

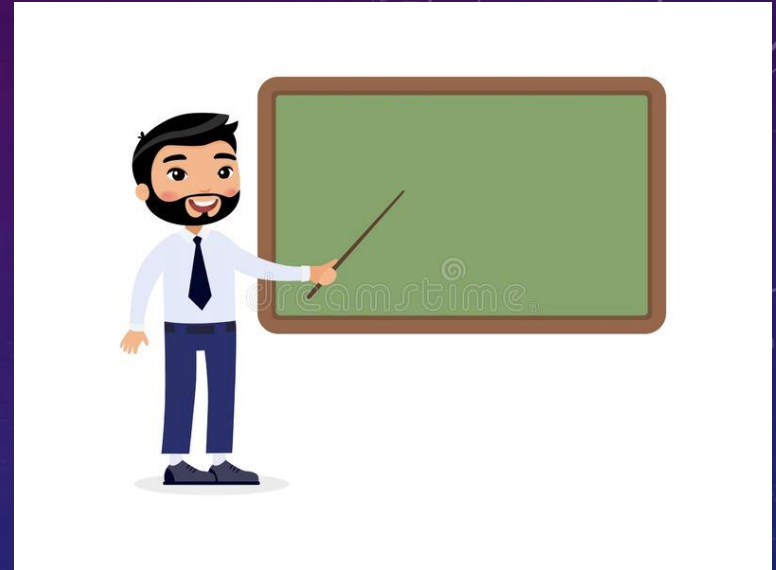
Current Concepts in Sleep & Insomnia



Rabbi Bruce D. Forman, PhD
Weston, Florida

Learning Objectives

- Characteristics of sleep
- Types of insomnia.
- Epidemiology of insomnia
- Impact of insomnia on health
- Appropriate use of medication
- Cognitive Behavioral Therapy for Insomnia







"Bad news, its curiosity"

Biblical References

- Numerous references to sleep throughout – also in Psalms and Proverbs
- Sleep is mentioned in Genesis 1:21 - the Almighty cast a deep sleep upon Adam
- Psalm 121: The guardian of Israel neither slumbers nor sleeps
- Prophecies occurred during sleep in the form of dreams
- Parasha *Vayetzei* (Genesis 28) discusses how Jacob slept and dreamed after fleeing his brother Esau, whom he fleeced
- Delilah cut off Samson's hair while he slept

Sleep in Talmud

- The Talmud tells us that after the destruction of the first Temple prophecy came to a halt. There were no more revelations as recorded in the Bible. God decreed that "Although I will hide my face from them, I will speak to them in a dream" (Chagigah 5b)
- There is an obligation to protect a parent's sleep as part of honoring a parent.
- According to Rabbi Eliezer, sleep is like food and medicine for the ill and contributes to length of life.
- Sleeping makes Shabbat (the Sabbath) more enjoyable (Yerushalyim Talmud, Shabbat 118b)

Rabbi Yehoshua ben Levi (Talmud: Berachot 4b)

One should recite the Shema before bed, even though it was also recited with the evening prayers.

Jesus said this was the most important commandment (Mark 12:29)

Hear, O Israel: the Lord our God, the Lord is One.

Shema Yisroel Adonai eloheinu Adonai echad

Blessed is the name of the glory of His kingdom forever and ever

You shall love the Lord your God with all your heart, with all your soul, and with all your might. And these words which I command you today shall be upon your heart. You shall teach them thoroughly to your children, and you shall speak of them when you sit in your house and when you walk on the road, when you lie down and when you rise. You shall bind them as a sign upon your hand, and they shall be for a reminder between your eyes. And you shall write them upon the doorposts of your house and upon your gates.

Sleep in Jewish Law (Halacha)

- One is not meant to sleep more than eight hours or less than six
- The correct position is on the side not face up or down
- One should not sleep with one's head or feet directly facing the door "in a position that it looks like one was about to be taken out of the room" – i.e., as a corpse
- One may not place food, even if it is covered, under a bed because there is a concern that an evil spirit may come upon it
- One is permitted to turn off a light on Shabbat if it would awaken a sick person
- Napping during the day should be avoided
- A sleeping person may be counted as part of a minyan (i.e., a quorum of ten required for certain prayers)
- A law referred to as "theft of sleep" (*gezel sheinah*) holds that it is immoral to awaken or prevent another from going to sleep

Jewish Customs (*Minhagim*) and Sleep

- During Sukkot, the harvest festival, it is taught to dwell in a Sukkah (a temporary structure with a semi-open roof). By dwelling is meant eating, drinking, praying, socializing, and sleeping
- On Shavuot, the day celebrating giving of the Ten Commandments on Mount Sinai, there is the custom to stay up all night to study Torah
- We are encouraged to sleep on Purim: “A person should drink more than he is accustomed to, so that he may sleep”
- One is encouraged to sleep in on the Sabbath to experience the joy of the day (*Oneg Shabbat*)

Sleep in Kabbalah

The Zohar explains that while we sleep 59 of the 60 parts of the soul leave our bodies, leaving only 1/60th to physically sustain us. When the body is in slumber, the chains of physical existence break. The soul becomes free to ascend to a higher place in the spiritual realm where it receives nourishment and messages.

A man sleeping alone in a house risks being seized by Lilith, a female demon

Ancient Interest in How Sleep Works



Sleep is...

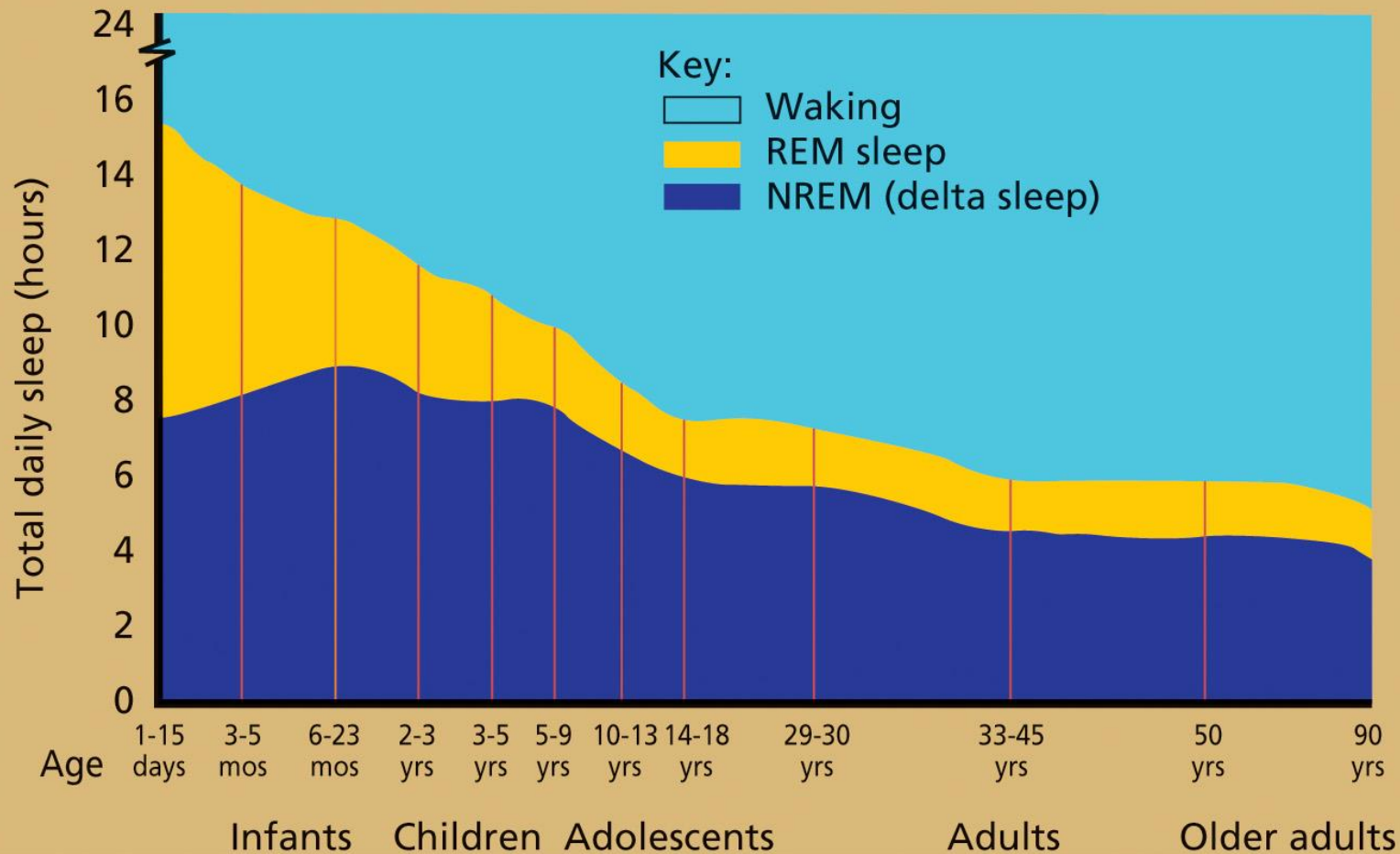
- Complex – several regions of the brain are involved (reticular activating system in brain stem, suprachiasmatic nuclei and ventrolateral preoptic nucleus in hypothalamus, neocortex)
- Endogenous, reversible and adaptive (all species with vertebraes)
- Homeostatic – recovery of missed sleep time or micro-sleep episodes
- Immobile while dreaming (REM stage)
- Highly regulated – adults normally sleep in cycles of about 90 minutes
- Essential to life and necessary for well-being
- Something we all do – and most of us enjoy a good night's rest
- Not fully understood, but sleep scientists continue working on it

What else we know about sleep

Sleep varies with age

- Newborns need to sleep 16 hours/day
- Children (ages 3-12) need up to 12 hours/day
- Teenagers (ages 12-18) need 8-9 hours/day
- Young adults (age 18-22) need to sleep 8 hours/day
- Adults need about 7 hours of sleep (6-8)
- Older adults (age 65+) sleep less, wake more, have less stage 3, 4 and REM sleep
- The last 2 hours of REM sleep tends to be the most important for integrating new information

The need for sleep



Sleeplessness

“The subject of sleeplessness is once more under public discussion.

The hurry and excitement of modern life is held to be responsible for much of the insomnia of which we hear; and most of the articles and letters are full of good advice to live more quietly and of platitudes concerning the harmfulness of rush and worry.

The pity of it is that so many people are unable to follow this good advice and are obligated to lead a life of anxiety and high tension.”

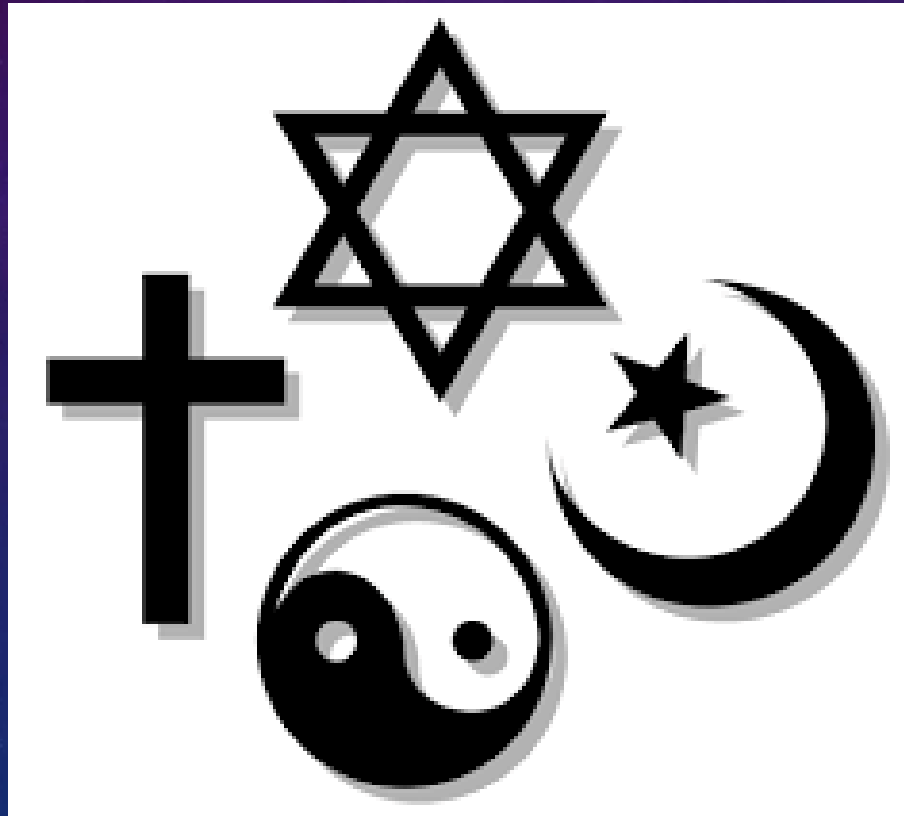
British Medical Journal 1894

Sleep Issues are Common

- Half of adults are **not getting enough restorative sleep**
- 37.9% reported unintentionally falling asleep during the day
- 50-70 million US adults have a sleep disorder
- 30%: Insomnia is the most common specific sleep disorder, with short term issues reported by about 30% of adults and chronic insomnia by 10%

National Sleep Foundation, 2018

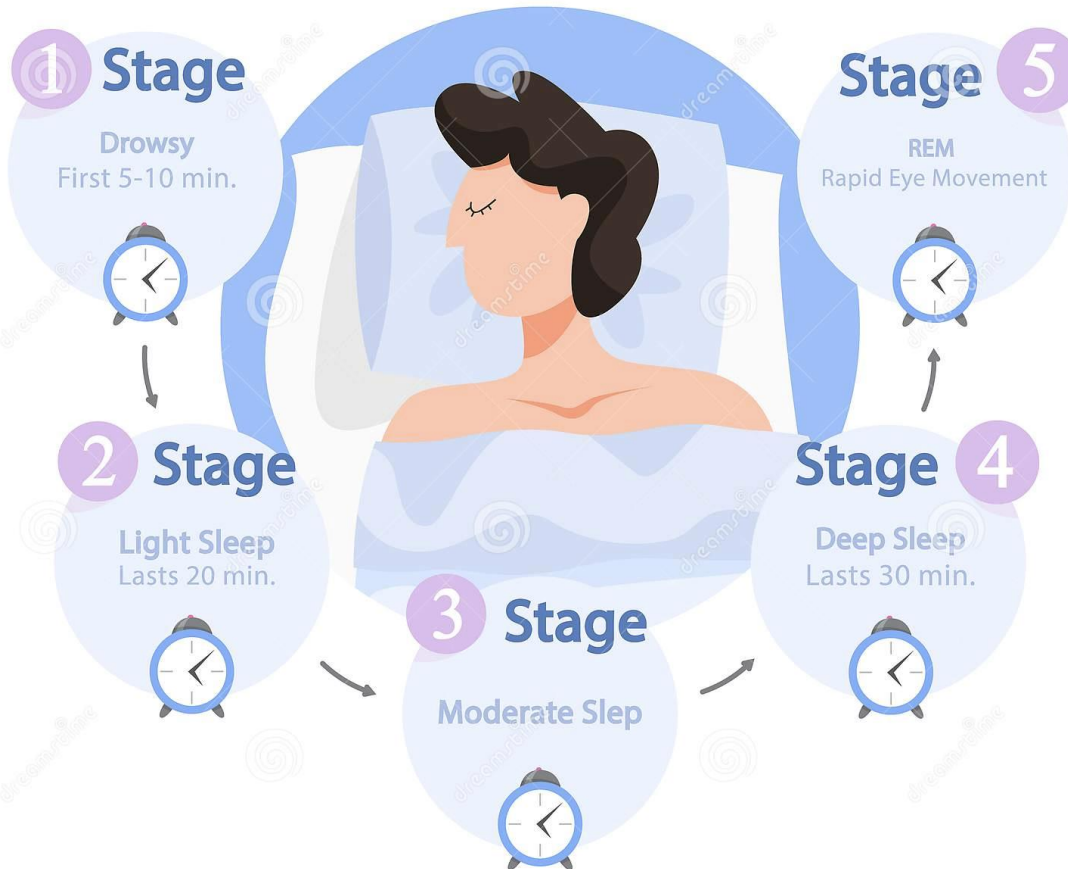
Research on Sleep and Religion



Annual Economic Impact of Sleep Deprivation

- Direct medical costs = \$25B
- Indirect medical costs (including accidents) = \$92.2 B
- Workplace losses (including accidents) = \$91.7B
- Workplace losses attributed only to Insomnia = \$62.3B

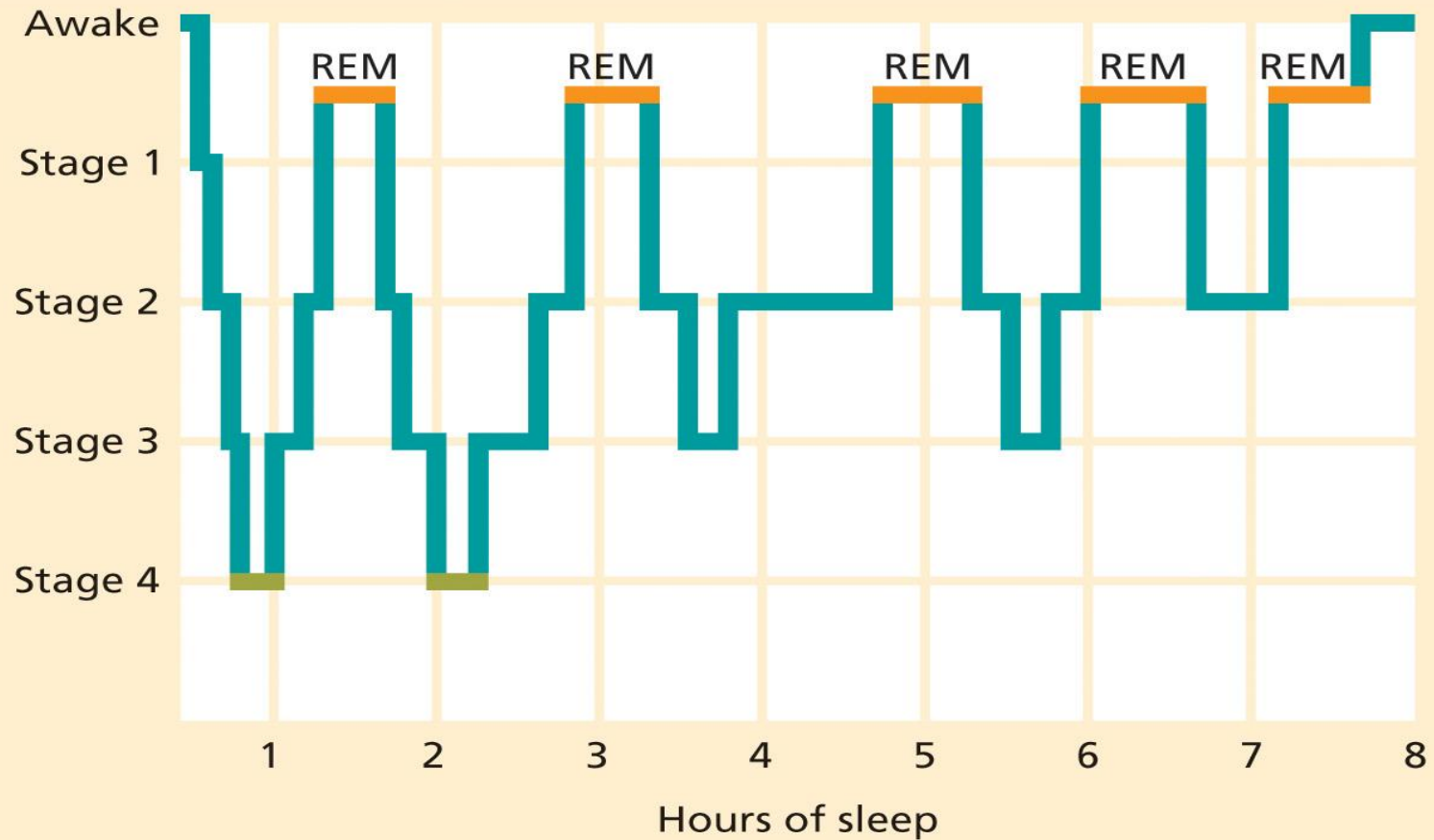
SLEEP CYCLE

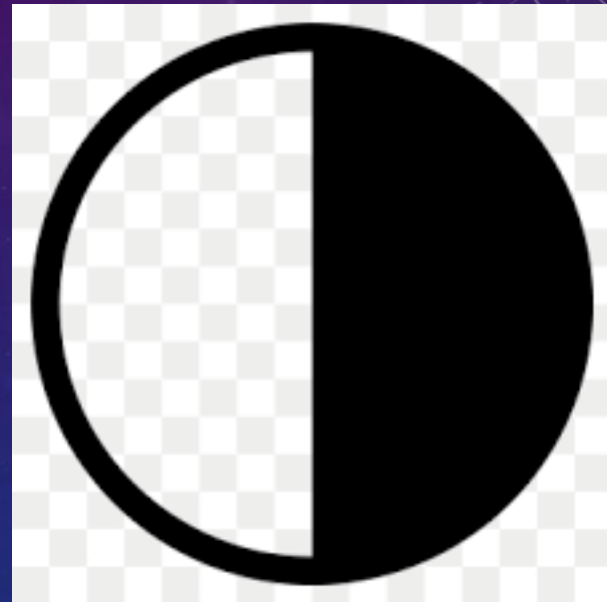
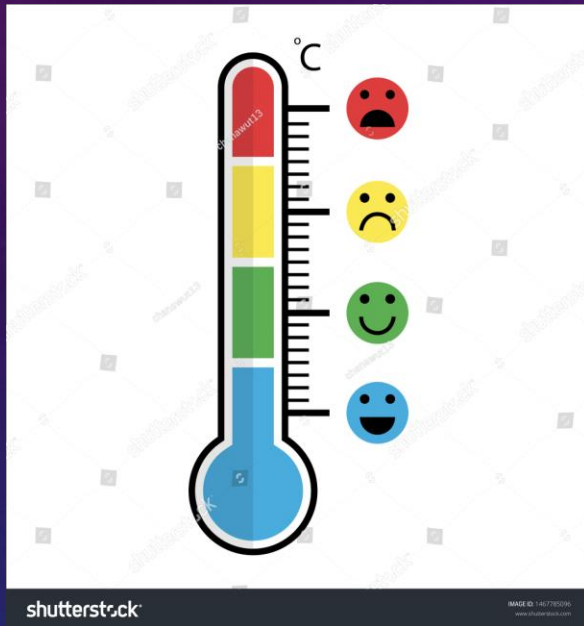


Sleep Stage Pattern

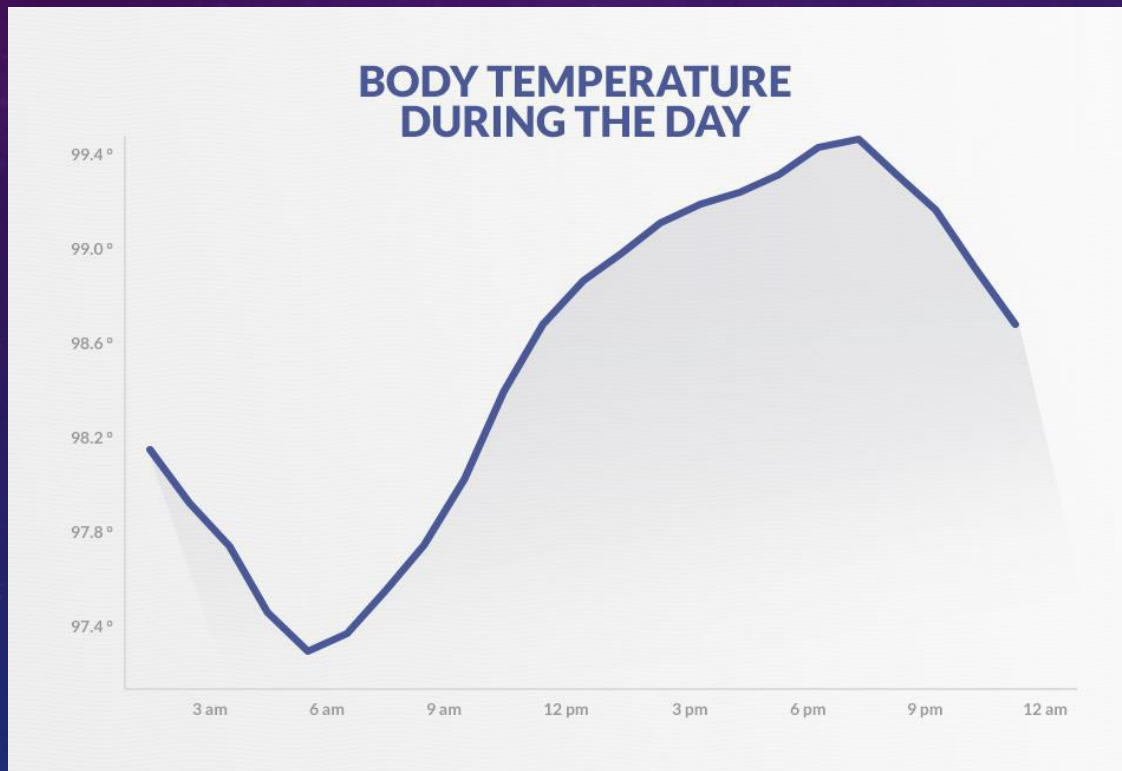
- Normal sleep starts with stage 1-2-3-4-3-2-REM
- The cycle repeats at around 90 minute intervals
- Adults have 4 to 5 cycles a night
- Stage 3 & 4 are more prominent in the first half of the night and decrease as time goes on
- REM is less prominent in the first half of the night and increases as time goes by
- The brain is just as aroused during REM sleep as during wakefulness
- **Awakening is commonly experienced when moving from one stage to another**

Sleep architecture





Body temperature variation



Circadian Rhythm of Body Temperature

- The circadian rhythm of body temperature is closely linked to the variations in our daily levels of activity, alertness, and sleepiness.
- We are most alert and active when our body temperature is highest, which is typically in the late morning and early evening.
- We grow sleepier and less active as our body temperature declines at night with the strongest desire for sleep occurring at around 3:30 a.m.
- These daily changes in our body temperature and levels of alertness occur regardless of how well we slept the night before so that, even after sleep loss, we feel more alert as our body temperature rises.

Light-sleep Connection

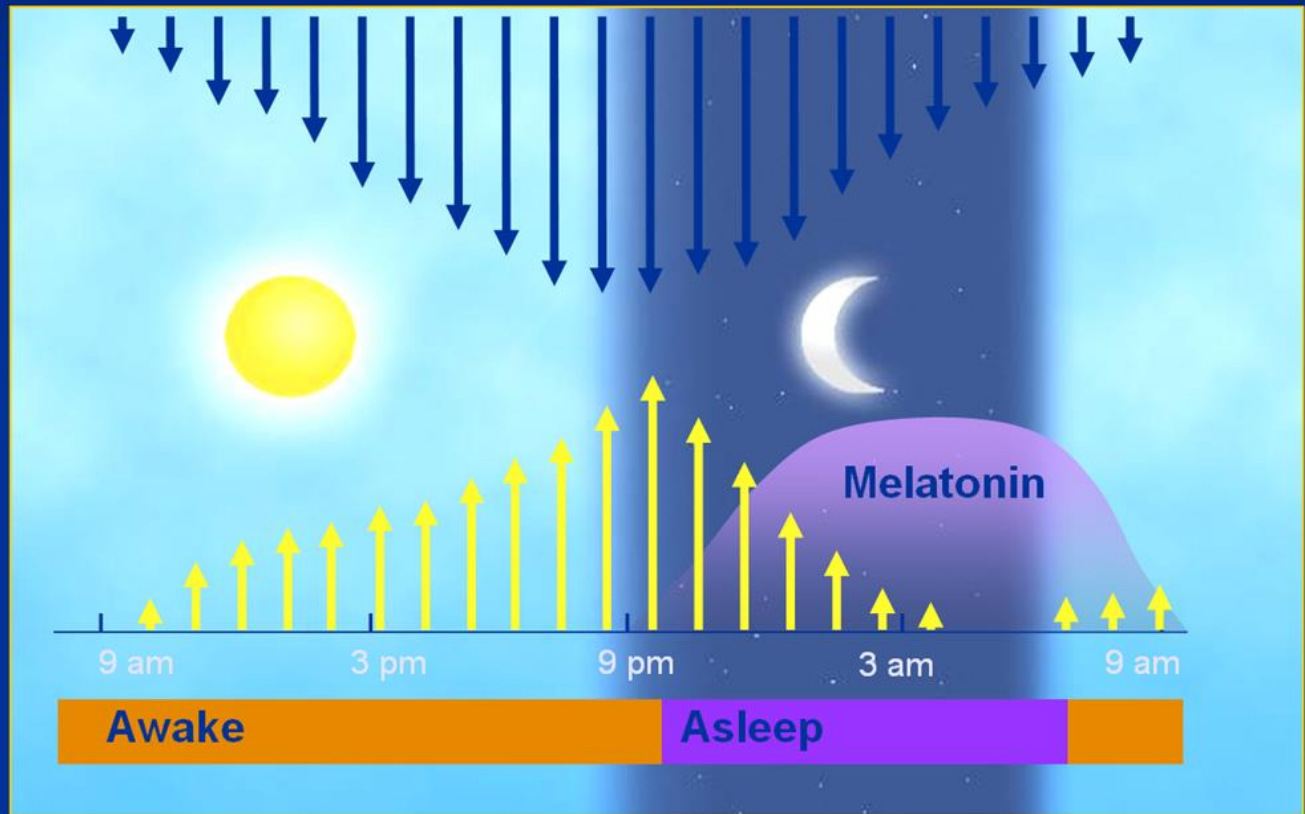
- Sleep and body temperature are directly influenced by the effect of the daily cycles of light and darkness on melatonin, a naturally occurring hormone produced by the pineal gland, part of the endocrine system, found in the brain.
- When sunlight enters the eyes, melatonin levels decrease, which signals body temperature to rise and promotes wakefulness.
- Darkness causes melatonin levels to rise and body temperature to fall, which promotes sleepiness.



Sleep Wake Cycle: Two Process Model

Homeostatic
Sleep Drive

Circadian
Alerting
Signal
(SCN)



Adapted from Kilduff TS, Kushida CA. *Sleep Disorders Medicine: Basic Science, Technical Considerations, and Clinical Aspects*. 1999; and Kennaway DJ, Voultsios A. *J Clin Endocrinol Metab*. 1998;83:1013-1015; Edgar DM, Dement WC. And Fuller CA. *The Journal of Neuroscience*. 1993;13(3):1065-1079.

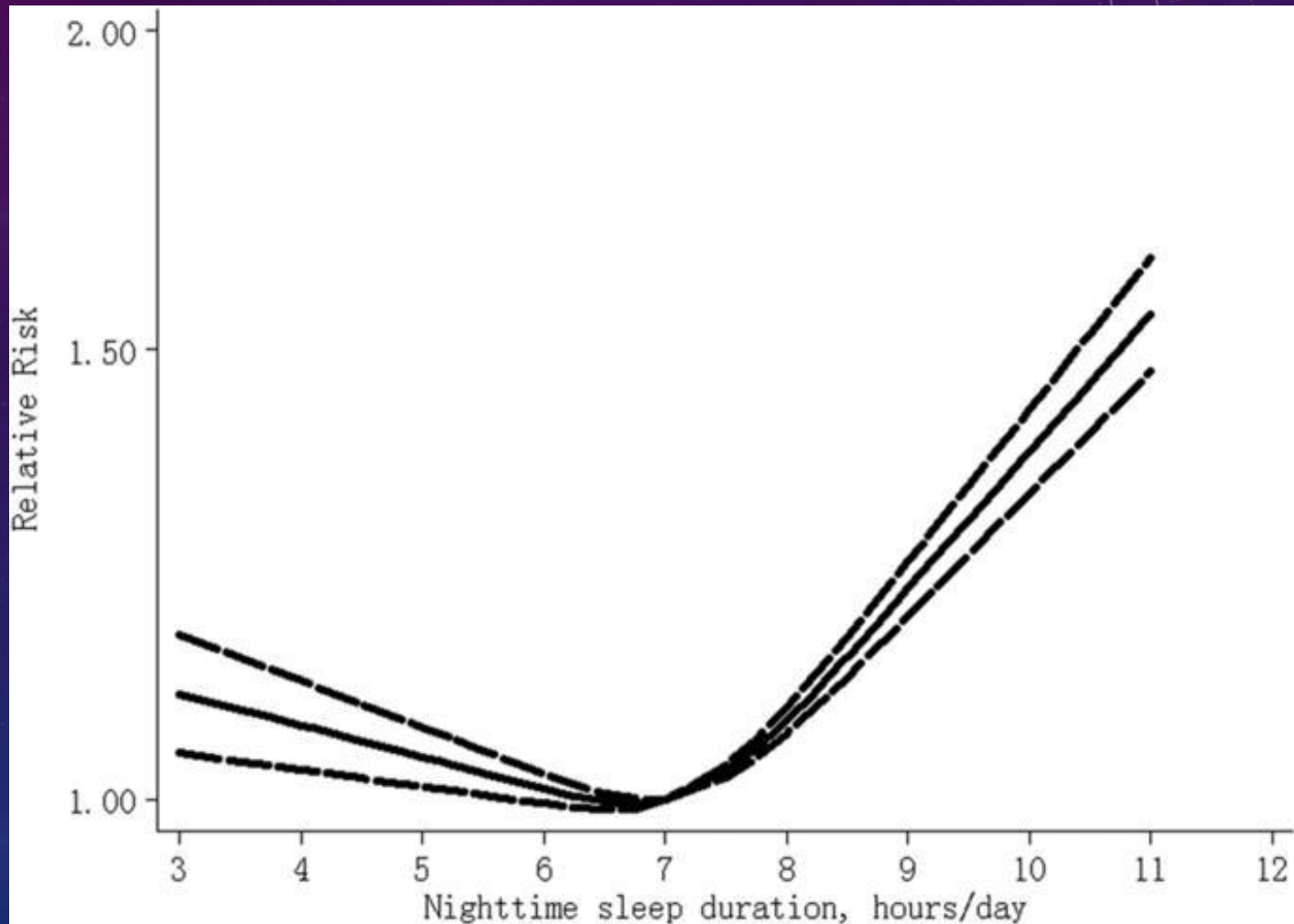
How much sleep is needed?

- Need for sleep decreases with aging.
- Individual differences
- **Average for adults 6-8 hours/night**
- Considerable evidence shows that for many individuals, performance on alertness, memory, and problem-solving tasks can be maintained for days, weeks, or even months with about 5 ½ hours of sleep, or what is called “**core sleep**”
- Higher mortality is associated with excessive sleep

Optimal sleep amount

- A 2016 meta-analysis in Nature involving 35 published studies and over 1.5 million adults found the **lowest mortality is associated with seven hours of sleep**.
- **Increased risk of death** was associated with sleeping **more than seven hours** was significantly greater than sleeping less than seven hours.
- This relationship between sleep duration and mortality risk is defined by the J-shaped curve shown in next slide of nighttime sleep duration and risk of all-cause mortality (the solid line and the dashed lines represent the estimated relative risk and its 95% confidence interval, respectively)

Mortality and sleep



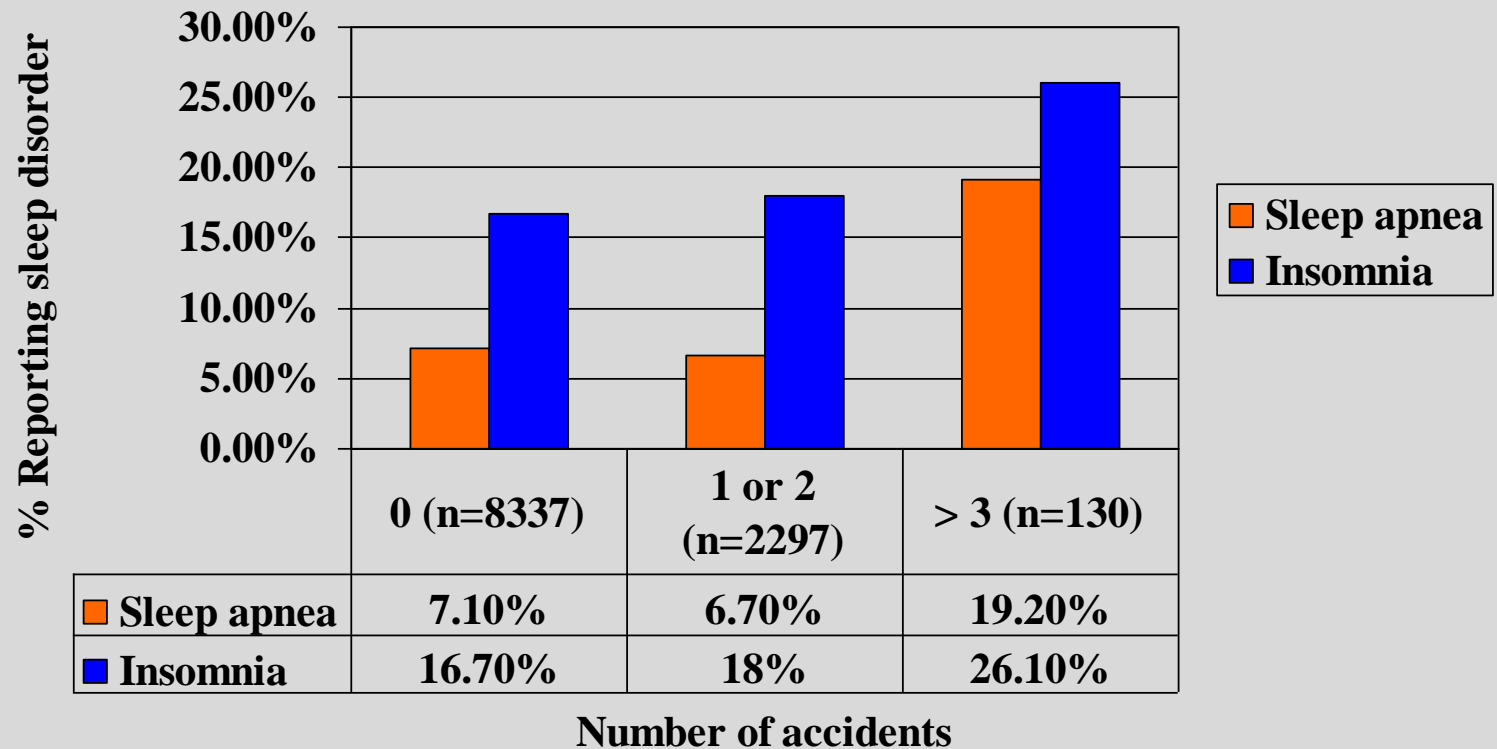


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"I won't be able to meet you today.
My car's in the shop."

Consequences of sleep deprivation



How Common are Sleep Problems?

- **About half of adults** in the U.S. said they experienced insomnia at least a few nights a week during any given year; increased to 60% during pandemic lockdown according to American Academy of Sleep Medicine
- Nearly one-third said they had insomnia nearly every night
- Increases with age
- The most frequent health complaint after pain
- Seen twice as often in women than in men

Sleep deprivation may result in:

- Mood disturbance with irritability, transient paranoia, disorientation, performance deficits, severe fatigue or hypomania – all sequelae of prolonged sleep deprivation
- Chronic sleep deprivation may reach a point at which the very ability to catch up on sleep is damaged, such that what's lost is lost
- Bodes ill for students, soldiers, et. al, trying to acquire new information while sleep-deprived
- Sleep deprived employees are over 70% more likely to be involved in workplace accidents

Conclusions about Sleep disorders

- Sleep disorders are *common*
- Sleep disorders are *serious*
- Sleep disorders are *underdiagnosed*
- Sleep disorders are *treatable*

International Classification of Sleep Disorders-3 (2014) (American Academy of Sleep Medicine)

- 1. Insomnia (chronic, short-term)
- 2. Sleep-related breathing disorders (OSA, central sleep apnea syndromes)
- 3. Central disorders of hypersomnolence (narcolepsy, Kleine-Levin syndrome)
- 4. Circadian rhythm sleep-wake disorders (shift work, delayed phase)
- 5. Parasomnias (sleepwalking, night terrors, REM-related)
- 6. Sleep-related movement disorders (restless leg syndrome, periodic limb movement disorder, sleep-related bruxism)
- 7. Other sleep-related symptoms – that do not meet diagnostic criteria



Shanahan

"My legs twitch in my sleep."

ACCORDING TO MY WIFE, I SNORE,
AND ONE OF THESE NIGHTS I MAY
STOP BREATHING.

BECAUSE OF
SLEEP APNEA?

BECAUSE HER
HANDS WILL BE
AROUND MY
THROAT.

WISE/ALDRICH



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R95

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FOR THE 5TH TIME IN AS MANY NIGHTS, HERB
IS AWAKENED BY HIS RESTLESS-LEG SYNDROME.



"Insomnia is very common. Try not to lose any sleep over it."

Insomnia - DSM V Criteria

- Complaint of sleep quantity or quality associated with problems falling asleep, staying asleep, and/or early morning awakenings
- The sleep problem causes distress and/or some sort of problem at work, with others, etc.
- The sleep problem occurs at least 3 nights/week and has been going on for at least 3 months
- The sleep problem occurs despite adequate opportunity for sleep
- The insomnia is not better explained by another sleep disorder, is not caused by the effects of a substance, and is not adequately explained by coexisting mental disorders or medical conditions

NOTE: insomnia is diagnosed whether it occurs as an independent condition or is comorbid with another mental disorder, medical condition, or another sleep disorder; insomnia is not diagnosed when the insomnia is not severe enough to warrant independent clinical attention

ICD-10 Definition of Insomnia

- The sleep difficulty occurs at least 3 nights per week.
- The sleep difficulty is present for at least 3 months.
- The sleep difficulty occurs despite adequate opportunity for sleep.
- The insomnia cannot be explained by and does not occur exclusively during the course of another sleep-wake disorder

ICSD-3 Diagnostic Criteria for Chronic Insomnia (#1)

A. The patient reports, or the patient's parent or caregiver observes, one or more of the following^a:

- Difficulty initiating sleep (Sleep Latency)
- Difficulty maintaining sleep (Sleep continuity)
- Waking up earlier than desired
- Resistance to going to bed on appropriate schedule
- Difficulty sleeping without parent or caregiver intervention

ICSD-3 Diagnostic Criteria for Insomnia (#2)

B. The patient reports, or the patient's partner, parent or caregiver observes, one or more of the following related to the nighttime sleep difficulty:

- Fatigue/malaise
- Attention, concentration, or memory impairment
- Impaired social, family, occupational, or academic performance
- Mood disturbance/irritability
- Daytime sleepiness
- Behavioral problems (e.g., hyperactivity, impulsivity, aggression)
- Reduced motivation/energy/initiative
- Proneness for errors/accidents
- Concerns about or dissatisfaction with sleep

ICSD-3 Diagnostic Criteria for Insomnia (#3)

- C. The reported sleep/wake complaints cannot be explained purely by inadequate opportunity (e.g., enough time is allotted for sleep) or inadequate circumstances (e.g., the environment is safe, dark, quiet, and comfortable) for sleep.
- D. The sleep disturbance and associated daytime symptoms occur at least three times per week.
- E. The sleep disturbance and associated daytime symptoms have been present for at least three months^b
- F. The sleep/wake difficulty is not better explained by another sleep disorder.

Brief insomnia screening

- Do you get at least 6 hours of sleep each night?
- Does it take you longer than 30 minutes to fall asleep?
(sleep onset insomnia)
- Do you have trouble staying asleep or awaken early and can't fall back asleep within 30 minutes?
(sleep maintenance insomnia and WASO)
- Does your sleep difficulty cause you any challenges with responsibilities at work/school/home?
- Do you have sleep difficulty 3 or more nights/week?
- Have you had sleep difficulty for at least 3 months?
- If yes to three or more questions **make provisional Dx of Chronic insomnia** & refer

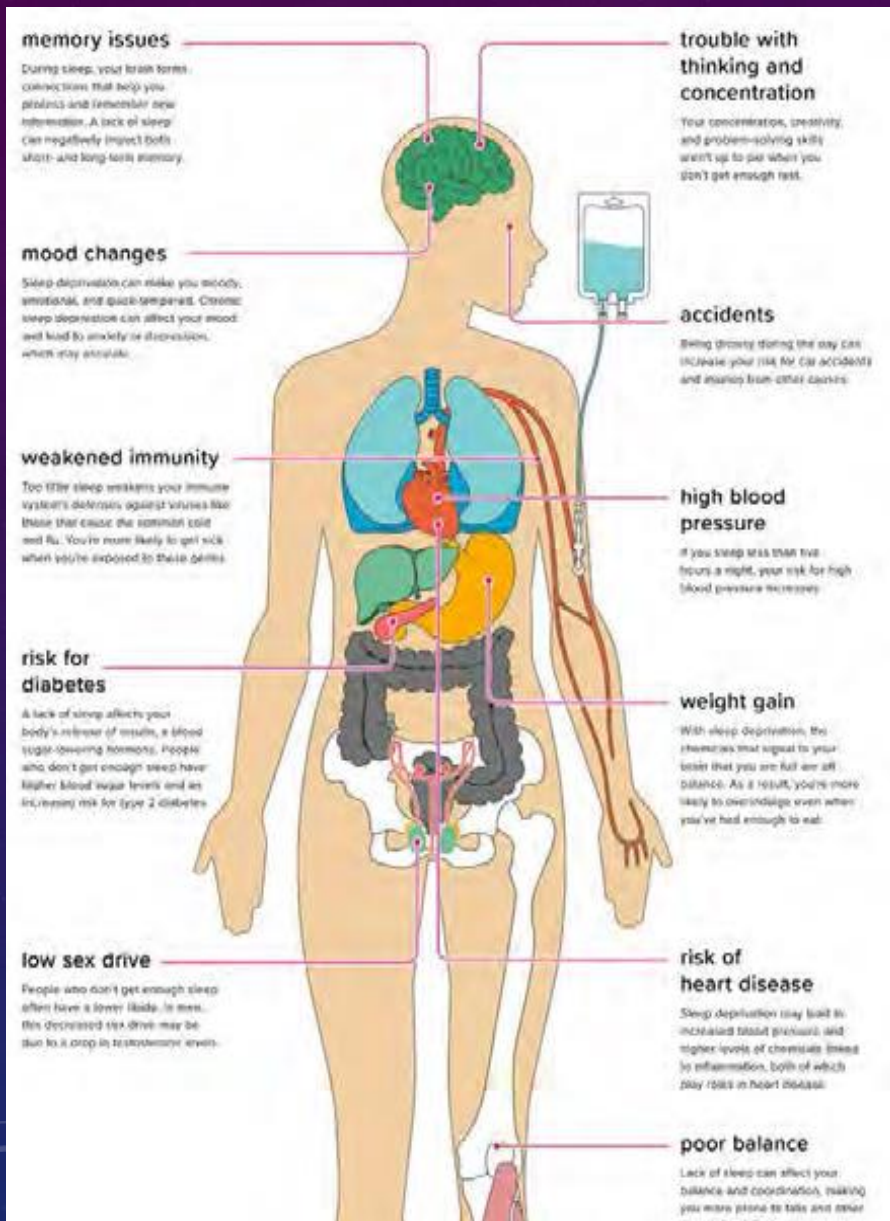
Neurobiology of Insomnia

- Arousal or hyperarousal of wakefulness system during 24 hour period but becomes manifest when attempting to fall asleep
- Increased activation of arousal systems (cortex, medial prefrontal cortex, thalamus, diffuse thalamocortical network, pontine brainstem) leading to overall increases in brain activity while asleep

Risk Factors for Insomnia

- Gender – more likely in females
- Increasing age – sleep maintenance
- Adverse Childhood Experiences (ACEs) score of 6+
- Medical conditions – notably chronic pain, GERD, thyroid, pulmonary/respiratory, and cardiovascular disorders; Vitamin D deficiency
- Psychiatric conditions - especially depressive and anxiety disorders; PTSD
- Lower SES
- Heightened response to stressors (sleep reactivity)
- Shift work

Most insomnia is NOT associated with any other diagnosis/condition



Insomnia leads to:

- Impaired immune function
- Increased risk of other medical conditions (obesity, diabetes, HTN, heart disease, cancer)
- Increased use of health care services & costs
- Decreased productivity; more days out of work or school

National Sleep Foundation, 2019

Medical Conditions Associated with insomnia

- Hyperthyroidism
- Arthritis or any other chronic painful condition
- Chronic lung or kidney disease
- Cardiovascular disease (heart failure, CAD)
- Heartburn (GERD)
- Neurological disorders (epilepsy, Alzheimer's, headaches, stroke, tumors, Parkinson's Disease)
- Diabetes
- Menopause/Menstrual disorders

Impact of insomnia

Psychological health

- Increased risk of developing substance abuse disorder
- 10X risk for clinically significant depression
- 17X risk for anxiety disorder
- Risk factor in suicide



Some drugs that cause insomnia

- Alcohol
- Caffeine/chocolate
- Nicotine/nicotine patch
- Beta blockers
- Calcium channel blockers
- Bronchodilators
- Corticosteroids
- Decongestants
- Antidepressants
- Thyroid hormones
- Anticonvulsants
- High blood pressure medications

Treatment options for insomnia



Let's consider drugs



Historic trials

- Fermented beverages
- Plant preparations
- Laudanum (opium/alcohol)
- Chloral hydrate (Mickey Finn)
- Barbiturates

Current

- Antihistamines
- Benzodiazepine hypnotics
- Nonbenzodiazepine hypnotics
- Selective melatonin receptor agonist
- Investigational compounds

Sleep medications

- Widely prescribed: Now a \$4.5 billion industry
- Many are not FDA-approved for treating insomnia
- Many have long half lives resulting in morning sleepiness
- Higher risk for elderly - balance; confusion; memory loss
- Tend to exacerbate Obstructive Sleep Apnea symptoms
- Hypnotics increase mortality rate
- Not curative – effects stop when discontinued
- Short-term solution that may become a long-term problem
 - ~Tolerance, dependency or addiction
 - ~Withdrawal, rebound, relapse
- Even newer non-BZDs (e.g., Ambien; Sonata) have risks
 - ~ Reduce REM sleep/ do not increase slow wave sleep
 - ~Complex sleep behavior & amnesia
 - ~Overdose & suicide risk

Over-the-counter sleeping aids

Antihistamines

- ~Rapid tolerance/dependence
- ~Daytime sedation
- ~No more effective than placebo

Melatonin

- ~Little scientific evidence of effectiveness
- ~No significant increase in sleep onset or total sleep time
- ~May help with jet lag and elderly with reduced melatonin levels
- ~Side effects may include headaches, nausea, and vivid dreams

CBD/CBN

- ~Some research supporting effectiveness for pain/anxiety
- ~May produce daytime fatigue, diarrhea, appetite loss
- ~Useful for REM sleep behavioral disorder (e.g., sleepwalking)
- ~CBN better than CBD for promoting sleep

Novel Sleeping Remedies

- Forest bathing
- Light treatment
- Sound/light limitation
- Sound exposure
- Brain tapping
- Beach therapy



Are there alternatives?



Yes: Cognitive Behavioral Therapy for Insomnia (CBT-I)



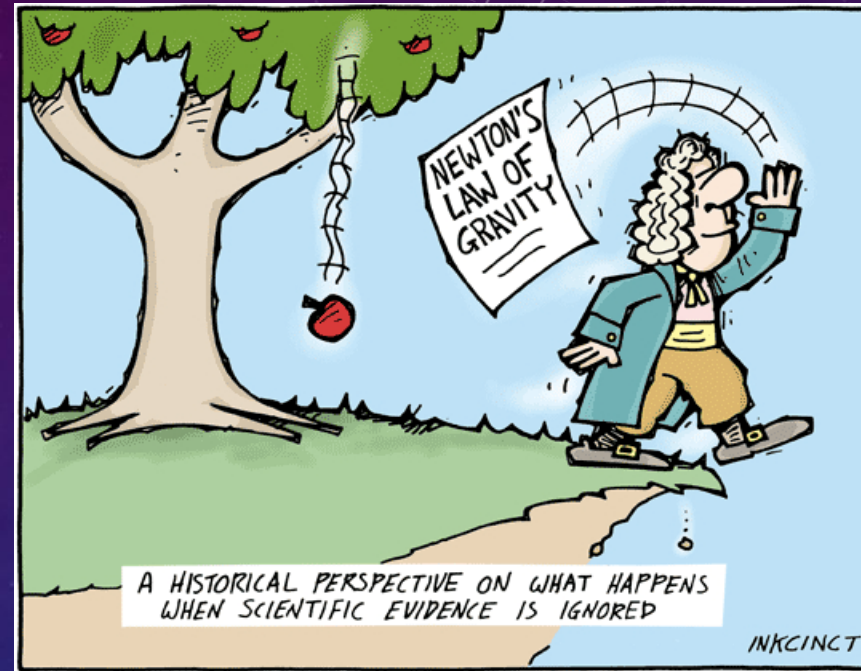
What Is CBT-I ?

Evidenced-based non-medical treatment.

Specialized protocol combining several behavioral and cognitive therapy strategies

Relies on provider specifically trained in CBT-I

In 2021, the American Academy of Sleep Medicine guidelines recommended CBT-I as the treatment of choice for chronic insomnia



Is CBT-I Effective?

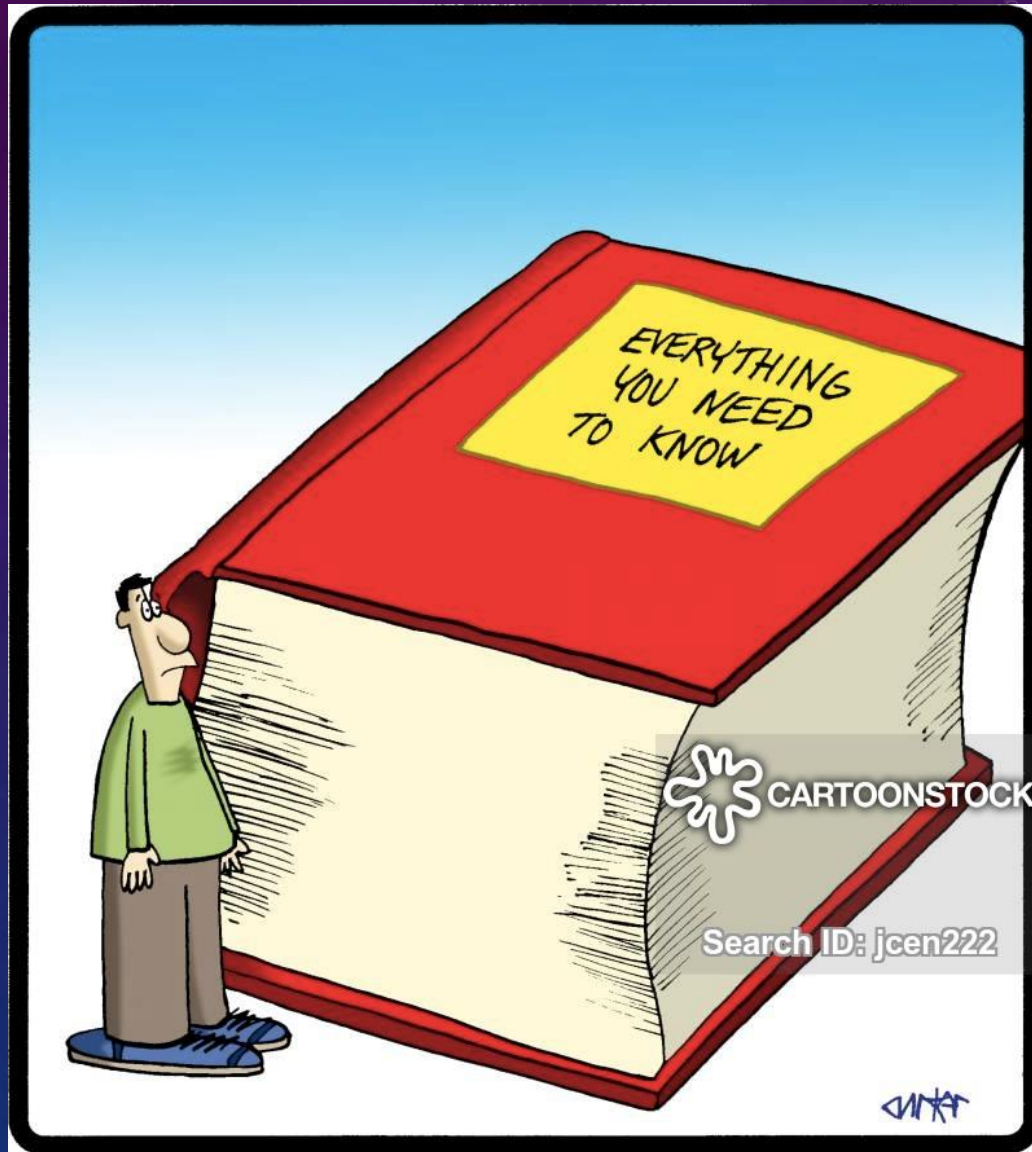
Scientific reviews and meta-analyses show **large treatment effect** size

National Institute of Health State-of-the Science meeting on insomnia concluded that CBT-I is a **safe and effective** means of managing chronic insomnia and its effects.

CBT-I is recommended as standard, first-line treatment for insomnia per published clinical guidelines by the Chronic Insomnia Task Force of the American Academy of Sleep Medicine and by American College of Physicians

CBT-I is **more cost-effective** than either drug treatment

How Does CBT-I Work?



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SLEEP HYGIENE



PUT YOUR MOBILE AWAY AND
SET AN ALARM CLOCK



YOU NEED ABSOLUTE DARKNESS
AND QUIETNESS



READ A BOOK INSTEAD OF
WATCHING A TV SHOW



ESTABLISH A PRE-BEDTIME
RITUAL FOR YOURSELF

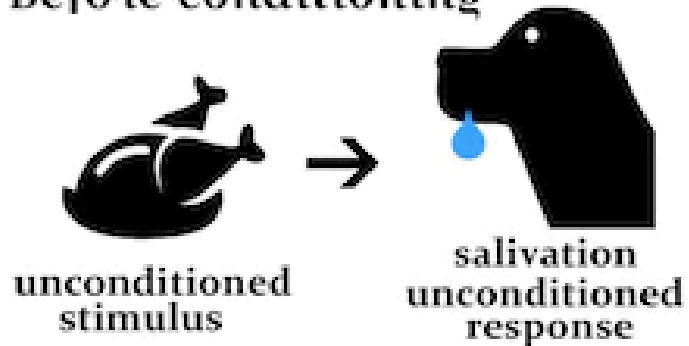


KEEP THE TEMPERATURE
COMFORTABLY COOL

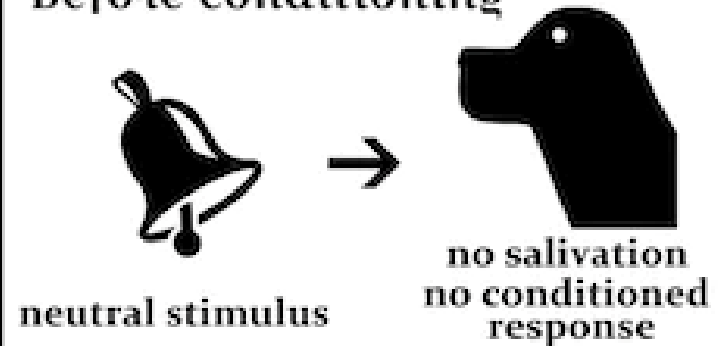


USE A HUMIDIFIER
TO MOISTURIZE THE AIR

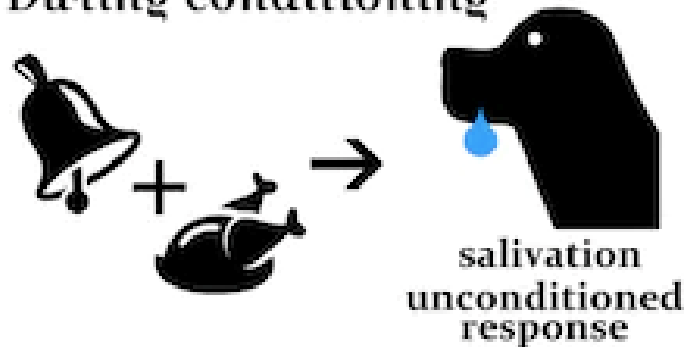
Before conditioning



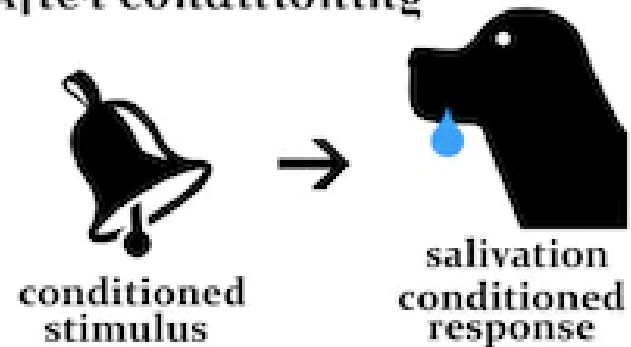
Before conditioning

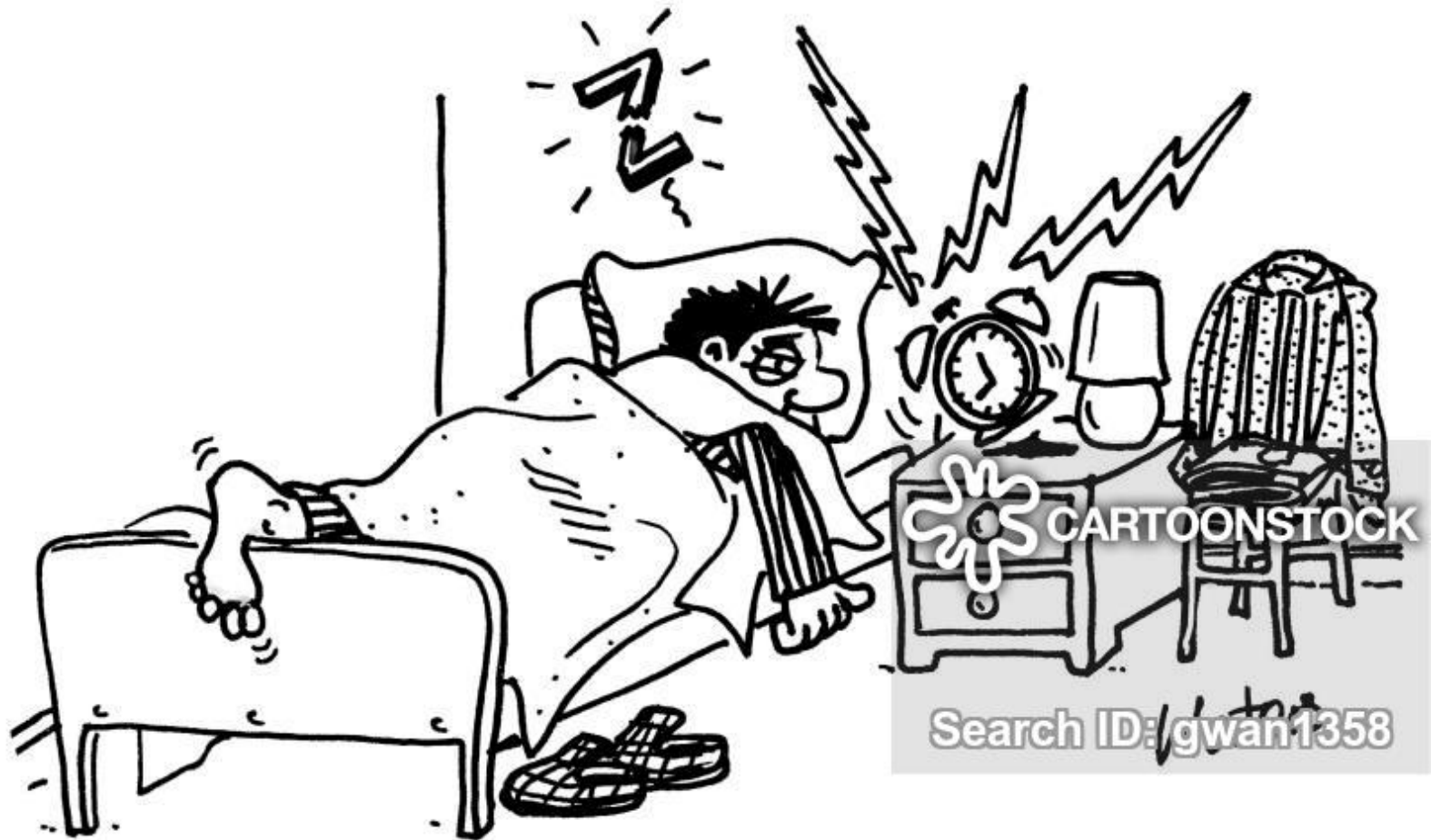


During conditioning



After conditioning





Wakey-Wakey.....Rise and shine!

NEVER, EVER...

...MAKE THE MISTAKE
OF SETTING YOUR
ALARM FOR 3:00A.M.
IF YOU INTEND TO
GET UP AT 7:00A.M.



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Cognitive Restructuring

Cognitive restructuring is a technique that helps to identify and challenge irrational or maladaptive thoughts known as cognitive distortions (Mills, Reiss & Dornbeck, 2018).

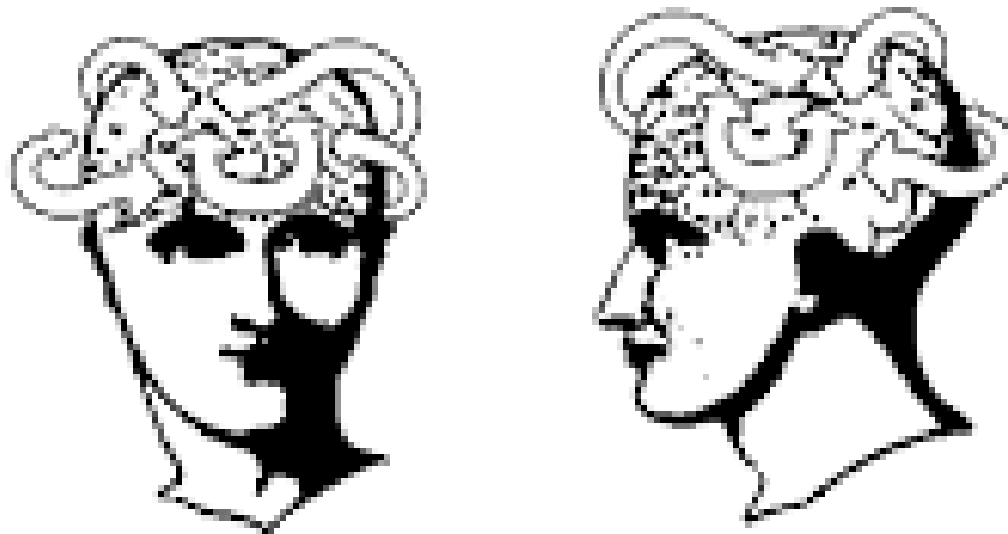


Figure 4

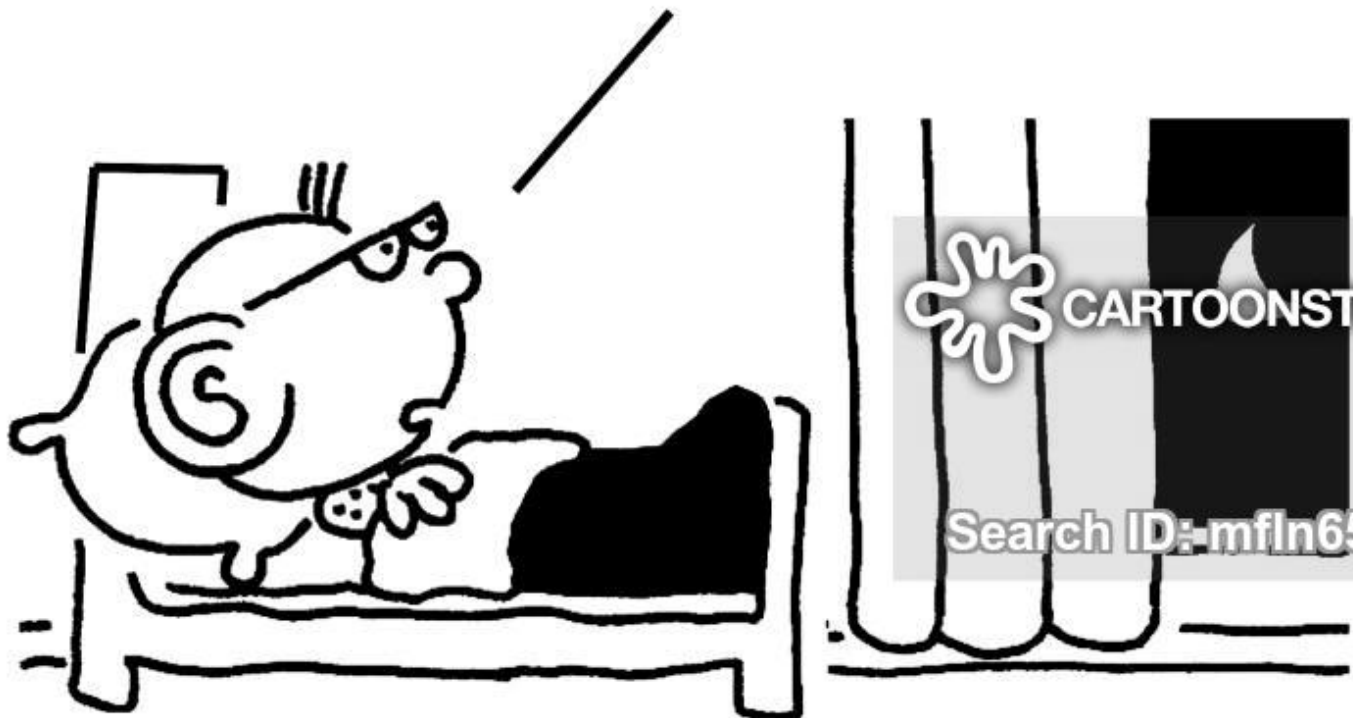
Source: Hayes, A. (2017). Try these negative restructuring exercises to improve your mood and reduce stress. Retrieved from <http://1.kings-college-nyc.gov/for-students/college-success/4-ways-to-try-1688896491-1688896491.pdf>





"Sleep? No, I'm the anxiety fairy. How about a cuppa joe?"

MY INSOMNIA WOULDN'T
BE SO BAD IF I DIDN'T
LIE AWAKE WORRYING
ABOUT IT!



CARTOONSTOCK

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CARTOONSTOCK
Reynolds

Search ID: dre2466

Visualize **I**nert **P**ease



"I'm trying to liven up my entries. What's another word for 'slept?'"

Benefits of CBT-I

- *Benefits are long-lasting, even after therapy is over, making it different from medications that are effective only while using
- *Treatment protocol is brief, requiring only a few weeks to complete
- *Can be successfully used to treat insomnia occurring with other medical or psychiatric disorders
- *Telehealth and face-to-face are equally effective
- *Empirical basis for efficacy and effectiveness
- *Insomnia diagnosis (ICD-10 F51.01) is covered benefit
- *No significant interactions with other medical treatments

The down side of CBT-I

- *Repeated visits with therapist are needed
- *Sleep may get worse before it gets better
- *Improvement may not occur for several weeks
- *Requires time, motivation and active participation
- *Possible daytime sleepiness, irritability or cognitive impairment during sleep restriction
- *Shortage of trained CBT-I therapists

When is CBT-I appropriate?

- Must be motivated and not just want a pill
- Requires sufficient intellect to follow protocol to benefit from CBT-I
- CBT-I can be used for all ages
- A major component of CBT-I (sleep restriction) is contraindicated for those with bipolar disorder, untreated sleep apnea, seizure disorder, alcoholics (CBT-I protocol is modified in these cases)

What about combined with Rx treatment?

- *CBT-I can be used as an adjuvant to medications
- *Medications can provide rapid relief and CBT-I can lead to long-lasting results
- *Goal is to significantly reduce or eliminate need for Rx for sleep through gradual and structured methods to achieve self-reliance

Efficacy of CBT for Insomnia

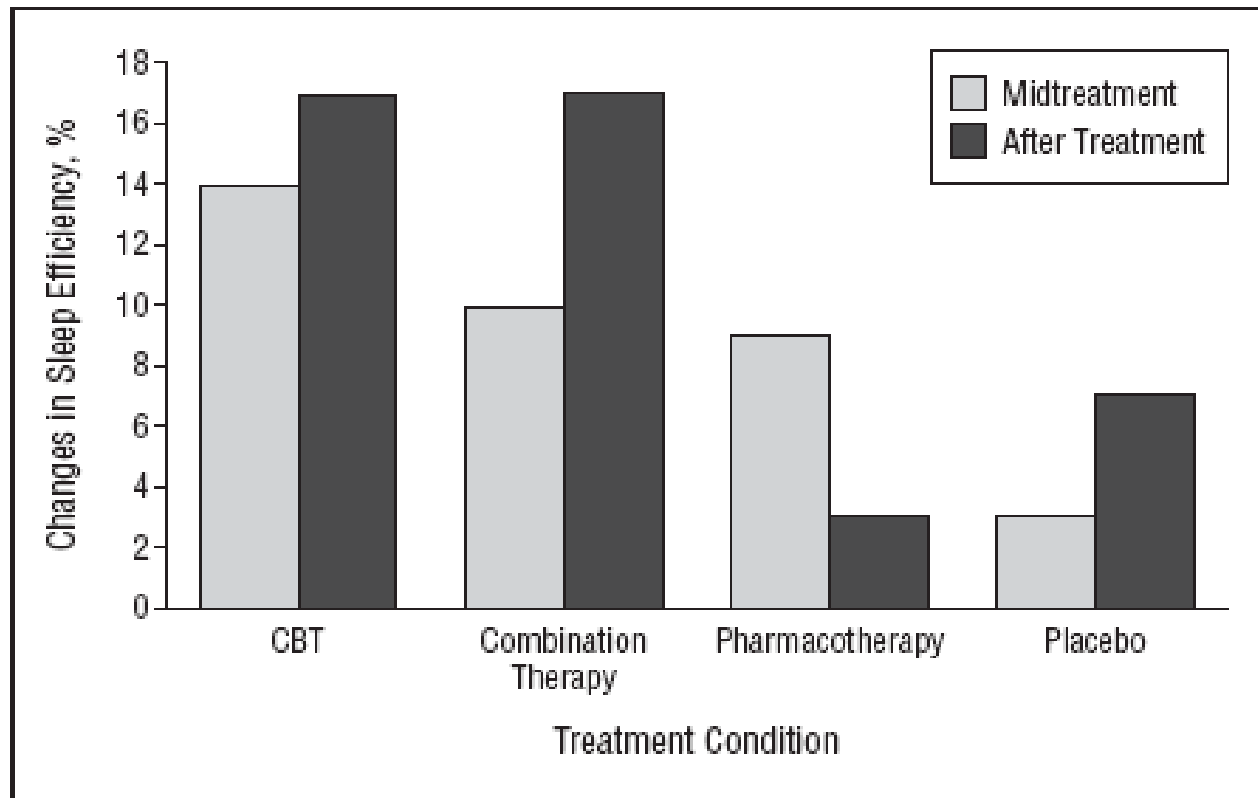


Figure 3. Changes in sleep efficiency as measured by sleep diaries. CBT indicates cognitive behavior therapy.

What About CBT-I Combined with Psychotherapy?

Published studies report positive results

- Insomnia impacts course of treatment for depression: adding CBT-I improves outcome – may double treatment effectiveness
- CBT-I improves coping skills for cancer patients
- CBT-I improves treatment effectiveness for PTSD when integrated with prolonged exposure method
- Improving sleep before and after psychotherapy sessions improves adherence to treatment by preparing key neural pathways for next day learning & promotes memory consolidation supporting long-term retention

Summary

- Sleep disorders are **widespread**
- **Half** of the adults in the U.S. complain of episodic insomnia
- Insomnia is **second most common complaint**, after pain, seen in primary care
- Sleep deprivation **increases risk** of auto & workplace accidents
- Insomnia is a **risk factor** for several medical and psychological conditions
- Medications are useful for periodic **short-term** use, but not long-term use
- Both medication treatment and psychotherapy can be combined with CBT-I
- CBT-I is an **evidence-based** treatment that is both safe and effective for providing lasting results
- CBT-I is recommended as a **first line treatment** of chronic insomnia by physician organizations

Savage Chickens

by Doug Savage

I'VE BEEN
HAVING
TERRIBLE
INSOMNIA
LATELY

HAVE YOU TRIED
POWERPOINTS?



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