Effects of a micro-intervention aimed at reducing the level of unpleasant dreams

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Summary. One-hundred and twenty-six adults participated in an experiment to test whether an online micro-intervention would reduce the level of unpleasant dreams. The intervention involved asking participants to vividly recall positive events of the day just before going to sleep. The results showed that the intervention led to a significantly lower level of unpleasant dreams in the experimental group the night after the intervention than in a waiting list control. The results indicate that the low-cost, easily disseminated intervention is worthy of further evaluation to determine whether the effects endure over time and whether the effects extend to children and to individuals who have PTSD.

Key words: dreams, nightmares, sleep, intervention, treatment

1. Introduction

Nightmares, which are relatively common, involve dreams that include disturbing content and lead to negative emotions (Nixon, Robidoux, Dale, & Konick, 2017; Zadra & Donderi, 2000). Zadra and Donderi (2000) distinguished between nightmares, which awaken the sleeper, and bad dreams, which do not. We do not make that distinction herein.

In an unusual study, De Koninick and Brunette (1991) assigned, apparently nonrandomly, four groups of six female college students, all of whom were quite fearful of snakes, to different conditions. In one condition the researcher asked the participants to have a pleasant dream about being in a park and seeing a snake. In another condition the request was for participants to have an unpleasant dream about seeing the snake. In the third and fourth conditions, the researchers asked participants to have either a pleasant or an unpleasant dream about seeing a squirrel in a park. The results indicated that the researcher instructions about the pleasantness of the dreams led to significant differences in how pleasant or unpleasant the dreams were.

Meta-analyses have found that two different psychological treatments tended to produce a significant reduction in nightmare frequency, compared to a waiting list control (Augedal, Hansen, Kronhaug, Harvey, & Pallesen, 2013; Hansen, Hofling, Kroner-Borowik, Stangler, & Steil, 2013). These treatments usually involved (1) imaginal exposure to nightmare content or (2) imagery-rescripting and practice of nightmare content. Sometimes the intervention also included sleep education and relaxation training (e.g., Hansen et al., 2013). The treatments are usually provided individually over several hours (e.g., Pruiksma, Cranston, Rhudy, Micol, & Davis, 2016). Proazosin, a drug that suppresses the activity of epinephrine and norepinephrine, also has solid evidence for producing a reduction in nightmares (Augedal et al., 2013).

The meta-analyses of Augedal et al. (2013) and Hansen et al. (2013) did not show any one type of treatment to have better effects than another. Subsequent studies that have compared one type of psychological intervention to another or a psychological intervention to prazosin also have not shown any one treatment to be superior (e.g., Harb et al., 2019; Kunze, Arntz, Morina, Kindt, & Lancee, 2017; Pruiksma et al., 2016).

All the usual psychological treatments for nightmares involve the use of health professionals and substantial time and money costs for the client. The drug treatment carries the risk of side-effects, including dizziness and sudden fainting, especially when getting up (Mayo Clinic, 2019).

An effective intervention for reducing nightmare frequency, with low cost and little or no risk of side-effects, could be helpful. The focus on predominant emotions in the nightmare model of Levin and Nielsen (2009) suggests that thinking about positive events of the day just prior to sleep onset might change a person's emotions enough to provide that safe, cheap alternative intervention.

We pilot-tested on two individuals who often had unpleasant dreams a micro-intervention focused on creating positive thoughts and mood just prior to sleep. The test went over a period of a few weeks. The results suggested that the intervention reduced the frequency of unpleasant dreams but had no effect on the frequency of pleasant dreams. We also found that participants did not always remember dreams from the prior night.

On the basis of the results of the pilot test, we designed an experimental study to test whether the same pre-sleep method would help reduce the level of unpleasant dreams. Our hypothesis was that the intervention would lead to a lower level of unpleasant dreams in the intervention group compared to a waiting-list control. In order to maximize participant entry into the study and completion of it, we used the briefest possible measures.

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Table 1. Comparisons of groups at baseline

Characteristic	Group		
	Experimental	Control	Difference
Sex (male/female)	23/38	17/47	$\chi^2 = 2.73$, $p = .26$
Age	33.08 ± 9.65	34.22 ± 10.09	$F(1,122) = 0.41$, $p = .52$
Days in past week with unpleasant dream	1.51 ± 1.42	1.47 ± 1.63	$F(1, 124) = 0.02$, $p = .89$

2. Method

2.1. Participants

Following approval of the study plan by a university research-ethics board, we recruited participants via social media and the participant pool for introductory psychology at an Australian university. Students could receive a small amount of credit for their course for completing the study. The announcement described the online study as intended to test the effects of a brief intervention aimed at decreasing the level of unpleasant dreams. A total of 126 adults entered the study by completing the initial questionnaire. The participants included 40 men, 85 women, and one individual who self-described as other. The mean age was 33.7 (*SD* = 9.9).

2.2. Measures

Covariate. To obtain information about the participants' usual frequency of unpleasant dreams, we asked: "On average over the past six months, on how many nights in a 7–day week have you had an unpleasant dream or nightmare?" Responses options ranged from 0 to 7.

Manipulation check. We asked participants assigned to the experimental group whether they used the suggested method prior to going to sleep the night after they entered the study. Response options were yes and no.

Outcome measure. To evaluate the effect of the intervention, we asked participants to respond to the following item the morning after they entered the study: "Regarding the first dream you recall from last night, record how *unpleasant* the dream was." The response options included -3 = very unpleasant content, -2 = moderately unpleasant content, -1 = slightly unpleasant content, 0 = no unpleasant content.

Other measure.To assess the effects of the intervention on a non-targeted variable, we asked participants to rate how *pleasant* their dream was from the prior night. The response options included 0 = no pleasant content, +1 = slightly pleasant content, +2 = moderately pleasant content, and +3 = very pleasant content.

2.3. Intervention

The intervention included the following instructions: "Just before going to sleep, remember one or more of the most positive events of the day. Think back to the event and to your reaction to it. Try to relive the event. Spend at least 20 seconds going over the event or events in your mind."

2.4. Procedures

After participants gave written consent to participate, they completed the initial research questionnaire, which asked about their age and sex, as well as about their past-week frequency of unpleasant dreams. Computer software then randomly assigned them to either the experimental group, which received the intervention immediately, or to the control group, which saw a message saying that they would receive the intervention as soon as they complete a brief assessment the next day. We sent all participants an email the next day with a link to the final research questionnaire. That post-intervention questionnaire included the previous-night dream questions. For participants in the experimental group, the questionnaire also include the manipulation-check question. After control participants completed the outcome question, they left the study and received the intervention.

3. Results

3.1. Assumption test results

The statistical assumptions of ANOVA and ANCOVA include normality of data in both groups and homogeneity of variance. Both of these assumptions were met for the following analyses. An assumption of ANCOVA is that the covariate have a linear relationship with the outcome variable. The covariate here, frequency of unpleasant dreams in the past week, had a significant linear relationship with the outcome report about dream unpleasantness on the first night after participants entered the study, $r(82) = .29$, $p = .007$.

3.2. Comparisons of groups at baseline

The experimental group had 61 individuals assigned to it. The control group had 65. ANOVAs and chi square tests showed that the two groups did not differ significantly at baseline with regard to age, gender, or the prior frequency of unpleasant dreams. See Table 1.

3.3. Comparison of completers and noncompleters

Of the 61 participants assigned to the experimental group, 39 (59%) completed the study. Of the 65 participants assigned to the control group, 45 (69%) completed the study. The differences between groups in completion rate were not significant, and there were no significant differences at baseline between the participants who completed the study and those who did not.

3.4. Manipulation-check results

Of the 38 experimental group members who completed the study and responded to the question about using the suggested method, 32 (84%) reported that they used the method.

3.5. Main results

The experimental group had a mean dream unpleasantness rating of -0.64 (*SD* = 0.90) compared to a higher mean unpleasantness rating for the control group of -1.11 (SD = 0.91). With prior-week level of unpleasant dreams as a covariate, the difference between groups was significant, $F(1,81) = 4.94$, $p = .029$, Cohen's $d = 0.49$.

3.6. Ancillary results

To assess whether the results might be due to experimenter-demand effects, we compared the two groups on how positive their dreams were after they entered the study. There was no significant difference between the mean for the experimental group, 1.87 (*SD* = 1.22) and the control group, 1.82 (*SD* = 1.25), $F(1,81) = 0.03$, $p = .86$.

We also compared outcomes for the 32 experimental-group participants who used the suggested method and those 6 who did not, controlling for baseline levels of unpleasant dreams. The participants who used the method had a mean dream-unpleasantness score of -0.53 (*SD* = 0.80) and those members of the experimental group who did not use the method had a mean of -1.00 (*SD* = 1.10) $F(1,35) = 1.48$, $p = .23$, $d = 0.55$.

4. Discussion

The results provide preliminary evidence that an online micro-intervention can significantly reduce the frequency of unpleasant dreams. This finding adds to the prior evidence (Augedal et al., 2013; Hansen et al., 2013) that psychological treatments can have a significant effect. The low cost of the present intervention, both for the intervention provider and for the client, gives the finding practical significance.

The between-groups effect size, $d = 0.49$, indicates that the experimental group had about half a standard deviation lower level of unpleasantness in their post-intervention dream than the control group. That effect size is less than the one-standard-deviation difference found in a meta-analysis of psychological interventions for nightmares (Hansen et al., 2013). Hence, the present intervention might be less effective than the typical intervention in nightmare studies. The significant correlation between the usual frequency of unpleasant dreams and the outcome-measure report of unpleasant dreams provided initial evidence of validity for the outcome report.

It is unclear how exactly the intervention worked. It could be that that the intervention alters the mood of participants and, consistent with the continuity hypothesis of Schredl (2018), the mood continues into sleep and thereby affects dreams. It is also possible that the intervention changes the person's predominant emotion at a crucial time for ensuing dreams. Following the dreaming model of Levin and Nielsen (2009), we could say that by reducing fear before sleep, the intervention may reduce the need to explore possibly dangerous situations in dreams.

Only 84% of completing participants in the intervention group used the intervention method. The effect size might have been larger with 100% adherence.

The study lost some participants in both groups. We do not know why they did not complete the study, but they may have dropped out because they could not remember their dreams.

The present research method was limited in that it included only self-report measures, the measures had no prior evidence of reliability or validity, it assessed only one night of sleep for the outcome, and there was no placebo-control group. The method had a strength in its use of an experimental research method, which can support causal conclusions.

Future research could explore (1) the mechanism of action for the intervention; (2) whether the intervention produces effects through experimenter-demand; (3) whether the intervention affects frequency of unpleasant dreams or negative reactions to dreams upon awakening; (4) the long-term effects of the intervention, using, where possible, measures with previously demonstrated reliability and validity (e.g., Cranston, Miller, Davis, & Rhudy, 2017; Stumbrys, Erlacher, & Schredl, 2013); (5) effects of efforts to increase adherence in the intervention group; (6) the effects of the intervention on different types of people, including children and individuals who have PTSD; and (7) the cost-effectiveness of the present method compared to more elaborate interventions that have been shown to reduce the level of unpleasant dreams.

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