PennState

CLEARINGHOUSE
FOR MILITARY FAMILY READINESS

Shift Work, Sleep Health and Interventions

Rapid Literature Review

Clearinghouse Technical Assistance Team

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Table of Contents

Executive Summary

Some individuals are expected to participate in shift work in different work sectors, such as healthcare or military occupations, to meet the needs and ensure the safety and well-being of those in a community and nationwide. However, issues arise regarding individuals' sleep health, like decreased sleep duration and quality, as staff must operate during irregular and sometimes extended work hours. Decreased sleep health is typically associated with shift work and can lead to fatigue, which likely affects staff's work-life balance, work performance, safety, and overall health. Scheduling staff to ensure shifts are properly staffed, work is properly completed, and to protect the health and safety of a team can be challenging; however, considering and using guidelines and interventions that address these challenges could be helpful. Scheduling guidelines to consider include the following:

- Match schedules to circadian alignment
- Limit longer shift duration
- Provide consistency in scheduling shifts
- Provide forward rotation of schedules
- Limit the number of night shifts and quick returns
- Ensure scheduling participation from multiple departments

In addition to using the above guidelines to help mitigate some of the negative effects of shift work, there are interventions that can also be implemented:

- Limit caffeine use and use in specific timelines
- Engage in healthy eating habits and regular exercise
- Create a pleasant bedroom environment for sleep
- Engage in taking naps
- Ensure leadership provides proper guidance and support when implementing interventions

Though there is no one way to perfectly schedule shift work since every situation is different, considering and using these guidelines and interventions could help staff improve their sleep health, which, in turn, will likely enhance mental and physical health, cognitive performance, and general safety.

Introduction

The Technical Assistance (TA) team at the Clearinghouse for Military Family Readiness at Penn State (Clearinghouse) conducted a brief, rapid literature review that focuses on the impacts of shift work on sleep health for Service members and how to counteract the negative effects of shift work using strategic scheduling and interventions. This review examined peer-reviewed journal articles and grey literature published between 2015 and 2025. Search queries included a combination of the following terms: *Shift Work, Rotating, Scheduling, Interventions, Sleep Hygiene, Work-Life Balance, and Optimization*.

Background

According to the National Institute for Occupational Safety and Health (2020a), shift work is defined as working at times outside of traditional office hours (i.e., 7 a.m. – 6 p.m.). Shift-work schedules and configurations vary widely by occupation and the unique demands of different jobs. The following variables are commonly considered when discussing differing shift work schedules (The National Institute for Occupational Safety and Health, 2020a):

- **Speed of Shift Rotation**: refers to how quickly shift work times change. For example, an individual may work different timed shifts in the same week, such as a combination of day and night shifts, which is also known as a fast shift rotation. Conversely, shift rotations may be slow. In a slower rotation, individuals may work the same day shift for longer periods of time (e.g., 2 weeks) and then transition to a night shift for the following 2 weeks.
- **Direction of Shift Rotation**: refers to how shifts move from one block of time to another block of time. The direction can be a forward rotation in which a worker moves from the day shift to the evening shift to the night shift with every rotation. The direction can also be a backward rotation in which a worker moves from the night shift to the evening shift to the day shift with every rotation.
- **Shift Duration** refers to how much time an individual works per shift. A shorter shift is between 8 to 10 hours, while longer shifts may last from 10 to 13 hours.
- **Time Off Between Shifts**: this refers to the amount of time workers have to rest after finishing one shift and before starting the next shift.

The following section describes how shift work may impact an individual's sleep, overall health, and quality of life. Limited rigorous studies exist that focus solely on the impact of shift work on military personnel (Good et al., 2020). In part, this lack of research may stem from difficulties related to interruptions in the data collection process as individuals may need to perform other mission-critical tasks (Good et al., 2020). As a result, the research

below draws upon other civilian professions, such as the healthcare sector. Those working in healthcare roles (e.g., nurses and doctors) have skill sets that could be transferable to skill sets found within the military sector (Good et al., 2020). For example, many healthcare professionals must have sharp cognitive abilities and be able to identify, process, and respond quickly to diverse situations to provide appropriate care. These same skills can be translated and applied to military occupations when Service members must carry out missions and avoid fatal errors (Good et al., 2020). These findings, while not exclusively related to the military, may contribute to an overall understanding of best practices in shift work scheduling in civilian and military populations (Good et al., 2020).

Shift Work's Impact on Sleep, Overall Health, and Quality of Life

Sleep

Multiple sleep research institutions, such as the National Sleep Foundation and American Academy of Sleep Medicine, and federal agencies, such as the Department of Defense (DoD), recommend that an adult should have a minimum of 7 hours of sleep each night (Good et al., 2020; United States Government Accountability Office [GAO], 2024). This recommended amount of sleep is needed for an individual to experience a healthy sleep process to keep their body functioning properly.

Different processes occur within the body in order to create and maintain balance. For example, the circadian process regulates an individual's biological clock and helps the body know when it is time to be awake, generally during daytime hours, and when it is time to sleep, generally during nighttime hours (Gurubhagavatula et al., 2021). The homeostatic sleep drive, or sleep pressure, determines the level of sleepiness a person experiences throughout the 24 hours in a day (Gurubhagavatula et al., 2021). For example, after an individual wakes up and starts their daily tasks and routines, their level of sleepiness will build, usually beginning at a low level and increasing throughout the day. When a person goes to sleep, this sleep pressure decreases since the sleep drive is being met with rest (Gurubhagavatula et al., 2021). An individual's inner clock and sleep pressure cycles work together throughout the day to tell their body when they should be awake and when they should sleep. The balance of these two cycles can be thrown off when work schedules interrupt times when a person should be at rest. This interruption can result in mental fatigue, which can affect an individual's problem-solving abilities, concentration, and performance (Gurubhagavatula et al., 2021).

Over the span of an individual's life, sleep and wake patterns change. Infants generally require twice as much sleep as adults, but as individuals develop into adolescents and young adults, their sleeping patterns slowly align with adult patterns, requiring around 9 hours of sleep (Good et al., 2020). Individuals who enlist in the military are generally young adults who still require around 9 hours of sleep; however, this sleeping pattern does not align with the basic training sleeping hours, usually 6 hours or less a day. According to research, if a person receives 6 or fewer hours of sleep a night, they experience short sleep duration (SSD)(Good et al., 2020). Two military studies found that between 69 and 72% of Service members experience SSD, and 27 to 30% get the recommended 7 hours of daily sleep (Good et al., 2020). Additional research completed by the GAO supports these findings and determined that 67% of the 190 officers in the study were getting 6 to 7 hours of sleep, and 26% of the officers were getting 4 to 5 hours of sleep (GAO, 2024).

Sleep quality is as important as sleep duration. Experiencing poor sleep quality can negatively impact an individual's mental and physical health and work performance. In the past 10 years, the DoD has recognized that sleep quality is as essential and important as physical activity and nutrition, so they created the Army Performance Triad. The Army Performance Triad is a plan that intends to increase Soldiers', their families,' and civilians' general health by emphasizing the relationship between sleep, activity, and healthy eating habits. This plan of action promotes health through physical activity, risk mitigation, and medical care and strives to improve performance, mission readiness, and personal resilience (Duessel et al., 2022).

Even though the DoD recognized the importance of sleep quality, the GAO report, mentioned above, stated that 47% of Service members reported receiving moderately good sleep quality, and 46% of Service members stated they had moderately poor sleep quality (GAO, 2024). These different reports of sleep quality may be due to diverse responsibilities such as performing primary and side duties; engaging in the fast pace of the military work environment; and, for deployed Service members, living in poor sleep environments (e.g., temperature, exposure to light, poor or no bedding; GAO, 2024).

Several negative outcomes can develop and worsen when sleep duration and quality are compromised. These include, but are not limited to, the following: increased fatigue, decreased work-life balance, and increased general health risks.

Fatigue

Experiencing a lack of sleep or a change in one's sleep schedule can cause the quality and duration of sleep to diminish, and this can lead to fatigue. Two types of fatigue can be experienced (Chen et al., 2023):

- Physical fatigue is related to the physical workload that causes an individual to become drained of strength, increasing general discomfort.
- Mental fatigue is related to psychological tiredness caused by extended intellectual or reasoning activity. Needing to care for others can exacerbate mental fatigue.

In their research, Chen and colleagues (2023) found that nurses who worked either day or night shifts in the intensive care unit (ICU) experienced physical and mental fatigue more often than nurses who worked in other units. This outcome may be due to the work environment where high levels of physical and mental energy are required, including excessive physical demands such as standing, bending, lifting, assisting patients, and facing high responsibility concerns (Chen et al., 2023). Fatigue and sleepiness can increase in workers if sleep loss or displacement is ongoing for an extended period, and recovery may take multiple days to stabilize the individual's circadian rhythms and physical energy levels (Gurubhagavatula et al., 2021).

As with healthcare workers, military personnel also work long shifts as they can be assigned to 24-hour details that can be physically and mentally demanding (Good et al., 2020). Engaging in nighttime missions and trainings that can last several days can increase Service members' susceptibility to sleep deprivation. Continued involvement in these types of environments can lead to compromised safety (Good et al., 2020). In addition, shift work and stressful situations can cause insomnia, which is the inability of one to go to sleep and/or stay asleep. Insomnia, which can also create fatigue for an individual, can be short- or long-term, transient, or chronic (Good et al., 2020). Causes of insomnia include post-traumatic stress disorder (PTSD), general anxiety, and depression. These conditions are connected to poor sleep quality and duration (Good et al., 2020).

Another side effect of engaging in shift work and working hours that are not aligned with one's internal clock is shift work disorder (SWD). SWD is "a circadian rhythm sleep-wake disorder characterized by excessive sleepiness and/or insomnia with concomitant sleep reduction due to work hours that overlap with the habitual time for sleep" (Waage et al., 2021,p. 924). One study found that 32% of the nurses surveyed were already experiencing SWD at baseline before changing their work schedule to various shifts over the course of the study (Waage et al., 2021).

Work-Life Balance

Work-life balance may become unsynchronized when individuals participate in shift work or experience the need to work for extended hours. In their study mentioned above, Chen and colleagues (2023) noted that fatigue has been correlated with family conflict and can interfere with an individual's ability to perform responsibilities related to family needs and commitments. These factors can lead to feelings of guilt, frustration, and anxiety (Chen et al., 2023).

However, work-life balance with shift work can be nuanced. In one qualitative study in Norway, nurses were interviewed to determine how they balanced the struggles and opportunities that arose from working long hours or different shifts (Ingstad & Haugan, 2024). These long hours or shifts included working the following:

- 14 hours for 7 days straight with 2 weeks off;
- 12 to 14 hours for 3 to 4 days with 1 week off; or
- 6 to 8 hours every day but longer shifts every 4th weekend

The nurses noted several negative effects from working these shifts: lacked a social life while working extended shifts, missed out on important events, and experienced stress when solving family logistics (e.g., school pick-ups, planning for a babysitter) (Ingstad & Haugan, 2024). However, nurses stated that the long breaks they experienced after the extended shift work allowed them to have more time with family and friends (Ingstad & Haugan, 2024). Additionally, these breaks provided an opportunity for the nurses to fully disconnect and relax from the stresses of work, which suggests that these breaks help reduce stress and help with recovery time (Ingstad & Haugan, 2024).

Though there were negative outcomes from working these long hours, nurses did note that they experienced better continuity in their work as they were able to complete more tasks during one shift (Ingstad & Haugan, 2024). Additionally, the nurses experienced financial peace and balance as they recognized their work and pay would be dependable with having a consistent schedule (Ingstad & Haugan, 2024). Having "peace of mind," feeling free from worry and anxiety, can ease work-related stress.

Additional Factors and Health Risks

Other factors associated with shift work can compound the negative effects of these schedules and may cause a ripple effect on sleep, health issues, work performance, and safety. For example, scheduling-related factors can influence an individual's work performance, and these include early starts, adjusting work schedules from forward to backward rotation, and working back-to-back shifts (Gurubhagavatula et al., 2021).

Commute time and the driving experience (e.g., dealing with different weather conditions, traffic, distance to work, and physical conditions of the road) can create mental fatigue and stress and may impede one's ability to engage in rest time (Gurubhagavatula et al., 2021).

Personal factors, like a person's chronotype or sleep-wake cycle, can impact levels of sleepiness and fatigue. Chronotype refers to a person's tendencies to be awake or sleepy at certain times of the day (i.e., a night person or late chronotype, or a morning person or early chronotype (Gurubhagavatula et al., 2021). Chronotype helps determine a person's optimal sleep time and can be influenced by internal (i.e., genetics) and external (i.e., work conditions) factors (Chauhan et al., 2023; Gurubhagavatula et al., 2021). Additional personal factors that can impact the effects of shift work include demographics (e.g., age), fitness level, mental health, and stress tolerance (Gurubhagavatula et al., 2021). If a shift's schedule does not align with these factors, workers may experience performance, health, and safety risks. This is especially true if shift duration results in irregular sleep or sleep patterns (e.g., sleeping during the day) or receiving poor sleep quality. In their review, Lu et al. (2022) noted a project from Havard that found that unpredictable and inconsistent scheduling have more negative effects on health outcomes when compared to low wages. Examples of negative effects were noted by 15 shift-work experts who completed an in-depth literature review on the side effects of shift work. These experts found that women in the nursing profession in the military who worked more than 3 to 5 days consecutively showed an increased risk of being diagnosed with breast cancer. For men in the same profession, working 6 or more night shifts back to back was linked to an increased risk of being diagnosed with prostate cancer (Garde et al., 2020). There was also evidence of an increased risk of cancer in men and women who worked night shifts for 10 or more hours, especially if this schedule was permanent (Garde et al., 2020). Finally, Garde et al. (2020) determined that there was an increased risk of injury for workers who worked more than 10 to 12 continuous hours.

Guidelines for Creating Optimal Work Schedules

Based on this brief, rapid review of the research literature, **no one optimal design currently exists for shift work schedules** (The National Institute for Occupational Safety and Health, 2020b). However, the following list of evidence-informed recommendations should likely be considered when creating work schedules, so the negative impacts of shift work may be mitigated:

1. **Match Schedules to Circadian Alignment**
   Consider circadian alignment when scheduling to increase an individual's sleep quality and duration and decrease instances of fatigue. One study that measured

the impact different shift types had on social jet lag (i.e., circadian misalignment) found that the sleep quality of people who have early chronotypes decreased if they worked a night shift, regardless of whether this shift was on a permanent or rotating schedule (Casjens et al., 2022). For individuals who had a late chronotype, their sleep quality was unstable, especially when on a permanent night schedule (Casjens et al., 2022). This finding aligns with other research findings that examined correlations between working overnight and experiencing sleep quality issues (Casjens et al., 2022; Good et al., 2020). Studies at the Naval Postgraduate School found that adjusting students' schedules from working 5 hours on/10 hours off to 3 hours on/9 hours off aligned better with the students' natural circadian rhythms and resulted in improved mood and reaction times and reduced errors (Good et al., 2020). Though these results are hard to generalize to the entire military population, this could present a promising insight (Good et al., 2020). Matching shifts to staff's circadian alignments may not always be optimal for operations but should be considered where suitable.

2. Limit Longer Shift Duration

Determine an individual's suitable shift length and limit extended longer shifts. Decreasing long work shifts may support sleep quality and duration, limit fatigue, and maintain health and performance levels for workers. For example, Casjens and colleagues (2022) studied two companies in Germany to determine if implementing different work shifts (i.e., an 8-hour shift or a 12-hour shift) had an impact on sleep debt (i.e., the accumulated amount of lost sleep) and social jet lag. The results showed that individuals who worked rotational 12-hour shifts showed evidence of sleep deprivation, including low sleep duration on workdays and high sleep debt (Casjens et al., 2022). They also found that individuals who worked 12-hour shifts on the weekend (i.e., worked 24 hours weekly) experienced quality sleep more often, even though they experienced sleep deprivation on the days they worked (Casjens et al., 2022). This result is likely due to these individuals having more sleep and rest opportunities on their off days.

Casjens and colleagues (2022) also determined that individuals who worked a permanent night shift experienced high social jet lag, found it hard to compensate for this jet lag with sleep during the daytime on workdays and on off days, and had problems adjusting to social time on off days. In addition, regardless of the shift length, individuals who worked night shifts experienced more sleep debt (Casjens et al., 2022). Based on these findings, schedulers should likely provide shift-length adjustments to support workers who have to work extended 12-hour shifts and/or overnight.

3. Provide Consistency in Scheduled Shifts

Engaging in a consistent schedule can help regulate an individual's "biological rhythms," which can improve brain health, build muscle memory for workers performing routine tasks, and, in turn, can increase productivity on the job (Lu et al., 2022). Lu and colleagues (2022) noted that individuals who follow inconsistent work schedules experience losses in productivity, less job satisfaction, increased stress levels, and negative relationship outcomes.

Implementing a fixed and reliable schedule can help staff plan for rest. Lecca and colleagues (2021) found that workers with a consistent shift rotation were able to plan for enough rest time and preserve day vigilance as opposed to on-call day-shift workers, who often were uncertain if they would get enough rest before returning to work. A study by Lu et al. (2022) took a more granular look at scheduling consistency (i.e., scheduling workers during the same hours each shift and/or scheduling workers the same day[s] during the week) versus schedule predictability (i.e., employees know what their schedules will be in advance). They found that hour-of-the-day consistency (i.e., working the same time block for most of the month) and day-of-the-week consistency (i.e., working the same days for most of the month) improved productivity (Lu et al., 2022). Having schedule consistency is an environmental factor that can positively impact an individual's work performance and sleep quality and duration (Gurubhagavatula et al., 2021; Lu et al., 2022).

4. Provide Forward Rotation of Schedules

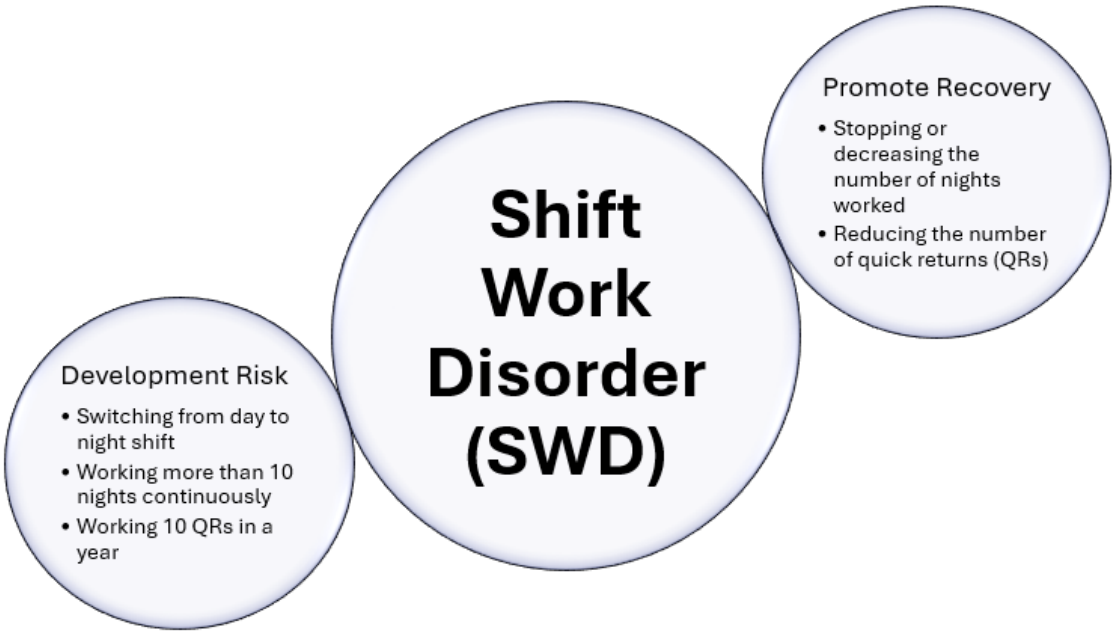
Moving from a backward to a forward rotation may be the best option to support sleep and wake cycles in professions where rotating shift schedules are necessary. For example, a worker might complete a week of night shift work, switch to a week of evening shift work, and then finish a cycle with a week of daytime work. Shifting schedules from backward to forward rotation has been shown to improve an individual's sleep quality and duration. However, the results of moving from forward to backward rotation (i.e., days to night work) can create more difficult adjustment for workers (Garde et al., 2020; The National Institute for Occupational Safety and Health, 2020b).

5. Limit the Amount of Night Shifts and Quick Returns

Working more nights or returning to work quickly after a previous shift can increase the instances of staff with SWD. A longitudinal study found that nurses with SWD had worked more night shifts within the last year and had worked more "quick returns" (i.e., returned to work less than 11 hours from the previous shift) compared to nurses who did not have SWD (Waage et al., 2021). Quick returns (QRs) can

have detrimental effects on productivity, and studies have shown that individuals who have less than 11 hours between two shifts experience more injuries on the job (Garde et al., 2020; Lu et al., 2022). The following figure illustrates how schedulers may reduce the likelihood of developing SWD and how to modify work hours to ensure a recovery from SWD.

Figure 1
Predictors for SWD



6. Ensure Participation from Multiple Stakeholders When Scheduling

Including input from multiple stakeholders across departments, including the workers impacted by the schedules, and leadership teams can ensure staff's physical, mental, and emotional needs are met. Best practices for creating schedules for workers can include working across departments and levels of management to determine how best to schedule shifts; understanding and considering the balance between staff's health, well-being, and output; and ensuring proper coverage to promote safety, efficiency, and productivity**.** In one study, Cheyrouze and Barthe (2023) worked in a private clinic to help the management change nurses' schedules from 12-hour shifts to a better-designed shift schedule that aligned with the nurses' preferences and chronotype. At the end of the study, researchers found that shifting schedules did benefit the nurses.

However, the biggest positive impact was that the nurses worked with other members of the organization to communicate concerns and find and test solutions (Cheyrouze & Barthe, 2023). Creating and implementing solutions to work schedules that consider various perspectives and situations can increase staff satisfaction and productivity and decrease the instances and impact of extended fatigue.

Interventions for Shift Work Issues

Sleep Hygiene

Outside of implementing scheduling practices to help with the sleep health of workers, sleep hygiene practices show promising impacts on the negative effects of decreased sleep duration and quality. Sleep hygiene is “a set of behavioral and environmental recommendations intended to promote healthy sleep” (Irish et al., 2015). Positive sleep hygiene practices can include, but are not limited to, limiting caffeine use, engaging in health eating habits and exercise, creating a pleasant bedroom environment, and engaging in taking naps (Irish et al., 2015; Shriane et al., 2020). Note, some research considered these interventions as sleep hygiene practices, while other research saw these as general interventions to increase sleep quality and duration and decrease fatigue.

Caffeine

Studies have shown that caffeine use (e.g., coffee, energy drinks) is common among shift workers as they try to combat sleepiness and fatigue. Ingesting moderate amounts of caffeine can temporarily improve alertness and focus but is not a substitute for sleep. The consumption time is an important consideration if one chooses to use caffeine (Shriane et al., 2020; GAO, 2024). Consuming caffeine too close to one’s standard bedtime can interrupt sleep. In addition, using caffeine frequently and in increasing amounts will increase its negative effects such as headaches, nervousness, dizziness, and restlessness (Shriane et al., 2020; GAO, 2024, Operation Supplement Safety, 2020). In one of the few studies related to the military, sleep, and shift work, the researchers noted that caffeine use is common among military personnel and a potential healthy alternative to prescription drugs (Good et al., 2020). For example, Service members utilized caffeine to improve marksmanship and sighting time during Hell Week.

However, caffeine use for Service members, over time, may develop into dependence through frequent overuse and abuse. As a result, the DoD has established resources that discuss caffeine dosing strategies, which involve Soldiers consuming controlled small and deliberately timed doses of caffeine (Good et al., 2020, Operation Supplement Safety, 2020). In a report published by the GAO that researched fatigue in the military, the report noted that Service members should have access to resources that discuss how to consume less caffeine (GAO, 2024). Consuming caffeine can have positive results, but this stimulant should be used with caution in moderation, and at suitable times.

Diet and Exercise

Research indicates that understanding what food is consumed, when food is consumed, and how often food is consumed can impact an individual's overall health, including sleep, mood, and cognitive functions (Kalkanis et al., 2023; Shriane et al., 2020). This is especially true for shift workers who may have irregular meal times and who may snack more often due to their inconsistent or varying work schedules (Kalkanis et al., 2023). Shift workers are encouraged to schedule their food intake around their work schedules and eat a healthy and balanced meal to maintain energy throughout their shift and promote healthy habits. Engaging in regular exercise or some type of physical movement (including low and high-intensity movements) can benefit an individual's physical and mental health and regulate their circadian rhythms (Kalkanis et al., 2023). Researchers also note that exercise "could keep 'winding' the internal clock, promoting better synchronization and improving sleep quality among shift workers" (Kalkanis et al., 2023, p.5).

Bedroom Environment

Sleep organizations, such as the Australasian Sleep Association and National Sleep Foundation, state that bedrooms should be cool, dark, and quiet to reduce interruptions and begin the sleep-inducing phase (Shriane et al., 2020). Shriane and colleagues noted that many shift workers, while in bed, participate in activities such as gaming and using other devices as they see these activities as a way to help them unwind; however, use of screens and gaming can be mentally stimulating, and this could prevent or delay the sleep process (Shriane et al., 2020). The National Institute for Occupational Safety and Health (2020c) suggests that creating a bedroom environment conducive to sleep, such as avoiding screens for an hour before bedtime, is a best practice.

Napping

Taking a nap can be a way for individuals to catch up on sleep and act as compensatory sleep, depending on how long the nap lasts. One study that examined two different German companies found that napping was common for permanent night-shift workers

and for 8-hour workers (in any shift), and taking naps helped to reduce the sleep debt (i.e., the amount of sleep owed to the body) individuals experienced (Casjens et al., 2022). The timing of the nap is also important. Sleeping before, during, or after a night shift can decrease physical fatigue if the sleep occurs before the night shift begins or lasts between 3 to 8 hours (Chen et al., 2023). Chen and colleagues (2023) also found that the longer an individual sleeps after their shift, the more their mental fatigue decreases. Napping during a night shift, however, may have differing effects for workers. The National Institute for Occupational Safety and Health found that taking a quick 15- to 30-minute nap during a shift could increase alertness, but other research found that taking naps during a shift (especially night shift) could lead to sleep inertia or difficulty focusing effectively after waking up (Chen et al., 2023; National Institute for Occupational Safety and Health, 2020b).

Guidance and Support for Intervention Implementation

Studies have shown that educating staff about sleep hygiene practices, providing clear directions on how to use these practices, and increasing accessibility to these practices have promising impacts on individuals' sleep quality, duration, and fatigue. In one study, the medical unit of the U.S. Army Reservists was provided with an online educational program called SleepSTAR. This program educated Service members on what sleep hygiene was and provided users with sleep assessments, educational videos, and different exercises and techniques Service members could use to help them cope with stress (Duessel et al., 2022). Though the sample size was small, there was a promising significant finding that, after using this resource, sleep duration increased for Service members (Duessel et al., 2022).

Another intervention program named PerfectFitNight integrated individual (e.g., e-learning options that taught people about healthy sleeping habits to counteract the effects of shift work, individual coaching sessions) and environmental (e.g., having beds provided for naps, free healthy meals on-site, information about food and dieting principles and training workshops on how to best staff shifts in a healthy way) factors to help healthcare workers who work night shifts increase their sleep quality (van Elk et al., 2024). Research that examined the PerfectFitNight program found that using this resource significantly decreased instances of insomnia, the need for recovery, and fatigue for participants. In fact, high fatigue went from 57% of participants to 39% (van Elk et al., 2024). Organizations that implement evidence-informed interventions targeting sleep can increase their support of their staffs' efforts to improve their sleep health.

Additional factors that can aid with these interventions include promoting a positive attitude, individually and organization-wide, toward healthy sleep and the suggested

interventions and providing circumstances that can enable the intervention to work effectively (e.g., enough staffing for coverage, low-work demands)(van Elk et al., 2024). These factors are validated by the DoD's recommendations of requiring a sleep trainer to be present in each unit to provide resources and strategies for others to use to engage in healthy sleeping habits and ensuring that commanders are committed to the core competence of sleep leadership by getting the suggested amount of sleep every night, leading by example (GAO, 2024).

Sleep and Wellness Programs on the Continuum of Evidence

The Clearinghouse provides a Continuum of Evidence (Continuum) that examines available evidence and research regarding a program in order to determine the program's effectiveness. A program is placed on a continuum that includes the following possible placements: Effective, Promising, Unclear +, Unclear 0, Unclear -, or Ineffective (Clearinghouse, n.d.). Nine programs related to sleep have been reviewed by research professionals and placed on the Continuum and include the following examples:

- **InShape Prevention Plus Wellness**, placed as Promising, is an intervention used to help reduce or prevent substance use and promote physical and mental health.
- **NeuroFlow,** placed as Promising, is a community-based mobile health application that people can use with their clinicians to gain support and find resources that address stress and sleep quality and provide mental health screeners.
- Mindfulness Applications, such as **Calm** (Unclear +) or **Headspace** (Unclear +), can help improve sleep quality and focus and decrease anxiety and stress.

A full list and description of these programs and their placement information can be found here. You may also read more about the Continuum and our placement process here: https://www.continuum.militaryfamilies.psu.edu/about

Summary of Recommendations

Some individuals are expected to participate in shift work in different work sectors, such as in healthcare professions, manufacturing positions, and military occupations. The following evidence-informed recommendations can be used by organizations and individuals who create shift schedules for workers to support the health and well-being of shift workers:

- Consider workers' circadian alignment and chronotype to try to align an individual's shift based on their internal clocks; their body's preferred sleep and wake

schedule, and their preference of the type of shift work (e.g., day shift, evening shift).

- Consider the most effective strategies, according to the organization's needs, that can be used to limit the length of shifts. The longer an individual works, the more tired they become and the less productive and safe they will be.
- Schedule work shifts consistently. Schedule workers, as often as possible, to work on the same day(s) or for the same shift hours each week.
- Consider the direction of shift rotation when creating schedules. Shifting schedules from backward to forward has been shown to improve an individual's sleep quality and duration.
- Examine the number of shifts an individual works without days off. When individuals work long hours and do not have adequate recovery time, they are prone to fatigue and poor physical and mental health outcomes.
- Collaborate with all levels of workers in various departments to determine how best to schedule shifts; understand and consider the balance between staff's health, well-being, and output; and ensure proper coverage to promote safety, efficiency, and productivity. This strategy can increase workers' successful adjustment, create worker satisfaction, and ensure longevity.
- Implement sleep hygiene practices and evidence-informed policies and interventions that can help offset the negative effects of shift work. Ensure accessibility to interventions (e.g., remove barriers to participation such as offering free childcare or removing barriers in cost or time) to ensure increased participation and effectiveness.

Implementing the above interventions may help mitigate some of the negative effects of engaging in shift work and/or long work hours. However, please note the following considerations (Gurubhagavatula et al., 2021):

- These interventions are not meant to eliminate health and safety risks; they intend to reduce them.
- Do not use these interventions as an excuse to extend the length of work shifts.
- Implementing these interventions may be time-dependent, and workers may require guidance on how and when to use them.
- Evaluate the unique factors present in your organization that lead to poor sleep quality and duration and fatigue to inform your choice of the best intervention that you can implement to obtain desired outcomes.
- Evaluate the positive and negative effects of the interventions on workers to determine if they reduce risks. This can be completed by analyzing staff self-reports and using predetermined performance metrics.

Additional Assistance

The TA specialists at the Clearinghouse support professionals as they examine and make informed decisions about which programs fit specific situations and are worth the investment. Whether connecting one with the resources and tools to conduct a needs assessment in a particular community, suggesting the best evidence-based program or practice for a certain situation, or developing an evaluation plan, the TA team of experts is a call or email away.

Please visit our website at www.militaryfamilies.psu.edu or call 1-877-382-9185 to speak with a TA specialist.

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