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Randomized Controlled Trial to Dismantle Exposure, Relaxation, and Rescripting Therapy (ERRT) for Trauma-Related Nightmares

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Objective: The aim of this study was to conduct a preliminary dismantling study of exposure, relaxation, and rescripting therapy (ERRT) for nightmares. Method: Participants (N = 70) were randomized to 1 of 2 conditions: ERRT with nightmare exposure and rescripting (full protocol; EX) or ERRT without nightmare exposure and rescripting (NEX). Participants completed follow-ups at 1 week, 3 months, and 6 months posttreatment. Results: Both conditions yielded statistically significant improvements with medium to large effect sizes on primary outcomes related to nightmares (i.e., nights with nightmares, nightmares per week, and nightmare severity). Both conditions also yielded statistically significant improvements on secondary outcomes with medium to large effect sizes on fear of sleep, sleep quality, insomnia severity, daytime sleepiness, posttraumatic stress disorder symptom severity, and depression severity. The conditions did not differ at any time point. Conclusions: Findings indicate that ERRT with and without nightmare exposure and rescripting can significantly alleviate nightmares and related distress. The addition of nightmare exposure and rescripting did not contribute incrementally to outcomes in this sample. It is possible that the dose of exposure was not sufficient to result in group differences or that the treatment components included in both conditions (i.e., psychoeducation about trauma, nightmares, and sleep; sleep habit modification; and relaxation training) may adequately treat factors that maintain nightmares for some individuals. Theoretical implications of findings are discussed. The reduction of symptoms of other conditions following this brief intervention provides further evidence for the primary role of nightmares and sleep disturbances posttrauma.

Keywords: nightmares, trauma, rescripting, imagery rehearsal, exposure

Nightmares and sleep disturbances are considered the hallmark of posttraumatic stress disorder (PTSD; Germain, 2013; Ross, Ball, Sullivan, & Caroff, 1989). Nightmares are reported by 50% to 88% of individuals presenting for PTSD treatment (Forbes et al., 2001; Kilpatrick, Acierino, Resnick, Saunders, & Best, 1997; Neylan et al., 1998) and cause an average of three to five awakenings per week (Krakow et al., 2002). Moreover, some studies show significant relationships between sleep disturbances (i.e., poor sleep quality and quantity and nightmares), poorer PTSD treatment outcomes, and higher symptom severity compared with trauma-exposed individuals without significant sleep disturbances (Nappi, Drummond, & Hall, 2012). For some individuals, nightmares are intractable following trauma-focused interventions (Davis, De Arellano, Falsetti, & Resnick, 2003; Forbes et al., 2001; Johnson et al., 1996; Scurfield, Kenderdine, & Pollard, 1990).

Awakenings and fear of sleep associated with trauma-related nightmares may significantly contribute to insomnia symptoms (Krakow et al., 2001), which are highly prevalent among trauma survivors with PTSD in civilian (20% to 100%; Maher, Rego, & Asnis, 2006; Steine et al., 2012), veteran (52.8%; Hughes, Jouldjian, Washington, Alessi, & Martin, 2013; Orr et al., 2010) and active duty military populations (92%; Pruiksma et al., 2016). Moreover, the sleep deprivation related to nightmares and sleep disruption may ultimately decrease emotion regulation and increase anxiety sensitivity and autonomic arousal, which may create difficulties falling asleep or increase the likelihood of having a nightmare, thus creating a vicious, self-perpetuating cycle (Davis, 2009).

Cognitive-behavioral treatments such as ERRT that address post-traumatic nightmares and sleep disturbances are efficacious (Augedal, Hansen, Kronhau, Harvey, & Pallesen, 2013; Casement & Swanson, 2012; Ho, Chan, & Tang, 2016). To date, two randomized controlled...
trials conducted in community samples have demonstrated the superiority of ERRT compared with waitlist control groups on psychological (i.e., sleep quality, nightmare frequency and severity, and symptoms of PTSD and depression) and physiological (i.e., heart rate reactivity, skin conductance, and corrugator and frontalis electromyography) variables (Davis et al., 2011; Davis & Wright, 2007). A recent meta-analysis found that ERRT yields larger overall effect sizes compared with other psychological interventions (e.g., imagery rehearsal therapy) and pharmacological treatments (Augedal et al., 2013). However, the mechanisms of change in ERRT remain unknown.

One hypothesized mechanism of change in ERRT could be the use of exposure to and rescription of the nightmare content. According to the emotional processing framework (Foa & Kozak, 1986), trauma-related fear is addressed by activating the fear network to allow emotional processing of a traumatic event. During a trauma-related nightmare, the individual is continuously exposed to distressing trauma-related imagery, which may be interpreted as very real (vivid) in the nightmare. The nightmare content (which may include images of the trauma or similar underlying themes) activates the fear network and exposes the individual to dysphoric emotion-congruent imagery. Although the individual is continually being exposed to the fearful content during nightmares, the process does not aid trauma processing because the individual wakes up before the nightmare is resolved (Davis, 2009; Rothbaum & Mellman, 2001). Further, after waking, there is a slight reduction in anxiety, similar to that experienced following the avoidance of trauma-related stimuli in waking life. As a result, the individual may become more sensitized through continued exposure to the nightmare, thus maintaining the fear network (Rothbaum & Mellman, 2001). Moreover, this process may incorporate sleep-related stimuli into the fear network (e.g., bedroom, bedtime routines).

Activating the fear network during waking hours and incorporating corrective information facilitates emotional processing (Davis, 2009; Foa & Kozak, 1986). ERRT achieves this through a detailed written nightmare account and reading the account aloud. This is followed by the identification of trauma-related themes (i.e., power/control, esteem, trust, intimacy, and safety) used to guide rescription of the nightmare (Davis, 2009). Nightmare rescription, along with daily imagery rehearsal of the rescription, is thought to serve as the corrective information incorporated into the fear network.

The present study examines a preliminary dismantling of ERRT by comparing the standard ERRT protocol that includes exposure and rescripting (EX) to a modified version that does not include exposure and rescripting (NEX). The primary hypothesis was that EX would yield greater reductions in nightmare frequency (i.e., nightmares per week and the number of nights with nightmares) and nightmare severity compared with NEX across follow-ups. Secondary hypotheses were that EX would yield greater improvement in sleep quality and reduce insomnia severity, daytime sleepiness, and fear of sleep compared with NEX.

**Method**

**Participants**

Participants were 70 adults from the community who were eligible for the study if they (a) were aged 18 or older, (b) reported having at least one nightmare per week for the past month and (c) reported having experienced a traumatic event at least 3 months prior to the initial evaluation. Nightmares were defined as dreams that involve negative emotions and cause awakenings. Exclusion criteria included psychosis, cognitive impairment, suicidal intent, current or past manic episodes, and untreated drug or alcohol abuse or dependence in the past 6 months. There were no restrictions on race or ethnicity. Participant enrollment and attrition are presented in Figure 1. Participant demographics are shown in Table 1 and did not differ between groups.

**Procedure**

The study was conducted from May 2009 to May 2013. Individuals were recruited from a community in the Midwest using fliers, newspaper/radio advertisements, and clinician referrals. Interested individuals completed a brief phone screen and, if eligible, were scheduled for an initial evaluation. Eligible participants were randomly assigned to one of two treatment groups—EX or NEX—and were reevaluated at 1 week, 3 months, and 6 months posttreatment. A random number generator was used to assign participants to treatment condition by the project manager, who prepared sealed envelopes containing a letter stating the treatment assignment. The assessor gave this sealed envelope to the participant after the person was deemed eligible at the initial evaluation. Additionally, assessors reminded participants to refrain from indicating their treatment group assignment at posttreatment assessments.

Assessments were conducted by advanced clinical psychology graduate students who were trained and supervised by the senior coauthor (JLD) and who were blind to treatment group assignment. Participants were compensated with a gift card to a local business for completing the follow-up assessments. All assessments and treatment sessions were conducted in a university clinical research center. All procedures were approved by the university’s institutional review board.

**Measures**

**Clinician-Administered PTSD Scale (CAPS).** The CAPS (Blake et al., 1995) is a 17-item semistructured clinical interview considered the “gold standard” interview for PTSD (King, Leskin, & Weathers, 1998; Weathers, Ruscio, & Keane, 1999). Items assessing PTSD symptom frequency and severity are rated by the interviewer and summed to derive a total score ranging from 0 to 136. The “F1/I2” rule (frequency coded at least 1 and intensity coded at least 2 for the past month) was utilized to determine symptom presence and diagnosis (Weathers et al., 1999). For the current study, the frequency and severity of each symptom in the past month at baseline and at each follow-up yielded an average Cronbach’s alpha of .93 (αbaseline = .92, α1-week = .93, α3-month = .94, and α6-month = .92), which is indicative of very good internal reliability. To examine reliability of assessors, 25% of the audio recordings were selected to be blind-rated by another assessor. On the CAPS, the kappa coefficient for overall categorical diagnostic assignment was κ = .73 and was moderate to high across PTSD symptom clusters (Reexperiencing κClusterB = .58; Avoidance/Numbing κClusterC = .84; Hyperarousal κClusterD = .81). Although the reexperiencing cluster fell within the moderate-to-substantial agreement range, it was lower relative to the other clusters. We
examined the item-level agreement within the cluster and found substantial agreement ($\kappa = .77$) for the distressing dream item on the CAPS. Overall, interrater reliability generally fell in the substantial agreement range.

**Modified Trauma Assessment for Adults: Self-Report Version (TAA).** The TAA (Resnick, Best, Kilpatrick, Freedy, & Falsett, 1993) assesses the number and types of traumatic events experienced. The modified version includes additional types of events not included in the original TAA for a total of 18 possible types of traumas.

**Trauma-Related Nightmare Survey (TRNS).** The TRNS (Cranston, Miller, Davis, & Rhudy, 2016) is a 15-item measure that assesses frequency and disturbance of nightmares, nightmare characteristics (e.g., similarity between nightmares and traumatic events, duration of chronic nightmares, onset of chronic nightmares), and cognitions, emotions, and behaviors associated with nightmares (Davis, Wright, & Borntrager, 2001). Empirical studies report adequate test–retest reliability and convergent validity (Cranston et al., 2016; Davis & Wright, 2007). The TRNS was used to assess nightmare frequency (i.e., nightmares in the past week and number of nights with nightmares in the past week) and severity.

**Pittsburgh Sleep Quality Index (PSQI).** The PSQI is a 19-item measure that assesses qualities and problems associated with sleep (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Open-ended and Likert items are summed to derive a global sleep quality index ranging from 0 to 21. A score of 5 distinguishes “good” sleepers

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**Figure 1.** Flowchart of participants through the trial. EX = exposure condition; NEX = no exposure condition.
Insomnia Severity Index (ISI). The ISI is a seven-item measure that assesses difficulties falling asleep, staying asleep, waking too early, and distress related to sleep difficulties (Morin, 1993). Items are summed to derive a total score ranging from 0 to 28, with higher scores indicating greater insomnia severity. For this study, internal consistency was acceptable with an average Cronbach’s alpha of .81.

Epworth Sleepiness Scale (ESS). The ESS is an eight-item item measure of depression (Beck, Steer, & Brown, 1996). Items are summed to derive a total score from 0 to 28, with higher scores indicating greater daytime sleepiness. Because Cronbach’s alpha is sensitive to the number of items on the scale, the raw interitem correlation is recommended for measuring internal consistency of short measures (Clark & Watson, 1995), where the optimal range is between .20 and .40 (Briggs & Cheek, 1986). Thus, the ESS demonstrated acceptable internal consistency (baseline = .91, 1-week = .92, 3-month = .93, and 6-month = .94).

Fear of Sleep Index (FoSI). The FoSI is a 23-item measure that assesses trauma-related thoughts and activities associated with sleep and the occurrence of traumas associated with the bedroom or sleep (Huntley, Hall Brown, Kobayashi, & Mellman, 2014; Pruiksma et al., 2014). Items are summed to derive a total score from 0 to 23, with higher scores indicating greater fear of sleep. The FoSI demonstrated good internal consistency with an average Cronbach’s alpha of .94 (αbaseline = .91, α1-week = .93, α3-month = .94, and α6-month = .96).

Beck Depression Inventory-II (BDI-II). The BDI-II is a 21-item measure of depression (Beck, Steer, & Brown, 1996). Items are summed to derive a total score from 0 to 63, with higher scores indicating more severe depression. The BDI-II demonstrated good internal consistency in the current sample with an average Cronbach’s alpha of .94 (αbaseline = .91, α1-week = .94, α3-month = .94, and α6-month = .96).

Treatment

Both treatments consisted of three sessions lasting 90 min administered over three consecutive weeks. Initially, attempts were made to administer sessions in group format but, due to scheduling conflicts and recruitment flow, this was not feasible. The majority of participants completed treatment in individual format (EX, n = 21; NEX, n = 19), with only three groups attempted for EX (n = 6; two

**Table 1**

<table>
<thead>
<tr>
<th>Demographic Characteristics and Trauma History</th>
<th>EX (n = 37)</th>
<th>NEX (n = 33)</th>
<th>t, x²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>41.76 (15.67)</td>
<td>43.39 (13.37)</td>
<td>- .47</td>
<td>.64</td>
</tr>
<tr>
<td>Gender (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>26 (70)</td>
<td>24 (73)</td>
<td>.052</td>
<td>.82</td>
</tr>
<tr>
<td>Men</td>
<td>11 (30)</td>
<td>9 (27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household income, mean</td>
<td>39,325</td>
<td>27,957</td>
<td>.88</td>
<td>.39</td>
</tr>
<tr>
<td>Highest education level (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>2 (6)</td>
<td>1 (3)</td>
<td>-1.37</td>
<td>.18</td>
</tr>
<tr>
<td>High school graduate</td>
<td>10 (27)</td>
<td>4 (12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>10 (28)</td>
<td>12 (33)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College graduate</td>
<td>9 (25)</td>
<td>11 (33)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate school</td>
<td>5 (14)</td>
<td>5 (15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>6 (16)</td>
<td>8 (24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>8 (22)</td>
<td>5 (15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>3 (8)</td>
<td>1 (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>16 (43)</td>
<td>10 (30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racial and ethnic background (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>33 (89)</td>
<td>27 (82)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>1 (3)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Indian</td>
<td>2 (5)</td>
<td>5 (15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>0 (0)</td>
<td>1 (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocational status (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>3 (8)</td>
<td>3 (9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>8 (22)</td>
<td>11 (33)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed full time</td>
<td>16 (43)</td>
<td>14 (42)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed part time</td>
<td>4 (11)</td>
<td>2 (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>6 (16)</td>
<td>3 (9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trauma history (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automotive accident</td>
<td>21 (57)</td>
<td>22 (67)</td>
<td>.723</td>
<td>.40</td>
</tr>
<tr>
<td>Witnessing serious injury or violent death</td>
<td>14 (38)</td>
<td>21 (64)</td>
<td>.646</td>
<td>.03</td>
</tr>
<tr>
<td>Unwanted sexual experience before 13</td>
<td>15 (41)</td>
<td>18 (55)</td>
<td>1.37</td>
<td>.24</td>
</tr>
<tr>
<td>Other unwanted sexual contact</td>
<td>14 (38)</td>
<td>17 (52)</td>
<td>1.32</td>
<td>.25</td>
</tr>
<tr>
<td>Child physical abuse</td>
<td>11 (30)</td>
<td>19 (59)</td>
<td>6.14</td>
<td>.01</td>
</tr>
<tr>
<td>Attacked with a weapon</td>
<td>11 (30)</td>
<td>16 (49)</td>
<td>2.59</td>
<td>.11</td>
</tr>
<tr>
<td>Fear being killed or seriously injured</td>
<td>16 (43)</td>
<td>11 (33)</td>
<td>.732</td>
<td>.40</td>
</tr>
</tbody>
</table>

Note: EX = exposure condition; NEX = no exposure condition.
participants per group) and two groups attempted for NEX (n = 4; two participants per group). Some participants who began in a group had to complete sessions in individual format if they missed a group session (EX, n = 2; NEX, n = 3).

ERRT EX. In the full protocol of ERRT (EX group), avoidance is conceptualized as a key mechanism maintaining nightmares. Avoidance of confrontation with the nightmare maintains anxiety, which may increase over time. This avoidance promotes fear and anxiety, which leads to more nightmares. Confronting the nightmare is thought to decrease avoidance, thereby alleviating distress. Anxiety is also targeted through the cognitive, behavioral, and physiological channels through psychoeducation about trauma and nightmares, exposure to nightmare content, rescription of nightmare content, relaxation training, and modification of unhelpful sleep habits.

ERRT NEX. In the NEX group, emphasis was placed on the cognitive and physiological arousal resulting from nightmares rather than avoidance of confrontation. NEX contains all of the components of the full ERRT protocol but with the exposure and rescripting components removed and additional relaxation practice added. Thus, NEX focuses on teaching relaxation skills to enhance anxiety management and emotion regulation as well as sleep habit modification to promote sleep quality. Psychoeducation about trauma and nightmares is also included.

Therapists and fidelity. Treatment was conducted by one PhD-level psychologist (JLD) and clinical psychology graduate students. All therapists were trained and supervised by JLD. Three independent PhD-level clinicians trained in the treatments reviewed a random selection of 25% of sessions; 40% from Session 1 recordings (n = 15), 40% from Session 2 recordings (n = 15), and 20% from Session 3 recordings (n = 7). This was done to increase the likelihood that sessions including the primary differences between the treatments would be reviewed. Treatment reviewers utilized an adherence measure adapted from trials of PTSD (e.g., Resick et al., 2008) to rate elements unique and specific to each session (e.g., “Had client write out nightmare” for the EX group), essential but not unique elements of each session (e.g., “Therapist established good rapport with the client” for both treatments), and proscribed elements for each session (e.g., “Had client write out nightmare” for the NEX group). For both treatments, over 95% of unique and essential elements were included in all sessions. There were no violations of the protocol. For EX (26 items), 96% of the unique and essential components were rated as “good” or “excellent” (from the following options: poor, mediocre, satisfactory, good, or excellent). Similarly, in NEX (21 items), 98% of the unique and essential components were rated as “good” or “excellent.” In both, therapist competencies were rated as “good” or “excellent.” There were no differences in competency ratings between treatment groups.

Power Analysis and Sample Size

Average pre- to posttreatment effect sizes were calculated from previous studies (Burgess, Gill, & Marks, 1998; Davis et al., 2011; Davis & Wright, 2007; Krakow et al., 2001; Miller & DiPilato, 1983; Rybarczyk, Lopez, Benson, Alsten, & Stepanski, 2002) for the following variables: nightmare frequency, nightmare disturbance, total PTSD symptomatology, and PSQI global sleep quality. The following sample sizes were obtained to achieve power = .95 and α = .05: N = 32,490 for nightmare frequency, N = 22 for nightmare disturbance, N = 16 for total PTSD symptoms, and N = 64 for global sleep quality. The nightmare frequency variable was problematic in that the expected effect for this variable was very small, f = .01. Based on these analyses, 65 participants would provide adequate power to detect expected effects.

Data Analysis

Intent-to-treat analyses were conducted using the MIXED procedure from SPSS, Version 20 to perform linear mixed models analysis of variance. The SPSS MIXED procedure uses maximum likelihood estimation, which accommodates missing data, thus overcoming the typical problem of listwise deletion. Further, because the procedure uses all available data, no data imputation is required. Thus, all participants were included in these analyses as long as they contributed at least one datapoint to the outcome variable. Prior to these analyses, outliers were replaced with the next most extreme value plus one unit (Field, 2009). Treatment effects were calculated using Cohen’s d effect size (Cohen, 1988). Consistent with previous ERRT studies (Davis et al., 2011; Davis & Wright, 2007), clinically significant outcomes were based on the following criteria: absence of nightmares at 6-month postassessment, ≥10-point decrease on the CAPS (Weathers, Keane, & Davidson, 2001) between baseline and 6-month postassessment, a cutoff score of 5 on the PSQI global index (Buysse et al., 1989), and a ≥11-point decrease on the BDI-II. Although other studies have used a 9-point cutoff for the BDI-II (e.g., de Graaf et al., 2009; Seggar, Lambert, & Hansen, 2002), due to the small sample size, a more conservative reliable change index (Jacobson & Truax, 1991) was utilized. Nonetheless, the number meeting clinically significant change on the BDI-II did not differ based on a 9- or 11-point change score cutoff.

Results

At the initial assessment, participants reported experiencing an average of six traumatic events (SD = 3.42; range 1 to 16), and 64.3% met criteria for current PTSD (CAPS past month). Using Weathers et al.’s (1999) severity cutoff scores, 8.6% of the sample were asymptomatic or had few symptoms (scored 0 to 19), 17.1% met mild/subthreshold PTSD (scored 20 to 39), 25.7% met moderate PTSD (scored 40 to 59), 30% met severe PTSD (scored 60 to 79), and 18.6% met extreme PTSD (scored ≥80). Mean nightmares in the past month was 30 (SD = 87.70), and mean nights with a nightmare in the past week was 4 (SD = 2.93). There were no significant differences between EX and NEX groups at baseline on outcome variables. No significant main effects of group, nor significant interactions between group and time, were observed for any outcome variable (Table 2 shows linear mixed- model results). However, a significant main effect for time was found for all variables that indicated all symptoms improved following treatment (Table 3 shows the means and standard deviations and follow-up comparisons for all outcome variables). Cohen’s d effect sizes (and their 95% confidence intervals) were calculated for all variables comparing baseline to 6-month posttreatment assessment (see Table 3).
Discussion

The present study is the third randomized controlled trial of ERRT and the first to explore the mechanism of change through dismantling. Both conditions yielded statistically significant improvement on all outcome variables (i.e., nightmare frequency, number of nights with nightmares, nightmare severity, fear of sleep, sleep quality, daytime sleepiness, insomnia severity, PTSD symptom severity, and depression). However, the full ERRT protocol (i.e., EX with exposure and rescripting) did not significantly differ from ERRT without exposure and rescripting (i.e., NEX) on any outcome. For nightmare frequency, within-treatment group effect sizes for EX ($d = 0.61$) and NEX ($d = 1.35$) were similar to or larger than those found in meta-analyses of behavioral treatments for nightmares ($d = 0.48–0.69$; Augedal et al., 2013; Casement & Swanson, 2012) and higher than those found for the nightmare medication prazosin ($d = 0.50$; Augedal et al., 2013). For sleep quality, effect sizes for EX ($d = 1.25$) and NEX ($d = 1.75$) were also larger than those found in meta-analyses of behavioral treatments for nightmares ($d = 0.68$; Casement & Swanson, 2012). For PTSD severity, the effect sizes ranged from lower ($d = 0.65$ for EX) to higher ($d = 1.01$ for NEX) than that found in a meta-analysis of behavioral treatments for nightmares ($d = 0.72$; Casement & Swanson, 2012). There does not appear to be a consistent pattern of differences in effect sizes between the current study and studies with veteran samples.

Results have implications for the theoretical understanding of the nature and treatment of trauma-related nightmares. Several factors are thought to perpetuate nightmares after trauma (Davis, 2009): (a) poor sleep (i.e., unhelpful sleep behaviors, REM disruption), (b) thoughts and feelings associated with a lack of control and helplessness, (c) avoidance of thinking about nightmares or the traumatic event and avoidance of sleep, and (d) fear and hyperarousal at night and during the day. The exposure and rescripting components are thought to aid in treatment response through achieving a sense of control and mastery via facing the feared stimulus (i.e., nightmare) and changing the fear network by adding new, non-fear-generating stimuli (i.e., rescription). It may yet be premature to say that the exposure and rescripting component does not contribute incrementally to treatment outcome. It is also possible that the dose of exposure to the actual feared content was not sufficient to result in a statistically significant group difference. The exposure component in the EX condition utilized standard exposure instructions, including writing the nightmare in present tense and providing details about all sensory information experienced in the nightmare. Exposure to the original nightmare was only 30–60 min during a single, 2-hr session. Treatment effectiveness may be reduced when there is not enough time spent on exposure (Carey, 2011; Resick et al., 2008). Indeed, studies assessing exposure-dose of cognitive-behavioral therapy indicate that more time spent on exposure led to faster symptom reduction (Borgeat et al., 2009). A similar dose-response relationship may be found in individuals suffering from chronic posttrauma nightmares. If this is the case, one may not expect to observe an incremental benefit of exposure, given the brief nature of the exposure exercise. However, it is also possible that exposure and rescripting may not be necessary for everyone. While it is generally important for providers working with trauma-exposed populations to refrain from colluding with avoidance, the NEX protocol may be helpful for patients who may otherwise avoid treatment due to exposure to the nightmare. NEX also may be an option for providers who are limited in terms of the frequency and duration that they are able to see patients, as the components of NEX are likely more adaptable to an abbreviated format.

The treatment components that were included in both EX and NEX (i.e., psychoeducation about trauma, nightmares, and sleep; sleep habit modification; and relaxation training) may adequately treat factors that maintain nightmares over time. Sleep habit modification and relaxation training may regulate processes associated with sleep architecture, which, in turn, may result in decreased nightmares. Indeed, early nightmare treatment studies have found relaxation training alone improves nightmares (e.g., Miller & DiPilato, 1983). Attending therapy for nightmares and receiving psychoeducation likely alleviates feelings and thoughts associated
Miller, Davis, and Balliett (2014) found that EX resulted in a significant increase in internal locus of control related to nightmares. The act of attending therapy and monitoring nightmares also likely reduce fear and hyperarousal.

The present study was limited by a number of factors that bear consideration when interpreting the above findings. Chief among these is attrition across follow-up time points. Although statistical methods were implemented to manage these missing data, the ability to accurately approximate true variance may be reduced with a small sample size and a large amount of missing data (Jain & Wang, 2008).

Overall dropout rate (those who began treatment but failed to complete all three sessions) was 17.65% (EX = 18.52%; NEX = 16.67%), which is lower than previous trials of pharmacological treatments for nightmares: A meta-analysis. Sleep Medicine Reviews, 17, 143–152. http://dx.doi.org/10.1016/j.smrv.2012.06.001

with helplessness and lack of control with regard to nightmares. Miller, Davis, and Balliett (2014) found that EX resulted in a significant increase in internal locus of control related to nightmares; it will be important for future research to examine whether NEX has a similar impact on locus of control to determine possible mechanisms of change. The act of attending therapy and monitoring nightmares also reduces avoidance to a degree. Attending therapy, sleep habit modification, and relaxation training also likely reduce fear and hyperarousal.

The present study was limited by a number of factors that bear consideration when interpreting the above findings. Chief among these is attrition across follow-up time points. Although statistical methods were implemented to manage these missing data, the ability to accurately approximate true variance may be reduced with a small sample size and a large amount of missing data (Jain & Wang, 2008). Overall dropout rate (those who began treatment but failed to complete all three sessions) was 17.65% (EX = 18.52%; NEX = 16.67%), which is lower than previous trials of ERRT for nightmares (26%; Davis et al., 2011; Davis & Wright, 2007) but slightly higher than those reported in a meta-analysis (12.8%; Ho et al., 2016). Analyses failed to find significant differences between those who dropped out and those who remained in the study, so reasons for dropout remain unknown. Future studies may benefit from strategies to increase follow-up rates (e.g., utilizing mobile technology, offering greater compensation, or attempting to collect reasons for dropout). The racial and ethnic background for the sample was also largely White which also limits generalizability of the findings. Future research with more diverse samples is needed.

In spite of the limitations, the present study provides further evidence that a brief intervention targeting sleep and nightmares is effective in improving those particular constructs, as well as related distress (e.g., symptoms of PTSD and depression). Future research should continue to explore various combinations of techniques to determine if there is an optimal approach to treating these issues. Further, studies are needed to determine if integrating treatments designed for nightmares and sleep problems with those targeting PTSD symptoms yields improved outcomes for clients.

### References


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