randomization. However, seven completed the treatment program and then were lost to follow-up.

Measurements

Nightmare Frequency Questionnaire (NFQ). The NFQ is a self-report questionnaire that retrospectively assesses nightmare frequency as a continuous variable (see Appendix A). Both “nights with nightmares” per unit of time (e.g., per week, per month) and actual “number of nightmares” are reported. The questionnaire was developed because of the inconsistent use of either measure in all prior nightmare treatment studies, that is, either one or the other measure is used, but not both. In this sample, test-retest reliability on the NFQ yielded both correlation coefficients and weighted kappas greater than .85 in all analyses. Correlations between nights and nightmares were high ($r = .72$) when measured prospectively and ($r = .80$) when measured retrospectively (Krakow et al., in press).

PTSD Symptom Scale (PSS). The PSS is reliable and valid for both diagnosing PTSD and for monitoring changes in PTSD severity following treatment (Foa, Riggs, Dancu, & Rothbaum, 1993). In the current study, the PSS-I (interview version) was utilized at intake and the PSS-SR (self-report version) was utilized to acquire 3-month data through the mail. Both use identical questions. The PSS measures PTSD symptoms according to the DSM-III-R criteria (APA, 1987). It consists of 17-items, which evaluate the severity of PTSD symptoms, as experienced by the patient in the 2-week preceding period. The PSS contains three symptom subscales: intrusion (reexperiencing), avoidance, and arousal. The severity of each symptom is rated on a 4-point scale: 0 (*not at all*), 1 (*a little bit*),

2 (*somewhat*), 3 (*very much*). The sum of all ratings gives a global score. Higher scores reflect greater severity. Reliability has been assessed (Foa, Riggs, et al., 1993): Cronbach's alpha was .85 for the overall scale. Alpha coefficients for the symptom subscales were intrusion, .69; avoidance, .65; and arousal, .71. The total severity score correlated significantly with other measures of psychological distress (Foa, Riggs, et al., 1993).

Pittsburgh Sleep Quality Index (PSQI). The PSQI is a standardized, self-report to assess sleep quality. Several studies have demonstrated its validity in distinguishing "good" (healthy controls) from "bad" (insomnia, depressed, and other sleep disorders patients) sleepers (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), and one study demonstrated changes on the PSQI posttreatment (King, Oman, Brassington, Bliwise, & Haskell, 1997). The PSQI assesses sleep quality and disturbances during the past month based on 18 items that generate seven component scores for sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, sleep medication use, and daytime dysfunction. The sum of the scores for these seven components yields one global score. Higher scores reflect worse sleep. Internal consistency (Cronbach's $\alpha = .83$) and test-retest reliability ($r = 0.85$, $p < .001$) have been obtained (Buysse et al., 1989). A global PSQI score >5 yields a diagnostic sensitivity of 89.6% and specificity of 86.5% ($\kappa = .75$, $p < .001$) in distinguishing good and poor sleepers (Buysse et al., 1989).

Nightmare Effects Survey (NES). The NES is a new instrument that assesses psychosocial impairment attributed to nightmares. It consists of 11 self-report questions, each rated on a scale of 0–4, to assess the adverse effects of nightmares on sleep, work, relationships, daytime energy, school, mood, sex life, diet, mental health, physical health, and leisure activities (see Appendix B). Higher scores reflect more impairment. Cronbach's alpha was calculated for this study at .90 (The school item was deleted due to limited applicability to the sample). Belicki, Chambers, and Ogilvie (1997) found correlations of $r = .70$ and $r = .54$ between the NES and the Nightmare Distress Questionnaire (NDQ)—an internally consistent (.83–.88) 13-item scale that assesses the degree of distress attributed to nightmares by nightmare sufferers. The NDQ correlates significantly with other measures of distress, such as the SCL-90-R (Belicki, 1992).

Treatment

The current protocol is a three session (two 3-hr sessions spaced 1 week apart with a 1-hr follow-up 3 weeks later), manual-based, cognitive–imagery approach offered in a group format. Treatment is expanded from the single, 3-hr, group session, imagery rehearsal protocol described in previous studies (Kellner et al., 1992; Krakow, Kellner et al., 1995; Krakow & Neidhardt, 1992; Neidhardt et al., 1992).

Session I is primarily educational and discusses the relationship between nightmares and insomnia, the most common sleep complaint of our participants. Other areas discussed include common facts and questions about nightmares. At the close of Session I, individuals practice pleasant imagery exercises and learn seven brief cognitive-behavioral tools for dealing with unpleasant images (thought stopping, breathing, grounding, talking, writing, acknowledging, and choosing) that might be expected to emerge in PTSD patients.

At Session II, the results of implementing pleasant imagery are discussed and any difficulties addressed. The remainder of the session involves learning to use the imagery-rehearsal technique on a single, self-selected nightmare. The participant writes down her disturbing dream, and then is given the instruction to "change the nightmare anyway you wish," then write it down. Afterwards, each woman rehearses her own "new dream" scenario for 10–15 min. Then, she briefly describes her old nightmare and how she went about making changes both on the first written attempt and, if applicable, during the actual rehearsal process. After this initial attempt, participants are encouraged not to write down the old nightmare or the changed version, but, instead, to establish the process as a mental function. Participants are instructed to rehearse a new dream for at least 5–20 min per day, but never to work on more than two distinct "new dreams" for any given week. The group meets again in 3 weeks for Session III, which lasts 1 hr, to discuss progress, share experiences, and ask questions about nightmares, sleep, and PTSD.

The central focus of the treatment program is on nightmares and is set within the framework of a cognitive-imagery restructuring paradigm. Accordingly, the following assumptions are made about the treatment and conveyed to the participants: (1) nightmares are not uncontrollable and may not be a function of an unconscious process; (2) nightmares are viewed as "habits" or learned behaviors rather than "unfinished business"; (3) nightmares are usually caused by traumatic events, but they are often sustained through the "habit" of having bad dreams; (4) nightmares serve beneficial purposes early on, following an acute trauma by providing warnings, emotional processing, and other information that may be important for safety and security; (5) nightmares persisting beyond the acute trauma phase may no longer serve any useful purpose; (6) once nightmares become chronic, it is helpful to consider them as an "independent sleep disorder," that is, no matter what causes or sustains the bad dreams, they always disturb sleep; after successful treatment of bad dreams, sleep improves; (7) nightmares represent a form of negative imagery (re-experiencing) that happens to occur while asleep; (8) working with waking imagery will have an impact on nightmares because things that you think about during the day are often similar to things you dream about at night; (9) while awake, images from previously experienced nightmares can be changed into positive, new imagery; (10) rehearsing positive new imagery (*new dream*) while awake reduces or eliminates nightmares, and this does not require that you work on or change each and every nightmare you experience.

Further imbedded within these principles is a clear and organized attempt to minimize exposure throughout the program. Descriptions of traumatic experiences and traumatic content of nightmares may spontaneously emerge through the group format; however, participants are requested to refrain from emphasizing trauma disclosure unless they wish to briefly mention historical information to make some other salient comment to the group, such as "I was assaulted in my bedroom, so that's why I keep the lights on all the time when I sleep." To further minimize exposure, participants are instructed to choose a nightmare of lesser intensity with which to work. The specific instruction is to "select a disturbing dream that does not seem like a replay or a reenactment of a traumatic event." After the nightmare is written down, the participant is immediately instructed to "change it anyway you wish." When the changed versions (*new dreams*) are discussed with the group, they are instructed to provide a brief synopsis of the nightmare and then provide greater detail about the new dream. Rehearsal of images is directed only at the new dream imagery. Participants are instructed to complete a daily follow-up log between Sessions II and III (21 days) to help monitor progress. In a calculated effort to minimize the possibility of rehearsing the old nightmare, the last question on the log asks, "Did you rehearse the old nightmare?" The participants are informed that the purpose of the question is to remind them not to rehearse any old nightmares. At Session III, a rare participant will report that she did indeed rehearse an old nightmare.

Follow-up

The 3-month control and posttreatment follow-ups contained four questionnaires on nightmares (NFQ), nightmare effects (NES), sleep quality (PSQI), and PTSD (PSS). Of the 87 women in the treatment wing, 43 completed the treatment program and returned the follow-up packet. Of the 82 control group participants, 48 returned the 3-follow-up. Of the 78 women who did not return follow-up packets, an average of two mailings and six phone calls were made to each participant to encourage them to complete and return the information. However, approximately 25% of these participants were unreachable due to changes in address (despite having provided a contact source in the event of a change in location), moved out of state, and disconnected phone numbers. Participants who completed follow-up packets returned them, on average, 3 weeks after being mailed out from our office.

Statistical Analysis

The baseline data of the sample were divided into four groups to examine differences between those who completed (i.e., returned 3-month follow-up data) the study and those who did not: control completers ($n = 48$); control noncompleters ($n = 34$); treatment completers ($n = 43$); and treatment noncompleters

Table 1. Demographic Data for Treatment and Control Groups, by Completers and Noncompleters of 3-Month Follow-up

Variables	<i>n</i>	Controls		Treatment	
		No ^a	Yes ^a	No ^a	Yes ^a
Participants	169	34 (20%)	48 (28%)	44 (26%)	43 (25%)
Ethnicity					
Non Hispanic White	106	20 (19%)	26 (25%)	30 (28%)	30 (28%)
Other	63	14 (22%)	22 (35%)	14 (22%)	13 (21%)
Marital status					
Married/lives with partner	67	13 (19%)	22 (33%)	11 (16%)	21 (31%)
Not with partner	102	21 (21%)	26 (25%)	33 (32%)	22 (22%)
Annual income					
\$10,000 or less	75	15 (20%)	18 (24%)	23 (31%)	19 (25%)
More than \$10,000	92	18 (20%)	29 (32%)	21 (23%)	24 (26%)
Education					
College degree	64	13 (20%)	18 (28%)	13 (20%)	20 (31%)
No college degree	104	20 (19%)	30 (29%)	31 (30%)	23 (22%)
Age ^b					
<i>M</i>	169	32.9	36.0	38.3	40.1
<i>SD</i>		9.6	9.8	12.3	11.3

^aParticipants' completion status.^bControl-No vs. Treatment-Yes, $p < .03$ (Tukey–Kramer adjustment for multiple comparisons).

($n = 44$). Ethnicity, marital status, income, and education variables were collapsed into two classifications each (e.g., married or lives with partner were combined into one category to be compared with a category consisting of single, divorced, separated, widowed) because of sparse cells (Table 1). Fisher's exact test was used to test differences in demographic variables across the four groups. Baseline outcome variables (nights, nightmares, NES, PSQI, PSS) were tested simultaneously across all four groups.

The main analysis was conducted on the 91 completers. To account for any clustering effects introduced by conducting imagery rehearsal in groups, 3-month data were analyzed with random effects regression (Gibbons et al., 1993; Hedeker, Gibbons, & Flay, 1994), using PROC MIXED in SAS (SAS Institute, 1997). The model included a random term for cluster in addition to the usual subject and residual variance components. Responses of different participants within a cluster are correlated by this model, and the intraclass correlation measures the proportion of treatment group variability attributable to the clustering. The software allows a heterogeneous covariance structure, necessary because control group subjects were not clustered. Thus, the overall regression model that was fit separately for each outcome variable included several predictors: (1) the independent variable (treatment group vs. control group); (2) the baseline value of the outcome variable as covariate (to adjust for preexisting differences in initial values); (3) the Treatment $\times$ Baseline Outcome interaction as a covariate; and (4) a random effect term for cluster (to adjust for correlated effects due to group treatments). Baseline PSQI was also used as a covariate to adjust for possible effects of sleep quality on the

other variables. To correct distributional problems (outliers and skewness) nightmares/week was square root-transformed and age was log-transformed. Level of significance was set at .05.

Results

Ninety-five percent of participants met the criteria for PTSD on the Clinician Administered PTSD Scale (Blake et al., 1990). On average, these participants had suffered from nightmares for 20 years. Ninety-seven percent reported a history of sexual assault. Fifty percent were raped as adults, 54% were raped as children, and more than 60% of the total sample experienced multiple episodes of sexual assault; 68% had suffered other violent assaults as adults and 72% as children. Seventy-eight percent reported other traumatic episodes including unexpected deaths in the family, witnessing violence, motor vehicle accidents, or natural disasters.

Baseline Data

There were no statistically significant differences between any of the groups for ethnicity, marital status, annual income, or education. Control noncompleters were significantly younger than treatment completers were (Table 1). There were no significant differences between any of the four groups for nights/week, nightmares/week, NES, PSQI, and PSS (Table 2). Baseline data from the seven women

Table 2. Baseline Data on Main Outcome Variables for Treatment and Control Groups by Completers and Noncompleters

Variable	n	All Groups	Controls		Treatment	
			No (n = 34)	Yes (n = 48)	No (n = 44)	Yes (n = 43)
Nights/week ^a						
M	168	3.86	3.59	3.79	4.15	3.85
SD		2.07	2.17	2.03	1.99	2.14
Nightmares/week ^a						
M	168	5.98	6.08	5.21	6.22	6.54
SD		4.75	5.80	3.60	4.39	5.38
NES						
M	169	24.11	24.15	24.21	24.65	23.42
SD		8.88	8.80	9.13	8.24	9.55
PSQI Global ^a						
M	166	12.28	12.73	13.45	11.91	11.05
SD		4.18	3.89	4.26	4.42	3.80
PSS Total ^a						
M	167	29.25	29.41	29.19	30.79	27.60
SD		11.43	11.39	12.09	11.64	10.64

Note. MANOVA to test simultaneously for any group differences on outcome variables such as nights, square root nightmares, NES (Nightmare Effects Survey), PSQI (Pittsburgh Sleep Quality Index), PSS (Posttraumatic Stress Symptom Scale) yielded Pillai's Trace $F(15, 471) = 1.24, ns$.
^a1 variable missing from one or more of the four main groupings.

Table 3. Outcomes as a Function of Treatment Completion

Variable	Treatment completers ($n = 43$)	Treatment noncompleters ($n = 7$)
Nights/week <i>M</i> (<i>SD</i>)	3.85 (2.14)	5.71 (1.70)
Nightmares/week <i>M</i> (<i>SD</i>)	6.54 (5.38)	8.00 (3.83)
NES <i>M</i> (<i>SD</i>)	23.42 (9.55)	26.57 (9.41)
PSQI <i>M</i> (<i>SD</i>)	11.05 (3.80)	12.43 (4.08)
PSS <i>M</i> (<i>SD</i>)	27.60 (10.64)	36.14 (15.32)

Note. MANOVA for group differences on all variables, Pillai's Trace, $F(5, 43) = 2.57$, $p < .05$. Nights/week alone, $F(1, 47) = 5.29$, $p < .05$; for all other variables, $F < 1$. NES: Nightmare Effects Survey; PSQI: Pittsburgh Sleep Quality Index; PSS: Posttraumatic Stress Symptom Scale.

in the treatment noncompleters group, who attended the treatment program but did not complete follow-up, were compared to the treatment completers group. The mean values were all higher in these seven women, but not statistically different except for an increased frequency of nights/week (Table 3); there were no significant differences on the demographic variables between these two groups. The main analyses were based on those who completed the 3-month protocol: Treatment ($n = 43$), Control ($n = 48$). Missing data were minimal except for 11 participants (7 controls, 4 treatment) who did not complete PSS at follow-up.

Three-Month Follow-up

Estimated cluster group variance components were all small (approximately the size of asymptotic standard errors). Intraclass correlations (asymptotic *SE*) were as follows: .40 (.18) for nights/week; .28 (.20) for square root nightmares/week; 0 (0) for NES; .14 (.14) for PSQI Global; and .06 (.18) for PSS Total. Although results were almost identical to those from more conventional analysis of covariance, the random effects analysis was retained for all outcome variables.

Demographic covariates were not significant in any of the analyses, and baseline PSQI was not a significant predictor for any variable other than posttreatment PSQI. Baseline value for each of the outcome variables was a significant predictor for the posttreatment values: nights/week, $F(1, 24) = 53.81$, $p < .001$; nightmares/week, $F(1, 24) = 46.29$, $p < .001$; NES, $F(1, 24) = 40.41$, $p < .001$; PSQI, $F(1, 24) = 62.64$, $p < .001$; and PSS, $F(1, 21) = 54.95$, $p < .001$.

For NES, PSQI, and PSS, a treatment main effect was found with a substantial reduction in mean values at 3 months for the treatment group and only small changes in the control group, after adjusting for all covariates. For NES, $F(1, 64) = 11.15$, $p < .01$, the estimated treatment effect was 6.11 ($SE = 1.83$) (i.e., a mean decrease of 6.11 units on the 0–44 scale, relative to the control group). For PSQI,

$F(1, 63) = 8.22, p < .01$, the estimated treatment effect was 2.31 ($SE = 0.81$) (i.e., a mean decrease, on average, of 2.31 units on the 0–21 scale). For PSS, $F(1, 56) = 22.15, p < .001$, the estimated treatment effect was 9.72 ($SE = 2.07$) (i.e., a mean decrease of 9.72 units on the 0–51 scale).

Main effects for treatment were not significant for nights/week and nightmares/week (square root), but a Group $\times$ Baseline Covariate interaction was found ($F(1, 24) = 14.67, p < .001$ and $F(1, 24) = 13.26, p < .01$, respectively). Interaction effects were the differences in slope for the two lines and were estimated (SE) as .520 (.136) and .619 (.170), respectively. With nights/week, the effect of treatment relative to controls is estimated to be a 52% reduction; for nightmares/week (square root), the effect of treatment is estimated to be a 62% reduction. The absolute effect of treatment is much greater for those who reported a larger number of nightmares at baseline compared with those who reported a smaller number of nightmares at baseline. Control participants had minimal changes in both variables.

Cohen's d values were calculated from raw means and standard deviations from baseline and follow-up scores to provide a comparison with Sherman's recent meta-analysis (Sherman, 1998) on treatment effects on PTSD. Treatment-group improvements were very large for nights/week, nightmares/week, and PSS, and moderate for NES and PSQI (Table 4). By contrast, control-group changes were small in PSS and PSQI, and nil for nights, nightmares, and NES.

Table 4. Baseline and 3-Month Means (SD) and Cohen's d Values for Outcome Variables

Variable	Baseline			3 month			Pooled SD	Difference in means	Cohen's d
	n	M	SD	n	M	SD			
Nights/week									
Control	48	3.79	2.03	48	3.53	2.01	2.02	−0.26	−0.13
Treated	43	3.85	2.14	43	1.44	1.65	1.91	−2.41	−1.26
Nightmares/week									
Control	48	5.21	3.60	48	5.45	4.30	3.97	+0.24	+0.06
Treated	43	6.54	5.38	43	2.23	3.15	4.41	−4.31	−0.98
Nightmares/week*									
Control	48	2.15	0.78	48	2.14	0.93	0.86	−0.01	−0.01
Treated	43	2.36	0.99	43	1.23	0.86	0.93	−1.13	−1.22
NES									
Control	48	24.21	9.13	48	24.15	9.80	9.47	−0.06	−0.01
Treated	43	23.42	9.55	43	17.53	11.16	10.39	−5.89	−0.57
PSQI ^a									
Control	47	13.45	4.26	48	12.00	4.46	4.36	−1.45	−0.33
Treated	43	11.05	3.80	43	8.05	4.44	4.13	−3.00	−0.73
PSS ^b									
Control	48	29.19	12.09	41	25.71	12.64	12.37	−3.48	−0.28
Treated	42	27.60	10.64	39	15.00	10.29	10.47	−12.60	−1.20

Note. NES: Nightmare Effects Survey; PSQI: Pittsburgh Sleep Quality Index; PSS: Posttraumatic Stress Symptom Scale.

^aData are missing from baseline for 1 participant.

^bData are missing from baseline for 1 participant and from 3-month follow-up for 11 participants.

*Square root.

Discussion

The treatment literature on PTSD (Shalev, Bonne, & Eth, 1996; Sherman, 1998; Solomon, Gerrity, & Muff, 1992) indicates that nightmare treatment is rarely offered to trauma survivors who complain of disturbing dreams. It is conceivable that nightmares have been utilized as appropriate targets for therapeutic interventions such as desensitization, yet this is rarely mentioned in published research studies or case reports (Brockway, 1987; Halliday, 1987; Kingsbury, 1993; Moss, 1973; Schindler, 1980). Even in the field of sexual assault research, where nightmare frequency in PTSD is noted to be very high (Rothbaum, Foa, Riggs, Murdock, & Walsh, 1992), nightmare therapies have received little attention (Foa, Rothbaum, et al., 1993; Resick & Schnicke, 1992). The findings in this preliminary report on a 3-month controlled follow-up, however, indicate that imagery-rehearsal therapy targeting nightmares, set within the framework of a cognitive-restructuring paradigm, effectively reduced disturbing dreams in PTSD patients and was associated with substantive improvements in global sleep quality and PTSD severity.

Currently, there is no adequate explanation to account for these treatment findings. The traditional view of nightmares in general and especially nightmares in the context of PTSD would not predict that a brief therapeutic intervention would have sizeable treatment effects on disturbing dreams or on the related symptoms of sleep and PTSD severity. Moreover, Belicki et al. (1997) has pointed out that imagery rehearsal "directly tackles people's waking reactions [to nightmares]," suggesting that actual changes in nightmare frequency are of a lesser importance. Therefore, to interpret these results, several theories must be considered.

First, Sherman's recent meta-analysis (Sherman, 1998) demonstrated that most successful PTSD treatments contain the element of exposure.

In one form or another, all treatments focus on Horowitz' (1974) conceptualization suggesting that the goal of psychotherapy is to help the patient work through the trauma experience through gradual re-exposure of the actual traumatic event and reinterpretation of its meaning.

However, our treatment discourages discussion of traumatic experiences and traumatic content of nightmares, and instructs patients to avoid rehearsing old nightmares. Anecdotally, many of our participants reported that they were previously offered (or they had previously attempted) desensitization procedures to help them with their PTSD-related symptoms. Of those who attempted such therapy, essentially all reported no improvement or worsening, although it seems fairly certain that none completed a full desensitization protocol. Rachman (1980) has pointed out that exposure may not always be an appropriate therapeutic option, for example, following bereavement. Although we concur that such a perspective may also be true for some trauma survivors, we could not measure the amount of exposure that our participants experienced through more subtle

aspects of the treatment program. To select one nightmare, write it down once, and talk briefly about it in the group setting must be considered exposure. More important, when the patient used the technique at home, despite being given the instruction to avoid working with the old nightmare, we do not know what the exact experience is like for an individual who selects a bad dream and mentally changes it. How long do they think about the old nightmare before they change it to the new dream? Thus, the current program creates the potential for some exposure, which theoretically might have had an important influence on the outcomes.

Second, improvement may have occurred through cognitive restructuring. Cognitive restructuring contains some degree of exposure albeit that is not its primary emphasis. Instead, participants are educated about different theories for the basis of nightmares: how nightmares may be caused by trauma yet sustained by learned behaviors; how bad dreams disrupt sleep; and how poor sleep might intensify other symptoms, such as anger or irritability—two common complaints among PTSD patients. Considering nightmares as a learned behavior induces initial surprise and skepticism among most participants. Regardless, we make it clear that we are not discounting the trauma or its role in causing nightmares; rather, in the most simplistic terms, we teach that if one learns to consistently respond to a stimulus in the same way, then it should not be surprising that such a response becomes a routine pattern of behavior. PTSD patients have heightened responses to otherwise routine stimuli, for example, a startle response to the sound of a door slamming. This is likely due to abnormal cognitive processing (Resick & Schnicke, 1992; Wolpe, 1981) in which the response to a slammed door is similar to a response to a previous traumatic event, such as the sound of a bomb exploding. This process could also be described as a catastrophizing response to a nonthreatening stimulus, or, in classical conditioning models, a conditioned response (McFall, Murburg, Ko, & Veith, 1990). The persistence of catastrophizing responses due to abnormal cognitive processing and cognitive distortions can maintain a variety of symptoms and is akin to learned “maladaptive schemas” (Beck, 1976; Young, 1994). We believe that nightmares may be a catastrophized response conditioned by abnormal cognitive processing and hypervigilance during sleep. To accept such a paradigm, the participant usually must consider the distinct possibility that nightmares are in fact eminently controllable by cognitive restructuring, and that they do not necessarily represent deeper psychic conflicts about their trauma. A habit can be recognized and treated differently than something that would ordinarily require dynamic psychotherapy or intensive exposure treatment.

In this program, imagery rehearsal is an imagery technique that asks the participant to cognitively restructure their nightmares. Usually, changes are positive, but the extent of change may vary. Some participants alter relatively minor or subtle events, actions, scenes, or just a word in the dream whereas others completely

revamp the old nightmare. It is unknown whether or not the degree of change affects outcome; anecdotally, we suspect that the *process* of changing the dream is a very integral component of the program. Most participants report improvements in nightmares in the initial 2 week–2-month time interval, and once the person notices a decrease in disturbing dreams, they invariably report improvement in sleep. What has proven more interesting is that after nightmares and sleep improve, it is almost routine for a participant to mention that they have begun using imagery rehearsal—of their own volition—by “changing” daytime stressors or symptoms to make their waking life less stressful. This is noteworthy because it is our clinical impression that decreases in PTSD symptoms follow improvements in nightmares and sleep.

Thus, further consideration of these treatment effects must take into account factors beyond simple reduction of nightmares (or perhaps altered reactions to bad dreams). Despite the fact that the treatment format and technique is relatively simple, the program targets nightmares, and virtually all participants who have a successful outcome report that decreases in nightmares were the first sign of improvement. The role of sleep quality improvement may be important, although only minimal instructions about how to sleep better are given during 7 hr of therapy. For example, no more than 10 min is devoted to learning sleep hygiene rules. The classic example is watching the clock during the night to gauge how much additional sleep might be acquired. Participants learn that clock-watching in bed promotes more clock-watching, more ruminations about time, and ultimately produces an antagonistic relationship to sleep. Sleep hygiene rules, however, are unlikely to be of much benefit if the monster remains lurking under the bed. It is considerably easier, for example, to set a regular schedule of bed and wakeup times after disturbing dreams have been reduced or eliminated. In fact, participants reported more successful application of sleep hygiene rules once they began to experience reductions in bad dreams.

It is conceivable that the simple instruction to “change the nightmare anyway you wish” offers the patient an opportunity to experience an abbreviated version of a psychodynamic process. When they encounter the instruction, it is common for the patient to either initially resist it or resonate with it. The resonators immediately write down a changed version of their old nightmare as if they had already known what to record. The resisters need to ask a few questions to clarify instructions, but, once satisfied, they will reflect for a minute or two, and then attempt the protocol. From the ensuing group discussion about the new dreams and the ability to image them, it is clear that participants’ changes engage some aspect of their own knowledge and interpretations of the content of the nightmares, trauma-related or otherwise. It is plausible that this process represents a form of “working through,” which continues to be engaged when the technique is utilized at home. The extent to which this represents a psychodynamic process is unknown, and it may not be measurable with this research design. Clinically, imagery rehearsal may align with

patients' attempts to "gain a sense of mastery over their intrusive recollections" (Sherman, 1998).

Resick and Schnicke (1990) have pointed out that (1) current theoretical underpinnings of PTSD do not provide a very good explanation for "a high level of intrusive recollections, flashbacks, and nightmares about the event, even in the absence of environmental stimuli"; and (2) "Because so many symptoms of PTSD are cognitive (intrusive recollections, nightmares . . .), it seems logical that theorists and researchers would start to look at more cognitive models of symptom development." Moreover, the recent work of Laor et al. (1998) not only supports the use of cognitive models, but it also indicates the potential benefit of targeting the patient's imagery system. Seemingly at odds with this perspective is the theory that nightmares are a symptom of unresolved conflict as suggested by the specific instruction offered to introduce the patient to imaginal flooding in the work of Foa, Rothbaum et al. (1993),

Often the experience [the traumatic event] comes back to haunt you through nightmares . . . because it is unfinished business. . . . We'll help you digest the experience by helping you to expose yourself to the assault in your imagination. The fleeting images or thoughts about the rape that you do have, like flashbacks or nightmares, stop short of finishing the process when the intense fear or emotion make it too uncomfortable.

Thus, to reiterate, trauma re-exposure appears to be an essential ingredient for treatment (Foa, Rothbaum, et al., 1993; Horowitz, 1974; Sherman, 1998).

How much exposure then is enough exposure? The current protocol is neither flooding, implosion, nor hierarchical desensitization. To be sure, exposure is present, but by using an imagery-rehearsal technique imbedded within the framework of cognitive restructuring, we believe that extensive exposure to trauma and the traumatic content of nightmares is not essential for reducing bad dreams. Instead of confronting prior traumatic events, imagery rehearsal allows the trauma survivor rapid self-efficacy by teaching them to alter cognitive processes which, in turn, produces rapid changes in a symptom (nightmares) that had previously been defined and perceived as uncontrollable. As with other cognitive-behavioral strategies, it is conceivable that participants also developed an early sense of mastery by using a relatively easy technique, which then may have promoted their use of the technique on other symptoms beyond disturbing dreams. Finally, it is our opinion that the improvements in sleep and PTSD associated with this therapeutic process suggest that nightmare treatment (and all that is included in the delivery of imagery-rehearsal therapy) provides more than does adjunctive therapy, but rather may be a treatment for PTSD itself. However, it must be reiterated that all of the above refers to sexual assault survivors with nightmares—a very large, albeit not all-inclusive, subset of sexual assault survivors with PTSD.

It is also important to recognize that the major potential adverse effect of any imagery-based technique is the worsening or provocation of negative imagery. Imagery rehearsal, with all its emphasis on practicing pleasant imagery initially

and then avoiding rehearsal of the old nightmare, must still be considered with caution in an individual who might be prone to this side-effect. In our study, we know of at least two people who reported a worsening of images and nightmares, requiring acute psychological support. It may be then that individuals with greater risk for developing adverse effects to imagery, for example, possibly those with more nightmares and greater PTSD severity, should be monitored more closely during the treatment or else provided alternative treatments. In fact, seven women, who at baseline appeared to have a greater frequency of nights of nightmares and appeared to have more severe PTSD, withdrew following completion of the treatment program. It would be interesting to learn why they did not complete follow-up; whether or not they used the technique and what impact, if any, it had on their nightmares, sleep, and PTSD. Conversely, the main results of the study indicated that those with the highest number of disturbing dreams actually reduced their nightmares the most; thus, case-by-case evaluation, as always, is essential in this regard.

In counterbalance to these findings and interpretations, the limitations of the study must be weighed. The available data represent a relatively short follow-up interval, incorporate a small sample size, and must be viewed in the context of a large number of participants who were lost to follow-up. The short follow-up period was designed to facilitate the acquisition of preliminary results in a population that is known to have high dropout rates (Rothbaum et al., 1992) or who prove difficult to maintain in research studies (Nadelson, Notman, Jackson, & Gornick, 1982) or who routinely avoid or withdraw from therapy in the clinical setting (Binder, 1981). Our investigation confirmed these difficulties in that 46% of sexual assault survivors with nightmares and PTSD symptoms did not complete a 3-month follow-up in the setting of a controlled treatment study. No outcome variables or demographic covariates shed any light on this phenomenon. Nonetheless, generalizability of these findings is limited because of this large lost-to-follow-up rate. The results must also be interpreted in the light of the inadequacies of a wait-list protocol compared with a psychological placebo (McConaghy, 1990); thus, nonspecific therapeutic effects have not been properly accounted for and may have had an important influence on the outcomes. Moreover, the treatment program enrolled only PTSD patients with nightmares; therefore, as currently devised, it has no applicability to PTSD patients without disturbing dreams, although, theoretically, the technique might be applied for other waking intrusive phenomenon. Last, the use of the self-report version of the PSS for the purposes of the 3-month follow-up may or may not confound the study. It certainly relieves the participant of the burden of responding during a face-to-face interview, and thus represents a form of blind evaluation. However, Foa, Riggs, et al. (1993) have noted that the self-report version is a less reliable means for PTSD evaluation.

Although these limitations favor caution in the interpretation of the findings, in the context of those completing treatment serving as their own historical controls, it

is worth noting that there was a decrease in the frequency of a nightmare disorder—typically of a severe degree—which had been present on average for more than 20 years; the reduction was equal to or greater than 50% within a very short time frame. Shalev et al. (1996) pointed out with respect to PTSD treatment studies that “many still had the mark of pioneering enthusiasm and lacked self-critique.” We anticipate that the completion of our study with 6-month follow-ups will provide a more precise assessment of this treatment approach. In the interim, we remain cautiously optimistic about the use of imagery-rehearsal therapy for the treatment of nightmares in sexual assault survivors with PTSD.

Appendix A

Name_____ ID#_____ Date_____

FREQUENCY OF NIGHTMARES AND DISTURBING DREAMS

PART I: Frequency by NUMBER OF NIGHTS

Based on the previous three months, please estimate on **average** how often you experience nightmares and disturbing dreams by selecting **one** of the following categories based on **number of nights**.

Select only one column from the four listed, then circle only **one** category:

<i>Zero</i>	<i>Yearly</i>	<i>Monthly</i>	<i>Weekly</i>
0 Nights	1 night per year 2 per year (<i>1 per 6 mths</i>) 3 per year (<i>1 per 4 mths</i>) 4 per year (<i>1 per 3 mths</i>) 5 per year 6 per year (<i>1 per 2 mths</i>) 7 per year 8 per year 9 per year 10 per year 11 per year	1 night per mth 2 nights per mth 3 nights per mth	1 night per week 2 nights per week 3 nights per week 4 nights per week 5 nights per week 6 nights per week 7 nights per week

PART II: Frequency by ACTUAL NUMBER of Nightmares and Disturbing Dreams

Based on the previous three months, please estimate on **average** how often you experience nightmares and disturbing dreams by selecting **one** of the following categories based on the **actual number**.

Select only one column from the four listed, then circle only **one** category:

Zero	Yearly	Monthly	Weekly
0 nightmares	1 nightmare per year 2 per year (<i>1 per 6 mths</i>) 3 per year (<i>1 per 4 mths</i>) 4 per year (<i>1 per 3 mths</i>) 5 per year 6 per year (<i>1 per 2 mths</i>) 7 per year 8 per year 9 per year 10 per year 11 per year	1 nightmare/mth 2 per month 3 per month	1 nightmare/week 2 per week 3 per week 4 per week 5 per week 6 per week 7 per week —per week**

If your total number of nightmares and disturbing dreams is more than 7 per week, please *estimate On Average* the actual number for a typical week and **fill in the blank. (For Example, some people have *more* than one nightmare or disturbing dream in a single night. They may report 2 disturbing dreams per night for 7 nights in the week. Their total number of nightmares per week would be 2 nightmares × 7 nights = **14**.)

Appendix B

Name_____ ID#_____ Date_____

NIGHTMARE EFFECTS SURVEY

1. Do you believe that your nightmares affect other aspects of your life?
1. YES___ 2. NO___
- 1a. Please rate how much your SLEEP is **adversely** or **negatively** affected by nightmares. (Circle one)
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal
- 1b. Please rate how much your WORK is **adversely** or **negatively** affected by nightmares.
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal
- 1c. Please rate how much your RELATIONSHIPS are **adversely** or **negatively** affected by nightmares.
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal
- 1d. Please rate how much your DAYTIME ENERGY is **adversely** or **negatively** affected by nightmares.
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal

- 1e. Please rate how much your SCHOOL is **adversely** or **negatively** affected by nightmares.
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal
- 1f. Please rate how much your MOOD is **adversely** or **negatively** affected by nightmares.
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal
- 1g. Please rate how much your SEX LIFE is **adversely** or **negatively** affected by nightmares.
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal
- 1h. Please rate how much your DIET is **adversely** or **negatively** affected by nightmares.
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal
- 1i. Please rate how much your MENTAL HEALTH is **adversely** or **negatively** affected by nightmares.
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal
- 1j. Please rate how much your PHYSICAL HEALTH is **adversely** or **negatively** affected by nightmares.
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal
- 1k. Please rate how much your LEISURE ACTIVITIES are **adversely** or **negatively** affected by nightmares.
0. Not at All 1. Slightly 2. Moderately 3. Very Much 4. A Great Deal

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