Psych Congress

Cognitive-Behavioral Therapy for Insomnia for Patients with Chronic Pain

Colleen E. Carney, PhD

Associate Professor

Department of Psychology, Ryerson University

Toronto, Ontario, Canada

Faculty Disclosure

- **Dr. Carney**: Grant/Research Support—Canadian Government.

Disclosure

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- This activity has been independently reviewed for balance.

Learning Objectives

- Describe the evidence for cognitive-behavioral therapy for insomnia (CBT-I) in patients with chronic pain
- Identify the 3 causal factors for chronic insomnia
- List evidence-based components of CBT-I

Links between Pain and Sleep

- Experimentally induced (acute) pain disturbs sleep in both human and animal models
- Sleep problems in chronic pain: ↑ alpha and continuity problems; ↓ slow waves
- Conversely, experimental sleep deprivation (N3) induces pain and decreases pain thresholds

Moldofsky H, et al. *J Rheumatol*. 1983;10(3):373-379. Nielsen KD, et al. *Methods Inf Med*. 1994;33(1):76-78.

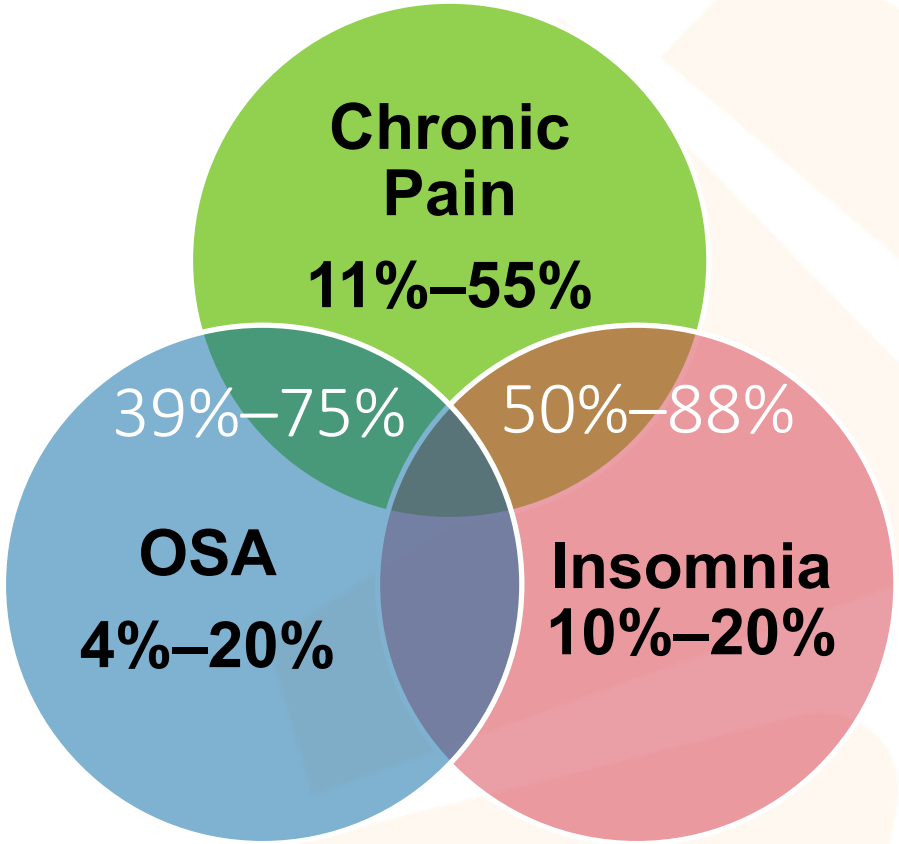
Deep Sleep and Pain

- GH is implicated in tissue restoration during sleep
- Secretion of GH positively associated with adenosine accumulation
  - Adenosine is byproduct of cells working
- GH mainly released at night near sleep onset and during deepest stages of sleep (SWS/N3)
  - GH production drops off over the course of the night and GH concentration is quite low in the second half of the night
- Sleep deprivation specific to N3 results in myalgias
- Healing slowed with N3 sleep deprivation

GH = growth hormone; SWS = slow-wave sleep.

Gümüştekín K, et al. *Int J Neurosci*. 2004;114(11):1433-1442. Moldofsky H, et al. *Psychosom Med*. 1975;37(4):341-351. Moldofsky H, et al. *J Rheumatol*. 1983;10(3):373-379.

Co-occurrence of Sleep Disorders in Those with Chronic Pain



OSA = obstructive sleep apnea.

Dahlhamer J, et al. *MMWR Morb Mortal Wkly Rep*. 2018;67(36):1001-1006. Dolan-Sewell RT, et al. *J Clin Sleep Med*. 2005;1(4):335-336. Ohayon MM. *J Psychiatr Res*. 2005;39(2):151-159. Senaratna CV, et al. *Sleep Med Rev*. 2017;34:70-81. Webster LR, et al. *Pain Med*. 2008;9(4):425-432.

Assess Sleep Problems in Co-occurring Pain

Obstructive Sleep Apnea

- Assess for daytime sleepiness with Epworth Sleepiness Scale (ESS)
- Assess for signs of OSA with STOPBANG

1. Snores loudly, persistently
2. Falls asleep involuntarily daytime
3. Observed apneas
4. High blood pressure
5. BMI > 35
6. Age > 50 years
7. Neck size > 17 in (16+ in for women)
8. Gender = male
9. Yes to ≥ 3? Refer

BMI = body mass index.

Johns MW. *Sleep*. 1991;14(6):540-545. Chung F, et al. *Anesthesiology*. 2008;108(5):812-821.

So we ought to treat sleep in co-occurring pain …

- Obstructive Sleep Apnea
  - Assess for sleepiness and/or signs of apnea, and refer for sleep study
  - Reinforce/support mask use if diagnosed, or refer for Behavioral Sleep Medicine services
- Insomnia
  - If acute → pain management + short-term, noncontingent, approved sleep medications
  - If chronic → pain management + cognitive-behavioral therapy for insomnia (CBT-I)

Sateia MJ, et al. *J Clin Sleep Med*. 2017;13(2):307-349. Society of Behavioral Sleep Medicine. www.behavioralsleep.org/index.php/united-states-sbsm-members. Accessed July 10, 2019.

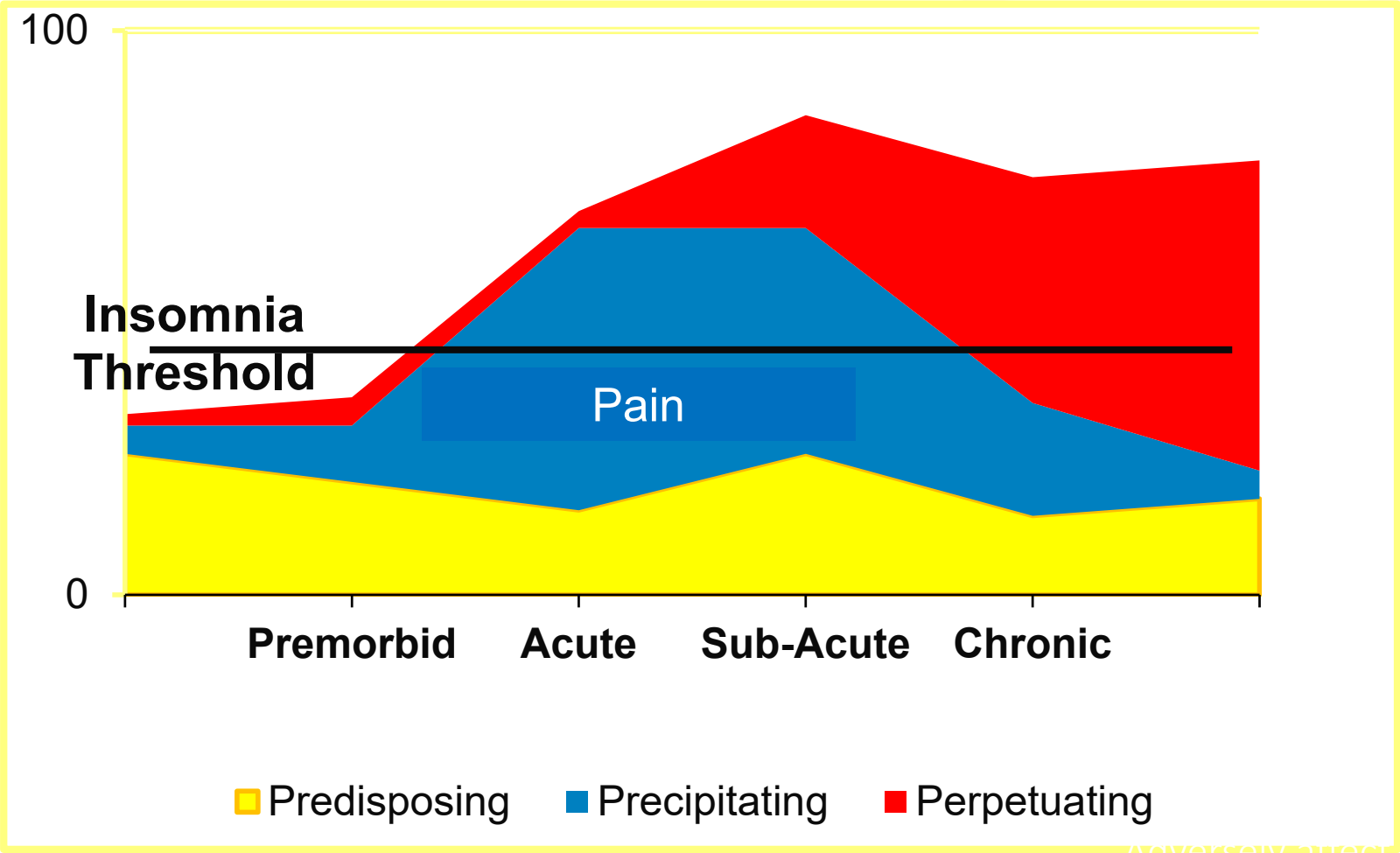
Why CBT-I for chronic insomnia in those with chronic pain?

- Same ES, but more durable than medications and no polypharmacy risks
- CBT-I in pain patients strong, large effects (comparable ES to insomnia only trials); durable at 3- to 12-month follow-ups
  - Chronic pain patients with insomnia
  - Older adults mixed disorders, including rheumatoid arthritis
  - Mixed outpatient cancer patients in primary care
  - Fibromyalgia
  - Osteoarthritis
  - Chronic neck and back pain
- The causal factors differ for chronic vs acute insomnias, but the causal factors for insomnia with or without pain do not differ

ES = effect sizes.

NIH State-of-the-Science Conference on Manifestations and Management of Chronic Insomnia in Adults. 2005. https://consensus.nih.gov/2005/insomniastatement.htm. Accessed July 10, 2019. Currie SR, et al. *J Consult Clin Psychol*. 2000;68(3):407-416. Rybarczyk B, et al. *Psychol Aging*. 2002;17(2):288-298. Espie CA, et al. *J Clin Oncol*. 2008;26(28):4651-4658. Edinger JD, et al. *Arch Intern Med*. 2005;165(21):2527-2535. Vitiello MV, et al. *J Am Geriatr Soc*. 2013;61(6):947-956. Vitiello MV, et al. *Pain*. 2014;155(8):1547-1554. Jungquist CR, et al. *Sleep Med*. 2010;11(3):302-309.

Perpetuating Factors for Chronic Insomnia



Spielman AJ, et al. *Psychiatr Clin North Am*. 1987;10(4):541-553.

Case Study

- Phyllis is a 48-year-old female with chronic low back pain working as an accountant at a paper company
- She complains of difficulty maintaining sleep which she believes is made worse by increases in her pain
- She has some daytime sleepiness, but her score was in the normal range (ESS score = 5)
- She complains of fatigue during the day
- She is taking NSAIDs (naproxen) and uses patches
- She greatly reduces activity and uses bed rest when her chronic pain increases

NSAID = nonsteroidal anti-inflammatory drug.

What are the key perpetuating factors for insomnia in chronic pain?

Insomnia only:

1. Low drive for deep sleep
2. Weak input into the circadian system
3. Conditioned arousal

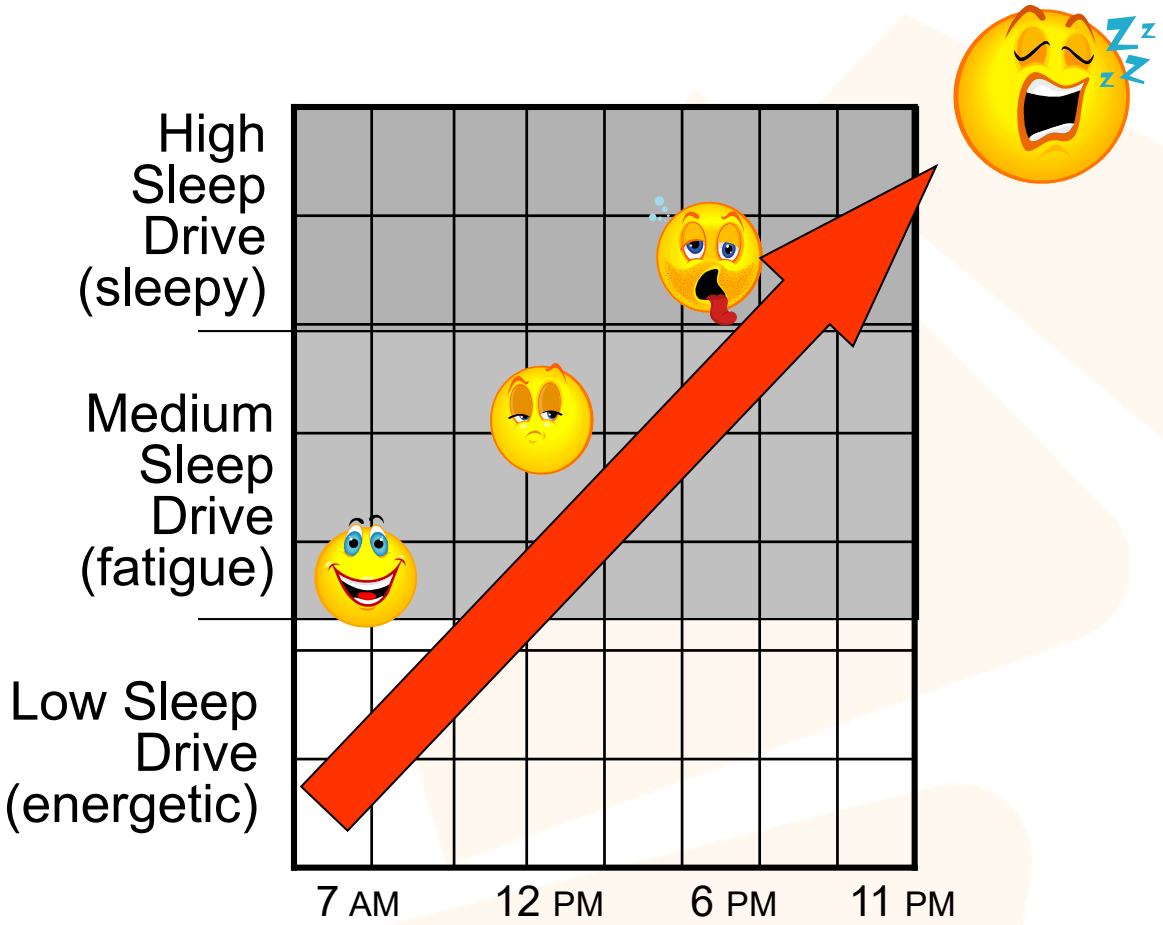
Insomnia + chronic pain:

1. Low drive for deep sleep
2. Weak input into the circadian system
3. Conditioned arousal

Perpetuating Factor #1

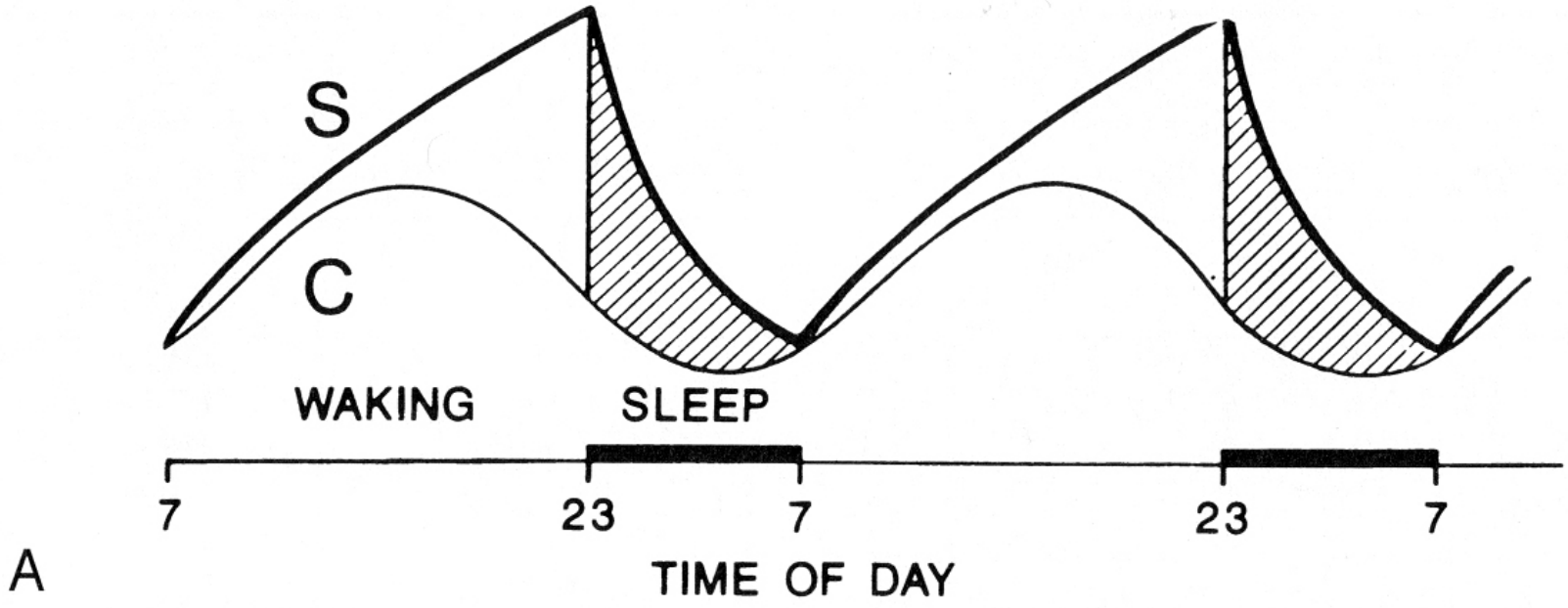
Decreased Drive for Deep Sleep

Building Drive for Deep Sleep



Carney C, et al. *Quiet Your Mind and Get to Sleep*. New Harbinger Publications; 2008.

Homeostatic Mechanism Balances Rest and Activity



Sleep drive determines the quantity of deep sleep and the quality

Perpetuating Factor #1:
Low Drive for Deep Sleep

- We need to “build” sleep drive to have continuous and quality sleep, therefore behaviors that have a negative impact on this build-up are
  - Spending increased time in bed relative to how much sleep you can currently produce
    - Napping, sleeping-in, going to bed early
  - Decreased activity
    - Pain patients often have to rest or may have limited mobility

Carney CE, et al. *Sleep*. 2006;29(4):444-453.

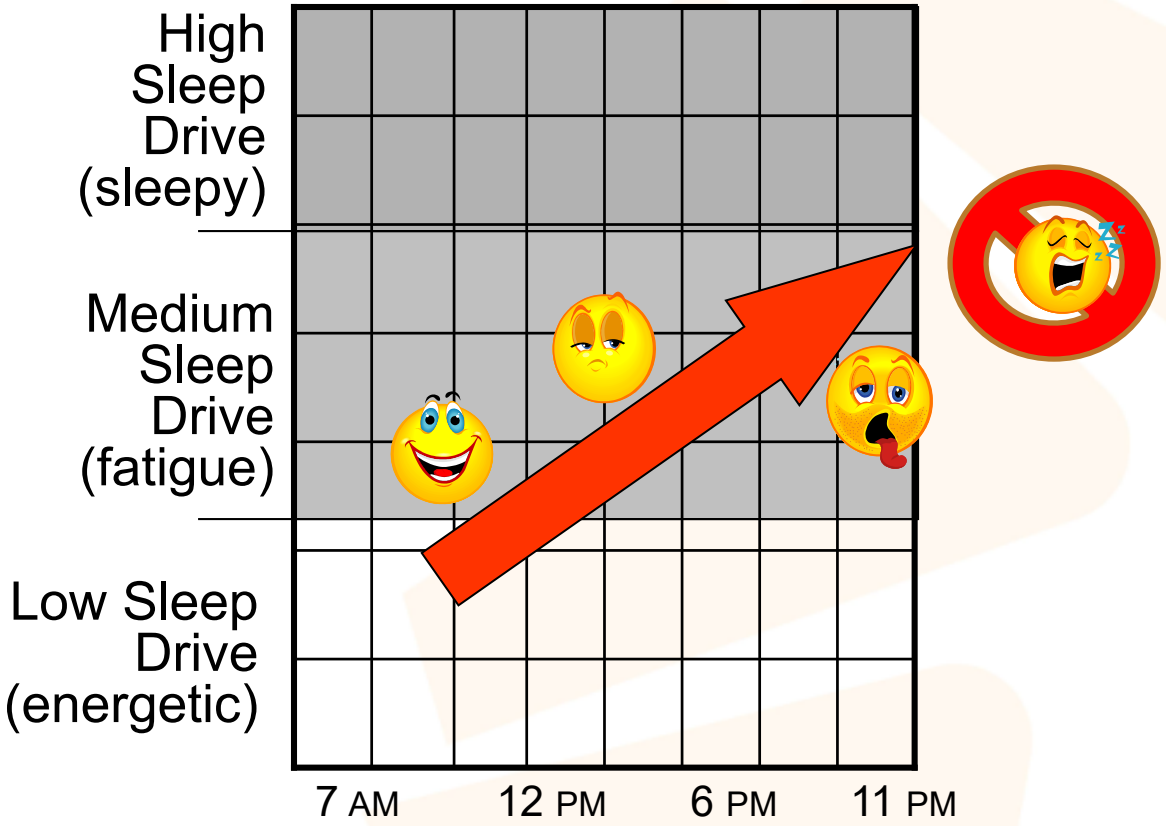
Phyllis: Look for Increased Time in Bed on Diary

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Bedtime	11:00 PM	11:30 PM	11:05 PM	10:35 PM	10:55 PM	12:15 AM	10:15 PM
Time to Fall Asleep	25	20	40	60	35	15	95
				> 9 hrs		> 10 hrs	> 12 hrs
Time Awake during Night	20	25	15	35	20	45	60
Wake Time	7 AM	7 AM	7 AM	7 AM	7 AM	8:40 AM	7:50 AM
Rise Time	7:15 AM	7:20 AM	7 AM	7:25 AM	7:15 AM	10:50 AM	11:45 AM

Naps?
Dozing during rest?
Evening dozing?

Phyllis' Sleeping-in or Laying-in:

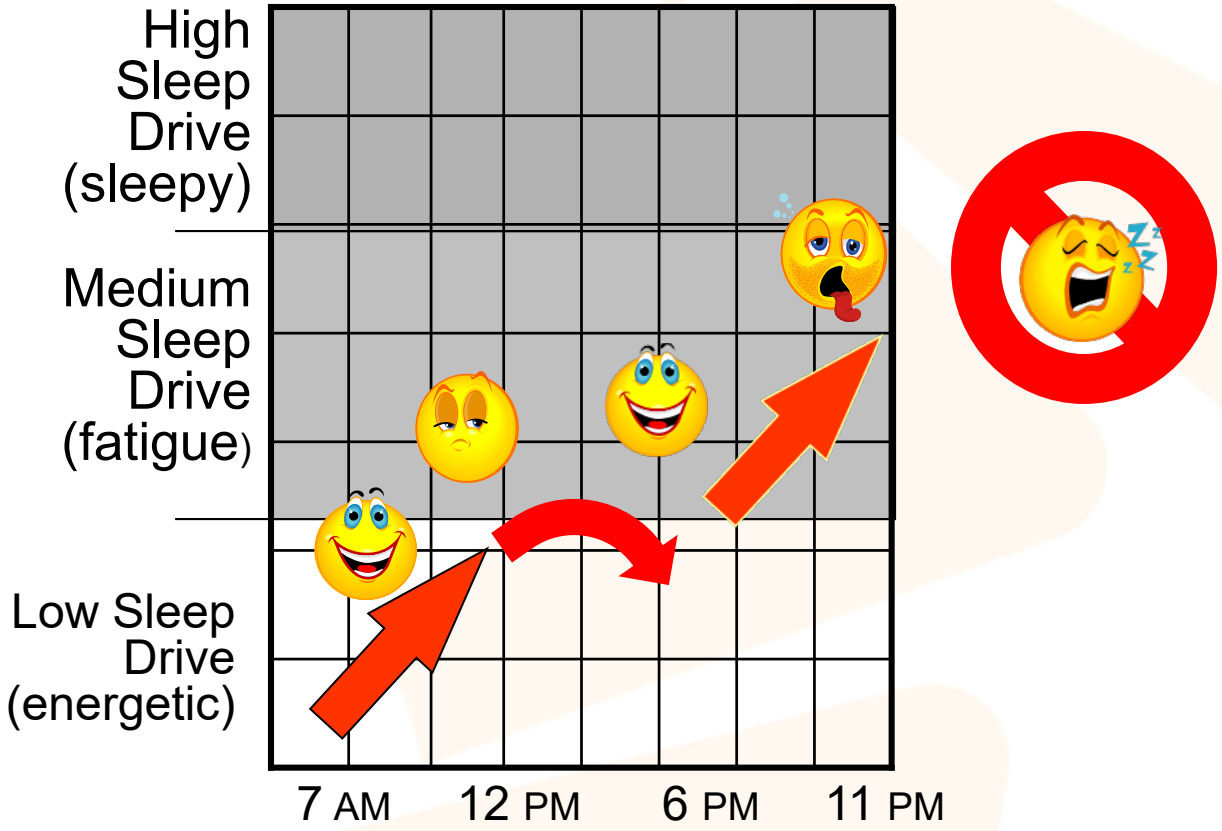
Decreasing Deep Sleep and GH Secretion at Night



Wake Up Later

From Carney C, et al. *Quiet Your Mind and Get to Sleep*. New Harbinger Publications; 2008.

Nap Impact on Building Sleep Drive for Phyllis



Carney C, et al. *Quiet Your Mind and Get to Sleep*. New Harbinger Publications; 2008.

Perpetuating Factor #2

Dysregulated Clock

Perpetuating Factor #2:
Clock is Not Reset Daily

- Our body clock is longer than 24 hours, so we have to set the clock each day, therefore behaviors that have a negative impact on the clock (and sleep) are
  - Variable timing of going to bed and getting out of bed and too little (natural) light exposure
  - Ever had jetlag?

Phyllis' Schedule: *Any variability*?

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Bedtime	11:00 PM	12:30 AM	1:05 AM	10:35 PM	12:55 AM	2:15 AM	10:15 PM
Time to Fall Asleep	25	20	40	60	35	15	95
Time Awake during Night	20	25	15	35	20	45	60
Wake Time	6 AM	6 AM	6 AM	6 AM	6 AM	8:40 AM	7:50 AM
Rise Time	7:15 AM	7:20 AM	7 AM	7:25 AM	7:15 AM	10:50 AM	11:45 AM

Perpetuating Factor #3

Conditioned Arousal

Conditioned Arousal

The “switch” story

Bed (bedroom, bedtime routine)

+

Sleeplessness, tossing, turning, upset, pain

= conditioned arousal

Phyllis uses daytime bed rest frequently

— *What impact does this have on the nocturnal bed’s stimulus value for sleep*?

Is Phyllis’ bed paired with pain too?

Medications: Balancing Pain and Sleep

- Pain relievers have variable effects on sleep architecture depending on the nature of the drug (eg, opioids, NSAIDS, TCAs, SNRIs, antispasmodics, anticonvulsants), but there are also variable effects across studies
  - Increases or decreases to light, transitional sleep (N1/N2)
  - Increases or decreases to REMS
  - Increases or decreases to SWS
- This makes it harder to pick medications that are positive for both conditions
- Additionally, opioids can increase central respiratory events

REMS = rapid eye movement sleep; SNRI = serotonin–norepinephrine reuptake inhibitor; TCA = tricyclic antidepressant.

Yue HJ, et al. *Med Clin North Am*. 2010;94(3):435-446.

Chronic Insomnia Causal Factors Summary

Sleep is controlled by:

- Clock (circadian system) determines optimal timing of sleep
- A (deep) sleep driving system that must accumulate over a 24-hour period
- Arousal system can override sleep during “emergencies”

Problems arise if:

- Body clock instability (variable schedule)
- Inadequate build-up of deep sleep drive (eg, too little activity or time out of in bed)
- Arousal system is overactive (conditioned arousal; pain, medications; illness-related concerns; preoccupation with sleep or fatigue)

Cognitive-Behavioral Therapy (CBT)

Treating Perpetuating Factors

Cognitive-Behavioral Therapy for Insomnia (CBT-I)

- Devised from insomnia perpetuating factor research
- Repeatedly tested and found efficacious

- 2 main components are
  1. Stimulus control
  2. Sleep restriction (sleep efficiency training)

- Either can be used as a monotherapy
  – Most CBT-I versions also have counter-arousal methods, as well as cognitive therapy

Edinger JD, et al. *Treatments That Work. Overcoming Insomnia: A Cognitive-Behavioral Therapy Approach, Therapist Guide*. Second Edition. New York, NY: Oxford University Press; 2015. Schutte-Rodin S, et al. *J Clin Sleep Med*. 2008;4(5):487-504. Wilson SJ, et al. *J Psychopharmacol*. 2010;24(11):1577-1601.

Stimulus Control

- If the bed and wakefulness (and/or negative experiences) have been paired
  - Unpair them by being in bed only when asleep
- Explain the idea of conditioning and that it occurs without awareness
- Follow rules for 2 weeks to unpair it
  1. Go to bed only when sleepy (ie, falling asleep)
  2. Get out of bed when unable to sleep
  3. Get out of bed at a consistent time each morning (may need a transition place)
  4. Use the bed and bedroom only for sleep. Rest elsewhere, whenever possible
  5. Do not take daytime naps
  - Rest in ways less likely to lead to dozing (ie, not supine)

Bootzin RR. Stimulus control treatment for insomnia. Proceedings of the American Psychological Association. 1972;395-396.

Pro-Energy, Pro-Sleep, and Anti-Pain Rest Habits

- Recovery comes first—acute pain often necessitates a high degree of rest
- When rest is needed, rest
- Gradual, paced activity with scheduled breaks helps with fatigue, pain, and building deep sleep drive. Overdo it and there will be setbacks
- Schedule rest, but in a place other than the bed (remember Phyllis?) and if medically acceptable, not supine to prevent dozing
- If it is unsafe to get out of bed in the middle of the night, give up the effort to sleep and sit up until sleepy again (counter control)

Sleep Restriction Therapy

- Increase drive for deep sleep by sending message to body that more is required
- Restrict time in bed with average total sleep time calculated with 2 weeks of diaries
- Wait for sleepiness to appear, then extend time in bed by 15 minutes/week until it is gone
- *Pain and fatigue management*: Plan breaks and activity; challenge interfering thoughts; mindfulness; good nutrition behaviors

Spielman AJ, et al. *Psychiatr Clin North Am*. 1987;10(4):541-553.

Sleep Hygiene:
Focus on Lifestyle Factors

- *NOT* empirically supported according to APA criteria
  - Caffeine – timing and reduction
  - Nicotine reduction/elimination
  - Prescribed exercise – timing
  - Light bedtime snack (milk, peanut butter)
  - Avoid middle of the night eating
  - Reduce alcohol, marijuana, and other substances
  - Optimize environment: Light, noise, temperature

APA = American Psychological Association.

Morin CM, et al. *Sleep*. 1999;22(8):1134-1156. Morin CM, et al. *Sleep*. 2006;29(11):1398-1414.

Sleep Hygiene Advice Problems

- Marijuana users believe it is helpful for sleep and may use it for pre-sleep arousal, not sleep per se
  - If they stop, what would you expect would happen?
- We can tell/show them that it is sleep-disruptive
  - Worse objective (ie, PSG) sleep efficiency, REM abnormalities, and longer sleep onset than those who don't use, like alcohol; REMS suppressed in early hours and then REMS rebound later, which disrupts sleep continuity/quality overall and can result in strange dreams (eg, longer marijuana use, ie, a month of regular use); suppresses SWS, but during abstinence nights, their sleep remains poor so sleep hygiene followers will most certainly not notice a benefit short-term
- What about looking at the pros and cons instead?
- What about testing whether they are satisfied after following CBT-I?

PSG = polysomnography.

Bolla KI, et al. *Sleep*. 2008;31(6):901-908. Freemon FR. *Drug Alcohol Depend*. 1982;10(4):345-353. Schierenbeck T, et al. *Sleep Med Rev*. 2008;12(5):381-389. Van Reen E, et al. *Alcohol Clin Exp Res*. 2006;30(6):974-981.

Arousal Reduction or “Counter-Arousal” Guidelines

1. Create a “buffer zone”
2. Relaxation practice
   - Progressive muscle relaxation
   - Diaphragmatic breathing
   - Breathing meditation
   - Guided imagery
3. Stimulus control

Beliefs about Fatigue

- Challenge idea that fatigue is dangerous (complements pain cognitive restructuring about fears of injury)
- Fatigue protects us against under- and overexertion
- Don’t attribute fatigue solely to sleep or assume overexertion – assess for under-exertion
- Increasing activities does not mean no resting
- Cognitive therapy: Ask Phyllis to collect data for a week on the idea that one must CONSERVE energy to feel good and sleep well; spend the second week expending energy in a manageable way and collect data on sleep etc.

Summary

- We NEED adequate pain relief
  - Watch for medications with sleep/sleepy side effects

- Problems in pain
  - Low deep sleep drive (↑ rest, ↑ time in bed)
  - Poor input to the clock (variable schedule—jetlag without the scenery)
  - Hyperarousal, including conditioned arousal
  - Inactivity increases fatigue and can create deconditioning

Pain management
+ CBT-I