An Online Sleep Hygiene Intervention for a Medical Unit of U.S. Army Reservists

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AN ONLINE SLEEP HYGIENE INTERVENTION FOR A MEDICAL UNIT OF U.S. ARMY RESERVISTS

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MENTOR: CAROL COX

Abstract

Sleep issues and their relationship to health and operational effectiveness problems are a growing concern for those serving in the military. In this small study, all 23 members of a U.S. Army Selected Reserve medical unit participated over one month in an online sleep hygiene intervention. Participant sleep quality and sleep duration before and after the intervention were measured using a pre-post assessment design utilizing the Pittsburgh Sleep Quality Index (PSQI). Although no change in pre-post total PSQI scores was found, there was a statistically significant ($p < .05$) increase in participants’ self-reported number of hours slept per night. This change over time suggests the online sleep hygiene intervention may affect number of hours slept per night over a monthlong period.

Key words: sleep, sleep hygiene, military health, online intervention

Introduction

The prevalence of sleep disturbances and sleep disorders (e.g., insomnia, sleep apnea) for military service members is a growing concern. Sleep disturbances have previously been associated with a variety of physical and mental health problems, including stress disorders, injuries, poor work performance, and other combat-related health concerns (Troxel et al., 2015). This is especially applicable for those service members with more combat exposure (Plumb et al., 2014). Deployments are negatively associated with proper sleep quality (Spelman et al., 2012). The physically and mentally demanding operational culture, along with irregular sleep schedules, loud noises, and personal anxiety, is not conducive to optimal sleep. Environmental demands are also associated with military service. A lack of knowledge of and training about sleep hygiene at higher levels of leadership may therefore contribute to a culture unsupportive of optimal sleep (Troxel et al., 2015; Wesensten & Balkin, 2013). Specifically, work tempo, schedules, rigorous training, a warrior culture, and combat exposure all have been identified as workplace demands associated with sleep problems in military personnel (Shattuck & Brown, 2013).

Active-duty service members and veterans are more likely than non-service members to report sleep problems (Chapman et al., 2015). Even post-deployment,
sleep problems including such issues as insomnia, nightmares, sleep apnea, short sleep duration, and daytime fatigue may continue for prolonged periods of time (Troxel et al., 2015). Studies examining post-deployment service members have reported sleep problems in 90% of participants, with insomnia and sleep apnea the most common diagnoses (Mysliwiec et al., 2013; Plumb et al., 2014). Enlisted members and those on active duty were more likely to report sleep problems (Mysliwiec et al., 2013; Plumb et al., 2014). Poor sleep quality has been shown to be related to poor mental and physical health characteristics such as low socio-emotional health status, sedentary lifestyle, overweight, and poor diet in Army Active, Guard, and Reserve members (Lentino et al., 2013). The Department of Defense has a variety of strategies (e.g., sleep assessment, educational programs, and medical referrals) to address the problem and improve sleep in military personnel and has developed the Army Performance Triad, a program that positions sleep on the same level of importance in the wellness equation as physical activity and nutrition (Troxel et al., 2015). Although sleep has been identified as a significant health issue in military personnel, however, a limited portion of wellness and stress-management training is focused specifically on sleep. There is a need for evidence-based sleep-disturbance-prevention programs for the military population (Troxel et al., 2015).

Sleep treatment options may include drug therapy, but non-drug therapy options may have longer-lasting effects and fewer side effects. Cognitive behavioral therapy has shown promise in treating insomnia, regardless of whether it is delivered online or face-to-face (Phelps et al., 2017; Seyffert et al., 2016; Zachariae et al., 2016). Other behavioral approaches, such as sleep hygiene education interventions, have been indirectly associated with sleep improvements in a clinical setting (Irish et al., 2015; Phelps et al., 2017). Sleep hygiene education interventions utilize mental training skills, such as meditation and imagery, to improve health outcomes (Elwy et al., 2014). This sort of intervention is not uncommon in a military setting, has been useful as a prevention or treatment tool for mental health issues, and has demonstrated some evidence of effectiveness in treating pain and drug-abuse disorders post-deployment (Khusid & Vythilingam, 2016; Thomas & Taylor, 2015). In a systematic review, sleep hygiene education interventions have demonstrated some positive outcomes on sleep quality (Neuendorf et al., 2015).

Sleep hygiene education has previously been used with military personnel (Nakamura, 2015); the participant is asked to address the thoughts causing his or her stress, as well as the associated physical reactions, to help better regulate and manage those reactions (Gallegos et al., 2017). This approach has demonstrated some efficacy in decreasing self-reported stress symptoms and sleep problems for military personnel (Nakamura, 2015). The intervention also has shown similar outcomes upon follow-up when compared to pharmaceutically based treatment for sleep problems (Lipschitz et al., 2016). As such, resources are becoming available for implementing such programs online. SleepSTAR, an online sleep hygiene program, provides
education and strategies for sleep management and has demonstrated effectiveness in reducing sleep problems. The SleepSTAR website is equipped with interactive tools including sleep assessments, educational content and videos, behavioral-change exercises, and stress-reducing techniques. Specifically using SleepSTAR as the sleep hygiene educational intervention, adult participants in one study significantly decreased sleep disturbances (Lipschitz et al., 2014).

Given the need for evidence-based sleep treatment programs for military personnel, and the growing support for sleep hygiene education as an effective strategy in improving sleep quality and duration, the current study describes the implementation of an online program designed to increase sleep quality and duration that was delivered to a group of Army Reservists. Reservists, about half of the military’s strength today, are frequently deployed to combat zones. Post-deployment, they must return to civilian life and face similar outcomes as those who are enlisted full-time (U.S. Army Reserve, n.d.).

Many Reservists in the small unit anecdotally reported poor sleep habits and complained to their commanding officer about constant fatigue. The commanding officer therefore invited community health educators to design and deliver an hour-long sleep hygiene education program, including lecture and instruction in an online intervention using the SleepSTAR website, to the Reserve unit during their Triad training session over a drill weekend. The U.S. Army Reservists’ sleep quality and duration were measured immediately before and one month after participation in the intervention.

Methods

Participants

Participants were a convenience sample of Army Reservists serving in one U.S. Army Selected Reserve medical unit in a Midwestern state. The commanding officer of the unit required all Reservists to attend a sleep hygiene presentation as a formal part of their battle assembly and drill weekend training. As a specialty medical unit in a rural area, membership was kept generally small; the 23 Reservists in attendance, however, were invited by the researchers to also participate in the study portion, and all (100%) consented. Participants included 10 males (9 White, 1 Black) and 13 females (11 White, 2 Black). Of the Reservists, 16 were enlisted personnel and 7 were officers. Seven of the Reservists had served at least one deployment, and all were between the ages of 18 and 52.

Measure

Sleep quality was assessed at the beginning and end of a one-month period using the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989). As a standardized
sleep assessment, the PSQI has demonstrated good internal consistency and high reliability and validity in previous studies (Mollayeva et al., 2016).

The assessment contained fill-in-the-blank questions related to usual bedtime and wake-up time, average number of minutes to fall asleep, and number of hours of sleep per night that month. Quality of sleep was rated as either very good, fairly good, fairly bad, or very bad.

The assessment also contained a series of ranked or scaled response items. Items were designed to assess seven components of sleep quality, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction (Buysse et al., 1989). Each component was derived from either a single item on the assessment or through a combination of items used to generate an individual score which contributed to the total PSQI score. Higher scores reflected more sleep problems (Buysse et al., 1989).

Procedure

All procedures were approved by Truman University’s Institutional Review Board. A pretest/posttest one-group design was used in this study. Six community health educators delivered this intervention as part of an Army Training Triad presentation during an Army Reserve drill weekend in the spring of 2018. The community health educators were young adult volunteers from a local university public health degree program who were studying for certification as health education specialists. They were experienced in health intervention program planning and implementation and had taught in a variety of settings and with diverse populations for many years. The intervention consisted of one lecture that lasted approximately three-quarters of an hour, followed by a small-group activity lasting approximately 15 minutes that demonstrated how to use the SleepSTAR website.

Prior to the lecture and small-group activity, participants completed a written PSQI pre-assessment to assess self-reported sleep quality and duration. Community health educators delivered lecture material gathered from the “Why Sleep Matters,” “The Science of Sleep,” and “Getting the Sleep You Need” sections from Harvard’s Healthy Sleep website (http://healthysleep.med.harvard.edu). The community health educators emphasized the importance of proper sleep hygiene and provided evidence-based suggestions for obtaining adequate sleep.

Following the 45-minute lecture, participants were divided into small groups. A community health educator for each group explained and demonstrated how to use the web-based program. Educators demonstrated use of the web-based tools containing technology-assisted techniques to relax the mind and reduce stress (SleepSTAR, n.d.). Although there are many choices for sleep hygiene education interventions, the online SleepSTAR training was chosen for its ease of use, lack of
cost, and variety of sleep hygiene tools tailored to each user. The community health educators and the researchers had no conflict of interest using this commercial application.

Upon each log-in, participants are assessed on their current stressors and physical tension spots, provided tailored instruction on sleep hygiene, instructed in specific exercises to clear the mind and reduce physiological tension, and provided tips and techniques to create healthy sleep and lifestyle habits. Participants were asked to download the program to their electronic devices and were encouraged to use the program to assist in their sleep hygiene routine for one month. During that one-month period, participants were asked to record the number of nights they used the program. At the one-month mark, participants completed the PSQI post-assessment during their Army Triad training at the next month’s drill weekend.

Analysis

Descriptive statistics we used to examine PSQI items, and subscales did not allow for inferential analyses. Paired sample t-tests were used to assess pre-post changes in total PSQI scores and average number of hours slept.

Results

A total of 18 participants completed all the necessary components to calculate total PSQI scores. A paired sample t-test used to assess pre-post changes in total PSQI scores from the multiple-choice sleep component items failed to reveal a statistically significant change (t(17) = 0.159, p > 0.05); however, from the fill-in-the blank questions, a statistically significant difference in the mean number of self-reported hours slept that month between the pretest (M = 5.79, SD = 1.146) and the posttest (M = 6.55, SD = 1.094) was noted among the 21 participants who responded to the question, indicating an increase in sleep duration (t(20) = −2.884, p < 0.05; d = −0.629).

In general, sleep quality remained positive between the pre- and posttests (Table 1). Between the pre- and posttests, no major changes in factors contributing to sleep difficulty were observed. In the posttest, the most common issues negatively affecting sleep included interrupted sleep due to unexpected or early waking, coughing or snoring, and the inability to fall asleep within 30 minutes of going to bed (Table 2).
Table 1. Participant Quality of Sleep Ratings ($n = 23$)

<table>
<thead>
<tr>
<th>Response Rating* [21]</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Very good</td>
<td>3 (13.0)</td>
<td>3 (13.0)</td>
</tr>
<tr>
<td>Fairly good</td>
<td>14 (60.9)</td>
<td>15 (65.2)</td>
</tr>
<tr>
<td>Fairly bad</td>
<td>6 (26.1)</td>
<td>2 (8.7)</td>
</tr>
<tr>
<td>Very bad</td>
<td>0 (0.0)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>No response</td>
<td>0 (0.0)</td>
<td>2 (8.7)</td>
</tr>
</tbody>
</table>
Table 2. Factors Contributing to Sleep Difficulty ($n = 23$)

<table>
<thead>
<tr>
<th>Factors [21]</th>
<th>Test</th>
<th>Not during the past month</th>
<th>Less than once a week</th>
<th>Once or twice a week</th>
<th>Three or more times a week</th>
<th>Missing data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot get to sleep within 30 minutes</td>
<td>Pre</td>
<td>8 (34.8)</td>
<td>6 (26.1)</td>
<td>4 (17.4)</td>
<td>5 (21.7)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>8 (34.8)</td>
<td>4 (17.4)</td>
<td>9 (39.1)</td>
<td>1 (1.4)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>Wake up in the night or early morning</td>
<td>Pre</td>
<td>5 (21.7)</td>
<td>4 (17.4)</td>
<td>6 (26.1)</td>
<td>8 (34.8)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>4 (17.4)</td>
<td>3 (13.0)</td>
<td>8 (34.8)</td>
<td>7 (30.4)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>Get up to use the bathroom</td>
<td>Pre</td>
<td>9 (39.1)</td>
<td>4 (17.4)</td>
<td>7 (30.4)</td>
<td>3 (13.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>7 (30.4)</td>
<td>6 (26.1)</td>
<td>8 (34.8)</td>
<td>1 (4.3)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>Cannot breath comfortably</td>
<td>Pre</td>
<td>19 (82.6)</td>
<td>2 (8.7)</td>
<td>1 (4.3)</td>
<td>1 (4.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>18 (78.3)</td>
<td>1 (4.3)</td>
<td>2 (8.7)</td>
<td>1 (4.3)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>Cough or snore loudly</td>
<td>Pre</td>
<td>14 (60.9)</td>
<td>2 (8.7)</td>
<td>4 (17.4)</td>
<td>3 (13.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>11 (47.8)</td>
<td>3 (13.0)</td>
<td>3 (13.0)</td>
<td>5 (21.7)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>Feel too cold</td>
<td>Pre</td>
<td>14 (60.9)</td>
<td>3 (13.0)</td>
<td>6 (26.1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>15 (65.2)</td>
<td>5 (21.7)</td>
<td>2 (8.7)</td>
<td>0 (0.0)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>Feel too hot</td>
<td>Pre</td>
<td>7 (30.4)</td>
<td>6 (26.1)</td>
<td>9 (39.1)</td>
<td>1 (4.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>9 (39.1)</td>
<td>6 (26.1)</td>
<td>5 (21.7)</td>
<td>2 (8.7)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>Have bad dreams</td>
<td>Pre</td>
<td>14 (60.9)</td>
<td>5 (21.7)</td>
<td>2 (8.7)</td>
<td>2 (8.7)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>12 (52.2)</td>
<td>6 (26.1)</td>
<td>2 (8.7)</td>
<td>2 (8.7)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>Have pain</td>
<td>Pre</td>
<td>15 (65.2)</td>
<td>5 (21.7)</td>
<td>2 (8.7)</td>
<td>1 (4.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>18 (78.3)</td>
<td>0 (0.0)</td>
<td>2 (8.7)</td>
<td>2 (8.7)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>Other</td>
<td>Pre</td>
<td>14 (60.9)</td>
<td>2 (8.7)</td>
<td>6 (26.1)</td>
<td>1 (4.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>16 (69.6)</td>
<td>0 (0.0)</td>
<td>4 (17.4)</td>
<td>2 (8.7)</td>
<td>1 (4.3)</td>
</tr>
</tbody>
</table>
Discussion

Members of the U.S. military may be more prone to sleep-related problems, prompting the necessity for targeted sleep hygiene interventions. In the present study, no significant change was found in pre- and posttest sleep quality scores. Overall sleep quality was found to be high in the pretest; factors that may contribute to inadequate sleep quality, such as snoring or coughing, may require assistance beyond that provided by the intervention. Additional measures of sleep quality are recommended for future studies.

The current study did see a statistically significant increase in the number of hours slept per night, however. This change over time suggests the intervention may have affected sleep duration. The data appear to provide some support for the use of behavioral approaches to reducing sleep problems in Reservists. The behavioral intervention of sleep hygiene education used in this study has been linked in the literature to improved sleep (Irish et al., 2015; Lipschitz et al., 2014; Nakamura, 2015; Phelps et al., 2017). The online intervention focused on behavioral change exercises as behavioral interventions have previously been used in the military setting in dealing with other mental health issues and may show lasting effects (Seyffert et al., 2016; Thomas & Taylor, 2015).

Limitations surrounding this study should be taken into consideration when determining the practical application of the results. The intervention was done using soldiers from one Army Reserve unit. The intervention should be conducted with soldiers from a wider array of specialties and across a wider geographic area in order to ensure generalizability. Participants did know that they were being studied; they may therefore have responded with socially desirable answers. Positive outcomes may have also come from participant perceptions of the high-tech intervention’s efficacy. In addition, other methods for assessing the impact of the intervention beyond the PSQI should be explored. Although the PSQI is a well-known and respected instrument, other instruments may be better suited to assess the potential impact of short-term interventions. Some of the constructs used to assess sleep quality in the PSQI, such as pain and snoring, may require specialized medical treatment that goes beyond the scope of the present intervention. Further, the present study did not utilize a control-group design, which should be implemented in future studies. The results of this study show preliminary potential positive impact of sleep hygiene education; however, follow-up studies are required.

The authors report no conflict of interest.
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