Mental health and sleep during basic combat training and beyond

Saúde mental e sono durante e após treinamento básico de combate

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ABSTRACT
There are emerging links between disturbed sleep and mental illness. These associations may have particular relevance for military populations which are often faced with extremely stressful situations and profound sleep deprivation. Indeed, disturbed sleep has been predictive of mental illness following exposure to trauma, and, conversely, treatment of sleep problems has helped alleviate mental illness. There is a need for further investigation of sleep and mental health of soldiers participating in basic combat training (BCT), which is clearly also associated with sleep loss and stress.

Keywords: depression, health status disparities, post-traumatic stress disorders, sleep.

RESUMO
Há conexões emergentes entre sono perturbado e doença mental. Estas associações podem ter particular relevância para as populações militares, que são muitas vezes confrontadas com situações extremamente estressantes e privação de sono profundo. Com efeito, o sono perturbado foi preditivo da exposição que se segue a doença mental, trauma e o tratamento de problemas do sono tem ajudado a aliviar a doença mental. Há necessidade de mais investigação sobre o sono e de saúde mental de soldados que participam na formação de combate de base (TBC), que é também claramente associada com a perda de sono e o stress.

Descritores: depressão, disparidades nos níveis de saúde, sono, transtornos de estresse pós-traumáticos.

INTRODUCTION
As with other wars, the recent wars in Afghanistan [Operation Enduring Freedom (OEF)] and Iraq [Operation Iraqi Freedom (OIF), now Operation New Dawn (OND)] have resulted in a high prevalence and associated burden of mental illness among active duty troops and veterans. In 2006, mental disorders were second only to injuries as a leading cause of medical encounters for US Armed Forces3, and reports of the prevalence of mental health disorders among soldiers and veterans of OEF/OIF have ranged from approximately 20%-40%5. Indeed, a recent report concluded that mental health care was responsible for approximately 40% of military hospital-related costs, and was one of the most significant causes of lost military duty6. Moreover, these figures might underestimate the problem because more than ½ of military personnel with mental illness fail to seek treatment7.

Consistent predictors of combat-related mental illness include prior history of trauma, mental illness and stressful life events; the level of trauma experienced during combat; the frequency and length of deployment(s); and the amount of time between deployments4. Recent work has shown that pre-deployment mental illness is significantly associated with post-deployment mental illness8. During deployment, reduced risk of developing mental illness is associated with the utilization of immediate psychological counseling and stress management interventions, as well as psychosocial factors, including feelings of unit cohesion and the perception that commanding officers are competent and care about the soldiers1,6. Mental illness, particularly posttraumatic stress disorder (PTSD), often first becomes evident or worsens after troops return home. However, having a “decompression” period of Adjustment just prior to returning home, and having a stable, supportive family and strong social network are apparently protective against development of mental illness8.

Nonetheless, these factors explain only a small part of the variance of mental health outcomes in military personnel. As part of the Soldier Health Promotion to Examine and Reduce Health Disparities (SHPERHD), a multi-faceted consortium that is studying soldiers taking part in Basic Combat Training (BCT) at Fort Jackson in Columbia, SC, our team is exploring three areas that have received limited attention in the field of inquiry: (i) mental health during basic combat training (BCT); (ii) associations of sleep with mental health and other outcomes; (iii) potential demographic disparities among these variables.
MENTAL HEALTH DURING BASIC COMBAT TRAINING

There have been many anecdotal accounts of mental health problems, as well as highly publicized suicides that have occurred during BCT, as well as active duty troops and veterans. However, in contrast with the extensive literature on mental health in military personnel during and after combat deployment, there has been relatively limited empirical investigation of the mental health of soldiers during BCT. This gap in research has been justified partly on the basis of previous evidence of low predictability of combat-related mental health disorders based on pre-deployment mental health screening.

However, previous attempts to investigate this issue might have underestimated the extent of mental health disturbance among BCT soldiers due, in part, to a strong disincentive for soldiers to face the stigma of perceived weakness in reporting problems. Moreover, the fact that lifetime history of mental disturbance remains one of the most salient predictors of deployment-related mental illness provides further rationale for continued investigation of this topic. BCT is associated with increased physical and psychological stress, factors known to trigger mental illness in many individuals. Moreover, mental problems are a significant cause of attrition and delayed completion of BCT, and could also contribute to other negative outcomes during BCT, including increased incidence of illness and injury, and poor performance and preparation for combat.

SLEEP

Emerging evidence indicates that disturbed sleep is co-morbid with mental illness, and not simply a symptom of mental illness. Poor sleep has been predictive of increased suicide risk, and evidence indicates that poor sleep may play a role in the etiology of mental health disorders, including depression and PTSD. Indeed, although sleep disturbance is a “typical” acute response to trauma, several studies suggest that aberrant sleep responses to acute trauma are predictive of subsequent development of PTSD.

The link between disturbed sleep and poor mental health might have particular relevance to the military, which often involves profound levels of sleep impairment and exposure to extraordinary levels of psychological and physical stress. Many combat-related skills and abilities are negatively influenced by sleep loss, including shooting accuracy, ability to maintain vigilance, decision-making, and risk-taking behavior. Sleep loss is also associated with an increased incidence of illness. Conversely, it is plausible that preservation of sleep under these extreme conditions could help reduce the risks of these consequences.

Sleep disturbance is perhaps the most common complaint of PTSD. In the National Vietnam Veterans Readjustment Survey, a large percentage of combat veterans with PTSD reported that they “sometimes” or “very frequently” experienced difficulty falling asleep, difficulty maintaining sleep, nightmares, and nightmares. In contrast, the prevalence of these complaints was 6%, 63%, and 5%, respectively, among combat veterans without PTSD, and was even lower for non-combat veterans.

In PTSD patients, there is also a significant association of sleep disruption with nightmares, which could wake an individual and also disturb sleep indirectly by causing one to avoid going to bed. On the other hand, nightmares in PTSD patients might arise partly from light sleep, just as the experience/recall of dreams in healthy individuals is largely a function of whether awakening occurs soon after the dreams. Conversely, improvement of sleep has been associated with fewer nightmares. For example, treatment of sleep apnea has led to dramatic reduction of nightmares and other symptoms of PTSD.

Associations of disturbed sleep with physical and mental illness might place veterans at an increased risk for multiple morbidities, including heart disease, diabetes, and obesity. It is noteworthy that combat veterans have a remarkably high prevalence of obstructive sleep apnea (OSA), which is significantly associated with these conditions. The risk of sleep apnea among veterans has been found to be 47%, about double that of the general population, and a recent study found that 69% of a sample of Vietnam veterans with PTSD had polysomnographically-verified OSA. OSA is also unique among veterans in terms of its early age of onset and prevalence even in the absence of obesity. These data provide further rationales for exploring sleep and mental health of soldiers during BCT.

There are abundant anecdotes about sleep curtailment during BCT, but limited systematic investigation of sleep in soldiers during BCT. It seems apparent that some aspects of sleep restriction are imposed by the military to challenge personnel enrolled in BCT. However, because sleep loss might be associated with other negative outcomes during BCT, including an increased risk of mental illness, increased incidence of physical illness and injury, and impaired ability to learn basic combat skills, it is plausible that the military might consider modifying some factors that negatively influence sleep during BCT.

There are many factors that could greatly disturb the sleep of many individuals. First, BCT is an extremely stressful environment unlike any that most individuals have previously experienced. Troops are placed in noisy, crowded barracks, and face separation from family and friends, loss of freedom, and added pressure from drill sergeants, performance standards, and demands to process and overwhelming amount of information. Second, young adults often have a delayed circadian system and are accustomed to delayed schedule, which could lead to profound difficulty in adjusting to a 2100-0400 hour sleep routine. Third, although it might be assumed that physical exercise associated with BCT would facilitate sleep, a recent study found that endurance exercise is associated with fewer nightmares. For example, treatment of sleep disruption with nightmares, which could wake an individual and also disturb sleep indirectly by causing one to avoid going to bed. On the other hand, nightmares in PTSD patients might arise partly from light sleep, just as the experience/recall of dreams in healthy individuals is largely a function of whether awakening occurs soon after the dreams. Conversely, improvement of sleep has been associated with fewer nightmares. For example, treatment of sleep apnea has led to dramatic reduction of nightmares and other symptoms of PTSD.

POTENTIAL DISPARITIES IN MENTAL HEALTH AND SLEEP

As part of the SHPERHD consortium, one focus of our team’s research is on potential disparities in mental illness and sleep...
among military personnel along dimensions of race, age, sex, residence, education, and socio-economic status (SES). Little is known about the extent to which there are such disparities, as most research of mental health of military personnel has statistically controlled for these factors. Nonetheless, there have been indications of higher prevalence of posttraumatic stress symptoms among non-white, female, and enlisted military personnel\(^{(23,24)}\). Combat exposure has been more strongly associated with development of PTSD and depression among women compared with men\(^{(25)}\). Trauma exposure has been shown to more likely to result in PTSD among African-Americans compared with whites\(^{(26)}\). Older age has been associated with a greater prevalence of combat-related PTSD and depression among women, but not men\(^{(28)}\).

There are numerous potential explanations for racial disparities. Non-whites are more likely to have some predictors of susceptibility to deployment-related mental illness, including race-related stress, and prior history of stressful life events\(^{(15)}\). Moreover, the degree to which minorities feel socially isolated from peers during deployment might contribute to susceptibility to deployment-related mental illness. Minority groups are also less likely to seek treatment for mental illness compared with whites\(^{(29)}\).

Female soldiers face extra potential burdens of separation from children that might partly explain a higher predisposition to develop mental health illness. Since most female enlisted Army soldiers complete BCT at Fort Jackson, this study will afford a unique opportunity to compare large numbers of male vs. female soldiers during BCT.

Disparities in sleep among military personnel are also plausible, as they have been observed in civilians. Epidemiologic studies in civilian populations show that short sleep duration and sleep disturbance are more likely among African-Americans and Hispanics compared with whites\(^{(24)}\), and among inner city vs. non-urban dwellers\(^{(26)}\). Evidence indicates that African Americans have a two-fold risk of having sleep apnea compared with Caucasians\(^{(25)}\). Disturbances in sleep quality are more prevalent in individuals with lower socioeconomic status and education levels compared with those of higher SES and education\(^{(26)}\). Women are more likely to report insomnia compared to men\(^{(26)}\). It could be posited that being accustomed to worse sleep might allow one to adapt better to sleep disturbances associated with the military. However, some evidence suggests that more sleep might serve as a reserve or buffer against detrimental effects of extreme sleep loss\(^{(25)}\).

There has been some speculation that the relatively higher prevalence of sleep disorders in African-American and Hispanic individuals might contribute to higher rates of mental illness in these groups\(^{(24,29)}\). Whether this applies to military samples will require further research.

Through a series of studies, our team will be examining these issues.

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**REFERENCES**

4. Hoge CW, Auecherlonie JL, Miliken CS. Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. JAMA. 2006;295(9):1023-32.


