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14. ABSTRACT

Sleep disturbances are very common among those with recent deployments and sleep problems are associated with other psychiatric symptoms and misuse of alcohol and other substances. The experience of being on guard and potential threat appears to contribute substantially to these problems and is not explicitly addressed by established insomnia treatments.

The purpose of this study is to develop and evaluate a treatment for sleep problems related to military deployments. The intervention targets nocturnal vigilance and other maladaptive sleep behaviors. We are evaluating its impact on sleep problems and alcohol and substance use habits.

15. SUBJECT TERMS
Sleep, deployment, intervention, vigilance

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1. Introduction

Recent surveys indicate substantial and increasing alcohol and other substance misuse among military personnel. Experience with prior Veteran cohorts suggests that such problems will magnify after leaving active duty service. Recent data also indicate that sleep disturbances are very common among those with recent deployments and that sleep problems are associated with other psychiatric symptoms and misuse of alcohol and other substances. Insomnia is highly intertwined with and has been noted to motivate the onset and continuation of alcohol and substance use disorders. Clinical observation strongly suggests, and emerging data indicate, that the need to maintain vigilance is a critical contributor to post-deployment sleep disturbances. Nocturnal vigilance is not a specific target of established sleep behavioral interventions. The over-arching hypothesis of this proposal is that targeting sleep disturbance in Veterans within a few months or years of deployment in a manner that addresses the nocturnal vigilance that is engendered by military combat, will reduce and prevent the misuse of alcohol and other substances that is common in this population.

The goal for this project is to adapt and integrate and then test intervention approaches that target disturbed sleep behaviors, nocturnal vigilance, and the use of substances to induce sleep. The resulting intervention will incorporate established sleep behavioral interventions, and include a novel component for addressing nocturnal vigilance that incorporates recent cognitive behavioral techniques. Alcohol, drug, and prescription medication use will be assessed including its relationship to sleep disturbance. Information regarding established short and longer term effects of substances on sleep will be provided and participants' perceptions of how their use affects their sleep and motivation to modify their use will be assessed. We will assess outcomes related to sleep and alcohol/substance/prescription drug use and the degree to which the effect on the latter is accounted for by improvements in sleep.

The first study phase served to fine tune the intervention by enrolling symptomatic participants in its initial prototype. Feedback on the applicability, acceptability, and perceived effectiveness of techniques will be solicited during and following individual treatment episodes. At the conclusion of the initial study phase the investigators finalized the intervention protocol influenced by participant preferences and their perceptions of acceptability and effectiveness as well as achievement of acceptable adherence and fidelity. The final treatment protocol was then initiated and is being compared to a condition that controls for attention and receipt of educational material regarding sleep with evaluation of subjective and objective measurements of sleep, substance use, and quality of life. The proposed study findings will inform larger trials and adaptation of the intervention to varied settings.

2. Keywords

Veterans; deployment; nocturnal vigilance; sleep initiation and maintenance disorders; substance use disorders

3. Accomplishments

(Administrative)

Approval by Georgetown Howard Universities Center for Clinical and Translational Science (GHUCCTS) IRB 2/19/2014
Submission to USAMRMC/ORP/HRPO 5/29/2014
Submission to DC VA IRB 6/18/2014
Receipt of initial response/requests from HARPO 6/27/2014
Provided additional docs to HARPO, submitted revised IC to GHUCCTS IRB 7/3/2014
Hired graduate student Mary K Howell as study interventionist
Responded to VA IRB scientific reviews 7/23/2014
Received VA IRB requests for revision, submitted revised docs 8/8/2014
Received GHUCCTS IRB approval of revised IC 8/15/2014
Approval by DC VA IRB 8/18/2014
Approval by USAMRMC/ORP/HRPO 9/09/2014

Revisions to protocol based on recommendations of IPR panel submitted to GHUCCTS IRB, approved 2/2/2015, submitted to HRPO 2/2/2015
Revisions to IRB allowing for mild to moderate sleep disordered breathing with stable treatment submitted to enhance recruitment; approved by GHUCCTS IRB July 11, 2015, approved VA IRB July 22, 2016.
Annual updates approved for HRPO, GHUCCTS and VA IRBs, December 2015 – August 2016, March 2017.

(Training)

In-service training with expert in Mindfulness and Acceptance and Commitment Therapy, Mary Anne Dutton, PhD, July 1, 2014; August 14, 2014
In-service training with behavioral sleep intervention expert Wil Pigeon, PhD 10/15/2014
In-service training with motivational interviewing for substance use practitioner Gloria Cain, LCSW 10/21/2014

(Outreach)

Outreach to several VFW organizations, visit to PG county VFW January - September 2015.
Outreach to Military Veterans and Society Program of Center for a New American Security; Howard and American Universities Veterans Program Coordinators. Flyers posted.
Three meetings with VAMC collaborators to set up recruitment and intervention facilitation, May, 2015 – May, 2016.
Presented study and related research at Walter Reed Medical Center on Dec 11, 2015.
Staff completed credentialing procedures and recruitment on-site in the VA began in May 2016.
Search of local VA EHR for potential participants related to demographics and insomnia diagnosis.
Study was posted on VA Research website May 2017.
Planning ongoing re other social media related outreach.
(Recruitment and study conduct)

Re-reviewed study tools and materials (with in-service discussions in mind), finalized tools 11/1//14;
First participant enrolled 12/3/2014.
Drafted study intervention procedure manual, May 2016.
In May 2016 the study team reviewed and initiated the control condition for the trial, consisting of provisions of materials on healthy sleep habits with clarifications on request without providing participant specific recommendations.
Have now enrolled (consented) 23 participants, 17 have completed the treatment procedure and 11 have completed the 3 month follow-up and 2 are active (4 dropped out)*. Five of these participants were recruited through outreach and advertisement at the VA site, the remainder through outreach efforts that led to contacting our University site.
Participants who have completed the treatment protocol have all been engaged and enthusiastic and endorsed improvement on several of the outcome measures. They have indicated interest in recommending the program to fellow veterans.
We are intensifying recruitment efforts with repeated contacts, encouraging in-service visits, and expanding contacts, and more recently use of web resources.
We have also been systematically assessing the frequency of behaviors that are known to disrupt sleep including intrusive cognitions. These ongoing assessments reveal frequent occurrences of the use of electronic devices in bed (70% of participants), mismatch of being sleepy and being in bed (50%), and getting out of bed to check on something in the environment (60%). Common intrusive cognitions related to needs to maintain vigilance (e.g. "on alert for outside noises", "feeling on guard") in up to 80% of participants; however, endorsements of potentially sleep interfering generalized worries and concerns regarding sleep loss were also not uncommon (40 – 60%). We have also found that self-generated imagery is the most often preferred technique for diminishing the impact of such cognitions, however, some of the participants were better able to engage in alternative approaches such as "cognitive defusion" and/or "body scanning."
Preliminary analysis of the initial cohort of 10 individuals who received the intervention indicates significant reduction in diary assessed sleep latency (42.5 $\pm$ 32.4 minutes at baseline vs. 28.6 $\pm$ 22.6 post-treatment; $t = 2.45$, $p = .04$) and minutes of wake after sleep onset (14.6 $\pm$ 8.8 minutes at baseline vs. 6.5 $\pm$ 7.2 post-treatment; $t = 2.56$, $p = .03$) in an. Analysis of actigraphy measured outcome data, a larger cohort, and comparisons of study treatment to the control condition are pending.

* at the time of revising this report (7/11/17)

4. Impact

When data are presented and treatment experiences are disseminated through the DC VA we anticipate increasing awareness of the roles for conditioned vigilance in deployment-related insomnia and the acceptability and preliminary evidence supporting efficacy for distraction from sleep interfering cognitions through personalized mindfulness and imagery techniques applied with standard sleep behavioral approaches.

5. Changes/Problems Recruitment has been the most significant ongoing challenge. The most successful approach has been establishing the study within the DC VA. Frequently encountering diagnoses of sleep disordered breathing led us to modify the inclusion criteria. Recent posting on the VA Research Website and other social media related initiatives have effected a recent uptake in enrollment and calls indicating interest. Due to the slow rate of recruitment we determined that

continuing with the plan to enroll 20 participants in the pilot trial would compromise the likelihood of recruiting an adequate sample within the time frame of the study to meaningfully compare the study treatment to the control condition. In addition, we were receiving similar feedback from participants regarding their preference for and engagement with techniques for diminishing the impact of intrusive thoughts on sleep. At this time we made 2 concerted attempts to convene the initial seven participants into a focus group but moves and cancellations would have reduced attendance to two participants on both occasions. We therefore decided to initiate the control condition while solidifying the study condition after the first seven participants during the middle of the second year of funding and to utilize feedback that was conveyed individually by participants in shaping the study intervention.

6. Products

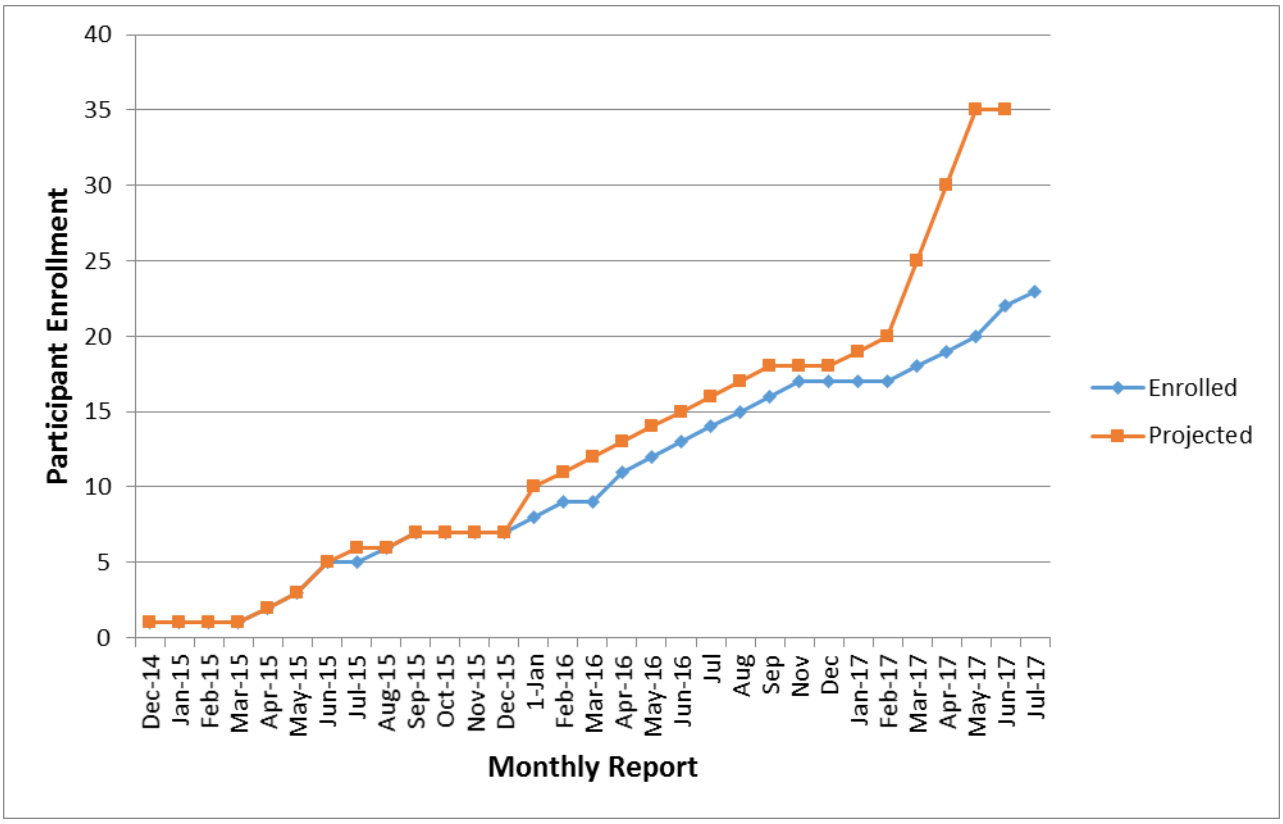
We have drafted an intervention manual (see appendix). We anticipate further revisions as the study progresses and making it available when the study is concluded.

7. Participants & Other Collaborating Organizations

The study is being conducted in partnership with the District of Columbia Veterans Medical Center with Matthew Reinhard, PhD as the principal collaborator. Howard based study personnel are now credentialed for the VA and regulatory documents are up-to-date.

8. Special Reporting Requirements - Not applicable.

9. Appendices –


Participant Enrollment
40
35
30
25
20
15
10
5
0
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
1-Jan
Feb-16
Mar-16
Apr-16
May-16
Jun-16
Jul
Aug
Sep
Nov
Dec
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Monthly Report
Enrolled
Projected

Learning to "N.O.D." - *"Not be On Duty"*
Intervention Manual

MANUAL OUTLINE

INTRODUCTION

Disturbed sleep is a common problem following military deployment and appears to play a large role in motivating the rising misuse of alcohol, illegal substances and prescription drugs in

Veterans. Nocturnal vigilance is a prominent feature of sleep disturbance in post-deployed Veterans that is not directly targeted by established behavioral treatments. The described intervention is designed to integrate established sleep behavioral interventions with novel approaches to diminish the impact of cognitions and rituals related to nocturnal vigilance and addressing substance use in relation to sleep, for improving sleep and forestalling the progression of substance misuse.

This manual describes this intervention approach designed to improve sleep in Veterans with histories of combat-related deployments. It has four components that are to be flexibly applied depending on the clinical presentation that have the following targets - 1.0 the sleep environment; 2.0 maladaptive sleep-related behavior; 3.0 disruptive cognitions and rituals; and 4.0 substance use and sleep.

Prior to the first session, the interventionist will review specified screening tools and provisionally determine intervention targets (using the Intervention Forms, Appendix A). The first session should last approximately 90 minutes, and the second session should last approximately 60 minutes. Ideally, the first session will include components 1.0-3.0, and the second session will review recommendations made for components 1.0-3.0 and will then cover 4.0, but this can be flexible.

During the course of each session, the interventionist should elicit questions and concerns and review for comprehension and enthusiasm for the assignments and create opportunities to practice cognitive exercises. Facilitate further feedback and discussion of how to best fit the environmental and lifestyle modifications and exercises to participant preferences and circumstances. The application of intervention procedures is tracked with diaries along with ongoing information regarding sleep patterns and sleep-related behaviors.

1.0 SLEEP ENVIRONMENT

1.1 Rationale – While nocturnal vigilance in the sleep environment is typically conditioned by experiences during deployment, there are often contributing real or perceived safety factors in the current environment as well as other potentially problematic aspects of the sleep environment, such as noise, temperature, or room-sharing.

1.2 Goals - To identify aspects of the participant's sleep environment that disturb sleep and collaboratively develop modifications that can be made to enhance perceived safety and address other factors that can affect sleep such as noise, temperature, and room-sharing. Acknowledging and emphasizing modifications that have been applied should reduce the propensity of such concerns intruding into pre-sleep cognition.

1.3 Assessment - Query for characteristics of participant's sleeping environment, concerns regarding self and family safety, noise temperature and room sharing and the potential for amelioration, and any prior remediation.

1.4 Component Description - Discuss above concerns and potential modifications of the participant's home sleep environment and acknowledge past accomplishments to remediate such concerns. Prompt participant to acknowledge and accept the adequacy and reasonableness of any

environmental adjustments and safety precautions. Note on Intervention Form - Session I which environmental issues apply and record recommendations and prior actions.

2.0 SLEEP-RELATED BEHAVIOR

2.1 Rationale – It is common for individuals with insomnia to try to compensate for sleep loss with behaviors that are not conducive to healthy sleep. This component utilizes stimulus reduction which has been shown to be an effective sleep intervention and is readily adapted into brief multi-modular interventions. The component also addresses healthy and unhealthy sleep-related habits related to physical activity and caffeine and other substances.

2.2 Goals - To assist the participant in setting measurable, attainable goals for improving maladaptive sleep behaviors.

2.3 Assessment - Refer to Sleep Diary, Dysfunctional Beliefs about Sleep (DBAS), Insomnia Severity Index (ISI), and Sleep Behavior Checklist.

2.4 Component Description - Review sleep diaries with the participant and determine which sleep behaviors should be addressed. Educate participant about healthy sleep behaviors and emphasize recommendations for targets identified by review of forms. Examples -

a. Get up at a consistent time.
b. Get out of bed when unable to sleep and getting frustrated (after ~15 minutes).
c. Use bed only for sleep and sex. Do not use electronic communication devices in bed.
d. Limit napping.

Note on Intervention Form - Session I which sleep behavior targets apply and record all recommendations. Indicate modifications on sleep diary forms.

3.0 SLEEP-INTERFERING COGNITIONS AND RITUALS

3.1 Rationale – Beliefs and conditioned responses that underlie nocturnal vigilance are likely not as amenable to disputation used to counter "dysfunctional beliefs about sleep" that are emphasized in standard cognitive behavioral therapy for insomnia. Approaches developed in the "third wave" of cognitive behavioral therapy (e.g. mindfulness, Acceptance and Commitment Therapy) are designed to promote cognitive flexibility (e.g., cognitive defusion and body scanner) and appear well suited to reduce the impact of persistent cognitions on disrupting sleep and promoting vigilance. In our preliminary experience, some participants were more amenable to using self-generated positive imagery as a distraction tool with similar apparent benefits.

3.2 Goals - To identify sleep-interfering thoughts and behaviors, particularly those related to nocturnal vigilance, and provide coping tools for reducing their impact. These can include cognitive defusion, body scanning, distraction through self-generated positive imagery, and dream re-scripting depending on the fit with the target problem as well as participant comfort and enthusiasm for the approach.

3.3 Assessment - Refer to Sleep Diary, Dream Diary, Fear of Sleep Index (FOSI), and Dysfunctional Beliefs about Sleep (DBAS).

3.4 Component Description – Negotiate reasonable behaviors and thresholds for getting out of bed and checking. Provide an overview of the 4 coping strategies, offering them as a menu to the participant. Determine relevance to the target problem and the participant's enthusiasm and likelihood of engagement in the strategy. Recommend the strategy for while lying in bed. If the participant reports distress or sleep disruption related to recurring nightmares these can also be addressed in the context of cognitive defusion, alternative self-generated imagery, and re-scripting of the nightmare images.

3.4.1 Cognitive Defusion
3.4.2 Body Scan
3.4.3 Imagery Distraction
3.4.4 Dream-Rescripting

Utilize the Cognitive Exercises sheet (Appendix B) to teach the participant the selected technique(s) and then give participant a copy of the sheet to take home. Note on Intervention Form - Session I which techniques the client will practice (including when and how often) and record all recommendations and include in the new diary.

4.0 SUBSTANCE USE & SLEEP

4.1 Rationale - This component has the goal of addressing and preventing problematic substance use, particularly use that is motivated, at least in part, by difficulty initiating or maintaining sleep or in maintaining wakefulness when desired. This component utilizes assessment, education, and motivational interviewing.

4.2 Goals - To identify potentially problematic substance use, educate the participant on the short and intermediate effects of substances used, and to evaluate and, when applicable, reduce or eliminate use of substances that are likely to be adversely affecting sleep quality

4.3 Assessment - Sleep Diary and NIDA ASSIST.

4.4 Component Description - Review reported substance use with the participant. If necessary, use the "What is one drink?" guideline to validate/help participants calculate number of drinks they consume per day & per week. Explore pros and cons of use using decisional balance and summarize using reflective listening. Educate participants about appropriate guidelines for use (NIAAA and NIDA) as well as the long term effects of alcohol/substance use on sleep using the relevant sections of the Substance Use & Sleep handout. Reinforce positives by praising whatever level of readiness, but query about what limits their readiness to make changes. Note on Intervention Form - Session II participant pros, cons, readiness, goal, and plan.

APPENDIX A
Intervention Forms

[INSERT]

APPENDIX B
Cognitive Exercises

(Suggested scripts)

"I am going to describe some ways of thinking at bedtime with the goal of reducing the impact of thoughts and concerns that contribute to keeping you awake. Two of these techniques are based in Acceptance and Commitment Therapy, or ACT, **cognitive defusion and a body scan**. These two activities help train attention. They can help you develop flexible and focused attention so that you can be prepared to respond when life calls, and especially when sleep calls. Also, we can discuss how to use **imagery to distract** yourself when you are having sleep-interfering thoughts. If you are often thinking about nightmares that are disturbing your sleep, you can add a technique to **re-script your dreams** before sleep to help reduce their impact. Today we'll practice some of these ways to relax before bed, which would you most like to learn? Which do you think might work best for you"?

Cognitive Defusion

"The first is called **cognitive defusion**. In this exercise, you will practice seeing events in your life--thoughts, emotions, memories, and sensations as ongoing experiences, not literal truths that dictate what you do and feel like. Sometimes, we have certain thoughts that keep us up at night--we have talked about some today already--and what I want you to consider is that it is not the thought itself that is the problem. I want to suggest that we have a choice between which thoughts, emotions, memories, and sensations we choose to act on, and which we decide to just observe.

One image that you can use when you are going to bed to help you experience relief or distance from your thoughts and emotions is that of a chessboard. Now if you like, think of a chessboard. Have you ever played chess or checkers?

Imagine a chessboard covered with black pieces, and white pieces. They work together and hang out in teams, the white pieces opposing the black pieces. You can think of your thoughts, feelings, and beliefs as these pieces, because they sort of hang out in teams too. For example, 'bad' feelings (like anxiety, depression, resentment) hang out with 'bad' thoughts and 'bad' memories. Same thing with the 'good' ones. In our minds, we may try to ride out the 'good' pieces, like thoughts that are self-confident or about being in control, and use them to try to fight the 'bad' pieces, like anxiety or thoughts about using drugs or drinking. In real chess, eventually, some of the pieces from one team, take pieces from the other team out, but that doesn't seem to be happening. Though you may be trying to fight the bad pieces with your good pieces, they are not going away and the battle goes on.

So is there an alternative to being the chess pieces? You can be the board. You hold the thoughts and the feelings. Without a board, these pieces have no place to be. The board holds them. What would happen to your thoughts if you weren't aware that you thought them? The pieces need you. They cannot exist without you, but you contain them, they don't contain you. Notice that if you're the pieces, the game is very important, you've got to win, your life depends on it! But if

you're the board, it doesn't matter if the game stops or not. The game may go on, but it doesn't make any difference to the board. As the board, you can see all the pieces, you can hold them, you are in intimate contact with them, and you can watch the war being played out in your consciousness, but it doesn't matter. It takes no effort. And thinking of yourself as the board, and watching the pieces move above you, but apart from you, is what I want you to think of when you are in bed, ready to sleep, and still having thoughts that keep you from sleeping. That is **cognitive defusion.**

You might find that this makes more sense to you with other images such as leaves in a stream, soldiers in a parade, clouds in the sky, including one that you may think of. Use an image that helps you observe your thoughts, but ultimately treat your thoughts as passing."

Body Scan

"Another type of attention training is the **body scan**. With cognitive defusion, we talked about how to give yourself distance from your thoughts, so that you can relax apart from them and just watch them go by. But with body scan, we will discuss how to focus on small details and sensations in your body so that you can slow your mind down and stop thinking about several things at once.

For this exercise, I'm going to give you directions about what to focus on out loud today, but you can give instructions like these to yourself in your head at home when you are preparing to sleep.

Close your eyes if you feel comfortable to do so, get settled in your chair, and follow my voice. If you find your thoughts wandering, just gently come back to the part of your body I am directing you to. For a moment, turn your attention to yourself in this room. Picture the room. Picture yourself in this room and exactly where you are.

Now begin to go inside your skin and get in touch with your body. Notice how you are sitting in the chair. See if you can notice exactly the shape that is made and the parts of your skin that touch the chair. Notice any bodily sensations that are there and the movement of your breath. As you see each one, just acknowledge that feeling, and allow your consciousness to move on. On each outbreath, allow yourself to let go, to sink a little deeper into the chair.

Remind yourself of the intention of this practice. Its aim is not to feel any different, relaxed, or calm; this may happen or not. Instead, the intention of this practice is, as best as you can, to bring awareness to any sensations you detect, as you focus your attention on each part of the body in turn.

Now bring your awareness to the physical sensations in the lower abdomen, being aware of the changing patterns of sensation in the abdominal wall as you breathe in and out. Take a few seconds to feel that. Having connected with the sensations in the abdomen, bring the focus or 'spotlight' of your awareness down to the left leg, into the left foot, and out to the toes of the left foot. Focus on each of the toes in the left foot in turn, bringing your curiosity to investigate the quality of the sensations you find, perhaps noticing the sense of contact between the toes, a sense of tingling, warmth or no particular sensation.

Now do likewise back up through the left leg, to the other leg in like fashion, then up into the chest cavity, and head, then out the left arm and in the right arm.

After you have scanned the whole body in this way, spend a few minutes being aware of a sense of the body as a whole, and of the breath flowing freely in and out of the body.

How did that feel?"

Imagery Distraction

Next, I'd like to discuss **imagery distraction** with you, to help relax when you are feeling on edge or having thoughts that are disturbing your sleep. You will identify an interesting and engaging mental image that you can use before going to sleep as an alternative to focusing on thoughts, worries, and concerns you're having before bed

To use this technique, you should imagine a situation that you find interesting and engaging, but also pleasant and relaxing. We wouldn't want you to choose a situation that might be too exciting, like a car race or a romantic evening. What kind of situation or image can you think of that would be interesting and engaging, but also pleasant and relaxing?

Now I'd like you to close your eyes, and I want you to spend 2 minutes imagining the scene you've chosen in as much detail as possible.

Ok, you can open your eyes now. What was that like? Tell me about the scene. What could you see around you? How were you feeling? What could you feel around you? Were you able to hear any sounds or noises? What about anything you smelled? What was the general atmosphere like?

This is a skill that needs to be practiced. The more you practice it, the more you will improve and the more helpful it will be. You may want to increase the amount of time you spend doing the technique.

Every time you use the imagery distraction technique before bed in the following week, I'd like you to mark it down in your sleep diary. You can use the technique for as long as you like--it doesn't only have to last for two minutes. But remember, as I've said before, if more than 10 minutes pass while you are lying in bed trying to sleep, and you still do not feel tired, you should actually get out of bed and do something else relaxing until you do feel sleepy.

How does that seem to you? Do you have any questions?"

Dream Re-scripting

Sometimes concerns and memories of recurring nightmares will disrupt the sleep of Veterans or make it difficult to fall asleep to begin with. Such dreams may represent of be related to experiences that the Veteran (you) had in the military. You can apply some of the other techniques we've been talking about, to concerns about and memories of nightmares too. For example…

There is a technique that has been shown to be effective for reducing the impact of nightmares that is similar to what we have been discussing regarding finding pleasant images to replace disturbing ones. It involves imagining the recurring nightmare and then altering the ending, and keeping the images of the altered ending in mind. It may not always seem like it, but you are the author of your dream. This dream-rescripting technique can help give you greater sense of

control over your dreams and choose how you would like to make the dream different, possibly something you feel more comfortable with.

Now, I want you to select a disturbing, recurring dream that you have. If you could change this nightmare in any way you wish, what would you change to make you feel more comfortable or more in control?

Would you change who is in the dream (the characters)? Would you change what happens in the dream (the plot)? Would you change where or when the dream happens (the setting)?

Spend the next 2 minutes rehearsing this dream with the changes you have just brainstormed.

What was that like? How do you feel after rehearsing that dream? Can you tell me more about some of the changes you made?

It will be helpful if you can practice this rehearsal every night in the hour before sleep or just before sleep for the next week.

Do you have any questions?

APPENDIX C
Substance Use & Sleep Informational Handouts

Sleep & Alcohol

- Alcohol does allow healthy people to fall asleep quicker and sleep more deeply for a while, but it reduces rapid eye movement (REM) sleep and the more you drink before bed, the more pronounced these effects. REM sleep happens about 90 minutes after we fall asleep. It's the stage of sleep when people dream, and it's thought to be restorative. **Disruptions in REM sleep may cause daytime drowsiness, poor concentration, and rob you of needed ZZZs.** The more a person drinks before bed, the stronger the disruption.
- If you drink a lot, **you may have to get up in the night to go to the toilet**. And it's not just the liquid you've drunk that you'll be getting rid of. Alcohol is a diuretic, which means it encourages the body to lose extra fluid through sweat too, making you dehydrated.
- Drinking can also **make you snore loudly**. It relaxes the muscles in your body, which means the tissue in your throat, mouth and nose can stop air flowing smoothly, and is

more likely to vibrate.

- Alcohol is also known to **suppresses breathing** and can precipitate sleep apnea (apnea= pauses in breathing that happen throughout the night.)

Marijuana

Wait, but isn't Marijuana Medicine? No, clinical evidence has not shown that the therapeutic benefits of the marijuana plant outweigh its health risks. Marijuana smoke is an irritant to the lungs, and frequent marijuana smokers can have many of the same respiratory problems experienced by tobacco smokers, such as daily cough and phlegm production, more frequent acute chest illness, and a heightened risk of lung infections.

Ok, but at least it's not addictive right? Wrong, Contrary to common belief, marijuana is addictive. Estimates from research suggest that about 9 percent of users become addicted to marijuana; this number increases among those who start young (to about 17 percent, or 1 in 6) and among people who use marijuana daily (to 25-50 percent).

Marijuana affects everyone differently. Below are the most common types of symptoms:

Acute	Heightened sensory perception; euphoria, followed by drowsiness/relaxation; impaired short-term memory, attention, judgment, coordination and balance; increased heart rate; increased appetite
Long-term	Addiction: About 9 percent of users; about 1 in 6 of those who started using in their teens; 25 to 50 % of daily users. Mental disorders: may be a causal factor in schizophreniform disorders (in those with a pre-existing vulnerability); is associated with depression and anxiety. Smoking related: chronic cough; bronchitis; lung and upper airway cancers is undetermined.
In combination with alcohol	Magnified tachychardia and effect on blood pressure; amplified impairment of cognitive, psychomotor, and driving performance

Withdrawal symptoms	Irritability, difficulty sleeping, strange nightmares, craving, and anxiety.

Sleep and Marijuana

- As a psychotropic with sedative effects, marijuana may help one fall asleep more quickly.
- Smoking up compromises the cyclical balance of the stages of sleep *throughout the night*
- Marijuana use affects the cycle of consistent and balanced SWS (slow wave sleep) in Stages 3 & 4, which is the deep, restful, and restorative part of the sleep cycle.
- Marijuana use suppresses the cycle of consistent and adequate REM sleep and keeps you in stage 2 of sleep.
- Disturbances in sleep patterns can remain for up to five days after use and normal sleep pattern

Opioids

What are opiods? Examples of opioids are: Painkillers such as; morphine, methadone, buprenorphine, hydrocodone, and oxycodone. Heroin is also an opioid and is illegal. Opioid drugs sold under brand names include: OxyContin®, Percocet®, Palladone.®

Opioid abuse and addiction can have negative mental and physical effects, such as:

- nausea
- vomiting
- weakened immune system
- slow breathing rate
- coma
- increased risk of HIV or infectious disease (common in intravenous use)
- increased risk of hepatitis (common in intravenous use)
- hallucinations
- collapsed veins or clogged blood vessels
- risk of choking

People addicted to opioids often have trouble achieving a satisfactory high because their

tolerance increases. This leads to using more, which leads to stronger and graver effects in the body.

Sleep and Opioids

- Many people who take opiates report **difficulty in falling asleep** and **staying asleep**
- One of the most troubling responses to opioid abuse is the d**evelopment of sleep apnea,** where the user has difficulty breathing while sleeping. This is extremely dangerous, not only because the user is not getting the right amount of oxygen, but also because his sleep is being disrupted.
- Tremors, also known as "the shakes," can make users so uncomfortable that they cannot relax their muscles enough to sleep
- Rapid heartbeat – A racing heart will keep opioid users up all night, which can cause anxiety and make it hard to become tired
- Cramps – Both muscle and abdominal cramps can keep users from getting comfortable enough to doze off. The pain from both types of cramps can quickly become unbearable.

Sleep and Benzodiazepines

What are Benzodiazepines? Examples of these medications include Valium©, Xanax©, Klonopin©, Seresta©, and Restoril©.

Benzodiazepines are known to improve sleep related problems like insomnia. However, the chronic use of benzodiazepines can adversely affect sleep. Here's how:

- Benzodiazepines are meant for short term use. **Long term use can cause lethargy and worsening of insomnia.**
- these medications can also have a **negative impact on sleep by inhibiting REM** (rapid eye-movement) sleep. So a benzo can knock you out for several hours which can make you feel better in the short term, but in the long term you need adequate amounts of the deep sleep that you get in stages 3 and 4 to have healthy and restorative sleep.
- Another negative effect of these medications is that **people can become dependen**t on their medication to fall asleep.
- Dependency can lead to the body building tolerance to the medication and requiring larger doses to get an effect.

Methamphetamine/Amphetamine

Methamphetamine is used clinically for treatment of attention deficit disorder with hyperactivity (ADHD), short-term treatment of obesity, and as an off-label treatment for narcolepsy. Recreational use of methamphetamine and other amphetamine-derived stimulants has reached epidemic proportions in the United States. After cannabis, it is the most widely abused drug worldwide.

Psychological effects can include confusion, depression, sleep problems, anxiety, and paranoia, sometimes lasting for weeks after taking the drug. Physical effects can include muscle tension, involuntary teeth-clenching, nausea, blurred vision, faintness, and chills or sweating. Increases in heart rate and blood pressure are a special risk for people with circulatory or heart disease.

Sleep and Amphetamines

- Amphetamine use also increases the time to the first REM sleep period while asleep (increased REM sleep latency).
- As users have become accustomed to the effects of the amphetamine, they may experience withdrawal when cutting back or ending use. Common withdrawal symptoms from amphetamine use include irritability, agitation, anxiety, and a major "come-down" effect where the user experiences intense fatigue and sleepiness.
- Withdrawal symptoms like anxiety, paranoid psychosis, and hallucinations can interfere with quality sleep and cause lucid dreams and suicidal ideation.
- Amphetamine users are familiar with a boost in energy and alertness, and when the drug is out of their systems, they can experience a crash in energy levels and sleep for great lengths of time while still feeling like they cannot catch up on their sleep.
- an addiction and the compulsive use of amphetamine will keep a person awake, and sleep disorders like insomnia will result.Insomnia is the condition of habitual sleeplessness or the inability to sleep. Lack of sleep or poor quality of sleep can cause restlessness, anxiety, psychosis, hallucinations, mental fatigue, depression, severe mood swings, and behavioral problems.

Cocaine

Cocaine is a powerfully addictive stimulant drug made from the leaves of the coca plant native to South America. It produces short-term euphoria, energy, and talkativeness in addition to potentially dangerous physical effects like raising heart rate and blood pressure. Cocaine use can lead to adverse physical effects, such as stroke and cardiac arrest.

Sleep and Cocaine

People who use cocaine usually do NOT sleep regularly, but this is the least of their worries Right? WRONG! Sleep is an essential body function that restores balance to both the mind and

body. Cocaine use and withdrawal both negatively affect sleep and has lasting effects on the brain

- Administration of cocaine increases wakefulness and suppresses REM sleep.
- Acute cocaine withdrawal is often associated with sleep disturbances and unpleasant dreams. this means that Cocaine is a powerful drug that keeps you wide awake, but when the affects wear off in about an hour you will still have trouble getting to sleep.
- Cocaine use also has been shown to suppress rapid eye movement (REM) sleep, decrease total sleep time, and increase time to first REM sleep, followed by a rebound specific to REM sleep. This is similar to the effects of amphetamines on sleep.
- Cocaine can also cause rapid heart beating and muscle spasms. These bothersome symptoms do NOT promote a restful sleep.

PCP

PCP (phencyclidine) was developed in the 1950s as an intravenous anesthetic. Its use has since been discontinued due to serious adverse effects. PCP can affect individuals differently. Below are the most commonly reported symptoms:

Low Doses: shallow, rapid breathing, increase in heart rate and blood pressure; nausea, blurred vision, dizziness; numbness; slurred speech; confusion; loss of coordination; muscle contractions; analgesia; altered perceptions; feelings of being separated from one's body

High Doses: Feelings of invulnerability and exaggerated strength; seizures, coma, hyperthermia

Sleep and PCP

- PCP ultimately acts as a depressant, slowing breathing and heartbeat, alcohol or other downers taken with PCP can also trigger an overdose.
- PCP aftershocks are physically-based and involve actual drug effects. Post-high bummers brought on by drugs, stress, or fatigue, have been known to occur weeks or months after last use.
- PCP withdrawal experienced depression, drug craving, increased appetite, and **increased need for sleep.**