



# Cognitive Behavioral Treatment of Insomnia

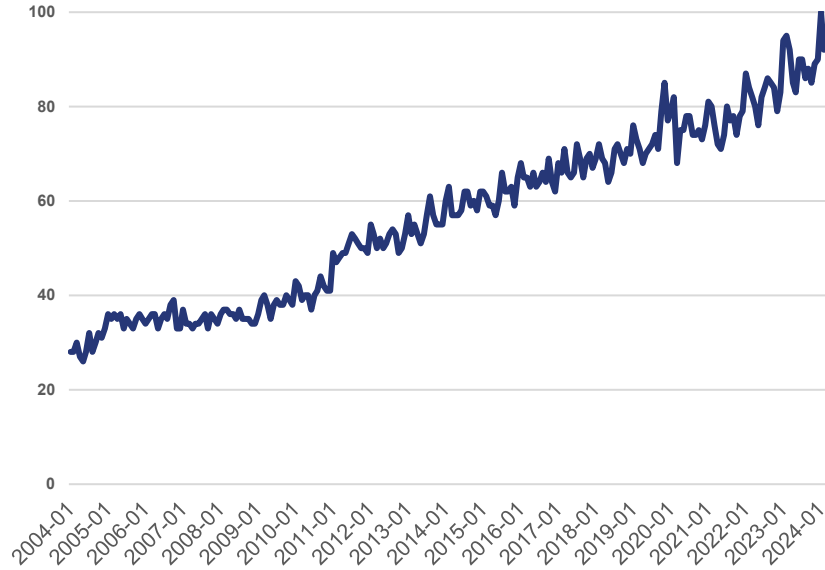
Kyle Thomas Darnall, PsyD, LP  
Executive Director, Behavioral Health

“If sleep does not serve an absolutely vital function,  
then it is the biggest mistake the evolutionary process has  
ever made”

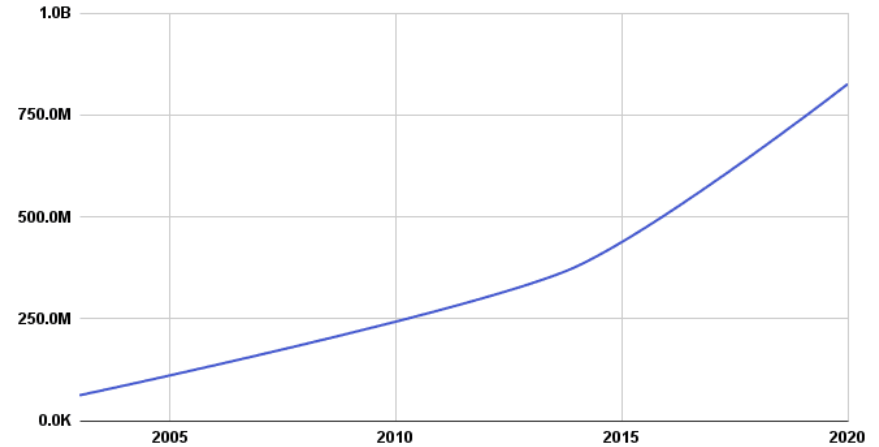
-Allen Rechtschaffen

# The Why: Public Interest/Concern(s)

Google Trends: "Sleep"



U.S. Melatonin Sales (2003-2020)



# The Why: Prevalence and Risk (n = 59,108 adults)

(Liu, et al, 2021)

- ▶ 50% Difficulties initiating or maintaining sleep (DIMS)
- ▶ 41% Loud snoring
- ▶ 23% Unintentionally falling asleep
- ▶ 14% Episodes of having stopped breathing
- ▶ 38% = Any 1 symptom
- ▶ 37% = Any 2 or more symptoms
- ▶ 12% = Any 3 or more symptoms
- ▶ 2% = All 4 symptoms
- ▶ 75% =  $\geq 1$  symptoms (n = 44,274)

# The Why: Prevalence and Risk

- ▶ 1/3 of adults report <7 hours of sleep per night
- ▶ 2/3 of adolescents report <8 hours of sleep per night
- ▶ Every hour of sleep variability = 27% increased chance of metabolic abnormality
- ▶ 50-70 million US adults have sleep/wake disorders (nearly 1 in 4)!!
- ▶ 40-50% of individuals with insomnia have comorbid mental disorder
- ▶ Meta-Analysis = Insufficient sleep is a significant predictor of all-cause mortality



# The Why: Little to no awareness of impairment due to insufficient sleep

## Neurocognitive Consequences of Sleep Deprivation

Namni Goel, Ph.D.<sup>1</sup>, Hengyi Rao, Ph.D.<sup>1</sup>, Jeffrey S. Durmer, M.D., Ph.D.<sup>2</sup>, and David F. Dinges, Ph.D.<sup>1</sup>

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### Abstract

Sleep deprivation is associated with considerable social, financial, and health-related costs, in large measure because it produces impaired cognitive performance due to increasing sleep propensity and instability of waking neurobehavioral functions. Cognitive functions particularly affected by sleep loss include **psychomotor and cognitive speed, vigilant and executive attention, working memory, and higher cognitive abilities**. Chronic sleep-restriction experiments—which model the kind of sleep loss experienced by many individuals with sleep fragmentation and premature sleep curtailment due to disorders and lifestyle—demonstrate that **cognitive deficits accumulate to severe levels over time without full awareness by the affected individual**.

Functional neuroimaging has revealed that frequent and progressively longer cognitive lapses, which are a hallmark of sleep deprivation, involve distributed changes in brain regions including frontal and parietal control areas, secondary sensory processing areas, and thalamic areas. There are robust differences among individuals in the degree of their cognitive vulnerability to sleep loss that may involve differences in prefrontal and parietal cortices, and that may have a basis in genes regulating sleep homeostasis and circadian rhythms. Thus, cognitive deficits believed to be a function of the severity of clinical sleep disturbance may be a product of genetic alleles associated with differential cognitive vulnerability to sleep loss.

## How Poor Sleep Impacts Cognitive Function



### Short-Term

Effects of sleep deprivation can appear in the form of:



Difficulty concentrating



Decline in mood



Impaired memory



Visible signs of fatigue

Vs.

### Long-Term

Sleep deprivation or fragmented sleep over long periods of time can result in:



Poor work performance



Cognitive decline



Heightened risk of dementia

# The Why: CBT-I



## CLINICAL GUIDELINE

### Management of Chronic Insomnia Disorder in Adults: A Clinical Practice Guideline From the American College of Physicians

Amir Qaseem, MD, PhD, MHA; Devan Kansagara, MD, MCR; Mary Ann Forciea, MD; Molly Cooke, MD; and Thomas D. Denberg, MD, PhD; for the Clinical Guidelines Committee of the American College of Physicians\*

**Description:** The American College of Physicians (ACP) developed this guideline to present the evidence and provide clinical recommendations on the management of chronic insomnia disorder in adults.

**Methods:** This guideline is based on a systematic review of randomized, controlled trials published in English from 2004 through September 2015. Evaluated outcomes included global outcomes assessed by questionnaires, patient-reported sleep outcomes, and harms. The target audience for this guideline includes all clinicians, and the target patient population includes adults with chronic insomnia disorder. This guideline grades the evidence and recommendations by using the ACP grading system, which is based on the GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach.

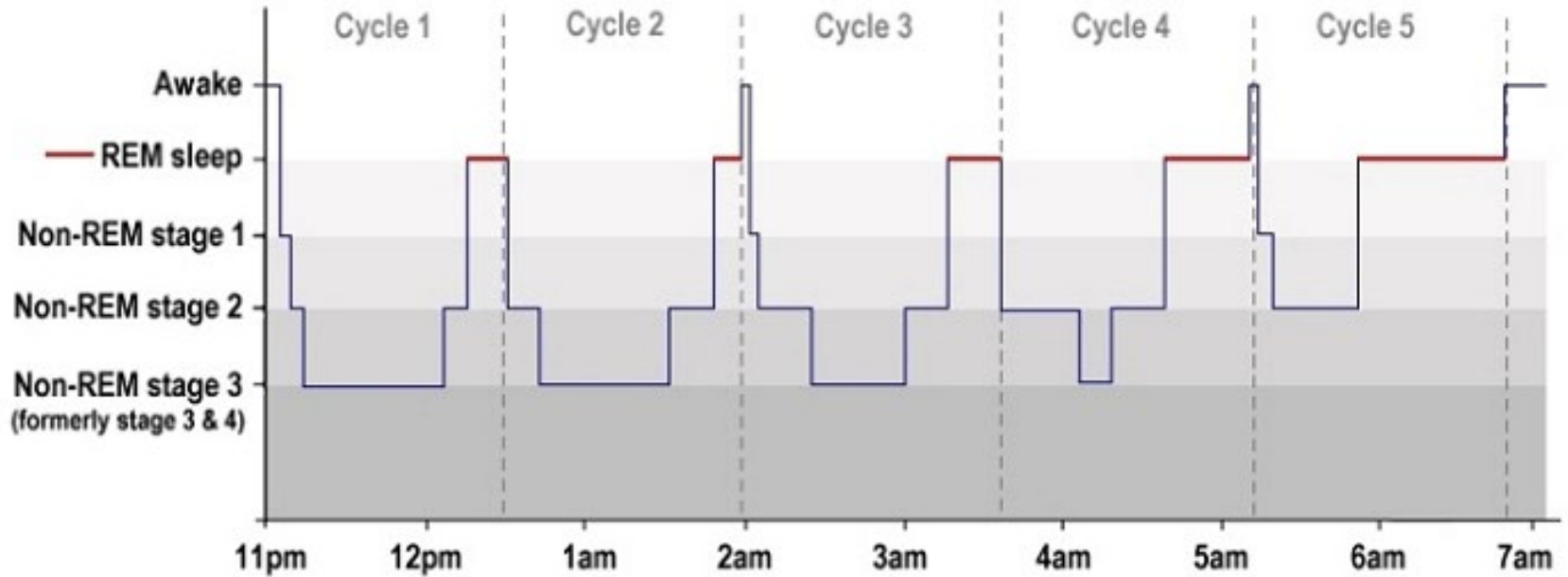
**Recommendation 1:** ACP recommends that all adult patients receive cognitive behavioral therapy for insomnia (CBT-I) as the initial treatment for chronic insomnia disorder. (Grade: strong recommendation, moderate-quality evidence)

**Recommendation 2:** ACP recommends that clinicians use a shared decision-making approach, including a discussion of the benefits, harms, and costs of short-term use of medications, to decide whether to add pharmacological therapy in adults with chronic insomnia disorder in whom cognitive behavioral therapy for insomnia (CBT-I) alone was unsuccessful. (Grade: weak recommendation, low-quality evidence)

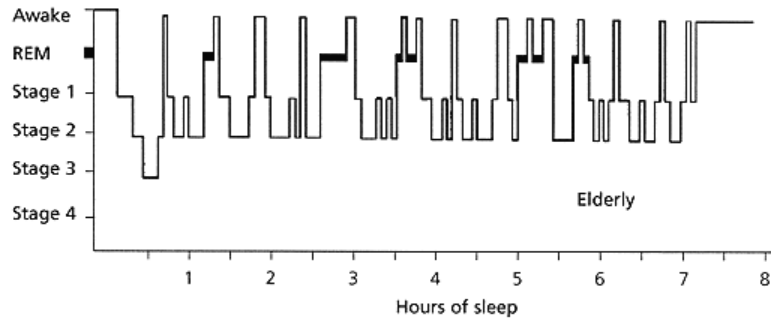
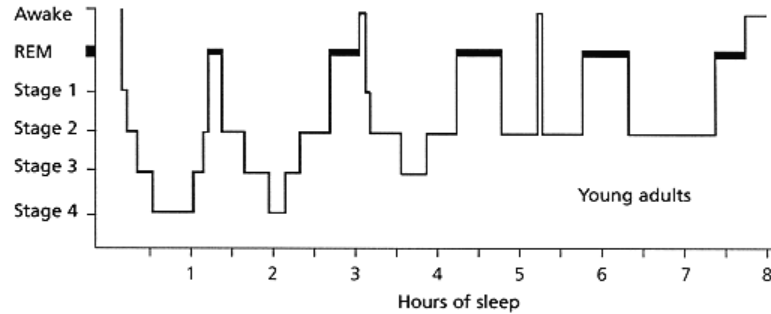
Ann Intern Med. 2016;165:125-133. doi:10.7326/M15-2175 [www.annals.org](http://www.annals.org)  
For author affiliations, see end of text.  
This article was published at [www.annals.org](http://www.annals.org) on 3 May 2016.



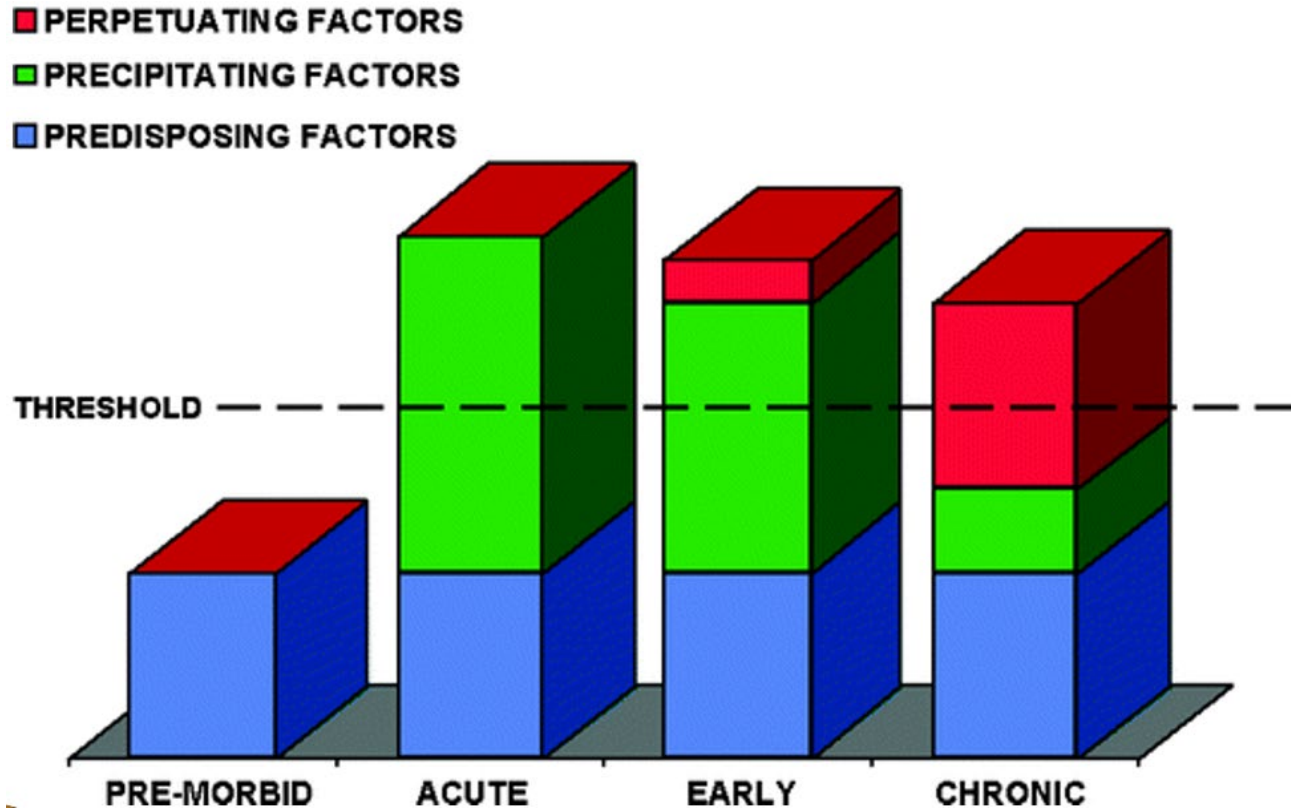
# Sleep Stages



# Sleep Stages & Aging



# Behavioral Model of Insomnia



# Central Components of CBT-I

- ▶ Assessment
  - ▶ Behavioral Monitoring (sleep logs)
  - ▶ Education
  - ▶ Sleep Restriction
  - ▶ Stimulus Control
  - ▶ Cognitive Restructuring
- 
- A decorative blue abstract graphic with horizontal brushstroke-like patterns, located at the bottom of the slide.

# Assessment

- ▶ Assess for mental/behavioral health disorders
- ▶ Assess for other medical disorders
- ▶ Assess for other sleep disorders
- ▶ Review prescribed/non-prescribed medications and substances that could be contributing to sleep complaints
- ▶ Two weeks of sleep logs (base-line data)





# General Session Outline

- ▶ Review sleep logs
- ▶ Provide education regarding the mechanisms of sleep/waking
- ▶ Establish sleep opportunity window (based on sleep log data)
- ▶ Establish stimulus control
- ▶ De-catastrophize/problem-solve
- ▶ <repeat>



# Sleep Log (Sleep Diary)

Fill this section out before you go to bed each evening							
date							
Fatigue during the day (1=none; 10=a lot)							
Napping (total minutes)							
Alcohol (# of drinks)							
OTC Medications (0=no; 1=yes)							
Pain (1=none; 10=a lot)							
Prescription Meds? (0=no; 1=yes)							
Stress (1=none; 10=a lot)							
Exercise (total minutes)							
Outside (total minutes)							
Typical Day? (0=no; 1=yes)							
Time to bed (actual)							
Fill this section out when you get up in the morning							
Time out of bed (actual)							
Minute to fall to sleep							
Number of awakenings							
Minutes awake after falling to sleep							
Minutes out of bed while awake							
On your last awakening..							
Minutes awake before getting out of bed							
Sleep Quality (1=poor; 10=good)							
Fatigue upon awakening (1=none; 10=a lot)							

# Sleep Log (Sleep Diary)


Time to bed (actual)							
Fill this section out when you get up in the morning							
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On your last awakening...							
Minutes awake before getting out of bed							
Sleep Quality (1=poor; 10=good)							
Fatigue upon awakening (1=none; 10=a lot)							

# Sleep Efficiency and Sleep Titration

$$\text{Sleep Efficiency} = \frac{\text{Total Time in Bed} - \text{Time Awake}}{\text{Total Time in Bed}}$$

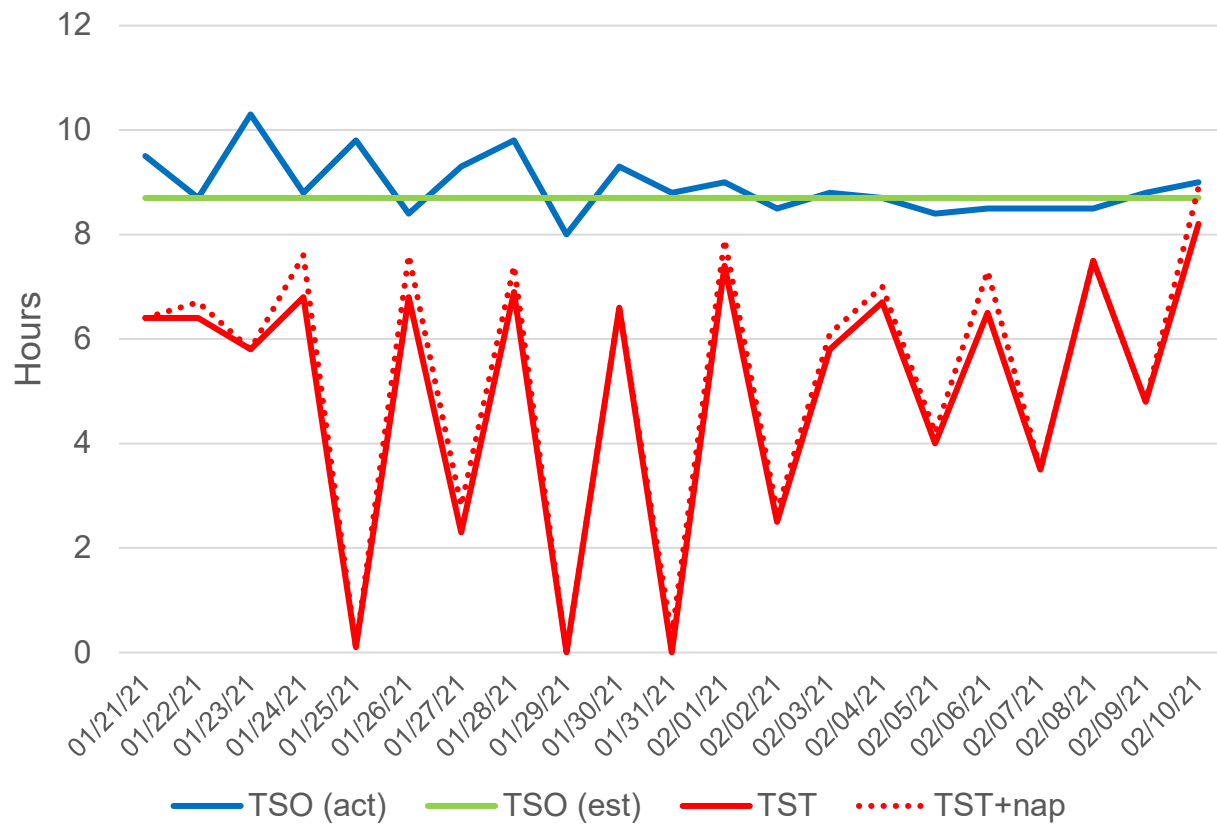
- ▶ <85% = Reduce Sleep Opportunity
- ▶ 85-90% = Maintain Sleep Opportunity
- ▶ >90% = Expand Sleep Opportunity

# Case

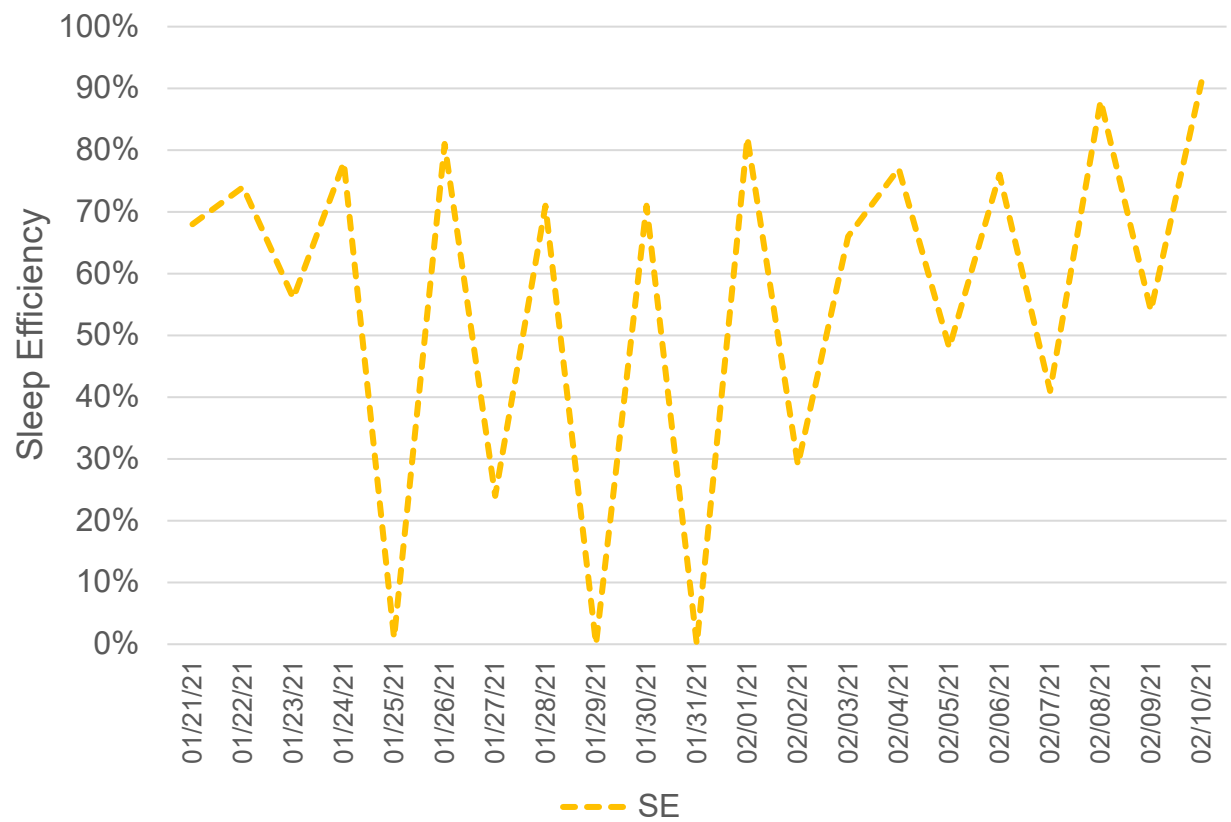
- ▶ 67 yr old female
  - ▶ Evaluated by sleep med: no indication of sleep apnea or RLS
  - ▶ Onset of sleep problems @ 55 years when husband began experiencing significant health concerns
  - ▶ No hx of mood or psychotic related dx
  - ▶ Hx of anxiety/panic beginning with husband's health concerns
  - ▶ No hx of trauma
  - ▶ Episodic arthritis pain
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- A decorative blue abstract graphic with horizontal brushstrokes and a textured appearance, located at the bottom of the slide.



# Baseline



# Baseline



# Baseline Assessment

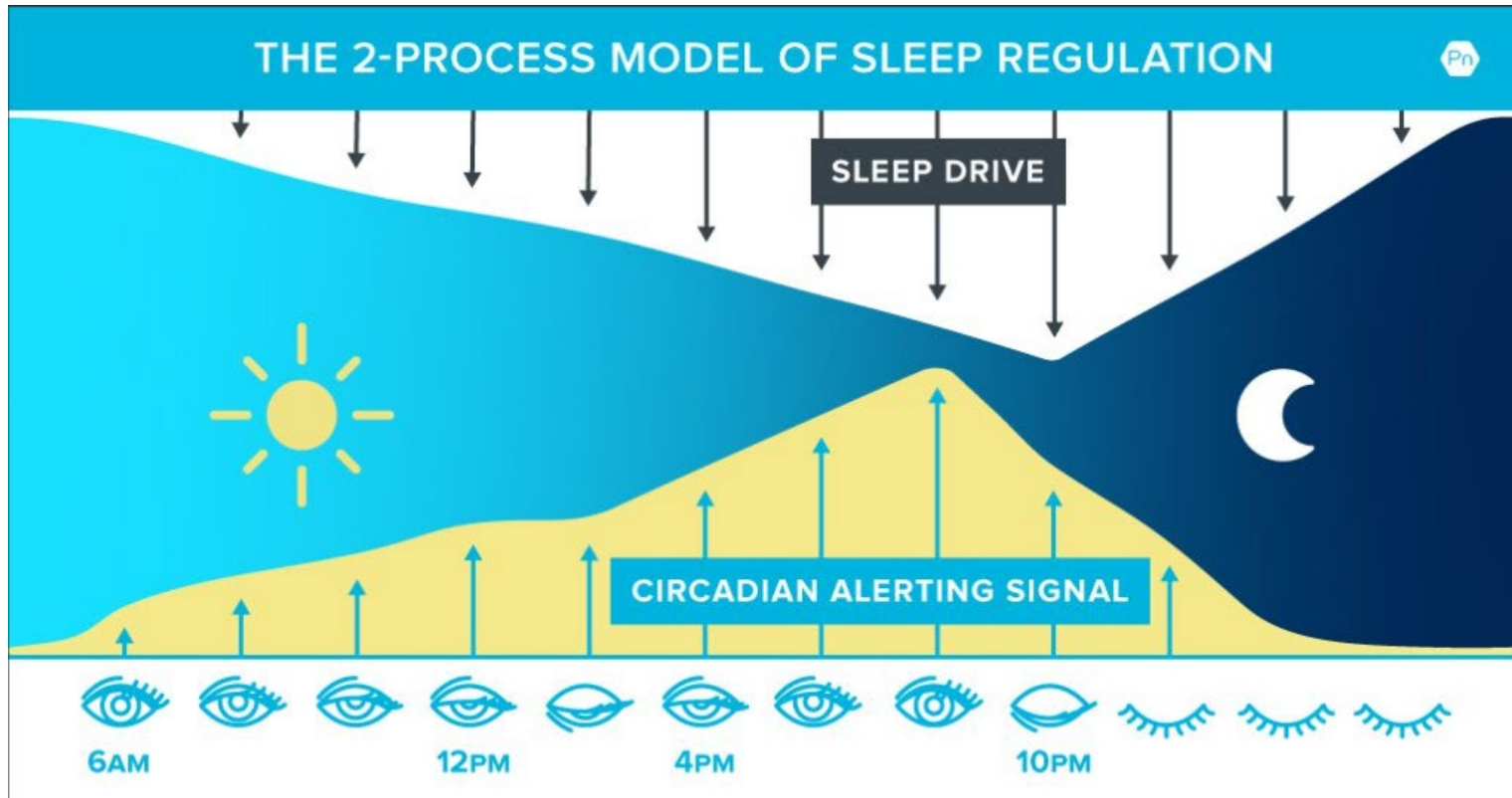
	Base	Int 1	Int 2
Total Prescribed Sleep Opportunity	8.7		
Total Sleep Opportunity (Actual)	8.9		
Sleep Latency	(0.7)		
WASO	(2.6)		
Early Morning Awakening	(0.6)		
Total Average Sleep Loss	(3.9)		
Total Sleep Time	5.0		
Sleep Efficiency	56%		

# The Pitch!

- ▶ Circadian Rhythm
- ▶ Homeostatic Sleep Drive
- ▶ Pavlov and his dogs

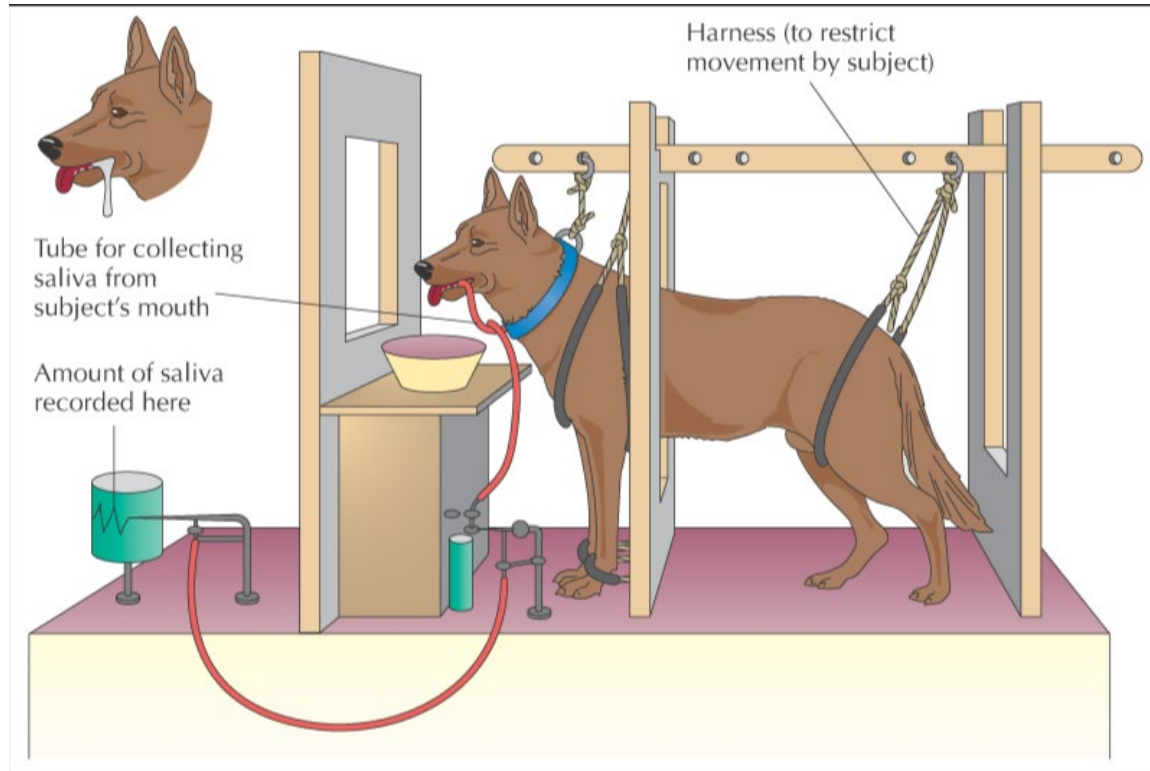


# Circadian Rhythm & Homeostatic Sleep Drive

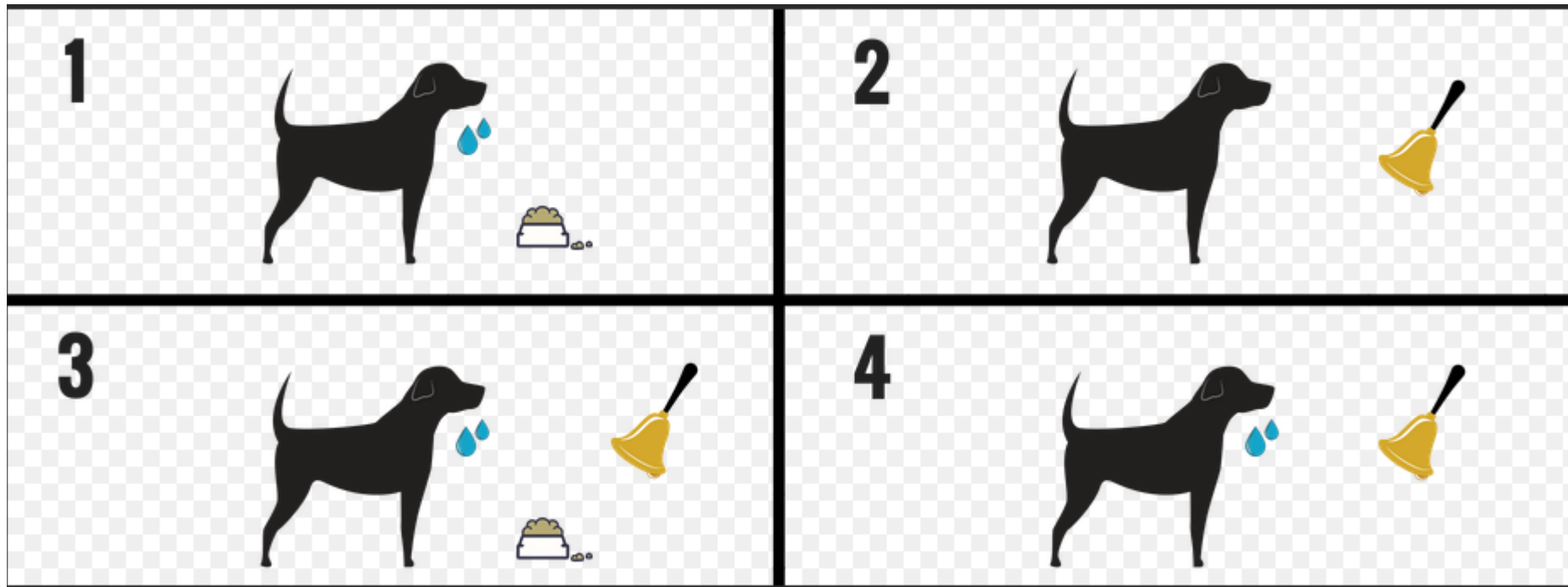




# Classical Conditioning



# Classical Conditioning



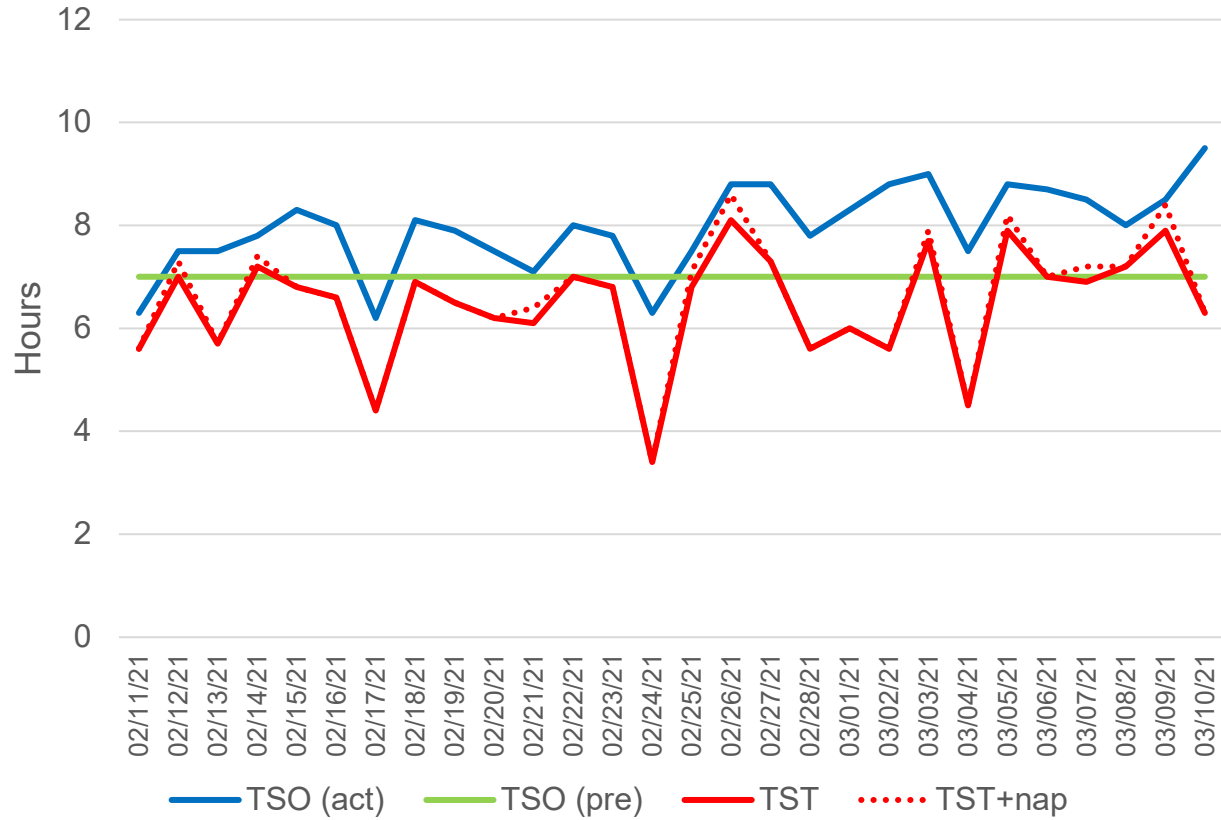
# Baseline Assessment: Review

	Base	Int 1	Int 2
Total Prescribed Sleep Opportunity	8.7		
Total Sleep Opportunity (Actual)	<b>8.9</b>		
Sleep Latency	(0.7)		
WASO	(2.6)		
Early Morning Awakening	(0.6)		
Total Average Sleep Loss	(3.9)		
Total Sleep Time	<b>5.0</b>		
Sleep Efficiency	56%		

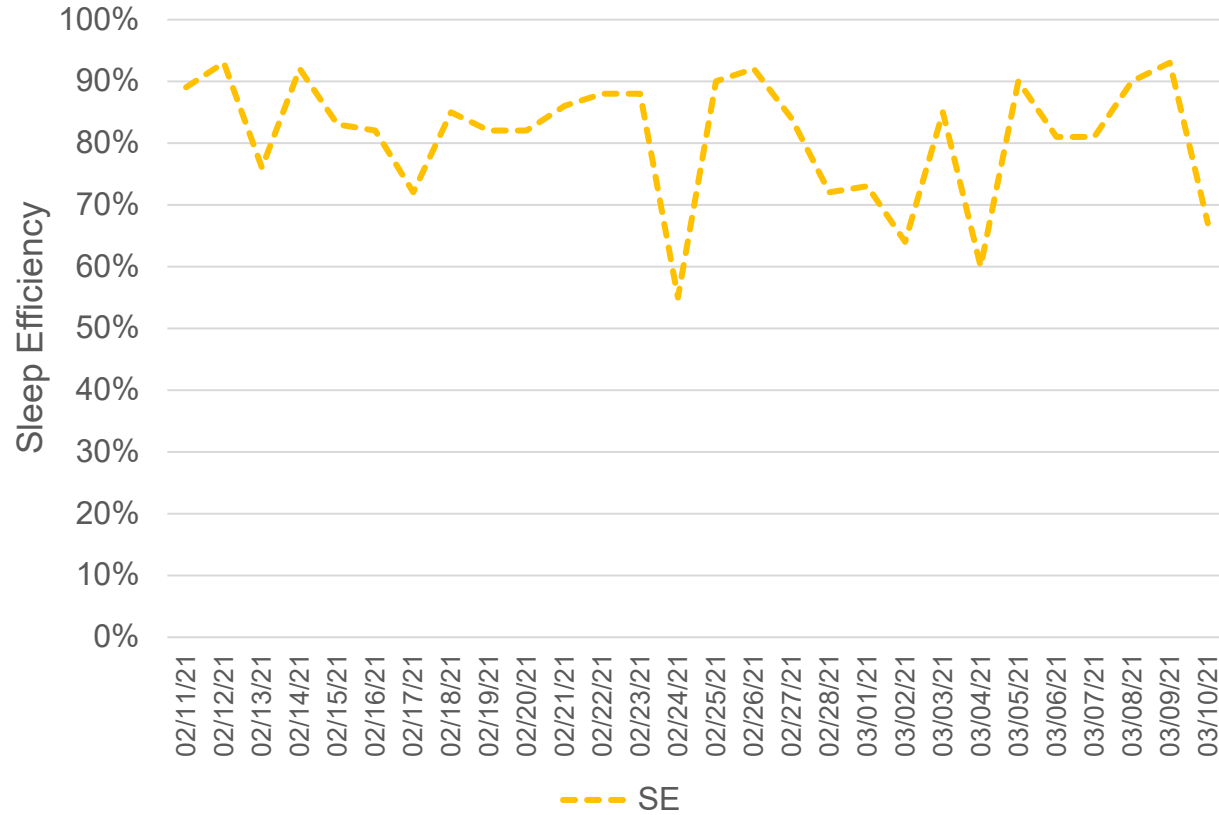
# Intervention 1: Set Parameters

	Base	Int 1	Int 2
Total Prescribed Sleep Opportunity	8.7	<b>7.0</b>	
Total Sleep Opportunity (Actual)	8.9		
Sleep Latency	(0.7)		
WASO	(2.6)		
Early Morning Awakening	(0.6)		
Total Average Sleep Loss	(3.9)		
Total Sleep Time	<b>5.0</b>		
Sleep Efficiency	56%		

# Intervention 1



# Intervention 1



# Intervention 1: Review

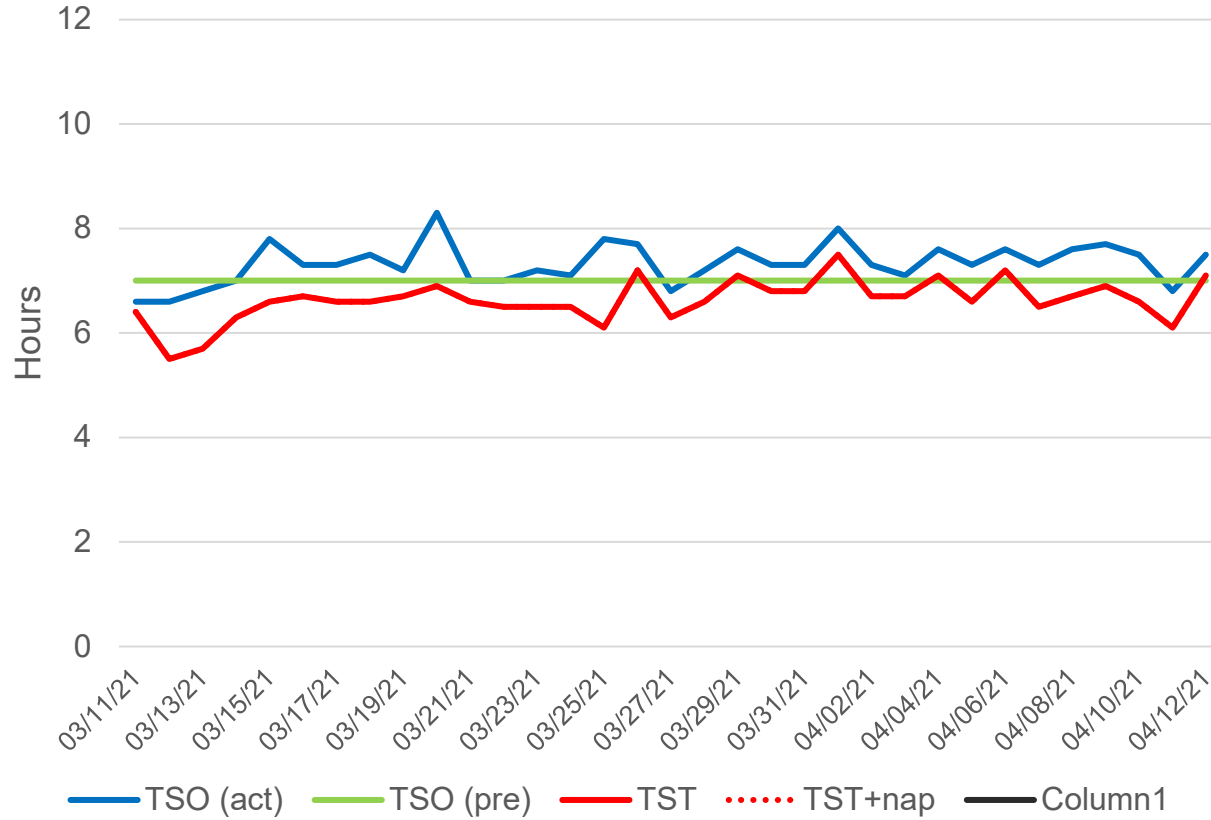
	Base	Int 1	Int 2
Total Prescribed Sleep Opportunity	8.7	<b>7.0</b>	
Total Sleep Opportunity (Actual)	8.9	<b>7.9</b>	
Sleep Latency	(0.7)	<b>(0.4)</b>	
WASO	(2.6)	<b>(0.9)</b>	
Early Morning Awakening	(0.6)	<b>(0.2)</b>	
Total Average Sleep Loss	(3.9)	<b>(1.5)</b>	
Total Sleep Time	5.0	<b>6.5</b>	
Sleep Efficiency	56%	<b>81%</b>	

## Intervention 2: Set Parameters

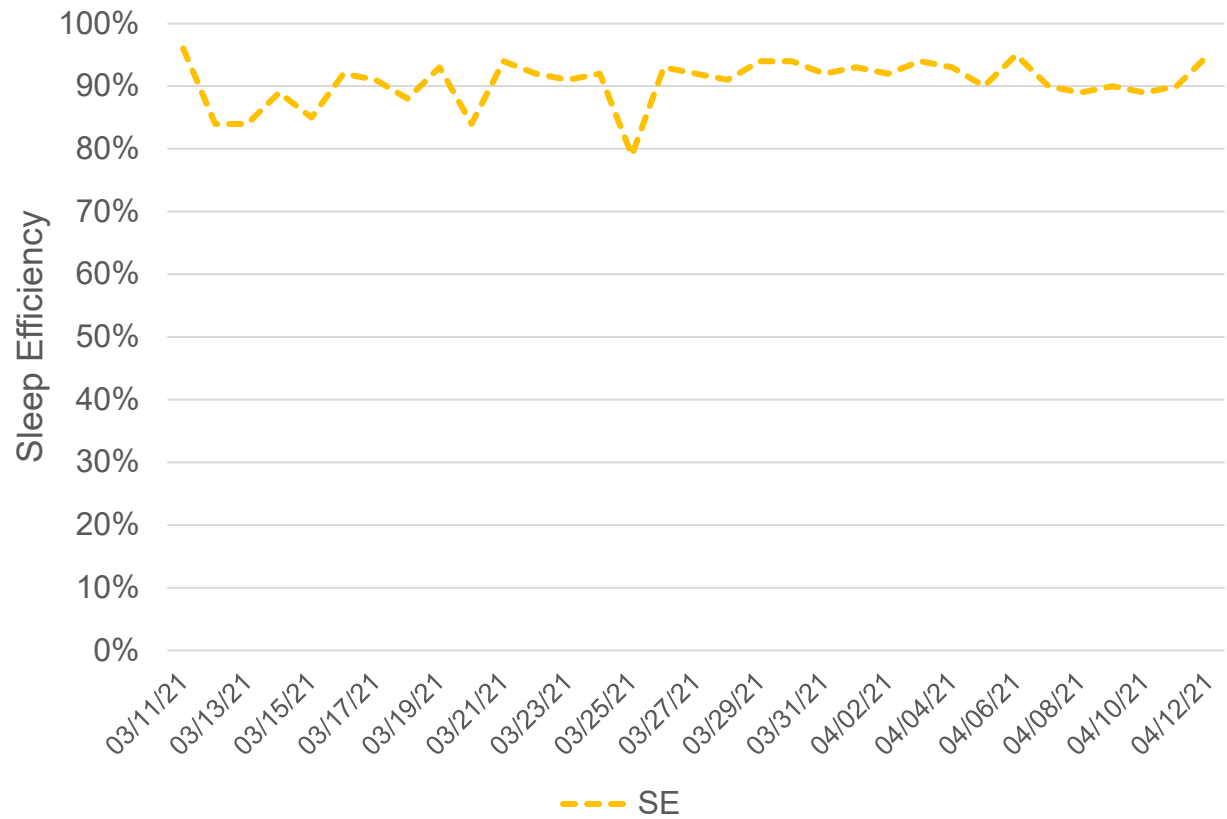
	Base	Int 1	Int 2
Total Prescribed Sleep Opportunity	8.7	7.0	<b>7.0</b>
Total Sleep Opportunity (Actual)	8.9	<b>7.9</b>	
Sleep Latency	(0.7)	(0.4)	
WASO	(2.6)	(0.9)	
Early Morning Awakening	(0.6)	(0.2)	
Total Average Sleep Loss	(3.9)	(1.5)	
Total Sleep Time	5.0	<b>6.5</b>	
Sleep Efficiency	56%	81%	



# Intervention 2



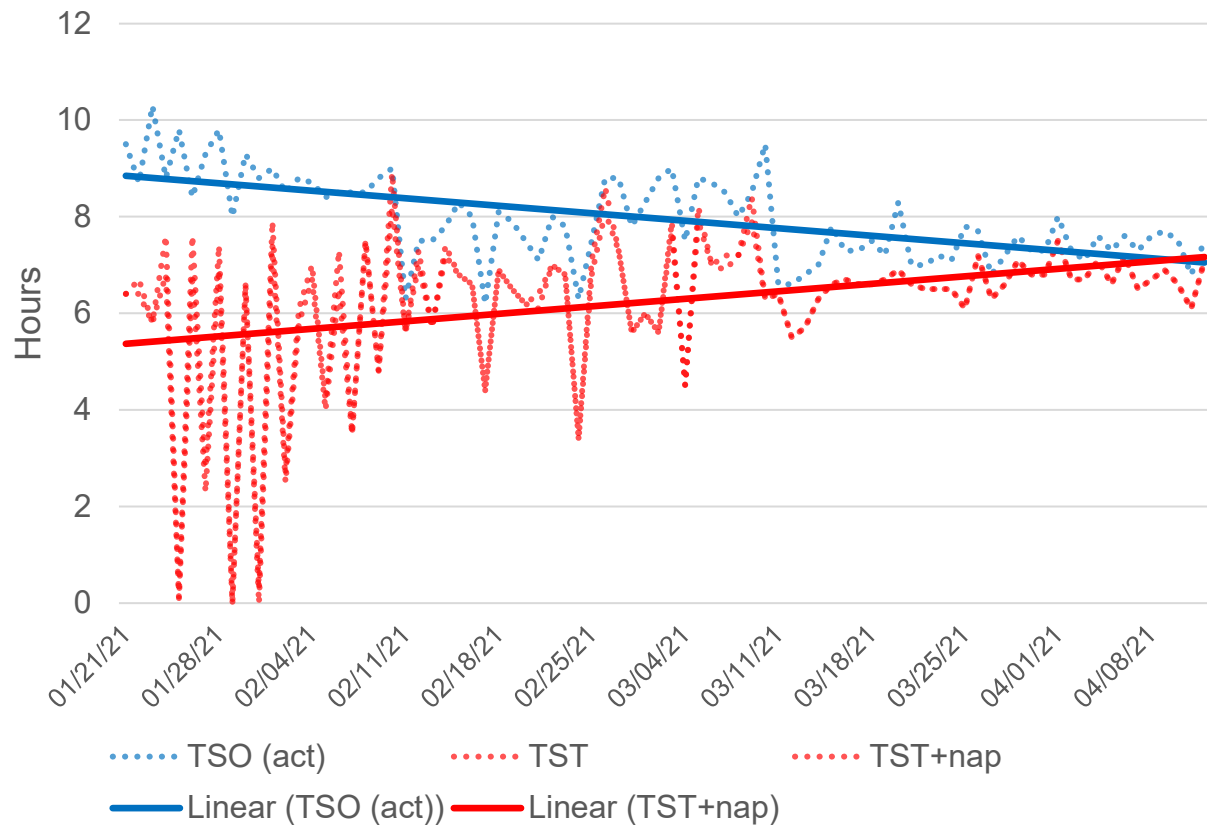
# Intervention 2



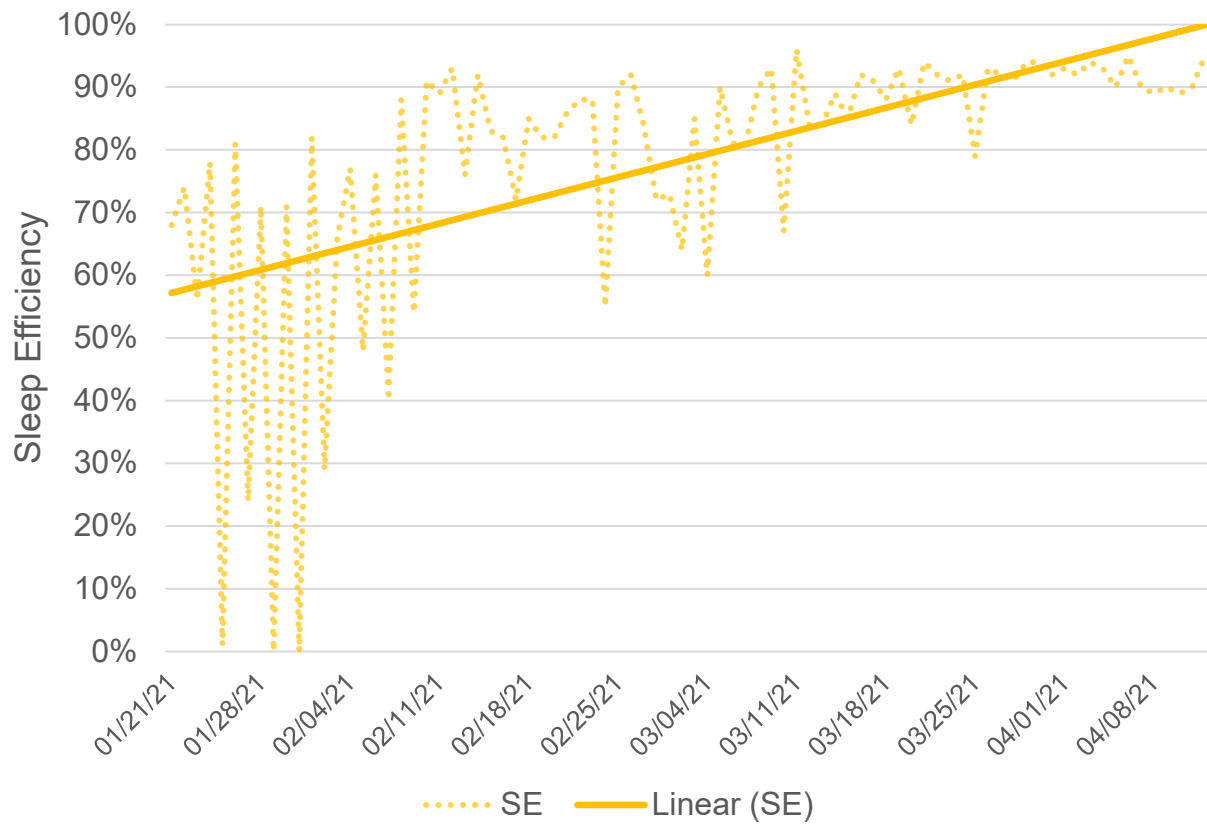
## Intervention 2: Review

	Base	Int 1	Int 2
Total Prescribed Sleep Opportunity	8.7	7.0	<b>7.0</b>
Total Sleep Opportunity (Actual)	8.9	7.9	<b>7.0</b>
Sleep Latency	(0.7)	(0.4)	<b>(0.2)</b>
WASO	(2.6)	(0.9)	<b>(0.3)</b>
Early Morning Awakening	(0.6)	(0.2)	<b>(0.1)</b>
Total Average Sleep Loss	(3.9)	(1.5)	<b>(0.7)</b>
Total Sleep Time	5.0	6.5	<b>6.6</b>
Sleep Efficiency	56%	81%	<b>91%</b>

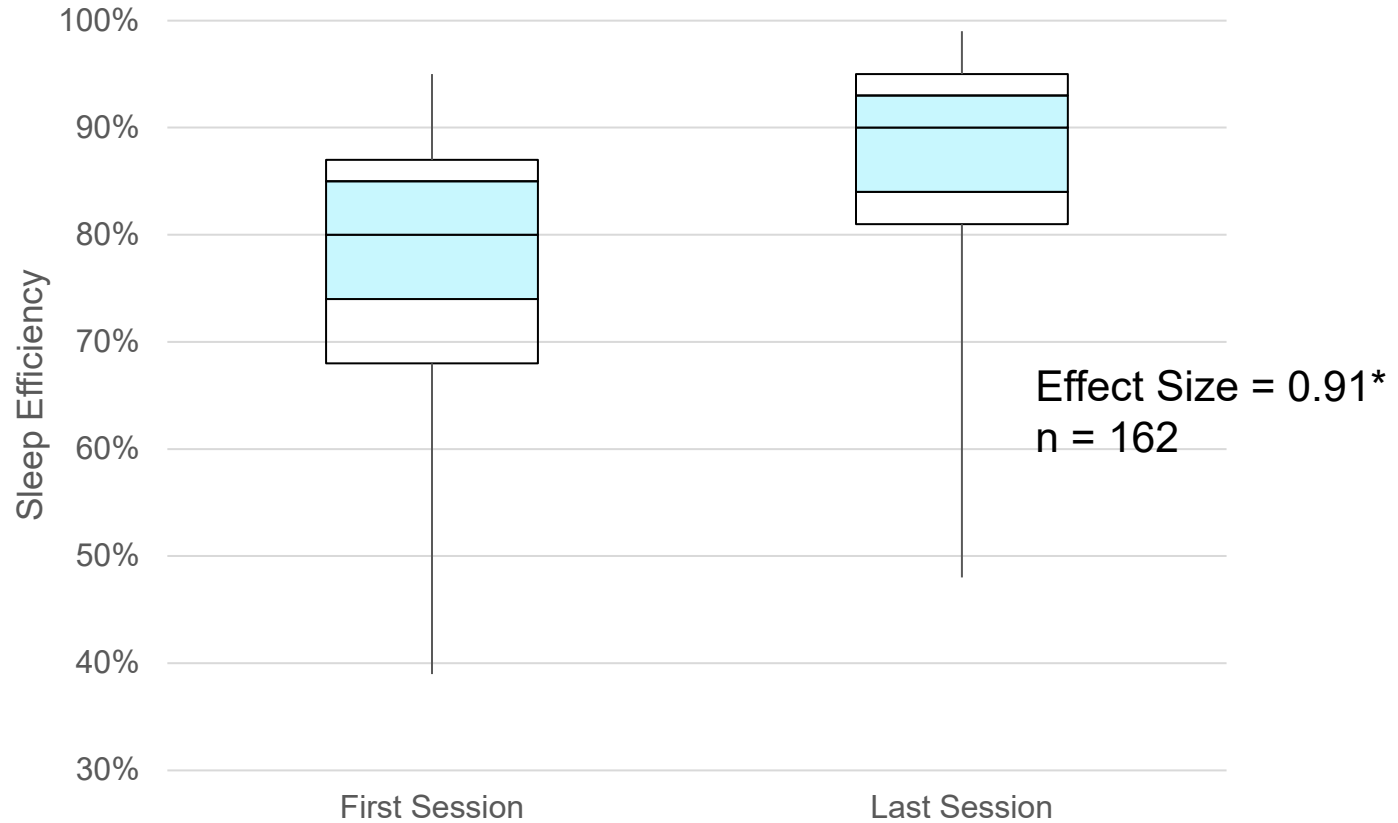
# Summary



# Summary



# Outcomes





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