Advancing Healthy Sleep in the Military: Spanning the Field to the Clinic

Army Lt. Col. Connie L. Thomas, M.D.
Sleep Medicine Physician Associate Director,
Center for Military Psychiatry and Neuroscience
Walter Reed Army Institute of Research
Bethesda, Md.

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Defense Health • Global Health

Presenter

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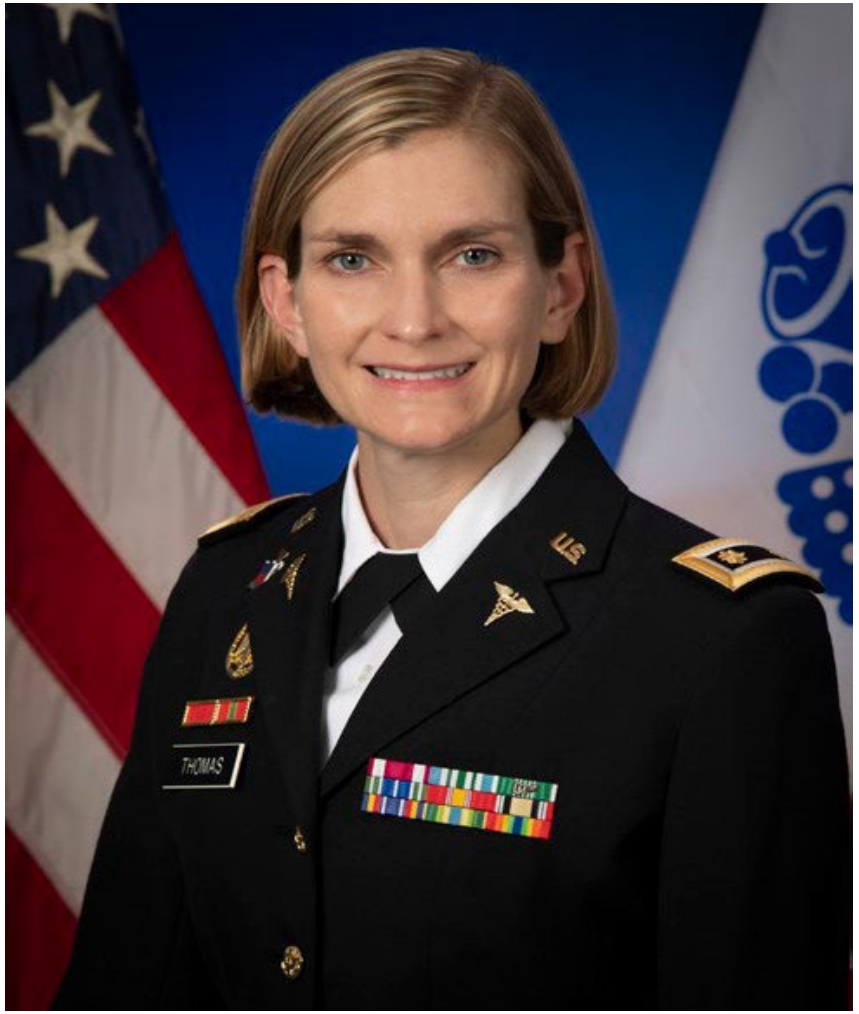

Army Lt. Col. Connie L. Thomas. M.D. is a psychiatrist who serves as the Sleep Medicine Physician Associate Director of the Center for Military Psychiatry and Neuroscience Walter Reed Army Institute of Research Bethesda, Md.

She graduated Summa Cum Laude with a Bachelor of Science degree in Biology and second major in Sociology from Bucknell University in Lewisburg, Pennsylvania.

Lt. Col. Thomas earned her medical degree from the Uniformed Services University (USU) in Bethesda, Md. She completed her residency in Psychiatry and fellowship in Sleep Medicine at Walter Reed Army Medical Center in Bethesda, Md.

Lt. Col. Thomas is assistant faculty for the USU Department of Psychiatry. Some of her military awards include Meritorious Service Medal, Joint Service Commendation Medal, and Army Commendation Medal.

Lt. Col. Thomas is married to John Thomas and has four daughters and one son. She enjoys family time and running.

connie.l.thomas29.mil@health.mil

Disclosures

- Army Lt. Col. Connie L. Thomas has no relevant financial or non-financial relationships to disclose relating to the content of this activity.
- The views expressed in this presentation are those of the author and do not necessarily reflect the official policy or position of the Department of Defense, nor the U.S. Government.
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I will be discussing off-labeled uses for purposes other than that for which the product use was approved by the FDA.

Learning Objectives

At the conclusion of this activity, participants will be able to:

1. Illustrate the role of research for the military specific sleep problem.
2. Summarize the biobehavioral pathway of insomnia.
3. Outline medications used to treat insomnia.
4. Discuss the role of cognitive behavioral therapy for insomnia (CBTi).

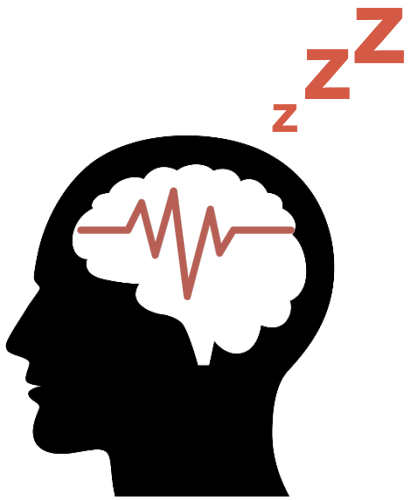
Behavioral Biology Branch

PACE

Performance Assessment & Chemical Evaluation

SRC

Sleep Research Center

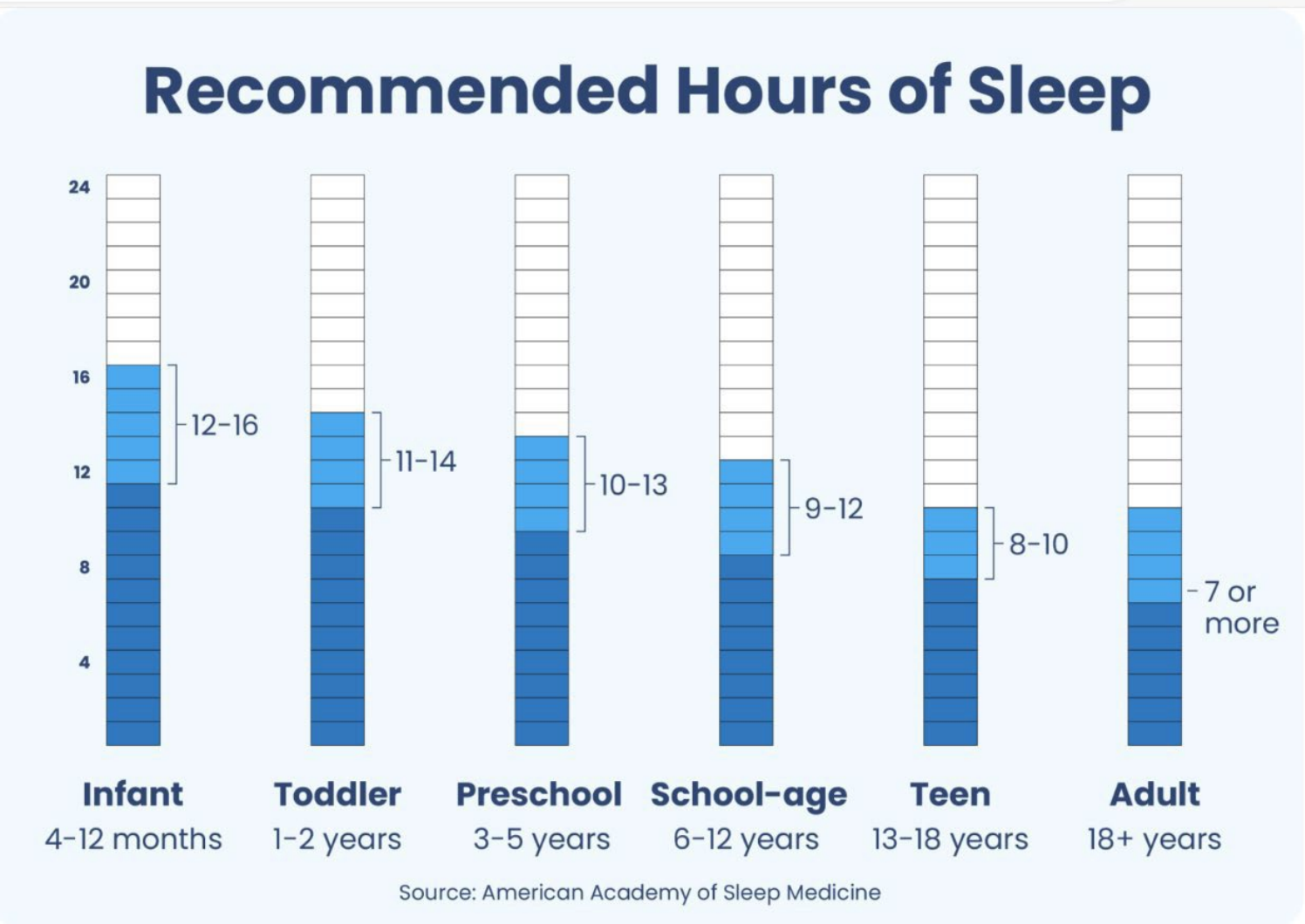


ORT

Operational Research Team

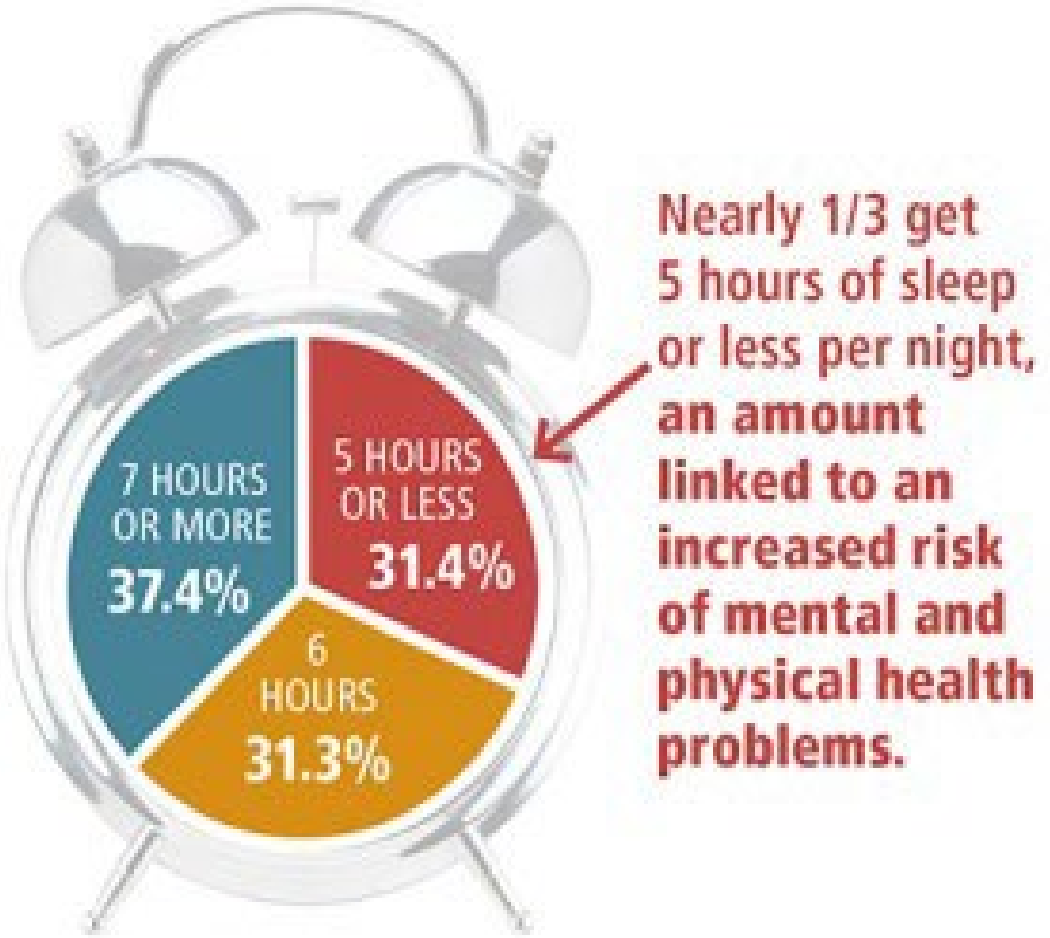
Mission: The exploration and development of strategies and technologies for monitoring, preventing, and/or reversing the decrementing effects of sleep loss and traumatic stress to enhance Warfighter readiness and operational performance.

How Much Sleep Do You Need?



(Suni & Singh, 2024)

A Military Specific Problem....



Nearly 1/3 get 5 hours of sleep or less per night, an amount linked to an increased risk of mental and physical health problems.

(RAND Corporation, 2015)

Problem

Sleep loss and fatigue are a significant threat to our success in Multi-Domain Operations

From the LAB to the FIELD

Sustaining Soldier alertness during sleep loss & circadian desynchrony

From the FIELD to the LAB

Sleep Research Center

- The DOD's **premier** Sleep Research Center in the Army
- **One of six** research groups in the entire DOD focused specifically on sleep-related fatigue mitigation

(DOD: Department of Defense)

Operational Research Team

Mass field actigraphy data collection & novel analysis

Sleep monitoring & circadian entrainment

- **Effectiveness**
- **Readiness**
- **Safety**
- **Performance**

(WRAIR, 2024)

A Military Specific Problem....

(RAND Corporation, 2015)

Patient reports 1 or more of the following (or is observed by parent or caregiver):

- Difficulty initiating sleep
- Difficulty maintaining sleep
- Waking up earlier than desired
- Resistance to going to bed at appropriate time
- Difficulty sleeping without intervention

Patient reports 1 or more of the following related to nighttime sleep difficulty (or is observed by parent or caregiver):

- Fatigue or malaise
- Impaired attention, concentration, or memory
- Impaired performance (social, familial, occupational, or academic)
- Mood disturbance or irritability
- Daytime sleepiness
- Behavioral problems (eg, hyperactivity, impulsivity, or aggression)
- Reduced motivation, energy, or initiative
- Proneness to judgment errors or to physical accidents
- Concerns about or dissatisfaction with sleep

Reported sleep-wake complaints cannot be explained purely by inadequate opportunity or circumstance for sleep:

- Enough time has been allotted for sleep
- Environment is safe, dark, quiet, and comfortable

Sleep disturbance and associated daytime symptoms:

- Occur at least 3 times per week
- Have been present for at least 3 months

Sleep-wake difficulty is not better explained by another sleep disorder (intoxication and acute withdrawal are ruled out)

ICSD-3, International Classification of Sleep Disorders – Third Edition.

What is Insomnia?

(American Academy of Sleep Medicine, 2014)

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(American Academy of Sleep Medicine, 2014)

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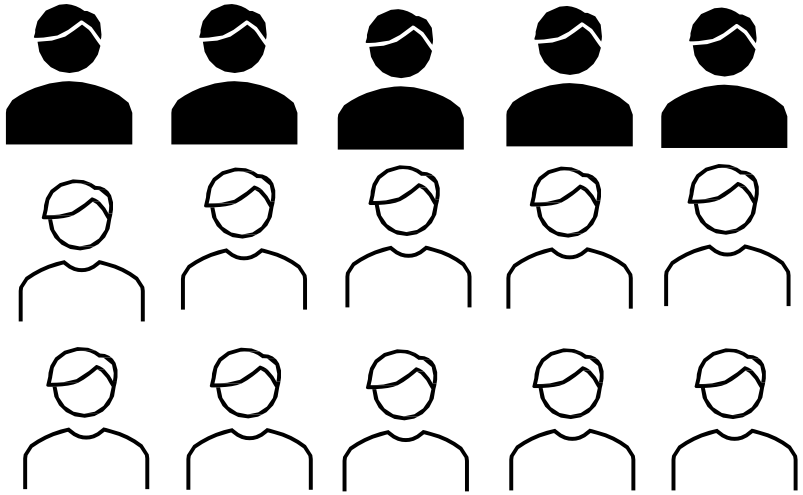
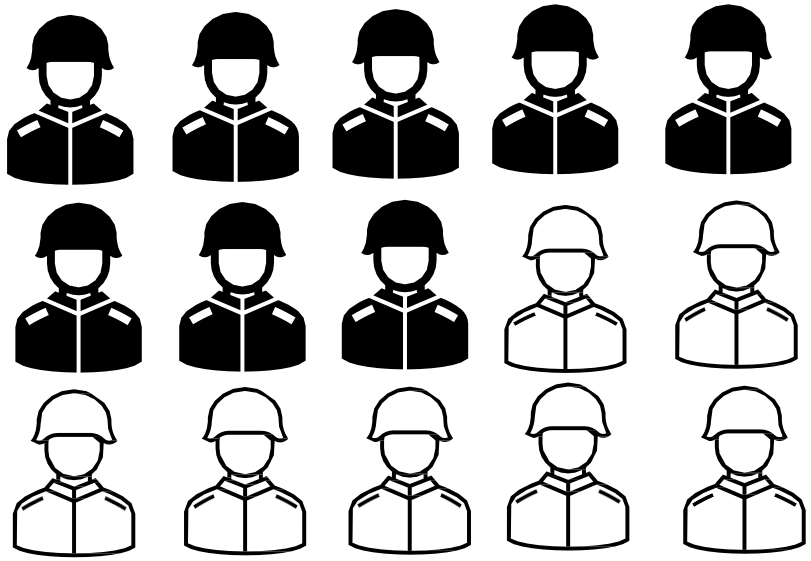
(American Academy of Sleep Medicine, 2014)

Insomnia Symptoms: Prevalence



Civilian: 20-33%



Military: 22.8-54%

(AFHSC, 2023)
(Mysliwiec, 2013)
(RAND Corporation, 2015)

Diagnosis of Insomnia: US Military

2000	2009	2021
Insomnia	Insomnia	Insomnia
7.2*	135.8*	109.3*

*per 10,000 person-years

(AFHSC, 2010)
(AFHSC, 2023)

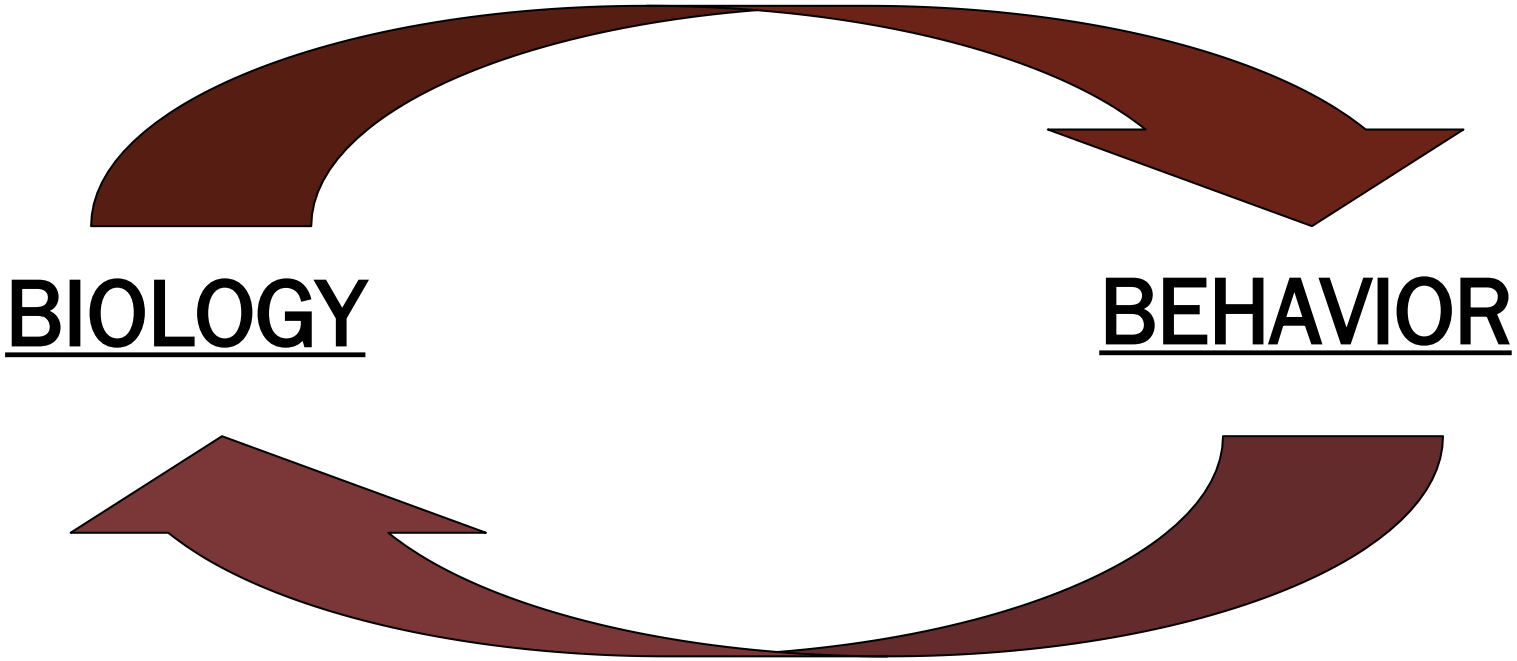
Insomnia: Consequences

- Decreased quality of life
- Increased absenteeism
- Decreased productivity
- Increased accident risk
- Increased risk for psychiatric/medical disorders
- Increased healthcare utilization and costs

(Chesson, 2000)
(Sateia, 2000)

How Insomnia Develops: Old thinking

How Insomnia Develops: Better understanding



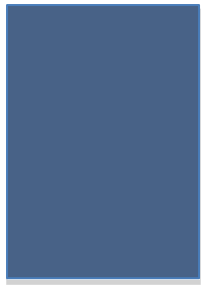
Insomnia

No Insomnia

(Spielman, 1987)

Insomnia

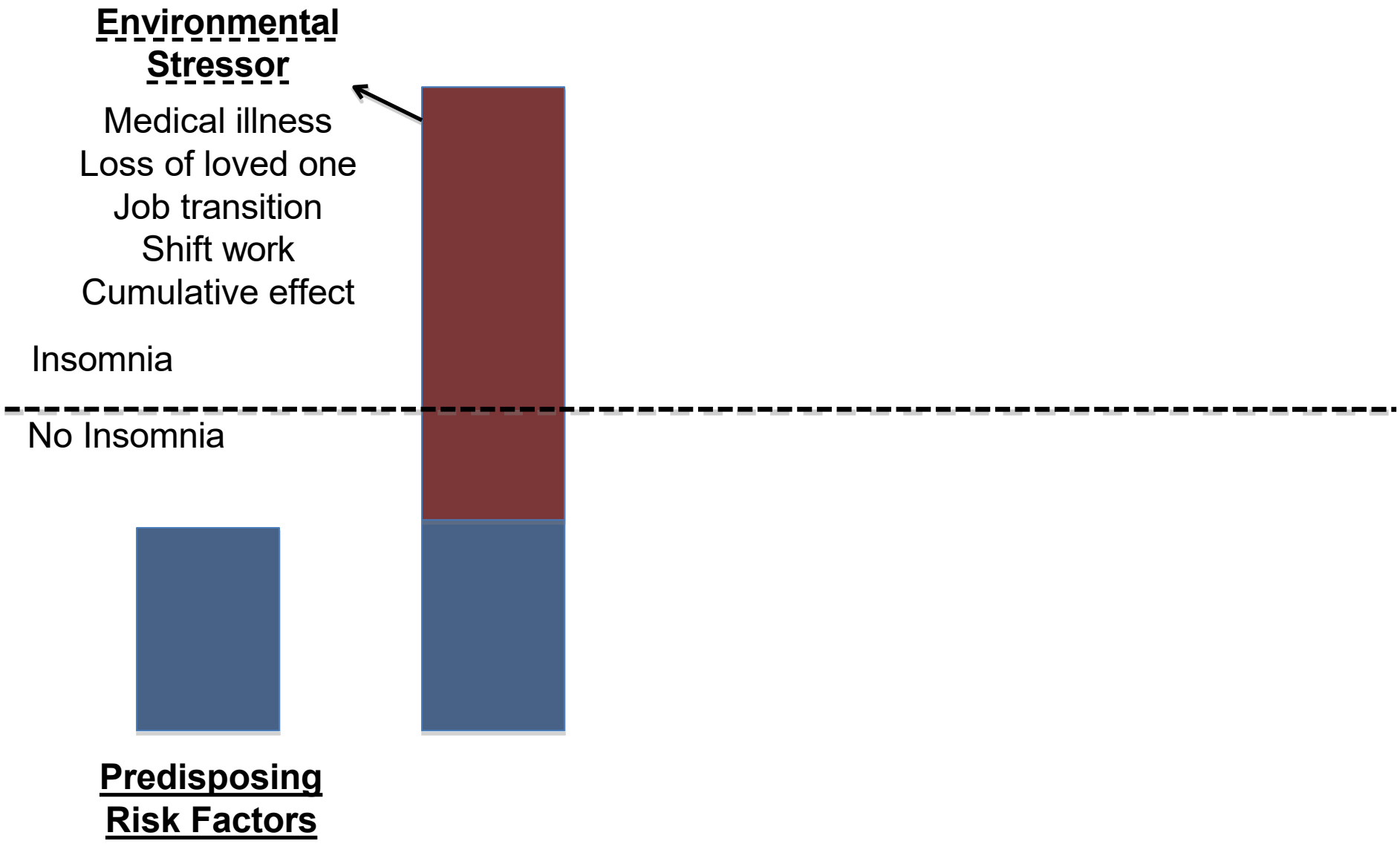
No Insomnia



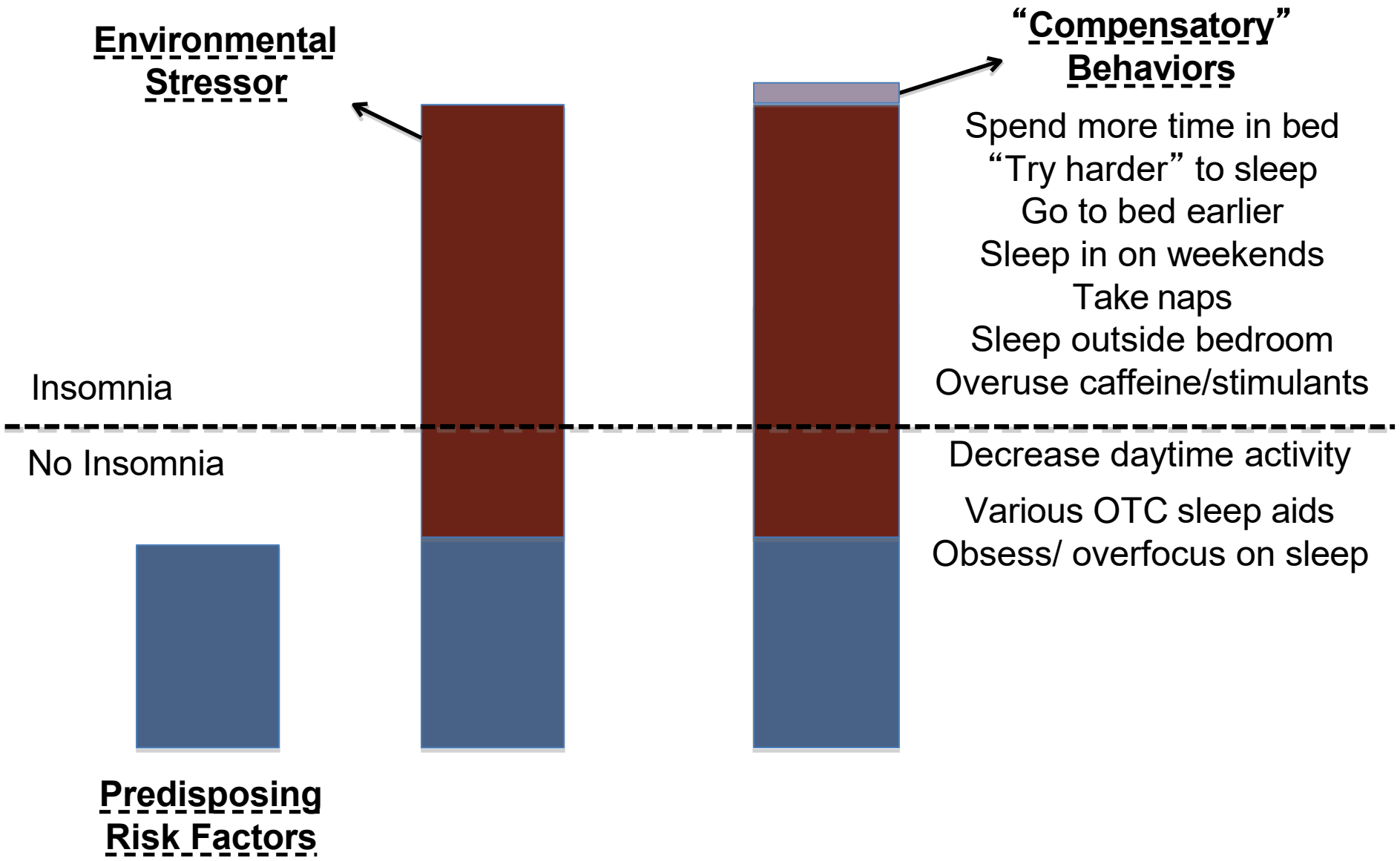
Predisposing Risk Factors

Biology/ Hard-wiring
Personality/Temperament
Adverse Childhood Events

(Spielman, 1987)

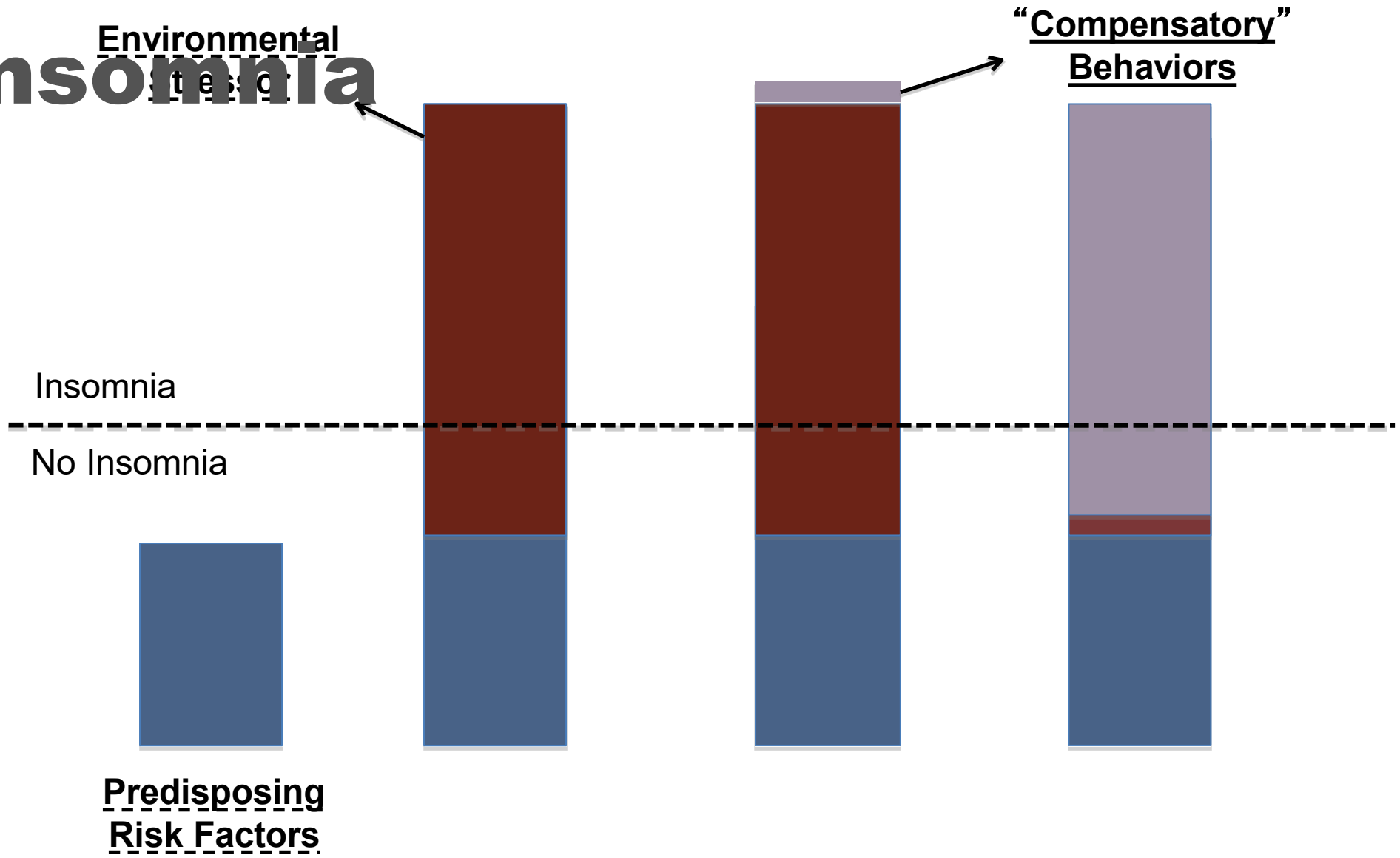


(Spielman, 1987)

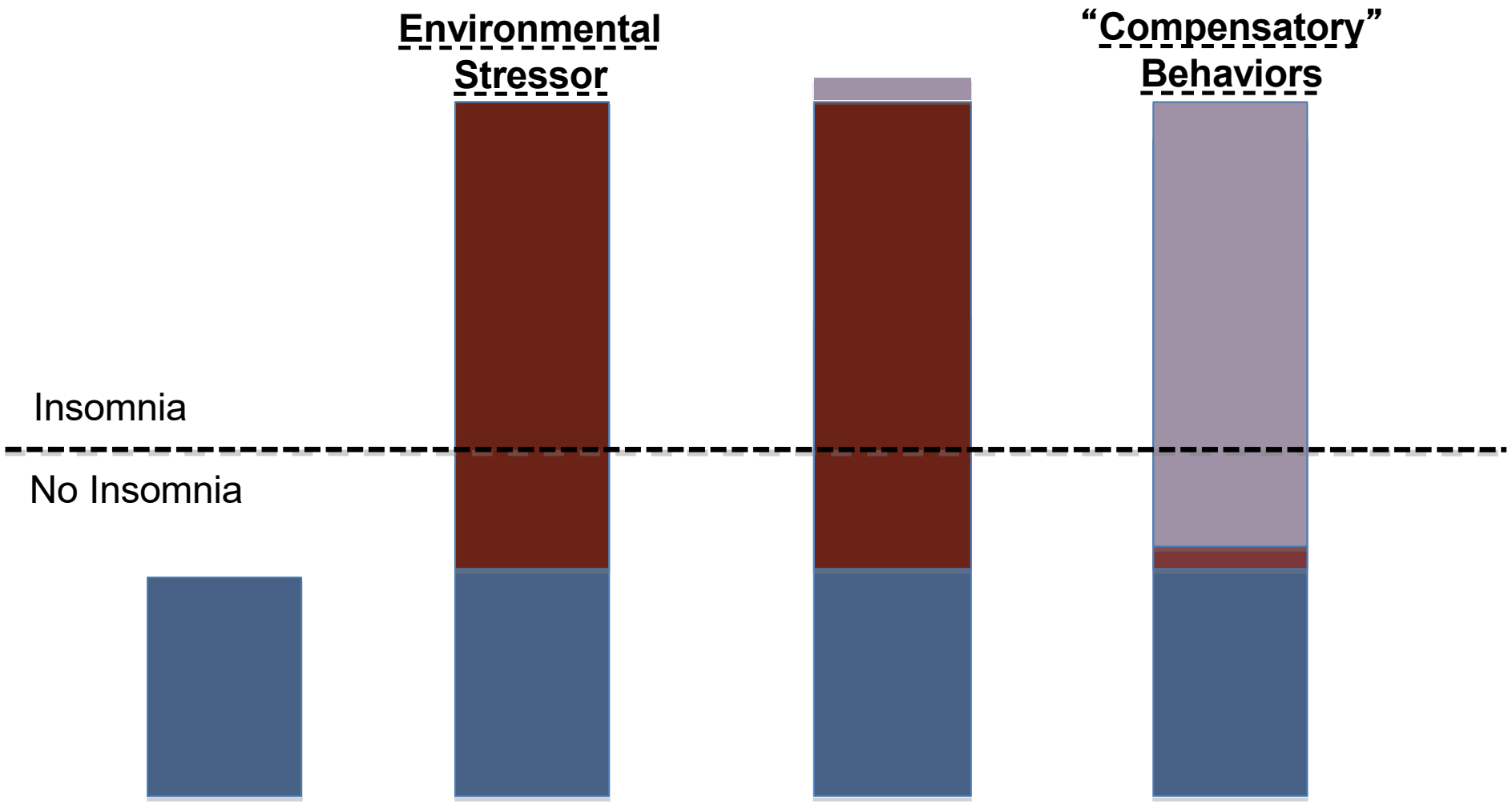


(Spielman, 1987)

Insomnia



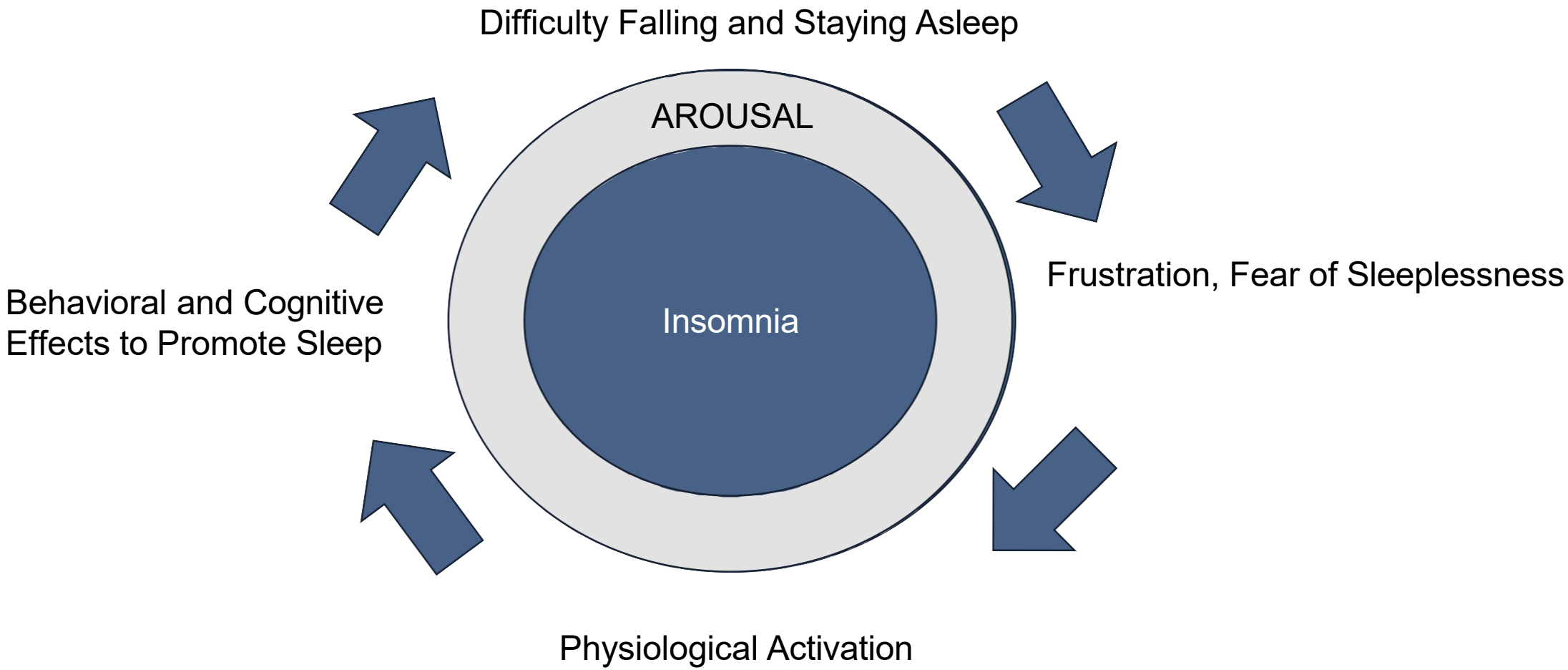
(Spielman, 1987)



ACUTE ⟶ **CHRONIC (≥ 3 mo)**

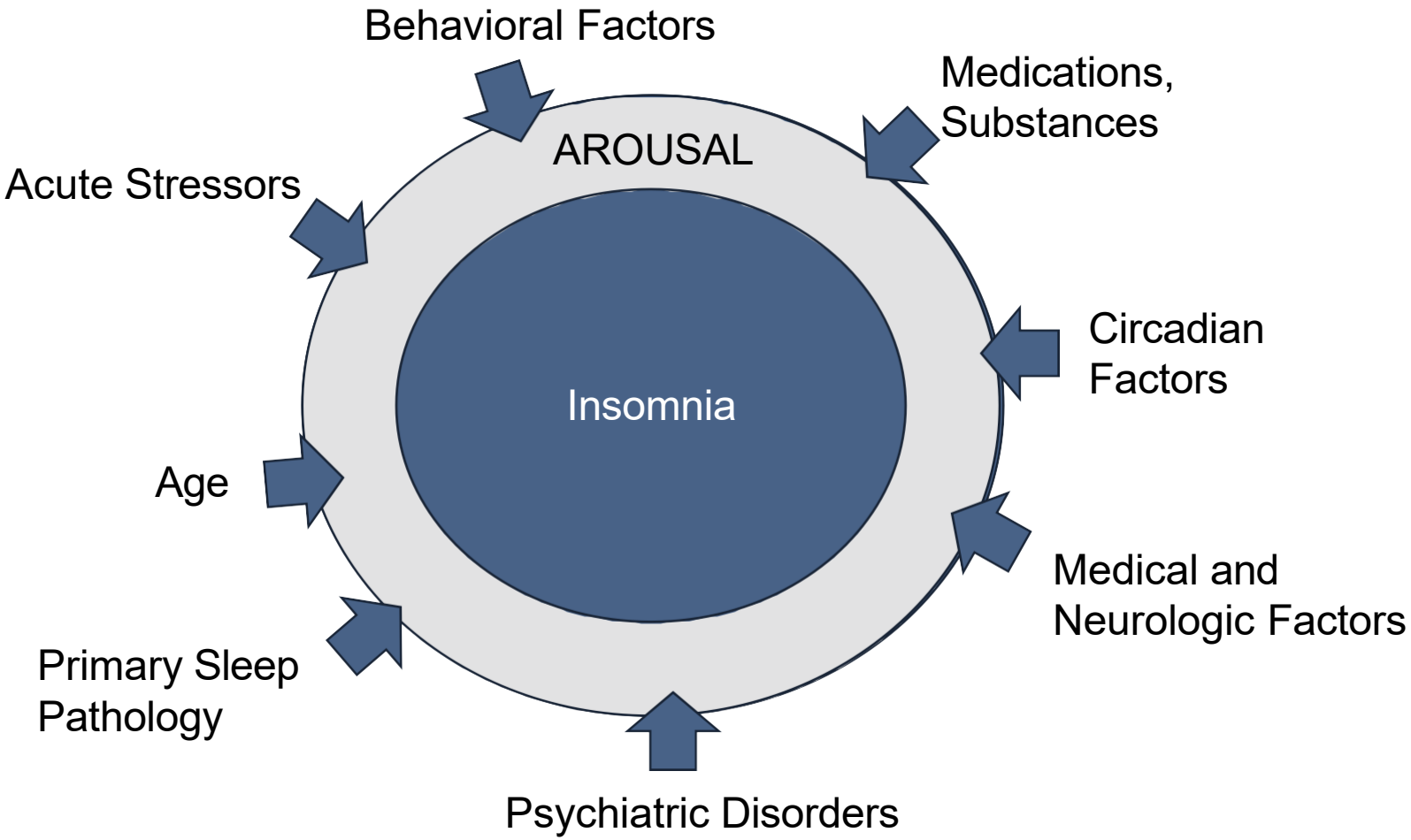
(Spielman, 1987)

Clinical Presentation: Arousal



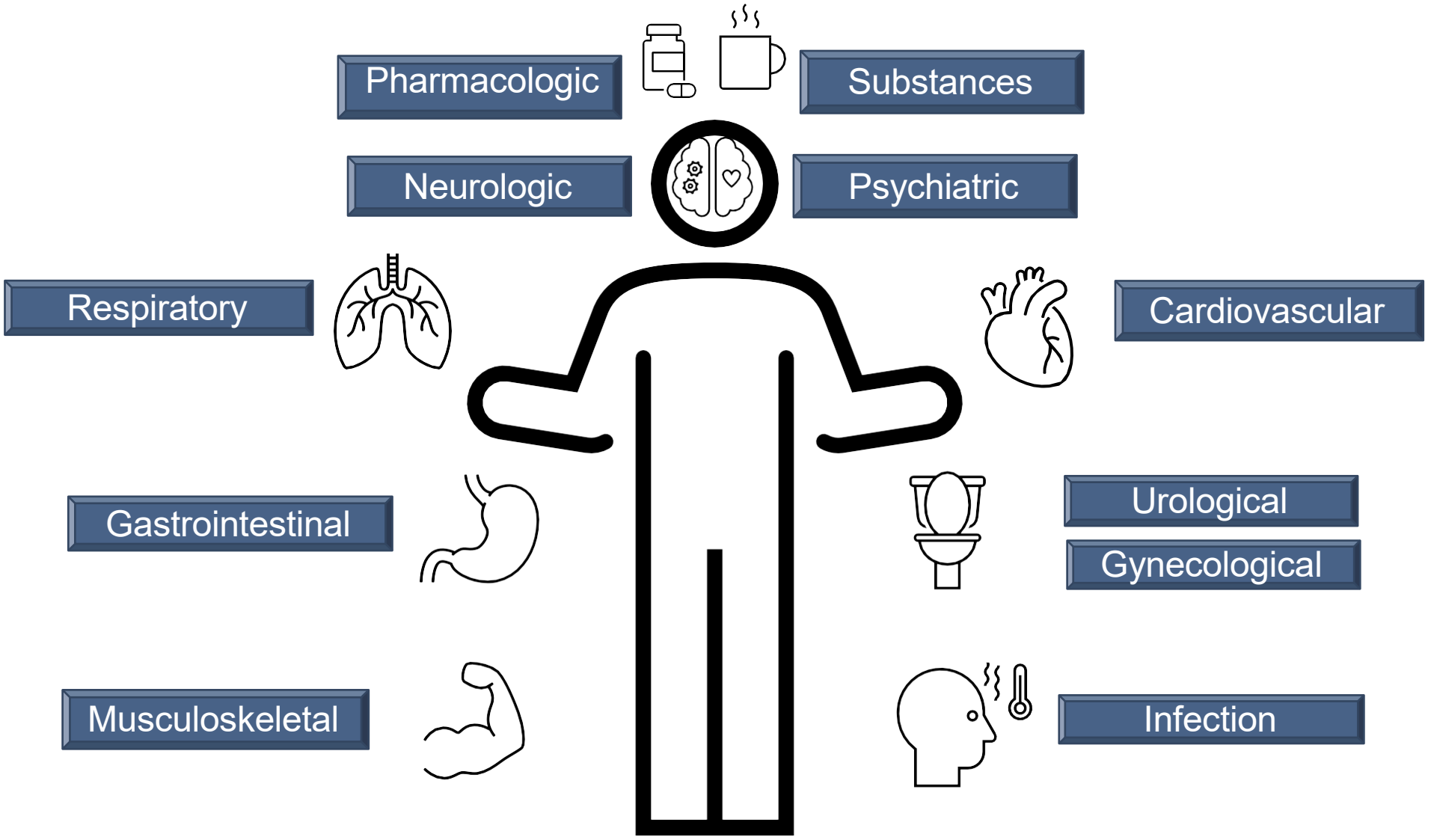
(Levenson, 2015)

Clinical Presentation: Arousal



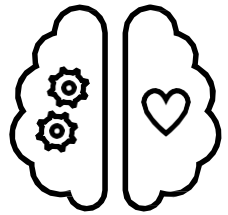
(Levenson, 2015)
(Kalmbach, 2018)

Clinical Presentation: Evaluating The Whole Person



(Yun, 2021)

Sleep Loss and Suicide



- Service Members (SMs) who report sleep difficulties are approximately three times more likely to report suicidal ideation
- Nearly half of SMs who died by suicide had documented sleep problems in their medical records
- Sleep loss impairs stress reactivity, emotional regulation, and cognition
- Theoretical mechanism: impaired decision-making and problem-solving

(APHC, 2021)
(SPIRIRC, 2022)

Medications: Indications

Acute Stress

Shift Work / Jet Lag

Chronic Insomnia

Predictable Stress

(istockphoto, n.d.)

“Ideal Sleeping Pill?”

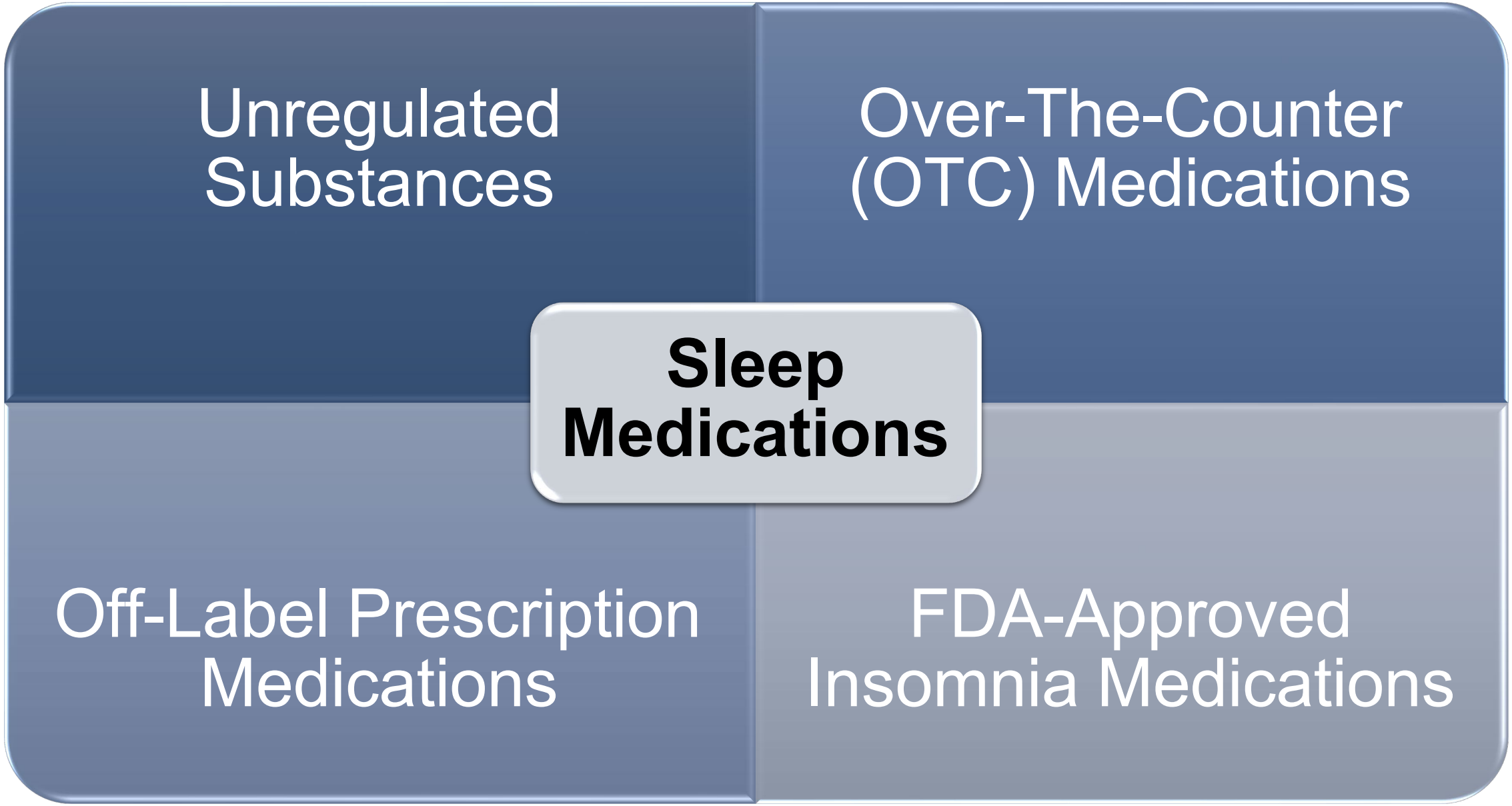
- Gets you to sleep fast
- No hangover effect
- No tolerance
- No side effects

(istockphoto, n.d.)

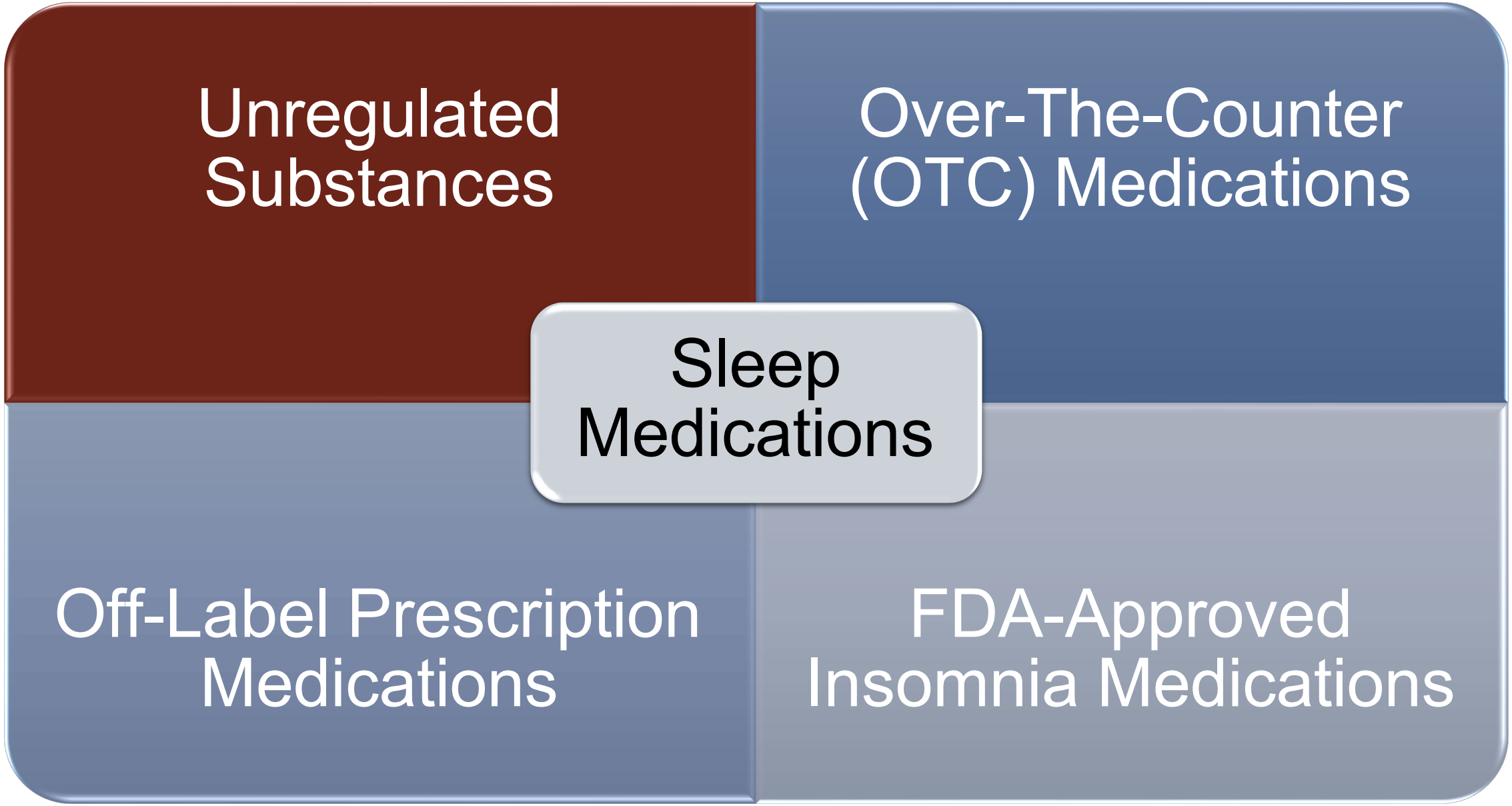
“Ideal Sleeping Pill?”

- **There is <u>no true</u> safe sleeping pill**
- All sleeping pills are sedatives, in one way or another
- All patients taking sleep medication should be counseled

(istockphoto, n.d.)



FDA: Food and Drug Administration

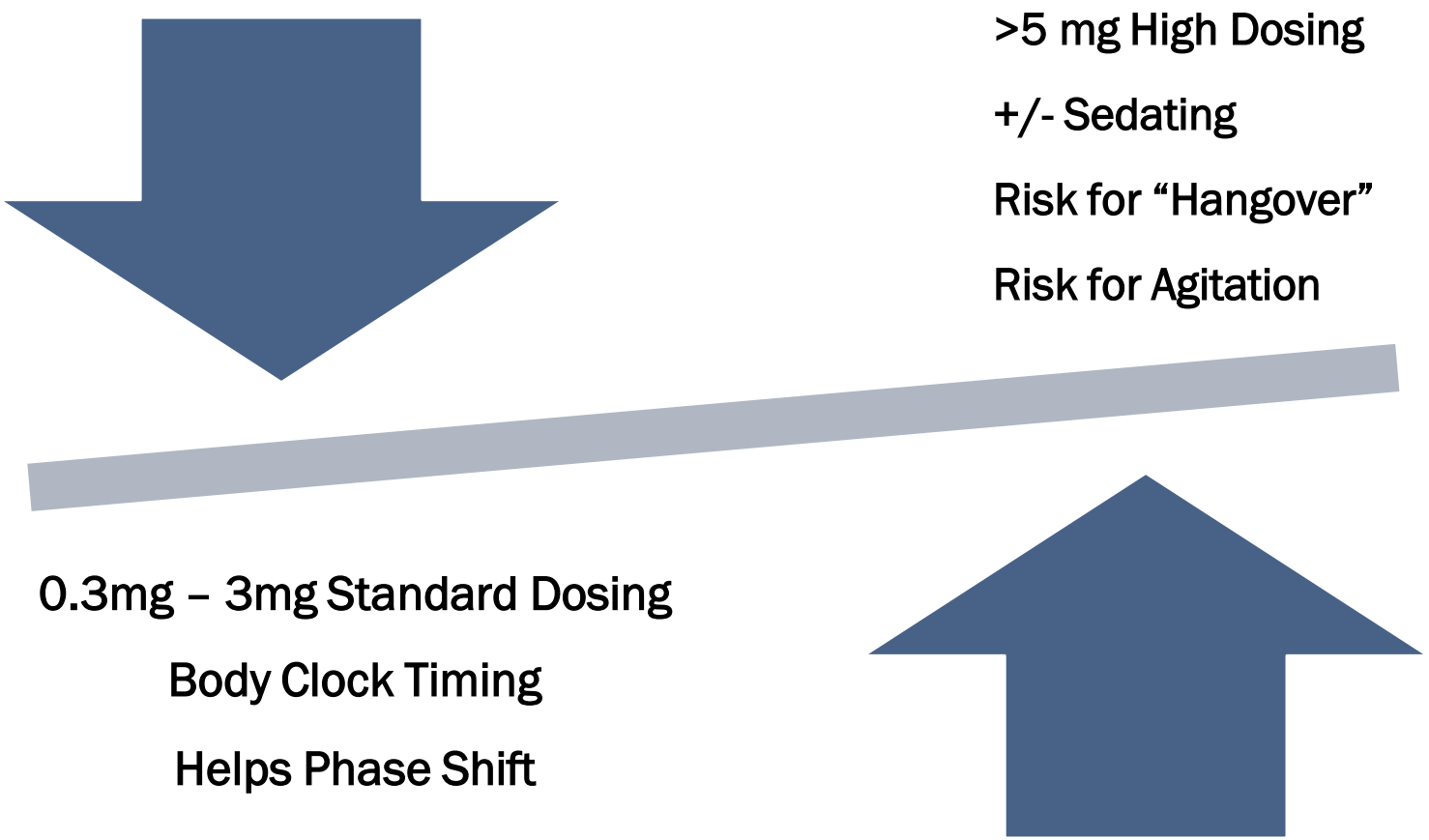

Unregulated Substances
Over-The-Counter (OTC) Medications
Sleep Medications
Off-Label Prescription Medications
FDA-Approved Insomnia Medications

Unregulated Substances: Melatonin

- Natural hormone produced by the pineal gland
- Helps synchronizes the “body clock”
- “Dietary supplement;” FDA does **not** regulate
- Study showed melatonin content did not meet within a 10% margin of the label claim in more than 71% of supplements

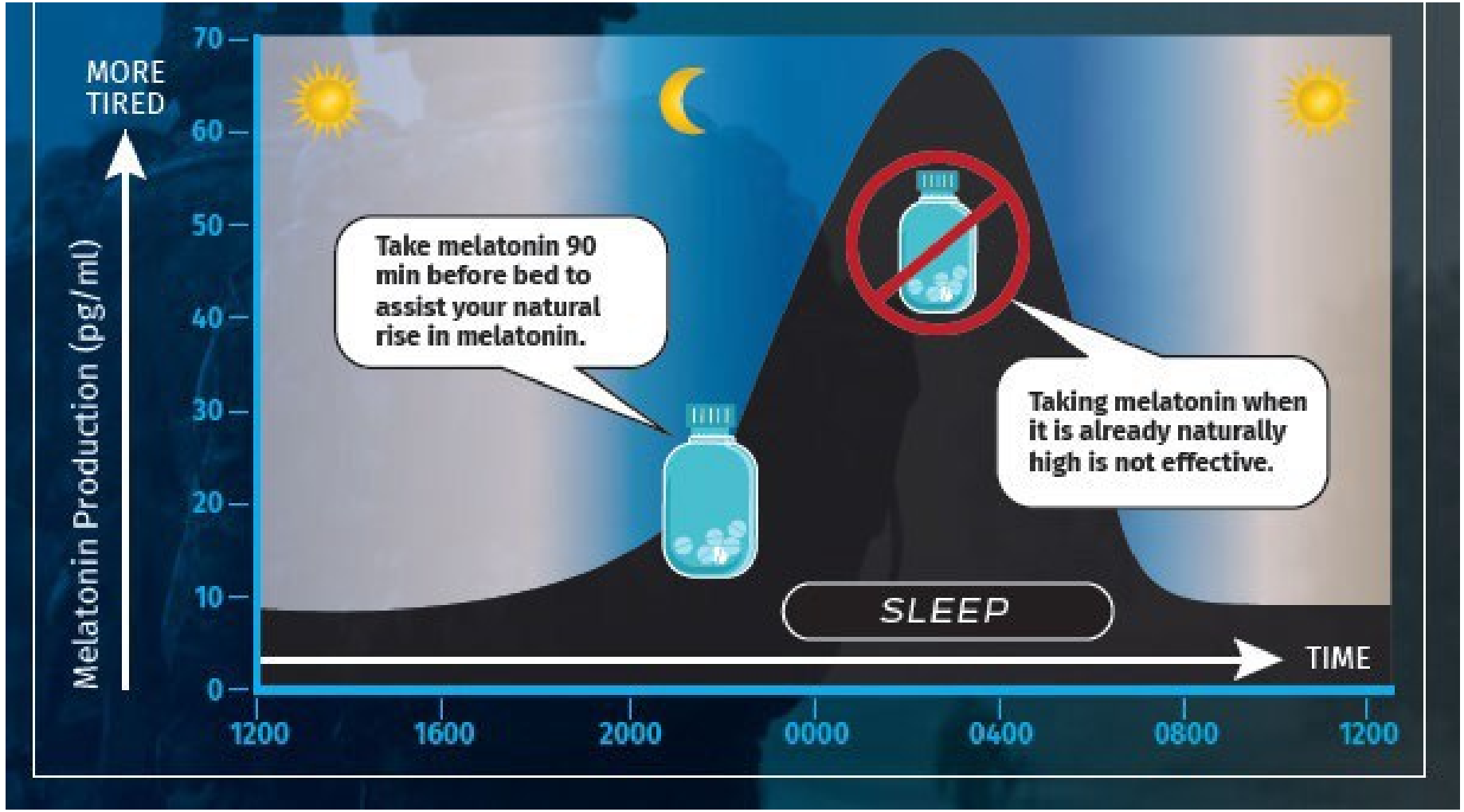
(Erland, 2017)

Unregulated Substance: Melatonin

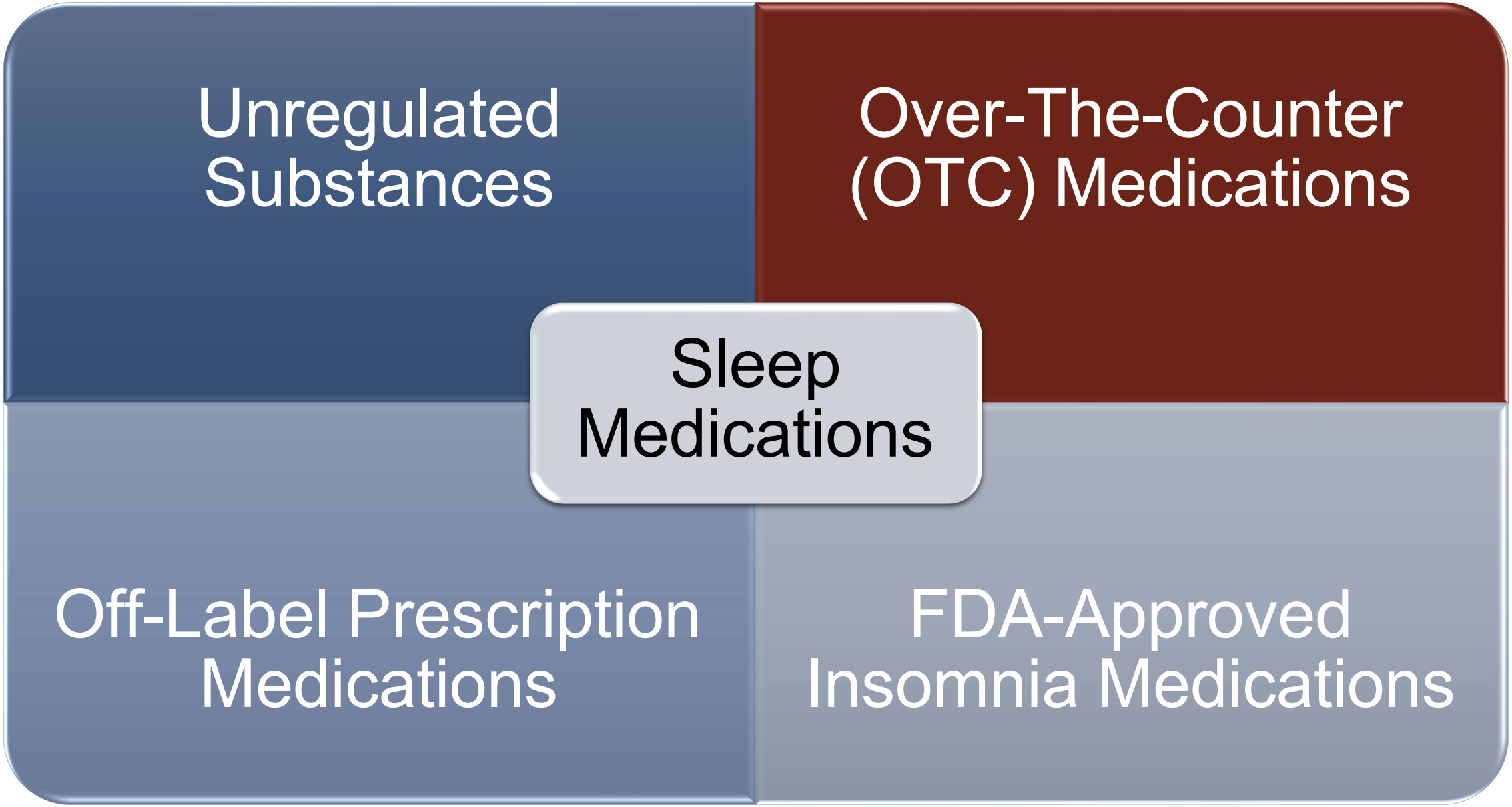


(Burgess, 2010)
(Menczel, 2022)

The Utility of Melatonin



(Developed by the Behavioral Biology Branch, WRAIR, n.d.)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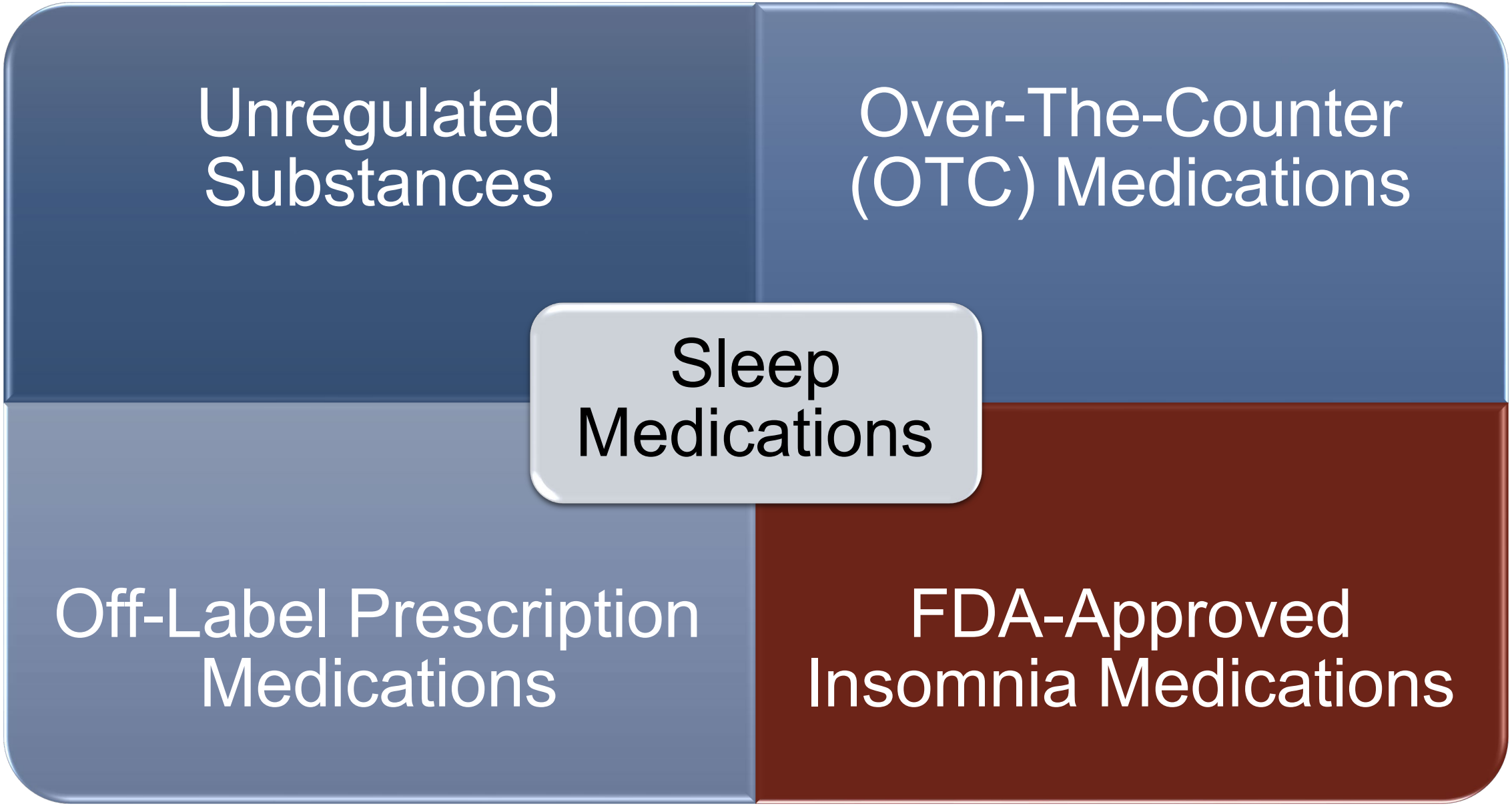
Over the Counter Medications

- Limited efficacy
- Rapid tolerance
- Side effects: Constipation; Dry mouth; Hangover effects
- Drug-Drug interactions

(Culpepper, 2015)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FDA Approved Medications

Benzodiazepines

Valium, Ativan, Clonazepam, Temazepam

Sedative Hypnotics

"Z-Drugs:" Zolpidem, Eszoplicone

Dual Orexin/Hypocretin Receptor Antagonists

Suvorexant, Lemborexant

Selective Melatonin Receptor Agonist

Ramelteon

Selective Histamine Receptor Antagonist

Doxepin

JCSM
Journal of Clinical Sleep Medicine

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, MD[1]; Daniel J. Buysse, MD[2]; Andrew D. Krystal, MD, MS[3]; David N. Neubauer, MD[4]; Jonathan L. Heald, MA[5]

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

(Sateia et al., 2017)

Table 5—Summary of "critical" outcomes by indication.

Recommended for Treating Sleep Onset Insomnia	
Eszopiclone	**Sleep latency:** Mean reduction was 14 min greater, compared to placebo (95% CI: 3 to 24 min reduction); **Quality of sleep*:** Moderate-to-Large[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 2, "Harms" *This recommendation is based on trials of 2 mg and 3 mg doses of eszopiclone.*
Ramelteon	**Sleep latency:** Mean reduction was 9 min greater, compared to placebo (95% CI: 6 to 12 min reduction); **Quality of sleep*:** No improvement[b] in quality of sleep, compared to placebo; **Side effects:** See Recommendation 7, "Harms" *This recommendation is based on trials of 8 mg doses of ramelteon.*
Temazepam	**Sleep latency:** Mean reduction was 37 min greater, compared to placebo (95% CI: 21 to 53 min reduction); **Quality of sleep*:** Small[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 6, "Harms" *This recommendation is based on trials of 15 mg doses of temazepam.*
Triazolam	**Sleep latency*:** Mean reduction was 9 min greater, compared to placebo (95% CI: 4 to 22 min reduction); **Quality of sleep*:** Moderate[c] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 5, "Harms" *This recommendation is based on trials of 0.25 mg doses of triazolam.*
Zaleplon	**Sleep latency:** Mean reduction was 10 min greater, compared to placebo (95% CI: 0 to 19 min reduction); **Quality of sleep*:** No improvement[b] in quality of sleep, compared to placebo; **Side effects:** See Recommendation 3, "Harms" *This recommendation is based on trials of 5 mg and 10 mg doses of zaleplon.*
Zolpidem	**Sleep latency:** Mean reduction was 5–12 min greater, compared to placebo (95% CI: 0 to 19 min reduction); **Quality of sleep*:** Moderate[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 4, "Harms" *This recommendation is based on trials of 10 mg doses of zolpidem.*
Recommended for Treating Sleep Maintenance Insomnia	
Doxepin	**Total sleep time:** Mean improvement was 26–32 min longer, compared to placebo (95% CI: 18 to 40 min improvement); **Wake after sleep onset:** Mean reduction was 22–23 min greater, compared to placebo (95% CI: 14 to 30 min reduction); **Quality of sleep*:** Small-to-moderate[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 8, "Harms" *This recommendation is based on trials of 3 mg and 6 mg doses of doxepin.*
Eszopiclone	**Total sleep time:** Mean improvement was 28–57 min longer, compared to placebo (95% CI: 18 to 76 min improvement); **Wake after sleep onset:** Mean reduction was 10–14 min greater, compared to placebo (95% CI: 2 to 18 min reduction); **Quality of sleep*:** Moderate-to-Large[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 2, "Harms" *This recommendation is based on trials of 2 mg and 3 mg doses of eszopiclone.*
Temazepam	**Total sleep time:** Mean improvement was 99 min longer, compared to placebo (95% CI: 63 to 135 min improvement); **Wake after sleep onset:** Not reported; **Quality of sleep*:** Small[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 6, "Harms" *This recommendation is based on trials of 15 mg doses of temazepam.*
Suvorexant	**Total sleep time:** Mean improvement was 10 min longer, compared to placebo (95% CI: 2 to 19 min improvement); **Wake after sleep onset:** Mean reduction was 16–28 min greater, compared to placebo (95% CI: 7 to 43 min reduction); **Quality of sleep*:** Not reported; **Side effects:** See Recommendation 1, "Harms" *This recommendation is based on trials of 10, 15/20, and 20 mg doses of suvorexant.*
Zolpidem	**Total sleep time:** Mean improvement was 29 min. longer, compared to placebo (95% CI: 11 to 47 min. improvement); **Wake after sleep onset:** Mean reduction was 25 min greater, compared to placebo (95% CI: 18 to 33 min reduction); **Quality of sleep*:** Moderate[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 4, "Harms"

(Sateia, 2017)

Table 5—Summary of "critical" outcomes by indication.

Recommended for Treating Sleep Onset Insomnia	
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Ramelteon	**Sleep latency:** Mean reduction was 9 min greater, compared to placebo (95% CI: 6 to 12 min reduction); **Quality of sleep*:** No improvement[b] in quality of sleep, compared to placebo; **Side effects:** See Recommendation 7, "Harms" *This recommendation is based on trials of 8 mg doses of ramelteon.*
Zolpidem	**Sleep latency:** Mean reduction was 5–12 min greater, compared to placebo (95% CI: 0 to 19 min reduction); **Quality of sleep*:** Moderate[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 4, "Harms" *This recommendation is based on trials of 10 mg doses of zolpidem.*
Zaleplon	**Sleep latency:** Mean reduction was 10 min greater, compared to placebo (95% CI: 0 to 19 min reduction); **Quality of sleep*:** No improvement[b] in quality of sleep, compared to placebo; **Side effects:** See Recommendation 3, "Harms" *This recommendation is based on trials of 5 mg and 10 mg doses of zaleplon.*
Zolpidem	**Sleep latency:** Mean reduction was 5–12 min greater, compared to placebo (95% CI: 0 to 19 min reduction); **Quality of sleep*:** Moderate[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 4, "Harms" *This recommendation is based on trials of 10 mg doses of zolpidem.*
Recommended for Treating Sleep Maintenance Insomnia	
Doxepin	**Total sleep time:** Mean improvement was 26–32 min longer, compared to placebo (95% CI: 18 to 40 min improvement); **Wake after sleep onset:** Mean reduction was 22–23 min greater, compared to placebo (95% CI: 14 to 30 min reduction); **Quality of sleep*:** Small-to-moderate[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 8, "Harms" *This recommendation is based on trials of 3 mg and 6 mg doses of doxepin.*
Eszopiclone	**Total sleep time:** Mean improvement was 28–57 min longer, compared to placebo (95% CI: 18 to 76 min improvement); **Wake after sleep onset:** Mean reduction was 10–14 min greater, compared to placebo (95% CI: 2 to 18 min reduction); **Quality of sleep*:** Moderate-to-Large[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 2, "Harms"
Suvorexant	**Total sleep time:** Mean improvement was 10 min longer, compared to placebo (95% CI: 2 to 19 min improvement); **Wake after sleep onset:** Mean reduction was 16–28 min greater, compared to placebo (95% CI: 7 to 43 min reduction); **Quality of sleep*:** Not reported; **Side effects:** See Recommendation 1, "Harms" *This recommendation is based on trials of 10, 15/20, and 20 mg doses of suvorexant.*
Zolpidem	**Total sleep time:** Mean improvement was 29 min. longer, compared to placebo (95% CI: 11 to 47 min. improvement); **Wake after sleep onset:** Mean reduction was 25 min greater, compared to placebo (95% CI: 18 to 33 min reduction); **Quality of sleep*:** Moderate[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 4, "Harms"

Zolpidem | **Sleep latency:** Mean reduction was 5–12 min greater, compared to placebo (95% CI: 0 to 19 min reduction); **Quality of sleep*:** Moderate[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 4, "Harms"
This recommendation is based on trials of 10 mg doses of zolpidem.

Zolpidem | **Total sleep time:** Mean improvement was 29 min. longer, compared to placebo (95% CI: 11 to 47 min. improvement); **Wake after sleep onset:** Mean reduction was 25 min greater, compared to placebo (95% CI: 18 to 33 min reduction); **Quality of sleep*:** Moderate[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 4, "Harms"

(Sateia, 2017)

Table 4—Summary of clinical practice recommendations and GRADE components of decision-making.

Treatment	Recommendation	Direction and Strength of Recommendation	Quality of Evidence	Benefits and Harms Assessment	Patients' Values and Preferences Assessment
Orexin receptor agonists					
Suvorexant This recommendation is based on trials of 10, 15/20, and 20 mg doses of suvorexant.	We suggest that clinicians use suvorexant as a treatment for sleep maintenance insomnia (versus no treatment) in adults.	WEAK	Low	Benefits outweigh harms	The majority of patients would use this treatment (over no treatment), but many would not.
BZD receptor agonists					
Eszopiclone This recommendation is based on trials of 2 mg and 3 mg doses of eszopiclone.	We suggest that clinicians use eszopiclone as a treatment for sleep onset and sleep maintenance insomnia (versus no treatment) in adults.	WEAK	Very low	Benefits outweigh harms	The majority of patients would use this treatment (over no treatment), but many would not.
Zaleplon This recommendation is based on trials of 10 mg doses of zaleplon.	We suggest that clinicians use zaleplon as a treatment for sleep onset insomnia (versus no treatment) in adults.	WEAK	Low	Benefits outweigh harms	The majority of patients would use this treatment (over no treatment), but many would not.
Zolpidem This recommendation is based on trials of 10 mg doses of zolpidem.	We suggest that clinicians use zolpidem as a treatment for sleep onset and sleep maintenance insomnia (versus no treatment) in adults.	WEAK	Very low	Benefits outweigh harms	The majority of patients would use this treatment (over no treatment), but many would not.
Benzodiazepines					
Triazolam This recommendation is based on trials of 0.25 mg doses of triazolam.	We suggest that clinicians use triazolam as a treatment for sleep onset insomnia (versus no treatment) in adults.	WEAK	High	Benefits approx equal to harms	The majority of patients would use this treatment (over no treatment), but many would not.
Temazepam This recommendation is based on trials of 15 mg doses of temazepam.	We suggest that clinicians use temazepam as a treatment for sleep onset and sleep maintenance insomnia (versus no treatment) in adults.	WEAK	Moderate	Benefits outweigh harms	The majority of patients would use this treatment (over no treatment), but many would not.
Melatonin agonists					
Ramelteon This recommendation is based on trials of 8 mg doses of ramelteon.	We suggest that clinicians use ramelteon as a treatment for sleep onset insomnia (versus no treatment) in adults.	WEAK	Very low	Benefits outweigh harms	The majority of patients would use this treatment (over no treatment), but many would not.
Heterocyclics					
Doxepin This recommendation is based on trials of 3 mg and 6 mg doses of doxepin.	We suggest that clinicians use doxepin as a treatment for sleep maintenance insomnia (versus no treatment) in adults.	WEAK	Low	Benefits outweigh harms	The majority of patients would use this treatment (over no treatment), but many would not.
Trazodone This recommendation is based on trials of 50 mg doses of trazodone.	We suggest that clinicians not use trazodone as a treatment for sleep onset or sleep maintenance insomnia (versus no treatment) in adults.	WEAK	Moderate	Harms outweigh benefits	The majority of patients would use this treatment (over no treatment), but many would not.

(Sateia, 2017)

General Risks of Sleeping Pills

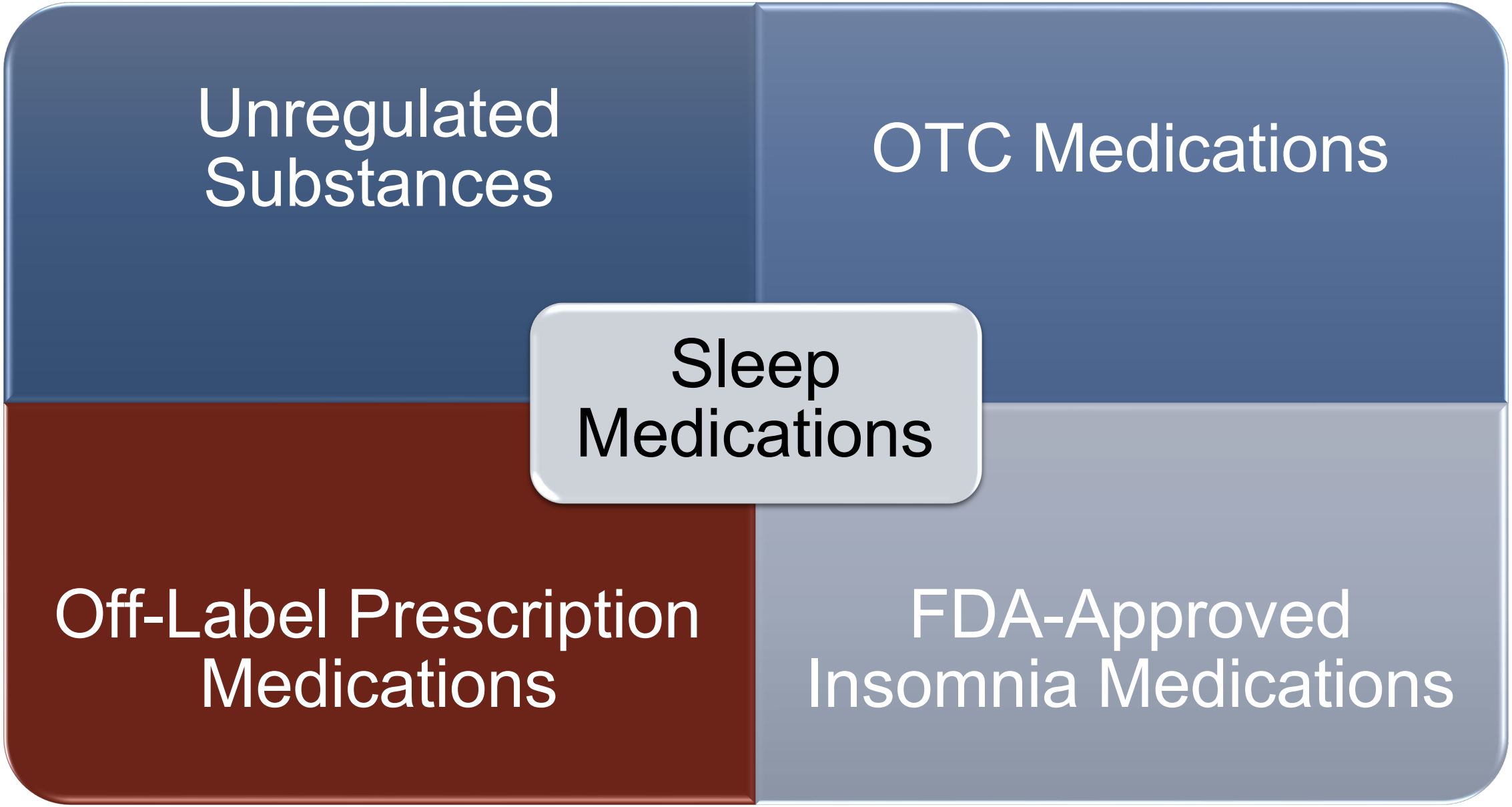
- Caution with certain meds
  - Don’t take it with other sedative medications
  - Don’t combine with alcohol or prescription pain medications
- Don’t take it if you are on-call or have nighttime responsibilities
- Don’t drive for eight hours (at least) after you have taken the medication, and only if you feel safe to drive
- May increase the risk of falls
- “Complex sleep behaviors” for sedative hypnotics
- Rebound insomnia for sedative hypnotics

Duty Limitations

- Chronic insomnia defined as requiring a sedative/hypnotic, antipsychotic or benzodiazepine for greater than three months requires a waiver for most Combat Commands (COCOMs).

- Chronic insomnia is a med-boardable condition
  - Occurs at least three nights per week for at least three months with associated daytime impairment
  - Does not respond to CBTi and/or requires medications three times a week for over six months

(DOD, 2018)
(US Central Command, 2023)


Unregulated Substances
OTC Medications
Sleep Medications
Off-Label Prescription Medications
FDA-Approved Insomnia Medications

Off Label Medications

Antidepressants

Trazodone, Mirtazepine

Antihistamines

Hydroxyzine Hydrochloride

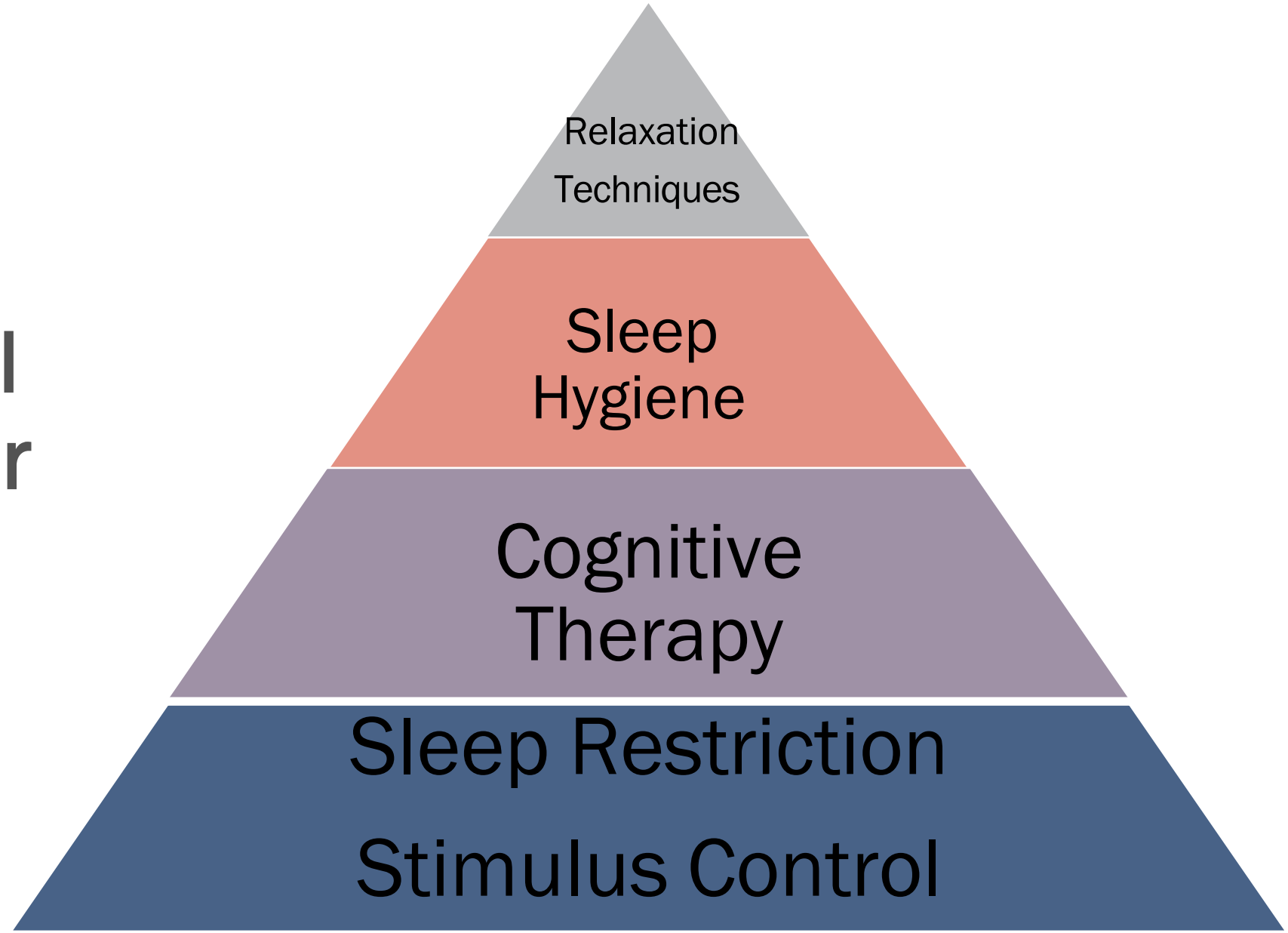
Antipsychotics

Quetiapine

Not Recommended for Treating either Sleep Onset or Sleep Maintenance Insomnia	
Diphenhydramine	**Sleep latency:** Mean reduction was 8 min greater, compared to placebo (95% CI: 2 min increase to 17 min reduction); **Total sleep time:** Mean improvement was 12 min longer, compared to placebo (95% CI: 13 min reduction to 38 min improvement); **Quality of sleep*:** No improvement[a] in quality of sleep, compared to placebo; **Side effects:** See Recommendation 11, "Harms" *This recommendation is based on trials of 50 mg doses of diphenhydramine.*
Melatonin	**Sleep latency:** Mean reduction was 9 min greater, compared to placebo (95% CI: 2 to 15 min reduction); **Quality of sleep*:** Small[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 12, "Harms" *This recommendation is based on trials of 2 mg doses of melatonin.*
Tiagabine	**Total sleep time:** Mean improvement was 1–7 min longer, compared to placebo (95% CI: 7 min reduction to 15 min improvement); **Wake after sleep onset:** Mean reduction was 1–9 min greater, compared to placebo (95% CI: 6 min increase to 25 min reduction); **Quality of sleep*:** No-to-Small[a] improvement in quality of sleep, compared to placebo; **Side effects:** See Recommendation 10, "Harms" *This recommendation is based on trials of 4 mg doses of tiagabine.*
Trazodone	**Sleep latency*:** Mean reduction was 10 min greater, compared to placebo (95% CI: 9 to 11 min reduction); **Wake after sleep onset:** Mean reduction was 8 min greater, compared to placebo (95% CI: 7 to 9 min reduction); **Quality of sleep*:** No improvement[d] in quality of sleep, compared to placebo; **Side effects:** See Recommendation 9, "Harms" *This recommendation is based on trials of 50 mg doses of trazodone.*
L-tryptophan	**Sleep latency:** Not reported; **Wake after sleep onset*:** Mean reduction was 10 min greater, compared to placebo (95% CI: 4 to 15 min reduction); **Quality of sleep*:** Small[a] improvement in quality of sleep, compared to placebo; **Side effects:** see Recommendation 13, "Harms" *This recommendation is based on trials of 250 mg doses of tryptophan.*
Valerian	**Sleep latency:** Mean reduction was 9 min greater, compared to placebo (95% CI: 0 to 18 min reduction); **Quality of sleep*:** Not reported; **Side effects:** See Recommendation 14, "Harms" *This recommendation is based on trials of variable dosages of valerian and valerian-hops combination.*

(Sateia, 2017)

What is Cognitive Behavioral Therapy for Insomnia (CBTi)?



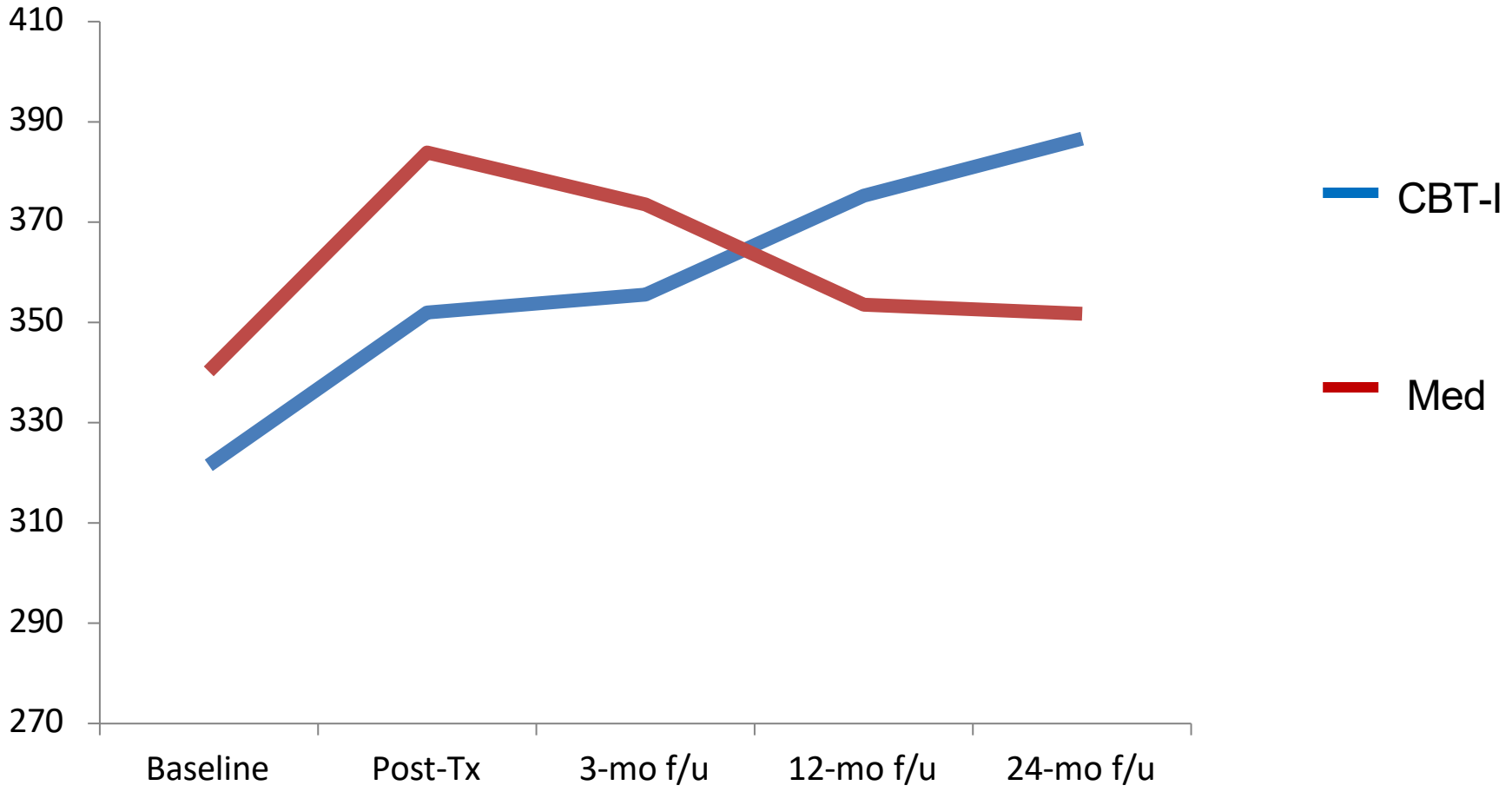
(Furukawa, 2024)

CBT-i is Effective

- Meta-analyses of randomized controlled trials—the highest quality evidence in medicine
- National Institutes of Health (NIH) Consensus Statement
- American Academy of Sleep Medicine Clinical Guidelines

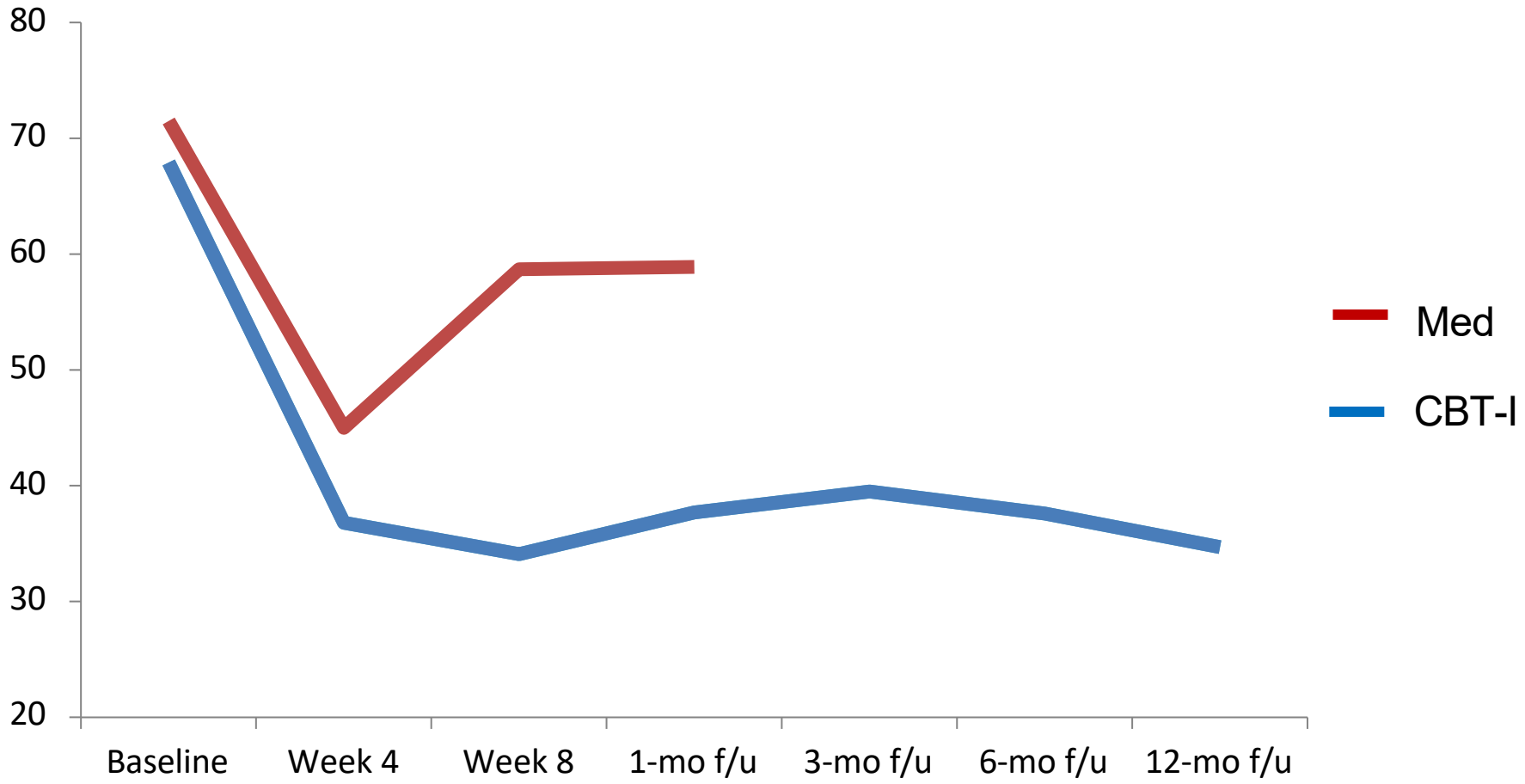
(Edinger, 2021)
(NIH, 2005)

Total Sleep Time



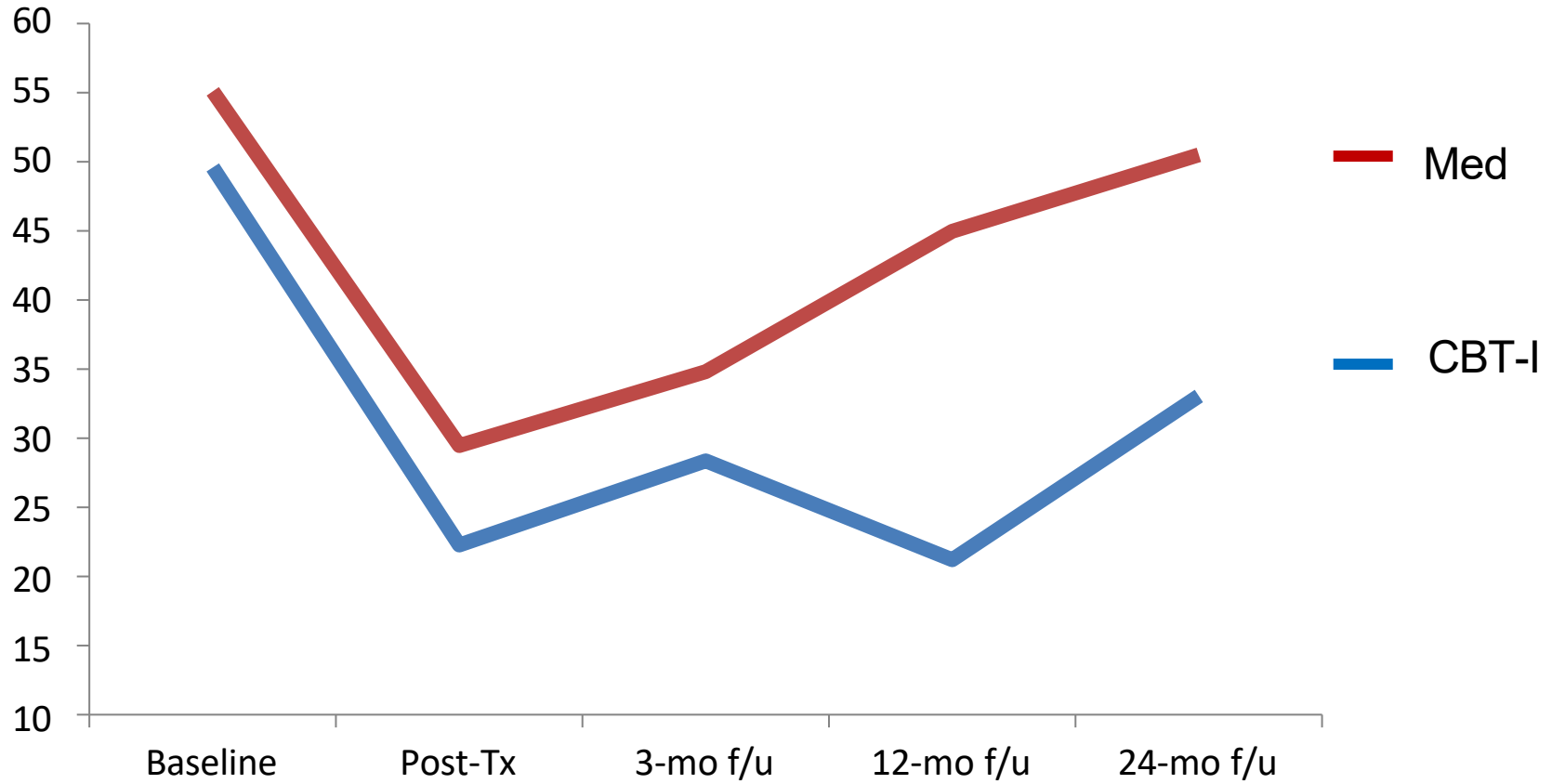
(Morin, 1999)

How Long It Takes to Fall Asleep (Minutes)



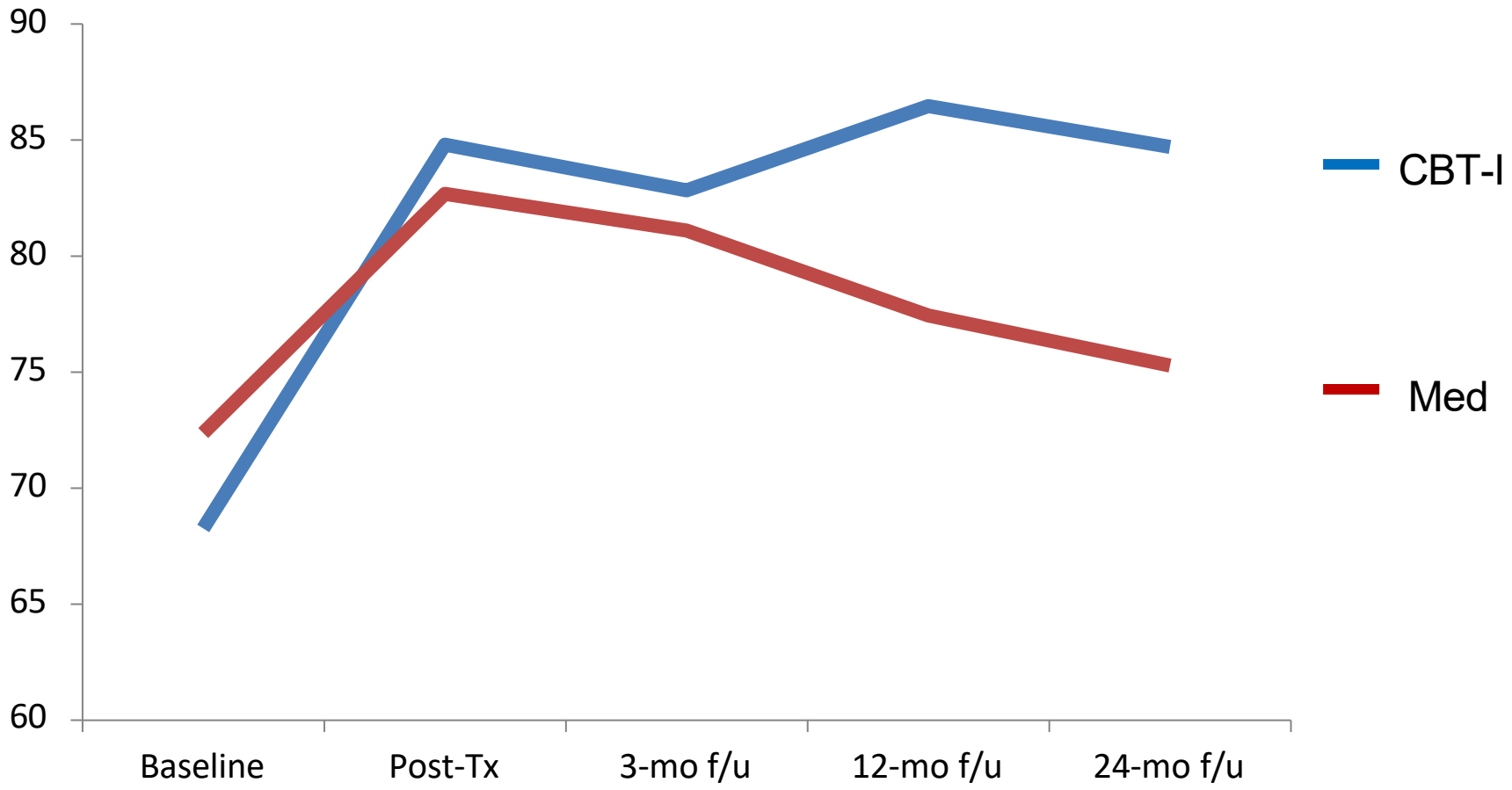
(Jacobs, 2004)

Wake Time After Sleep Onset (Minutes)



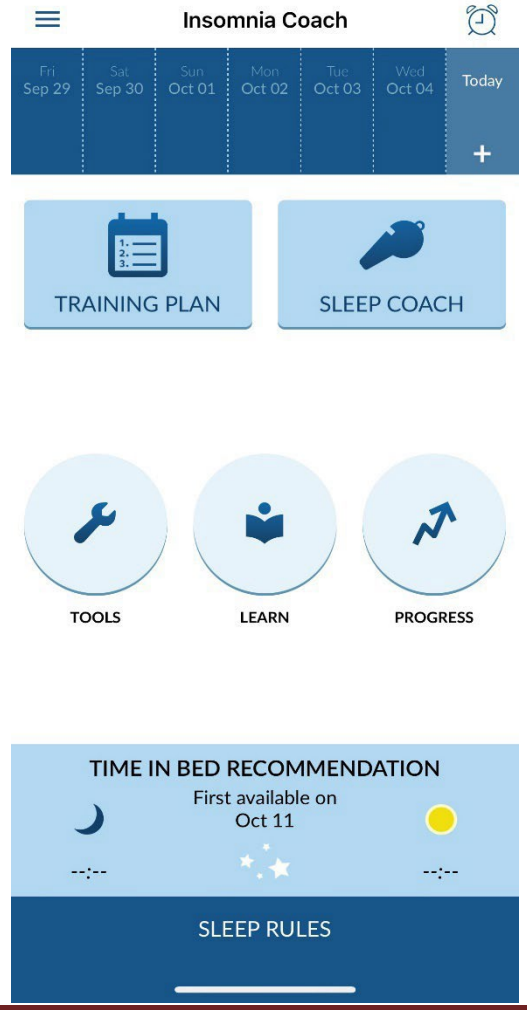
(Morin, 1999)

Sleep Efficiency (Time Asleep/Total Time in Bed)



(Morin, 1999)

You Don't Have to Wait for a Referral to a Sleep Specialist!

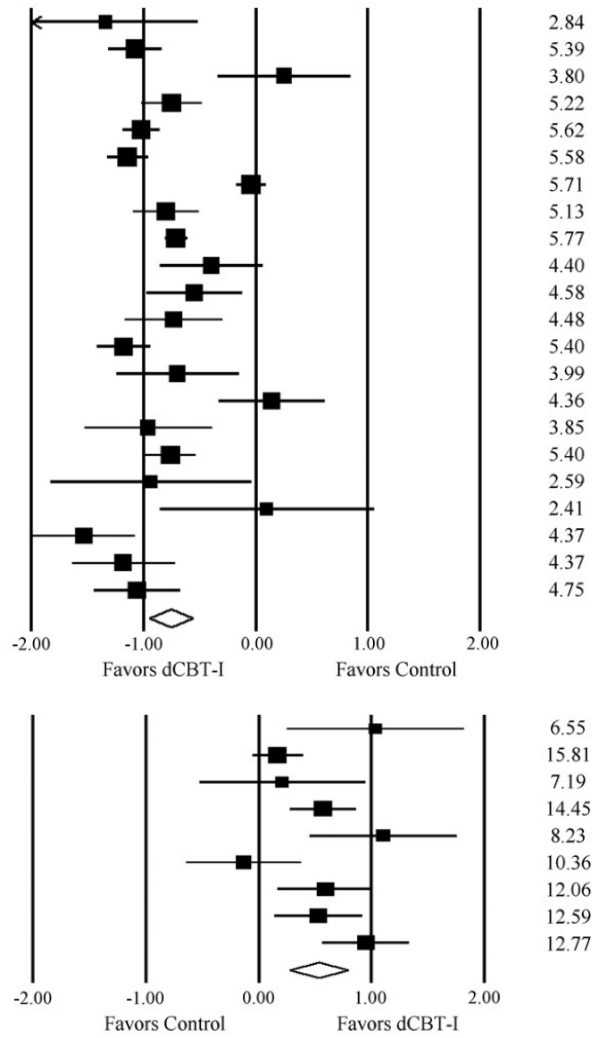


(Lu, 2023)
(Lin, 2023)
(Zang, 2023)

Fig. 4: The effect of dCBT-I on sleep outcome and sleep efficiency.

From: Digital cognitive behavioral therapy for insomnia on depression and anxiety: a systematic review and meta-analysis

Study Name	SMD	SE	Statistics for Each Study: Variance	Lower Limit	Upper Limit	z-value	p-value	Sample Size: Intervention	Control	Relative Weight
Sleep Outcome										
Agyemang et al. (2017)	-1.340	0.418	0.175	-2.159	-0.520	-3.203	0.001	14	14	2.84
Ahorsu et al. (2020)	-1.077	0.120	0.014	-1.312	-0.843	-9.003	0.000	160	160	5.39
Blom et al. (2015)	0.255	0.299	0.090	-0.332	0.842	0.851	0.395	22	23	3.80
Bostock et al. (2016)	-0.749	0.142	0.020	-1.027	-0.471	-5.279	0.000	98	116	5.22
Cheng et al. (2019)	-1.021	0.083	0.007	-1.184	-0.858	-12.271	0.000	358	300	5.62
Christensen et al. (2016)	-1.143	0.090	0.008	-1.320	-0.966	-12.650	0.000	248	333	5.58
Espie et al. (2019)	-0.041	0.064	0.004	-0.166	0.084	-0.646	0.518	468	517	5.71
Felder et al. (2020)	-0.799	0.153	0.023	-1.099	-0.500	-5.230	0.000	91	94	5.13
Freeman et al. (2017)	-0.711	0.049	0.002	-0.806	-0.615	-14.583	0.000	733	1142	5.77
Glozier et al. (2019)	-0.395	0.234	0.055	-0.853	0.063	-1.690	0.091	40	35	4.40
Kalmbach et al. (2020)	-0.548	0.215	0.046	-0.969	-0.127	-2.551	0.011	46	44	4.58
Krieger et al. (2019)	-0.729	0.226	0.051	-1.171	-0.286	-3.228	0.001	34	54	4.48
Kyle et al. (2020)	-1.176	0.118	0.014	-1.408	-0.944	-9.927	0.000	155	181	5.40
Lancee et al. (2015)	-0.696	0.278	0.077	-1.241	-0.151	-2.502	0.012	36	22	3.99
Lancee et al. (2016)	0.145	0.238	0.057	-0.322	0.612	0.610	0.542	26	55	4.36
Lorenz et al. (2018)	-0.961	0.293	0.086	-1.536	-0.387	-3.279	0.001	25	27	3.85
Majd et al. (2020)	-0.759	0.117	0.014	-0.988	-0.529	-6.471	0.000	156	156	5.40
Pillai et al. (2015)	-0.936	0.456	0.208	-1.830	-0.043	-2.054	0.040	13	9	2.59
Sveen et al. (2021)	0.100	0.486	0.236	-0.853	1.053	0.206	0.837	9	8	2.41
van der Zweerde et al. (2019)	-1.533	0.237	0.056	-1.998	-1.068	-6.463	0.000	45	47	4.37
van der Zweerde et al. (2020)	-1.181	0.237	0.056	-1.644	-0.717	-4.991	0.000	43	41	4.37
van Straten et al. (2014)	-1.059	0.197	0.039	-1.444	-0.673	-5.385	0.000	59	59	4.75
Overall random effects model	-0.760	0.098	0.010	-0.953	-0.567	-7.722	0.000			
Sleep Efficiency										
Agyemang et al. (2017)	1.034	0.402	0.162	0.246	1.823	2.570	0.010	14	14	6.55
Ahorsu et al. (2020)	0.166	0.112	0.013	-0.053	0.386	1.486	0.137	160	160	15.81
Blom et al. (2015)	0.210	0.373	0.139	-0.521	0.941	0.563	0.573	11	21	7.19
Felder et al. (2020)	0.570	0.150	0.023	0.276	0.864	3.800	0.000	91	94	14.45
Lancee et al. (2015)	1.106	0.331	0.110	0.456	1.755	3.337	0.001	25	18	8.23
Lancee et al. (2016)	-0.133	0.261	0.068	-0.645	0.378	-0.511	0.609	21	49	10.36
van der Zweerde et al. (2019)	0.592	0.213	0.045	0.175	1.010	2.780	0.005	45	47	12.06
van der Zweerde et al. (2020)	0.529	0.199	0.040	0.140	0.919	2.663	0.008	55	50	12.59
van Straten et al. (2014)	0.950	0.194	0.038	0.570	1.331	4.893	0.000	59	59	12.77
Overall random effects model	0.528	0.129	0.017	0.275	0.781	4.086	0.000			



Forest plot of studies reporting the effect of dCBT-I on sleep outcome and sleep efficiency.

(Lee, 2023)

Summary/Key Takeaways

- Sleep loss is prevalent in the military due to unique occupational factors (i.e., operating tempo [OPTEMPO], deployments, work-life balance and mission creep)
- Clinically significant sleep problems are also prevalent in the military and is a result of predisposing, precipitating, and perpetuating factors.
- Evidence based treatments are available and include medications and CBTi
- CBTi appears to have the best long-term efficacy for treating insomnia and is available in digital applications

Questions?

For resources developed by the Behavioral Biology Branch, visit:
https://wrair.health.mil/Biomedical-Research/Center-for-Military-Psychiatry-and- Neuroscience/CMPN-Training-Products/

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