A Systematic Review of Cognitive-Behavioral Treatment for Nightmares: Toward a Well-Established Treatment

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The aim of this review is to evaluate the effectiveness of cognitive behavioral therapy (CBT) on nightmare frequency and to determine which kind of CBT is the most effective treatment. A systematic literature search was carried out in PsychInfo and PubMed articles published on or before May 1, 2008. The inclusion criteria were: nightmare treatment study, use of nonpharmacological treatment, not a qualitative case study, randomized-controlled trial (RCT). After selection, 12 peer-reviewed studies about 9 RCTs remained (2 follow-up studies and one displaying preliminary results). Several interventions have been reviewed including, recording one’s nightmares, relaxation, exposure, and techniques of cognitive restructuring. The 12 evaluated articles varied in quality, and none fulfilled CONSORT guidelines. All articles used nightmare frequency as the primary dependent variable, and all found significant in-group differences (pre vs post) for intervention or placebo (range $d = 0.7–2.9$). Five studies were able to find a significant group effect for the intervention compared to a waiting list control group. Only one study found significant differences between 2 intervention groups. Nightmare-focused CBT (exposure and imagery rehearsal therapy [IRT]) revealed better treatment outcomes than indirect CBT (relaxation, recording). IRT and exposure showed no meaningful differences, but only one RCT directly compared both techniques. Three different research groups demonstrated the effects of exposure, but only one group showed the effect of IRT. Thus, RCTs that compare IRT with exposure by independent research groups are much needed.

Keywords: Nightmares; imagery rehearsal therapy (IRT); exposure; treatment; randomized controlled trial (RCT)


Nightmares are typically defined as extremely frightening dreams leading to awakening (Diagnostic and Statistical Manual of Mental Disorders, 4th ed. [DSM-IV-TR]), although definitions vary. For instance, the definition in the International Classification of Sleep Disorder, 2nd ed. (ICSD-2) does not limit negative emotions in nightmares to fear alone, as anger or sadness are also prevalent in nightmares. In the research literature, nightmares that do not lead to awakening are usually referred to as bad dreams, and nightmare induced distress is differentiated from nightmare frequency (NF): two related but independent constructs.

Studies of the general population have indicated that nightmares are highly prevalent, with up to 70% having occasional nightmares and approximately 2% to 5% of the adult population suffering from frequent nightmares. A similar percentage is estimated to “have a current problem with nightmares,” as frequent and chronic nightmares are associated with disrupted sleep, daily distress, and a variety of sleep complaints (e.g., night terrors, chronic insomnia, and sleep disordered breathing) and affective complaints. nightmares can have an idiopathic (unspecific) origin or occur as part of a post-traumatic stress disorder (PTSD). Approximately 50% to 70% of PTSD patients report frequent nightmares.

This high prevalence and impact of nightmares has resulted in several treatment outcome studies. In general, older studies on pharmacological treatment of nightmares (e.g., antidepressants) have shown poor results, while a recent systematic review on pharmacological treatment of posttraumatic nightmares showed that effects are inconclusive/tentative at best. The only clear exception is the $\alpha_1$-antagonist prazosin, which has shown very promising outcomes for posttraumatic nightmare reduction in 3 relatively small randomized controlled trials (RCTs). Although it appears that prazosin must be used continuously as nightmares return after drug withdrawal. To date, cognitive-behavioral treatment (CBT) has gained more empirical support and is the treatment-of-choice for nightmares, particularly in long-term scenarios.

A range of cognitive-behavioral techniques seem to effectively decrease NF. Indirect CBT such as recording one’s nightmares and relaxation exercises reduce NF. Nightmare-focused CBT such as exposure or systematic desensitisation and techniques of cognitive restructuring seem to decrease
NF even more. These techniques mostly include recording and relaxation with an extra component. In exposure-related techniques, nightmares are written down and relived in imagination during the day. In cognitive restructuring techniques, nightmares are written down and thereafter changed in a (typically) more positive version. These changed nightmares can be relived during the day (imagery rehearsal therapy [IRT]) or can be changed within the nightmare directly (lucid dreaming Treatment [LDT]). In a review, Wittmann et al. concluded that IRT has been evaluated most extensively but has been tested only by one research group.

To date different nightmare treatment studies have not been reviewed systematically. The aim of this review is to evaluate whether CBT shows effects on diminishing nightmare frequency as promising as those seen in RCTs, and if so, which kind of CBT is most effective.

METHOD

Search Strategy

A systematic literature search was carried out in PsychInfo and PubMed for articles published on or before May 1, 2008. The terms “nightmares” AND “treatment” were used. References from each relevant paper, including 3 recent reviews of the literature were examined for additional relevant studies.

The search strategy sought to obtain all relevant published database RCTs based on the following criteria: nightmare treatment study, use of nonpharmacological treatment, not a qualitative case study, RCT. Follow-up studies were also included because they supplied information about the long-term effects of treatment. All RCTs on nightmare treatments for adults were reviewed by the first 2 authors.

Data Analysis

To adequately compare studies, Cohen’s d was calculated for all studies with the software package G*power 3.0.5. Because all studies were paired-sample studies, the between-group correlations have to be taken into account when deriving Cohen’s d. However, most studies did not supply the correlations between groups or sufficient data to calculate Cohen’s d for a paired-sample study. To adequately compare the Cohen’s d between studies, a conservative correlation between pre- and post-test measurement of r = 0.5 was used for all studies. No effect sizes could be calculated for one study because means and standard deviations were not reported, another study only supplied NF information (Both authors were contacted, but could not supply the missing data).

G*power 3.05 was used to further explore the nonsignificant differences within- and between-groups. When there was no within-group (pre-post) (p > 0.05) effect over time, we calculated the sample size necessary to detect a significant effect (using the difference in effect size, assumption of dependent groups and a power of 0.8). If there was no significant effect in a study between 2 groups (e.g., intervention, waiting list), the sample size necessary to achieve adequate power (0.8) was determined (independent groups assumed).

Table 1—Search String

<table>
<thead>
<tr>
<th>PubMed</th>
<th>PsychInfo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment AND nightmares</td>
<td>2645</td>
</tr>
<tr>
<td>Treatment studies</td>
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</tr>
<tr>
<td>Nonpharmacotherapy studies</td>
<td>33</td>
</tr>
<tr>
<td>No single-case studies</td>
<td>17</td>
</tr>
<tr>
<td>Controlled trials</td>
<td>12</td>
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<tr>
<td>Controlled-controlled trials</td>
<td>11</td>
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<tr>
<td>Population &gt;18 years</td>
<td>10</td>
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<tr>
<td>Studies</td>
<td>9</td>
</tr>
<tr>
<td>Follow-up articles</td>
<td>2</td>
</tr>
<tr>
<td>Article displaying preliminary results</td>
<td>1</td>
</tr>
</tbody>
</table>

RESULTS

Studies

The search string yielded 454 article titles in PsychInfo and 2645 in PubMed. After reviewing the abstracts, most articles were excluded because they were no-treatment articles. Of the remaining 108 articles, 70 were rejected because they were pharmacotherapy (30) or single case articles (40). The remaining articles were then reviewed; 17 of these were excluded because they were not controlled studies, one was excluded because it was in-group controlled, and one was excluded because the population was not >18 years of age. Twelve articles remained—9 studies, and one follow-up articles, and one article displaying preliminary results (see Table 1).

Study Characteristics

Of the articles we examined, 10 were written in the US, one in the UK, and one in the Netherlands (Table 2). The articles were published between 1978 and 2007. In the studies, a total of 437 participants were analyzed, the average number per study being 48.6 (SD = 35.8, range 20-114). In the 2 follow-up articles, intervention was offered to the waiting list (or recording condition) after 3 months. One preliminary and original study investigated sexual assault victims with PTSD and another study used students. The remaining studies recruited participants through advertisements in the general media.

The published trials we examined varied in quality, yet none fulfilled CONSORT guidelines. None of the articles explained how sample size was determined to achieve enough power. Only 3 articles explained how randomization was achieved, and one covered the issue of blinding the procedure.

All articles described eligibility criteria of participants. For inclusion, most studies used a minimum NF of once a week. Miller and DiPilato used a minimum frequency of once a month. Cellucci and Lawrence, and Kellner et al. did not mention a minimum frequency. Other inclusion criteria were: 18 years or older, sexual assault survivors, posttraumatic stress symptoms, and having experienced a traumatic event. Exclusion criteria included alcohol/drug abuse, medication, psychosis/schizophrenia, severe (psychiatric) illness, and other sleep disorders.

Three studies did not suffer from any dropout. Other studies mentioned the following reasons for dropout: falling...
to contact the participant, not sending back follow-up measurement, illness, got better. Krakow et al.27 and Davis and Wright34 found no statistical differences between completers and dropouts. Dropouts in the study of Burgess et al.24 were more often single and had fewer nightmares in the relaxation group at baseline. Moreover, this study suffered the highest dropout (42% for treatment condition); this attrition rate is, however, not abnormal for self help treatment.39

Four articles described an exposure type method,24,29,30,33 7 articles IRT,23,25,26,33,35,37 one study used “exposure, relaxation and rescripting therapy” (ERRT), an IRT-like technique,34 and one study used LDT.27 Most studies used a waiting-list control group, and one30 was placebo controlled. Four studies used a second intervention next to the control group. These second interventions consisted of relaxation,29 recording,23,30,35 and LDT group intervention.27 One study compared only 2 interventions without using a control group.31 Treatment duration from a therapist ranged from 450 minutes29 to zero minutes (self-help).24 Most studies used one to 3 treatment sessions.

All studies used a measurement for nightmare frequency; some studies used a diary to assess NF,24,30,37 others used interviews,20 the remaining studies used questionnaires.23,25,27,33,35,36 Some studies also measured nightmare intensity (NI),20,33,34 nightmare distress (ND)26,37 or amount of nights with nightmares per week.25,26,30,34,36 Most studies used questionnaires to assess other sleep complaints or mental health complaints.

To test for changes in time within- and between-groups, repeated-measures analysis of variance and subsequent paired t-tests, was used by most articles. Some used only paired t-tests,29,32 or did not describe their statistical analysis.29,30 One did not provide mean scores for variables,29 and one only reported mean scores for NF.30 Only 3 articles provided the intention-to-treat analysis.24,26,34

**Intervention Efficacy**

Key results for all the studies are displayed using standardized effect sizes (Cohen’s d) in Table 3; for a quick overview, see Table 4. All articles used NF as a primary variable, and all found significant in-group differences (pre vs post) for intervention or placebo (range d = 0.7 to 2.9), and none for waiting list. Most studies found differences on secondary variables (range d = 0.4 to 1.6), one did not,27 and 3 found these differences for only one of their interventions.23,24,35 The insignificant findings
Although the number of included studies is relatively small and the studied groups are quite heterogeneous, this first systematic review on nightmare treatment was able to demonstrate that nightmare-focused CBT showed superior effects to other forms of nightmare treatment for both nightmare reduction and amelioration of associated sleep and affective complaints. So while indirect CBT such as recording and relaxation are effective in reducing nightmares (but not associated complaints), nightmare-focused CBT demonstrated better results on all outcomes, most notably the techniques of exposure and IRT.

The only RCT comparing exposure with IRT found no statistical differences,33 and this systematic review could not conclude that one was more effective than the other. The only possible difference so far may be a trend that IRT seemed to reduce related affective complaints to a larger degree. It would be interesting to compare IRT to exposure in a sample with adequate power.

Although IRT has been studied in more RCTs than exposure (5 vs 3), all studies on IRT have been conducted by the same research groups.22 According to APA criteria for empirically supported treatments42 this would mean that IRT is a probably efficacious treatment instead of a well-established treatment (criterion V for well-established treatments: effects must have been demonstrated by at least 2 different investigators or investigatory teams). Criterion I, “superior to pill or psychological placebo or to another treatment,” has not been fulfilled yet for IRT, as the only nightmare study so far with statistically significant differences between interventions was that of Burgess et al.,24 which showed stronger effects for exposure than for relaxation. Moreover, the effects of exposure have been demonstrated by...
3 different research groups, making it the only well-established treatment for nightmares so far. Including the ERRT as employed by Davis and Wright as an IRT-like technique, may help lift the status of IRT, but RCTs following CONSORT guidelines evaluating IRT by independent research groups are much needed. Comparisons should be made with other techniques (well-established ones such as exposure and/or psychological placebo like recording), and pharmacological treatment (e.g., prazosin) in larger samples with sufficient power; assessment should focus on nightmare (frequency and distress), sleep, and affective (anxiety, PTSD, and depressive) complaints.

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DISCLOSURE STATEMENT

This was not an industry supported study. Dr. Krakow owns and operates Maimonides Sleep Arts and Sciences, Ltd., a for-profit sleep medical center and has published the following intellectual properties: Books – Insomnia Cures, Turning Nightmares Into Dreams, and Sound Sleep, Sound Mind; Websites – www.sleepcure.com, www.nightmarecure.com, and www.sleepdynamictherapy.com. The other authors have indicated no financial conflicts of interest.

REFERENCES