



SLEEP:

The Only True “Fix-All” for Health & Performance

2019 NSCA TACTICAL ANNUAL TRAINING

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Conflict of Interest Statement

I currently have, or I have had in the past 2 years an affiliation or financial interest with Perform Better, Sleep Performance Inc., and NHL PHATS/SPHEM around this presentation, including:

- Consulting
- Honorarium

- Over 20-years experience in the high-performance profession.

20+

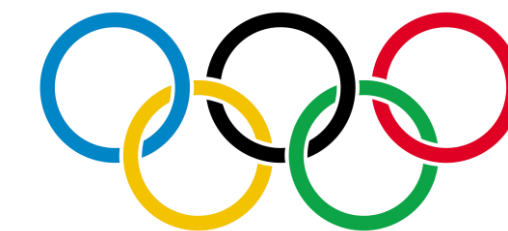
- Performance Specialist: IMG Academies



- Co-Founder Athletes' Performance (EXOS)



- Director of Human Performance



- Director of Sports Performance: Stanford University



- High-Performance Strategist
- I take forward-thinking organizations and elite athletes to the next level of their game – and their careers.

DRAPER



EQUINOX



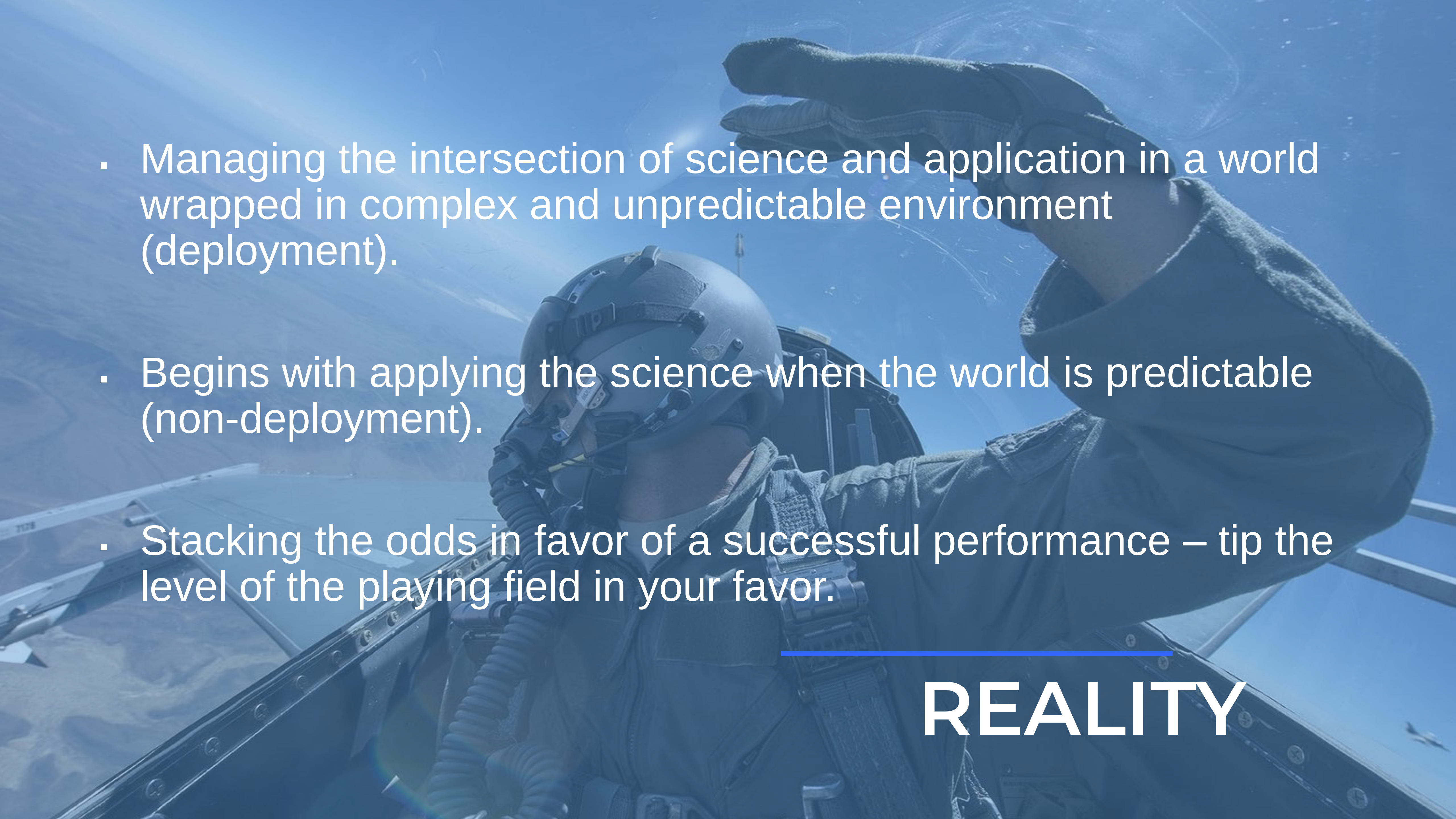


DISCLAIMER

- This presentation is about the basics of sleep.
- Will not be diagnosing sleep-related illnesses.
- Information will be general sleep knowledge as it pertains to health, wellness, and performance.

You have to coach sleep!



- 
- Managing the intersection of science and application in a world wrapped in complex and unpredictable environment (deployment).
 - Begins with applying the science when the world is predictable (non-deployment).
 - Stacking the odds in favor of a successful performance – tip the level of the playing field in your favor.

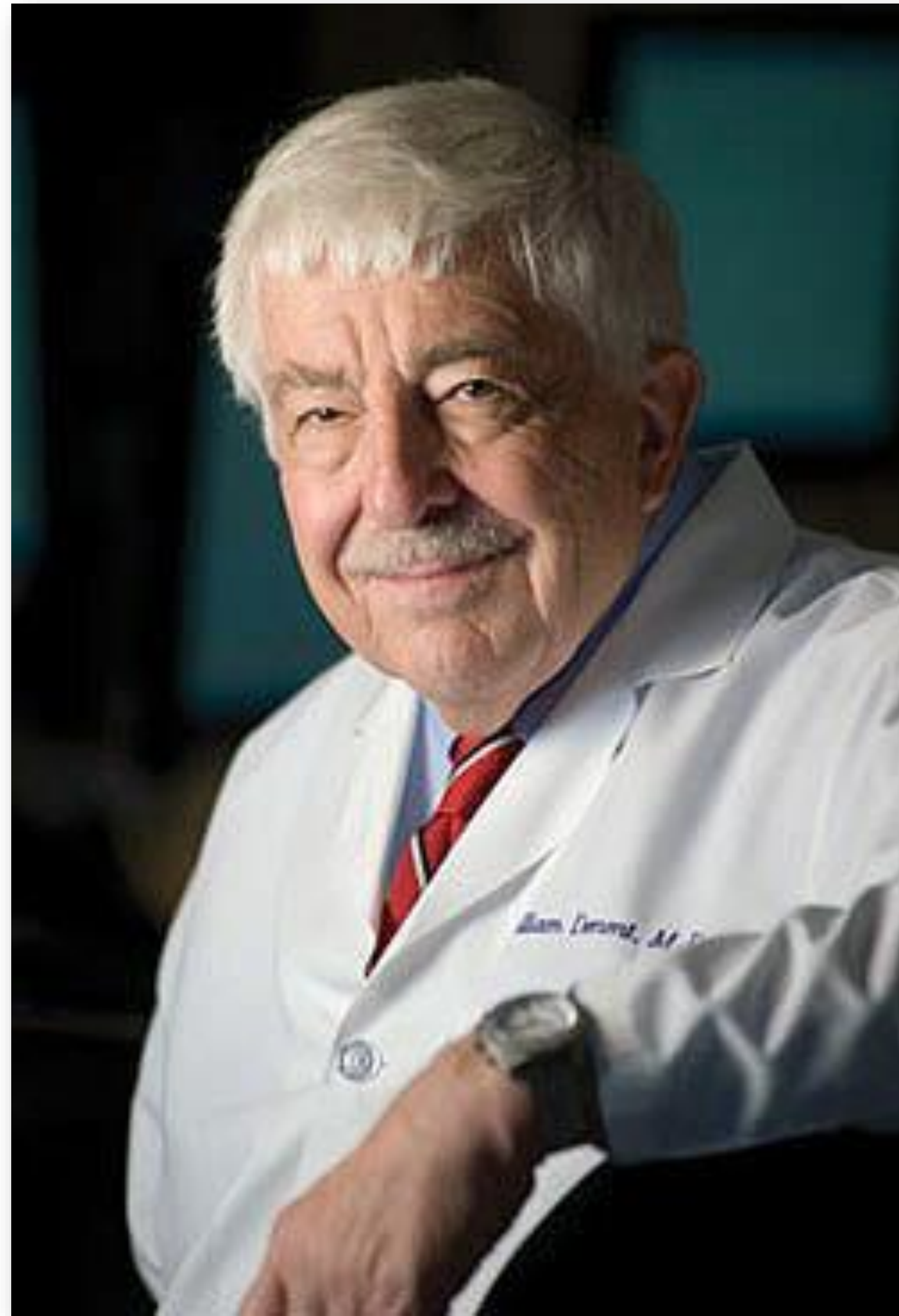
REALITY

My journey into sleep...



2007



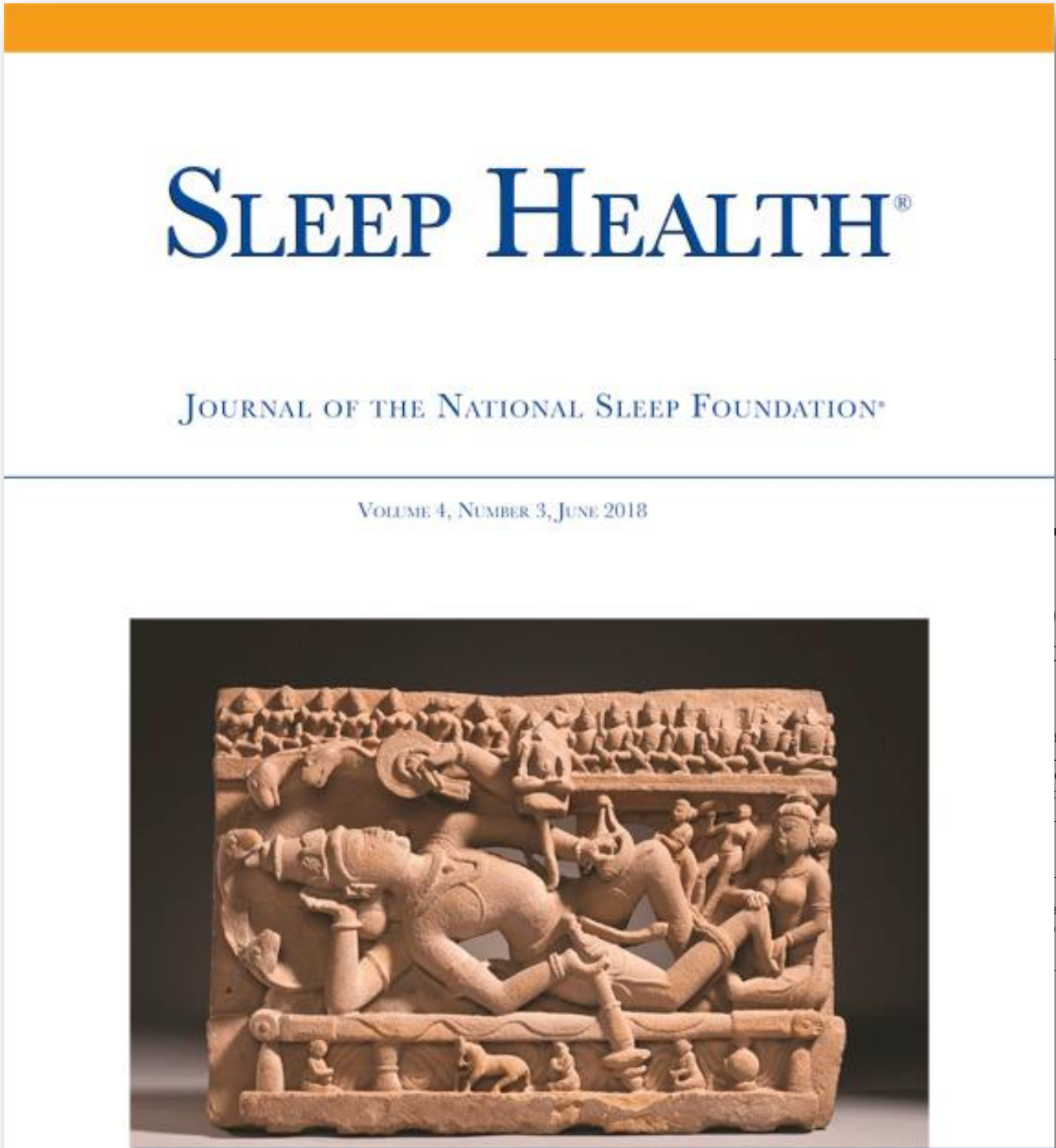


Dreaming permits each and every
one of us to be quietly and safely
insane every night of our lives

— William C. Dement —



Research
Published June 2018



Author's Personal Copy

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quality and insufficient sleep of a collegiate athlete population

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info

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abstract

Objective: Poor and inadequate sleep negatively impact cognitive and physical functioning and may also affect sports performance. The study aim is to examine sleep quality, sleep duration, and daytime sleepiness in collegiate student-athletes across a wide range of sports.

Design: Questionnaire.

Setting: University setting.

Participants: 628 athletes across 29 varsity teams at Stanford University.

Measurements: Athletes completed a questionnaire inquiring about sleep quality via a modified Pittsburgh Sleep Quality Index (PSQI), sleep duration, and daytime sleepiness via Epworth Sleepiness Scale. Sleep quality on campus and while traveling for competition was rated on a 10-point scale.

Results: Collegiate athletes were classified as poor sleepers (PSQI 5.38 ± 2.45), and 42.4% of athletes experience poor sleep quality (reporting PSQI global scores ≥ 5). Athletes reported lower sleep quality on campus than when traveling for competition (7.1 vs 7.6, $P = .001$). Inadequate sleep was demonstrated by 39.1% of athletes that regularly obtain ≥ 7 hours of sleep on weekdays. Fifty-one percent of athletes reported

Poor sleep quality and insufficient sleep of a collegiate student-athlete population



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[SLEEP]

The most important area is
the roll of sleep in facilitating
an optimal level of waking
function.

SLEEP

FATIGUE

A major contributing factor to disasters.



3 Mile Island

MARCH 1979



Chernobyl

APRIL 1986



Challenger

JANUARY 1986

SLEEP

FATIGUE



DEPARTMENT OF THE NAVY
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UNITED STATES PACIFIC FLEET
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COMMANDER
NAVAL SURFACE FORCE ATLANTIC
1751 MORRIS STREET
NORFOLK VIRGINIA 23551-2808

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From: Commander, Naval Surface Force, U.S. Pacific Fleet
Commander, Naval Surface Force Atlantic

Subj: COMPREHENSIVE FATIGUE AND ENDURANCE MANAGEMENT POLICY

MARCH 1989

JUNE 2017



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RANCE MANAGEMENT POLICY

ce Handbook v1.1, 1 Oct 2017
gement Practices, Jan 2003

rface Forces (CNSF) comprehensive fatigue
float staffs, both at sea and in port.

l risk factors including unpredictable
ese risk factors degrade impact a Sailor's
tion codifies and consolidates several years
e circadian rhythm implementation message,
eas, and training sessions at Surface Warfare
s Type Commander policy, commander's
endurance, performance, and safety.

policy is to ensure Sailors are adequately
deliver enhanced warfighting effectiveness
paired health, decreased performance, and

uperiors in command, ships, and craft shall
their staffs and crews on its content.

ained, optimal warfighting performance
nd environmental challenges.

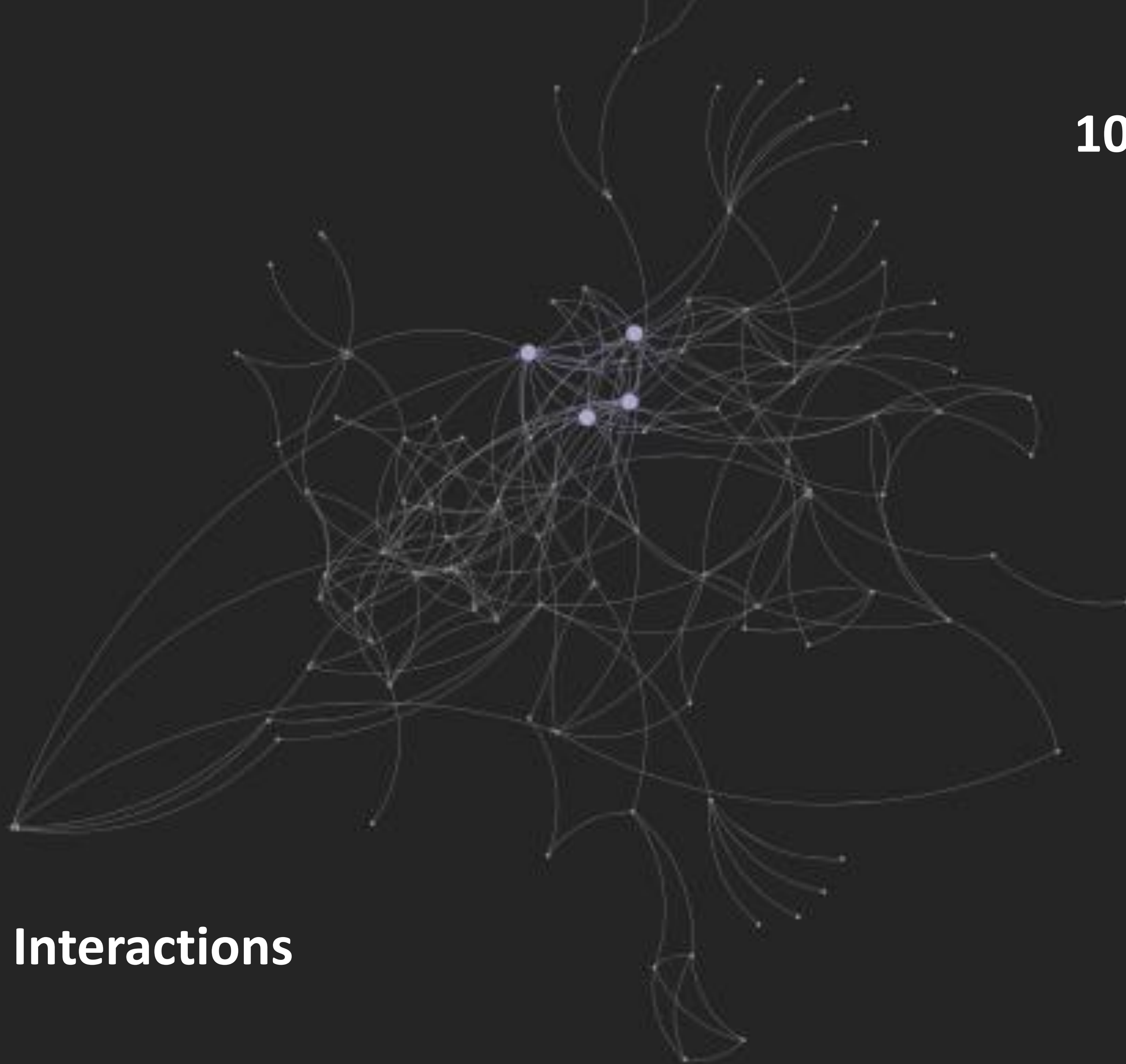
h rhythm. The human circadian rhythm is
ep and wake cycles, and affects levels of
alertness. This clock mechanism influences sleep by controlling the timing of "sleep gates" and



Holistic Framework for Human-Performance

D R ^ P E R

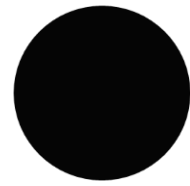
105 Elements



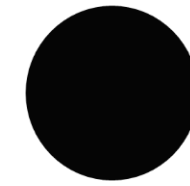
Multiple Interactions

Human Performance Domains

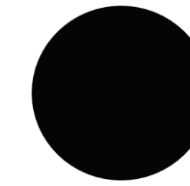
Cognitive



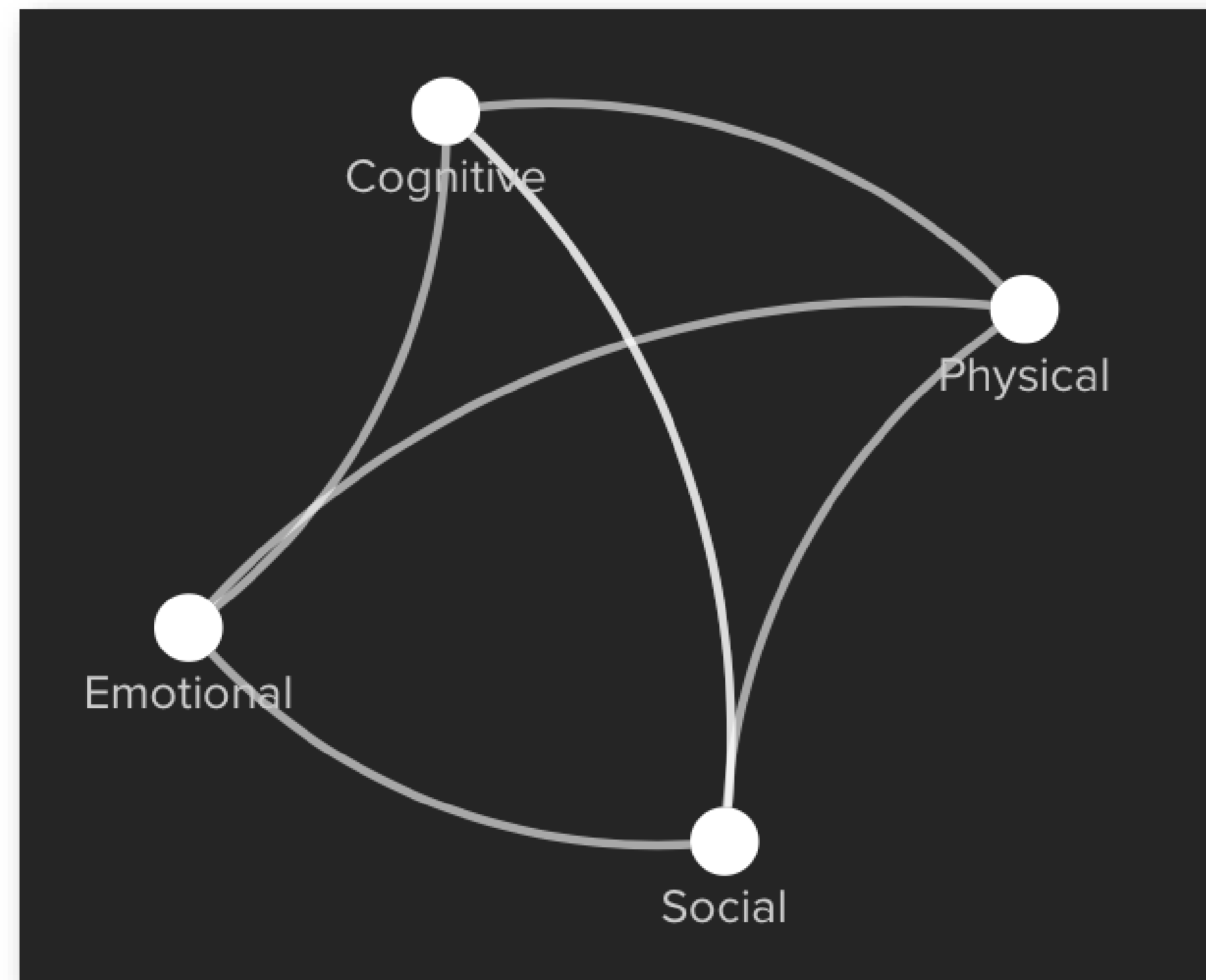
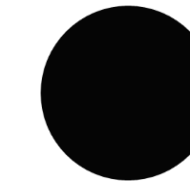
Physical



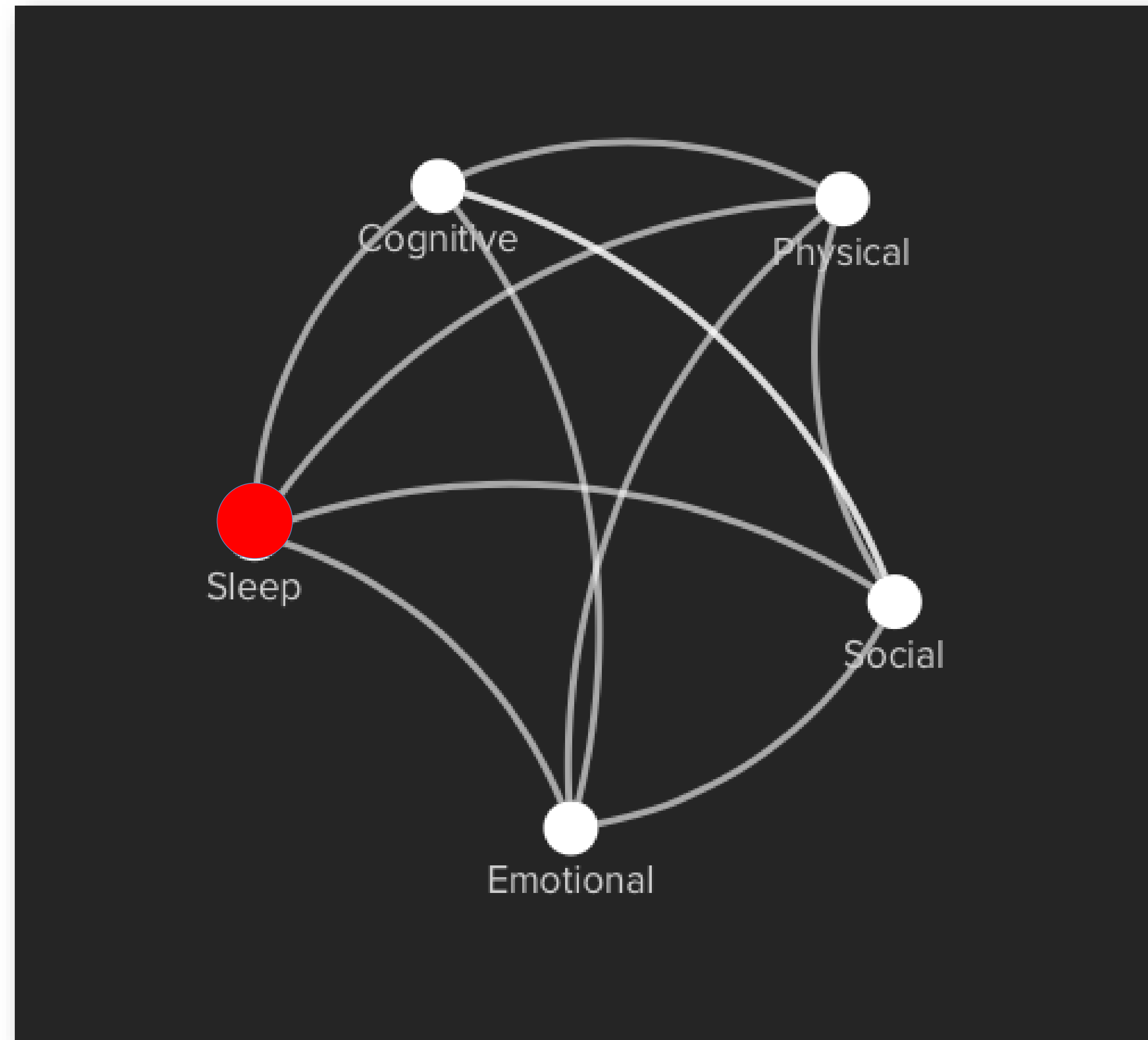
Social



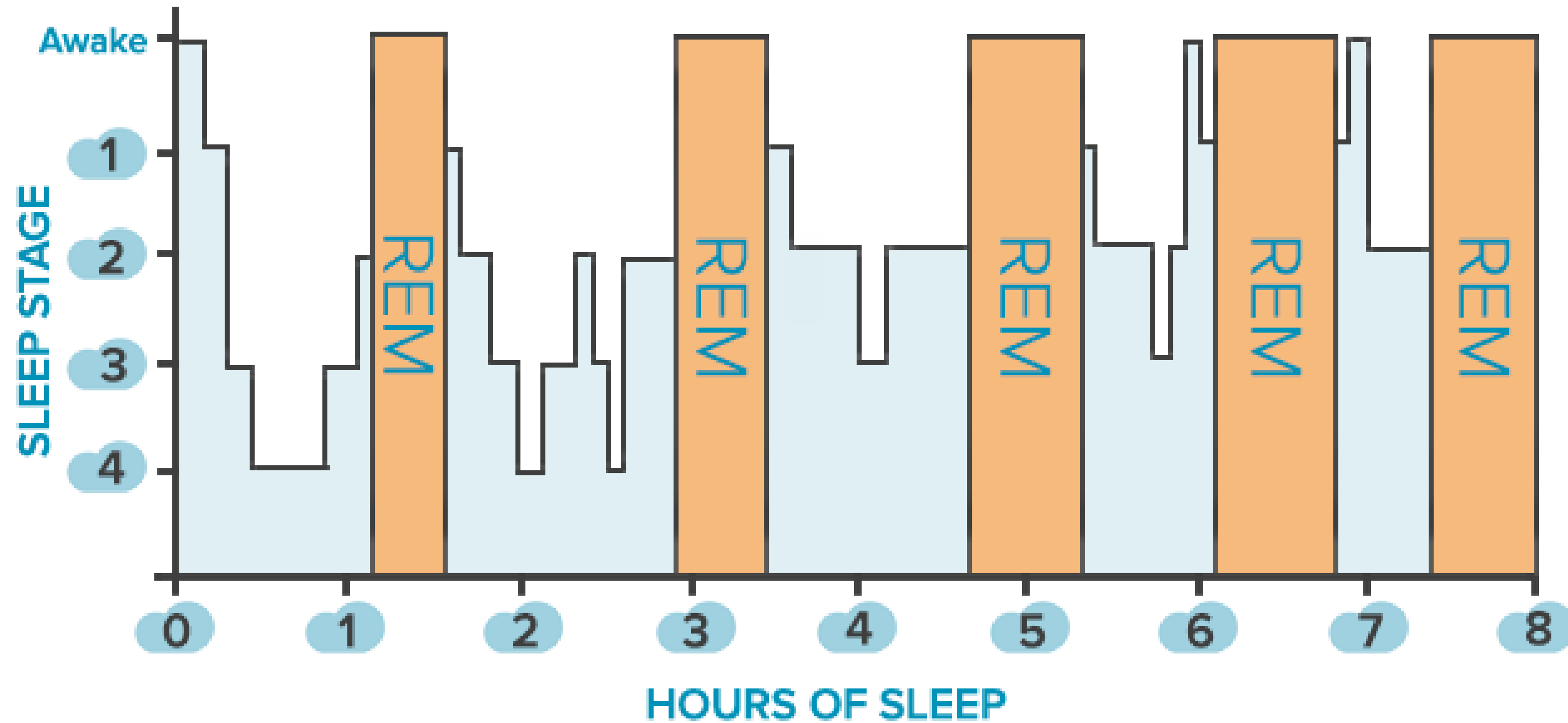
Emotional



1st-Order Connections



Stages of Healthy Sleep



Sleep matters

Fatigue, resulting from inadequate sleep, has a direct and measurable impact on:

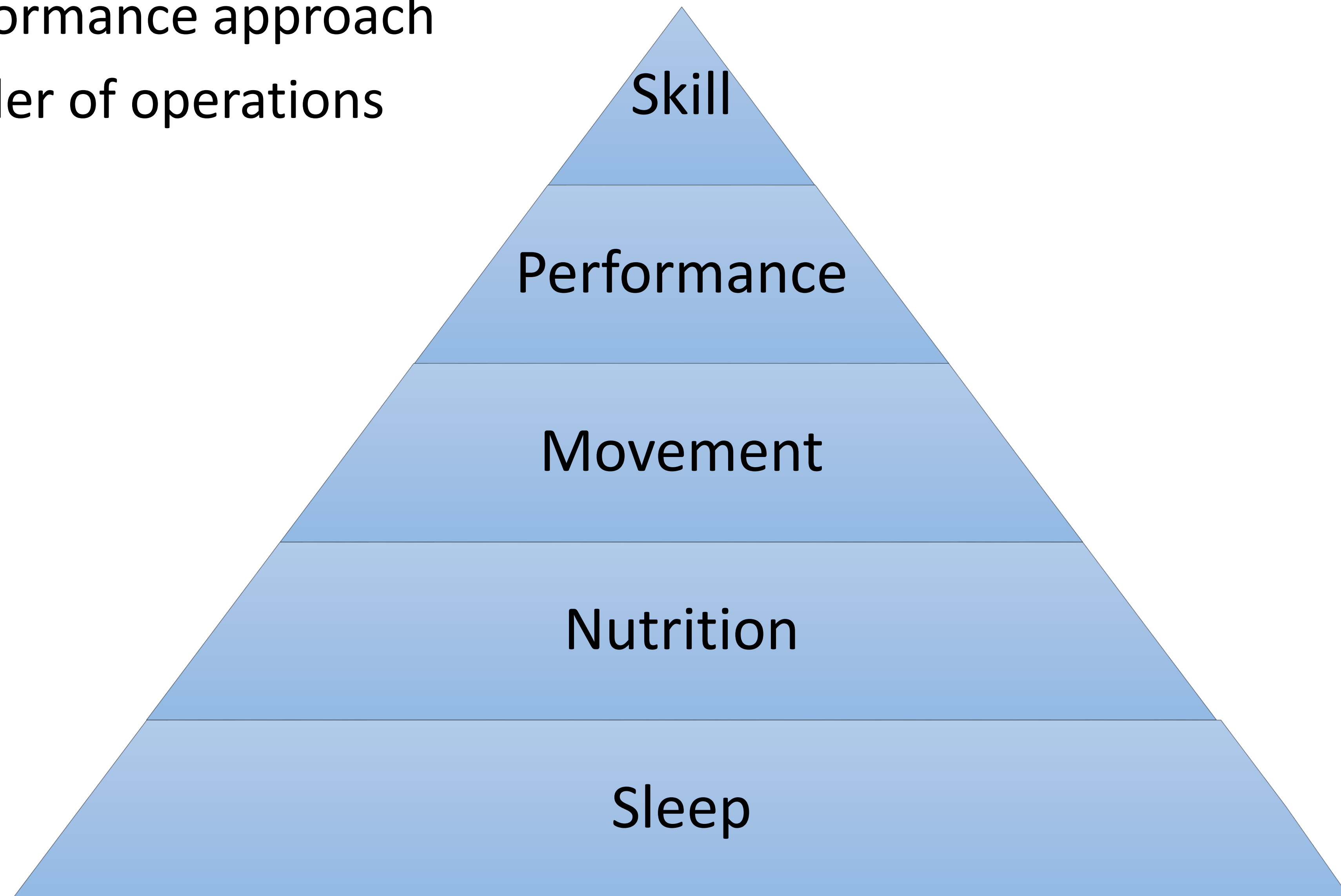
**REACTION
TIME**

RECOVERY

**OVERALL
PERFORMANCE**

**CAREER
LONGEVITY**

High-performance approach Order of operations



- ⊗ INCREASED RISK OF INJURY
- ⊗ REDUCED PAIN THRESHOLD
- ⊗ GREATER SUSCEPTIBILITY OF SICKNESS
- ⊗ REDUCED PSYCHOLOGICAL & PHYSICAL PERFORMANCE
- ⊗ INCREASED ANXIETY, IRRITABILITY, and MISTAKES
- ⊗ IMPAIRED SITUATIONAL AWARENESS
- ⊗ INCREASED BODY FAT PERCENTAGE
- ⊗ REVERT BACK TO OLD HABITS
- ⊗ POOR JUDGMENT OF DISTANCE, SPEED, and TIME

NOT GETTING ENOUGH

GETTING ENOUGH

- ✓ MOTIVATION
- ✓ RECOVERY & MUSCLE STRENGTH
- ✓ SPRINT SPEEDS
- ✓ STRESS (cortisol) REGULATION
- ✓ STORE ENERGY IN MUSCLE
- ✓ SITUATIONAL AWARENESS
- ✓ MEMORY CONSOLIDATION
- ✓ REACTION TIME

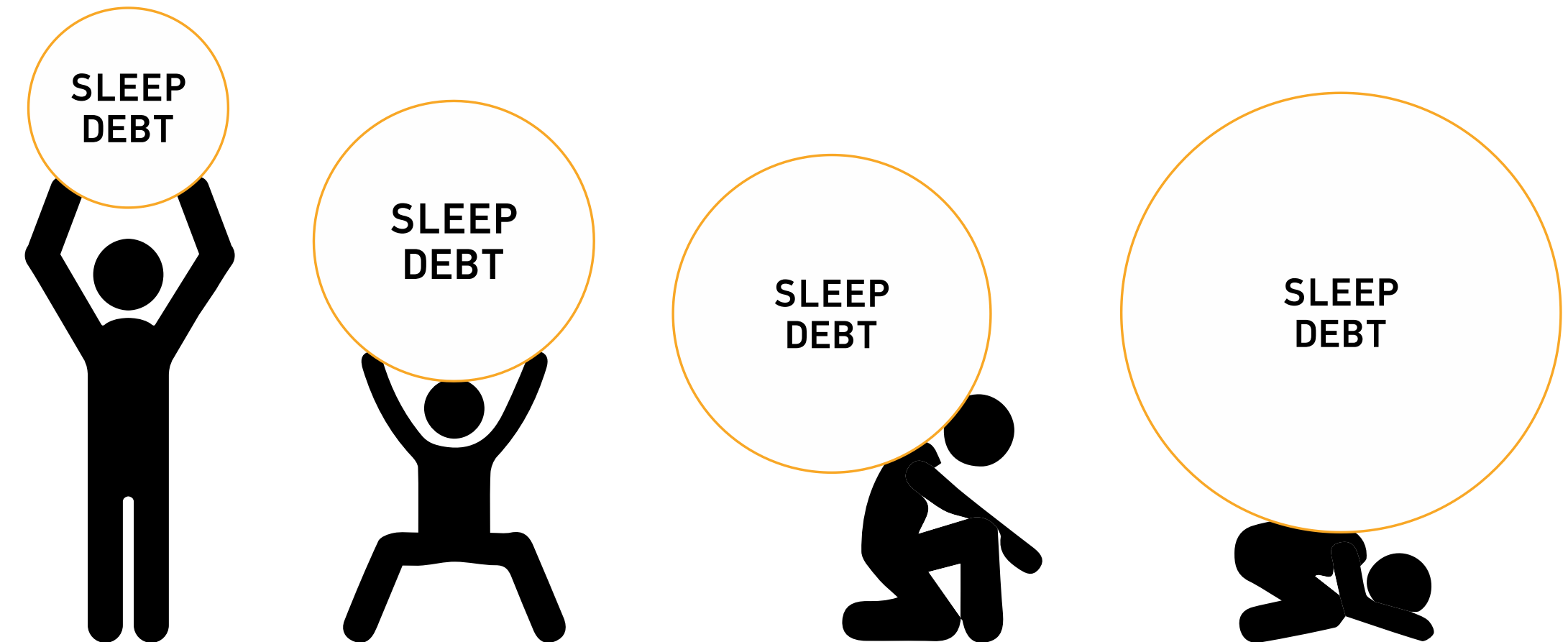
Paying back what you owe?

- sleep debt

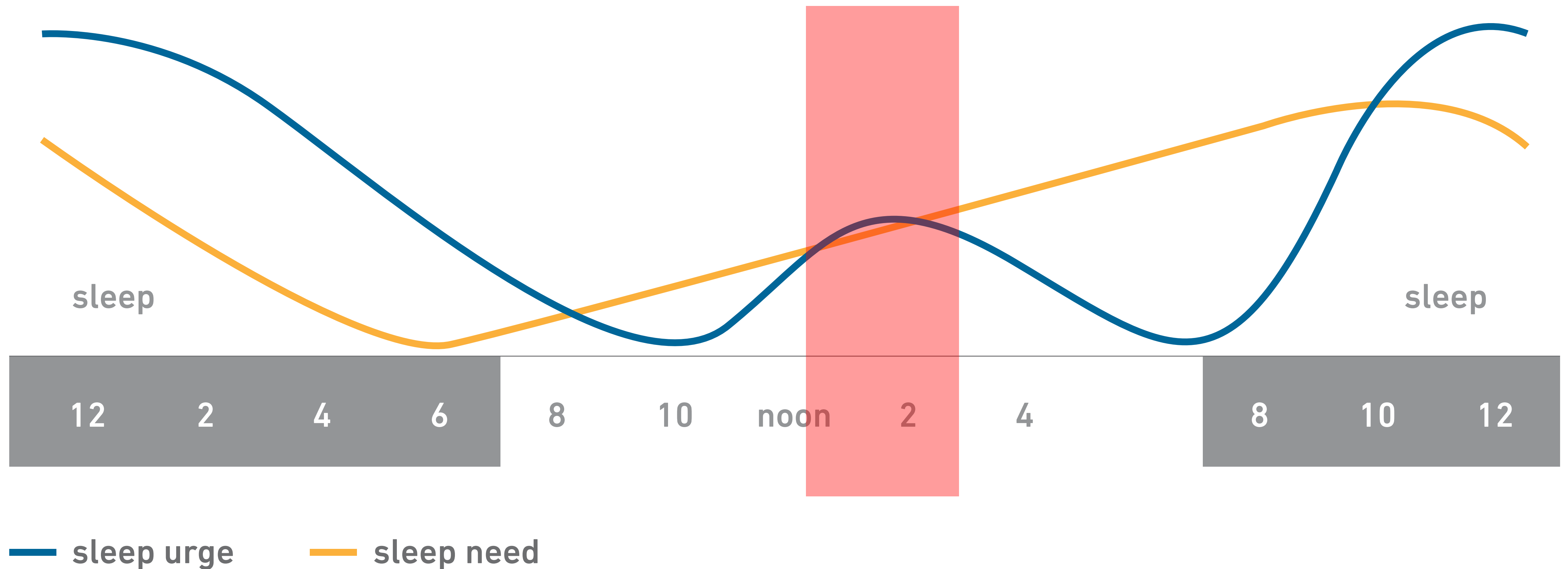
SLEEP DEBT

SIMPLIFIED

- ✓ Need 8 hours and got 7 hours = 1 hour of sleep debt
- ✓ Need to get 9 hours tonight to “repay” sleep debt
- ✓ How can I tell if I have sleep debt?
- ✓ “Drowsiness is red alert!”



Healthy Circadian Rhythm





SLEEP DEBT

- ✓ Chronically obtaining less sleep than your body needs builds sleep debt over time
- ✓ Sleep debt is manageable at first, but over time, it becomes overwhelming
- ✓ For optimal functioning and performance, you should eliminate your sleep debt by gradually extending your sleep duration
- ✓ **Be patient:** Reducing sleep debt takes more than one night or weekend of good sleep!

Study: Sleep extension with swimmers

After extending time in bed to
10hr/night for several weeks
collegiate swimmers showed
improvements of

+8% +20% +10% +19%

15m sprint
speed

reaction time
off the block

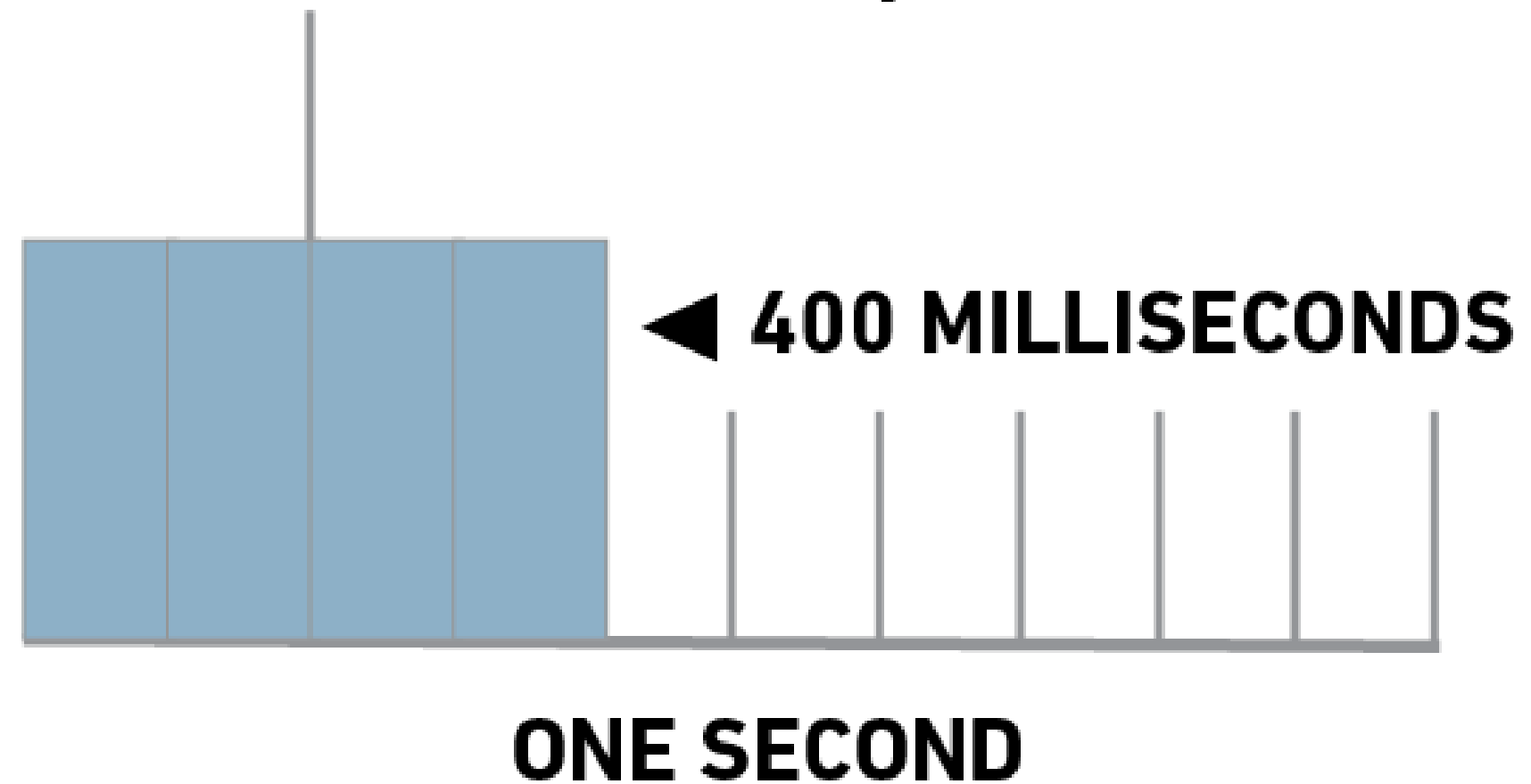
turn time
efficiency

kickstrokes

Extended Sleep and the Effects on Mood and Athletic Performance in Collegiate Swimmers;
Mah CD, Mah KE, Dement WC, Psychiatry and Behavioural Sciences, Stanford University, CA



Time needed for 90 mph
fastball to reach homeplate



Study: Sleep extension with basketball players

After extending time in bed to 10hrs/night for several weeks, collegiate basketball players showed a:

+9%

improvement
in free throw
shooting
accuracy

+9.2%

improvement
in 3pt field
goal shooting
accuracy

Source: The Effects of Sleep Extension on the Athletic Performance of Collegiate Basketball Players; Mah CD, Mah KE, Dement WC, Kezirian, EJ, Psychiatry and Behavioral Sciences, Stanford University, CA



They were faster too.

.7s

faster sprint
over 95 yards

8.5 hr sleep

6.5 hr sleep

In the outfield,
that's a
difference of
10' over 15s.

Source: The Effects of Sleep Extension on the Athletic Performance of Collegiate Basketball Players; Mah CD, Mah KE, Dement WC, Kezirian, EJ, Psychiatry and Behavioral Sciences, Stanford University, CA

Study: Sleepiness & predicting career longevity in baseball

Winter tracked 80 MLB players. After 3 years:

72%

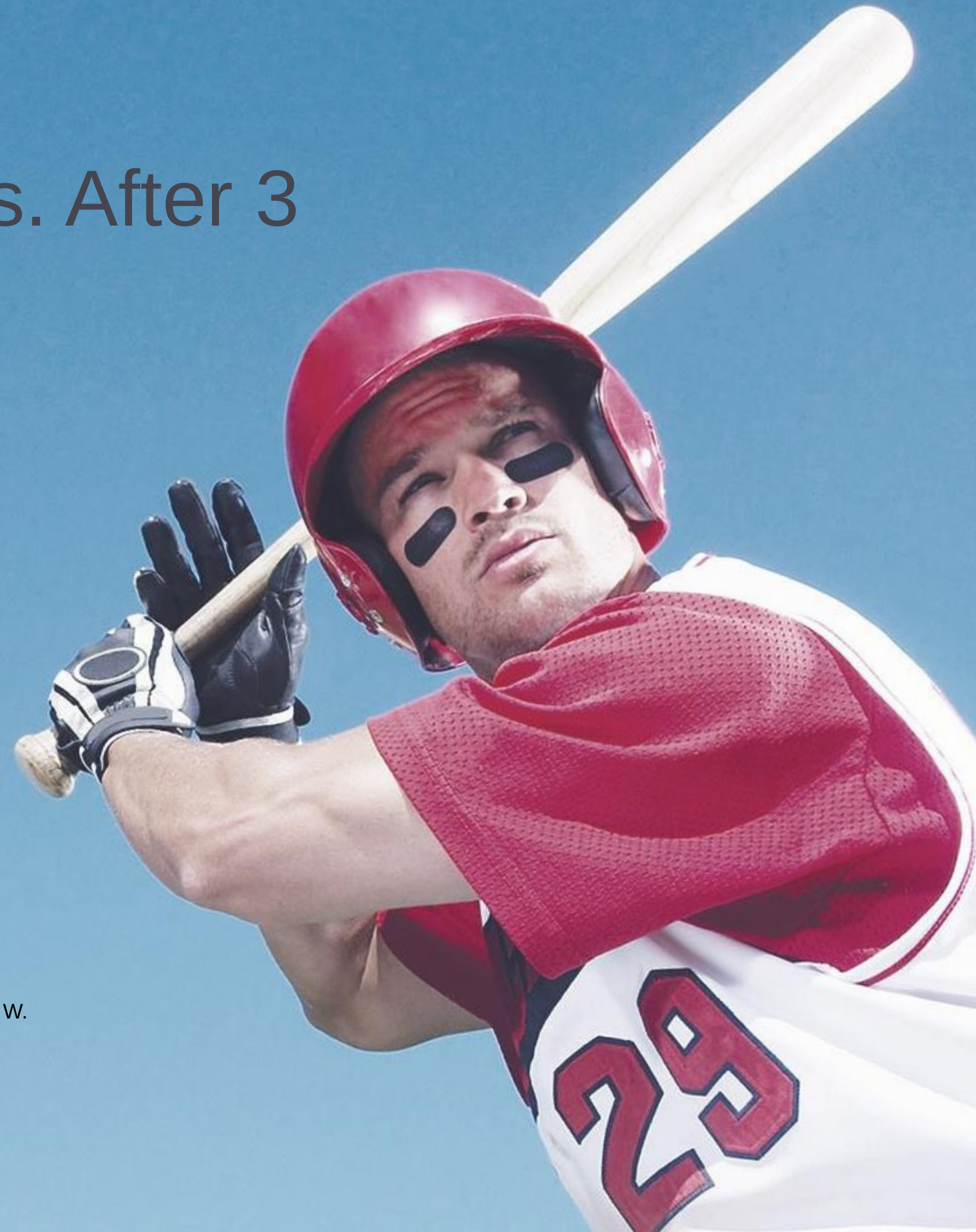
of players with normal sleep traits were still playing

39%

of players with poor sleep traits were still playing

14%

of players with severe sleep issues were still playing



Source: Predicting Major League Baseball (MLB) Player Career Longevity via Sleepiness Measurements; Winter, W. Christopher

30 MLB teams were tracked from 2005-2011.

Performance in strike zone judgement consistently worsens over the course of each MLB season, despite the inputs of frequent practice and repetition. Researchers hypothesized that this decline is the result of fatigue.

Injuries have been shown to be related to sleep less than 6 hours the night before the injury occurred

1.7x

greater risk for injury compared to athletes that obtained ≥ 8 hours of sleep.

Source: Milewski MD, Skaggs DL, Bishop GA, et al. Chronic lack of sleep is associated with increased sports injuries in adolescent athletes. J Pediatr Orthop 2014;34(2):129-33. PMID: 25028798



Study: Sleep Restriction on Testosterone Levels

↓ sleep = ↓ testosterone

24yr old healthy men who slept less than 5hrs a night for a week, registered a 15% drop in testosterone. That's like aging 15yrs.

Key for: strength and muscle mass, energy and concentration, bone density, libido

Effect of 1 Week of Sleep Restriction on Testosterone Levels in Young Healthy Men Rachel Leproult, PhD; Eve Van Cauter, PhD

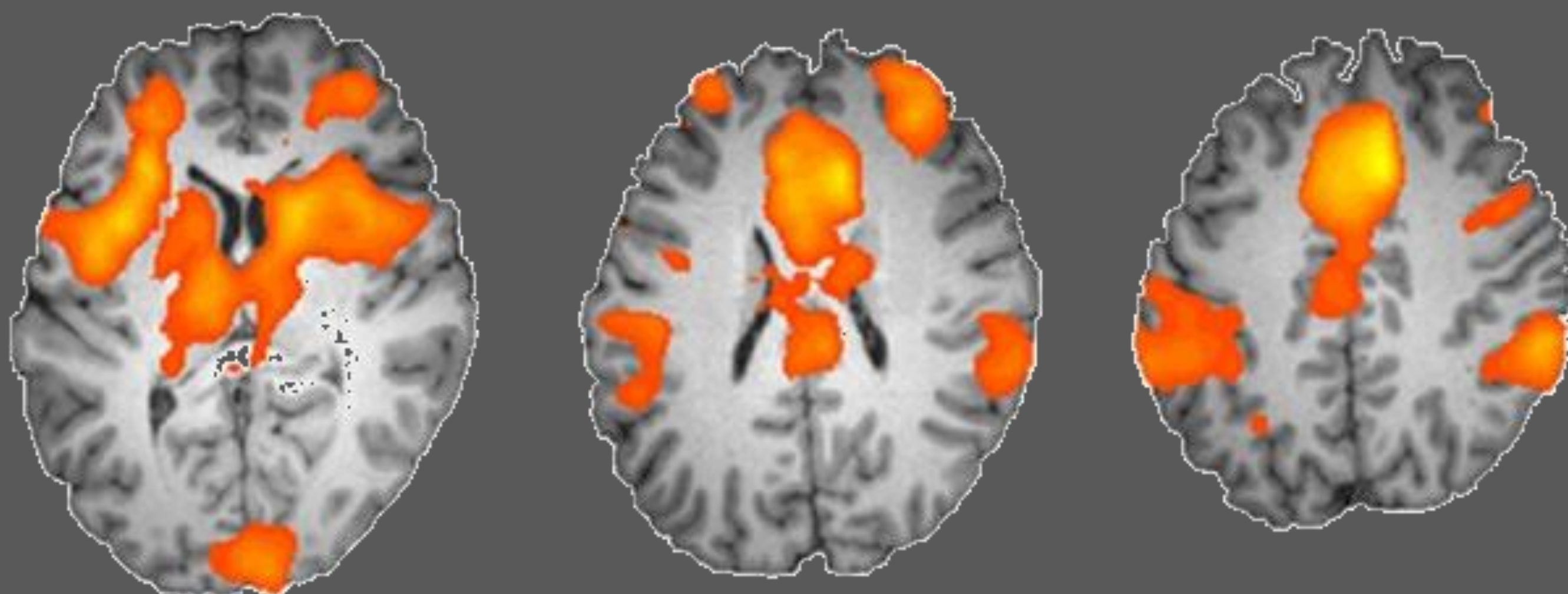


- 
- During sleep, the brain “bathes” itself in cerebrospinal fluid to get rid of waste products
 - The brain will also clean out toxic proteins which can impair healthy aging of the brain, and cause brain-related diseases such as Alzheimer’s and other neurological disorders

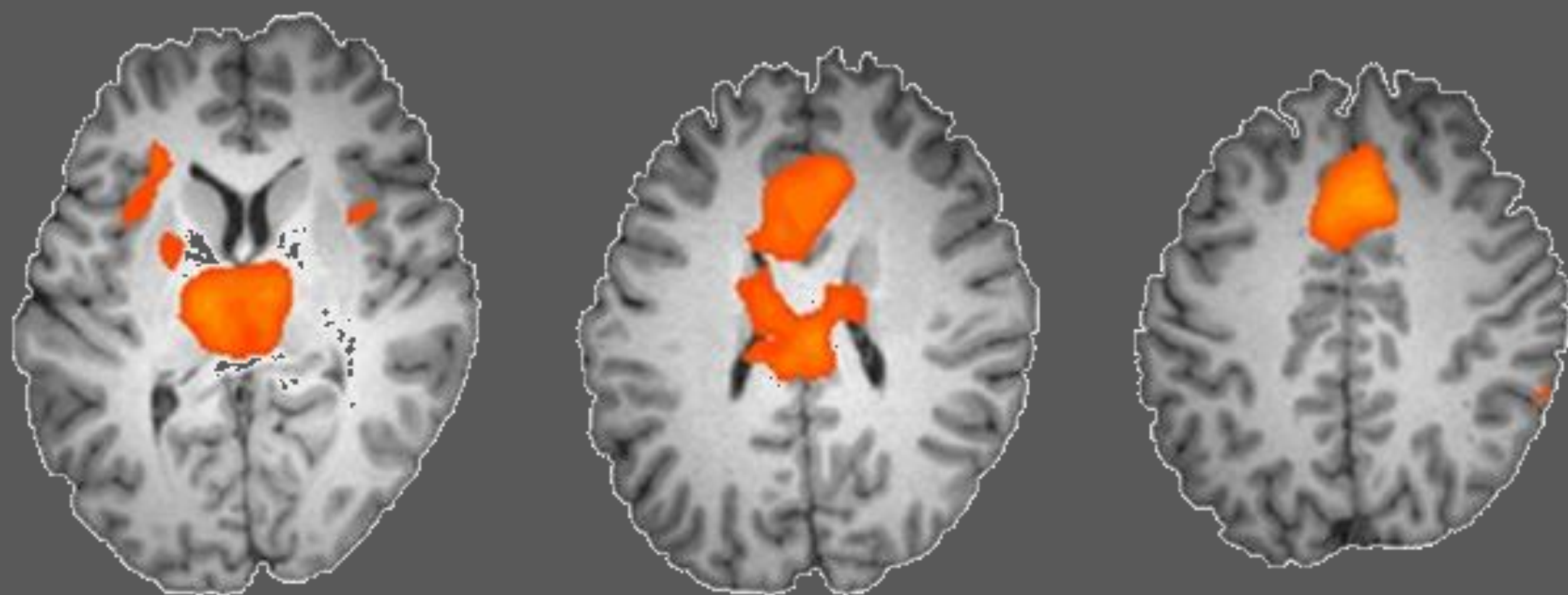
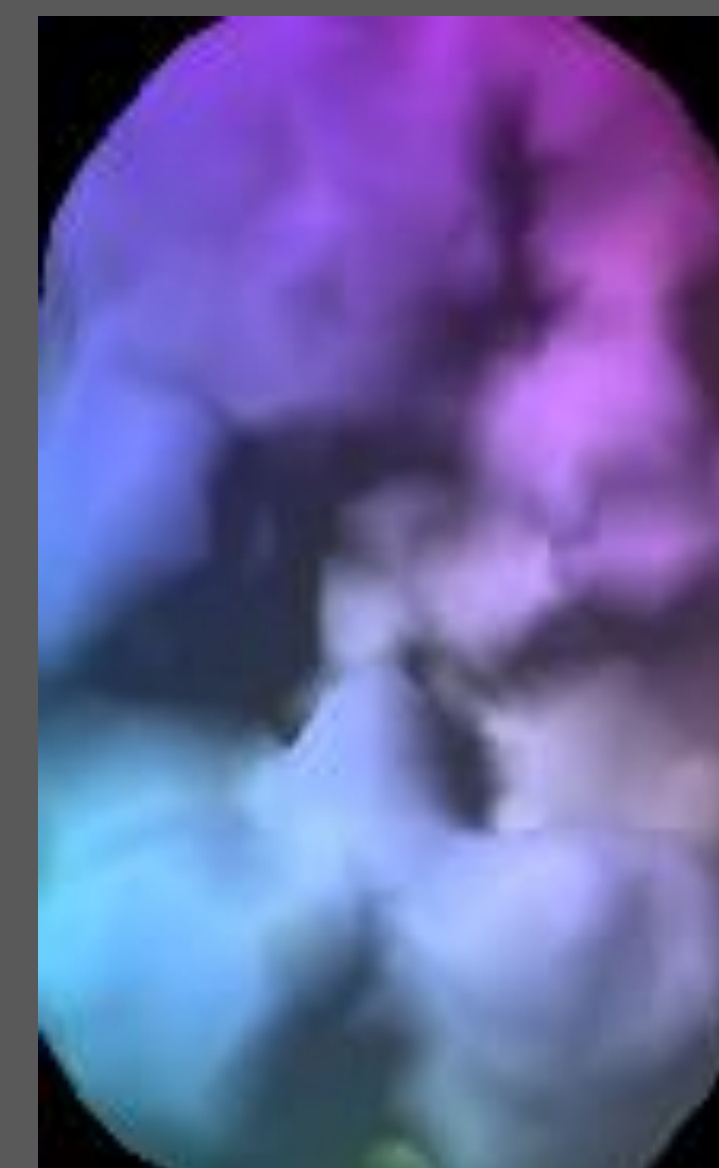
BRAIN HEALTH

Grade point averages improved 11% when cadets' sleep opportunity was expanded from 6hr/night to 8hr/night.





ADEQUATE
SLEEP



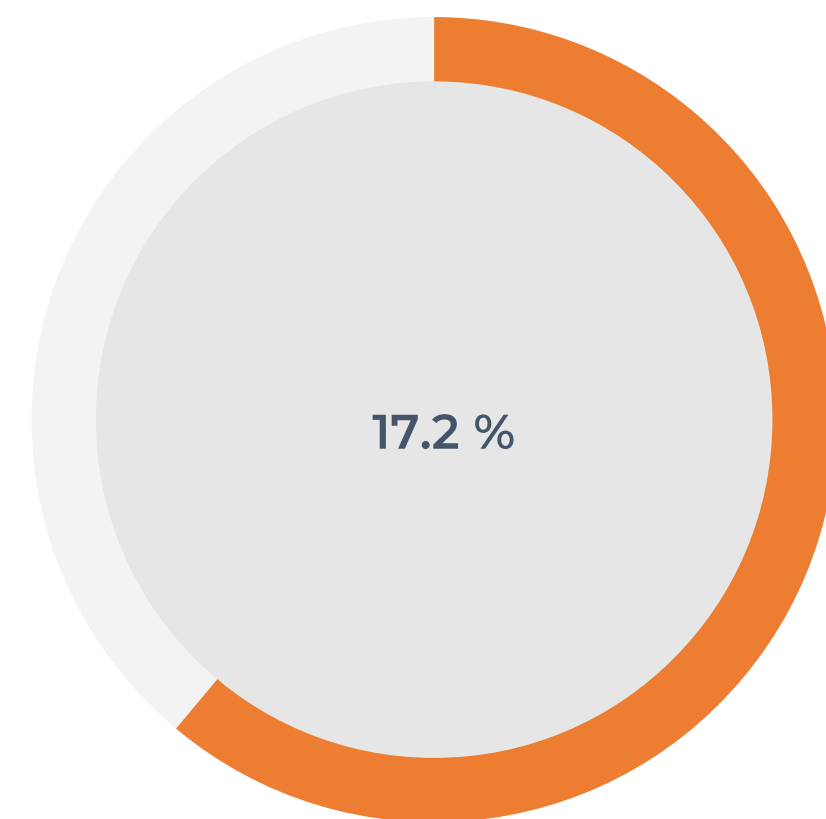
SLEEP
DEPRIVED



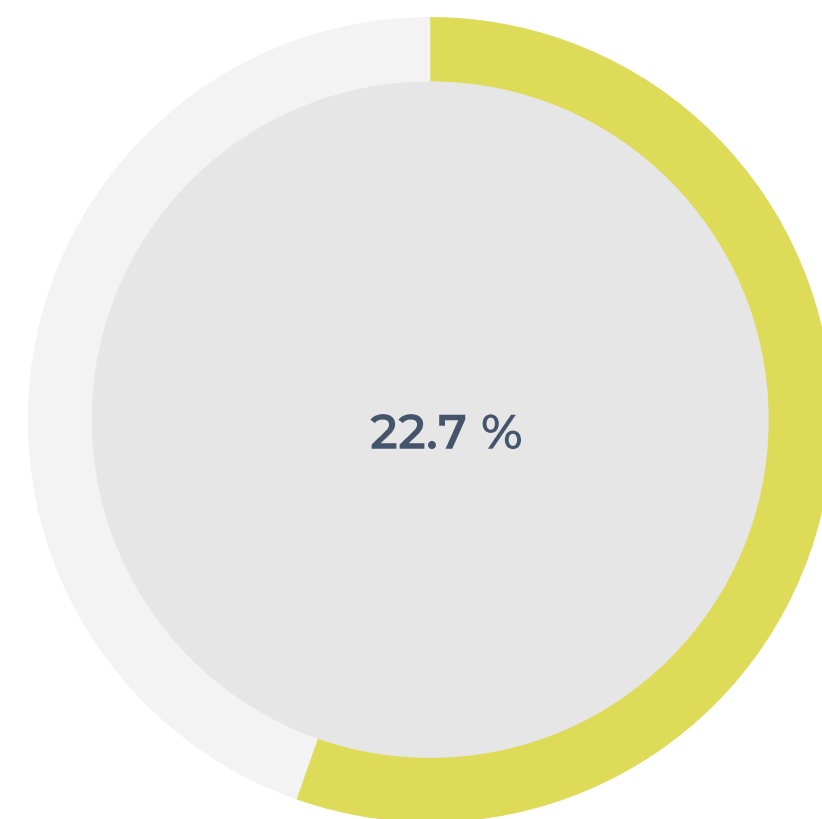
Modern Presentation

SHORT SLEEP = MORE COLDS

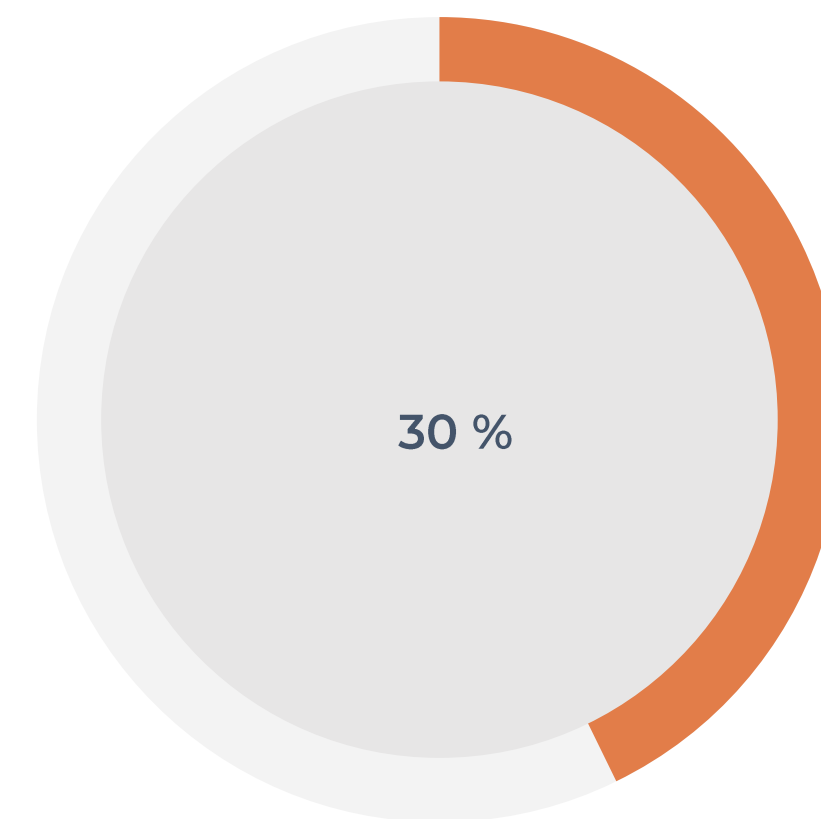
Chances (%) of catching a cold when exposed to the virus if you're not sleeping enough



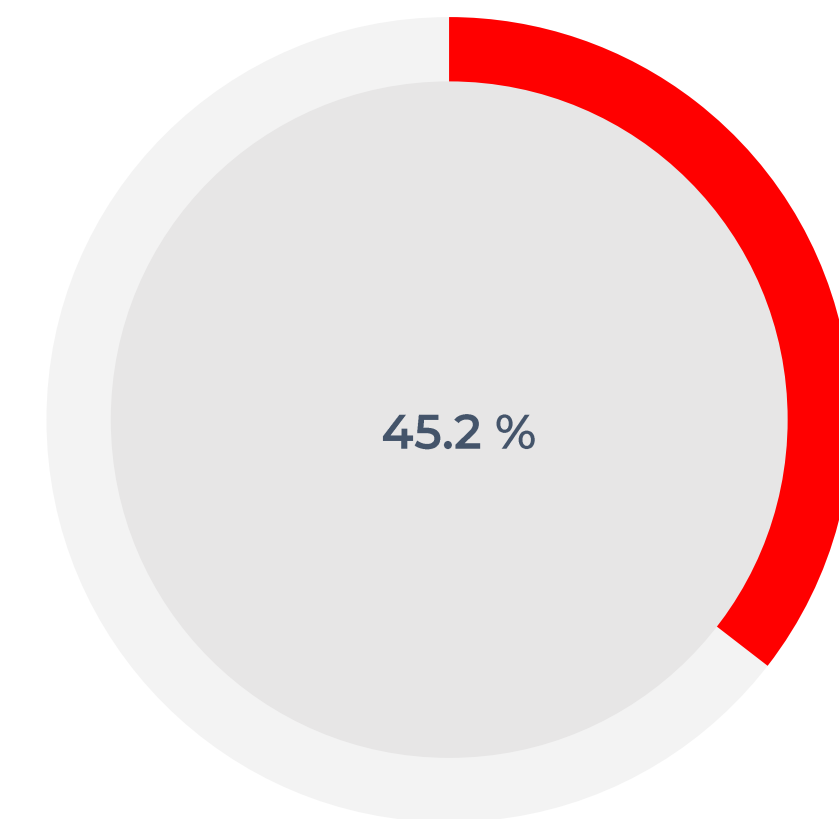
> 7 HOURS



6 – 7 HOURS



5 – 6 HOURS



< 5 HOURS

Source: Prather et al, 2015

sleep mythology

SLEEP MYTHOLOGY

You can get too much sleep

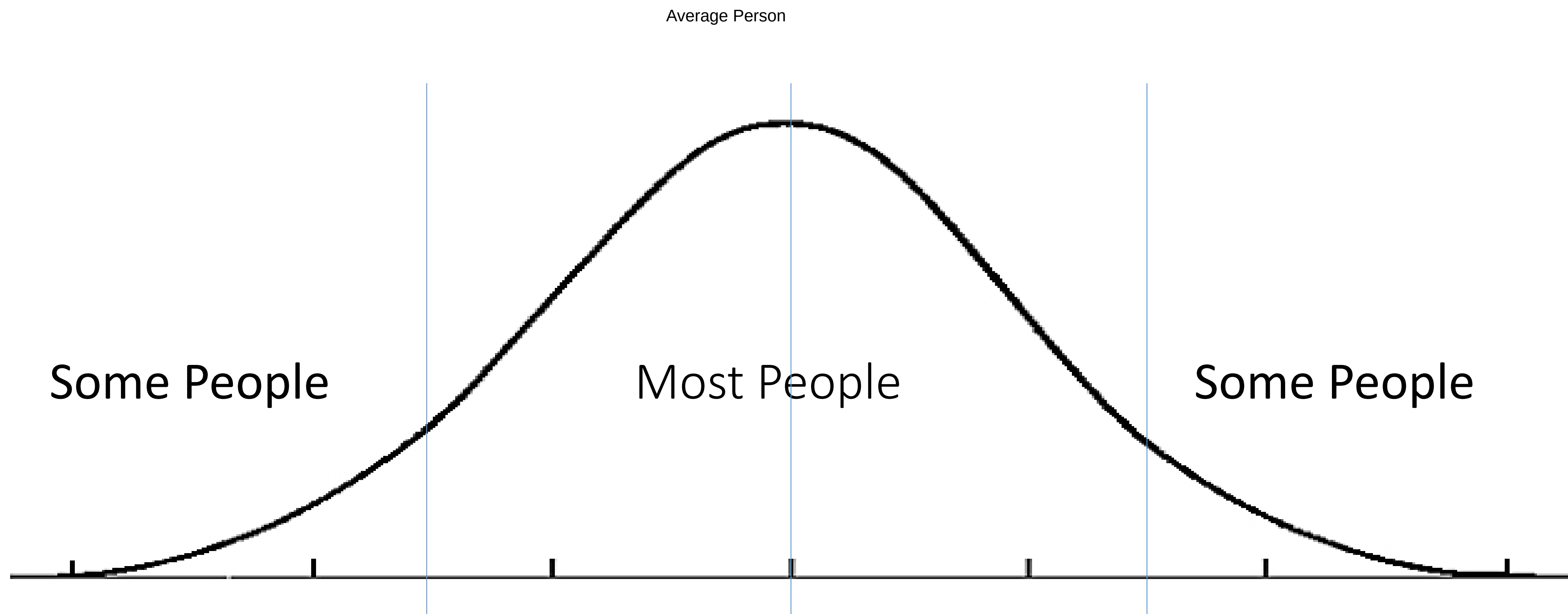
Naps are bad

8 hours of sleep is ideal

Older people don't need as much sleep

Storing up sleep for the week ahead

Alcohol helps you sleep



Athletes need a lot of sleep to perform their best

9-10 hr/night
<24 yr old

8-10 hr/night
25+ yr old

SLEEP MYTHOLOGY

You can get too much sleep

Naps are bad

8 hours of sleep is ideal

Older people don't need as much sleep

Storing up sleep for the week ahead

Alcohol helps you sleep

Stay calm after one bad-night's rest...



Sleep / Nutrition Interaction

- Your sleep can influence what you eat, and vice versa.
- The primary fuel source for athletes are carbohydrates.
- Sleep deprivation alters the ability of the body to metabolize and store carbohydrates for recovery, as well as use for a later time.
- Individuals who are sleep deprived tend to crave carbohydrates.
- Certain foods can have an adverse effect, keeping you awake at night.
- Large quantities of food consumed late at night can also contribute to a restless night.
- If your food is keeping you up at night, check in with an RD.



FATIGUE MANAGEMENT

sleep strategies

Be sure you're asking the right questions...

Readiness Questionnaires and Training Monitors



Development of the athlete sleep behavior questionnaire: A tool for identifying maladaptive sleep practices in elite athletes

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Cheri D Mah²

Shona L Halson³

¹ University of Waikato, Health, Sport and Human Performance - Hamilton - Waikato - New Zealand.

² University of California, Human Performance Center - San Francisco - California - USA.

³ Australian Institute of Sport, Physiology - Canberra - ACT - Australian.

⁴ High Performance Sport New Zealand, Performance Physiology - Auckland - Auckland - New Zealand.

ABSTRACT

Introduction: Existing sleep questionnaires to assess sleep behaviors may not be sensitive in determining the unique sleep challenges faced by elite athletes. The purpose of the current study was to develop and validate the Athlete Sleep Behavior Questionnaire (ASBQ) to be used as a practical tool for support staff working with elite athletes. **Methods:** 564 participants (242 athletes, 322 non-athletes) completed the 18-item ASBQ and three previously validated questionnaires; the Sleep Hygiene Index (SHI), the Epworth Sleepiness Scale (ESS) and the Pittsburgh Sleep Quality Index (PSQI). A cohort of the studied population performed the ASBQ twice in one week to assess test-retest reliability, and also performed sleep monitoring via wrist-actigraphy. **Results:** Comparison of the ASBQ with existing sleep questionnaires resulted in *moderate* to *large* correlations ($r=0.32 - 0.69$). There was a significant difference between athletes and non-athletes for the ASBQ global score (44 ± 6 vs. 41 ± 6 , respectively, $p < 0.01$) and for the PSQI, but not for the SHI or the ESS. The reliability of the ASBQ was acceptable (ICC=0.87) when re-tested within 7 days. There was a *moderate* relationship between ASBQ and total sleep time ($r=-0.42$). **Conclusion:** The ASBQ is a valid and reliable tool that can differentiate the sleep practices between athletes and non-athletes, and offers a practical instrument for practitioners and/or researchers wanting to evaluate the sleep behaviors of elite athletes. The ASBQ may provide information on areas where improvements to individual athletes' sleep habits could be made.

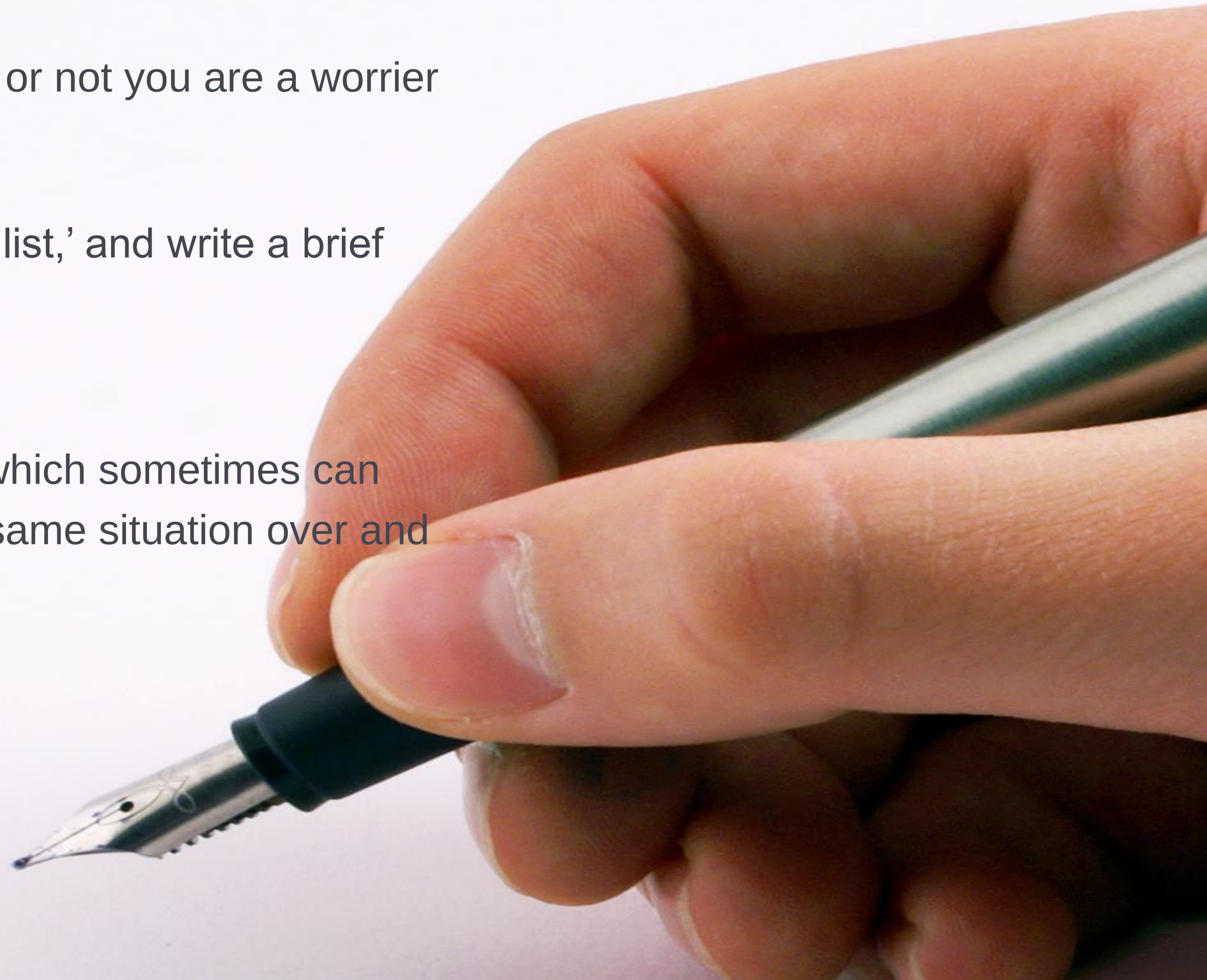
Keywords: Surveys and Questionnaires; Actigraphy; Polysomnography; Sleep Hygiene; Athletes.

Lark or Owl?



Resolve Daily Dilemmas Outside of the Bedroom

- It is important to recognize whether or not you are a worrier
- Before going to bed, make a 'worry list,' and write a brief action item beside each concern
- This can bring a sense of closure, which sometimes can stop the process of re-thinking the same situation over and over, all night long



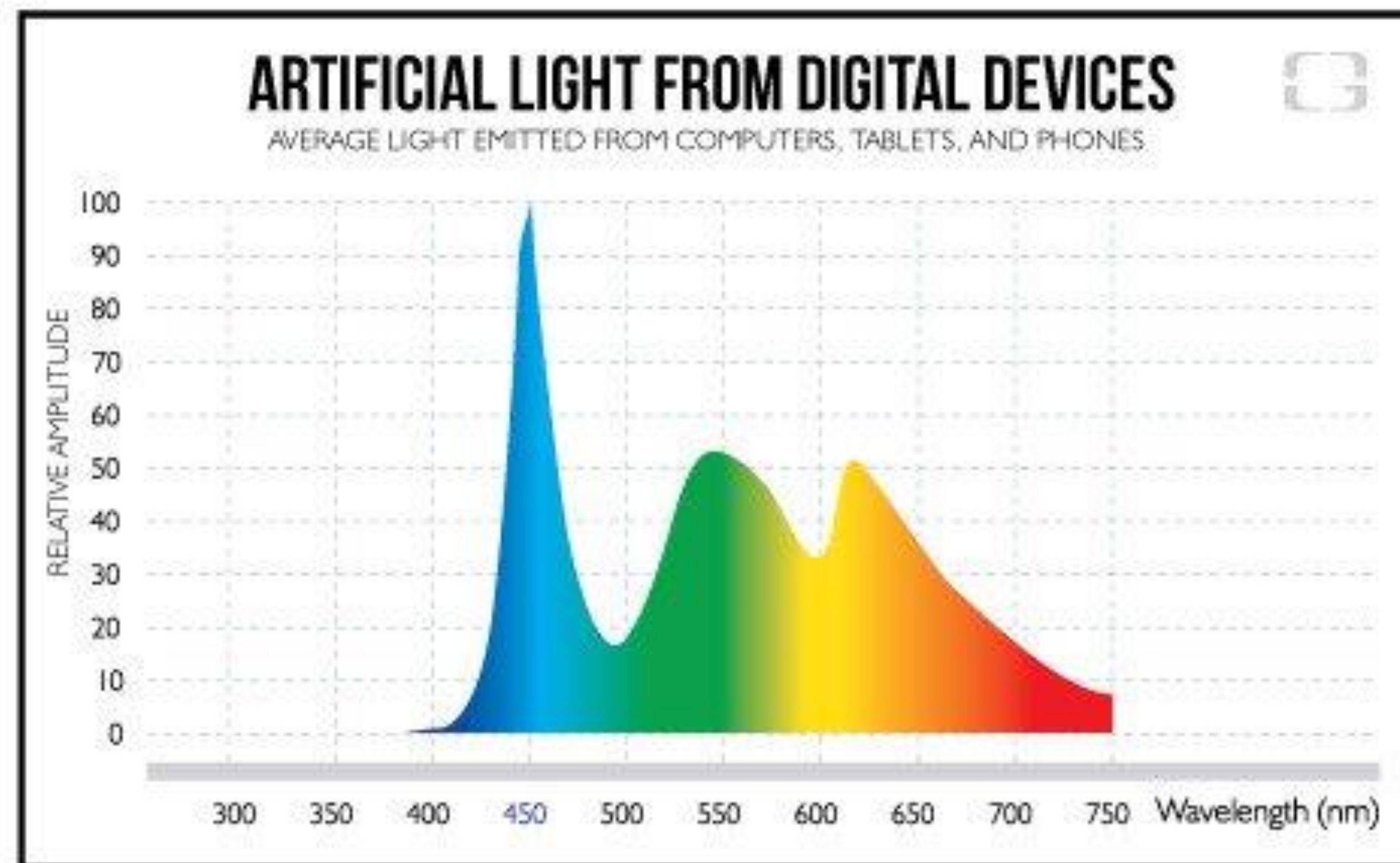
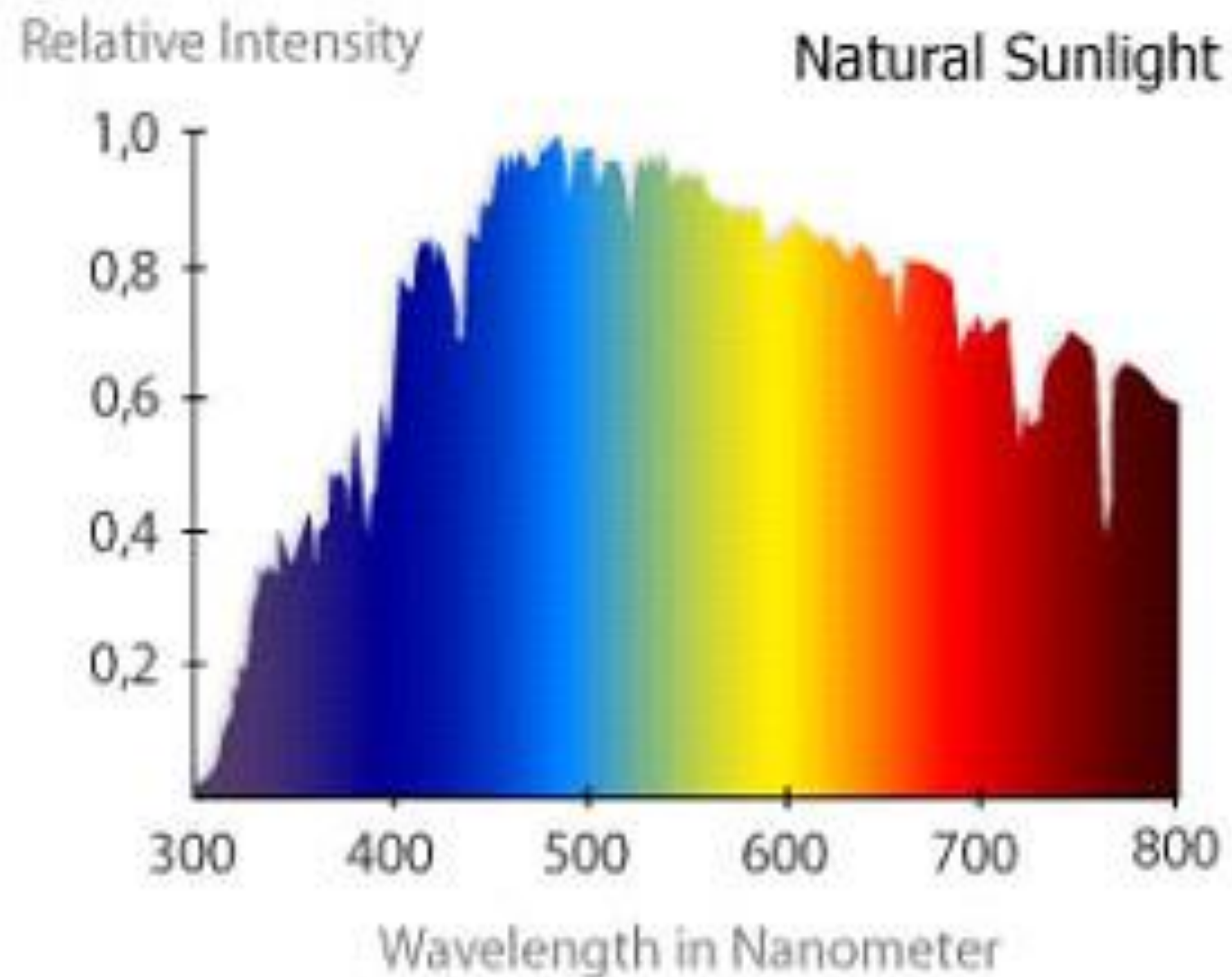
The Bedroom is not an office

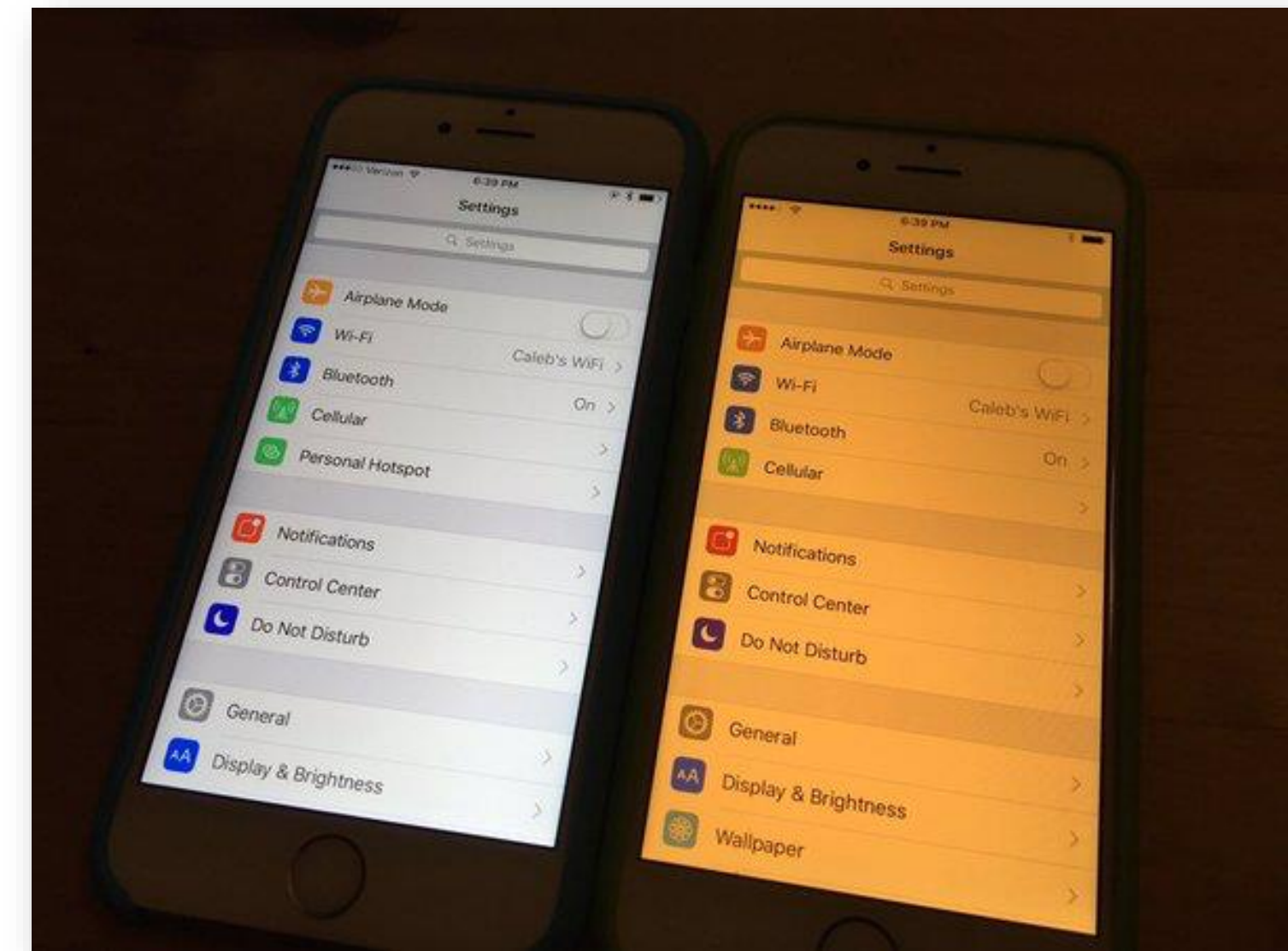
Bright
light = ↓ Melatonin
levels

- Be wary of using technology in the bedroom, even an hour before going to bed.
- Alertness is enhanced either because the bright light emitted suppress melatonin levels and/or because the content presented on these devices is engaging and exciting

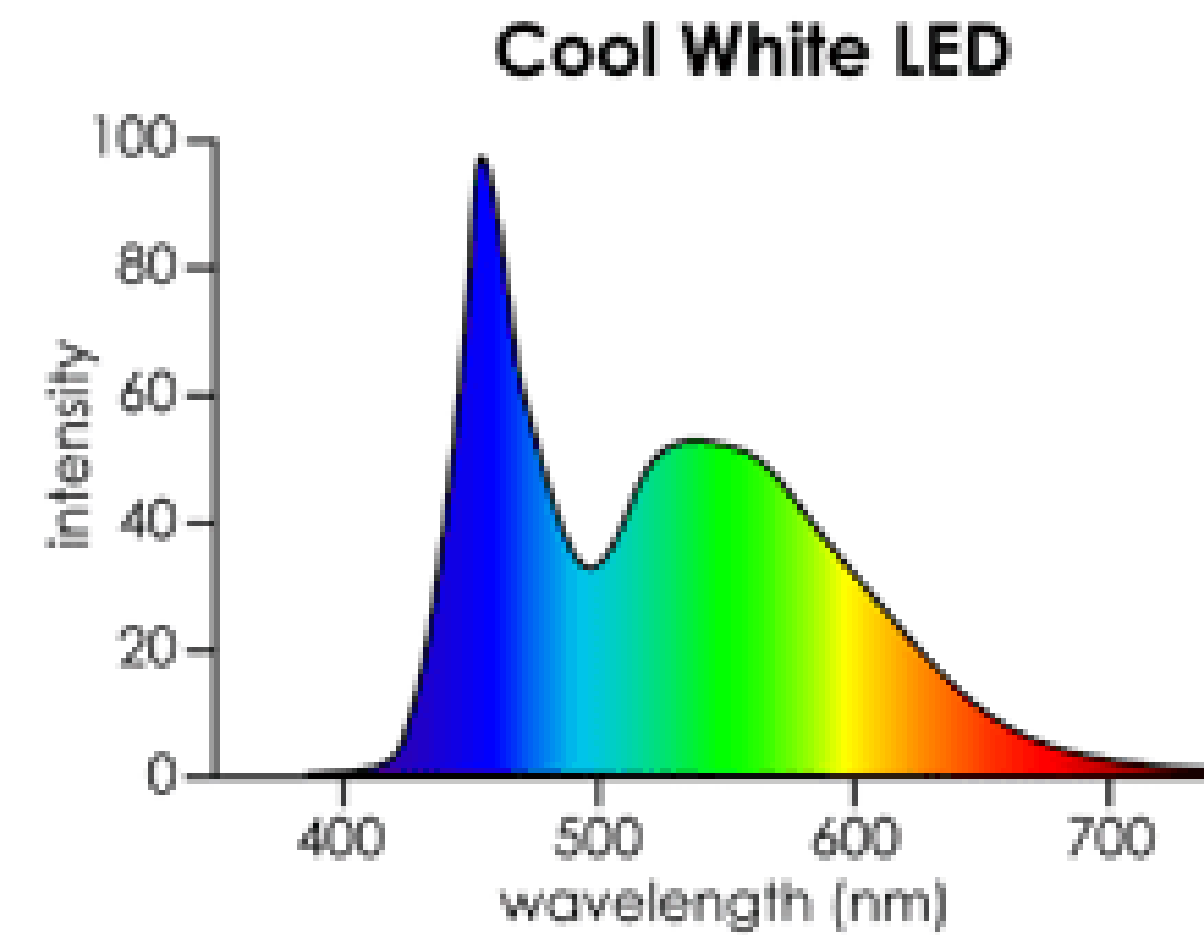
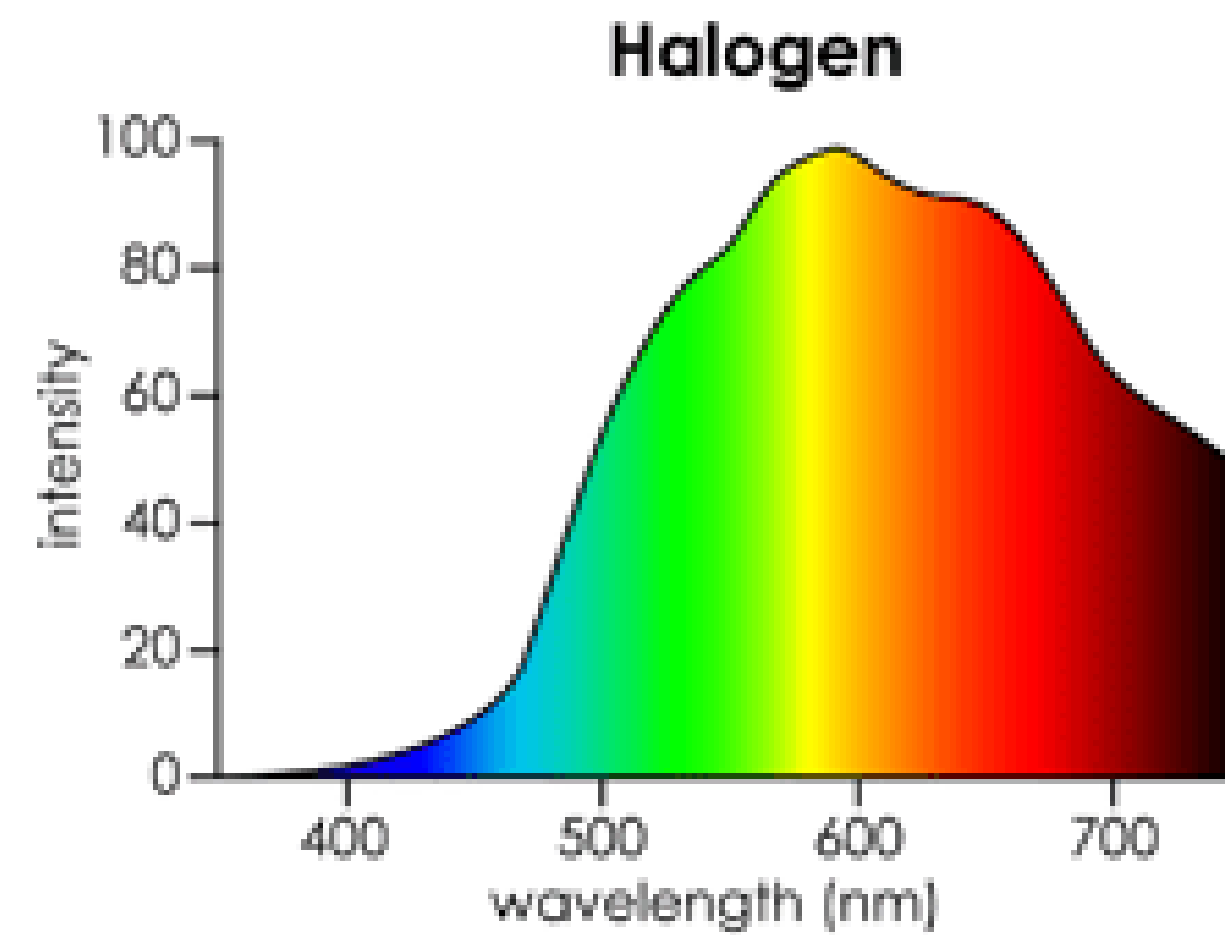
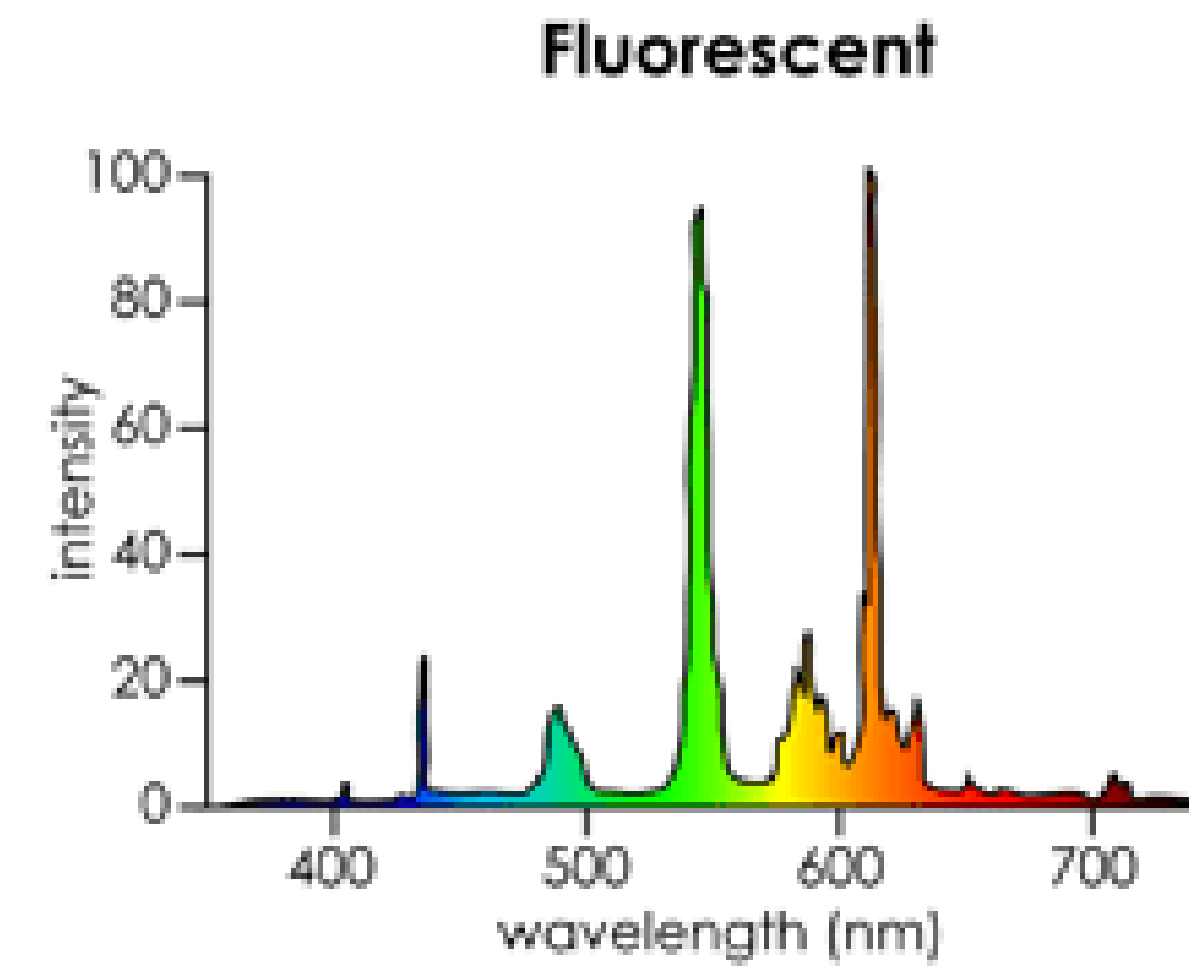
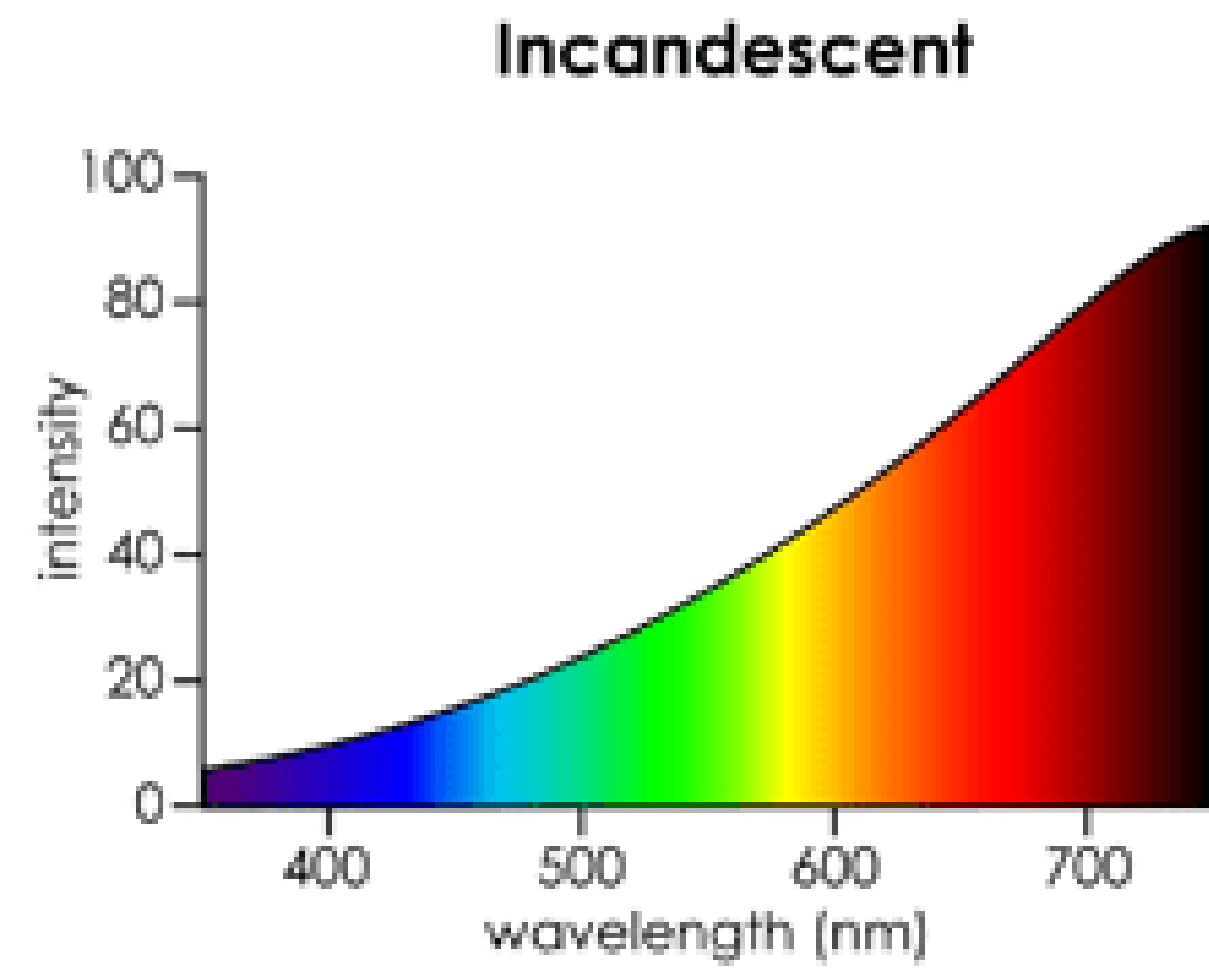
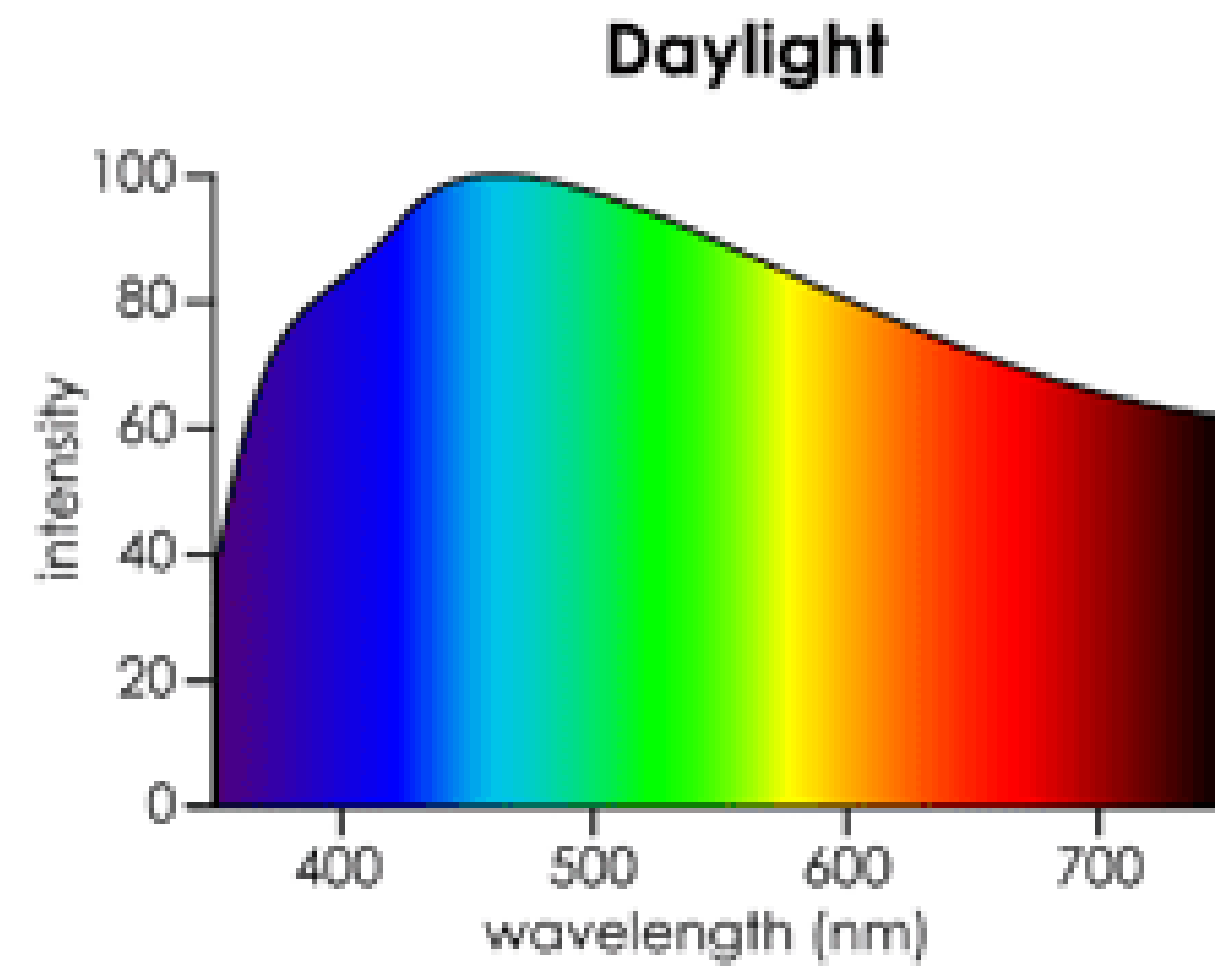


What is this thing called blue light?



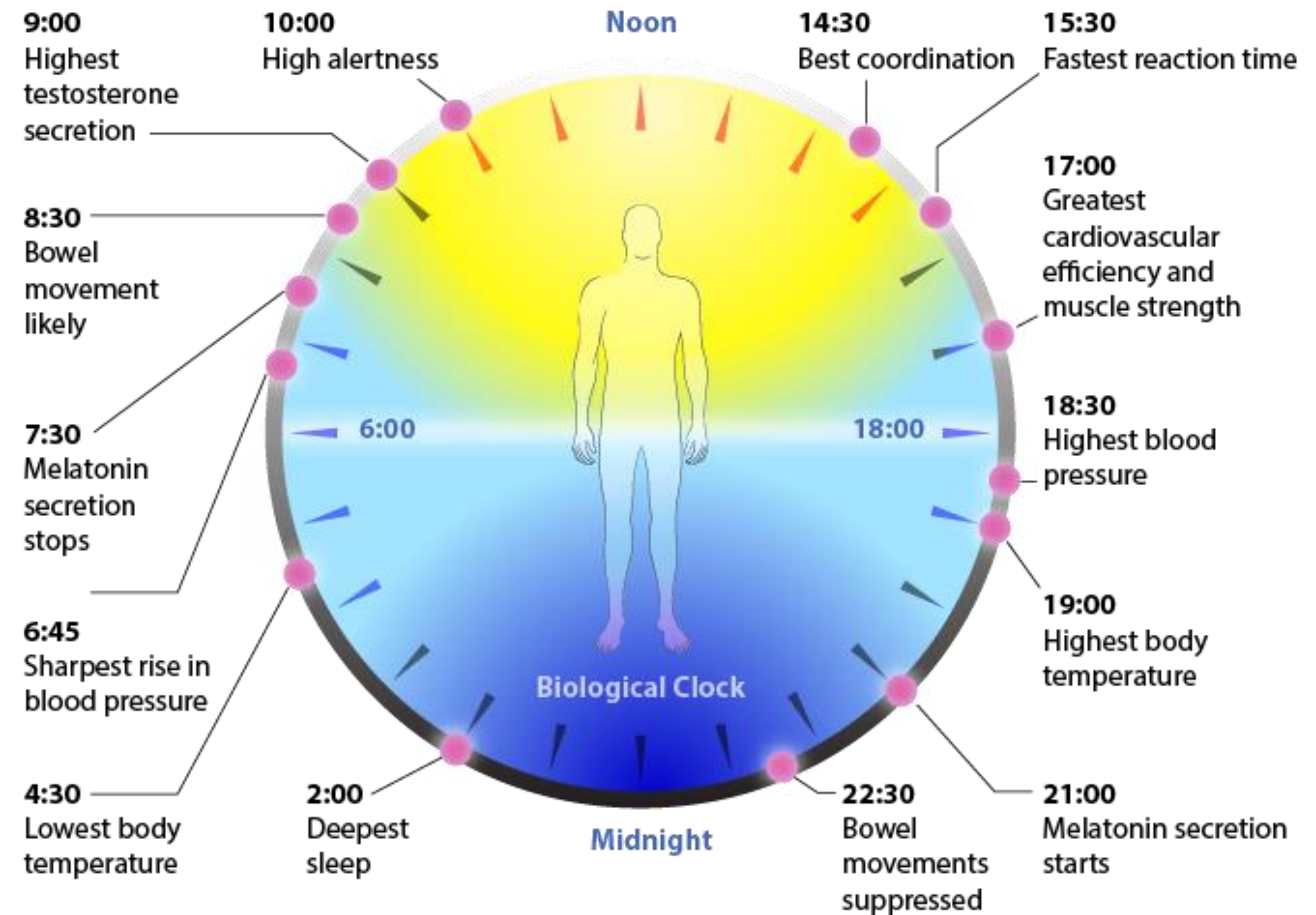






Other strategies

- Planning around biological clock



Reasons some athletes don't get enough sleep



Sleep disorders

- insomnia, sleep apnea



Scheduling

- training and meetings
- missions
- long distance travel, time zone shifting
- eating, commuting, time off



Lifestyle/Environmental

- sleep hygiene
- alcohol, drugs, caffeine
- noise, air quality, light exposure
- stress

Establish a Bedtime Routine

Strategies for winding down for a good nights sleep



Turn off
all screens



Take a hot
shower



Listen to
relaxing music



Stretch



Lay out clothes
for the next day



Go to bed by
10:30pm



Read a relaxing
book for 30-45
minutes

Create a Quiet and Comfortable Sleep Environment



Dark room, with
temperature
around 67°F / 19°C



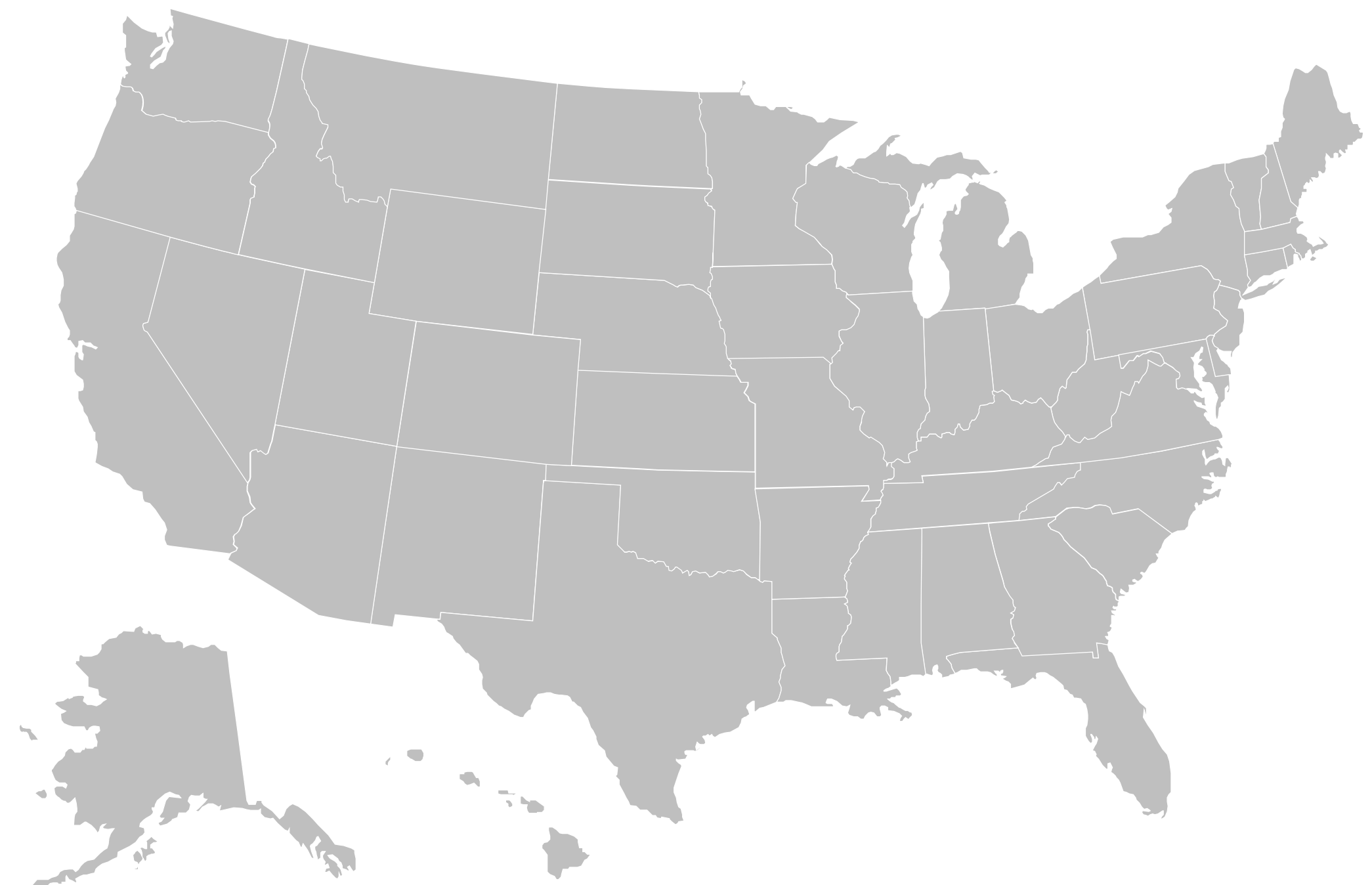
Mask unwanted
sounds with fan or
other white-noise



Ear plugs and
sleep mask can
aid sleep

CONUS

- Pay back sleep debt
- Sleep hygiene
- Optimize nutrition for sleep, recovery, and regeneration
- Manage your time efficiently so you can be effective



OCONUS

- Control what you can control
- Minimize sleep debt prior to travel
- Deploy countermeasures to take advantage of opportunities to sleep
- Prioritize health and immunity = recovery and adaptation



supplementation | Rx drugs

SLEEP

SUPPLEMENTATION | Rx



ZMA



MELATONIN



TART CHERRY



BioZzz

These products can be beneficial for improving sleep and/or enhancing recovery while sleeping.

SLEEP

SUPPLEMENTATION | Rx



POWER OFF



SOM SLEEP



ADVIL PM



ZzzQuil



Ambien

These products may not be beneficial for improving sleep and/or enhancing recovery while sleeping.

sleep technologies



Brandon Marcello PhD

@bmarcello13



Simply because a technology is available, doesn't make it accurate. Therefore, one of the important questions you must ask yourself is how much error are you willing to accept. #accurate #valid #reliable

12:12 PM - 21 Nov 2017



Readiband



3-4 Week Battery

93% Accurate to PSM



Whoop Band



1-2 Day Battery

They tend to underestimate sleep disruptions and overestimate total sleep times and sleep efficiency in normal individuals.



Charge 2



~ 5 Day Battery



Oura Ring



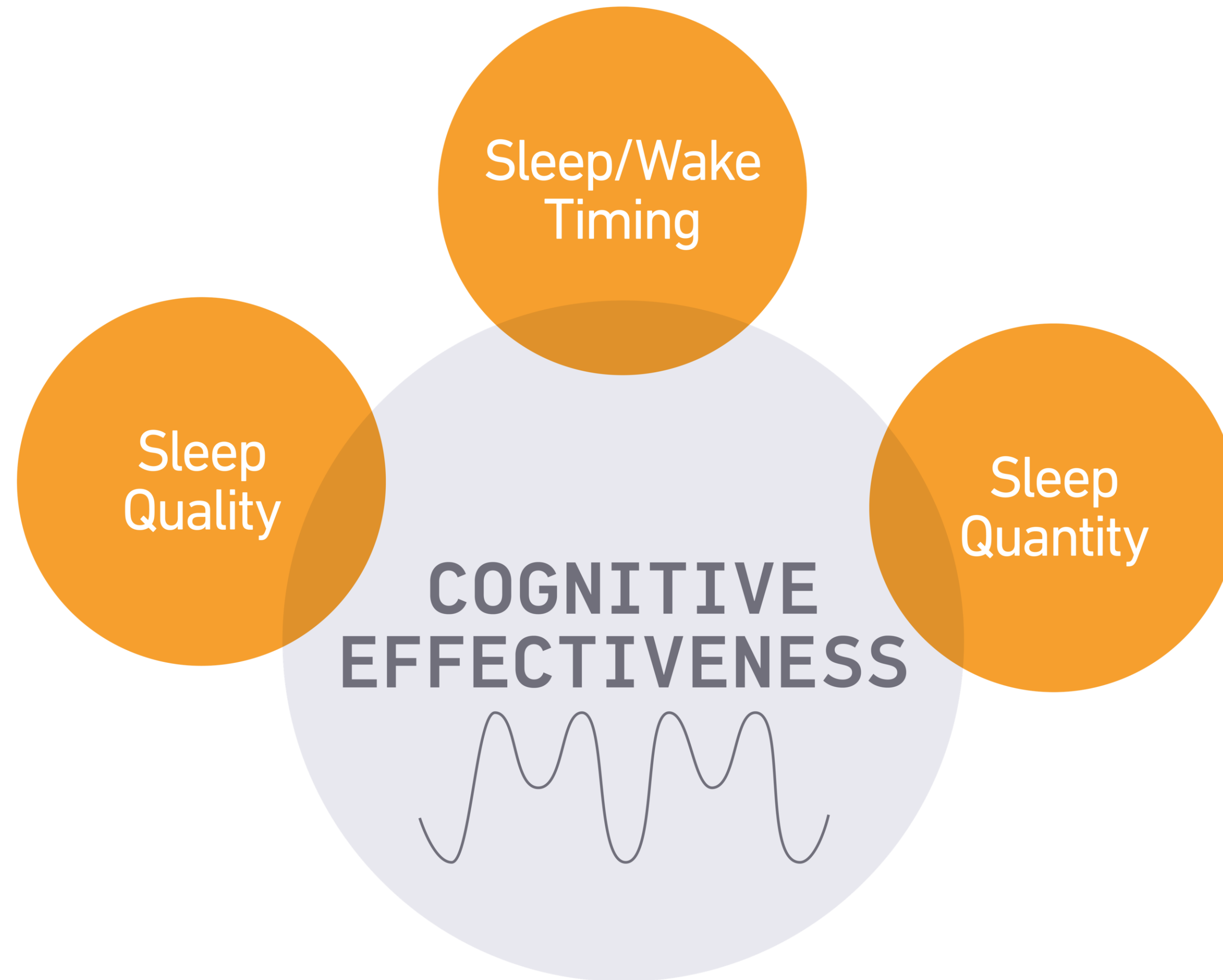
7 Day Battery

takeaways



RECAP

- Sleep is important to every human being; there is no exception.
- Sleep impacts the physical, cognitive, social, and emotional domains.
- Sometimes reality doesn't permit optimal sleep.
- Strategies, countermeasures, and low sleep debt can offset these times
- Get sleep when you can!
- Sleep hygiene.



resources

What to watch....



Jeff Iliff

One More Reason to Get a Good Night's Sleep



Russell Foster

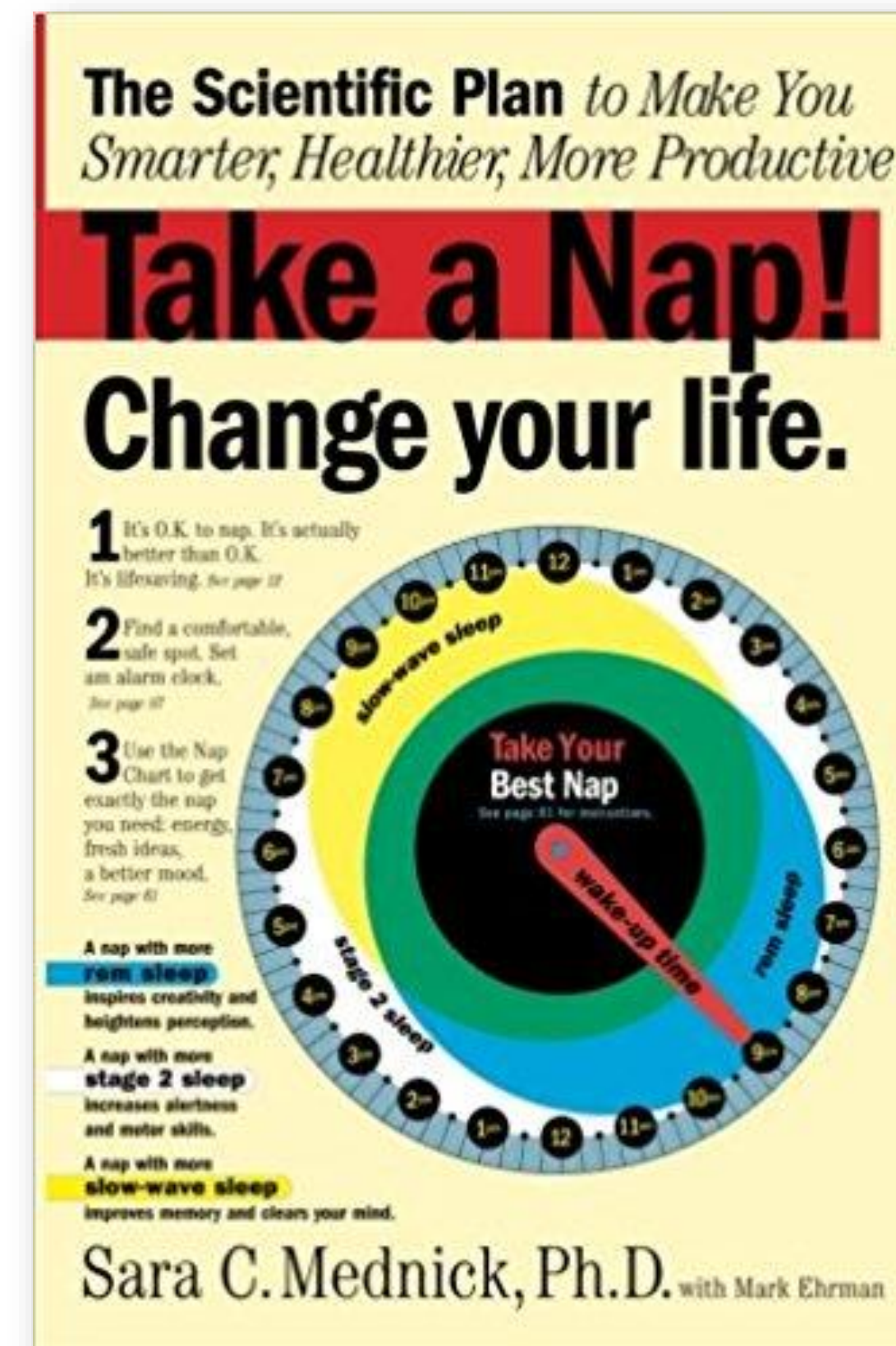
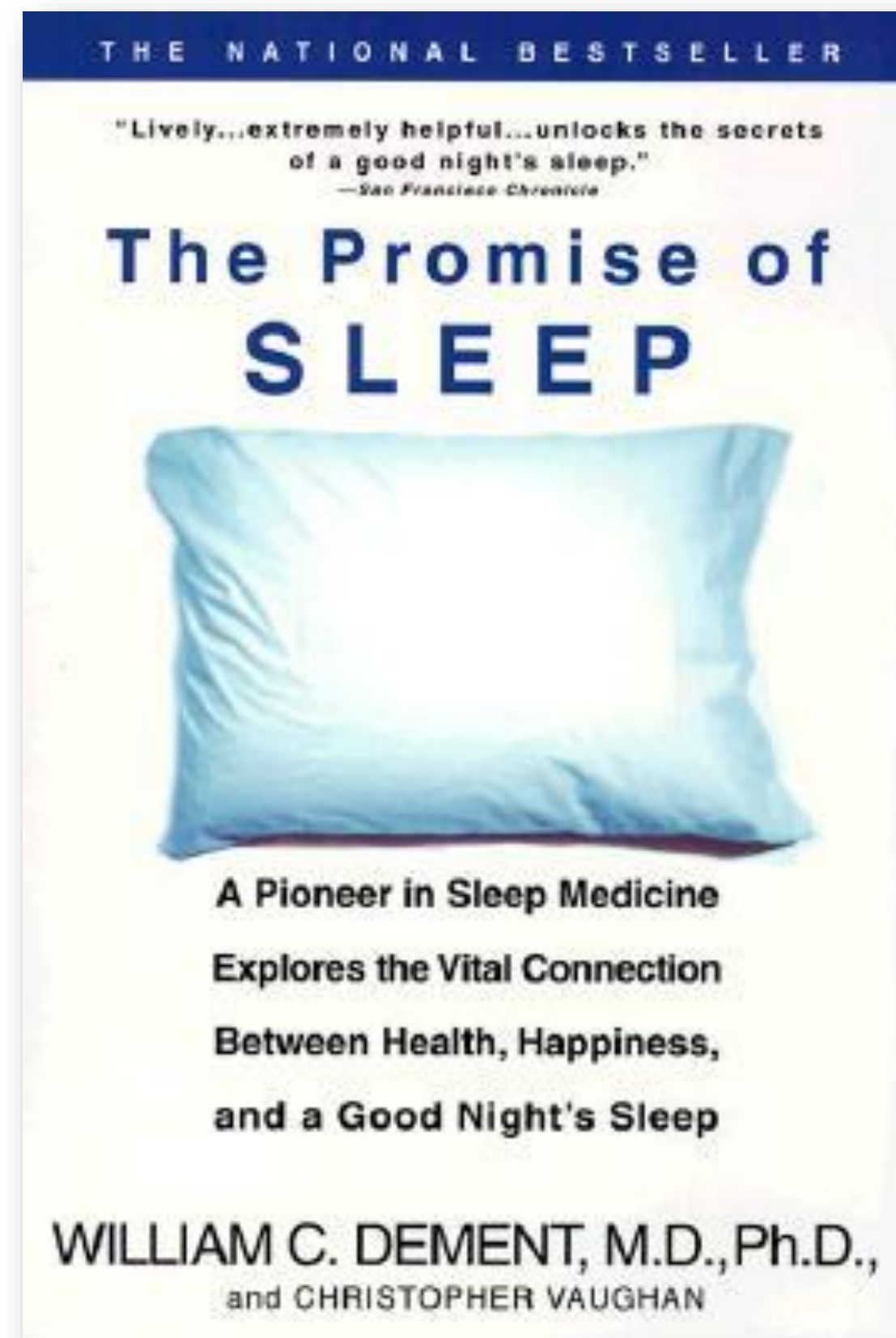
Why Do We Sleep?



Matt Walker

Sleep is Your Superpower

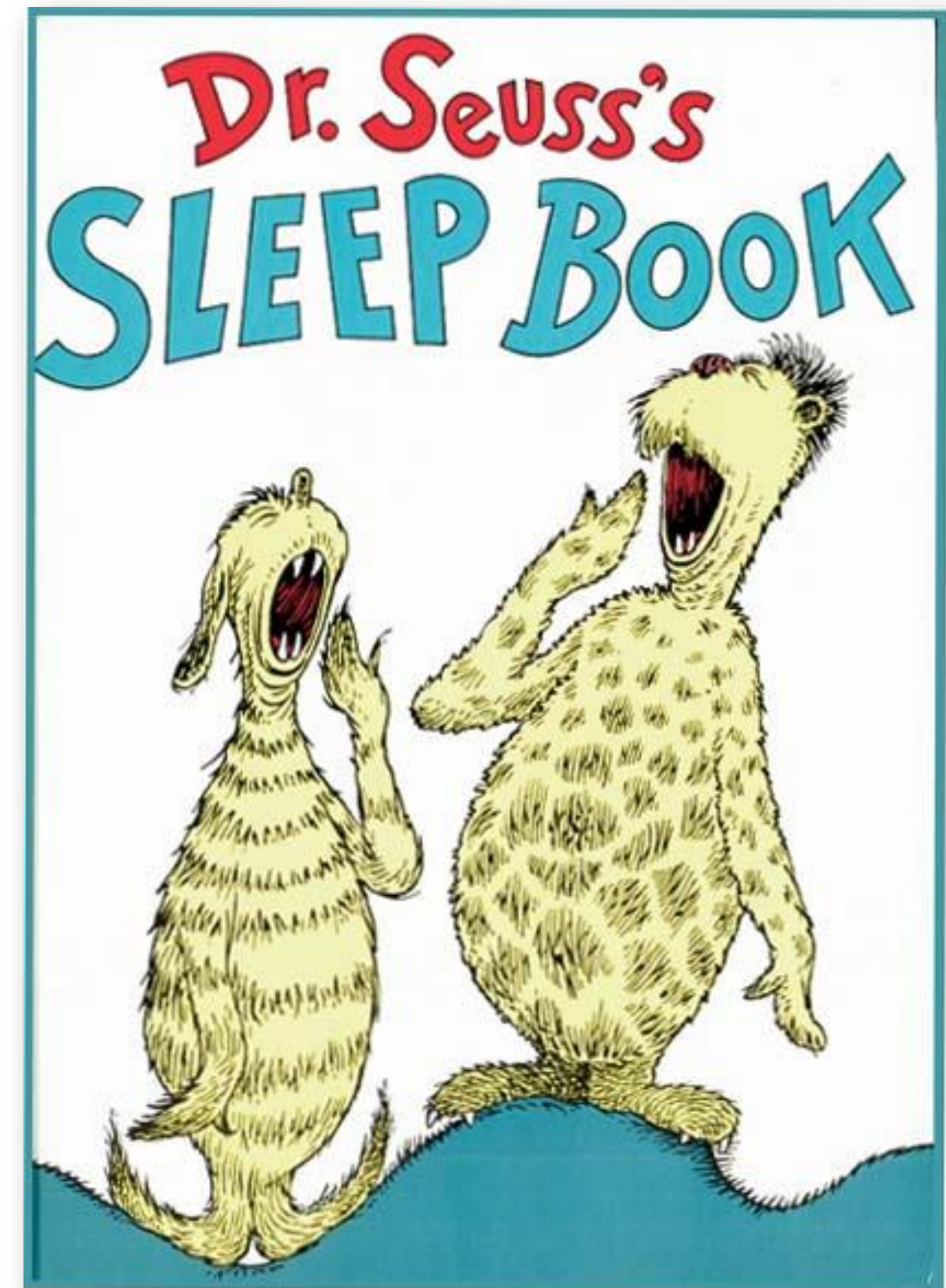
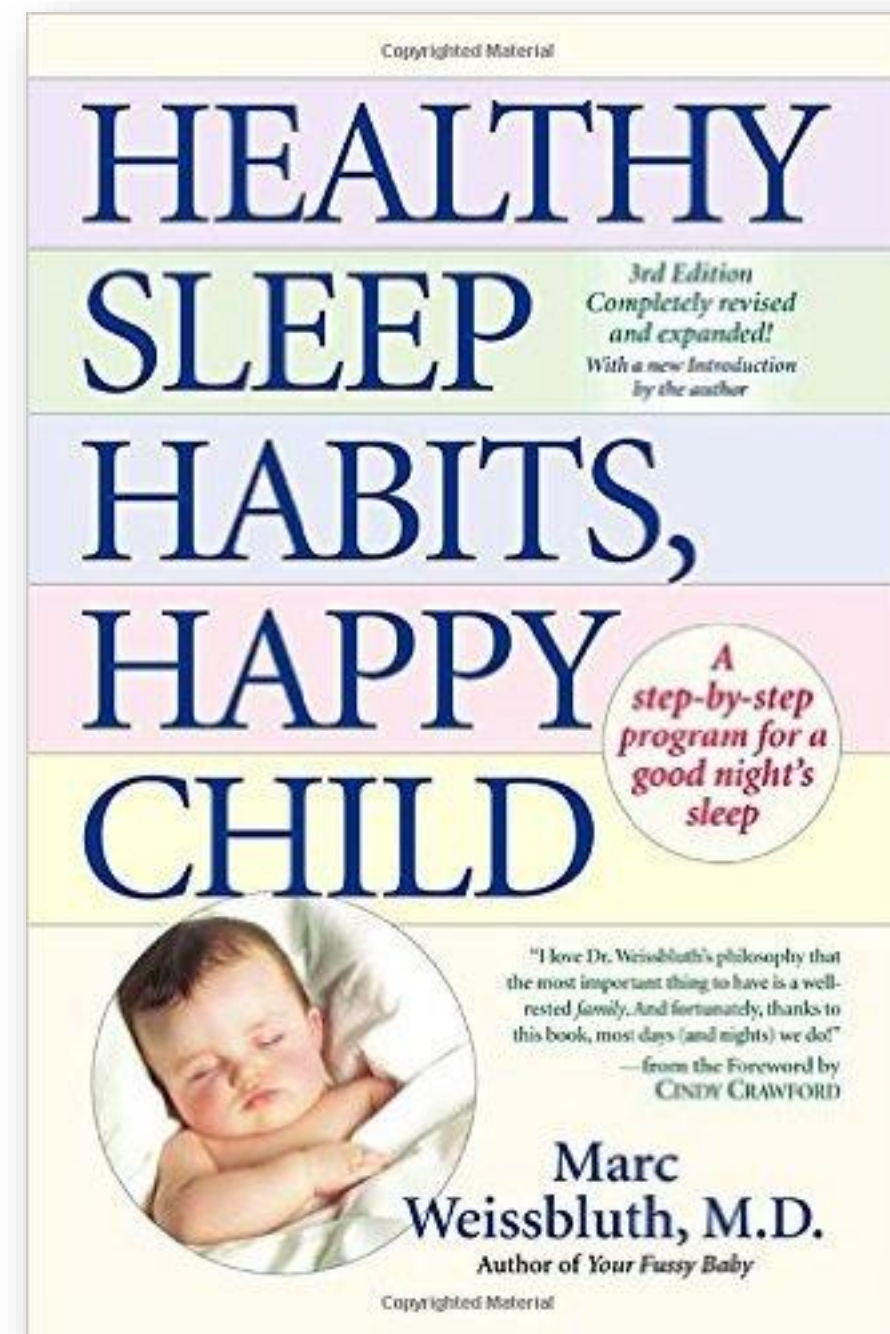
For you...



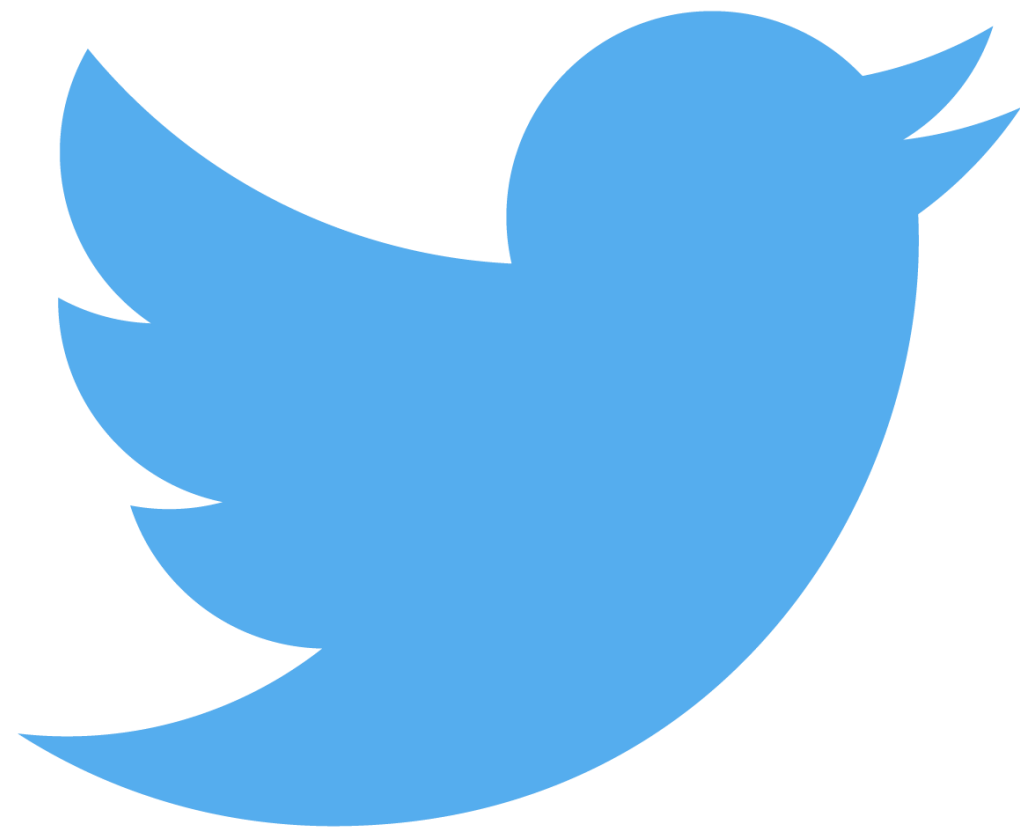
For your athletes (and you)...



Have or having kids?...



Who to follow...



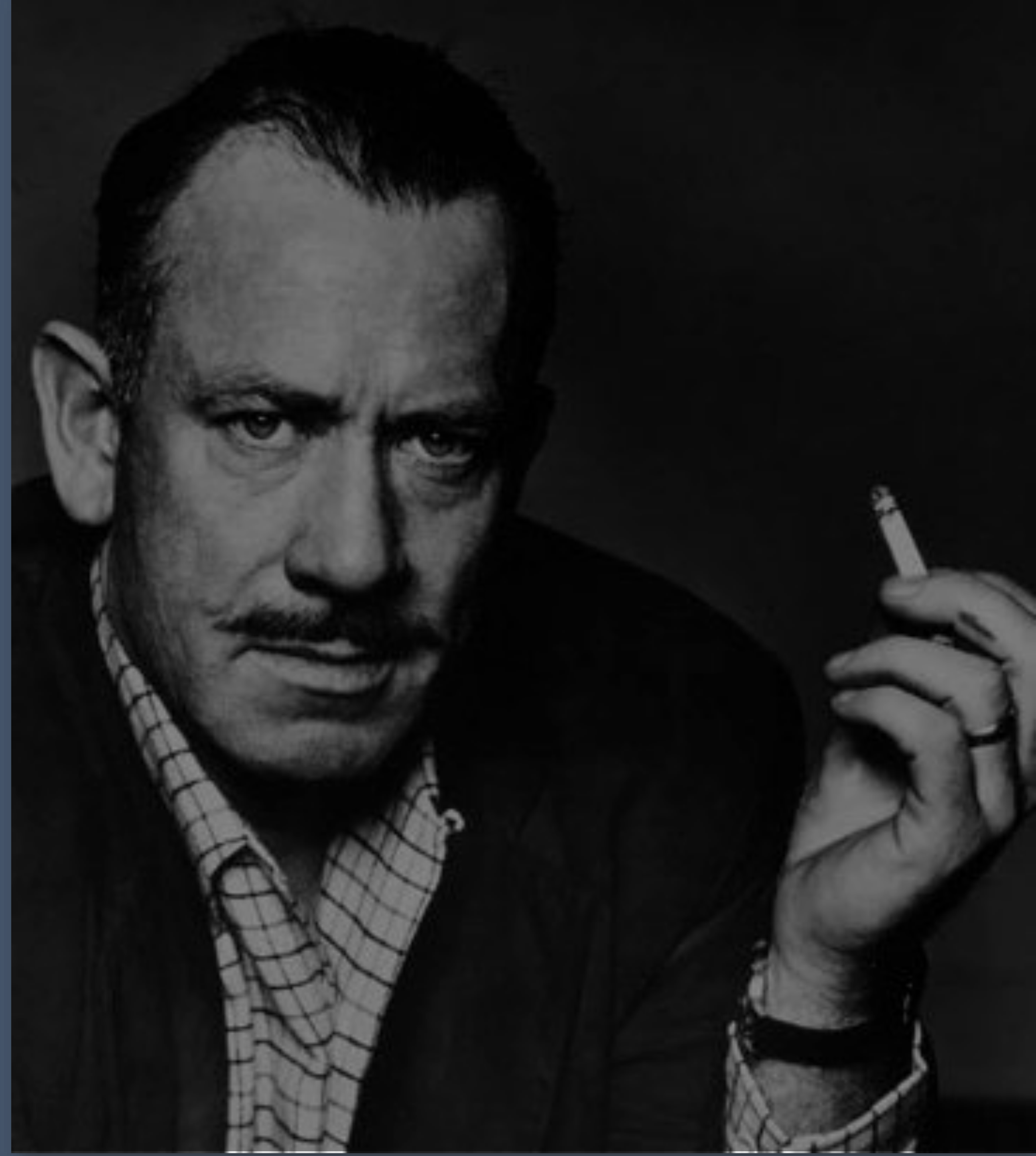
@CheriMah

@sleepfoundation

@AASMorg

“It is a common experience that a problem difficult at night is resolved in the morning after the committee of sleep has worked on it.”

– *John Steinbeck*



thank you & good night