

# SLEEP AND INJURIES

**“SLEEP IS THE GREATEST LEGAL PERFORMANCE ENHANCING  
DRUG THAT MOST PEOPLE ARE PROBABLY NEGLECTING IN  
SPORT”- MATTHEW WALKER**

# **SLEEP AND INJURIES**

**Study done in 2014- “Chronic Lack of Sleep is Associated With Increased Sports Injuries in Adolescent Athletes”**

**Milewski et al.**

- 160 Middle and High School Athletes
- 60% increase in Injuries for athletes getting 5-7 hours of sleep vs. 8-9 hours of sleep

# **SLEEP**

## **Are you getting enough sleep??????**

- Two Questions to ask yourself
  - When you first wake up and start your day, ask yourself, do I feel like I could fall back asleep in a couple of hours?
  - Can I function optimally without caffeine before noon?

# **SLEEP**

- 1 out of 2 adults not getting recommended 8 hours a night
- 1942- Average 7.9 hours a night
- 2018- Average 6 hours and 30 min a night
- 2018 Study by Wolfson and Clarskadon reported 73% of high school students are not getting the recommended sleep



# **ELECTRONICS AND** **BLUE LIGHT**

## **Sources**

- **Digital Sources**
  - **Smartphones**
  - **Tv Screens**
  - **Computer Screens**
- **Fluorescent and LED Lights**
- **Blue light suppresses secretion of melatonin from the pineal gland**
  - **Up to 3 hours**



# **CIRCADIAN RHYTHM**

**24 hour body clock**

- **Daily/Nightly Rhythm**

**Speeds up during the day**

**Slows down in the evening**

# **TYPES OF SLEEP**

## **Two types of sleep**

- Non-Rapid Eye Movement (NREM Sleep)
- Rapid Eye Movement (REM Sleep)
- NREM- “Physical Maintenance” Human Growth Hormone is released, tissues are repaired and regrown, immune system is strengthened, Built up waste products are removed and washed away
- REM- “Mental Maintenance” Memory. Learning and retaining information and memories from the day. Creativity. Social. This is when we dream

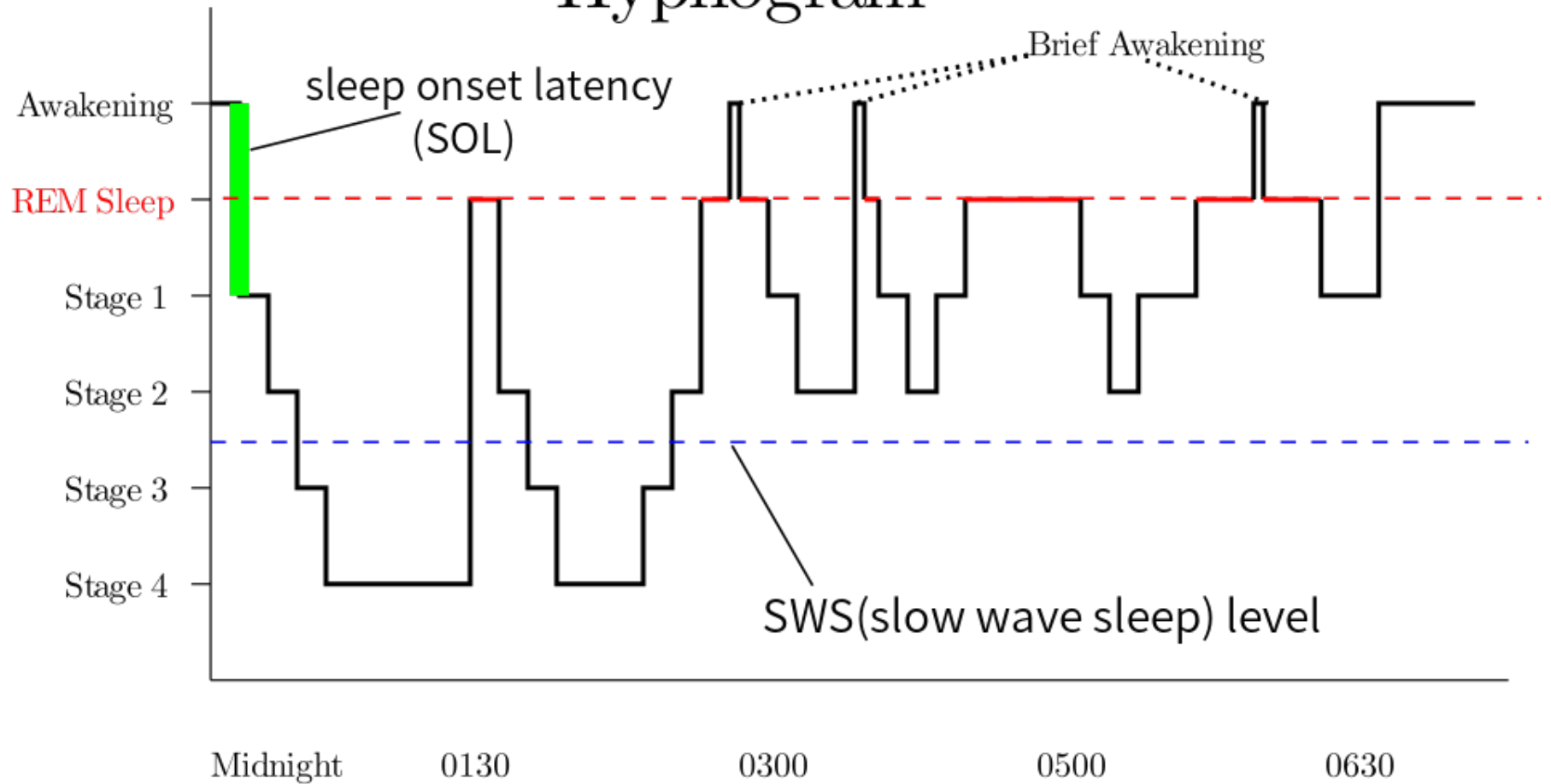
# **THE SLEEP CYCLE**

## **Sleep Cycle Lasts 90 minutes**

- This sleep cycle is a battle between both NREM and REM Sleep
- All cycles throughout the night are not even in terms of proportion of REM sleep to NREM sleep
  - Ratio's vary throughout the night



# Hypnogram



# **SLEEP AND INJURIES**

- **Less than 8 hours of sleep, especially 6 or less**
  - Time to Physical Exhaustion drops 10 to 30 percent
  - Aerobic Output is significantly Reduced
- **Sweating is impaired by sleep loss**
- **Stability Muscles Fail Quicker**
- **Recovery**
  - Post-performance sleep accelerates physical recovery from inflammation, stimulate muscle repair, and helps restock cellular energy in the form of glucose and glycogen

# **CONCUSSION**

# **RECOVERY TIMES**

## **2018-2019**

- 26.7 Days

## **2019-2020**

- 34 Days

## **2020-2021**

- 15.5 Days

## **2021-2022**

- 19.4 Days

# SLEEP AND THE INJURED ATHLETE

Research done in 2014, showed that high school athletes who slept less than 8 hours a night were 1.7 times more likely to sustain an injury than athletes who slept more than 8 hours a night.

## FALL SPORTS AT LEXINGTON HIGH SCHOOL

During fall sports, we had 21 injuries that resulted in time loss from sport.



## 7.02 HOURS OF SLEEP A NIGHT

An average, these 21 athletes got 7.02 hours of sleep the night before their injury.

# SLEEP AND THE INJURED ATHLETE

Research done in 2014, showed that high school athletes who slept less than 8 hours a night were 1.7 times more likely to sustain an injury than athletes who slept more than 8 hours a night.



## SPRING SPORTS AT LEXINGTON HIGH SCHOOL

During fall sports, we had 24 injuries that resulted in time loss from sport.

## 7.16 HOURS OF SLEEP A NIGHT

An average, these 24 athletes got 7.16 hours of sleep the night before their injury.



# **SLEEP AND** **PERFORMANCE**

- **Peak Muscle Strength, Vertical Jump Height, Running Speed, Reaction Time all correlate with sleep**
- **2011 Study by Cheri Mah**
  - **Stanford Men's Basketball Team**
    - **Sprint time improved by .7 seconds**
    - **Free Throw and 3 Point percentage improved by 9%**

# SLEEP AND PERFORMANCE

- **Andre Iguodala**
  - **More than 8 hours of sleep before a game**
    - **12% increase in minutes played**
    - **29% increase in points/minute**
    - **2% increase in 3 point percentage**
    - **9 % increase in free throw percentage**



# **SLEEP AND PERFORMANCE**

NBA player who wore a WHOOP for a 24 game period



## **LOW**

- **3.5 Assists**
- **5 Turnovers**
- **18.5 PPG**
- **35% Field Goal**

## **HIGH**

- **8 Assists**
- **1 Turnover**
- **21.3 PPG**
- **51% Field Goal**



7:00

LTE



TODAY

OVERVIEW

STRAIN

RECOVERY

SLEEP

72%  
RECOVERY

HRV  
144



15.5  
DAY STRAIN

CALORIES  
2,811



START ACTIVITY



11.1

RUNNING

9:13am  
8:36am



7:41

SLEEP

6:27am  
(Sun) 9:59pm

39%

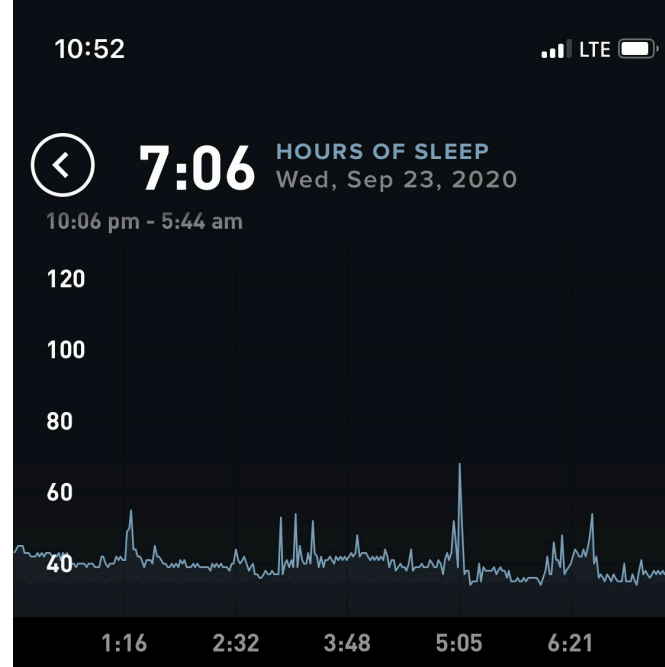
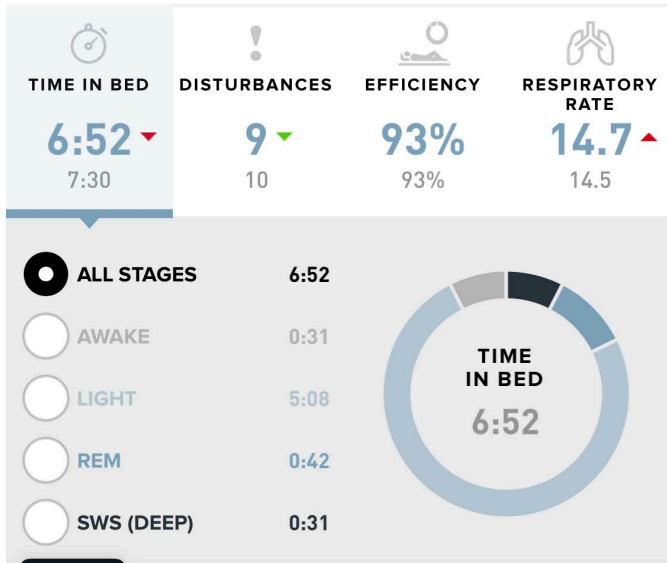


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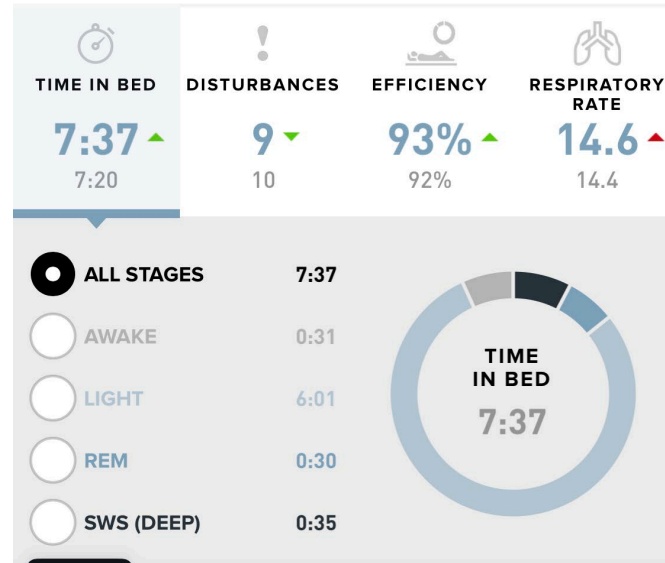




SLEEP STATISTICS VS. PREVIOUS 30 DAYS

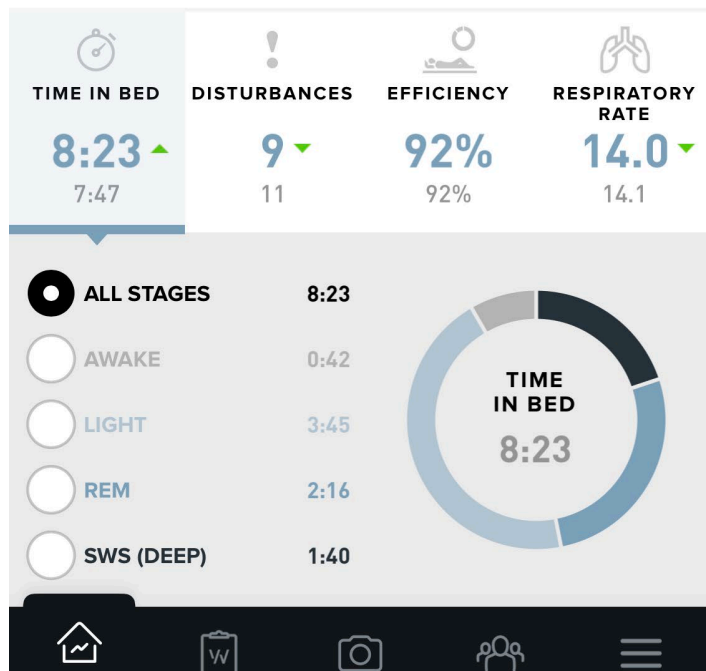


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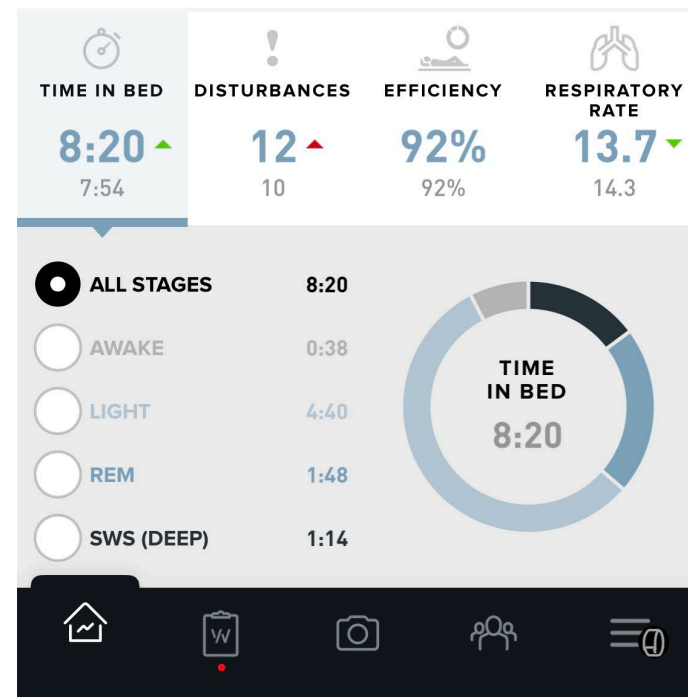




SLEEP STATISTICS VS. PREVIOUS 30 DAYS



SLEEP STATISTICS VS. PREVIOUS 30 DAYS



# **SLEEP AND** **PERFORMANCE**

- **119 D1 Athletes wore a WHOOP for 129 days**
  - 60% fewer injuries
  - 54% less sickness
  - Resting Heart Rate dropped 4.4 BPM

# **CAFFEINE**



**Caffeine is going to affect our deep sleep the most- Lessen it by 20-40%**

- **Caffeine stays in your system for 12 hours**

**Afternoon/Evening Caffeine Ingestion (4:00 pm or Later)**

- **100mg- Can stop deep sleep by 30% in the first sleep cycle**

**Tips for Caffeine Consumption**

- **Keep Caffeine Consumption 12 hours before bed**
- **Limit to 100mg a day**

# **NAPS**

## **Benefits**

- Improvements in Memory
- Improvements in Mood
- Improvements in Performance
  - Waterhouse et al 2007 Study
    - 30 minute nap after poor sleep led to increase in sprint performance

## **Downside**

- Make it harder to fall and stay asleep at night

## **Best Way To Nap**

- Before 2 pm
- Less than 20-30 minutes

# **MELATONIN**

**Helps regulate the timing of when sleep occurs**

**It has little influence on the generation of sleep itself**

- Track starting line example

**Controlled by light/dark**

- Begins releasing around dusk

**Supplementation**

- Increased speed at which people fell asleep by 3.9 minutes
- Increased sleep quality by 2.2%

**Over the counter Melatonin not commonly regulated by governing bodies around the world**

- Studies have shown that Melatonin concentrations in over the counter brands range from 83% less than claimed and 478% more than claimed

# **HOW TO IMPROVE SLEEP**

## **Regularity**

### **Keep it Cool, Keep it Dark**

- 65-67 Degree's
- Core Body Temperature needs to drop 2-3 Degree's
- Dark

### **Have a Sleep Routine**

- Time to Unwind

**Don't take Naps after 3pm**

**Avoid Screens at night**

**Avoid Caffeine after Noon**

**Exercise**

**Don't Lie in bed awake**

**Practice Times**





# **SLEEP AND THE CARDIOVASCULAR SYSTEM**

**Losing even 1 or 2 hours of sleep will increase a persons heart rate and significantly increase their systolic blood pressure**

- Daylight Savings Time

## **Overactive Sympathetic Nervous System**

- Triggers increase in stress hormone cortisol
  - Chronic Cortisol increases blood pressure
  - Alarm Clock/Snooze Button

**Growth hormone is shut off by sleep deprivation. Without growth hormone to replenish the lining of blood vessels, they will slowly be stripped of their integrity**

# **SLEEP AND THE CARDIOVASCULAR SYSTEM**

**Adults 45 and older who sleep less than 6 hours a night are 200 percent more likely to have a heart attack or stroke during their lifetime vs. 7-8 hours of sleep.**

## **Study in Japan**

- **4,000 Male Works over 14 years**
- **Six hours or less, 400% more likely to suffer one or more cardiac Arrests**

# **SLEEP IN** **ADOLESCENTS**

**Circadian Rhythm shifts progressively forward**

- Meaning they are ready for sleep later

**Need to be more diligent on sleep routine habits**

- **Teton County, WY**
  - Moved School Start time from 7:35-8:55
  - 70% decrease in car crashes
- **Edina, MN**
  - 7:25-8:30
  - Improvement in Test scores, Primarily SAT

# **SLEEP**

**Sleep is not like the bank**

## **Study**

- 6 months
- 8 hrs vs 4-5 hrs in the week all on weekend
- Second group- Twice as likely to be in poor health

**QUESTIONS????**