

U.S. Army War College

# Maximizing Senior Leader Health and Wellbeing



## EDITORS

COL Michael Hosie, Ph.D.  
COL Maurice L. Sipos, Ph.D.  
LTC Thomas W. Britt, Ph.D.

# **MAXIMIZING SENIOR LEADER HEALTH AND WELLBEING**

## **EDITORS**

COL Michael Hosie, PhD

COL Maurice L. Sipos, PhD

LTC Thomas W. Britt, PhD

Foreword by MG David C. Hill

Department of Command, Leadership, and Management  
School of Strategic Landpower  
U.S. Army War College, Carlisle PA

\*\*\*\*\*

Comments pertaining to this primer are invited and should be forwarded Dr. Maurice L. Sipos, PhD, Department of Command, Leadership, and Management, School of Strategic Landpower, U.S. Army War College, 122 Forbes Avenue, Carlisle, PA 17013-5010.

\*\*\*\*\*

All U.S. Army War College (USAWC) Press Publications may be downloaded free of charge from the USAWC Publications website. Hard copies of certain reports may also be obtained free of charge while supplies last by placing an order on the Strategic Studies Institute (SSI) website. Check the website for availability. Strategic Studies Institute publications may be quoted or reprinted in part or in full with permission and appropriate credit given to the U.S. Army Strategic Studies Institute, U.S. Army War College Press, and U.S. Army War College, Carlisle, PA. Contact SSI by visiting our website at the following address: <http://publications.armywarcollege.edu>.

\*\*\*\*\*

The Strategic Studies Institute and the U.S. Army War College Press publishes a monthly email newsletter to update the national security community on the research of our analysts, recent and forthcoming publications, and upcoming conferences sponsored by the Institute. Each newsletter also provides a strategic commentary by one of our research analysts. If you are interested in receiving this newsletter, please subscribe on the SSI website at <http://ssilarmywarcollege.edu/newsletter>.

Cover design by Jennifer Nevil and the editors. Some of the graphic elements used in the cover design were paid for through <https://www.shutterstock.com>. The editors thank Jennifer Nevil for her attention to detail and expertise in publishing this text.

ISBN: 1-58487-842-8

## TABLE OF CONTENTS

|                                                                                      |    |
|--------------------------------------------------------------------------------------|----|
| Forward .....                                                                        |    |
| CHAPTER 1: MIDLIFE AND THE MILITARY: OPPORTUNITIES AND OBSTACLES .....               | 1  |
| What is Midlife? .....                                                               | 2  |
| Midlife Development Perspectives .....                                               | 3  |
| Stress, Health, and Wellbeing .....                                                  | 5  |
| Role Transitions .....                                                               | 7  |
| Exemplar Military Midlife Roles .....                                                | 9  |
| The Senior Leader .....                                                              | 9  |
| The Care-Giver .....                                                                 | 10 |
| The Midlife Retiree .....                                                            | 11 |
| Pivoting Toward Improved Health and Wellbeing .....                                  | 13 |
| Key Takeaways .....                                                                  | 15 |
| CHAPTER 2: PHYSIOLOGICAL CHANGES IN MIDLIFE .....                                    | 17 |
| The Musculoskeletal System .....                                                     | 20 |
| The Neurocognitive System .....                                                      | 25 |
| The Cardiopulmonary System .....                                                     | 27 |
| The Metabolic System .....                                                           | 29 |
| The Reproductive System .....                                                        | 33 |
| Conclusion .....                                                                     | 36 |
| Key Takeaways .....                                                                  | 36 |
| CHAPTER 3: PHYSICAL FITNESS GUIDANCE TO ACHIEVE OPTIMAL HEALTH AND PERFORMANCE ..... | 37 |
| Trends – America, the Army, and the Army War College .....                           | 38 |
| Health Benefits from Exercise .....                                                  | 40 |
| Basic Fitness Principles .....                                                       | 43 |
| Exercise Duration and Intensity .....                                                | 46 |
| Flexibility .....                                                                    | 53 |
| Tying It All Together .....                                                          | 54 |
| Key Takeaways .....                                                                  | 56 |
| CHAPTER 4: DIET AND NUTRITION FOR ENERGY AND VIGOR .....                             | 57 |
| Army and Department of Defense (DoD) Publications and Initiatives .....              | 58 |
| Nutrition to Sustain Energy to Meet Work and Life Demands .....                      | 59 |

|                                   |    |
|-----------------------------------|----|
| Macronutrients.....               | 65 |
| Micronutrients .....              | 67 |
| What Should I Eat? .....          | 70 |
| Supplements.....                  | 71 |
| Nutrition for Enhanced Vigor..... | 72 |
| Nutrition to Manage Stress .....  | 76 |
| Conclusion.....                   | 79 |
| Key Takeaways .....               | 80 |

## CHAPTER 5: SLEEP AS A CRITICAL RESOURCE FOR PERFORMANCE HEALTH AND WELLBEING .....

|                                                              |     |
|--------------------------------------------------------------|-----|
| .....                                                        | 81  |
| Sleep and the Military Leader .....                          | 84  |
| Sleep in Midlife: “I need less sleep the older I get.” ..... | 86  |
| Sleep in the Multi-Domain Context.....                       | 88  |
| Recommendations to Improve Sleep (Individual) .....          | 90  |
| Sleep Hygiene.....                                           | 90  |
| Medical and Non-medical Sleep Aids .....                     | 93  |
| Recommendations to Improve                                   |     |
| Sleep (Organizational) .....                                 | 95  |
| Sleep Banking .....                                          | 95  |
| Caffeine use.....                                            | 95  |
| Jet Lag .....                                                | 96  |
| Public Health Related Resources .....                        | 97  |
| Conclusion.....                                              | 99  |
| Key Takeaways .....                                          | 100 |

## CHAPTER 6: MINDFULNESS TRAINING FOR OPTIMIZATION

|                                                               |     |
|---------------------------------------------------------------|-----|
| AND WELLNESS.....                                             | 101 |
| The Concept of Mindfulness.....                               | 103 |
| Mindfulness Training as a Competitive                         |     |
| Advantage .....                                               | 104 |
| Relevance for the Military .....                              | 104 |
| Relevance for Midlife .....                                   | 105 |
| Relevance for Leadership.....                                 | 106 |
| Benefits of Mindfulness Training.....                         | 106 |
| Optimized Cognitive Performance .....                         | 106 |
| Reduced Emotional Reactivity.....                             | 109 |
| Increased Wellness.....                                       | 110 |
| Implementation: Senior Military Leaders’ Personal Adoption of |     |
| Mindfulness.....                                              | 115 |
| Professional Military Education .....                         | 117 |
| Mindfulness-Based Attention Training (MBAT).....              | 117 |
| Attaching to Organizational Activities .....                  | 119 |
| Overcoming Barriers to Implementation.....                    | 119 |

|                                                                             |     |
|-----------------------------------------------------------------------------|-----|
| Conclusion.....                                                             | 121 |
| Key Takeaways .....                                                         | 122 |
| CHAPTER 7: SENIOR LEADER RESILIENCE.....                                    | 123 |
| Understanding the context Stressors: Traumatic<br>Events and Hassles.....   | 124 |
| Employee Resources for Responding to Stress<br>and Adversity.....           | 126 |
| Coping Depends on the Context .....                                         | 130 |
| Self-awareness.....                                                         | 131 |
| Emotion Regulation .....                                                    | 132 |
| Leadership .....                                                            | 136 |
| The Limits of a Resilience Lens .....                                       | 137 |
| Building a Culture that Promotes Resilience.....                            | 138 |
| Conclusion.....                                                             | 139 |
| Key Takeaways .....                                                         | 140 |
| CHAPTER 8: REFRAMING WORK-LIFE BALANCE FOR SENIOR<br>MILITARY LEADERS ..... | 141 |
| The Nature of the Military Work Environment.....                            | 142 |
| Research Foundation for Work-life Interface .....                           | 143 |
| The Myth of Balance.....                                                    | 143 |
| Work-life Interface: Interference and Facilitation.....                     | 145 |
| Conservation of Resources Theory .....                                      | 146 |
| Recovery and Boundary Management.....                                       | 147 |
| Organizational Boundary Management .....                                    | 149 |
| USAWC Work-life Interface Survey for<br>Senior Military Leaders .....       | 151 |
| High Work to Home Interference .....                                        | 151 |
| Low Home to Work Interference .....                                         | 153 |
| Home Life as Recovery .....                                                 | 153 |
| The Gap Between Messaging and Action.....                                   | 154 |
| Recommendations .....                                                       | 156 |
| Conclusion.....                                                             | 160 |
| Key Takeaways .....                                                         | 161 |

## Chapter 5

### SLEEP AS A CRITICAL RESOURCE FOR PERFORMANCE HEALTH AND WELLBEING

COL Brian Hoffman  
US Army War College

LTC Vincent F. Capaldi, II, SCM, MD  
Uniformed Services University

COL Maurice L. Sipos, Ph.D.  
US Army War College

In peace and war, the lack of sleep works like termites in a house: below the surface, gnawing quietly and unseen to produce gradual weakening which can lead to sudden and unexpected collapse.

—Major General Aubrey Newman<sup>1</sup>

Fatigue is associated with adverse events in the military. In 2018, the United States Army Aeromedical Research Lab (USAARL) conducted a retrospective review of 133 Class A and B aircraft mishaps between 2011 and 2015.<sup>2</sup> Twenty eight percent of the mishaps, 37 cases, were fatigue related.<sup>3</sup> USAARL identified partial sleep deprivation (less than 6 hours), time of mishap (between the hours of 2200 and 0600), and duration of duty day (greater than 10 hours) as the contributing factors to fatigue.<sup>4</sup> The 37 cases resulted in 15 fatalities, 16 total disabilities, and \$309 million in damages or \$7.7 million per mishap.<sup>5</sup>

According to the USAARL study, partial sleep deprivation contributed to the 37 mishaps because it was associated with “reduced cognitive performance, loss of attention, decreased reaction time, and memory impairment.”<sup>6</sup> As noted in the USAARL findings, sleep and fatigue mitigation are critical to mission success, individual performance, and personal safety. Beyond impacts to operations and training, sleep is a critical resource for the health

---

1. Aubrey S. Newman, *Follow Me: The Human Element in Leadership* (Novato, CA: Presidio Press, 1981), 279.

2. United States Army Aeromedical Research Laboratory (USAARL), “Review of U.S. Army Aviation Accident Reports: Prevalence of Environmental Stressors and Medical Conditions,” Report No. 2018-02, (2018), 6.

3. USAARL, 6.

4. USAARL, 6.

5. USAARL, 7.

6. USAARL, 7.

and wellbeing of every service member and leaders play a critical role in managing fatigue across their formations.<sup>7</sup>

In March 2021, the Department of Defense (DoD) released a study focused on the effects of sleep deprivation on military readiness in response to section 749 of the National Defense Authorization Act for Fiscal Year 2020.<sup>8</sup> The report defined sleep deprivation as “inadequate sleep that negatively impacts a Service Member’s military effectiveness, evidenced by a reduced ability to execute complex cognitive tasks, communicate effectively, quickly make appropriate decisions, maintain vigilance, and sustain a level of alertness required to carry out assigned duties.”<sup>9</sup> Furthermore, sleep deprivation was identified as a “contributing factor to mental health disorders and physical diseases, conditions, and syndromes” that undermines readiness.<sup>10</sup>

In multi-domain operations, the Joint Chiefs of Staff recently recognized the need for “intellectual overmatch,” which requires leaders to develop and sustain peak mental and physical performance.<sup>11</sup> By extension, the most essential weapon system in the multi-domain environment is the human brain, as expressed in cognitive dominance. Addressing sleep deprivation in the military begins with Army leaders understanding the critical importance of sufficient sleep on their own readiness and their ability to meet the cognitive and physical demands required to maintain intellectual overmatch.<sup>12</sup>

Moreover, leaders’ behaviors and attitudes toward sleep can influence their subordinates’ health, wellbeing, and performance. Many of us have had leaders whose actions reflected unhealthy sleep schedules and discouraged their subordinates from getting adequate sleep to keep up with the boss. Not only does prioritizing sleep improve organizational

---

7. Deydre S. Teyhen, et al., “How Sleep Can Help Maximize Human Potential: The Role of Leaders,” *Journal of Science and Medicine in Sport* 24, no. 10 (2021), 988-994.

8. National Defense Authorization Act 2020, Public Law 116-92, 116<sup>th</sup> Congress (December 20, 2019), 133 STAT.1358, SEC. 749, “Study on Effects of Sleep Deprivation on Readiness of Members of the Armed Forces,” <https://www.congress.gov/116/plaws/publ92/PLAW-116publ92.pdf>.

9. U.S. Department of Defense, *Report to Congressional Armed Services Committees: Study on Effects of Sleep Deprivation on Readiness of Members of the Armed Services*, (Washington, DC: DoD, March 2021), i, <https://www.health.mil/Reference-Center/Reports/2021/02/26/Study-on-Effects-of-Sleep-Deprivation-on-Readiness-of-Members-of-the-Armed-Forces-Final-Report>.

10. U.S. Department of Defense, i.

11. Joint Chiefs of Staff, *Developing Today’s Joint Officers for Tomorrow’s Ways of War: The Joint Chiefs of Staff Vision and Guidance for Professional Military Education & Talent Management*, (Washington, DC: Joint Chiefs of Staff, 2020), 2, [https://www.jcs.mil/Portals/36/Documents/Doctrine/education/jcs\\_pme\\_tm\\_vision.pdf?ver=2020-05-15-102429-817](https://www.jcs.mil/Portals/36/Documents/Doctrine/education/jcs_pme_tm_vision.pdf?ver=2020-05-15-102429-817); Headquarters, Department of the Army, FM 7-22 Holistic Health and Fitness, (Washington, DC: Department of the Army, October 8, 2020), xiv, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/ARN30964-FM\\_7-22-001-WEB-4.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN30964-FM_7-22-001-WEB-4.pdf).

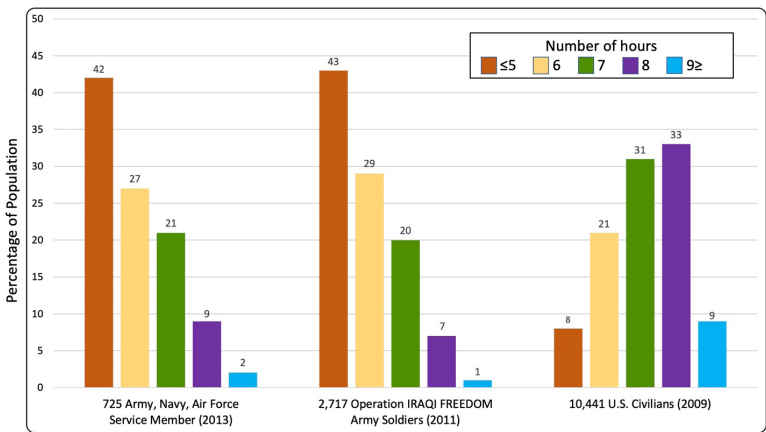
12. Headquarters, Department of the Army, xiii.



readiness, it also better prepares senior leaders to address the challenges and stresses of work and life while mitigating the physiological changes associated with aging.

According to the National Sleep Foundation adults require seven hours of sleep per night to achieve peak cognitive and physical performance.<sup>13</sup> However, most Americans achieve a “less-than-optimal (but subjectively tolerable and sustainable) level of chronic, mild sleep restriction” by sleeping less than seven hours per night.<sup>14</sup> A recent RAND study attempted to quantify the impact of military culture on sleep by comparing sleep duration in civilian and military populations.<sup>15</sup> Service members reported fewer hours of sleep per night than their civilian counterparts. Over 40% of military personnel slept less than five hours a night, compared to 8% of the civilian population (see Figure 1).<sup>16</sup> Moreover, approximately 70% of service members reported sleeping less than seven hours per night compared to 29% of their civilian counterparts.<sup>17</sup>

**Figure 1. Sleep Duration: U.S. Civilian Population Compared to U.S. Military Personnel<sup>18</sup>**



13. Alexa Fry, “What is Healthy Sleep?,” Sleep Foundation, last updated April 29, 2022, <https://www.sleepfoundation.org/sleep-hygiene/what-is-healthy-sleep/>.

14. Nancy J. Wessensten and Thomas J. Balkin, “The Challenge of Sleep Management in Military Operations,” *U.S. Army Medical Department Journal* October – December 2013: 112, <https://ufdc.ufl.edu/AA00062689/00032>.

15. FM 7-22, *Holistic Health and Fitness* defines sleep duration as the number of hours slept. See Headquarters, Department of the Army, Chapter 11, page 11-1.

16. Wendy M. Troxel et al., *Sleep in the Military: Promoting Healthy Sleep Among US Servicemembers*, (Santa Monica, CA: RAND Corporation), 16, [https://www.rand.org/content/dam/rand/pubs/research\\_reports/RR700/RR739/RAND\\_RR739.pdf](https://www.rand.org/content/dam/rand/pubs/research_reports/RR700/RR739/RAND_RR739.pdf)

17. U.S. Department of Defense, 4.

18. Adapted from Troxel et al., 16.

You may be asking the question, “I have gotten this far in my professional career without focusing on sleep, why should I make changes now?” In the following sections, we review the impact of sleep enhancement on individual health outcomes and the professional impact of how leadership emphasis on sleep may impact operational outcomes and risk mitigation. We then review practical strategies for implementing measurable change in your personal sleep habits and within the organizations you lead.

Personal discipline is paramount to success as a military leader. Discipline takes commitment, effort and may, at times, conflict across domains. For example, people may sacrifice sleep to spend more time in the gym to increase power, strength, and endurance. However, the cost of sleep loss on cognitive performance is more difficult to measure. The prevailing military mindset regarding sleep is unhealthy and competes directly with science and common sense. Instead of wearing lack of sleep as a badge of courage and “embracing the suck,” leaders need to change sleep culture as the first step in gaining intellectual overmatch. In the following paragraphs we will provide the latest evidence supporting sleep as a critical resource for health maintenance and mental acuity.

### Sleep and the Military Leader

Science underscores sleep’s role in cognitive performance, critical and creative thinking, awareness, and effective communication.<sup>19</sup> Improved sleep is associated with improved attention, response times, and greater mental flexibility.<sup>20</sup> It enhances judgment, awareness, mood, resilience, and the ability to navigate and respond to unfamiliar information.<sup>21</sup> Sufficient sleep also enhances concentration, improves emotional outlook, and increases social awareness.<sup>22</sup> Sleep also boosts the immune system allowing the body to fight off infections, reduces blood pressure, lowers the resting heart rate, and releases hormones that stimulate the process of breaking down fats.<sup>23</sup>

---

19. Torbjörn Åkerstedt and Peter M. Nilsson, “Sleep as Restitution: An Introduction,” *Journal of Internal Medicine* 254, no. 1 (2003): 10, <https://doi.org/10.1046/j.1365-2796.2003.01195.x>.

20. Bradley M. Ritland et al., “Effects of Sleep Extension on Cognitive/Motor Performance and Motivation in Military Tactical Athletes,” *Sleep Medicine* 58 (2019): 54, <https://doi.org/10.1016/j.sleep.2019.03.013>.

21. Eric R. Pedersen et al., “Increasing Resilience Through Promotion of Healthy Sleep Among Service Members,” *Military Medicine* 180, no. 1 (2015): 4, <https://doi.org/10.7205/MILMED-D-14-00264>; William DS Killgore et al., “Sleep Deprivation Reduces Perceived Emotional Intelligence and Constructive Thinking Skills,” *Sleep Medicine* 9, no. 5 (2008): 524, <https://doi.org/10.1016/j.sleep.2007.07.003>.

22. Geraldine S. Perry, Susheel P. Patil, and Letitia R. Presley-Cantrell, “Raising Awareness of Sleep as a Healthy Behavior,” *Preventing Chronic Disease* 10 (2013): 1, <https://dx.doi.org/10.5888%2Fpcd10.130081>; Marie Vandekerckhove and Raymond Cluydts, “The Emotional Brain and Sleep: An Intimate Relationship,” *Sleep Medicine Reviews* 14, no. 4 (2010): 219, <https://doi.org/10.1016/j.smrv.2010.01.002>.

23. Martha Lally and Suzanne Valentine-French, “8.3: Sleep,” in *Lifespan Development – A Psychological Perspective* (College of Lake County, last modified September 25, 2019), [https://socialsci.libretexts.org/Bookshelves/Human\\_Development/Book%3A\\_Lifespan\\_Development\\_-\\_A\\_Psychological\\_Perspective\\_\(Lally\\_and\\_Valentine-French\)/08%3A\\_Middle\\_Adulthood/8.03%3A\\_Sleep](https://socialsci.libretexts.org/Bookshelves/Human_Development/Book%3A_Lifespan_Development_-_A_Psychological_Perspective_(Lally_and_Valentine-French)/08%3A_Middle_Adulthood/8.03%3A_Sleep).

Similarly, sleep allows the body to repair tissue and recover following exercise. It elevates mood and increases motivation to follow rigorous fitness programs.<sup>24</sup> Extending sleep duration by 90 minutes can also have immediate and significant positive impacts on athletic performance.<sup>25</sup> Furthermore, testosterone, which is instrumental in performance and recovery, is restored to peak levels at the end of a seven to nine-hour sleep cycle. Going one night without sleep can reduce testosterone levels by 90 percent.<sup>26</sup> Physical exercise, on the other hand, aids sleep onset, promotes restorative non-rapid eye movement (NREM) and rapid eye movement (REM) sleep, allowing the body to recover more rapidly from physical stress and injuries.<sup>27</sup>

In contrast, short sleep duration is associated with increased risk of cancer, cardiovascular disease, type 2 diabetes, and obesity.<sup>28</sup> For example, shortened sleep increases appetite and hunger, leading to excessive food intake. Decreased sleep duration increases the risk of weight gain, obesity, and type 2 diabetes by altering food cravings, the type of food consumed, and meal timing.<sup>29</sup> Similarly, degraded sleep duration and quality can cause an individual to lose interest in exercise or reduce their workout intensity.<sup>30</sup>

Similarly, sleep affects mental fitness. Chronic sleep restriction correlates with an increased risk of post-traumatic stress disorder (PTSD), traumatic brain injuries (TBI), depression, and suicide.<sup>31</sup> For example, approximately

---

24. Shona L Halson, "Nutrition, Sleep and Recovery," *European Journal of Sport Science* 8, no. 2 (2008): 119, <https://doi.org/10.1080/17461390801954794>; Wesensten and Balkin, 112.

25. Ritland et al., 54.

26. Janna Mantua et al., "Sleep Loss During Military Training Reduces Testosterone in U.S. Army Rangers: A Two-Study Series," *International Journal of Sports and Exercise Medicine* 6, no. 4 (2020), 1-2. <https://doi.org/10.23937/2469-5718/1510169>.

27. Halson, 119.

28. National Institute of Neurological Disorders and Stroke, "Brain Basics: Understanding Sleep," U.S. Department of Health and Human Services, last reviewed February 10, 2023, <https://www.ninds.nih.gov/health-information/public-education/brain-basics/brain-basics-understanding-sleep#:~:text=Sleep%20is%20important%20to%20a,up%20while%20you%20are%20awake>; Mark R. Zielinski, James T. McKenna, and Robert W. McCarley, "Functions and Mechanisms of Sleep," *AIMS Neuroscience* 3, no. 1 (2016): 77, <https://dx.doi.org/10.3934%2FNeuroscience.2016.1.67>.

29. Andrea M. Spaeth, David F. Dinges, and Namni Goel, "Effects of Experimental Sleep Restriction on Weight Gain, Caloric Intake, and Meal Timing in Healthy Adults," *Sleep*, 36, no. 7 (2013): 981, <https://doi.org/10.5665/sleep.2792>; Kristen L. Knutson and Eve Van Cauter, "Associations Between Sleep Loss and Increased Risk of Obesity and Diabetes," *Annals of the New York Academy of Sciences* 1129 (2008): 299-300, <https://doi.org/10.1196/annals.1417.033>.

30. Knutson and Cauter, 299.

31. Adam D. Bramoweth and Anne Germain, "Deployment-Related Insomnia in Military Personnel and Veterans," *Current Psychiatry Reports* 15, no. 10 (2013): 1, <https://dx.doi.org/10.1007%2Fs11920-013-0401-4>; David D. Luxton et al., "Prevalence and Impact of Short Sleep Duration in Redeployed OIF Soldiers," *Sleep* 34, no. 9 (2011): 1192, <https://doi.org/10.5665/SLEEP.1236>.

88% of combat veterans with PTSD have chronic sleep disruption.<sup>32</sup> Moreover, individuals who suffer from sleep disturbances before deployments are at a higher risk of developing post-traumatic stress from stressful experiences, including combat.<sup>33</sup> Individuals with at least one TBI are also at higher risk for decreased sleep continuity, which can prolong the recovery period.<sup>34</sup> Suffering from inadequate sleep also increases the risk of depression. Individuals who regularly get 8 hours of sleep are at the lowest risk for suicidal ideation, planning, attempts, and death compared to individuals reporting fewer hours of sleep. There is a 34 percent increase in the risk of suicide associated with poor sleep quality.<sup>35</sup> All of these statistics are important to consider as the Army battles the harmful behaviors that continue to plague the force.

### **Sleep in Midlife: “I need less sleep the older I get.”**

Senior leaders are adept at developing strategies based on their experiences and wisdom to address life challenges and to navigate stress. However, their experience and wisdom are impacted by physiological changes associated with aging. The changes in sleep patterns common in midlife can have profound effects on the mind and body. For example, as adults age, they have more difficulty coping with insufficient sleep. Sleep deprivation amplifies the age-related declines in cognition, memory, and information processing speed and may compromise a leader’s ability to capitalize on midlife experience and wisdom.<sup>36</sup> Getting adequate amounts of uninterrupted sleep becomes more challenging with age. Moreover, the ability to fall back to sleep after waking during the sleep cycle becomes

32. John H. Krystal et al., “Sleep Disturbance in Chronic Military-Related PTSD: Clinical Impact and Response to Adjunctive Risperidone in the Veterans Affairs Cooperative Study # 504,” *The Journal of Clinical Psychiatry* 77, no. 4 (2016): 488, <http://dx.doi.org/10.4088/JCP.14m09585>.

33. Philip Gehrman et al., “Predeployment Sleep Duration and Insomnia Symptoms as Risk Factors for New-Onset Mental Health Disorders Following Military Deployment,” *Sleep* 36, no. 7 (2013): 1009, <http://dx.doi.org/10.5665/sleep.2798>.

34. Craig J. Bryan, “Repetitive Traumatic Brain Injury (or Concussion) Increases Severity of Sleep Disturbance Among Deployed Military Personnel,” *Sleep* 36, no. 6 (2013): 944, <https://doi.org/10.5665/sleep.2730>; Military Health System, “DoD Clinical Recommendation: Management of Sleep Disturbances Following Concussion/mTBI: Guidance for Primary Care Management in Deployed and Non-Deployed Settings,” *Health.mil*, accessed March 21, 2021, <https://www.health.mil/Reference-Center/Publications/2020/07/31/Management-of-Sleep-Disturbances-Following-ConcussionmTBI-Clinical-Recommendation;FM7-22,HolisticHealthandFitness> defines sleep continuity as the ease of falling asleep and maintaining uninterrupted sleep (see Headquarters, Department of the Army, 11-2).

35. Rebecca A. Bernert and Thomas E. Joiner, “Sleep Disturbances and Suicide Risk: A Review of the Literature,” *Neuropsychiatric Disease and Treatment* 3, no. 6 (2007): 736, <https://dx.doi.org/10.2147%2Fndt.s1248>.

36. Wilse B. Webb and C. Michael Levy, “Age, Sleep Deprivation, and Performance,” *Psychophysiology* 19, no. 3 (1982): 275, <https://doi.org/10.1111/j.1469-8986.1982.tb02561.x>; Margie E. Lachman, “Development in Midlife,” *Annual Review of Psychology* 55 (2004): 319, <https://doi.org/10.1146/annurev.psych.55.090902.141521>.

increasingly more difficult in midlife.<sup>37</sup> As a result, individuals spend less time in NREM and REM sleep, giving the brain and body less time to recover.<sup>38</sup>

Sleep deprivation and associated lack of sufficient cognitive and physical recovery contribute to or exacerbate a range of health issues commonly found in midlife.<sup>39</sup> For example, declines in sleep duration and sleep quality can alter hormone release, contribute to insulin resistance, and disrupt glucose metabolism, all of which can intensify the physiological changes associated with midlife.<sup>40</sup> As a result, sleep-restricted adults face an increased risk of higher blood pressure, type 2 diabetes, cardiovascular disease, and weight gain.<sup>41</sup> Chronic sleep restriction may contribute to the cognitive decline associated with aging, possibly accelerating the aging process by three to eight years.<sup>42</sup> Sleep deprivation is associated with decreased glymphatic clearance, increasing the risk of neurodegenerative diseases such as Alzheimer's disease.<sup>43</sup> Consistent inadequate sleep duration and sleep quality in midlife can also influence cognitive performance up to 20 years later.<sup>44</sup>

Common comorbidities observed in midlife (i.e., sleep apnea, restless leg syndrome, depression, and insomnia) further complicate the physiologically driven changes in sleep quality associated with aging.<sup>45</sup> Sleep deprivation caused by our own actions (also known as behaviorally induced insufficient sleep syndrome (BISS)) in midlife also contributes to sleep deprivation by "stealing" time typically associated with sleep.<sup>46</sup> Senior leaders deal with family and life stressors and other "sleep stealing

---

37. Dominique Gosselin, Joseph De Koninck, and Kenneth Campbell, "Novel Measures to Assess the Effects of Partial Sleep Deprivation on Sensory, Working, and Permanent Memory," *Frontiers In Psychology* 8 (2017): 14, <https://doi.org/10.3389/fpsyg.2017.01607>.

38. Kristine Yaffe, Cherie M. Falvey, and Tina Hoang, "Connections between Sleep and Cognition in Older Adults," *The Lancet Neurology* 13, no. 10 (2014): 1017, [https://doi.org/10.1016/s1474-4422\(14\)70172-3](https://doi.org/10.1016/s1474-4422(14)70172-3).

39. Kermit Pattison, "Sleep Deficit," *Experience Life*, May 05, 2015, <https://experiencelife.lifetime.life/article/sleep-deficit/>.

40. Lally and Valentine-French, "8.3 Sleep."

41. Kristen L. Knutson et al., "Association Between Sleep and Blood Pressure in Midlife: the CARDIA Sleep Study," *Archives of Internal Medicine* 169, no. 11 (2009): 1061, <https://doi.org/10.1001/archinternmed.2009.119>; Åkerstedt and Nilsson, 11.

42. Jane E. Ferrie et al., "Change in Sleep Duration and Cognitive Function: Findings from the Whitehall II Study," *Sleep* 34, no. 5 (2011): 571, <https://doi.org/10.1093/sleep/34.5.565>.

43. Maiken Nedergaard and Steven A. Goldman, "Glymphatic Failure as a Final Common Pathway to Dementia," *Science* 370, no. 6512 (2020): 50-56, <https://doi.org/10.1126/science.abb8739>.

44. June C. Lo et al., "Sleep Duration and Age-Related Changes in Brain Structure and Cognitive Performance," *Sleep* 37, no. 7 (2014): 1171, <https://doi.org/10.5665/sleep.3832>.

45. Gosselin et al., 14.

46. Michael J. Sateia, "International Classification of Sleep Disorders- Third Edition," *Chest* 146, no. 5 (2014): 1391, <https://doi.org/10.1378/chest.14-0970>.



activities” such as watching television, playing video games, and surfing the internet.<sup>47</sup> As described in Chapter 8 senior leaders are not immune to BIISS and often are forced to choose between sleep, work requirements, physical fitness, and family time. The choices between sleep, work, fitness, and family often confound senior leaders. Chapter 8 offers several techniques to design schedules and boundaries that preserve sleep, reduce interference from work activities, and increase engagement in personal wellbeing and family life.<sup>48</sup>

### Sleep in the Multi-Domain Context

Service members need to perform at peak cognitive levels to integrate the complex systems associated with sophisticated multi-domain operations.<sup>49</sup> Sleep deprivation impairs innovative thinking and flexible decision-making required to generate creative and appropriate solutions to unfamiliar challenges. Reducing sleep duration and degrading sleep continuity leads to inflexible thinking and greater difficulty understanding, interpreting, and responding to changing situations.<sup>50</sup> Furthermore, sleep deprivation degrades performance by causing individuals to focus excessively on peripheral issues or distractions, to be less willing to modify previous plans and strategies, and to show less empathy for teammates.<sup>51</sup> In contrast, sufficient sleep optimizes brain function, allowing leaders to make good decisions, use sound judgment, and maintain effective situational awareness.<sup>52</sup> Vignette 6-1 demonstrates the impact of sleep deprivation on cognitive function during simulated sustained combat.

**Vignette 6-1:** Thirteen five-person teams were evaluated for their ability to conduct **simulated continuous combat operations lasting 36 hours**. Each team’s task was to plot target locations; derive range, bearing, and angle of gun elevation; and charge immediately on receipt of the target and update situation maps. Across 36 hours of sleep deprivation, each team’s ability to derive range, bearing, and elevation accurately and to charge was unimpaired. **After approximately 24 hours without sleep ... team members stopped updating their situation maps and stopped computing preplanned targets immediately on receipt of new**

---

47. Wesensten and Balkin, 114.

48. See Chapter 8 of this volume: “Reframing Work-Life Balance for Senior Military Leaders.”

49. Nancy J. Wesensten et al., “Jet Lag and Sleep Deprivation,” in *Military Preventive Medicine: Mobilization and Deployment* (Fort Sam Houston, TX: Borden Institute, 2003): 298, <https://doi.org/10.3109/9780203998007-16>.

50. Yvonne Harrison and James A. Horne, “One Night of Sleep Loss Impairs Innovative Thinking and Flexible Decision Making,” *Organizational Behavior and Human Decision Processes* 78, no. 2 (1999): 141-142, <https://doi.org/10.1006/obhd.1999.2827>.

51. Yvonne Harrison and James A. Horne, “The Impact of Sleep Deprivation on Decision Making: A Review,” *Journal of Experimental Psychology: Applied* 6, no. 3 (2000): 246, <https://doi.org/10.1037/1076-898x.6.3.236>.

52. Killgore et al., 524.

**information...** [T]he teams disrupted their smooth, accurate flow of work, fired on prohibited targets, and generally lost control of the operation.<sup>53</sup>

Leaders must balance sleep duration, timing, and continuity against mission requirements and constraints.<sup>54</sup> By finding opportunities for and creating conditions that maximize sleep, leaders foster mission success by increasing the resilience needed to overcome combat's emotional and physical challenges. In contrast, sleep deprivation over a prolonged period increases risks to mission in several ways. For example, sleep-deprived soldiers have slower reaction times, lack high emotional regulation, and make poor decisions, especially when forced to respond to ethical dilemmas quickly.<sup>55</sup> When operating in groups, sleep-deprived individuals have the propensity to loaf, often deferring work and actions to others resulting in reduced productivity and animosity.<sup>56</sup> Sleep deprivation is associated with an elevated risk of depression, post-traumatic stress disorder, and suicide.<sup>57</sup> Furthermore, senior leaders are not immune to the effects of sleep deprivation on behavioral health.<sup>58</sup> Leaders should consider the impact of their sleep habits on their own readiness and mission success.

Army senior leaders are becoming increasingly aware and attuned to the importance of sufficient sleep. For example, FM 7-22 uses the acronym **SLEEP** to encourage leaders to **set** conditions, **lead** by example, **educate**, and **encourage**, and **prioritize and plan** for sleep.<sup>59</sup> Army leaders are setting the example by discussing and educating subordinates on the importance of sleep, by resourcing better sleeping conditions for their Soldiers, and by prioritizing sleep as a combat multiplier balanced against mission requirements. Retired Lieutenant General David Barno's description of the Army's culture and sleep exemplifies the shift in priorities. "The Army has always had an internal dynamic that real men don't need sleep and can just push on, and it's incredibly stupid. Combat is a thinking man's business, and your brain doesn't function without sleep."<sup>60</sup> The DoD and the Army recognize the impact of sleep loss on ethical judgment, decision-making,

---

53. Wessensten et al., 291. Emphasis added.

54. FM 7-22 *Holistic Health and Fitness* defines sleep timing as the ability to initiate and maintain sleep, influenced by the circadian rhythm (see Headquarters, Department of the Army, 11-2).

55. William DS Killgore et al., "The Effects of 53 Hours of Sleep Deprivation on Moral Judgment," *Sleep* 30, no. 3 (2007): 351, <https://doi.org/10.1093/sleep/30.3.345>.

56. Claudia Y. D. Hoeksema-van Orden, Anthony W. K. Gaillard, and Bram P. Buunk, "Social Loafing Under Fatigue," *Journal of Personality and Social Psychology* 75, no. 5 (1998): 1179, <https://doi.org/10.1037/0022-3514.75.5.1179>.

57. Brian C. Gunia et al., "Sleep Leadership in High-Risk Occupations: An Investigation of Soldiers on Peacekeeping and Combat Missions," *Military Psychology* 27, no. 4 (2015): 1990, <https://doi.org/10.1037/mil0000078>.

58. Meghann Myers, "Army Report: Self-doubt and Sleep Deprivation Led to 2-Star's Suicide," *Army Times*, January 11, 2017, <https://www.armytimes.com/news/your-army/2017/01/11/army-report-self-doubt-and-sleep-deprivation-led-to-2-star-s-suicide/>.

59. Headquarters, Department of the Army, 11-5.

60. Dave Phillips, "The Army Rolls Out a New Weapon: Strategic Napping," *New York Times*, October 1, 2020, <https://www.nytimes.com/2020/10/01/us/army-naps.html>.

and risk-taking behavior.<sup>61</sup> Indeed, sleep deprivation is strongly correlated with unethical conduct, associated with limited self-regulation, increased cognitive fatigue, and reduced inhibitions.<sup>62</sup>

Senior leaders must address sleep deficits observed in garrison, training, and combat environments. For example, a study conducted in 2015 found that only a quarter of soldiers surveyed reported that their leaders encouraged them to get sufficient sleep or provide conducive sleep conditions. Only 35% of Soldiers surveyed considered sleep as a critical planning factor.<sup>63</sup> Historically, military culture has undervalued or dismissed the role that sleep plays in individual and unit readiness. A RAND study cited “culture, operational [tempo], knowledge-related, and medical system barriers” as impediments to promoting sleep and treating service members with sleep disorders.<sup>64</sup>

Senior military leaders must understand the critical role sleep plays in sustaining individual health, wellbeing, and performance. Moreover, leaders’ behaviors and attitudes may impact their subordinates’ health, wellbeing, and performance. Prioritizing sleep improves organizational readiness and prepares senior leaders to navigate career and midlife stressors.

### **Recommendations to Improve Sleep (Individual)**

The following section offers recommendations on sleep-related strategies to improve performance in the cognitive and physical domains that may help postpone age-related decrements associated with midlife. Often, individuals can make minor behavioral adjustments to enhance sleep duration, timing, and continuity.

#### Sleep Hygiene

Sleep hygiene includes habits and factors (i.e., daily routines, exercise, use and timing of stimulants, environmental conditions, and cognitive wellbeing) that impact the duration, timing, and continuity of sleep.<sup>65</sup> Improving sleep hygiene can be accomplished by implementing behavior changes over several weeks and months that encourage sleep while avoiding behaviors that inhibit sleep.<sup>66</sup> The Sleep Hygiene Index (see Table

---

61. U.S. Department of Defense, 3; Department of the Army, *A Leader's Guide to Soldier Health and Fitness*, ATP 6-22.5 (Washington, DC: Department of the Army, 2016), 2-5.

62. Christopher M. Barnes et al., “Lack of Sleep and Unethical Conduct,” *Organizational Behavior and Human Decision Processes* 115, no. 2 (2011): 177, <https://doi.org/10.1016/j.obhdp.2011.01.009>.

63. Gunia et al., 203-205.

64. Troxel et al., xx.

65. David F. Mastin, Jeff Bryson, and Robert Corwyn, “Assessment of Sleep Hygiene Using the Sleep Hygiene Index,” *Journal of Behavioral Medicine* 29, no. 3 (2006): 223, <http://dx.doi.org/10.1007/s10865-006-9047-6>.

66. Brant W. Riedel, “Sleep Hygiene,” in *Treatment of Late-life Insomnia*, eds. Kenneth L. Lichstein and Charles M. Morin (Thousand Oaks, CA: Sage, 2000), 125-146, <https://dx.doi.org/10.4135/9781452225555>.



1) can be used to assess inadequate sleep hygiene and offers a framework to organize behaviors to improve hygiene.<sup>67</sup> Please take a minute to take the test and assess the results.

Table 1. Sleep Hygiene Index<sup>68</sup>

| Sleep Hygiene Index                                                                                                                                                |       |        |           |            |        |        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|-----------|------------|--------|--------|
| Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice. |       |        |           |            |        |        |
|                                                                                                                                                                    | 0     | 1      | 2         | 3          | 4      | Score: |
|                                                                                                                                                                    | Never | Rarely | Sometimes | Frequently | Always |        |
| 1. I take daytime naps lasting two or more hours.                                                                                                                  | 0     | 1      | 2         | 3          | 4      |        |
| 2. I go to bed at different times from day to day.                                                                                                                 | 0     | 1      | 2         | 3          | 4      |        |
| 3. I get out of bed at different times from day to day.                                                                                                            | 0     | 1      | 2         | 3          | 4      |        |
| 4. I exercise to the point of sweating within 1 hr of going to bed.                                                                                                | 0     | 1      | 2         | 3          | 4      |        |
| 5. I stay in bed longer than I should two or three times a week.                                                                                                   | 0     | 1      | 2         | 3          | 4      |        |
| 6. I use alcohol, tobacco, or caffeine within 4 h of going to bed or after going to bed.                                                                           | 0     | 1      | 2         | 3          | 4      |        |
| 7. I do something that may wake me up before bedtime (for example: play video games, use the internet, or clean).                                                  | 0     | 1      | 2         | 3          | 4      |        |
| 8. I go to bed feeling stressed, angry, upset, or nervous.                                                                                                         | 0     | 1      | 2         | 3          | 4      |        |
| 9. I use my bed for things other than sleeping or sex (for example: watch television, read, eat, or study).                                                        | 0     | 1      | 2         | 3          | 4      |        |
| 10. I sleep on an uncomfortable bed (for example: poor mattress or pillow, too much or not enough blankets).                                                       | 0     | 1      | 2         | 3          | 4      |        |
| 11. I sleep in an uncomfortable bedroom (for example: too bright, too stuffy, too hot, too cold, or too noisy).                                                    | 0     | 1      | 2         | 3          | 4      |        |
| 12. I do important work before bedtime (for example: pay bills, schedule, or study).                                                                               | 0     | 1      | 2         | 3          | 4      |        |
| 13. I think, plan, or worry when I am in bed.                                                                                                                      | 0     | 1      | 2         | 3          | 4      |        |
| Total Score:                                                                                                                                                       |       |        |           |            |        |        |

If your score is greater than 39.5, your sleep hygiene is poor, and you should write down one strength and one goal to focus on for the next 7 days. If your score falls between 26 and 39.5, your sleep hygiene is fair, and you should write down two strengths and one goal to focus on for the next 7 days. If your score falls between 12.5 and 26, your sleep hygiene is moderate, and you should write down three strengths and one goal to focus on for the next 7 days. If your score is less than 12.5, your sleep hygiene is excellent, and you should write down four strengths and identify what may cause you to compromise your sleep habits. The scoring rubric is from <https://zestysleep.com/sleep-hygiene-index/>.

There are many things one can do to improve sleep hygiene. For example, routinely napping for two or more hours during the day or sleeping in on weekends reflects sleep debt and potentially poor sleep habits. Instead, avoid napping after 3 pm to sustain the sleep pressure required to fall asleep at bedtime.<sup>69</sup> Although many individuals know that caffeine and nicotine are stimulants, they often forget that they are “antithetical to sleep” and signal the body to be alert and awake.<sup>70</sup> Consequently, limiting caffeine and

67. Mastin et al., 223.  
68. Adapted from Mastin et al., 226-227.  
69. U.S. Department of Health and Human Services, “In Brief: Healthy Sleep,” National Heart, Lung, and Blood Institute, last modified September 2011, <https://www.nhlbi.nih.gov/files/docs/public/sleep/healthysleepfs.pdf>.  
70. Headquarters, Department of the Army, FM 7-22, 11-4.

nicotine consumption six hours before bedtime may also improve sleep.

Many additional behavioral and environmental changes can also be implemented to improve sleep hygiene and facilitate sleep onset. Establish a consistent wake time and bedtime seven days per week to allow the body to improve the circadian rhythm.<sup>71</sup> Develop a healthy pre-bedtime routine.<sup>72</sup> Consider setting an evening alarm as a reminder to begin winding down and preparing for sleep. A nightly sleep routine might include reducing fluid intake three hours before bedtime to prevent sleep disruption, avoiding alcohol consumption within two hours of bedtime, avoiding vigorous exercise or elevating core body temperature within an hour of bedtime, and limiting exposure to electronic devices at least 30 minutes before bedtime.<sup>73</sup>

Unfortunately, common evening behaviors hinder the onset of sleep. For example, a common misbelief is that alcohol helps one sleep better. While alcohol may help one fall asleep, its effects are short-lived. As the body metabolizes alcohol, it disrupts sleep cycles and negatively impacts the latter stages of sleep.<sup>74</sup> Furthermore, many people enjoy watching television and using other electronic devices that emit blue light before or while in bed. Unfortunately, blue light negatively affects sleep by impacting melatonin release and may trick the mind into thinking it is daytime. Fortunately, its impacts are reduced by wearing blue light blocking lenses.<sup>75</sup> Moreover, television, radio, and other activities can distract the mind and prevent the brain from achieving the deepest sleep stages, disrupting sleep continuity.<sup>76</sup>

Creating a healthy sleep environment can help improve sleep quality. Start by mitigating ambient light in the bedroom. Use window covers or a sleep mask, red nightlights for safety, and turn clocks away from the bed to minimize anxiety about sleep.<sup>77</sup> Further limit distractions by using earplugs or white noise machines to reduce ambient and background noise. Setting a bedroom temperature between 63 degrees °F (with heavy bedding) and

---

71. Headquarters, Department of the Army, *FM 7-22*, 11-2; Edward J. Stepanski and James K. Wyatt, "Use of Sleep Hygiene in the Treatment of Insomnia," *Sleep Medicine Reviews* 7, no. 3 (2003): 219, <https://doi.org/10.1053/smr.2001.0246>.

72. "Healthy Sleep Habits," American Academy of Sleep Medicine, last modified August 2020, <http://sleepeducation.org/essentials-in-sleep/healthy-sleep-habits>.

73. Wesensten and Balkin, 116; National Heart, Lung, and Blood Institute, "Healthy Sleep Habits," American Academy of Sleep Medicine.

74. Mahesh M. Thakkar, Rishi Sharma, and Pradeep Sahota, "Alcohol Disrupts Sleep Homeostasis," *Alcohol* 49, no. 4 (2015): 299, <https://doi.org/10.1016/j.alcohol.2014.07.019>.

75. Kimberly Burkhardt and James R Phelps, "Amber Lenses to Block Blue Light and Improve Sleep: A Randomized Trial," *Chronobiology International* 26, no. 8 (2009): 1602, <https://doi.org/10.3109/07420520903523719>; Ari Shechter et al., "Blocking Nocturnal Blue Light for Insomnia: A Randomized Controlled Trial," *Journal of Psychiatric Research* 96 (2018): 196, <https://doi.org/10.1016/j.jpsychires.2017.10.015>.

76. Alain Muzet, "Environmental Noise, Sleep and Health," *Sleep Medicine Reviews* 11, no. 2 (2007): 141, <https://doi.org/10.1016/j.smr.2006.09.001>.

77. Zachary A. Caddick et al., "A Review of the Environmental Parameters Necessary for an Optimal Sleep Environment," *Building and Environment* 132 (2018): 18, <https://doi.org/10.1016/j.buildenv.2018.01.020>.

82 degrees °F (without bedding) with humidity between 40-60% will also help produce environmental conditions conducive to sleep.<sup>78</sup>

Finally, engage in stress-relieving activities before bedtime. Many individuals may be preoccupied with work, worries, thoughts, or other stressors that can inhibit sleep. Mindfulness practice, breathing exercises, light stretching, meditative yoga, or a casual walk can help calm the mind and release tension.<sup>79</sup> Likewise, if unable to sleep after 20 minutes in bed, do not continue to lie in bed and try to force sleep, as it will only delay onset. Instead, get out of bed and practice relaxing activities that reduce stress and calm the mind, such as mindful deep breathing, soothing stretching, or reading.<sup>80</sup> Limiting light and sound while doing so will further aid in easing the mind to sleep.

Senior leaders who struggle with persistent daytime sleepiness, disrupted sleep, insomnia, or excessive snoring should consult their medical provider to address its impact on their physical and mental wellbeing. Medical providers may recommend minor lifestyle changes, adjust medication and supplement use, or recommend additional tests to understand issues that may be disrupting sleep patterns. The following section provides an abbreviated list of medical and non-medical sleep aids and their potential side-effects. The list is provided to aid discussions with a medical provider when seeking treatment for sleep disturbances or disruptions. The list should not substitute for a medical consultation.

### Medical and Non-medical Sleep Aids

Medical options to discuss with a medical provider include taking melatonin, sleep hypnotic drugs, and a combination of drugs for extreme circumstances requiring immediate sleep followed by immediate alertness. Melatonin generally does not promote sleep onset, but studies have demonstrated its efficacy in resetting the circadian rhythm (i.e., jetlag). Melatonin is not regulated by the FDA and thus may have varied amounts in each formulation.<sup>81</sup>

Prescribed sleep hypnotics, such as Zolpidem/Ambien and Temazepam/Restoril, facilitate the onset and continuity of sleep.<sup>82</sup> These medications may be addictive and generally should not be used for longer than a month. Studies have also linked high doses and prolonged use of hypnotics

---

78. Caddick et al., 14.

79. U.S. Department of Health and Human Services, "In Brief: Healthy Sleep;" U.S. Department of Defense, 11-4.

80. Wesensten and Balkin, 116; U.S. Department of Health and Human Services, "In Brief: Healthy Sleep;" Eric Suni, "Sleep Hygiene," Sleep Foundation, last updated September 29, 2022, <https://www.sleepfoundation.org/sleep-hygiene>.

81. Rebecca B. Costello et al., "The Effectiveness of Melatonin for Promoting Healthy Sleep: A Rapid Evidence Assessment of the Literature," *Nutrition Journal* 13, no. 106 (2014), 2. <https://doi.org/10.1186/1475-2891-13-106>.

82. Use of trademarked names does not imply endorsement by the author, the U.S. Army War College, the Department of Defense, or the U.S. Government and is intended only to assist in identification of specific medications.

with an increased risk of mortality and certain cancers.<sup>83</sup> For situations where sleep-deprived individuals require immediate sleep followed by immediate alertness, doctors may prescribe a combination of drugs that includes a sleep-inducing hypnotic and a rapid awakening agent (i.e., dextroamphetamine or modafinil). However, the longer-term health impact of using a two-drug combination for prolonged periods remains an area of research and study.<sup>84</sup>

Medical providers may also recommend non-pharmacological options such as keeping a sleep diary to track and understand daily routines that affect sleep or conducting a sleep study to rule out sleep disorders such as sleep apnea.<sup>85</sup> For example, smart phone applications can be used to help track sleep.<sup>86</sup> Mobile applications such as *CBT-I Coach* have been used to augment therapy from a medical provider, whereas other applications such as *Sleep Cycle* can be used to capture individual sleep data.<sup>87</sup> Tools like the psychomotor vigilance test can measure reaction times and alertness, both of which are impacted by a sleep deficit.

Other non-pharmacological options include behavioral therapies that improve sleep. For example, behavioral therapies such as cognitive behavioral therapy for insomnia (CBT-i) and brief behavioral treatment for insomnia (BBTi) have more durable and longer lasting benefits than pharmacological solutions.<sup>88</sup> Senior leaders have options to discuss with their medical provider if they are having difficulty falling or staying asleep.

---

83. Daniel F. Kripke, Robert D. Langer, and Lawrence E. Kline, "Hypnotics' Association with Mortality or Cancer: A Matched Cohort Study," *BMJ Open* 2, no. 1 (2012), 1, <http://dx.doi.org/10.1136/bmjopen-2012-000850>.

84. Wesensten et al., 293.

85. Colleen E. Carney et al., "The Consensus Sleep Diary: Standardizing Prospective Sleep Self-Monitoring," *Sleep* 35, no. 2 (2012): 287, <https://doi.org/10.5665/sleep.1642>; Deepak Shrivastava et al., "How to Interpret the Results of a Sleep Study," *Journal of Community Hospital Internal Medicine Perspectives* 4, no. 5 (2014): 1, <https://doi.org/10.3402/jchimp.v4.24983>.

86. Jong Cheol Shin, Julia Kim, and Diana Grigsby-Toussaint, "Mobile Phone Interventions for Sleep Disorders and Sleep Quality: Systematic Review," *JMIR mHealth and uHealth* 5, no. 9 (2017): e131, <https://doi.org/10.2196/mhealth.7244>.

87. Erin Koffel et al., "A Randomized Controlled Pilot Study of CBT-I Coach: Feasibility, Acceptability, and Potential Impact of a Mobile Phone Application for Patients in Cognitive Behavioral Therapy for Insomnia," *Health Informatics Journal* 24, no. 1 (2018): 4, <https://doi.org/10.1177/1460458216656472>; Adrian A. Ong and M. Boyd Gillespie, "Overview of Smartphone Applications for Sleep Analysis," *World Journal of Otorhinolaryngology-Head and Neck Surgery* 2, no. 1 (2016): 47, <https://doi.org/10.1016/j.wjorl.2016.02.001>; Use of trademarked names does not imply endorsement by the author, the U.S. Army War College, the Department of Defense, or the U.S. Government.

88. Vincent F. Capaldi et al., "Insomnia in the Military: Application and Effectiveness of Cognitive and Pharmacologic Therapies," *Current Psychiatry Reports* 17, no. 10 (2015): 4, <https://doi.org/10.1007/s11920-015-0622-9>; Troxel et al., 92; Matthew D. Mitchell et al., "Comparative Effectiveness of Cognitive Behavioral Therapy for Insomnia: A Systematic Review," *FOCUS* 12, no. 1 (2014): 86, <https://doi.org/10.1176/appi.focus.12.1.80>.

Recommendations to Improve Sleep (Organizational)

The following section offers recommendations on sleep leadership at the organizational level; strategies to improve the cognitive and physical performance of units in garrison, training, and combat.

Sleep Banking

Sleep banking provides the “physical resilience” to prepare for sleep loss.<sup>89</sup> Building a reserve of sleep by increasing daily sleep duration reduces the effects of subsequent sleep deprivation. Sleep banking extends performance and sustains alertness while also shortening the duration of recovery following decremented sleep.<sup>90</sup> Leaders should plan for and integrate sleep banking into operations to allow individuals and units to increase performance during periods of anticipated sleep loss (see Table 2). Sleep banking also improves morale and unit climate, even during periods of training or combat with reduced sleep.<sup>91</sup>

Table 2. Sleep Banking Strategy<sup>92</sup>

| Operations or Training | Strategy                                                                                                                                                                                                                                                                                                                                 |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Before                 | <ul style="list-style-type: none"><li>• Integrate sleep banking into training plans two weeks prior to execution</li><li>• Set conditions for 8 or more hours of sleep per 24-hour period</li><li>• Implement reverse cycle physical training, ~1600-1700hrs</li><li>• Stop caffeine and alcohol at least 6 hours before sleep</li></ul> |
| During                 | <ul style="list-style-type: none"><li>• Integrate naps to accumulate 7 to 8 hours of sleep</li><li>• Use caffeine to reduce grogginess and improve alertness</li><li>• Separate day and night sleeping areas</li></ul>                                                                                                                   |
| After                  | <ul style="list-style-type: none"><li>• Allow additional time to refill the sleep bank</li><li>• Sleep at least 8 hours to return to optimal cognitive and physical performance</li></ul>                                                                                                                                                |

Napping can buy back sleep debt. Short duration naps have minimal impact on the circadian rhythm and sleep cycle when limited to 20-30 minutes. Short-duration naps are most effective at restoring the body and mind while limiting sleep inertia upon waking.<sup>93</sup> The best time to nap is the early afternoon, which coincides with the circadian rhythm’s natural dip.<sup>94</sup>

Caffeine use

Caffeine suppresses sleep pressure building in the brain, but it cannot replace sleep, improve judgment or decision-making.<sup>95</sup> The recommended

89. U.S. Department of Defense, 15.  
90. Wesensten and Balkin, 111.  
91. Amy Thompson, Brad Jones, and Jordan Thornburg, “Sleep Banking,” *Military Review* (January – February 2017): 92-95, [https://www.armyupress.army.mil/Portals/7/military-review/Archives/English/MilitaryReview\\_2017228\\_art016.pdf](https://www.armyupress.army.mil/Portals/7/military-review/Archives/English/MilitaryReview_2017228_art016.pdf).  
92. Adapted from Headquarters, Department of the Army, *FM 7-22*, 11-9.  
93. Amber Brooks and Leon Lack, “A Brief Afternoon Nap Following Nocturnal Sleep Restriction: Which Nap Duration is Most Recuperative?” *Sleep* 29, no. 6 (2006): 831, <https://doi.org/10.1093/sleep/29.6.831>.  
94. Qingwei Chen et al., “Effects of Afternoon Nap Deprivation on Adult Habitual Nappers’ Inhibition Functions,” *Biomed Research International* (2018): 2, <https://doi.org/10.1155/2018/5702646>.  
95. Headquarters, Department of the Army, *FM 7-22*, 11-11.



dose to enhance alertness and mental acuity is 200mg of caffeine or two cups of coffee, not to exceed 400mg in 24 hours.<sup>96</sup> For periods of total sleep deprivation, caffeine consumption should not exceed 1000mg.<sup>97</sup> See Table 3 for a caffeine dosing strategy during sustained operations with total and partial sleep deprivation and night operations.

**Table 3. Caffeine Dosing Strategy<sup>98</sup>**

| Mission Requirements                                                  | Caffeine Dose                                                                                                                                                         |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sustained Operations –<br>Total Sleep Deprivation                     | <ul style="list-style-type: none"> <li>• 200mg at midnight</li> <li>• 200mg at 0400 and 0800 as needed</li> <li>• 200mg at 1200 and 1600 as needed</li> </ul>         |
| Sustained Operations –<br>Partial Sleep Deprivation (6 hours or less) | <ul style="list-style-type: none"> <li>• 200mg upon awakening</li> <li>• 200mg four hours later</li> <li>• Last Dose: at least 6 hours before bed</li> </ul>          |
| Night Operations with Daytime Sleep                                   | <ul style="list-style-type: none"> <li>• 200mg at start of night shift</li> <li>• 200mg four hours later</li> <li>• Last Dose: at least 6 hours before bed</li> </ul> |

### Jet Lag

Jet lag stresses the body's internal clock and throws it out of synchronization. It takes several days for the body to restore the circadian rhythm as it resynchronizes to the new time zone. Jet lag affects younger travelers less severely than individuals in midlife who require additional recovery time after a flight.<sup>99</sup>

Traveling across three or fewer time zones produces minimal jet lag. Several guiding principles can be implemented to reduce jet lag (see Table 4). For example, the body needs one day of recovery per hour of time zone change.<sup>100</sup> For short trips (less than 72 hours) that cross four or more time zones, one should attempt to remain in the original time zone.<sup>101</sup> Although eastbound flights crossing six time zones can feel more

96. A cup of coffee is generally 100 milligrams of caffeine; D.A. Hansen et al., "Randomized, Double-Blind, Placebo-Controlled, Crossover Study of the Effects of Repeated-Dose Caffeine on Neurobehavioral Performance During 48 h of Total Sleep Deprivation," *Psychopharmacology* 236 (2019), 7. <https://doi.org/10.1007/s00213-018-5140-0>; Daniele Wikoff et al., "Systematic Review of the Potential Adverse Effects of Caffeine Consumption in Healthy Adults, Pregnant Women, Adolescents, and Children," *Food and Chemical Toxicology* 109 (2017): 586, <https://doi.org/10.1016/j.fct.2017.04.002>.

97. Olivier Coste, Patrick Remont, and Didier Lagarde, *Wake-Sleep Cycle Management during SUSOPS and CONOPS in French Military Forces: Policy and Ethics* (Institut de Medicine Navale du Service de Sante des Armees, Toulon, France, 2009), 29-9, <https://apps.dtic.mil/sti/citations/ADA567875>.

98. Adapted from Headquarters, Department of the Army, FM 7-22, 11-11.

99. Wesensten et al., 290.

100. Wesensten et al., 289-290, 294.

101. Jim Waterhouse et al., "Jet Lag: Trends and Coping Strategies," *The Lancet* 369, no. 9567 (2007): 1125-1126, [https://doi.org/10.1016/S0140-6736\(07\)60529-7](https://doi.org/10.1016/S0140-6736(07)60529-7).

stressful than westbound flights, each direction can affect sleep differently. For example, eastbound travelers have difficulty falling asleep, whereas westbound travelers have less difficulty falling asleep but have difficulty remaining asleep. For north or southbound flights, jet lag results from flight duration and sleep deprivation. In other words, the longer the flight and associated sleep deprivation from the flight, the more exhaustion and malaise experienced by the traveler.<sup>102</sup>

**Table 4. Jet Lag Strategy<sup>103</sup>**

| Travel | Strategy                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Before | <ul style="list-style-type: none"><li>• Integrate sleep banking into training plans two weeks prior to travel</li><li>• Set conditions for 8 or more hours of sleep per 24-hour period</li><li>• Implement reverse cycle physical training, ~1600-1700hrs</li><li>• Refrain from attempting to pre-adapt to a new time zone</li><li>• Issue foam ear plugs, eye mask, and blankets</li><li>• Drink water and hydrate prior to travel</li></ul> |
| During | <ul style="list-style-type: none"><li>• Coordinate for meals prior to or immediately after takeoff</li><li>• Drink lots of water and eat roughage (fruit and vegetables)</li><li>• Sleep, use the assistance of foam ear plugs, eye mask, and a blanket</li></ul>                                                                                                                                                                              |
| After  | <ul style="list-style-type: none"><li>• Schedule meetings during normal waking hours from originating time zone</li><li>• Regular exercise and mealtimes shorten the recovery period</li><li>• Avoid naps for 3 to 4 days as the body adjusts to a new time zone</li><li>• Melatonin can aid with recovering from jetlag as it assists with resetting the circadian rhythm*</li></ul>                                                          |

\* Melatonin dosing can be administered depending on the direction of travel. For recovery from eastbound flights, take melatonin in the late afternoon. For recovery from westbound flights, take melatonin halfway through a sleep cycle to prevent waking up too early.

Public Health Related Resources

There are many resources available from military and civilian sources to help service members improve sleep duration, timing, and continuity. This section provides a partial listing and does not imply endorsement of commercial products by the authors, the U.S. Army War College, the Department of Defense, or the U.S. Government.

The DoD sleep-related websites include information, resources, and tools generated by the Uniformed Services University Consortium of Health and Military Performance (CHAMP), the Army Public Health Center, the Army FIT – Ready and Resilient, the Walter Reed Army Institute of Research, and the Biotechnology High Performance Computing Software Applications Institute (BHSI).<sup>104</sup> For example, the Human Performance

102. Wessensten et al., 289-290.

103. Adapted from Headquarters, Department of the Army, *FM 7-22*, 11-7 through 11-8.

104. “Sleep & Stress,” Uniformed Services University Consortium of Health and Military Performance (CHAMP), accessed March 30, 2021, <https://www.hprc-online.org/mental-fitness/sleep-stress>; “Sleep,” Army Public Health Center, updated January 5, 2021, <https://phc.amedd.army.mil/topics/healthyliving/sleep>; “Army FIT – Ready and Resilient,” Army Resiliency Directorate, accessed March 30, 2021, <https://armyfit.army.mil/>, CAC or DS Logon required; “Sleep Resources,” Walter Reed Army Institute of Research (WRAIR), accessed February 12, 2023, <https://wrair.health.mil/Sleep-Resources/>; “2B-Alert Web,” Biotechnology High Performance Computing Software Applications Institute (BHSI), accessed March 30, 2021, <http://sleep.bhsai.org/>.



Resources found on the CHAMP website provide evidence-based resources to maximize holistic performance that include tips and information on sleep that leaders can use to educate themselves and their teams.<sup>105</sup> The CHAMP website also offers an “Ask the Expert” service where one can submit questions and receive tailored responses from CHAMP providers, scientists, and researchers.<sup>106</sup>

The Army Public Health Center publishes tips and articles for healthy living, including effective sleep habits, sleeping tactics during sustained operations, and a sleep checklist for leaders and supervisors. The Army Public Health Center also includes links to news articles that discuss sleep’s role in consolidating memory, maintaining health, and the interaction between diet and sleep patterns.<sup>107</sup>

The Army FIT – Ready and Resilient website offers information focused on physical, emotional, social, spiritual, and family fitness. The website allows service members to take the *Azimuth Check For Soldiers* and to view their results and personalized recommendations based on the results. It also offers specific resources on sleep loss and performance, developing better sleep habits, impacts of screen time before bed, and links between post-traumatic stress disorder and sleep disruptions.<sup>108</sup>

The Walter Reed Army Institute of Research (WRAIR) Center for Military Psychiatry and Neuroscience also offers a wide range of tips, checklists, and fact sheets for individuals and units.<sup>109</sup> The resources on WRAIR’s website are based on decades of military-specific studies on warfighter performance and resilience. In addition, WRAIR houses the DoD’s largest research sleep laboratory and focuses on implementing science in operational units and continues to study the impacts of sleep on alertness, decision-making, and performance to produce material and non-material solutions for warfighters.<sup>110</sup>

The Biotechnology High Performance Computing Software Applications Institute (BHSAL) is part of the Army’s Telemedicine and Advanced Technology Research Center (TATRC). Found on the BHSAL website, the “2B-Alert” tool and mobile application can be used to predict how an individual’s sleep/wake schedule will be impacted by caffeine consumption and time of day.<sup>111</sup> The website and app can also design an individual plan optimizing sleep/wake and caffeine to increase alertness during 48 hours of total sleep deprivation.”<sup>112</sup>

---

105. CHAMP, “Sleep & Stress.”

106. “Ask the Expert,” Uniformed Services University Consortium of Health and Military Performance (CHAMP), accessed March 30, 2021, <https://www.hprc-online.org/ask-the-expert>.

107. Army Public Health Center, “Sleep.”

108. Army Resiliency Directorate, “Army FIT – Ready and Resilient.”

109. WRAIR, “Sleep Resources.”

110. “Behavioral Biology,” WRAIR, accessed February 12, 2023, <https://wrair.health.mil/Biomedical-Research/Center-for-Military-Psychiatry-and-Neuroscience/Behavioral-Biology/>.

111. BHSAL, “2B-Alert Web.”

112. Jaques Reifman et al., “2B-Alert App: A Mobile Application for Real-Time Individualized Prediction of Alertness,” *Journal of Sleep Research* 28, no. 2 (2019): 1, <https://doi.org/10.1111/jsr.12725>.

Civilian sleep resources include the National Sleep Foundation and the American Association of Sleep Medicine websites, which provide extensive articles on sleep science and sleep and wellness reviews. For example, [www.sleepfoundation.org](http://www.sleepfoundation.org) includes information on sleep hygiene, the circadian rhythm, women's health and sleep, infant and youth sleep, and travel fatigue. The National Sleep Foundation offers a sleep calculator to determine the optimal sleep schedule and in-depth analysis of sleep disorders like insomnia, sleep apnea, and restless leg syndrome (RLS). The [www.sleepfoundation.org](http://www.sleepfoundation.org) website provides detailed reviews of sleep-related products, including mattresses, sheets, pillows, CPAP machines, anti-snoring devices, and weighted blankets. Finally, the American Association of Sleep Medicine provides online resources to measure sleep at [www.sleepeducation.org](http://www.sleepeducation.org).

## **Conclusion**

Sleep is fundamental to senior leader health and wellbeing and plays a critical role in sustaining performance throughout midlife. The physiological processes that occur during sleep have profound impacts on all systems of the body, especially brain health. Sufficient sleep enhances cognitive function and mental agility required to gain the intellectual overmatch needed to win in complex multi-domain operations. Prioritizing sleep improves individual and organizational readiness and serves as a tool for senior leaders to mitigate physiological changes associated with aging. By ensuring adequate sleep duration, continuity, and timing, senior leaders nourish their mind and body maximizing their cognitive and physical performance and forestalling the biological declines of aging.

## Key Takeaways

- Senior military leaders must understand the critical role sleep plays in sustaining their individual health, wellbeing, performance, and readiness.
- Prioritizing sleep better prepares leaders to address the challenges of work and life while mitigating the physiological changes associated with aging.
- Sleep deprivation reduces one's ability to execute complex cognitive tasks, communicate effectively, make appropriate decisions, and maintain vigilance.
- Sleep, physical fitness, and diet are interdependent and are often among the first things sacrificed in times of stress.
- Sleep deprivation can exacerbate a range of health issues commonly found in midlife.
- This chapter provides both individual and organizational recommendations to improve sleep.



For this and other publications, visit us at [armywarcollege.edu](http://armywarcollege.edu)



This Publication

USAWC Website