

Useful Facts Humans (and Behavior Analysts) Should Know about Sleep

Association for Behavior Analysis International

July 25, 2022



Susan M. McCurry, PhD

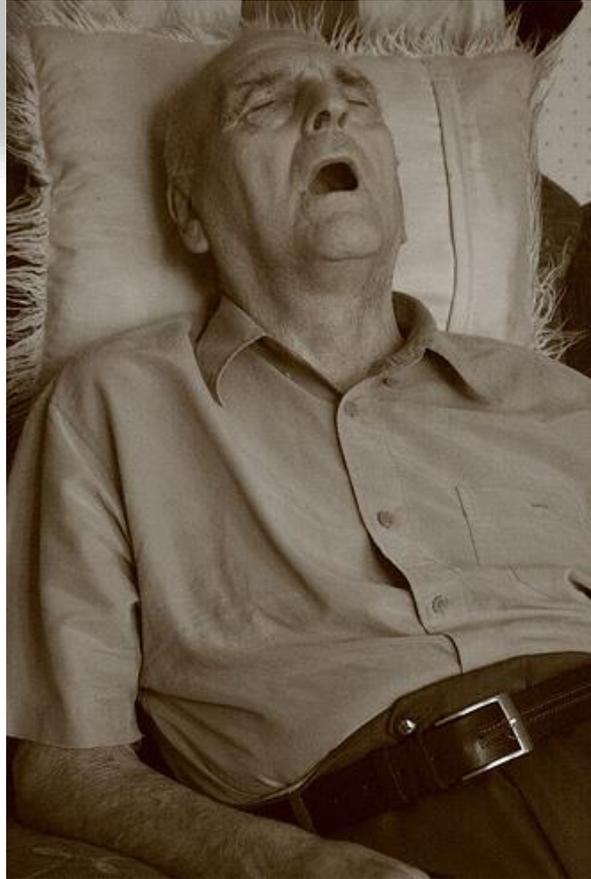
suemccurryphd@gmail.com / smccurry@uw.edu

Clinical Psychologist

Research Professor Emeritus

University of Washington School of Nursing

SLEEP
IS
GOOD



Sleep is essential to health: an American Academy of Sleep Medicine position statement

Kannan Ramar, MD, Raman K. Malhotra, MD, Kelly A. Carden, MD, MBA, Jennifer L. Martin, PhD, Fariha Abbasi-Feinberg, MD, R. Nisha Aurora, MD, MHS, Vishesh K. Kapur, MD, MPH, Eric J. Olson, MD, Carol L. Rosen, MD, James A. Rowley, MD, ... [SEE ALL AUTHORS](#) ▾

Published Online: June 21, 2021 • <https://doi.org/10.5664/jcsm.9476>

Abstract

Sleep is a biological necessity, and insufficient sleep and untreated sleep disorders are detrimental for health, well-being, and public safety. Healthy People 2030 includes several sleep-related objectives with the goal to improve health, productivity, well-being, quality of life, and safety by helping people get enough sleep. In addition to adequate sleep duration, healthy sleep requires good quality, appropriate timing, regularity, and the absence of sleep disorders. It is the position of the American Academy of Sleep Medicine (AASM) that sleep is essential to health. There is a significant need for greater emphasis on sleep health in education, clinical practice, inpatient and long-term care, public health promotion, and the workplace. More sleep and circadian research is needed to further elucidate the importance of sleep for public health and the contributions of insufficient sleep to health disparities.

ADVERTISEMENT

xywav™
(calcium, magnesium, potassium, and sodium oxybates) oral solution

DISCOVER XYWAV

Important Safety Information and Indications

Jazz Pharmaceuticals

©2021 Jazz Pharmaceuticals plc or its subsidiaries
US-XYW-2000085 Rev0221
[Full Prescribing Information, including BOXED Warning >](#)

Figures References Related Details

Just A Few Reasons Sleep is Important

- Sleep is important for learning and memory, motor-skill performance, problem-solving and creativity
- Chronic sleep loss correlated w/cancer, diabetes, cardiovascular disease, mood disorders, substance use, compromised immunity
- Sleeping < 5 hours/night increases risk of a car accident three-fold and is equivalent to driving legally drunk



Credit: Eiko Ojala

“While the brain sleeps, it clears out harmful toxins, a process that may reduce the risk of Alzheimer’s, researchers say.”

*- Jon Hamilton, NPR,
October 17, 2013*

Jessen et al., 2015, Neurochem Res 40(12):2583-2599; Chong et al., 2022, Sleep Med Rev 61:101572 [Epub 2021 Nov 18]



What is Revenge Bedtime Procrastination?

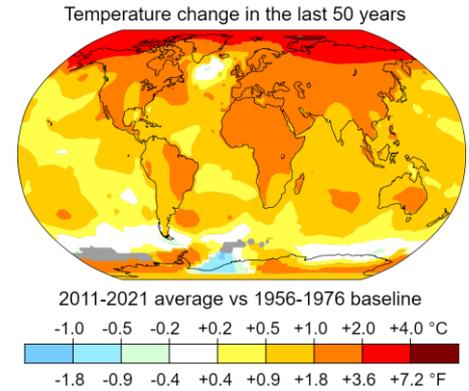
Refusing to go to sleep because you value the freedom of late-night hours more than sleep.

Often affects busy parents or caregivers, overworked employees, and people with anxiety or poor time management skills

It's a way to gain control over your time and reclaim hours for yourself

It's your way of getting "revenge" for not having control of daytime hours.

@JUSTGIRLPROJECT



All the News That's Fit to Print

The New York Times

Vol. CLXXXI No. 56,314 NEW YORK, THURSDAY, FEBRUARY 24, 2022 \$3.00

RUSSIA ATTACKS AS PUTIN WARNS WORLD; BIDEN VOWS TO HOLD HIM ACCOUNTABLE



Large Explosions in Ukrainian Cities — Moscow Says Not to Interfere

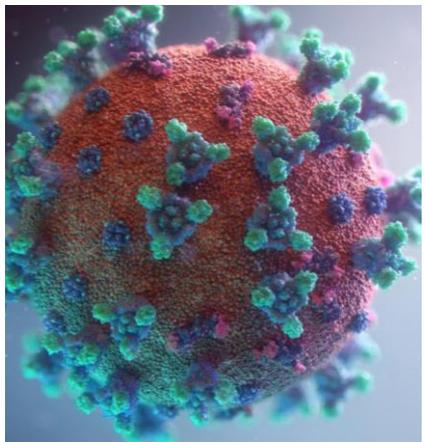
By Andrew Ross and Nicholas...
 MOSCOW — Russian President Vladimir Putin said on Wednesday that he would not allow any foreign military intervention in Ukraine, as he warned of a "catastrophic" escalation of the conflict. He said that Russia would not be deterred by any international pressure, and that it would continue to fight until it achieved its goals. He also said that he would not be deterred by any international pressure, and that he would continue to fight until he achieved his goals.

Europe Hopes to Pressure Putin By Crimping Cronies' Lifestyles

DEADLIEST MASS SHOOTINGS IN MODERN U.S. HISTORY

Las Vegas, NV (2017)	58 killed
Orlando, FL (2016)	49
Blacksburg, VA (2007)	32
Newtown, CT (2012)	27
Sutherland Springs, TX (2017)	26
Killeen, TX (1991)	23
El Paso, TX (2019)	22
San Ysidro, CA (1984)	21
Parkland, TX (2018)	17
San Bernardino, CA (2015)	14

THE TRACE



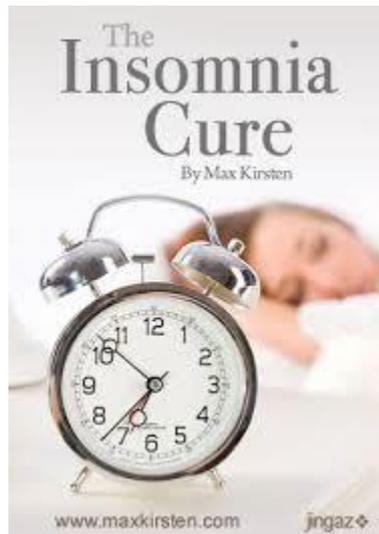
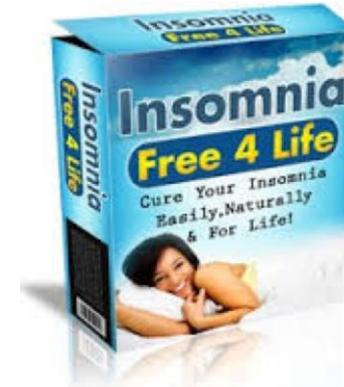
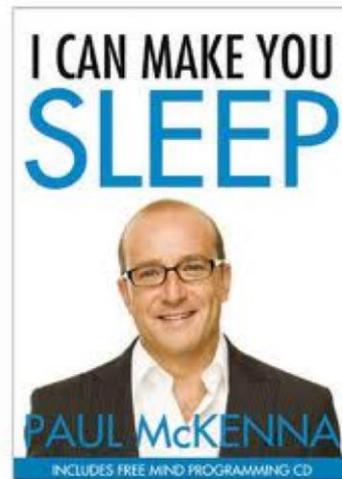
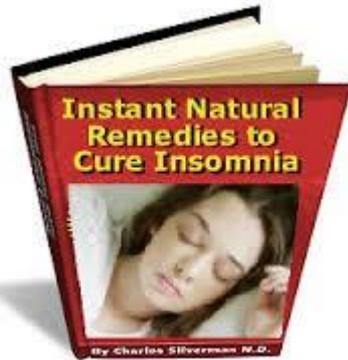
CORONASOMNIA

A recent survey of > 3000 responders from 49 countries found that **58% were dissatisfied** with their sleep during the pandemic; **40% reported decreased sleep quality.**

Medscape
 Source: doi/10.5664/jcam.8800



We Are Led to Believe We Can Control Sleep



Cure insomnia through
essential oils & herbal tea

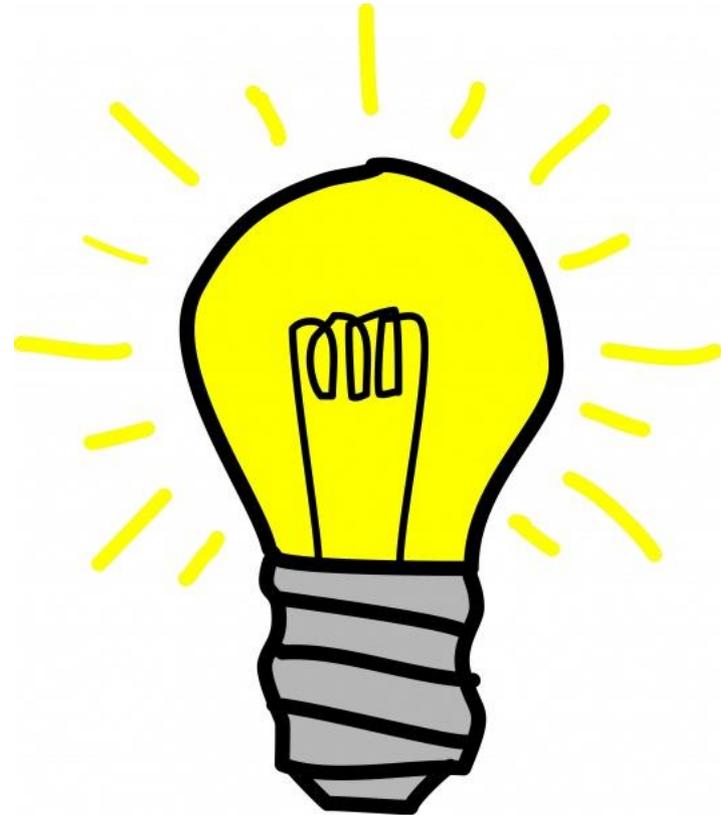
www.HealthAndCare.in

How To Sleep Better



How To Sleep Well By Fixing Common
Sleeping Problems To Relieve Sleep
Insomnia
26 Super Tips To Help You Get The Sleep
You REALLY Need!
by Chris Barnaby

The Truth: We Cannot



We Can Change Our Relationship With Sleep

Frank and Ernest



From:

"I should be able to fall asleep whenever and wherever I want every night."

To:

"I can take steps to promote and support better sleep over time."

What Is Sleep, Anyway?



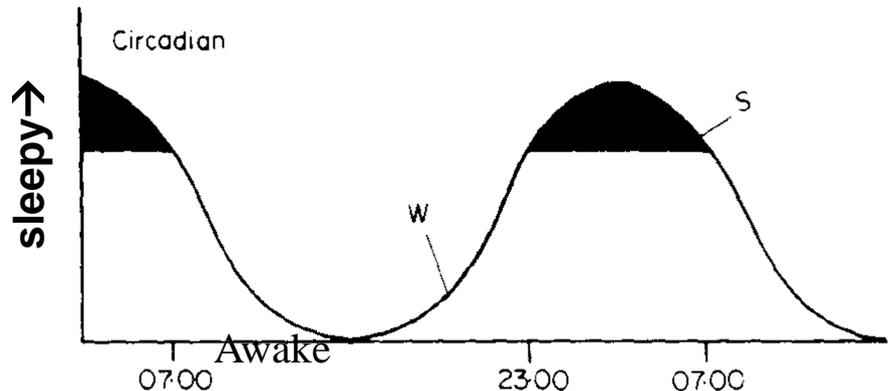
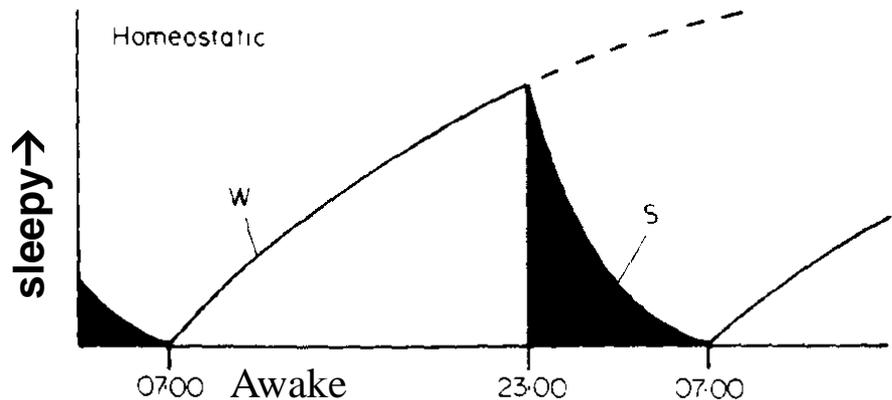
Two Process Model of Sleep Regulation

1) Homeostatic Process

Sleep need (“drive”) increases the longer you are awake.

2) The Circadian Process (Biological Clock)

The propensity to sleep varies as a function of the time of day/night over 24 hours.



Germain A, Buysse DJ. Brief behavioral treatment of insomnia. In: Perlis M, et al. (eds.). Behavioral treatments for sleep disorders, pp. 143-150. Elsevier, 2011.

Two Processes Work Together To Produce Sleep

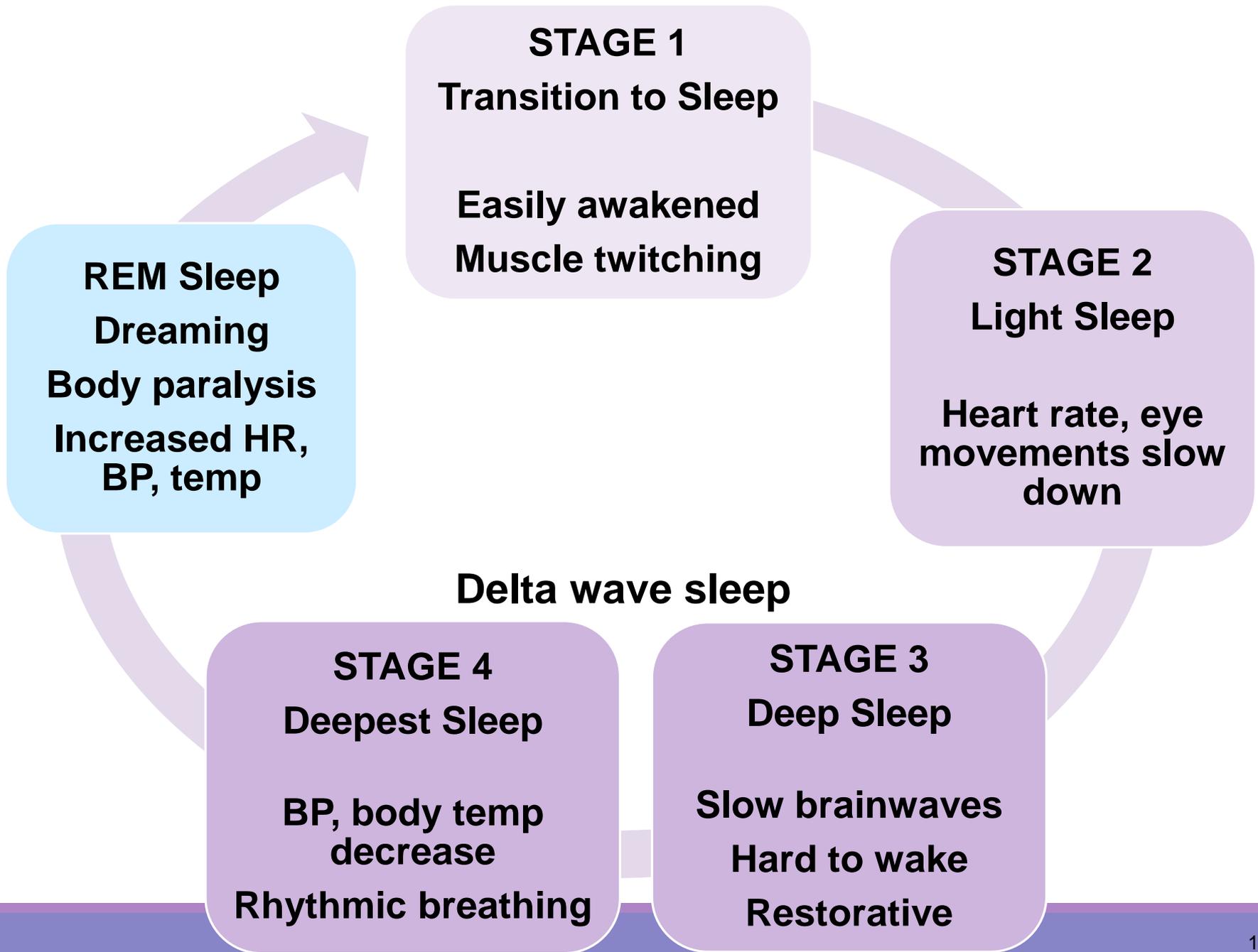


Stages of Sleep

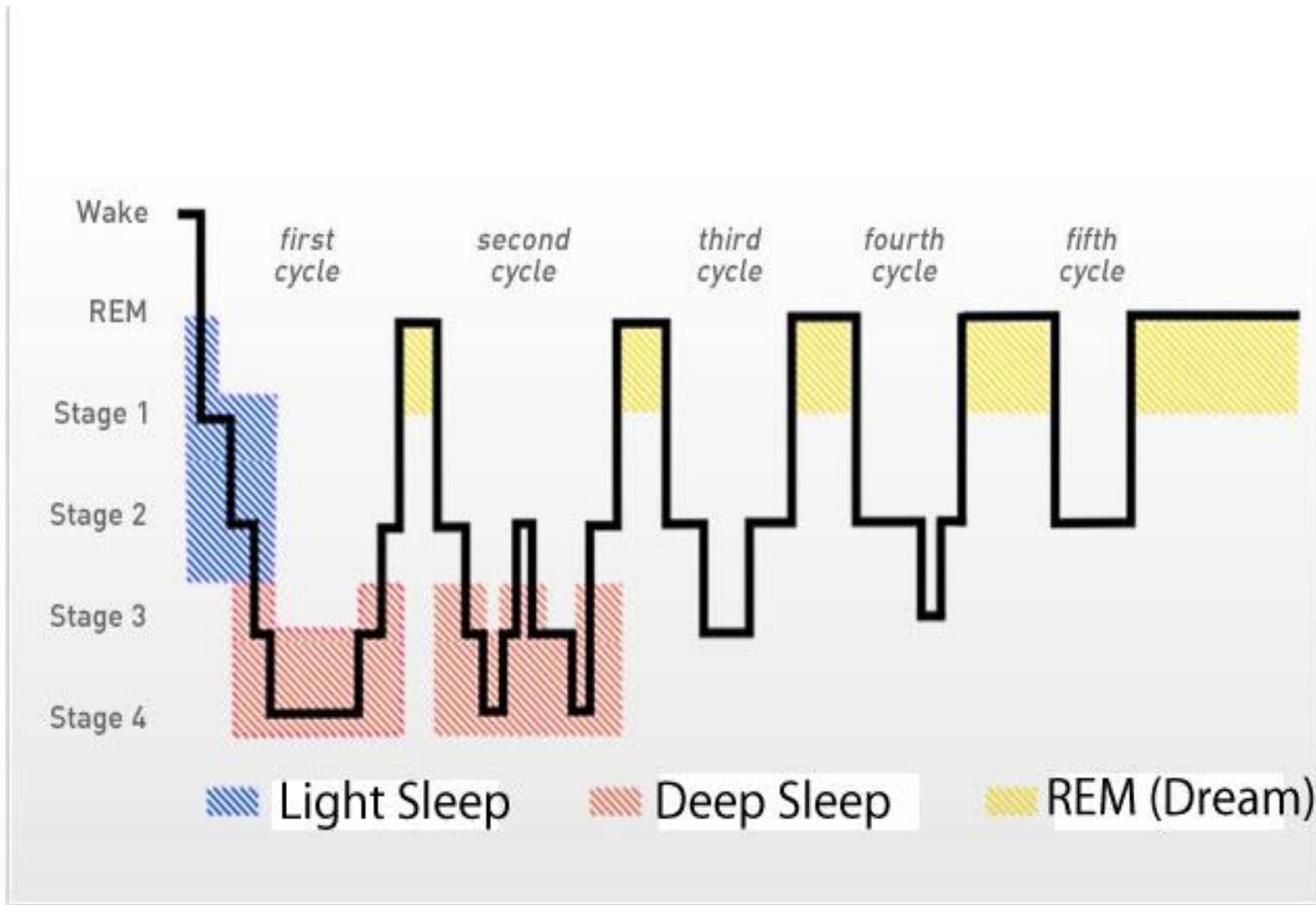
There are 5 stages of sleep

We cycle through all them, several times a night

- Stage 1 = transition from wake to sleep
- Stages 2 = light sleep
- Stages 3 – 4 = increasingly deep (delta) sleep
- REM = Rapid Eye Movement (dream) sleep

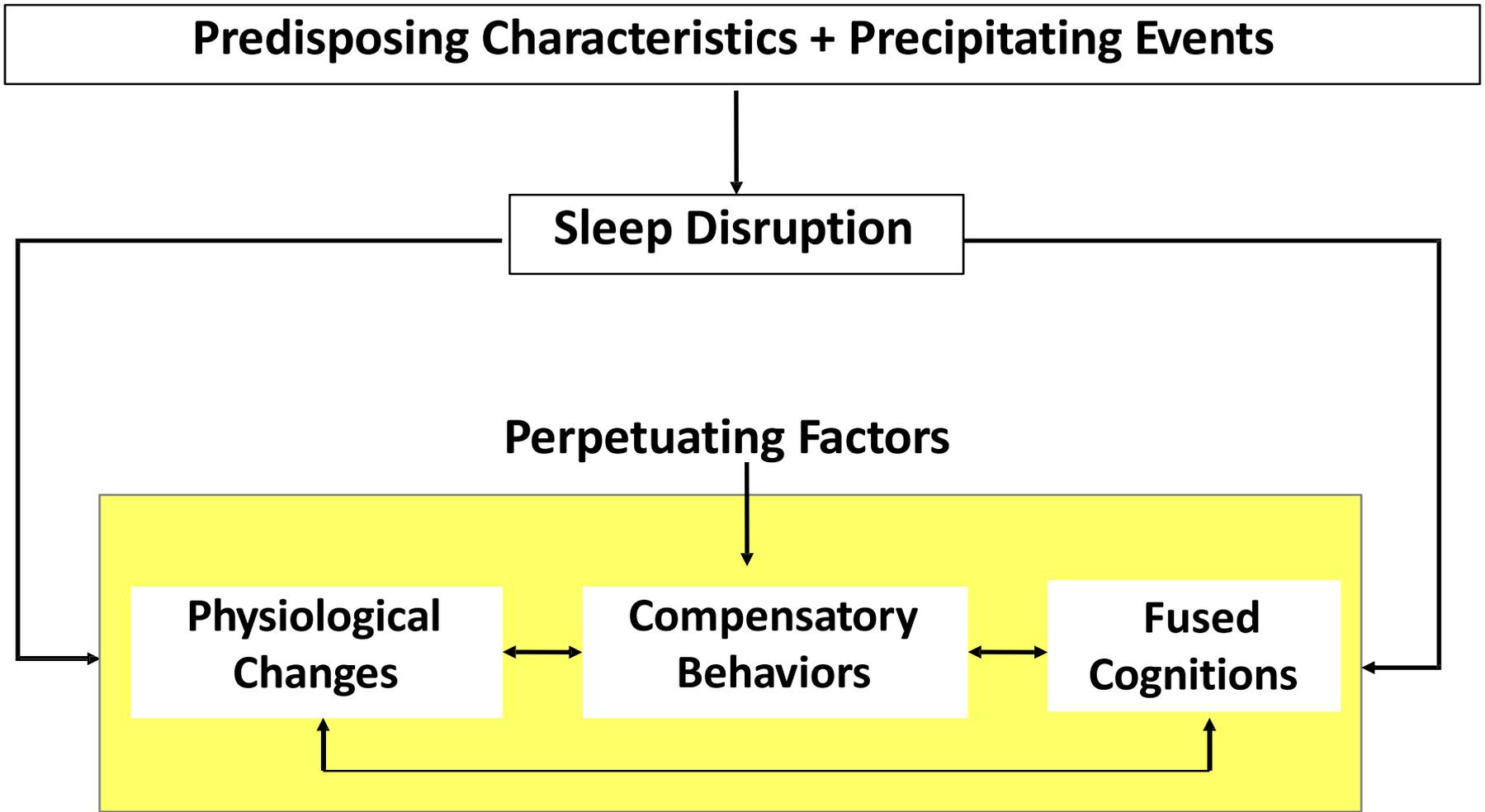


Sleep Cycles During the Night



The 3P Model of Insomnia

(Spielman & Glovinsky, 1987)



What I Have:

- _____ Poor sleeper all my life
- _____ “Light” sleeper
- _____ Frequent physical pain or discomfort
- _____ Female sex at birth
- _____ Over the age of 65
- _____ Frequently find myself worrying or fretting
- _____ Have been diagnosed with depression or anxiety or other psychiatric condition
- _____ Hormonal fluctuations
- _____ High energy/High intensity
- _____ High need for control
- _____ A body that is overly alert and energized (hyperarousal)
- _____ Other

PREDISPOSING FACTORS

What Life Gave Me:

- _____ Birth of a child
- _____ Death of a loved one or pet
- _____ Job promotion
- _____ Job loss
- _____ Change in financial status (either direction)
- _____ Significant increase in daily stress
- _____ Moving
- _____ High conflict with someone in my life
- _____ Health concerns or health issues
- _____ Onset of menopause
- _____ Other

PRECIPITATING FACTORS

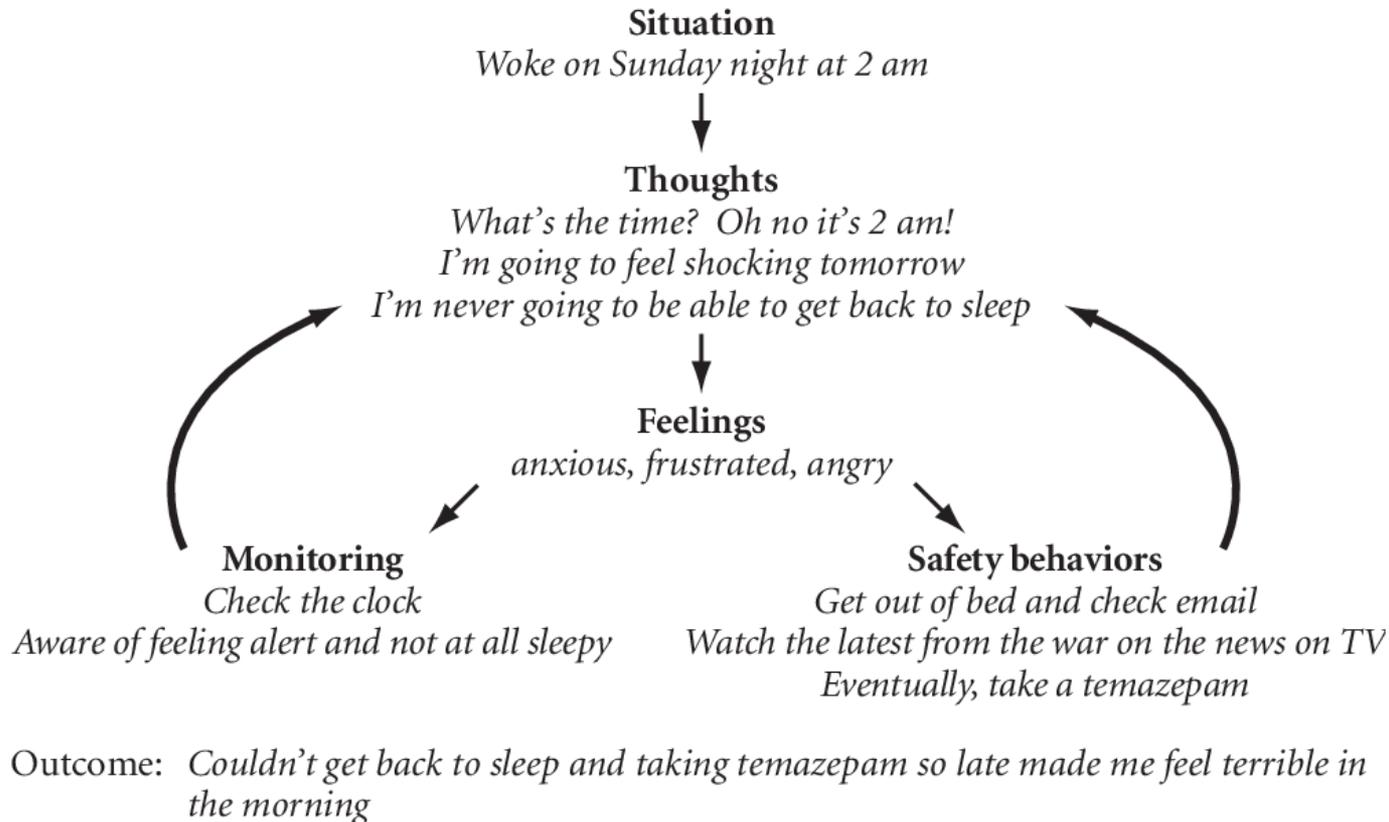
What I've Done to Handle Sleep Disruption:

- _____ Stay in bed longer
- _____ Catch up on sleep on the weekends
- _____ Nap
- _____ Watch the clock at night and get concerned as time passes
- _____ Tell myself I *have* to sleep tonight
- _____ Skip exercise
- _____ Take more sleep medications than prescribed
- _____ Use alcohol to help me fall asleep
- _____ Use caffeine, sugar, etc. to be more alert
- _____ Cancel activities
- _____ Avoid scheduling activities
- _____ Eat in the middle of the night
- _____ Other

PERPETUATING FACTORS

The “4th P”: Conditioned Insomnia

Bed and bedroom become associated with sleeplessness leading to cognitive and physiological hyperarousal at night



Sleep Disturbance Risk Factors

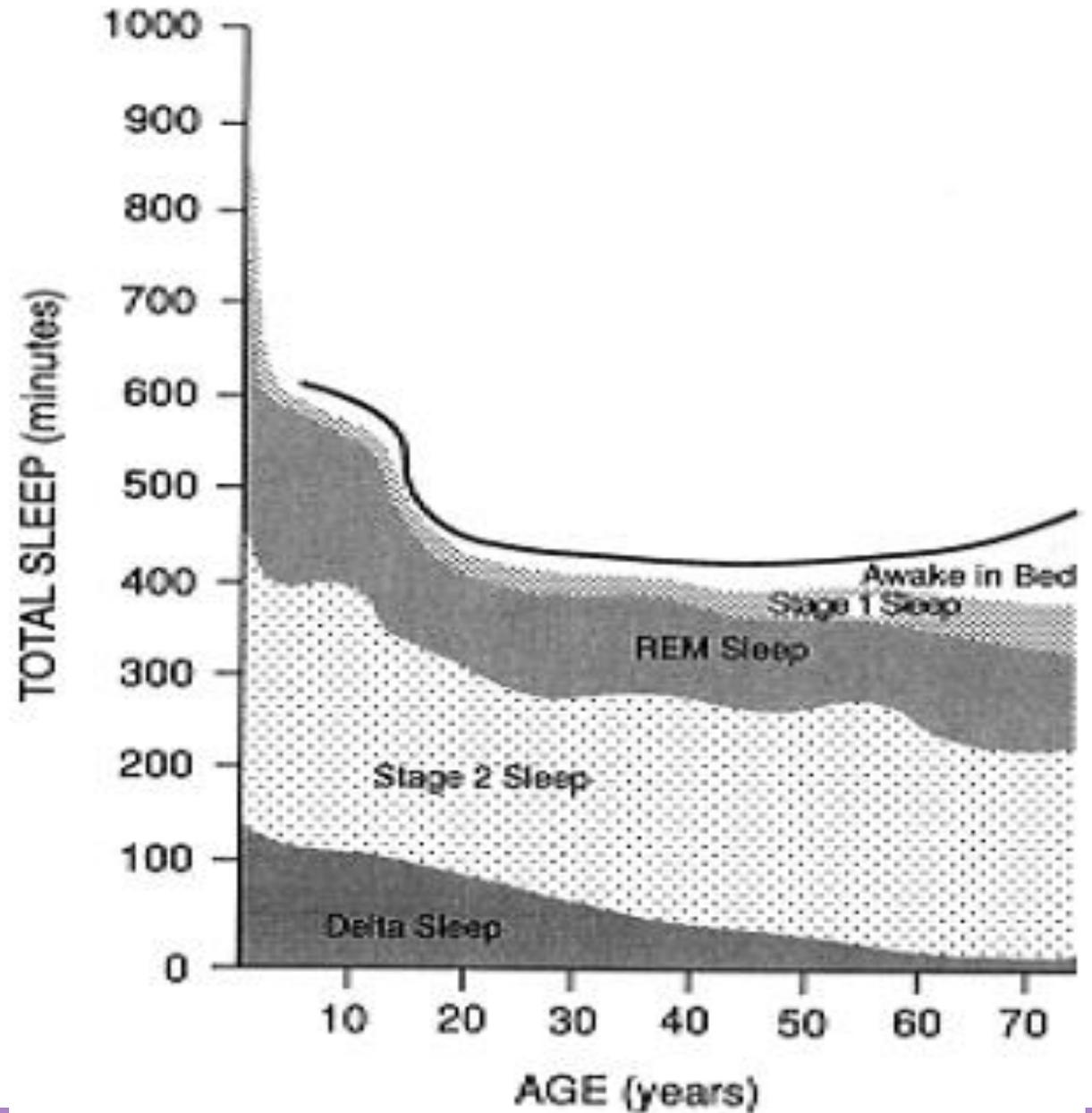
- ▶ Age-related change in sleep mechanisms
- ▶ Neurodegenerative disease / neurocognitive disorders
- ▶ Primary sleep disorders
- ▶ Other co-morbid conditions and treatments
- ▶ Environmental and behavioral factors
- ▶ Any combination of the above

Least
Modifiable

Most
Modifiable

Bloom et al. J Am Geriatr Soc. 2009; 57(5): 761-789; McCurry et al. Sleep Med Rev. 2000; 4:603-608.

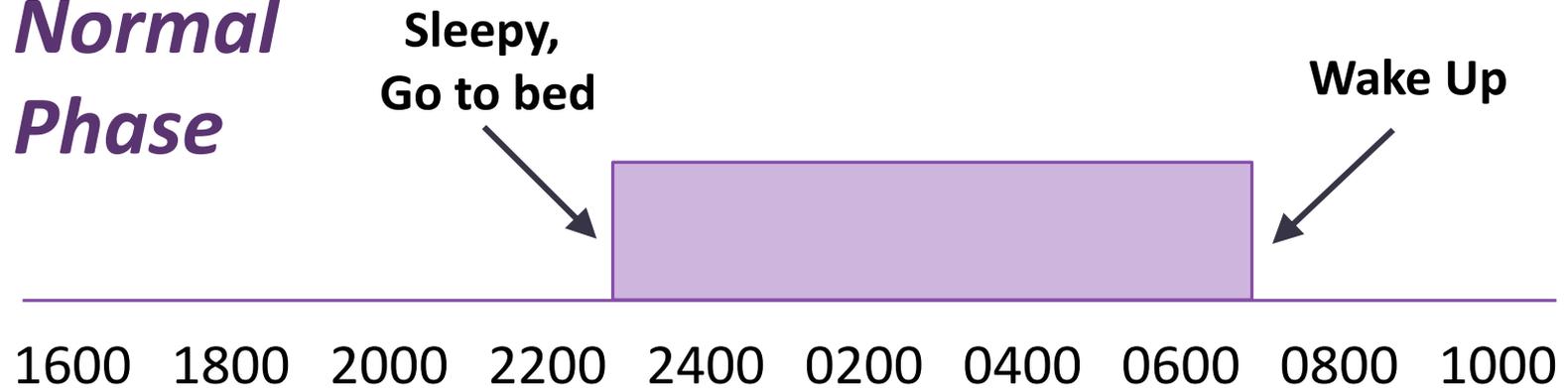
Changes in Sleep Architecture with Age



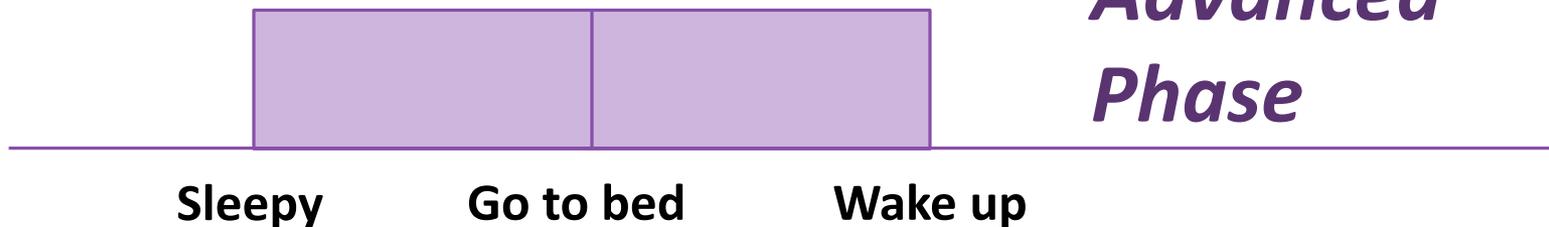
Courtesy of Charles Morin, PhD

Circadian Rhythm Changes: Advanced Sleep Phase

Normal Phase



Advanced Phase



Neurodegenerative Disease and Sleep

Alzheimer's disease

- Loss of neurons that regulate circadian sleep-wake cycles (SCN: the body's internal "clock") and thermoregulatory processes
- Sleep architecture changes resemble an acceleration of normal age-related changes

Parkinson's disease and related disorders

- Sleep problems nearly universal in advanced PD
- Tremors, muscle contractions and cramps, limb jerks, nocturia, nightmares, daytime "sleep attacks"

Sleep Problems in Adults With Autism Spectrum Disorder and Intellectual Disability

Pura Ballester, María José Martínez, Auxiliadora Javaloyes, María-del-Mar Inda, Noemí Fernández, Pilar Gázquez, Víctor Aguilar, Agustín Pérez, Luís Hernández, Amanda L. Richdale, and Ana M. Peiró 

Sleep problems (SP) are recognized as a common comorbid condition in autism spectrum disorder (ASD) and can influence core autism symptoms and mental and physical health. SPs can be lifelong and have been reported that adults on the autistic spectrum with and without intellectual disability (ID) present SPs (longer sleep latency, frequent night awakenings, and circadian rhythm sleep–wake disorders).

A prospective, objective sleep study was conducted in 41 adults with ASD (33 ± 6 years old) and ID and 51 typically developing adults (33 ± 5 years old) using ambulatory circadian monitoring (ACM) recording wrist temperature, motor activity, body position, sleep, and light intensity. The findings indicated that individuals with ASD presented sleep difficulties including low sleep efficiency, prolonged sleep latency and increased number and length of night awakenings, together with daily sedentary behavior, and increased nocturnal activity. Furthermore, indications of an advanced sleep–wake phase disorder were found in these autistic adults. Examining sleep and markers of the circadian system showed significant differences between adults with ASD and ID and an age-matched, healthy adult population. The sleep disturbances described for this sample of adults with ASD and ID are similar to those of already described for adults with ASD without ID; their relationship with intellectual ability should be further studied. Improving knowledge of sleep patterns in ASD adults with ID might help to design targeted interventions to improve their functioning and reduce family stress. *Autism Research* 2019, 12: 66–79. © 2018 International Society for Autism Research, Wiley Periodicals, Inc.

Lay Summary: SPs are very frequent in autism from childhood to adulthood. We recorded sleep with a watch-like device in adults with autism and ID and compared sleep patterns with nonautistic volunteers. Results showed poorer sleep conditions in adults with autism (increased sleep latency and number/length of night awakenings) that resulted in decreased sleep efficiency. Increasing knowledge of the SPs in adults on the autism spectrum will allow to improve their and their families' quality of life.

Keywords: autism spectrum disorder; intellectual disability; sleep problems; circadian rhythm; circadian rhythm sleep–wake disorder

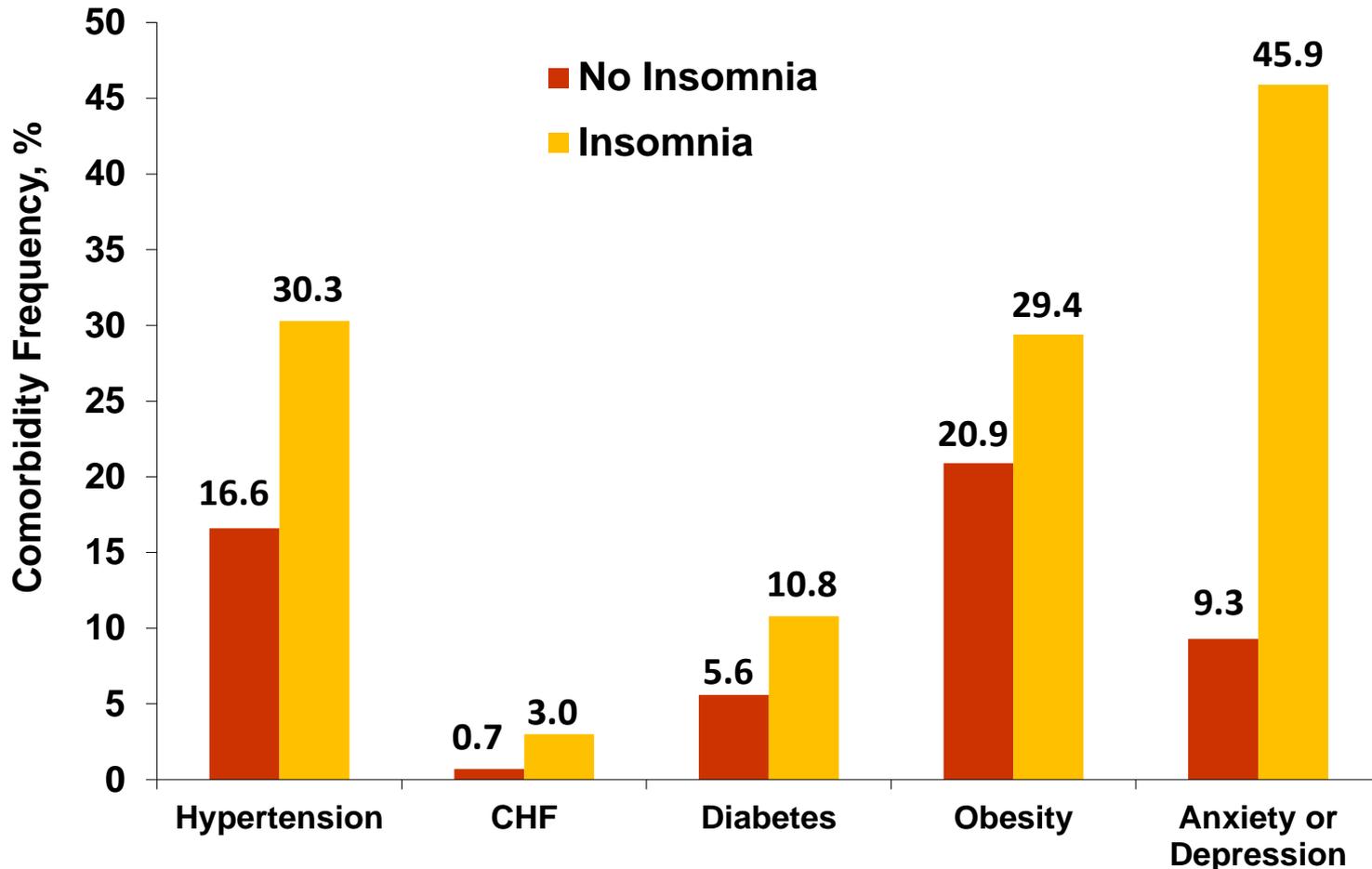
Ballester et al. *Autism Research* 2019; 12(1): 66-79.

Primary Sleep Disorders

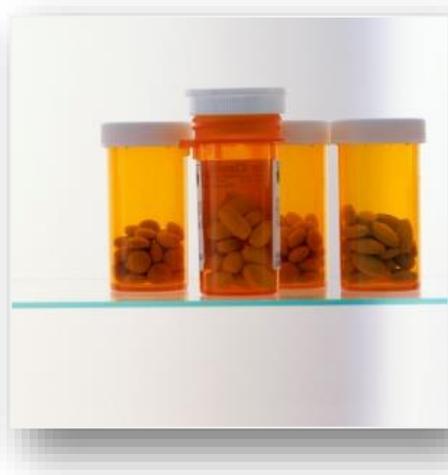
- ▶ **Sleep Disordered Breathing / Sleep Apnea**
 - Overlapping risk factors for stroke (HTN, diabetes, atrial fibrillation, cardiac and carotid disease)
 - Widely underdiagnosed; compliance w/CPAP often poor
- ▶ **Periodic leg movement syndrome (PLMS)**
- ▶ **Restless legs syndrome**
 - Linked to low iron levels
 - In persons with dementia more strongly associated with nocturnal agitation than apnea and PLMS
- ▶ **REM sleep behavior disorder (RBD)**
 - Most common in older men
 - Increased in persons with Parkinson's
- ▶ **Irregular Sleep-Wake Rhythm**
 - Associated with neurological/medical conditions

Insomnia and Medical/Psychiatric Conditions

(National Health Interview Survey)



Drugs That Can Worsen Sleep



- ▶ Alcohol
- ▶ CNS stimulants (e.g., caffeine, theophylline, nicotine)
- ▶ Beta-blockers, calcium channel blockers
- ▶ Bronchodilators
- ▶ Corticosteroids
- ▶ Decongestants
- ▶ Diuretics
- ▶ Stimulating antidepressants, cognitive enhancers
- ▶ Thyroid hormones

Environmental & Behavioral Causes



- ▶ Noise
- ▶ Light
- ▶ Temperature
- ▶ Season of year
- ▶ Bedding
- ▶ Television, computer, smart phone
- ▶ Dietary practices
- ▶ Exercise routines
- ▶ Pets
- ▶ Roommate or bed partner behaviors

How Do We Assess Sleep???



Every Sleep Disorder Has A Story

- When did the sleep difficulties start?
- What do they do when they can't sleep?
- Prior history of seeking treatment for their insomnia?
- Contributing medical conditions?
- Unique contextual factors?
- What have they already tried?
- What has helped?



Quick Screening Tools

- There are many, many screening tools out there
- The instrument of choice for you depends upon:
 - Age group (adults vs. children)
 - Insomnia symptoms vs. specific sleep disorders (e.g., OSA or RLS)
 - Insomnia vs. daytime fatigue and/or sleepiness
 - Need to assess sleep in the context of other comorbidities
 - Acceptable amount of patient time and paperwork burden, including whether they complete them before the first appointment or at the clinic

Adult Self-Administered Questionnaires

Assessment Domain	Instrument
Global sleep	Pittsburgh Sleep Quality Index (PSQI)
Insomnia symptoms	Insomnia Severity Index (ISI)
Fatigue	Flinders Fatigue Scale (FFS)
Sleepiness	Epworth Sleepiness Scale (ESS)
Attitudes about sleep	Dysfunctional Beliefs About Sleep (DBAS) scale
Sleep-related behaviors	Sleep Hygiene Index (SHI)
Quality of life	SF-36 (includes pain subscale)
Psychological symptoms	Patient Health Questionnaire (PHQ-9) Pre-Sleep Arousal Scale (PSAS)
Undiagnosed primary sleep disorders	STOP-BANG or G.A.S.P. Restless legs single question*

*When you try to relax in the evening or sleep at night, do you ever have unpleasant, restless feelings in your legs that can be relieved by walking or movement? (Ferri R. et al. 2007)

The following questions are about the past month.

In the past month, about how many nights **per week** have you had ...

**Enter number of
nights below**

*Don't
know*

7. ...trouble falling asleep?

_____ (0-7)

8

8. ...trouble staying asleep?

_____ (0-7)

8

9. ...trouble waking up too early?

_____ (0-7)

8

10. About how many **days** per week have you woken up feeling worn out after your night's sleep?

_____ (0-7)

8

11. During the past month, have you had any of the following problems because of trouble sleeping?

Check all that apply.

1 **Tiredness**

8 **Headaches**

2 **Trouble concentrating**

9 **Trouble paying attention**

3 **Memory problems**

10 **Feeling crabby or irritable**

4 **Upset stomach**

11 **Accidents while working or driving**

5 **Feeling depressed**

12 **Trouble staying awake during the day**

6 **Feeling tense**

13 **Not able to do all the things you**

7 **Worry about sleeping**

normally get done each day

Insomnia Severity Index (ISI)

For each question below, please circle the number corresponding most accurately to your current (such as in the last 2 weeks) sleep patterns.

For the first three questions, please rate the current **SEVERITY** of your sleep problems.

1. Difficulty falling asleep

None	Mild	Moderate	Severe	Very Severe
0	1	2	3	4

2. Difficulty staying asleep

None	Mild	Moderate	Severe	Very Severe
0	1	2	3	4

3. Problem waking up too early

None	Mild	Moderate	Severe	Very Severe
0	1	2	3	4

4. How **SATISFIED**/dissatisfied are you with your current sleep pattern?

Very Satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied
0	1	2	3	4

5. To what extent do you consider your sleep problem to **INTERFERE** with your daily functioning (e.g., daytime fatigue, ability to function at work/daily chores, concentration, memory, mood).

Not at all Interfering	A little interfering	Somewhat interfering	Much interfering	Very much interfering
0	1	2	3	4

6. How **NOTICEABLE** to others do you think your sleeping problem is in terms of impairing the quality of your life?

Not at all noticeable	Barely noticeable	Somewhat noticeable	Much noticeable	Very much noticeable
0	1	2	3	4

7. How **WORRIED**/distressed are you about your current sleep problem?

Not at all	A little	Somewhat	Much	Very much
0	1	2	3	4

Full Scale:

0-7 No insomnia

8-14 Mild insomnia

15-21 Moderately severe insomnia

22-28 Severe insomnia

ISI-3, using cutpoint ≥ 7
 sensitivity (0.94-0.97),
 specificity (0.88-0.91),
 Kappa 0.68-0.71, with
 89.1-91.5% agreement

Limitations to Questionnaires

- No consistency in referent time frame (generally 1 week to 1 month)
- Subjects often fill out incorrectly (e.g., leave items blank, circle 2 options, write explanatory notes in the margins)
- Poor readers, non-native English speakers may have difficulty with them
- Few are validated for use with other cultures
- Can be expensive to use proprietary instruments

Purpose of Daily Sleep Diaries

- Teach people to observe their own sleep habits and patterns
 - Can help undermine catastrophic thinking (“I never sleep”)
 - See improvement during treatment
- Gather daily sleep quality/satisfaction data over time
- Can collect other real-time data related to sleep (e.g., daily pain or depression ratings)
- Provide validation check for actigraphy data editing

Sample: Single Page Diary

Microsoft Excel

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for help

40% Arial 24 B I U

Reply with Changes... End Review...

F22 fx 2

Assessment sleep log.xls

ID Number 10001
Start Date 2/2/2009
Assessment Baseline

MORNING DIARY PAGE

Please answer these questions when you get up in the morning

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	2-Feb	3-Feb	4-Feb	5-Feb	6-Feb	7-Feb	8-Feb
1. Last night, I took ___ mg of medication and/or ___ oz of ___ alcohol as a sleep aid	7.5 oz ETOH	none	none	350 mg tylenol	none	none	none
2. Last night I went to bed and turned off the lights at (Did you remember to push the button on your actiwatch?)	1:00 AM PM	12:40 AM PM	12:40 AM PM	11:30 AM PM	10:30 AM PM	1:00 AM PM	12:15 AM PM
3. After turning the lights off, it took me this long to fall asleep	___ hours 15 minutes	___ hours 10 minutes	1 hours 45 minutes	___ hours 30 minutes	___ hours 10 minutes	2 hours 10 minutes	___ hours 40 minutes
4. My sleep was interrupted ___ times (specify number of nighttime awakenings)	1	3	5 - 6	4	1	5	2
5. My sleep was interrupted for ___ minutes (specify duration of each awakening).	5 minutes	20, 15, 15	total = 3 hours	5, 10, 5, 45	20	4x5mins; 1=1hr	5, 45
6. This morning, I woke up at ___ o'clock (note time of last awakening).	8:45 AM PM	7:30 AM PM	7:40 AM PM	7:40 AM PM	6:00 AM PM	8:00 AM PM	7:40 AM PM
7. This morning I got out of bed to get ready for the day at (Did you remember to push the button on your actiwatch?)	8:45 AM PM	7:30 AM PM	7:40 AM PM	7:45 AM PM	8:00 AM PM	8:50 AM PM	8:10 AM PM
8. Overall my sleep quality last night was: (1=very restless..... 5=very sound)	4	2	2	3	2	2	4
9. When I got up this morning I felt: (1=exhausted..... 5=refreshed)	3	3	2	3	1	2	3

AM questions / PM questions /

Ready

BEDTIME

To be filled out LAST thing at night

Today, did your child nap (i.e. car rides)? 1 = Yes 2 = No
 If yes, what time(s) did your child nap? Start time: ___:___ AM PM End time: ___:___ AM PM
 Start time: ___:___ AM PM End time: ___:___ AM PM

Today, was your child ill? (e.g., cold, fever, nausea) 1 = Yes 2 = No
 Did anything happen today that may affect your child's sleep? 1 = Yes 2 = No
 (i.e. parent out of town, grandparent visiting)
 If yes what? _____

Did your child consume any caffeine today? 1 = Yes 2 = No
 (e.g., tea, coffee, chocolate, energy drinks, hot chocolate, soda)
 If yes, what did they consume and when? _____

What medications did your child take today?

Names of medication(s): _____ Time of dose _____ Amount of each dose _____
 _____ :___:___ AM PM _____
 _____ :___:___ AM PM _____

Please read each item and circle the appropriate number to indicate the frequency and severity of each symptom your child may have experienced today. Space is provided for you to write in other symptoms you experienced today.

	How many times did your child seem to experience these symptoms today?								IF your child had this symptom today, How severe was it?			
	0	1	2	3	4	5 or more	All Day	not at all	Slightly	moderately	extremely	
Fatigue/Tired	0	1	2	3	4	5	9	0	1	2	3	
Pain/Discomfort	0	1	2	3	4	5	9	0	1	2	3	
Stressed/Worried	0	1	2	3	4	5	9	0	1	2	3	
Tantrum/Meltdown	0	1	2	3	4	5	9	0	1	2	3	
Irritable	0	1	2	3	4	5	9	0	1	2	3	
Other:	0	1	2	3	4	5	9	0	1	2	3	

Today, did your child need to take off the actigraph. 1 = Yes 2 = No
 If yes why? _____

Did your child use any of the following types of media within two hours of bedtime tonight?

	N/A	0-30 min	30-60 min	60-90 min	90-120 min
TV	0	1	2	3	4
Computer	0	1	2	3	4
Smartphone	0	1	2	3	4
Tablet	0	1	2	3	4
Video games	0	1	2	3	4
Other:					

Were the devices your child used before bed set to night mode? 1 = Yes 2 = No

Did your child fall asleep by him/herself tonight? 1 = Yes 2 = No
 If no, who did your child fall asleep with? _____
 where did your child fall asleep? _____

What time did your child get into bed tonight? Bed time: ___:___ AM PM
 What time did your child fall asleep tonight? Sleep time: ___:___ AM PM

Is there anything else to report about your child's day today? (can leave blank if not) _____

WAKETIME

To be filled out FIRST thing in the morning

This morning your child woke at: ___:___ AM PM

Your child actually got out of bed at: ___:___ AM PM

Last night after your child fell asleep, your child woke up this many times during the night

(circle one): 0 1 2 3 4 5 or more

Altogether, these awakenings lasted about ___ minutes; ___ hours.

The overall quality of your child's night's sleep: (Circle one; 1=terrible, 9=great)

1 2 3 4 5 6 7 8 9

Please read each item and circle the appropriate number to indicate the frequency and severity of each symptom your child may have experienced last night.

	How many times did your child seem to experience these symptoms last night?								IF your child had this symptom last night, How severe was it?			
	0	1	2	3	4	5 or more	All night	not at all	slightly	moderately	extremely	
Restless												
Pain/Discomfort												
Snoring												
Illness (e.g., coughing)												
Other:												

Did anything unusual happen last night that affected your child's sleep? 1 = Yes 2 = No
 (e.g., unusual noise or disruption)

If yes, what happened? _____

Please circle the appropriate number to indicate how your child felt this morning, after waking up.

This morning your child looked:	not at all	a little	moderately	quite a bit	extremely
Rested	0	1	2	3	4
Refreshed	0	1	2	3	4
Tense	0	1	2	3	4
Sleepy	0	1	2	3	4
Worried	0	1	2	3	4
Irritable	0	1	2	3	4

		Noon	p.m.									Midnight	a.m.											Sleep Quality	
			Afternoon					Evening					Morning												
Date		12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
F	22																								
Sa	23																								
Su	24																								
M	25																								
T	26																								
W	27																								
Th	28																								
F	29																								
Sa	30																								
Su	31																								
	1																								
	2																								
	3																								
F	12																								
Sa	13																								
Su	14																								
M	15																								
F	16																								
W	17																								
Th	18																								
F	19																								
Sa	20																								
Su	21																								
	22																								
	23																								
	24																								

Limitations to Daily Diaries

- Wide variability in diaries across users
- Some people don't like to keep them, especially for weeks at a time
- They are often filled out incorrectly
- If not completed every day poor recall can invalidate data
- Computing daily sleep stats for clinical review can be cumbersome (although it is essential for doing CBT-I)

How Is Insomnia Treated???

Treatment for
insomnia

```
graph TD; A[Treatment for insomnia] --> B[Pharmacologic]; A --> C[Cognitive-Behavioral (CBT-I)];
```

Pharmacologic

Cognitive-
Behavioral
(CBT-I)



Melatonin

- Neuro-hormone secreted by the pineal gland at the back of the brain to synchronize circadian rhythm with sleep-wake cycle, with peak levels 1-5 am.
- Production inhibited by light passing through the retina
- Melatonin is not a sedative
- If you are not melatonin deficient, excess use can disrupt its normal 24-hour rise and fall
- Clinical trial results show mixed results
- Side effects: daytime fatigue, dizziness, irritability, depression
- **NOT** FDA regulated

Benadryl Derivatives

Recommendation 11: We suggest that clinicians not use diphenhydramine as a treatment for sleep onset and sleep maintenance insomnia (versus no treatment) in adults.

- Limited RCT evidence for efficacy
- Improvements modest – 8 mins SOL, 12 mins TST compared to placebo

SPECIAL ARTICLES

Clinical Practice Guideline for the Pharmacologic Treatment of Chronic Insomnia in Adults: An American Academy of Sleep Medicine Clinical Practice Guideline

Michael J. Sateia, MD¹; Daniel J. Buysse, MD²; Andrew D. Krystal, MD, MS³; David N. Neubauer, MD⁴; Jonathan L. Heald, MA⁵

¹Geisel School of Medicine at Dartmouth, Hanover, NH; ²University of Pittsburgh School of Medicine, Pittsburgh, PA; ³University of California, San Francisco, San Francisco, CA; ⁴Johns Hopkins University School of Medicine, Baltimore, MD; ⁵American Academy of Sleep Medicine, Darien, IL

Introduction: The purpose of this guideline is to establish clinical practice recommendations for the pharmacologic treatment of chronic insomnia in adults, when such treatment is clinically indicated. Unlike previous meta-analyses, which focused on broad classes of drugs, this guideline focuses on individual drugs commonly used to treat insomnia. It includes drugs that are FDA-approved for the treatment of insomnia, as well as several drugs commonly used to treat insomnia without an FDA indication for this condition. This guideline should be used in conjunction with other AASM guidelines on the evaluation and treatment of chronic insomnia in adults.

Methods: The American Academy of Sleep Medicine commissioned a task force of four experts in sleep medicine. A systematic review was conducted to identify randomized controlled trials, and the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) process was used to assess the evidence. The task force developed recommendations and assigned strengths based on the quality of evidence, the balance of benefits and harms, and patient values and preferences. Literature reviews are provided for those pharmacologic agents for which sufficient evidence was available to establish recommendations. The AASM Board of Directors approved the final recommendations.

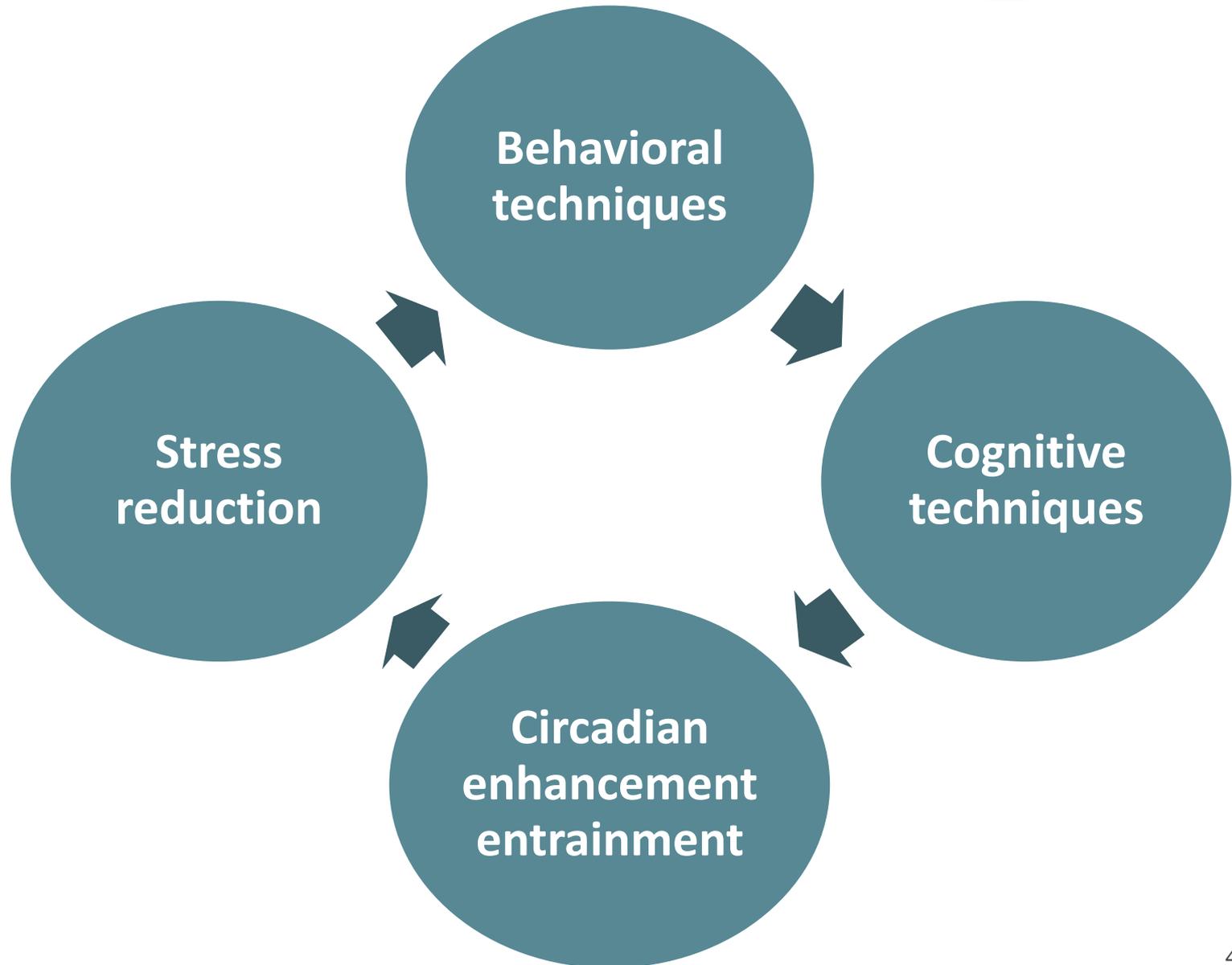
Recommendations: The following recommendations are intended as a guideline for clinicians in choosing a specific pharmacological agent for treatment of chronic insomnia in adults, when such treatment is indicated. Under GRADE, a STRONG recommendation is one that clinicians should, under most circumstances, follow. A WEAK recommendation reflects a lower degree of certainty in the outcome and appropriateness of the patient-care strategy for all patients, but should not be construed as an indication of ineffectiveness. GRADE recommendation strengths do not refer to the magnitude of treatment effects in a particular patient, but rather, to the strength of evidence in published data. Downgrading the quality of evidence for these treatments is predictable in GRADE, due to the funding source for most pharmacological clinical trials and the attendant risk of publication bias; the relatively small number of eligible trials for each individual agent; and the observed heterogeneity in the data. The ultimate judgment regarding propriety of any specific care must be made by the clinician in light of the individual circumstances presented by the patient, available diagnostic tools, accessible treatment options, and resources.

1. We suggest that clinicians use suvorexant as a treatment for sleep maintenance insomnia (versus no treatment) in adults. (WEAK)
2. We suggest that clinicians use eszopiclone as a treatment for sleep onset and sleep maintenance insomnia (versus no treatment) in adults. (WEAK)
3. We suggest that clinicians use zaleplon as a treatment for sleep onset insomnia (versus no treatment) in adults. (WEAK)
4. We suggest that clinicians use zolpidem as a treatment for sleep onset and sleep maintenance insomnia (versus no treatment) in adults. (WEAK)
5. We suggest that clinicians use triazolam as a treatment for sleep onset insomnia (versus no treatment) in adults. (WEAK)
6. We suggest that clinicians use temazepam as a treatment for sleep onset and sleep maintenance insomnia (versus no treatment) in adults. (WEAK)
7. We suggest that clinicians use ramelteon as a treatment for sleep onset insomnia (versus no treatment) in adults. (WEAK)
8. We suggest that clinicians use doxepin as a treatment for sleep maintenance insomnia (versus no treatment) in adults. (WEAK)
9. We suggest that clinicians not use trazodone as a treatment for sleep onset or sleep maintenance insomnia (versus no treatment) in adults. (WEAK)
10. We suggest that clinicians not use tiagabine as a treatment for sleep onset or sleep maintenance insomnia (versus no treatment) in adults. (WEAK)
11. We suggest that clinicians not use diphenhydramine as a treatment for sleep onset and sleep maintenance insomnia (versus no treatment) in adults. (WEAK)

ACP recommends that all adult patients receive cognitive behavioral therapy for insomnia (CBT-I) as the initial treatment for chronic insomnia disorder.

Qaseem et al., *Annals of Internal Medicine*, 2016, 165:125-133

CBT for Insomnia Multicomponent Approach



Domain	Technique	Aim
Behavioral components	Sleep hygiene	Promote habits and environments that help sleep
	Stimulus control	Strengthen bed and bedroom as sleep stimuli
	Sleep (bed) restriction	Restrict time in bed to improve sleep depth and consolidation

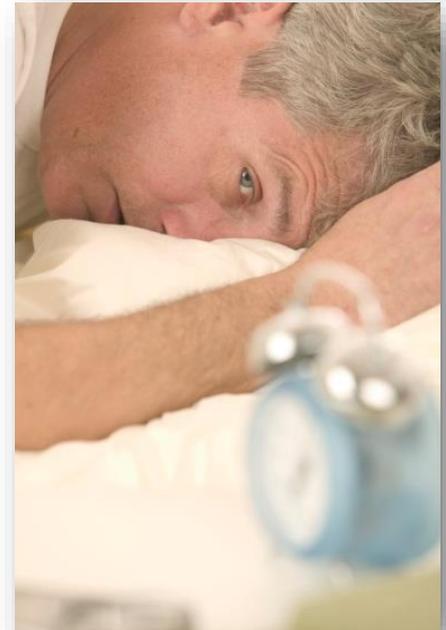
Sleep Hygiene Recommendations

- ▶ Regularize sleep / wake schedules (especially rise time)
- ▶ Establish a relaxing bedtime routine
- ▶ Increase daytime light exposure, keep sleep areas dark
- ▶ Reduce alcohol and caffeine use
- ▶ Keep bedroom a comfortable (cooler) temperature
- ▶ Eliminate environmental factors that interrupt sleep (pets!)
- ▶ Avoid stimulants and stimulating behavior at night (including smoking, TV, email, internet, and radio)
- ▶ Don't watch the clock or check your cell phone at night
- ▶ Get regular exercise earlier in day
- ▶ Urinate before bedtime
- ▶ Ask your pharmacist about medication side effects

These are often insufficient by themselves to treat insomnia

Stimulus Control

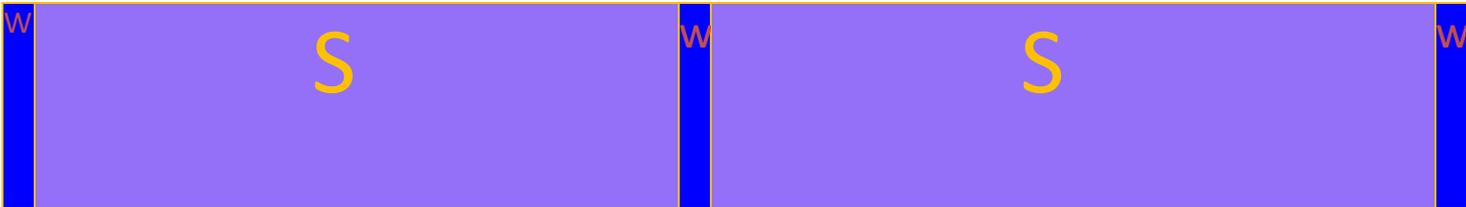
- ▶ **To prevent your bedroom from becoming associated with poor night sleep, do the following:**
 - Use bedroom only for sleep and intimacy
 - Get up at the same time every day, no matter how much you slept the night before
 - Don't go to bed if you are not sleepy
 - Get out of bed if you wake up and can't fall back to sleep ("bed is for sleep!")
 - Minimize daytime napping; if you must nap do it in bed ("bed is for sleep!")



Bed Restriction Helps Increase Sleep Drive

- People with sleep problems often spend too much time in bed
- Going to bed early, sleeping late, and napping may provide some short-term relief, but in the long term they can perpetuate insomnia
- Clients cut back the amount of time they spend in bed so that more of the time in bed is spent sleeping

How Bed Restriction Works





Domain	Technique	Aim
Cognitive components	Cognitive therapy	Address thoughts and beliefs that interfere with sleep
	Mindfulness/relaxation training	Reduce arousal and decrease anxiety
	Acceptance based	Decrease struggle to control sleep at cost of living your life

Insomnia and Cognitive Effort

- *People with insomnia...*
 - Tend to use more thought control strategies (suppression, reappraisal, worry)
 - Are more involved in excessive and counter-productive rumination about sleep and daytime function, both at night and during the day
 - Have more physiological and cognitive arousal (“insomnia brain”) and anxiety



Attention-Intention Effort (AIE) Pathway



*Worrying about sleep
makes it harder to
sleep*

Sleep Medicine Reviews (2006) 10, 215-245



SLEEP
MEDICINE
ELSEVIER

www.elsevier.com/locate/smr

THEORETICAL REVIEW

The attention–intention–effort pathway in the development of psychophysiological insomnia: A theoretical review

Colin A. Espie^{a,*}, Niall M. Broomfield^a, Kenneth M.A. MacMahon^b,
Lauren M. Macphree^c, Lynne M. Taylor^d

^aSleep Research Laboratory, Section of Psychological Medicine, University of Glasgow, Southern General Hospital, Glasgow G51 4TF, Scotland, UK

^bDepartment of Clinical Psychology, NHS Ayrshire and Arran, Scotland, UK

^cDepartment of Psychology, University of Glasgow, Scotland, UK

^dDepartment of Clinical Psychology, NHS Grampian, Scotland, UK

KEYWORDS

Insomnia;
Sleep;
Psychological;
Model;
Cognitive;
Behavior;
Information-
processing

Summary Psychophysiological insomnia (PI) is the most common form of persistent primary insomnia. Its 'behavioral phenotype', comprising elements such as conditioned arousal, sleep-incompatible behavior and sleep preoccupation, has not changed markedly across several generations of diagnostic nosology. Moreover, a substantial outcome literature demonstrates that PI can be treated effectively using a range of psychological interventions. It seems evident that behavioral and cognitive factors play a part. What is less clear is exactly how PI develops and what are its crucial maintaining factors. This paper proposes an explanatory model, that we call the attention–intention–effort pathway. The argument is that sleep normalcy is a relatively automatic process. Consequently, it is vulnerable, and may be inhibited, by focused attention and by direct attempts to control its expression. Drawing upon parallels in the literature on adult psychopathology, and upon recent clinical and experimental studies on insomnia, the evidence for this pathway is considered and a research agenda is outlined. In particular, computerized tests of cognitive bias are seen as offering an objective means of appraising mental processes in insomnia. These may be applied concurrently with somatic measurements in future studies to better understand this common psycho-physiologic condition.

'Sleep (is like) a dove which has landed near one's hand and stays there as long as one does not pay any attention to it; if one attempts to grab it, it quickly flies away'

[Viktor E. Frankl (1965, p. 253); [Frankl VE. The Doctor and the soul. 2nd ed. New York: Knopf; 1965.] cited in Ansfield, Wegner and Bowser (1996) [AnsfieldME, Wegner DM, Bowser R. Ironic effects of sleep urgency. Behav Res Ther 1996;34:523-31.]
© 2006 Elsevier Ltd. All rights reserved.

* Corresponding author. Tel.: +44 141 211 3903; fax: +44 141 357 4899.
E-mail address: c.espie@clinmed.gla.ac.uk (C.A. Espie).

The Evolution of Conditioned Insomnia

- The human brain evolved to use every life experience as a reference library to solve problems
 - Prediction and control increases likelihood of survival
- The same part of the brain that helps us avoid/escape from danger can create a chronic sleep disorder
 - The human threat detection system is very sensitive but not very discriminative
 - Insomnia is a perceived threat
 - Conditioned insomnia can develop easily and quickly
 - Attempts to control sleep create the very problem we are trying to solve

Constructive Worry Tool

- Sometimes people are too busy during the day to deal with their problems/worries
- Bedtime is first opportunity when it is quiet enough for the brain to think
 - “Do you find it hard to shut your thoughts down when you go to bed or wake up in the middle of the night?”
- Bedtime isn't the right time to plan or problem-solve
- Constructive Worry has people set a time during the day when they list concerns that keep them up at night, and develop a “next steps” plan

Beliefs and Attitudes About Sleep

- **Address misconceptions about sleep**
 - I must get 8 hours/sleep at night to function
 - I can control how much I sleep
 - All daytime problems are due to my lack of sleep
- **Cognitive errors**
 - Catastrophizing (“If I don’t get a good sleep tonight, xx will happen”)
 - Overgeneralization (“There’s nothing that will help my sleep”)
 - Magnification (“Insomnia is destroying my life”)
- **Perceived obstacles to acceptance / letting go of the struggle**
 - Fear of failure / lack of trust in body’s natural ability to sleep

Important Notes About Sleep Beliefs

- Beliefs are not “right” or “wrong;” they just usually have never been intentionally considered
- Clients have “stories” about their insomnia that have been internally repeated countless times
 - Cognitive habits are hard to change
 - Under the right contextual cues are easily reactivated (“there is no permanent delete button...”)
- Clients should never feel badgered to change beliefs
 - Beliefs, rules, evaluations don’t have to be gotten rid of
 - Mindfulness helps clients notice beliefs with kindness and curiosity, and to decide if they are useful in this situation

Acceptance-Based Strategies

- **We cannot control sleep**
 - Sleep is an automatic, physiological process
 - “Trying to sleep” increases arousal and risk for insomnia
- **Thoughts and feelings are not your enemy**
 - Mindfulness: Notice – don’t resist – judgments, evaluations, criticisms, negative or positive thinking about sleep and self, feelings and sensations, memories, beliefs
- **Life is about more than a good night’s sleep**
 - Normal sleepers have bad nights too
 - Value-based action: What is important to you that you’ve been missing out on because of your insomnia?

Mindfulness and Insomnia

- You can't make yourself sleep; you can only allow sleep to come
- Mindfulness techniques give your mind something quiet and calm to do at night
- Use mindfulness to change your relationship with sleep
 - It is the struggle with insomnia that makes things worse
- Present moment awareness stops mental “time travelling” to the future and past where anxiety resides
 - “Get out of your head and into the bed”



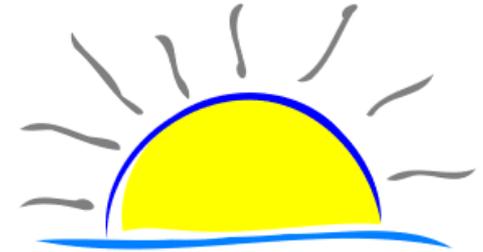


Strengthening Circadian Rhythms

▶ **Set consistent first exposure to light**

▶ **Increase daytime light**

- Get outside whenever you can
- Open household curtains during the day
- Use full spectrum lighting if possible
- Regular morning light will help you fall asleep earlier at night, evening light will help you fall asleep later
- Use of a bright light box may help



▶ **Decreasing nighttime light**

- Use bathroom night lights not overhead lights
- Close curtains to outside traffic and street light
- No screens (computer, TV, smart phone) at night

Sleep and Functional Analysis



Medical Causes

- Brain changes from aging or neurodegenerative disease
- Daytime napping
- Primary sleep disorders
- Medications
- Chronic pain
- Medical illness
- Hunger, thirst
- Incontinence
- Depression or anxiety
- Lack of daytime exercise

Interpersonal

- Roommate sleep habits
- Boredom or loneliness
- Caregiver habits

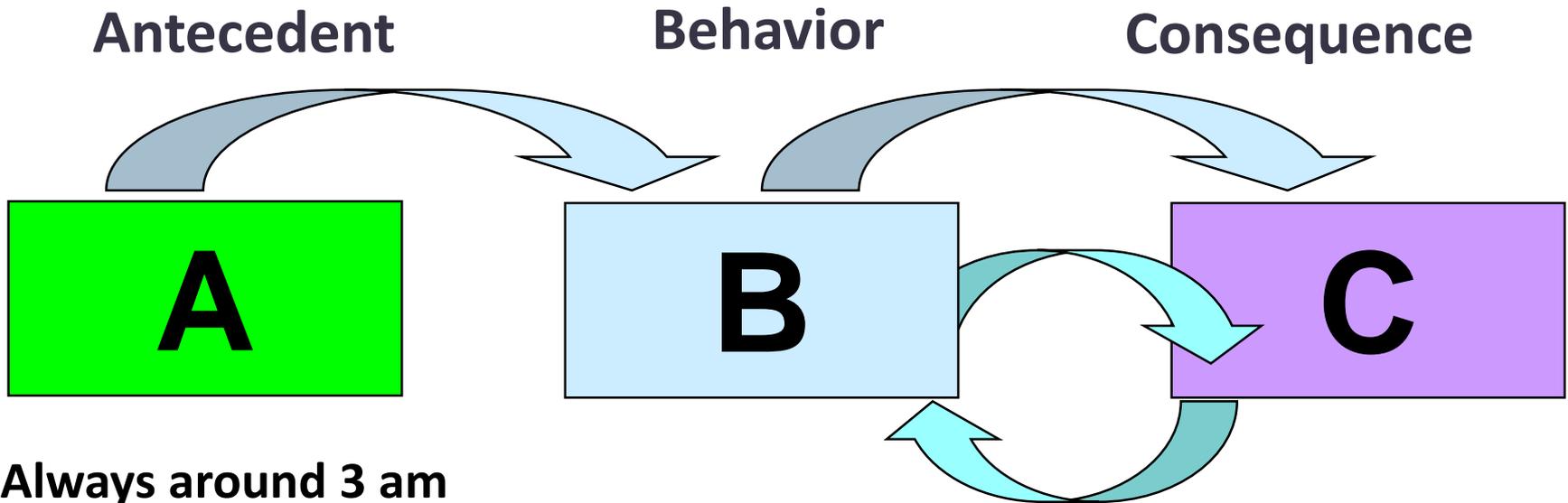
Historical

- Poor sleep habits
- Diet
- Preferred routines
- Past work/school schedules

Environmental

- Bedroom light exposure
- Noise
- Pets
- Temperature
- Uncomfortable bedding
- Season of year
- Visual exit cues
- Unfamiliar surroundings
- Sensory deprivation or overstimulation

Sample Sleep ABCs



- Always around 3 am
- Almost every night
- When Mrs. A's alone in her room
- Bedtime 7:45-10:15pm
- Napping during dinner prep

- Gets up at night, sometimes exits house
- Inappropriate activities once up involving fish tank in hallway

- Daughter scolds, argues with Mrs. A
- Mrs. A gets upset with daughter

Brainstorming Ideas

- ▶ Check with physician to see if any of Mrs. A's medications or medical problems are waking her up at night
- ▶ Install alarm system on outside doors to alert daughter
- ▶ Eliminate late afternoon and evening napping
- ▶ Move fish tank out of the hallway near the bathroom
- ▶ Give Mrs. A snack before bed so make sure she's not hungry during the night
- ▶ Switch to adult incontinence undergarments
- ▶ Establish consistent bed, rising times
- ▶ Increase daytime physical and social activity
- ▶ Have Mrs. A spend one weekend a month in a nearby respite center to give daughter a break

The Bottom Line

- Sleep interventions must be individualized to each situation.
- Standard CBT-I interventions can be modified to fit the unique circumstances of your client population
- There are a wide variety of contextual variables that impact treatment efficacy and acceptability of behavioral plans.



Some Books to Get Started

- Edinger JD, Carney CE. *Overcoming Insomnia: A Cognitive-Behavioral Therapy Workbook*. Oxford University Press, 2014.
- Ehrnstrom C, Brosse AL. *End the insomnia struggle*. New Harbinger Press, 2016
- Polan Orzech C, Moorcroft W. *Mindfulness for insomnia*. New Harbinger Press, 2019.
- Silberman S, Morin C. *The Insomnia Workbook: A Comprehensive Guide to Getting the Sleep You Need*. New Harbinger Publications, 2008.
- Meadows, G. *The Sleep Book*. London: Orion House, 2014.

Online Resources and Apps

<https://mobile.va.gov/app/cbt-i-coach>

<http://www.cbtforinsomnia.com>

<https://www.sleepio.com/>

<http://www.sleepeducation.com/>

<http://www.sleepfoundation.org/>

<http://www.aasmnet.org/>

<http://www.med.upenn.edu/cbti/>

<http://www.nhlbi.nih.gov/health/prof/sleep/index.htm>

<http://www.behavioralsleep.org/>

<https://www.thesleepschool.org/insomnia>

Reviews of Sleep and Mindfulness Apps

American Sleep Association

<https://www.sleepassociation.org/sleep-treatments/sleep-apps/>

Consumer Reports

<https://www.consumerreports.org/sleeping/do-sleep-apps-really-work/>

NY Times

<https://www.nytimes.com/wirecutter/reviews/best-meditation-apps/>