Sleep, Stress Management, and Injury Prevention in Military Personnel

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INSIDE, WE ALSO TALK ABOUT:

ABSTRACT Musculoskeletal injuries (MSIs) are among the leading causes of limited duty and decreased operational readiness in military personnel. Factors such as poor sleep, high stress, and lack of injury prevention strategies greatly contribute to the occurrence of noncombat musculoskeletal injuries. Recent studies emphasize the success of educational and behavioral interventions, including sleep hygiene education, stress management techniques, mind–body practices, and multidisciplinary programs, in decreasing injury risk and enhancing overall health and performance. Data from quantitative, qualitative, and mixed-methods research consistently shows that improvements in sleep quality, stress management, and injury prevention education are associated with fewer injuries, reduced pain severity, and improved quality of life. Using wearable technology within multidisciplinary approaches further enhances monitoring, early detection, and personalized strategies. For health, wellness, and fitness professionals, adopting these approaches provides practical ways to boost physical and psychological resilience, supporting mission readiness.

Keywords: sleep, stress management, musculoskeletal injury, injury prevention, military personnel

Explore evidence-based strategies for sleep, stress, and injury prevention to reduce musculoskeletal injuries and improve military readiness.

Musculoskeletal injuries (MSIs) are among the most common health issues impacting military personnel, affecting mission readiness, operational success, and long-term health outcomes (Foulis et al., 2025). The rates are high, with research showing that 62% of women and 42% of men sustain injuries during service. These injuries result in significant medical costs, more limited-duty days, and decreased deployment readiness (Lisman et al., 2022). Additionally, having a history of previous musculoskeletal injuries raises the risk of future injuries, highlighting the urgent need for effective prevention strategies (Smith et al., 2023).

62% of women and 42% of men sustain injuries during service

Research has consistently identified modifiable factors that contribute to musculoskeletal injuries, including insufficient sleep, elevated stress, and inadequate injury prevention strategies (Grier et al., 2020). Military personnel face high physical and psychological demands, which create an environment conducive to fatigue, sleep deprivation, and stress-related health concerns (Pojednic et al., 2024). Recognizing these risks, recent studies advocate for holistic interventions that include educational, behavioral, and mind-body strategies to reduce injury rates and enhance overall wellness. This article synthesizes current evidence on these factors and offers practical strategies for health, wellness, and fitness professionals to help prevent musculoskeletal injuries in military personnel.

Factors Contributing to Musculoskeletal Injuries

SLEEP

Sleep is essential for recovery, performance, and resilience, but service members often face inadequate or broken sleep because of operational demands, shift work, and environmental conditions (Ebrahimi et al., 2023). Studies show that about 42% of military personnel get less than five hours of sleep per night, well below the recommended seven to eight hours (Grier et al., 2020). Lack of sleep affects alertness, reaction time, and neuromuscular control, which are key factors that raise the risk of musculoskeletal injuries (Ebrahimi et al., 2023).

Across multiple studies, sleep disruption consistently predicts injury vulnerability. Harris et al. (2015) found that even during low-tempo operations, Naval Special Warfare operators averaged only six to seven hours of sleep per night with frequent interruptions. Similarly, Harrison et al. (2017) observed that poor sleep quality among deployed Navy personnel worsened with combat exposure, leading to slower recovery and impaired decision-making. Chronic sleep deprivation amplifies fatigue, inflammation, and pain perception, creating a self-reinforcing cycle that undermines physical readiness (Ritland et al., 2023).

Collectively, this research underscores the value of proactive sleep interventions. Educational and behavioral programs targeting sleep hygiene, such as consistent sleep-wake cycles, environmental optimization, and pre-sleep routines, improve sleep quality and operational performance while reducing injury risk (Grier et al., 2020; Lisman et al., 2022).

> **42% of military personnel get less than 5 hours of sleep per night**

STRESS

Stress acts as both a direct and indirect factor in musculoskeletal injury risk. Multiple studies show that stress consistently serves as a mediator linking sleep disruption to delayed recovery and injury. Schmied et al. (2021) and Güler et al. (2023) highlight that chronic stress damages sleep quality and muscular recovery, while Knapik et al. (2023) reveal its wider physiological effects, including hormonal imbalances, inflammation, and cardiovascular strain. These findings together demonstrate that unmanaged stress worsens physical wear and tear, decreasing resilience and adaptability during training or deployment.

Factors Contributing to Musculoskeletal Injuries

Military trainees experiencing higher stress levels show poorer sleep and reduced physical performance, emphasizing that injury prevention must address both physiological and psychological factors (Güler et al., 2023). Evidence supports incorporating recovery protocols like structured rest, mindfulness, and active recovery to restore autonomic balance. Educational programs that include stress management techniques such as breathing exercises, mindfulness, and cognitive–behavioral strategies reduce injury rates and improve readiness (Smith et al., 2023; Veehof et al., 2016). Overall, these studies demonstrate that stress is not just a background factor but a key mechanism affecting both sleep and musculoskeletal health.

INJURY PREVENTION

Approximately two–thirds of musculoskeletal injuries in the military are preventable, yet they remain widespread due to repetitive strain, overtraining, and inadequate recovery practices (Grier et al., 2020). Chronic pain conditions, especially low back and neck pain, affect nearly half of service members early in their careers, with over 80% reporting clinically significant pain at some point (Groessl et al., 2023; Smith et al., 2023).

Injury risk is often identifiable before it manifests. Functional Movement Screen (FMS) assessments, for instance, have been effective in detecting high–risk movement patterns, with scores of 14 or below correlating with elevated injury rates (Stegerhoek et al., 2024). Beyond physical assessments, aligning training schedules with individual chronotypes shows emerging promise. McGinnis et al. (2022) found that cadets whose circadian rhythms misaligned with early–morning training demonstrated higher inflammation and stress markers, suggesting that adjusting training times could mitigate injury risk.

Integrating physical conditioning with psychosocial resilience strategies amplifies prevention outcomes. Mind–body practices such as yoga and mindfulness reduce injury rates while improving flexibility, balance, and self–awareness (Smith et al., 2023). In a large-scale study involving nearly 1,900 Army Basic Combat Training participants, those receiving yoga and mindfulness instruction sustained fewer injuries and reported better mood and sleep (Smith et al., 2023). Collectively, these findings reinforce that injury prevention should extend beyond biomechanics to include cognitive and behavioral readiness.

Approximately two–thirds of musculoskeletal injuries are preventable.

Educational Interventions for Musculoskeletal Injury Reduction
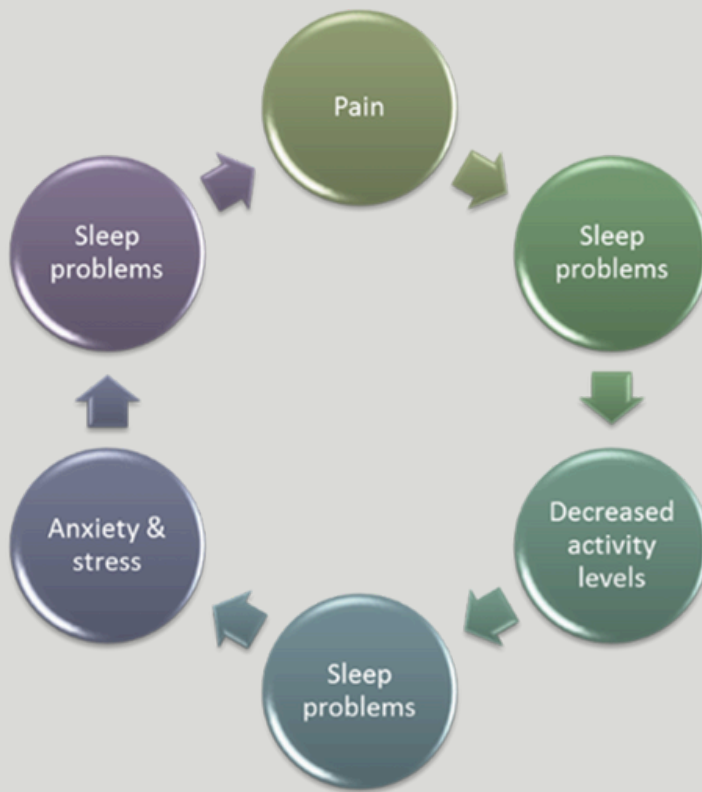
Military-specific sleep programs also focus on managing light exposure, reducing caffeine and alcohol intake, and incorporating relaxation techniques before sleep (Harrison et al., 2017). Interventions led by sleep specialists and supported by resources like sleep kits and wearable monitoring devices improve outcomes (Harris et al., 2015). When combined with regular reinforcement, this education fosters sustainable behavioral changes, enhancing both sleep quality and injury resilience.

SLEEP HYGIENE EDUCATION

Non-pharmacological sleep interventions are increasingly recognized as essential for injury prevention. Ebrahimi et al. (2023) demonstrated that sleep hygiene education improves sleep quality and reduces fatigue, findings applicable to military settings where sleep deprivation is common. These programs typically combine structured education, environmental adjustments, and behavioral monitoring to promote adherence (Grier et al., 2020; Schmied et al., 2021).

Tips for Better Sleep:

Avoid Caffeine, Alcohol, and Nicotine Before Bed

Maintain a Sleep Schedule

Have a Regular Sleep Routine

Relieve Stress

Exercise

Optimize Your Sleep Environment

Educational Interventions for Musculoskeletal Injury Reduction

MIND BODY EDUCATION AND INTERVENTIONS

Mind-body interventions connect psychological and physiological recovery, addressing pain, stress, and movement quality simultaneously. Groessl et al. (2023) found that yoga combined with mantram repetition decreased pain, fatigue, and PTSD symptoms while boosting overall well-being in veterans. Similarly, Pey-Shan et al. (2022) reported improved cognition, mood, and pain reduction after a six-week yoga program for people with traumatic brain injury.

In military settings, incorporating mindfulness and yoga into basic training has been shown to reduce injuries and stress while improving recovery and sleep (Smith et al., 2023). Overall, these findings indicate that mind-body practices serve as both therapeutic and preventative tools, enhancing physical performance and supporting emotional regulation and resilience.

MULTIDISCIPLINARY INTERVENTIONS AND WEARABLE TECHNOLOGY

Given the intertwined nature of sleep, stress, and injury, multidisciplinary interventions provide the most comprehensive prevention approach.

Programs that combine educational sessions, psychological support including Cognitive Behavioral Therapy (CBT), physical assessments, and wearable monitoring offer real-time insights for early intervention (Güler et al., 2023; Pojednic et al., 2024; Veehof et al., 2016). CBT-based methods have been shown to enhance sleep quality and reduce stress, decreasing physiological strain and lowering injury rates (Ritland et al., 2023; Schmied et al., 2021).

Wearable devices, such as smartwatches, bands, and rings, monitor sleep patterns, heart rate variability, and stress responses, enabling personalized feedback (Tait et al., 2024). These data-driven tools facilitate adaptive recovery protocols and performance optimization. Together, combining CBT, education, and wearable technologies empowers service members to manage recovery independently, while providing professionals with actionable data for precision prevention (Groessl et al., 2023; Lisman et al., 2022).

Implications for Practice

Health, wellness, and fitness professionals can implement several practical strategies to lower musculoskeletal injuries among military personnel.

1. Sleep Hygiene Programs: Conduct structured sleep education sessions, provide educational materials, and track sleep habits with wearable devices or self-reports.
2. Stress Management Interventions: Incorporate mindfulness, breathing exercises, and cognitive-behavioral techniques into daily routines to enhance recovery and resilience.
3. Personalized Injury Prevention: Perform functional movement assessments, chronotype evaluations, proper warm-up and cool-down routines, and workload adjustments to reduce injury risk.
4. Mind-Body Training: Include yoga, Pilates, or similar activities to improve flexibility, balance, core strength, and mental resilience.
5. Multidisciplinary Coordination: Work with medical, psychological, sleep, and performance professionals to provide comprehensive education, care, and early intervention programs.
6. Wearable Technology Integration: Use biometric feedback to track sleep, stress, and activity patterns for proactive injury prevention and recovery optimization.

Using these evidence-based strategies promotes long-term health, lowers musculoskeletal injuries, and improves operational readiness. The cyclical link between poor sleep, stress, and injury underscores the importance of integrated interventions that target multiple risk factors simultaneously.

Musculoskeletal injuries are preventable using evidence-based strategies.
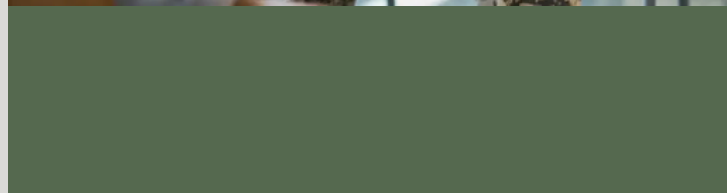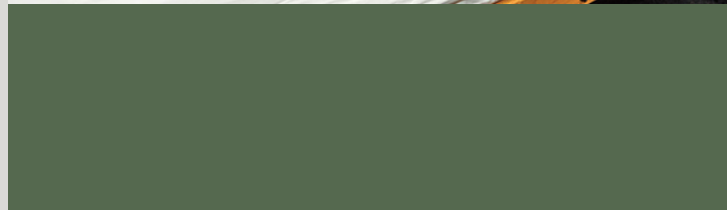
Limitations and Future Directions

Despite promising outcomes, much of the current research on sleep, stress, and injury prevention in military settings remains cross-sectional, which limits conclusions about cause and effect. Sample sizes often favor specific branches or demographics, creating gaps in understanding differences by gender and occupation. Future research should employ longitudinal and intervention studies to evaluate long-term behavior changes, incorporate objective wearable data, and assess the feasibility of implementation across various military environments.

Conclusion

Musculoskeletal injuries continue to be a primary concern for military personnel, affecting health, well-being, and mission readiness. The interconnected factors of poor sleep, high stress, and insufficient injury prevention efforts contribute to chronic pain, fatigue, and reduced performance. Evidence supports implementing educational programs that focus on sleep hygiene, stress management, and injury prevention, along with mind-body techniques such as yoga, mindfulness, and CBT strategies.

These combined approaches have been shown to enhance injury outcomes, sleep quality, mental health, and overall resilience (Grier et al., 2020; Ritland et al., 2023; Smith et al., 2023).

Multidisciplinary programs that combine education, physical assessments, psychological support, and wearable technology offer a comprehensive approach for identifying risk factors, tracking progress, and customizing interventions for individual needs (Güler et al., 2023; Pojednic et al., 2024; Veehof et al., 2016). By addressing modifiable factors such as sleep, stress, and injury prevention, health and fitness professionals can provide practical, actionable solutions that enhance the health, operational readiness, and mission success of military personnel. A proactive, integrated approach is essential for reducing musculoskeletal injury risk and promoting long-term wellness among military populations.

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