


**Everything that you wanted to
know about sleep but were too
sleepy to ask.**

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Who am I?

- Independent freelance sleep expert.
- Involved in sleep research for 37 years.
- Worked at
 - Neurosciences Division, R.A.F. Institute of Aviation Medicine.
 - Human Psychopharmacology Research Unit, University of Surrey.
 - Norfolk and Norwich University Hospital.
 - London Clinic, Harley Street.
 - ScanSleep, Copenhagen.
 - Lovisenberg Hospital, Oslo
- Member of
 - European Sleep Research Society.
 - American Academy of Sleep Medicine .
 - British Sleep Society (Chairman 2000-2004)
- Published 38 peer-review papers

- 
- This lecture may contain information, ideas, concepts and discursive anecdotes that may be thought provoking and challenging
 - It is not intended for the content or delivery to cause offence
 - Any issues raised in the lecture may require the viewer to engage in further thought, insight, reflection or critical evaluation

Is it any better in 2019?

• within the NHS complaints of poor sleep continue to attract responses *“unstructured by medical education and un-influenced by developments in clinical sleep research”*

- Lancet editorial 1991.

Sleep disorders

Sleep disorders in individuals..... remain

- underreported
- under diagnosed
- undertreated

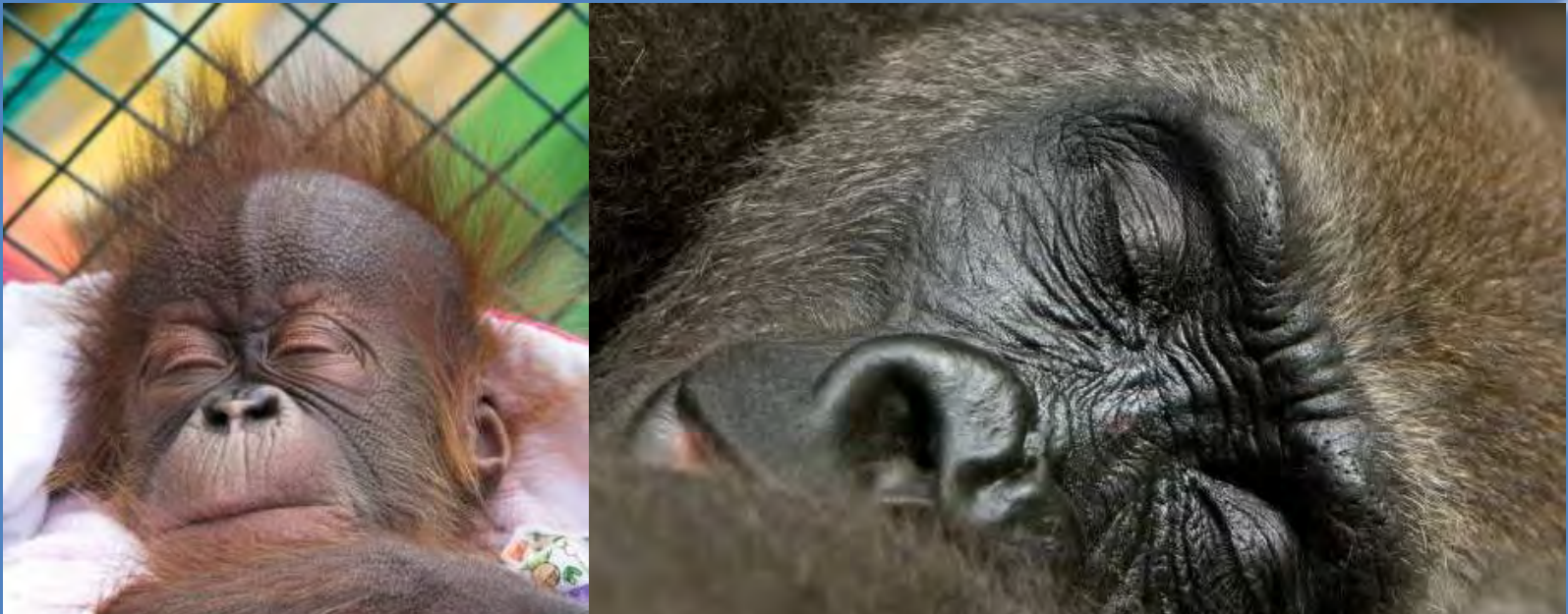
Stiefel and Stagno, CNS Drugs 2004

Hypnosis and sleep

●●● They are not the same but they are similar.

- Benedittis, G.D., Neural mechanisms of hypnosis and meditation, *Journal of Physiology - Paris* (2015),
- Kihlstrom, J. F. (2013). Neuro-hypnotism: Prospects for hypnosis and neuroscience. *Cortex*, 49(2), 365-374.

The importance of sleep

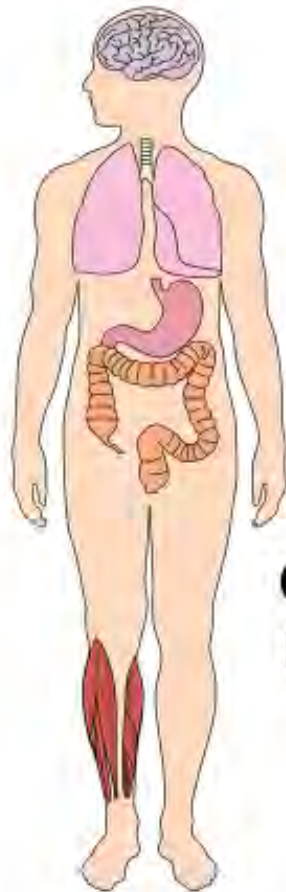


“ If sleep does not serve an absolutely vital function,
then it is the biggest mistake
the evolutionary process ever made¹

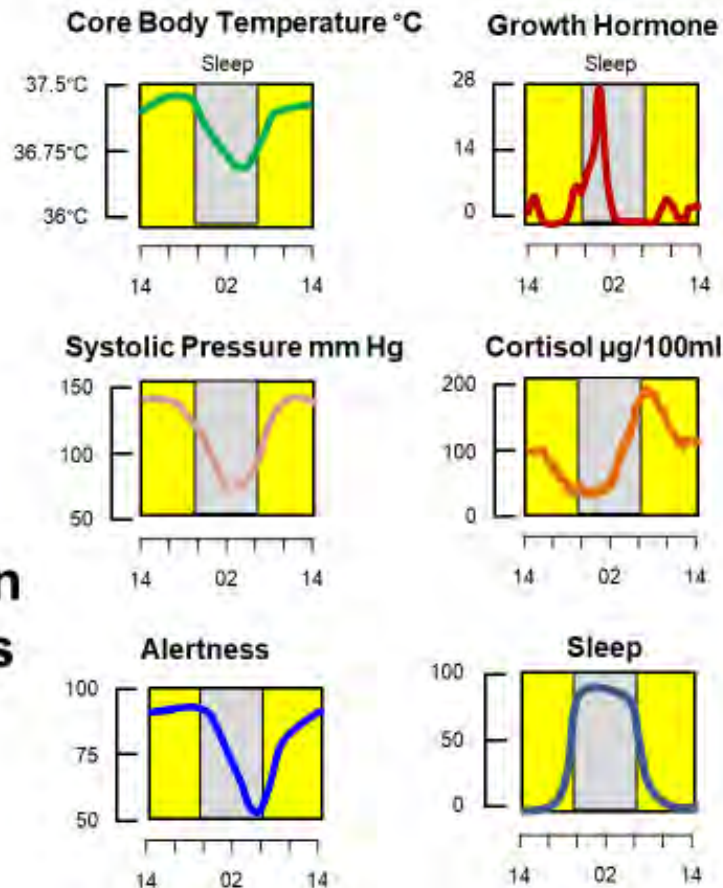
1. Rechtschaffen. The control of sleep. In: Hunt, editor. Human behaviour and its control. Cambridge, MA: Schenkman; 1971

Circadian rhythms in all biological functions

- different timing of each rhythm with respect to the sleep-wake / light-dark cycle



24h Circadian Rhythms



Individual differences

Morning type VS evening type

Larks VS owls

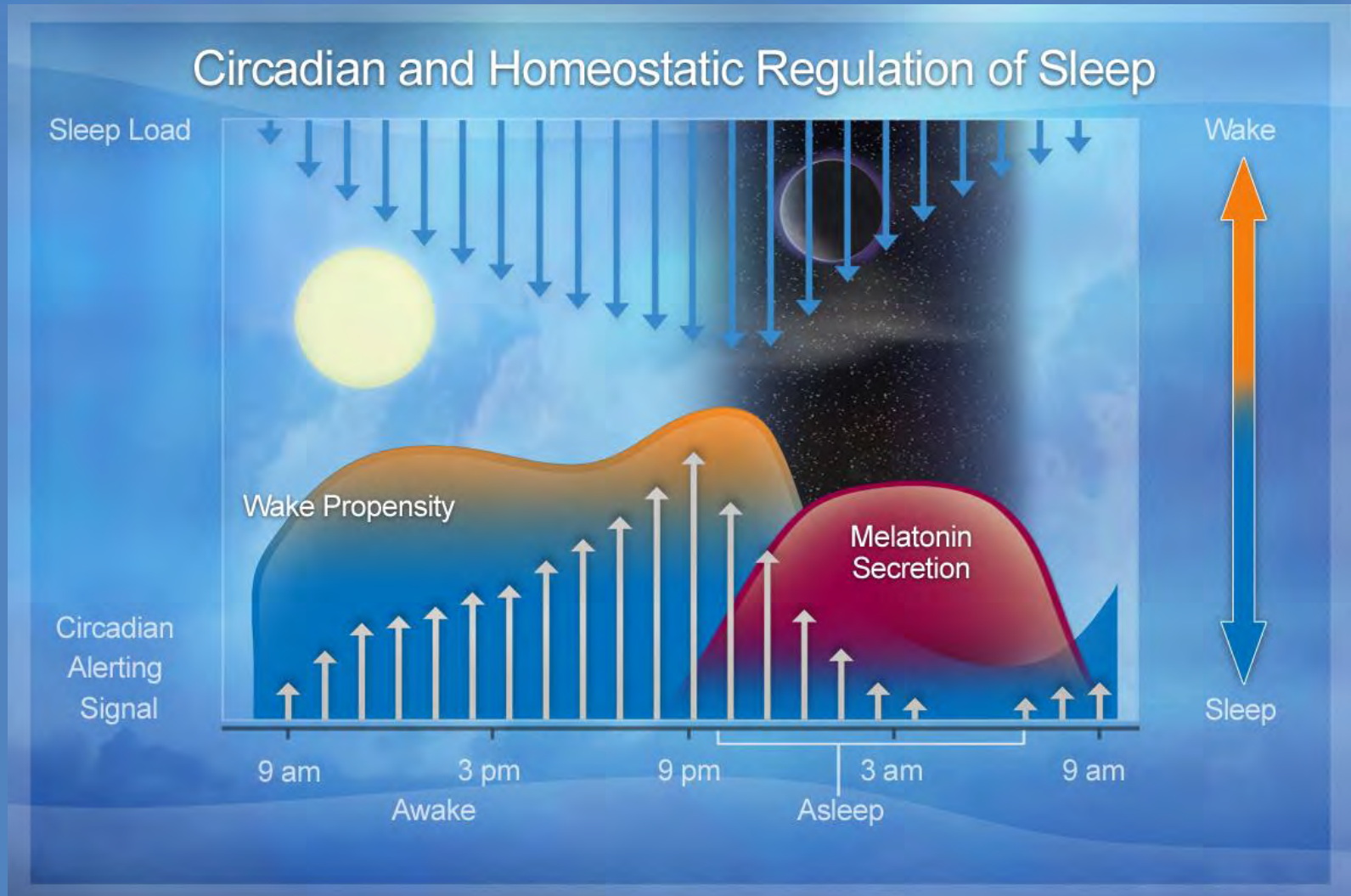
Largely genetically determined.



Function of sleep

- Sleep remains a biological enigma
- Sleep is not negotiable- it is a biological imperative
- Needed for recuperation and restoration of physical and mental functioning.
- Sleep is important for optimal functioning of the endocrine, metabolic and immune system.
- Sleep affects all organs of the body.
- But primarily sleep is of the brain and for the brain.

Regulation of sleep



What type of sleeper are you?

<http://www.schneggenburger.at/>



Different States of Sleep

●●● Non-REM (NREM) sleep (75-80%)

Increasing sleep depth & decreasing muscle tone, decreasing respiratory & heart rate & decreasing eye movement, physical rest & immune system. Memory and physiological rest.

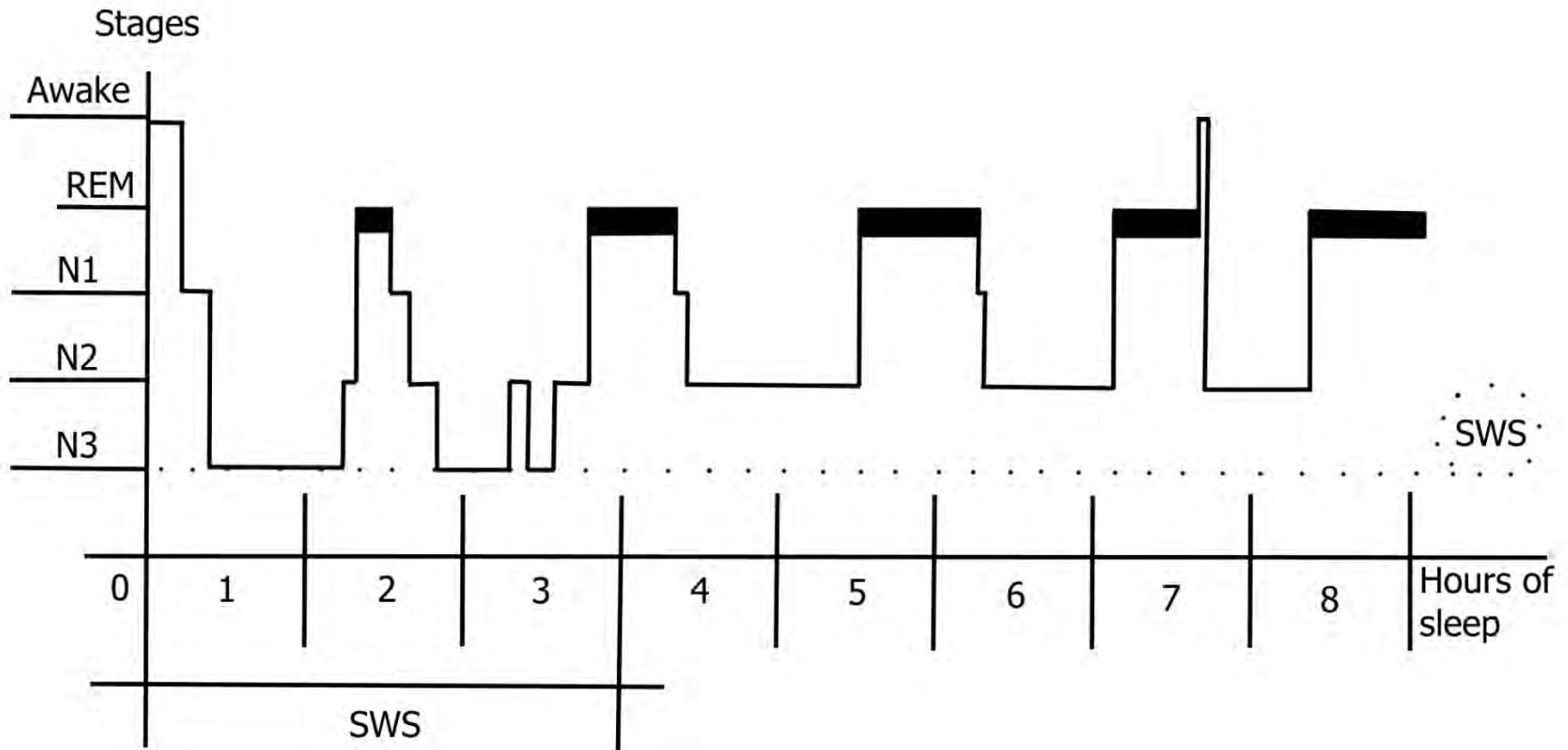
- Stage N1: transition from awake to sleep (1-5%)
- Stage N2: true sleep (45-50%)
- Stage N3: *deep, slow wave sleep (SWS: 25-27%)*

●●● Rapid Eye Movement (REM) sleep (20-25%)

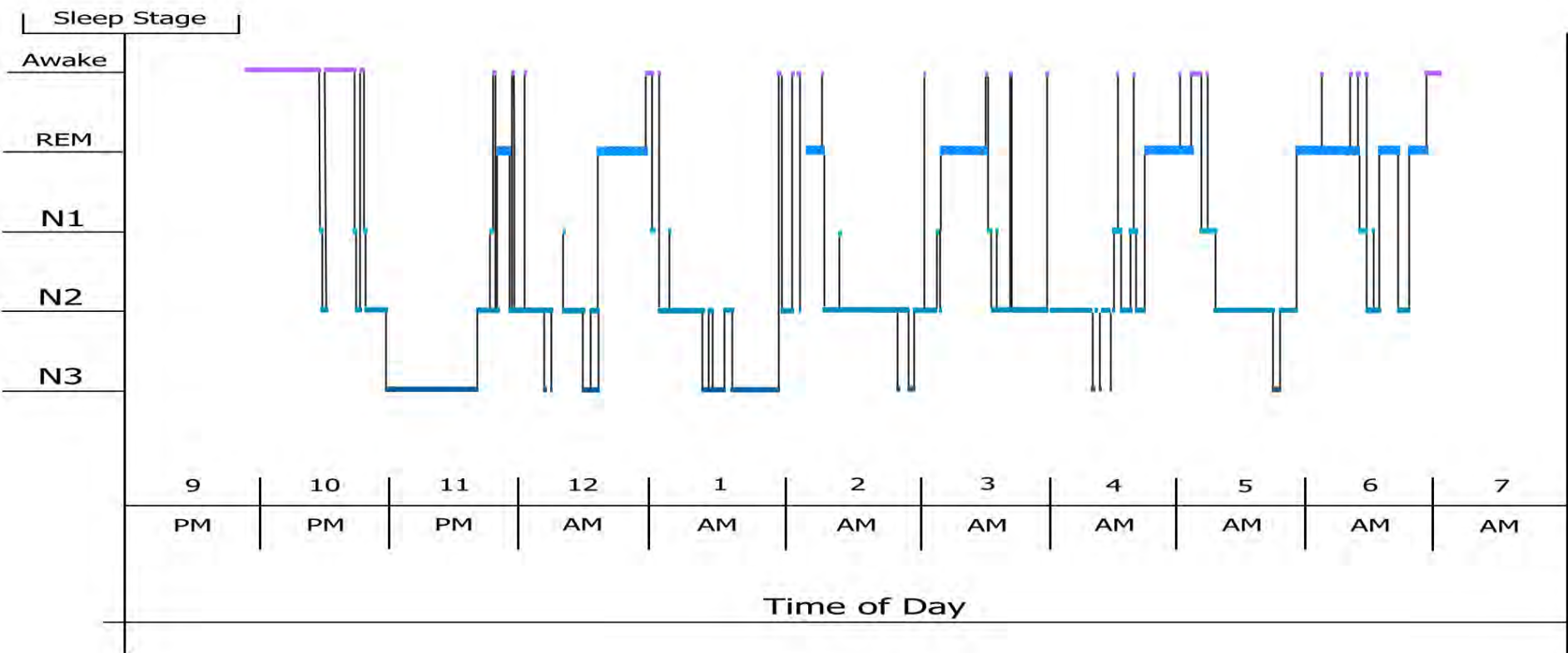
Irregular breathing and increased heart rate, very low muscle tone, vivid dreams

Psychological rest, emotional well-being & memory

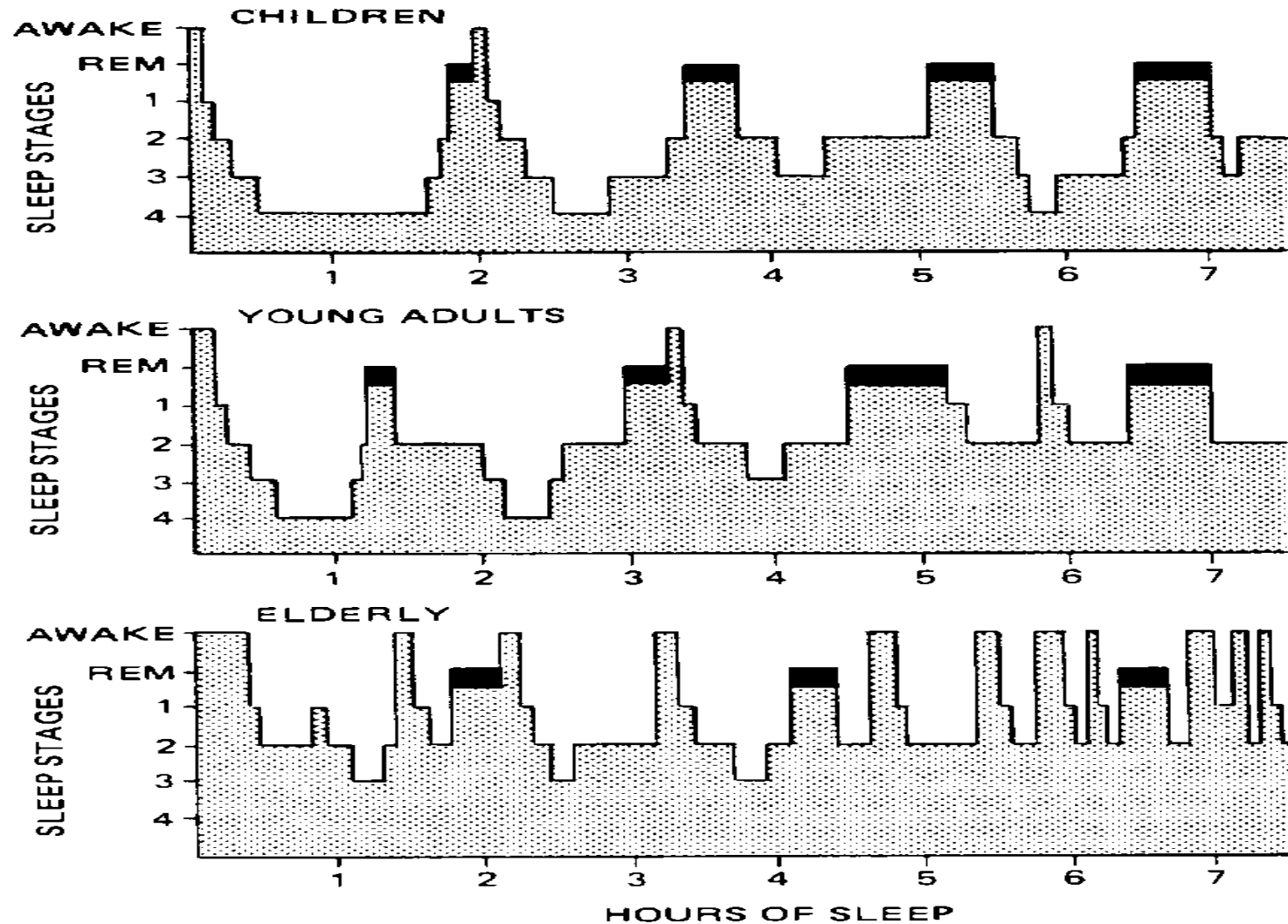
'Normal' Sleep Hypnogram



Real Sleep Hypnogram



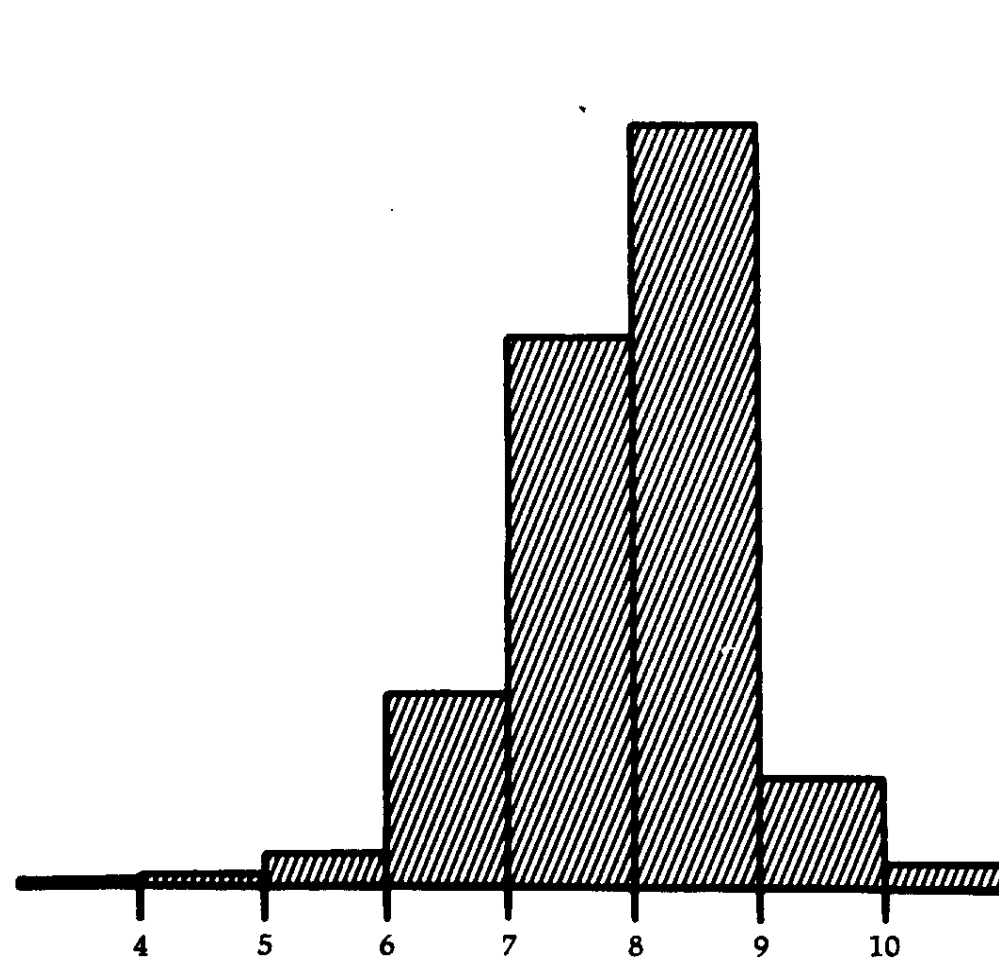
Sleep Hypnogram - Ontogeny



Total Sleep Requirement

Percentage
of All
People

50
40
30
20
10
0



Length of Sleep in Hours

How sleepy are you?



Epworth Sleepiness Scale

Use the following scale to choose the most appropriate number for each situation.

- 0 = would never doze
- 1 = slight chance of dozing
- 2 = moderate chance of dozing
- 3 = high chance of dozing

Epworth Sleepiness Scale

Sitting and reading?



Epworth Sleepiness Scale

Watching TV?



Epworth Sleepiness Scale

Sitting inactive in a public place (e.g., a theater or a meeting)?



Epworth Sleepiness Scale

As a passenger in a car for an hour without a break?



Epworth Sleepiness Scale

Sitting and talking to someone?



Epworth Sleepiness Scale

Sitting quietly after a lunch without alcohol?



Epworth Sleepiness Scale

In a car, while stopped for a few minutes in traffic?



Epworth Sleepiness Scale

Lying down to rest in the afternoon
when circumstances permit?



Epworth Sleepiness Scale

- A score of ≤ 10 is considered normal
- A score of > 10 suggests excessive sleepiness

You would not turn up to work drunk so why did you turn up sleepy?

●●● If you are an 8 hour a night person, getting the following hours of sleep per night is similar to consuming the following number of 500ml beers:

- 6 h sleep \approx 2 beers
- 4 h sleep \approx 4 beers
- 2 h sleep \approx 5 beers
- 0 h sleep \approx 7 beers



Signs of sleepiness

The signs include:

- not feeling refreshed after sleep
- difficulty keeping your eyes open and focussed
- greater tendency to fall asleep while at work
- more frequent naps during leisure hours
- lots of yawning
- extended sleep during days off
- increased errors and loss of concentration at work
- feeling irritable, restless and impatient

The Acute Effects of Sleepiness



- ❖ Involuntary “micro sleeps” occur
- ❖ Reaction times slower
- ❖ Attention becomes unstable
 - vigilance poor, lapses increase
 - short term memory suffers
 - unable to sustain performance
- ❖ Problem solving and judgement deteriorate
 - frontal lobe function particularly affected
 - inflexible behaviour (note industrial accidents)
 - sense of humour, moral judgement, risk taking
- ❖ Pain threshold reduced

Sleepiness leads to traffic accidents



- Fatigue thought to be involved in 16–60% of road accidents
- Even moderate sleep deprivation is at least as dangerous whilst driving as low-level alcohol intoxication
- Most vulnerable times for accidents are around 2–7am and in the mid-afternoon

The risks of sleepiness

Sleep before you drive

Land Transport NZ and NZ Police
[New Zealand Government](#)



Beauty sleep

- People are capable of detecting sleep loss related facial cues, and these cues modify judgments of another's health and attractiveness.
- Sleep deprived people were also judged to also look sadder and this sadness was judged to be related to looking fatigued.

Look good, feel good

- Chronic poor sleep quality is associated with decreased satisfaction with personal appearance.
- People with adequate sleep may be more self-confident and happier with how they look.

Beauty is not only skin deep

- Just a single night's poor sleep was associated with increased relationship conflict the next day.
- The worse couples slept, the less empathy they showed towards their partners, the more negative feelings they had.
- When sleepy, couples also found it harder to resolve their differences
- poor sleep caused more selfish feelings in partners and they felt less able to appreciate and feel gratitude towards the other.

Poor sleep kills!!!! (maybe)

●●●● Poor sleep-associated reduced health:

- ↑ morbidity and mortality
- ↑ risk of falling, traffic and occupational accidents
- ↑ risk of cardiovascular disease
- ↓ immune response
- ↑ risk of Alzheimer's
- ↑ risk of depression
- ↑ healthcare costs
- ↑ suicidal behaviour
- ↑ risk of obesity/diabetes


Insomnia is a highly prevalent condition.

- Generally prevalence has been reported between 5-35%
- Among primary care clinic populations, some studies have reported more than 50% of patients complain of insomnia.
- Conservatively, a prevalence of 10-15% is reasonable.

Insomnia is a highly prevalent condition.

- Research studies typically define insomnia as a latency to sleep of > 30 min. and/or sleep efficiency $< 85\%$.
- In clinical practice, the patient's subjective sense of poor quality sleep defines insomnia

Sleep Disorders: Etiologic Framework/ Clinical Disorders



●●●●	Circadian	Shift work/Sleep Schedule Disorders
●●●●	Neurological	RLS/PLMD, Narcolepsy
●●●●	Psychiatric	Depression, anxiety
●●●●	Behavioral	Psychophysiologic Insomnia, Poor Sleep Hygiene

Sleep Disorders: Etiologic Framework/Clinical Disorders

●●●●● Cardiorespiratory

Obstructive Sleep Apnea

●●●●● Other Medical

G E Reflux, Asthma, COPD, Pain-related

●●●●● Substance/Medication

Alcohol, Nicotine, Caffeine, Medications

Insomnia- based on timing

- Classification based on time of onset of symptoms
- Sleep onset insomnia - anxiety, tension
- Sleep maintenance insomnia
 - Medical/neurological diseases
 - Parasomnias - RLS/PLMS etc
 - Alcohol, stimulants, hypnotic/drug withdrawal
- Early morning insomnia – depression
- CRSD - Phase-shift disorder- depending on shift
- Cyclical insomnia - drug/alcohol abuse, psych/medical disorders- bipolar disorder, bulimia, anorexia

Insomnia –based on duration

- **Chronic insomnia** — daily symptoms for > a month – sub-acute or for >6 months - chronic
- In reality, chronic insomniacs have variable sleep
- Symptoms may not be present every night
- Vary night to night
- Some nights better than others
- So - **Chronic intermittent insomnia** more pertinent description for many patients
- Most insomnia patients in the clinic have chronic insomnia

Four Questions to Screen for Sleep Disorders

- How do you feel during the day?
- Are you generally content with your sleep?
(picks up the insomnias)
- Are you excessively sleepy during the day without obvious cause? (Picks up the EDS disorders like narcolepsy, primary hypersomnia and obstructive apnoea)
- Does your bed-partner complain about your sleep? (picks up the parasomnias)

These questions will take about 20 seconds and can pick up 90% of serious sleep problems

If you get the “wrong” answer to any question consider taking a sleep history

Sleep History: “DREAMS”

●●●● **D**aytime sleepiness

●●●● **R**egularity and duration of sleep

●●●● **E**vening routine

●●●● **A**wakenings: night wakings

●●●● **M**orning: early morning waking

●●●● **S**nororing

Sleep History: Daytime sleepiness

Initial Question:

Have you ever fallen asleep during the day when you didn't want to?

Follow-up Questions:

How likely are you to fall asleep whilst:

reading or watching TV?

during a conversation?

while driving?

Sleep History: Regularity and duration of sleep

Initial Question:

What time do you usually go to bed and get up in the morning?

Follow-up questions:

Do you feel that you usually get enough sleep?

Do you work odd shifts or hours?

Sleep History: Evening Routine

Initial Question:

Do you have any difficulty falling asleep?

Follow-up Questions:

How long does it take you to fall asleep?

What prevents you from falling asleep?

How long have you had this problem?

What do you do in the evening before bed?

Check: alcohol, nicotine, caffeine, medications

Sleep History: Awakenings (Nighttime)

Initial Question:

Are you having difficulty sleeping through the night?

Follow-up Questions:

What awakens you (pain, toilet, shortness of breath, etc)?

How often and for how long are you awake?

What keeps you from falling back asleep?

Sleep History: Morning (Early morning awakening)

Initial Question:

Are you having any difficulty sleeping until the morning?

Follow-up Questions:

At what time do you usually awaken?

What is your mood like in the morning?

Do you feel refreshed in the morning?

Sleep History: Snoring and sleep apnoea

Initial Question:

Have you or anyone else noticed that you snore loudly?

Follow-up Questions:

Have you or anyone else noticed that you stop breathing in your sleep?

Hypnotic Drugs

- Definition – a drug which produces drowsiness and facilitates the onset and maintenance of a state of sleep which resembles natural sleep.

Drugs, Pain and Sleep

- All drugs that reduce pain will improve sleep because of the reduction in pain
- However, this does not mean that the various drugs per se necessarily have positive effects on sleep

Effects of Pain Medications on Sleep Architecture

(medications listed may not be licensed for treatment of disturbed sleep)

NSAIDs	Aspirin and ibuprofen increase sleep latency, awakenings and decrease SWS in healthy subjects
Opioids	Decrease SWS and particularly REM sleep in drug addicts and healthy patients Increase nocturnal wake time (prolonged sleep latency and increased awakenings) May induce or worsen sleep apnoeas
Tramadol	Increased stage 2 sleep, decreased the duration of slow-wave sleep decreased the duration of REM sleep in healthy subjects
TCAs	Increase SWS, decrease REM sleep and nocturnal awakening in depressed patients and healthy subjects
SSRIs	Associated with increased awakenings after sleep onset, decreased REM time and SWS, increase in wakefulness
SNRIs	Effects on sleep seems similar to SSRIs. Increase sleep latency, decrease of REM sleep and reduced sleep continuity
Carbamazepine	Increases stage 1 and 2 NREM sleep and depresses REM sleep Reduces sleep latency in healthy subjects and patients with epilepsy
Gabapentin	Increases SWS in healthy subjects
Pregabalin	Increases SWS in healthy subjects

Onen et al. How pain and analgesics disturb sleep. Clin J Pain. 2005;21:422–431; Walder et al. The effects of two single doses of tramadol on sleep: a randomized, cross-over trial in healthy volunteers. Eur J Anaesthesiol. 2001;18(1):36-42; DeMartinis and Winokur. Effects of psychiatric medications on sleep and sleep disorders. CNS & Neurological Disorders - Drug Targets. 2007;6:17-29 ; Chalon et al. Comparative effects of duloxetine and desipramine on sleep EEG in healthy subjects. Psychopharmacology. 2005;177: 357–365; Hindmarch et al. A double-blind study in healthy volunteers to assess the effects on sleep of pregabalin compared with alprazolam and placebo. Sleep. 2005;28(2):187-93

Treatment

Theoretically, therapies that not only reduce pain, but also improve sleep and reduce anxiety and depression can provide multiple benefits without the risk of increased side effects inherent in combination therapy.

Amitriptyline and Sleep

Low doses (sub-therapeutic for depression) of sedating tricyclics, particularly amitriptyline, dosulepin and doxepin, have been used for decades to treat insomnia. This is particularly common practice in primary care in the UK, where amitriptyline 10 or 25 mg is also used for long periods in many patients with chronic illness, particularly those with pain syndromes. At this dose amitriptyline is probably acting mostly as a histamine H1 receptor antagonist, although a degree of 5-HT₂ and cholinergic muscarinic antagonism may also contribute. There are no controlled studies of hypnotic efficacy of low-dose amitriptyline in insomnia, and tricyclics are more likely to be lethal than licensed hypnotics in overdose.

Amitriptyline, Sleep and Pain

“Therefore, although amitriptyline can ameliorate clinical symptoms, the negative sleep profile may counteract this effect and give limitations in the use of the drug.”

Benzodiazepine Controversy

- Tolerance infrequent¹
- Rebound insomnia may occur with any but appears less likely with zolpidem and zaleplon^{1,2}
- Addiction unlikely when recommended doses are used³
- Dysfunction present for duration of drug activity³

1. Roth T, Roehrs TA, Stepanski EJ, Rosenthal LD. *Am J Med.* 1990;88(3A):43S-46S. Review.
2. Ancoli-Israel S, Walsh JK, Mangano RM, Fujimori M. *J Clin Psychiatry.* 1999;1(4):114-120.
3. Voderholzer U, Riemann D, Hornyak M, et al. *Eur Arch Psychiatry Clin Neurosci.* 2001;251(3):117-123.

Hypnotic Use is Responsible for Falls in the Elderly

- Insomnia is associated with increased risk of future falls
- Hypnotic use not independently associated with falls
- In elderly nursing home residents, insomnia, but not hypnotic use, is associated with a greater risk of subsequent falls

Avidan AY et al. *J Am Geriatr Soc.* 2005;53:955-962.

Benzodiazepine Controversy

Pooled OR for associations between use of various psychotropic medications from 40 nonrandomised controlled trial^{46,63}

Benzodiazepines	OR 1.48 (95% CI 1.23-1.77)
Short-acting	OR 1.44 (95% CI 1.09-1.90)
Long-acting	OR 1.32 (95% CI 0.98-1.77)
Antidepressants	OR 1.66 (95% CI 1.38-2.00)
TCA's	OR 1.51 (95% CI 1.14-2.00)
SSRIs: low dose	OR 1.50 (95% CI 1.30-1.70)
high dose	OR 2.40 (95% CI 1.70-2.20)
Neuroleptics	OR 1.50 (95% CI 1.25-1.79)

OR = odds ratio; TCA = tricyclic antidepressant; SSRI = selective serotonin reuptake inhibitor.

Antipsychotics

- Not approved for insomnia
- Typically used at doses much lower than those for treating psychosis
- Quite sedating but also associated with weight gain, increased risk for diabetes, high blood pressure, restless leg syndrome, muscle spasm or parkinson-like symptoms
- Quetiapine and ziprasidone have been shown to increase total sleep time as well as sleep efficiency

Sedation

- Sedation is associated with both newer and traditional antipsychotics.
- Tends to be more pronounced at the initiation of therapy or upward dose titration.
- Starting at low doses and stepping up the dose slowly can reduce the impact.
- Patients should be warned to expect sedation in the early stages of treatment

Therapeutic guidelines psychotropic, version 5. 2003.

Melatonin

Characteristics	Efficacy	Limitations
<ul style="list-style-type: none">●●● Natural hormone produced by the pineal gland●●● Plays a role in the control of circadian rhythms●●● Not available in UK, not regulated by FDA in USA	<ul style="list-style-type: none">●●● Appears to be effective for the treatment of circadian rhythm disorders●●● Little evidence exists for efficacy in the treatment of insomnia.	<ul style="list-style-type: none">●●● Lack of a well-defined, effective dose●●● No information about the safety of long-term use

OTC Antihistamines

- Typically long half-life
- Residual sedation common
- Minimal efficacy data
- Side effects
 - Induce daytime sedation 10-25%
 - May impair daytime function
 - Dryness of mouth, nose and throat
- Effectiveness for sleep may be lost by the 4th Day
- Sensitivity to drug effects

Herbal Supplements



- Chamomile
 - § Mild sedative/anxiolytic
 - § Binds GABA receptors
 - § No clinical data on efficacy or safety
- Valerian root
 - § Some clinical evidence of efficacy for mild to moderate insomnia
 - § Contains GABA and multiple organic sedative-hypnotic compounds
 - § No long-term safety data

Evidence based treatment

Original Paper

British Association for Psychopharmacology consensus statement on evidence-based treatment of insomnia, parasomnias and circadian rhythm disorders

SJ Wilson¹, DJ Nutt², C Alford³, SV Argyropoulos⁴, DS Baldwin⁵, AN Bateson⁶, TC Britton⁷, C Crowe⁸, D-J Dijk⁹, CA Espie¹⁰, P Gringras¹¹, G Hajak¹², C Idzikowski¹³, AD Krystal¹⁴, JR Nash¹⁵, H Selsick¹⁶, AL Sharpley¹⁷ and AG Wade¹⁸

Psychopharm

Journal of Psychopharmacology

0(0) 1-25

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DOI: 10.1177/0269881110379307

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 SAGE

Excessive Sleepiness

- Persons are considered excessively sleepy if they are **unable to consistently achieve and sustain wakefulness and alertness to accomplish the tasks of daily living**. Sleep occurs unintentionally or at inappropriate times or places.
- **In children**, sleepiness may manifest as **hyperactivity**.
- ,
- Hypersomnolence occurring **almost daily for at least 3 months**, and **mean sleep latency of less than 8 minutes**
- It is important to **distinguish excessive sleepiness from fatigue**, exhaustion, tiredness, weariness, listlessness or weakness, which may closely mimic it.

Consequences of Excessive Sleepiness



- Greater risk of accidents (vehicular, industrial, or household)
- Increased absenteeism, reduced work productivity, poor academic performance .
- Mood disorder (depression or irritability)
- Impaired interpersonal relationships.

Common causes of excessive sleepiness

1- Inadequate sleep duration

- Acute sleep deprivation
- Chronic sleep deprivation
- Insufficient sleep syndrome

2-Frequent awakenings and fragmented sleep

- Obstructive sleep apnea syndrome
- Upper airway resistance syndrome
- Periodic limb movement disorder
- Environmental sleep disorder

Common causes of excessive sleepiness

3- Pathology of the central nervous system sleep-wake apparatus

- Narcolepsy
- Idiopathic hypersomnia
- Post-traumatic hypersomnia
- Recurrent hypersomnia
- Kleine-Levin syndrome
- Menstrual-related hypersomnia

Common causes of excessive sleepiness

4- Disturbance of the endogenous circadian rhythm influencing the timing of wakefulness and sleep

- Jet lag
- Shift work sleep disorder
- Delayed sleep-phase syndrome
- Advanced sleep-phase syndrome
- Non-24-hour sleep-phase disorder
- Irregular sleep-wake pattern

Common causes of excessive sleepiness

5- Drug or substance use

- Administration of hypnotic and sedating medications
- Withdrawal from stimulant agents
- Adverse effects of medications

6- Other conditions

- Medical disorders (CRF ,LCF ,Hypothyroidism)
- Neurologic disorders (brain tumors, meningoencephalitis)
- Psychiatric disorders (depression)

Narcolepsy

Definition

- Narcolepsy is a neurologic disorder characterized by excessive sleepiness, and manifestations of REM sleep physiology during wakefulness (eg, cataplexy, sleep paralysis, and hypnagogic hallucinations).

Demographics

- Narcolepsy affects an estimated 0.05% of the general population often during adolescence or early adulthood (in the second decade of life), affect men slightly more frequently than women.
- Excessive sleepiness is usually the presenting symptom, followed months to years later by cataplexy, sleep paralysis, and hypnagogic hallucinations.
- Course is typically chronic, and symptoms persist lifelong.

Sleep Paralysis

- Transient loss of the ability to move occurring at sleep onset (hypnagogic) or upon awakening (hypnopompic).
- It occurs in approximately 25% to 80% of persons with narcolepsy.
- Less frequently, it can be seen either in an isolated form or in normal persons during sleep deprivation. Recurrent sleep paralysis can affect about 4% of the normal population.
- Sleep paralysis involves all voluntary muscles with sparing of the respiratory and ocular muscles; lasts from several seconds to a few minutes; and is frequently accompanied by hypnagogic hallucinations, dyspnea, and a sensation of dread.
- Sensorium is generally unaffected.
- Recovery, either spontaneously or following external stimulation (being touched or spoken to), is immediate and complete.
- It often develops several months to years following the onset of excessive sleepiness.

Sleep Hallucinations

- Recurrent sleep hallucinations can be seen in about 4% of the normal population.
- Hallucinations may occur during wakefulness at sleep onset (hypnagogic) or on awakening (hypnopompic).
- Hallucinatory phenomena often last a few seconds or minutes and can be visual (seeing a stranger or object in the room), auditory (being spoken to), tactile (a touch or a sensation of warmth or cold) or kinetic (a sensation of movement).
- Often the experience has a fearful quality such as being attacked or escaping from danger, and this can be accompanied by sleep paralysis.
- Sleep hallucinations often begin several months to years after the onset of excessive sleepiness.

Insufficient Sleep Syndrome

Definition Insufficient sleep syndrome is a chronic voluntary but unintentional failure to obtain nighttime sleep that is sufficient in duration to achieve and maintain normal alertness while awake. If desired, individuals have no difficulty sleeping longer.

- This sleep pattern is present almost daily for at least 3 months.
- Insufficient sleep is the most common cause of excessive sleepiness.

Demographics

- Habitual sleep insufficiency is more common during adolescence and among men.

Clinical Features

- The disparity between actual sleep obtained each night and the need for sleep may be due to **occupational demands, school or social activities, acquired lifestyle, or inadequate consideration of sleep requirements.**
- Duration of sleep is commonly extended during weekends or vacations compared to weekdays.

Consequences

- Significant sleep insufficiency can give rise to **excessive sleepiness, fatigue, malaise, increase risk of accidents, and neurocognitive impairment.**
- Insufficient sleep can **worsen preexisting sleepiness due to other primary sleep disorders** such as OSA or narcolepsy.

Behavioral disorders

- 1-Adjustment sleep disorder Daytime sleepiness secondary to sleep disruption related to stress or unfamiliar sleep environments
- 2-Limit-setting sleep disorder Sleep onset disruption resulting in a decrease in total sleep time.
- 3-Inadequate sleep hygiene Excessive sleepiness resulting from acquired habits that are incongruous with sleep

Circadian rhythm disorders

- 1- Delayed sleep-phase syndrome:- An inability to arise until late morning or early afternoon is typical.
Morning sleepiness attempts develops if a person to arise at times closer to socially accepted norms
- 2- Advanced sleep-phase syndrome:- There is a severe inability to delay sleep time beyond 6 to 8 PM.
Excessive sleepiness may develop in the early evening hours if the person is forced to stay awake beyond the customary bedtime

Circadian rhythm disorders

3-Irregular sleep-wake pattern Disorganization of sleep and wake times, with three or more short “naps” constituting the fragmentary remnants of the major sleep episode, can lead to excessive daytime sleepiness

4-Non-24-hour sleep-phase Sleep-wake patterns are entirely dependent on intrinsic biologic rhythms. Because free-running internal rhythms have a periodicity of slightly over 24 hours, the person's sleep onset and arising times are delayed by about 1 hour or more each day.

Circadian rhythm disorders

Desynchrony between the external 24-hour world and internal rhythms can give rise to excessive daytime sleepiness.



Circadian rhythm disorders

5- **Jet lag** Excessive sleepiness can develop following rapid travel across multiple time zones.

Delay in nighttime sleep after **a westward flight** and the earlier-than-customary arising times following **eastward flights** can result sleep deprivation and diminished daytime alertness.

6- **Shift work sleep disorder** Mismatch between the requirements of nighttime work and the demands for sleep, as well as the **decreased efficiency of sleep taken during the daytime**, produces excessive **sleepiness** and diminished vigilance among shift workers.

Sleep disorders

- 1- OSAS:- Respiratory events and arousals can recur throughout the evening, to produce sleep fragmentation and subsequent daytime sleepiness. Naps are generally unrefreshing.
- 2- CSAS:- Persons can present with complaints of daytime sleepiness and cognitive impairment.
- 3- Central alveolar hypoventilation:- Hypoventilation during sleep leads to ABG abnormalities (hypercapnia and hypoxemia), repetitive arousals, sleep fragmentation and, possibly, excessive daytime sleepiness.

Sleep disorders

- 4- RLS:- When sufficiently severe, restless legs syndrome can increase sleep onset latency and cause sleep disruption, which can, in turn, lead to excessive daytime sleepiness.
- 5- PLMD:- Sleep fragmentation from repetitive limb movement-related arousals can result in excessive sleepiness. Diagnosis requires polysomnography.

Medical Disorders

- Sleepiness may be directly caused by an underlying medical disorder (eg, hypothyroidism, Addison disease, chronic renal failure, hepatic encephalopathy, and toxic encephalopathy)
- Polysomnography may either be normal or show disturbed sleep.
- The MSLT demonstrates a decrease in mean sleep latency (< 8 minutes) and less than two sleep onset REM periods.
- Hypothyroidism can directly give rise to excessive sleepiness or indirectly as a result of OSA .
- Addison disease(hypoadrenalism) Inadequate secretion of adrenal steroid hormones can result in fatigue and sleepiness.

Neurologic Disorders

- A number of neurologic disorders are associated with excessive sleepiness. These include meningitis, encephalitis, head trauma, stroke, seizures, myotonic dystrophy, neoplasms, and neurodegenerative conditions.
- **Dementia** Excessive sleepiness and decreased daytime vigilance secondary to sleep fragmentation, repetitive arousals, and reduced sleep efficiency can develop.
- **Parkinsonism** Sleep disruption may give rise to significant daytime sleepiness.

Psychiatric Disorders

- Excessive sleepiness (prolonged nighttime sleep duration and frequent napping) can develop in a number of psychiatric disorders, namely mood disorders, psychosis, alcoholism, adjustment with sleep disorder, conversion disorder (pseudohypersomnia)
- In each of these disorders, sleepiness is temporally related to the underlying condition.

Use of Medications or Substances

- Sleepiness can be due to the use, abuse, adverse effects, prior prolonged use, or recent withdrawal of medications and substances.
- **Alcohol-dependent sleep disorder** Acute ingestion of alcohol can result in sleepiness, especially in those with an underlying sleep deprivation.
- **Hypnotic-dependent sleep disorder** Habitual use of hypnotic and sedative agents may give rise to excessive daytime sleepiness if large doses are taken, **long-acting agents** are used, medications are taken close to awakening time, or dose escalation is occurring.

Differential Diagnosis Of Excessive Sleepiness

- Sleepiness should be differentiated from fatigue (sensation of exhaustion or lack of energy) secondary to Addison disease, anemia, cancer, chronic fatigue syndrome, depression, fibromyalgia, hypothyroidism, and infections.
- Sleep duration in a long sleeper is longer than is typical for the person's age and is often greater than 10 hours during a 24-hour period for a young adult. Excessive sleepiness develops if less than the required amount of sleep is obtained. Polysomnography and MSLT are normal. Its course is chronic and unrelenting.

Evaluation of Excessive Sleepiness

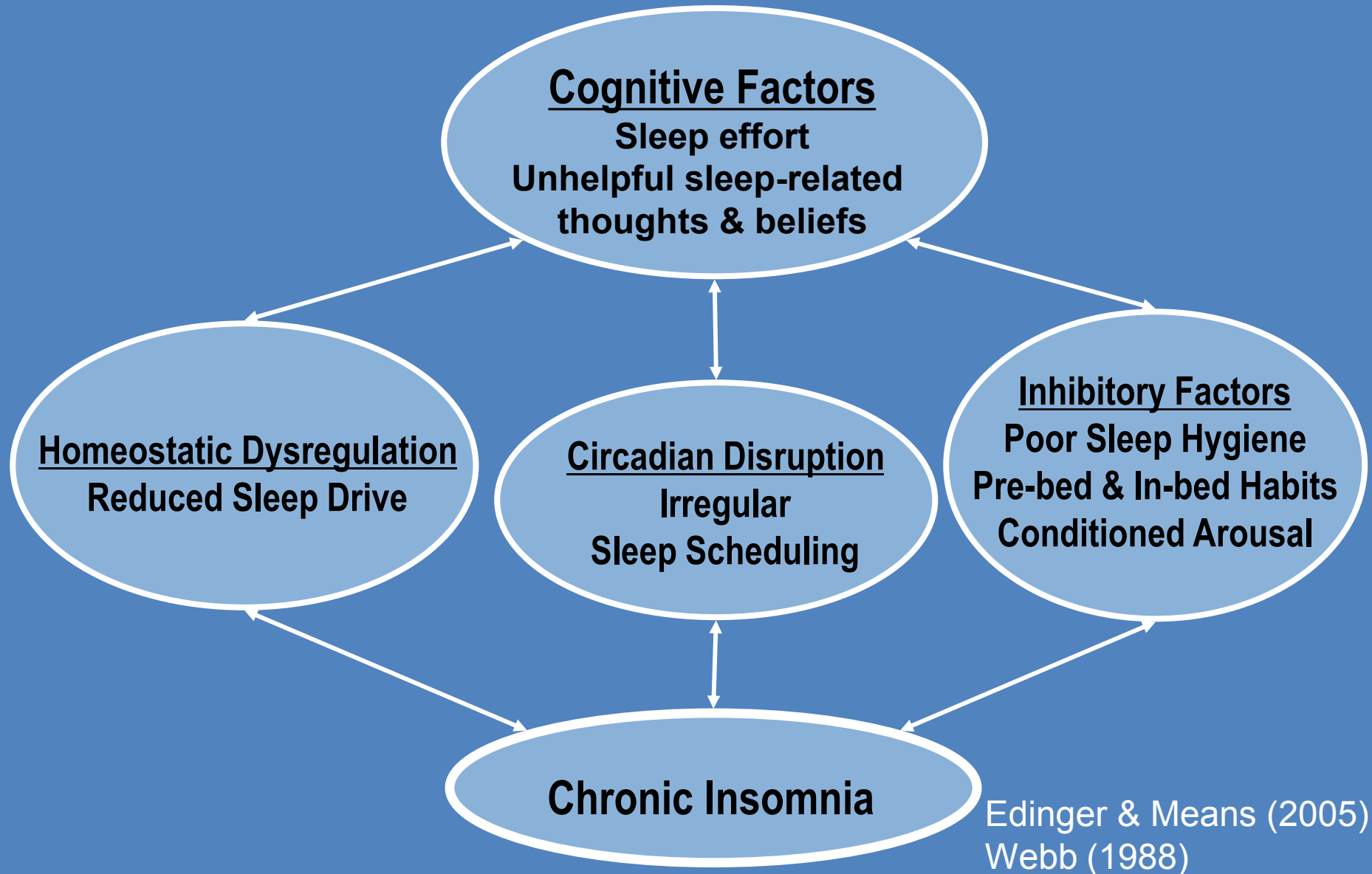
- History Inquiries into nighttime (sleep latency, duration of nocturnal sleep, and frequency of awakenings) and daytime (overall level of alertness, timing of and activities during periods of sleepiness, decrements in cognitive function and performance, accidents, napping, use of stimulants including caffeine, and other medications) habits and activities are often helpful.
- Family history, clinical history (sleep, medical, neurologic, and psychiatric) and medication use are also important.
- Clinical evaluation: Clinical features suggestive of excessive sleepiness include yawning; head bobbing; ptosis; constricted pupils; and attempts to remain alert by repetitive stretching, standing, or walking.

Non-drug treatments

Cognitive-behavioral therapy (CBT)

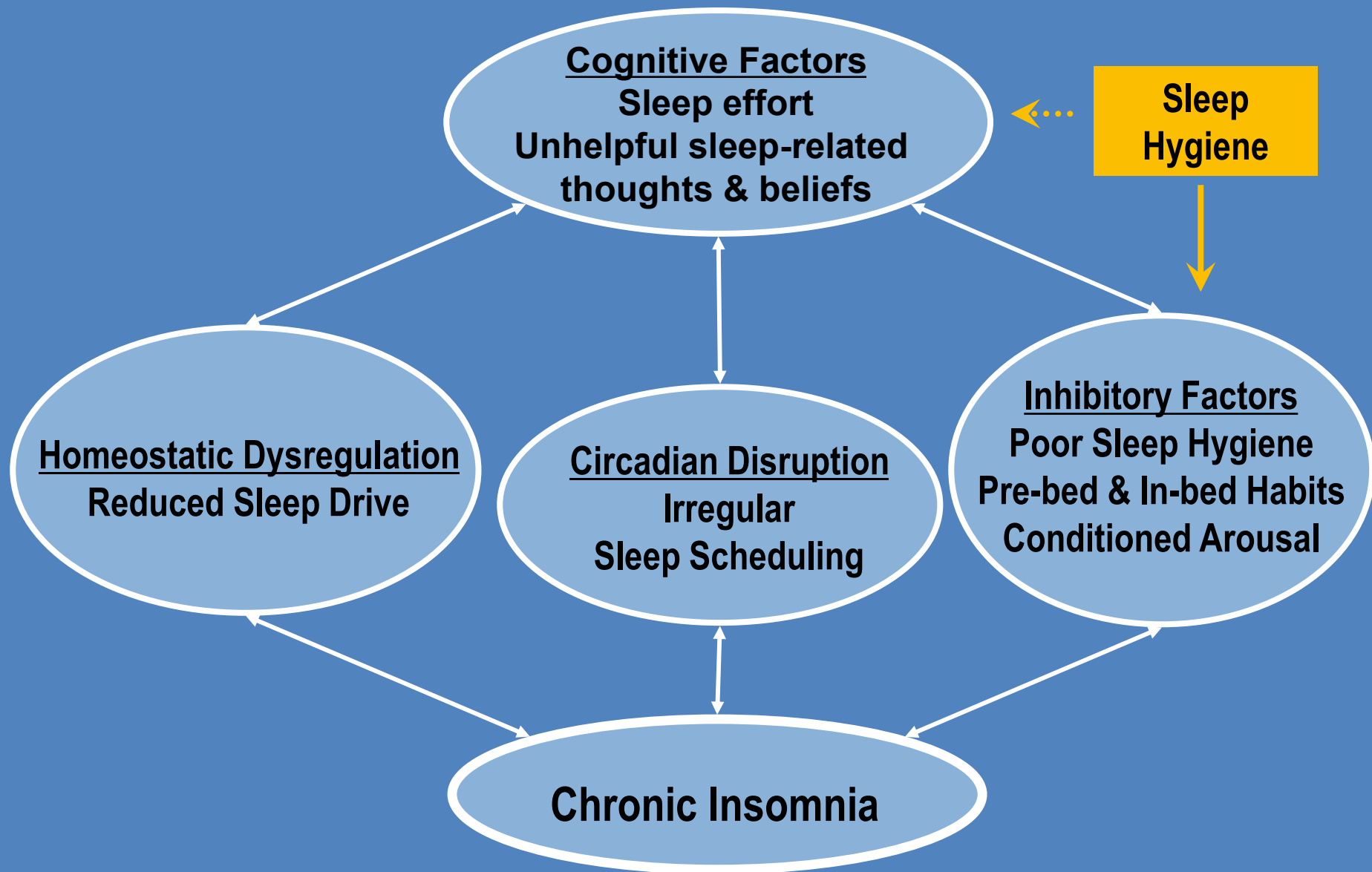
- Stimulus control
- Cognitive therapy
- Sleep restriction
- Relaxation training
- Sleep hygiene

A Cognitive-Behavioral Model of Insomnia



Principles of Sleep Hygiene

- Awaken at approximately the same time each day (biological clock)
- Exposure to bright light during desired daytime hours (biological clock)
- Limit napping if insomnia is present (maximize homeostatic sleep drive)
- Limit or eliminate caffeine, nicotine, ethanol (external factors)
- Go to bed only when sleepy (maximize homeostatic sleep drive)
- Exercise daily
- Shut down your day at least 1 hour before bedtime (minimize cognitive arousals)
- Worry time (minimize cognitive arousals)
- Comfortable bedroom used only for sleeping (minimize cognitive arousals, stimulus control)



Relaxation Therapies:

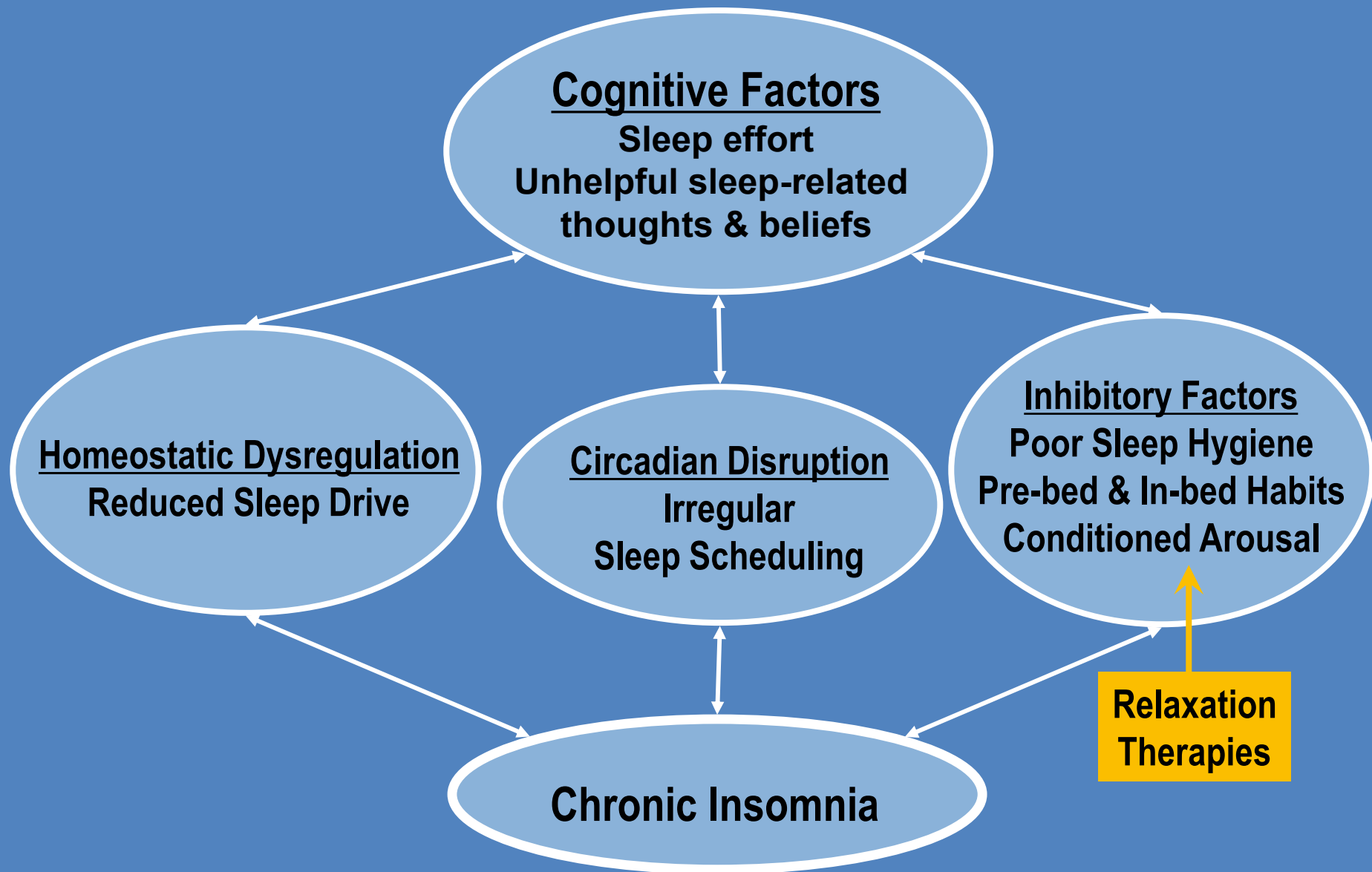
Reducing Arousal

Progressive muscle relaxation

- Jacobsen (1934)
- Autogenic training, diaphragmatic breathing, passive muscle relaxation, etc.

Biofeedback - EMG & EEG

- Hauri (1980's)

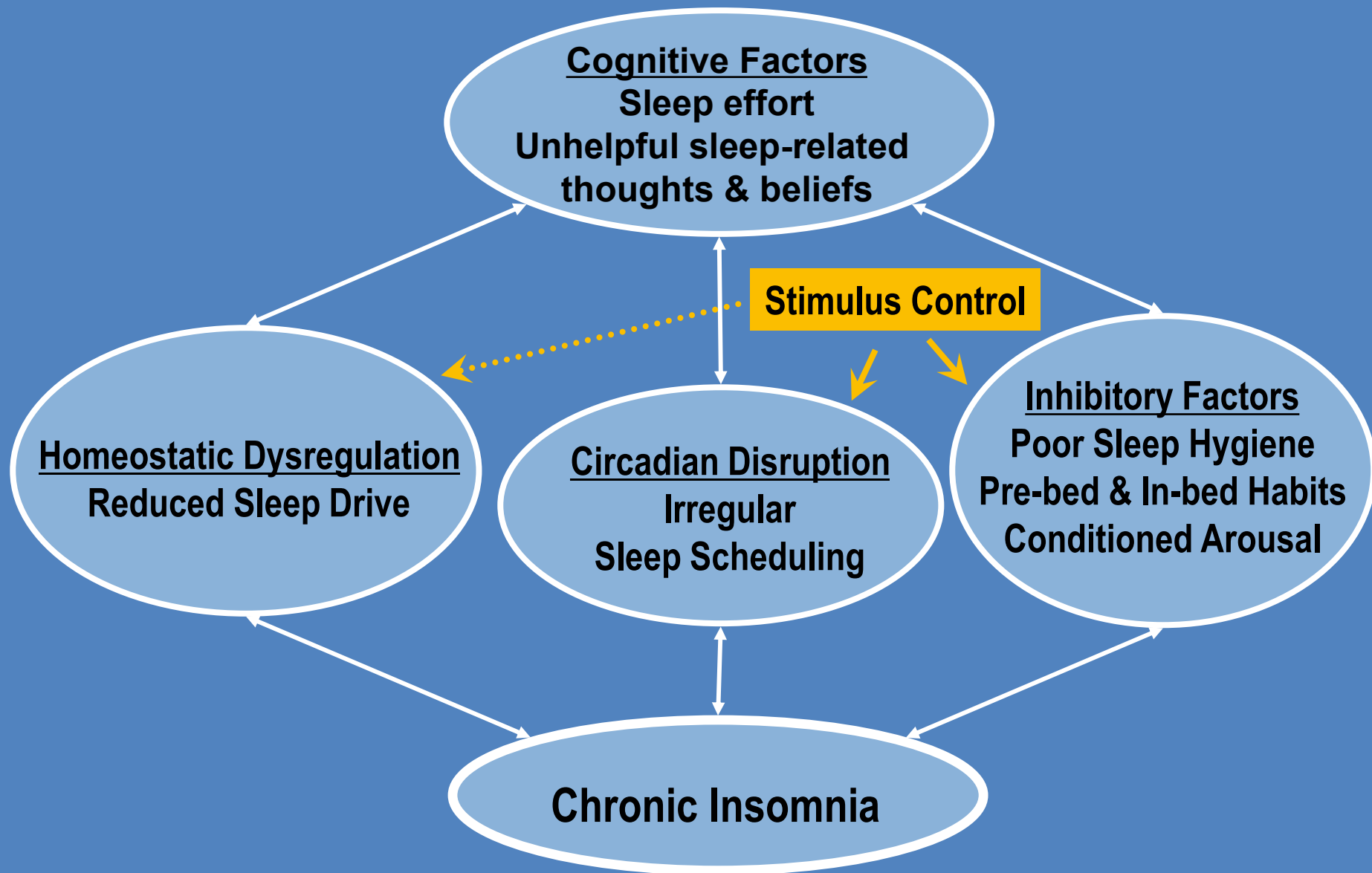


Stimulus Control:

Reassociating the Bedroom with Sleeping & setting the Body's Clock

- Select a standard wake-up time
- Avoid sleep-incompatible activities in bed
- Get out of bed when unable to sleep
- Avoid napping
- Go to bed only when sleepy

Bootzin (1972)



Cognitive Therapy

- Cognitive restructuring or educational approaches
 - Targets unhelpful beliefs/attitudes about sleep
- Scheduled and structured worry time
 - Targets worry and cognitive arousal in bed
- Scheduled pre-bedtime winding down time
 - Targets pre-bedtime cognitive arousal

Cognitive Factors



Consequences

- “I cannot function without a good night’s sleep.”



Worry

- “I am worried that I will lose control over my ability to sleep.”



Expectations

- “I need 8 hours of sleep to function well during the day.”



Medication

- “Medication is the only solution to my sleep difficulties.”

**Cognitive
Therapy**



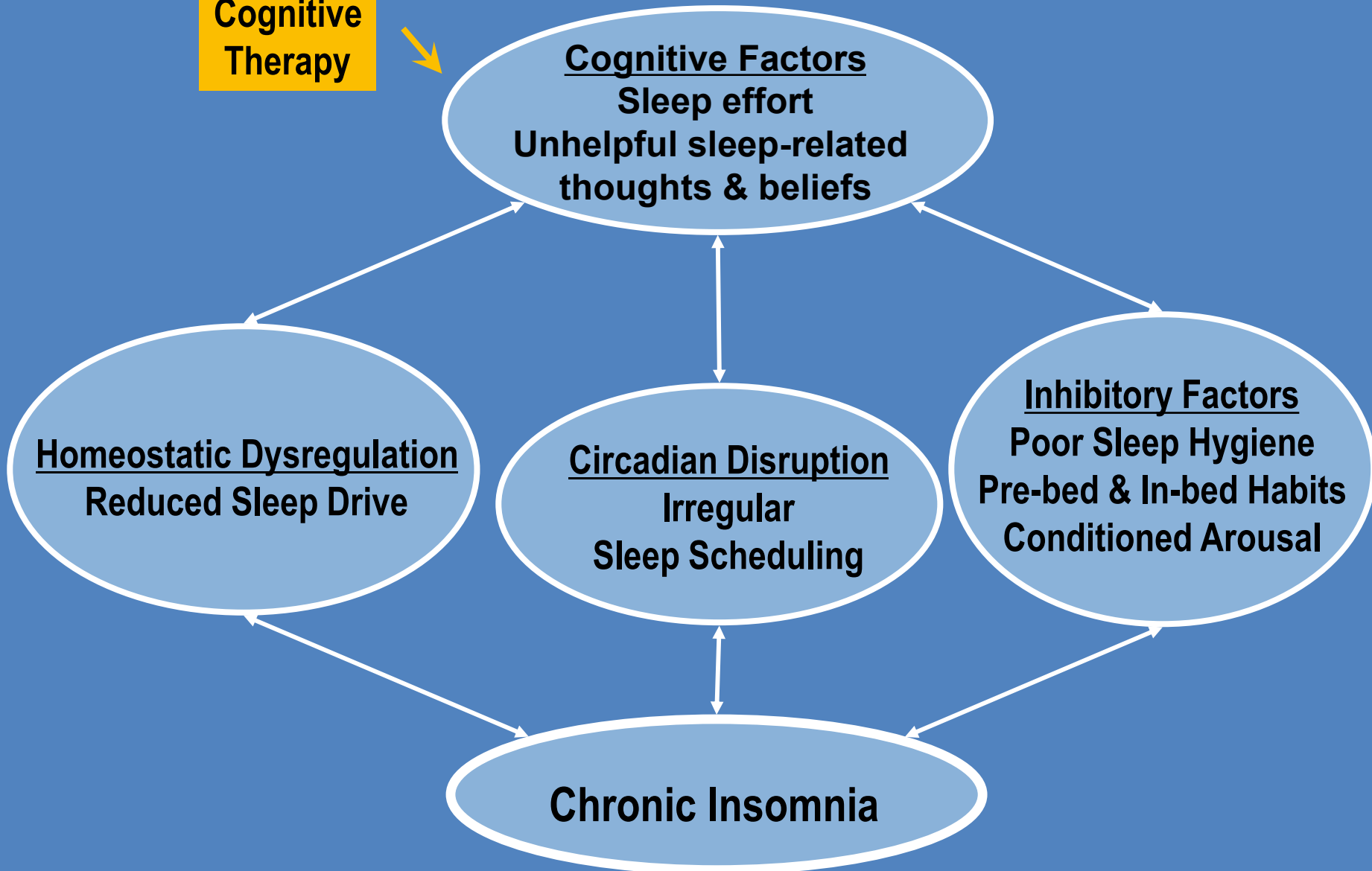
Cognitive Factors
Sleep effort
**Unhelpful sleep-related
thoughts & beliefs**

Homeostatic Dysregulation
Reduced Sleep Drive

Circadian Disruption
**Irregular
Sleep Scheduling**

Inhibitory Factors
Poor Sleep Hygiene
Pre-bed & In-bed Habits
Conditioned Arousal

Chronic Insomnia

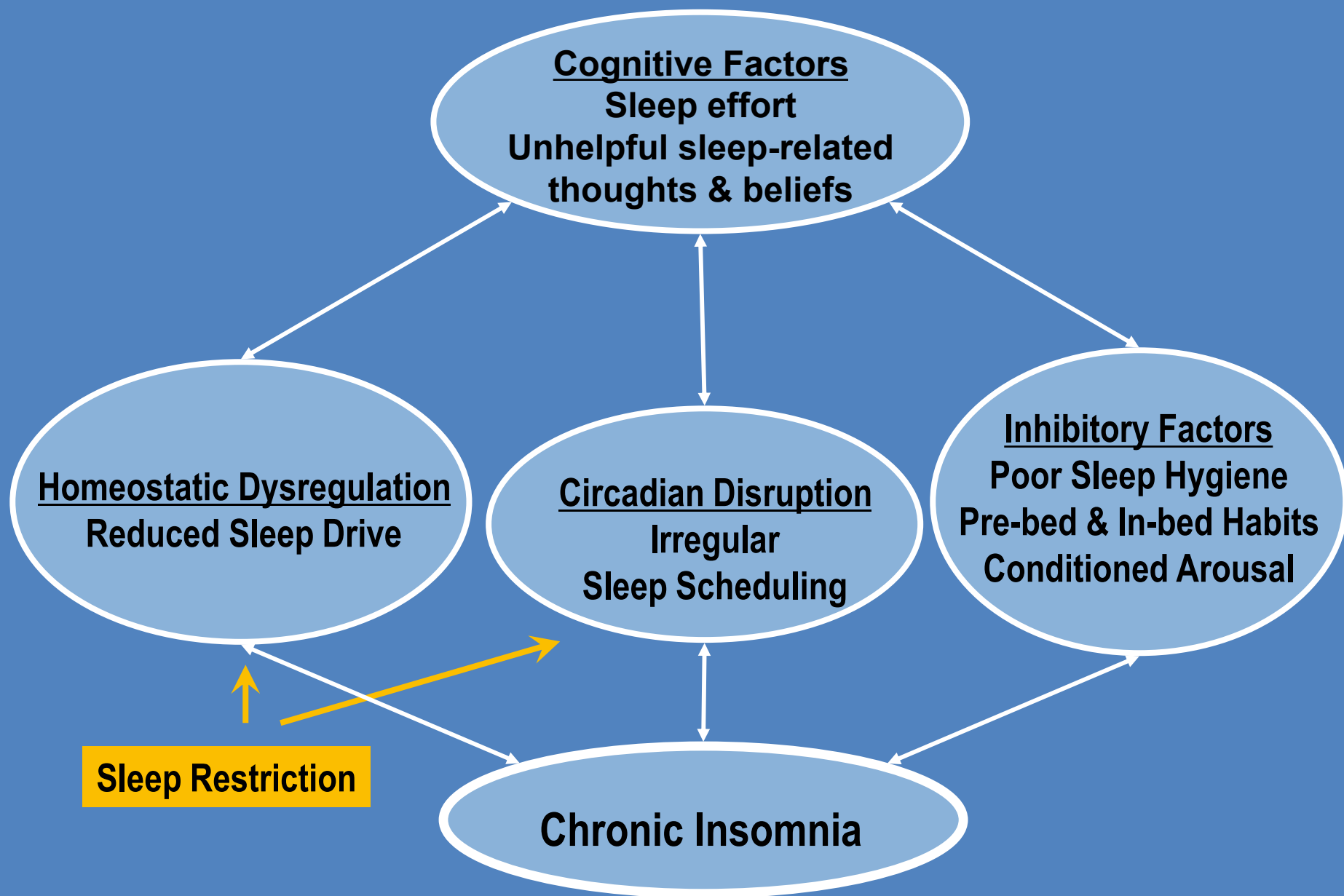


Sleep Restriction Therapy:

Increasing Sleep Drive & Setting the Body's Clock

- Patient completes sleep logs
- Compute average total sleep time (TST)
- Limit time in bed (TIB) to TST + 30 min
- Increase TIB 30 min when sleep efficiency $\geq 85\%$ and patient remains sleepy
- Decrease TIB 30 min. when sleep efficiency is $< 80\%$

(Spielman et al., 1987)

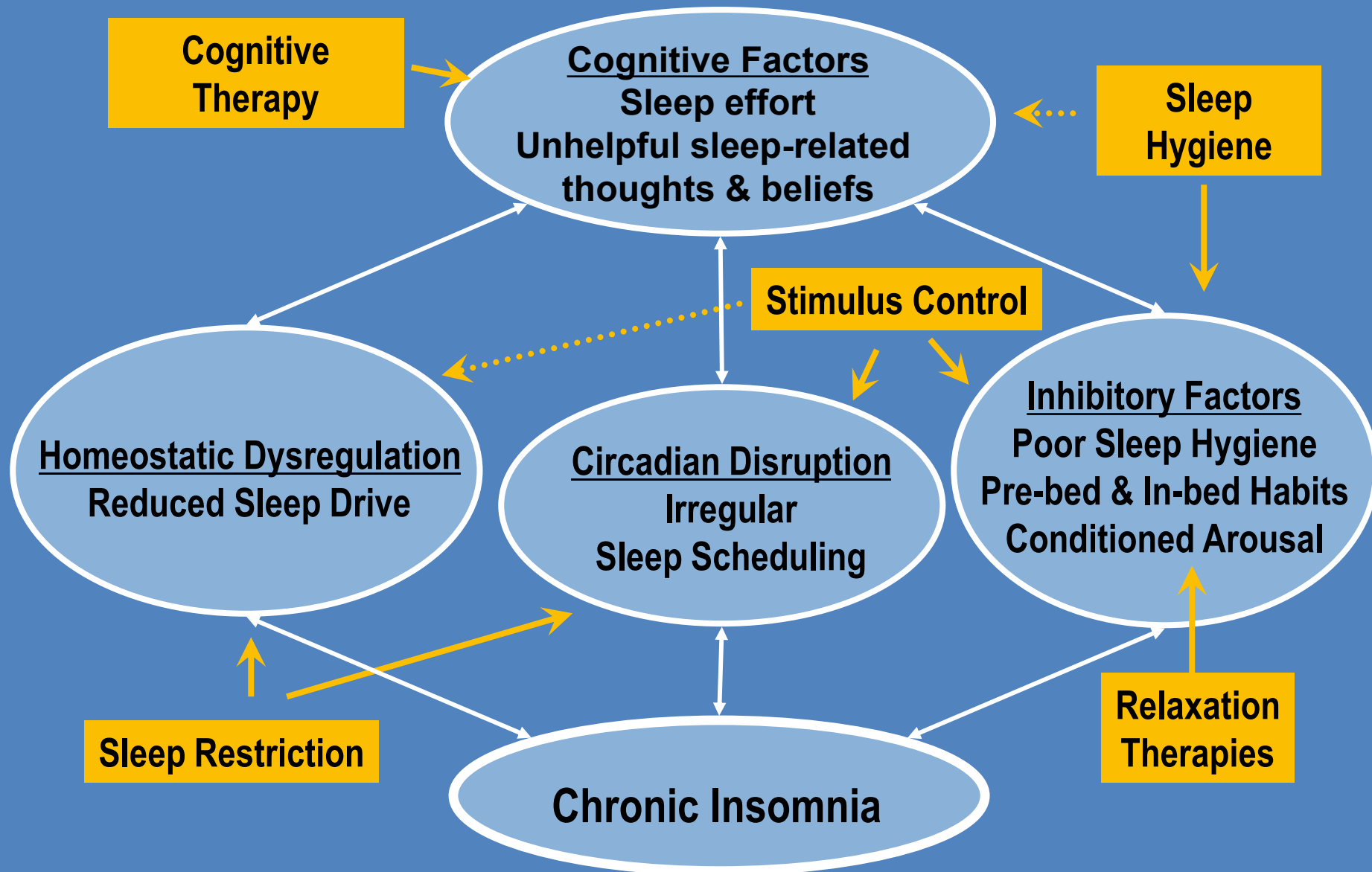


Efficacy of Traditional Behavioral Approaches

- Not efficacious as a stand alone treatment
 - Sleep Hygiene
 - Cognitive Therapy
- Probably efficacious
 - EMG Biofeedback
- Well-established treatments
 - Relaxation
 - Stimulus Control
 - Sleep Restriction

(Morin et al., 1994, 1999, 2006; Murtagh & Greenwood, 1995)

Limitations of Traditional Behavioral Interventions for Insomnia



Sleep Management

Everything you need in one app...

Developed from research supported by ESRC, EPSRC and the NHS

Designed for self-help and guided self-help



The advertisement for the Sleepful app features a central image of four smartphones displaying different app screens: 'My Treatment', 'Sleep Diary', 'How Thinking Affects Sleep', and the main app interface. The top right corner includes the logo for the National Centre for Sport & Exercise Medicine, with the tagline 'WORKING FOR HEALTH & WELLBEING'. The main headline reads 'Effective Treatment for Insomnia – for Life'. Below the smartphone images, the text 'Free to download', 'Free to use', and 'Easy to follow' is displayed. At the bottom, there are logos for the App Store and Google Play, along with the website address 'sleepful.me'.

Sleepful
Helping you Sleep

NATIONAL CENTRE FOR
SPORT & EXERCISE MEDICINE
WORKING FOR HEALTH & WELLBEING

Effective Treatment for Insomnia
– for Life

My Treatment
Sleep Diary
How Thinking Affects Sleep
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Helping you Sleep

Free to download
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Download on the
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GET IT ON
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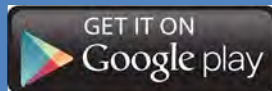
& on the web at sleepful.me

Sleep Management

Everything you need in one app



- Evidence based
- Free to download
- Free to use
- Easy to follow



& on the web at sleepful.me

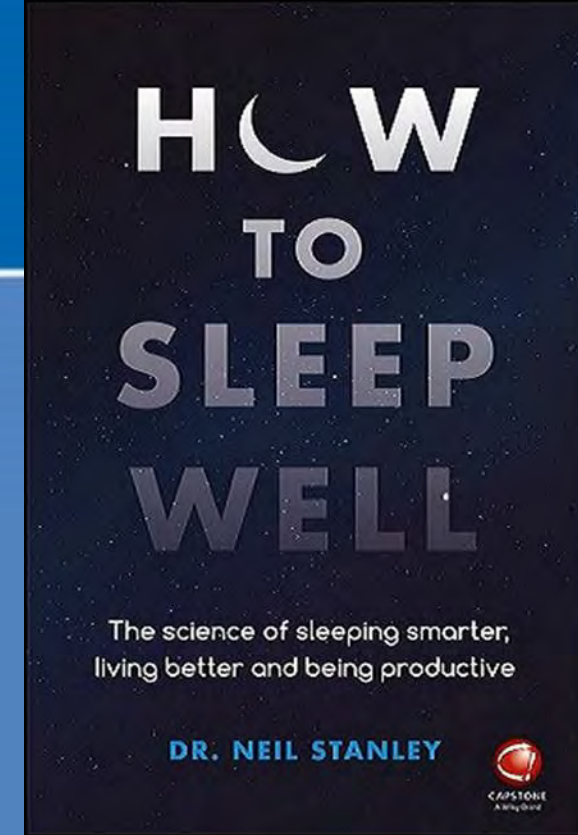


How can sleep catch us best?

- Sleep-promoting sleep environment
 - Dark, moderate temperature, quiet, well-ventilated
- Quiet mind and relaxed body
- Strong association between sleep & bed
- No direct efforts toward sleep
- Absence of regular thought process about sleep



Thank you



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Daily sleep tip @drneilstanley