Sleep & Shift Work

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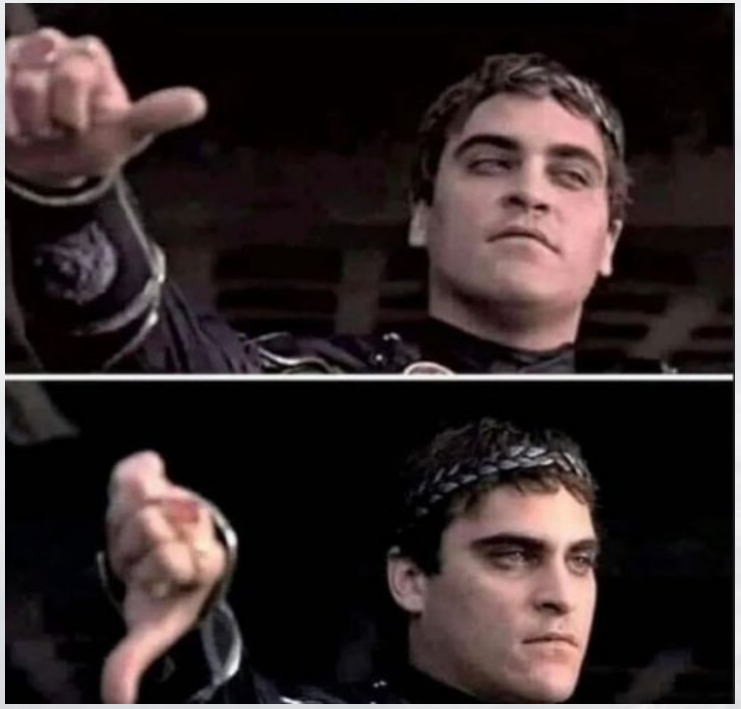
Point of Reference: Felix Baumgartner

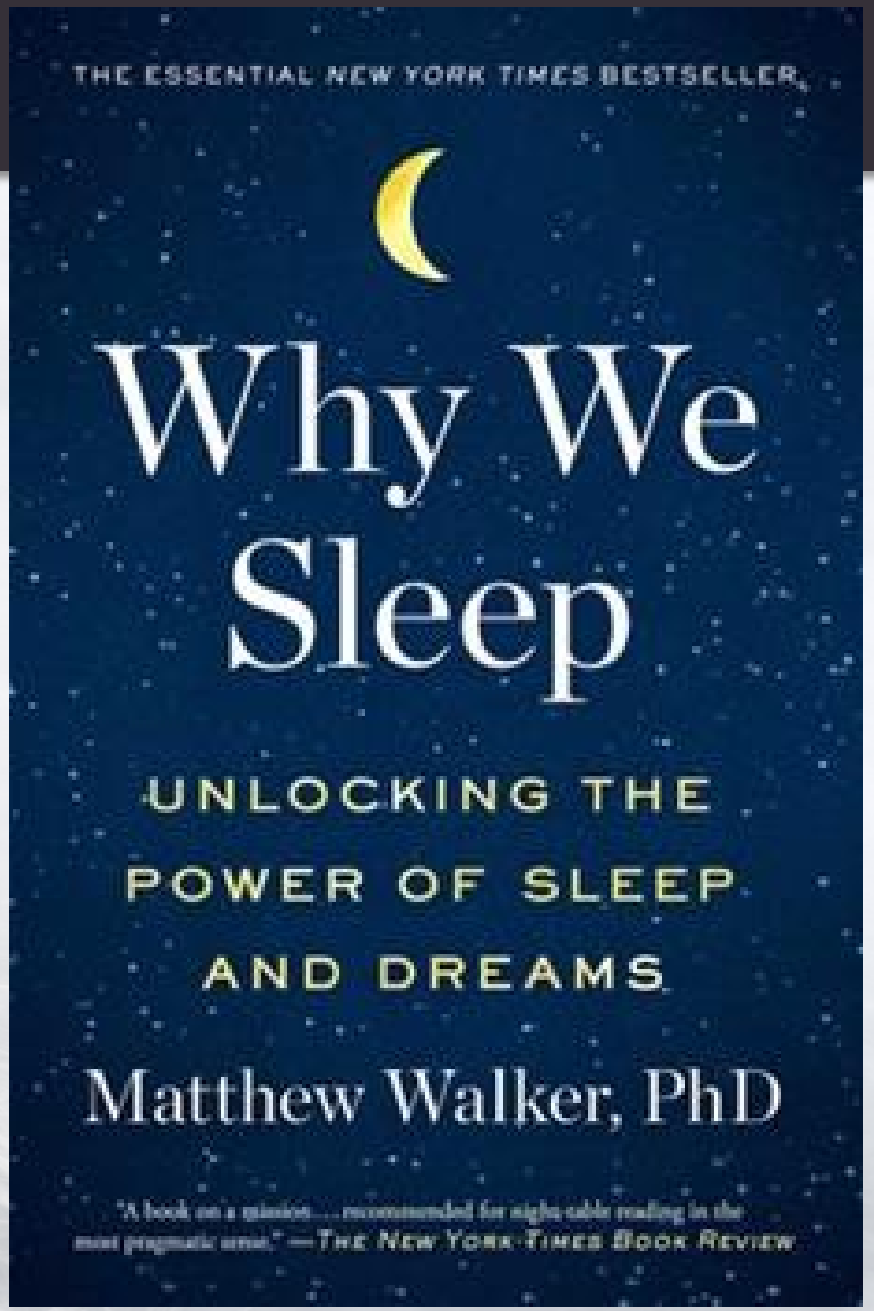
- 128,000 feet into the air
- Hot air balloon
- Wearing a spacesuit
- Stood atop a ladder
- Free fell to earth at 843 mph
- Created a sonic boom with his body

Sleep and just about every health outcome…



- CANCER: IARC (2020) – Shift work classified as a “probable carcinogen” (Group 2A)
- CVD: Over 14 years, six or less hours sleep 400-500% more likely to experience cardiac arrest
- BEHAVIORAL HEALTH: Sleep deprivation for increases emotional reactivity by 60% and sleep disruption is linked to increased risk for suicide
- REPRODUCTIVE HEALTH: Otherwise health men, limited to 5 hours of sleep or less a night for 1 week – 29% lower sperm count and marked drop in testosterone

For more bad news...



Sleep Disorders in Firefighters

- Barger et al. 2016
- 6,933 firefighters from 66 fire department
- 37.2% screened positive for any sleep disorder
- 28.4% obstructive sleep apnea
- 6.0% insomnia
- 9.1% shift work disorder
- 3.4% restless leg syndrome

Sleep Disorders in Firefighters

- Those who screened positive vs. not
- Twice as likely to report a motor vehicle crash
- More than twice as likely (OR = 2.41) to report falling asleep while driving
- More than twice as likely to report CVD (OR=2.37)
- Double risk of diabetes (OR-1.91)
- Three times as likely to report depression (OR=3.10) and anxiety (OR=3.81)

Sleep & Alcohol

- Alcohol = artificial sedating
  - Fragments sleep
  - Most awakenings are not remembered
  - Often not recognized
- Suppresses REM sleep
  - Metabolizing alcohol creates aldehydes and ketones
  - Aldehydes prevent pulsating beat of brainwaves
- Excessive alcohol use – no dream sleep that then builds up

BEHAVIORAL SLEEP MEDICINE
https://doi.org/10.1080/15402002.2021.2021912

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Intra-Tour Variation of Firefighter Sleep Duration and Sleep-Wake Cycle within the 24/48 and 48/96 Shift Schedules

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ABSTRACT

Objective: The purpose of this paper is to investigate intra-tour variation in total sleep time (TST) and sleep-wake cycle among US firefighters working the 24 hours on and 48 hours off shift schedule (24/48) and the 48 hours on and 96 hours off shift schedule (48/96).

Methods: Twenty-four firefighters were recruited for this sleep study and were evaluated over 18 days during a 24/48 shift schedule and again 6 months after firefighters transitioned to a 48/96 shift schedule. The primary outcome variables included TST, measured by actigraphy, and sleep-wake cycle (in-bed time and sleep offset) using the Emergency Services Sleep Diary.

Results: Firefighters experienced intra-tour variations in TST and sleep offset. The least TST occurred at home prior to starting shift on the 24/48 and 48/96 schedules (5.80 hours and 5.66 hours, respectively). The second least TST occurred the night preceding shift end (5.84 hours and 5.81 hours, respectively). In contrast to in-bed time, sleep offset varied throughout the schedule and was found to correlate with TST. In addition, shift start/end time appears to be responsible for advanced sleep offset.

Conclusion: Results indicate that firefighters' sleep is complex and should not be reduced to singular averages. In both schedules, firefighters arrived at work with insufficient sleep, received insufficient sleep while on shift, and would commute home with insufficient sleep. These findings can inform future firefighter sleep research by accounting for intra-tour variations.

Introduction

The purpose of this research is to explore how total sleep time (TST) varies night-by-night throughout firefighters' shift schedules. Fire and emergency services are a unique occupation in that sleep can be influenced exogenously by several factors (Vincent et al., 2018). Sleep is often fragmented due to emergency response during the night (Billings, 2022). The sleeping environment at work may not be conducive to promote quality sleep as firefighters commonly bunk in the same area, rotate sharing beds with other shifts, and are exposed to light, noise, and odor from their coworkers and environment (Carey et al., 2018). Some firefighters may rotate stations, exposing them to varying sleep environments each shift. In fire stations that house multiple units, firefighters may wake from alarms intended for other firefighters (Kuorinka & Korhonen, 1981), which further fragments and truncates sleep. Fire department shift schedules also play an important role in sleep (Billings & Focht, 2016; Haddock et al., 2013; Vincent et al., 2016) as the unique pattern of work and non-workdays may impact the sleep/wake cycle. In turn, firefighters often must wait several days until the end of the tour to recover lost

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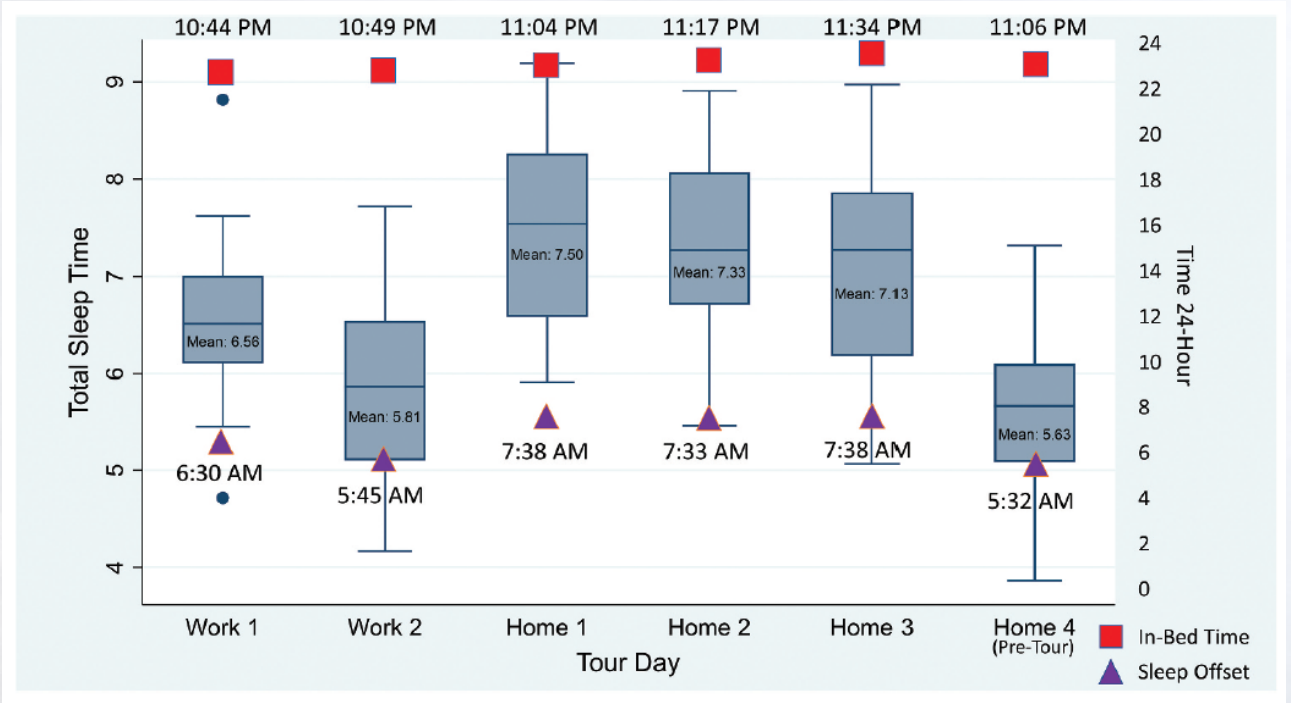

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