



Insomnia and Mental Health

Michael A. Grandner PhD MTR CBSM DBSM FAASM FAHA

Director, Sleep and Health Research Program

Director, Behavioral Sleep Medicine Clinical Program

Associate Professor of Psychiatry, Psychology, Medicine, and Nutritional Sciences

Associate Professor of Clinical and Translational Science

University of Arizona College of Medicine

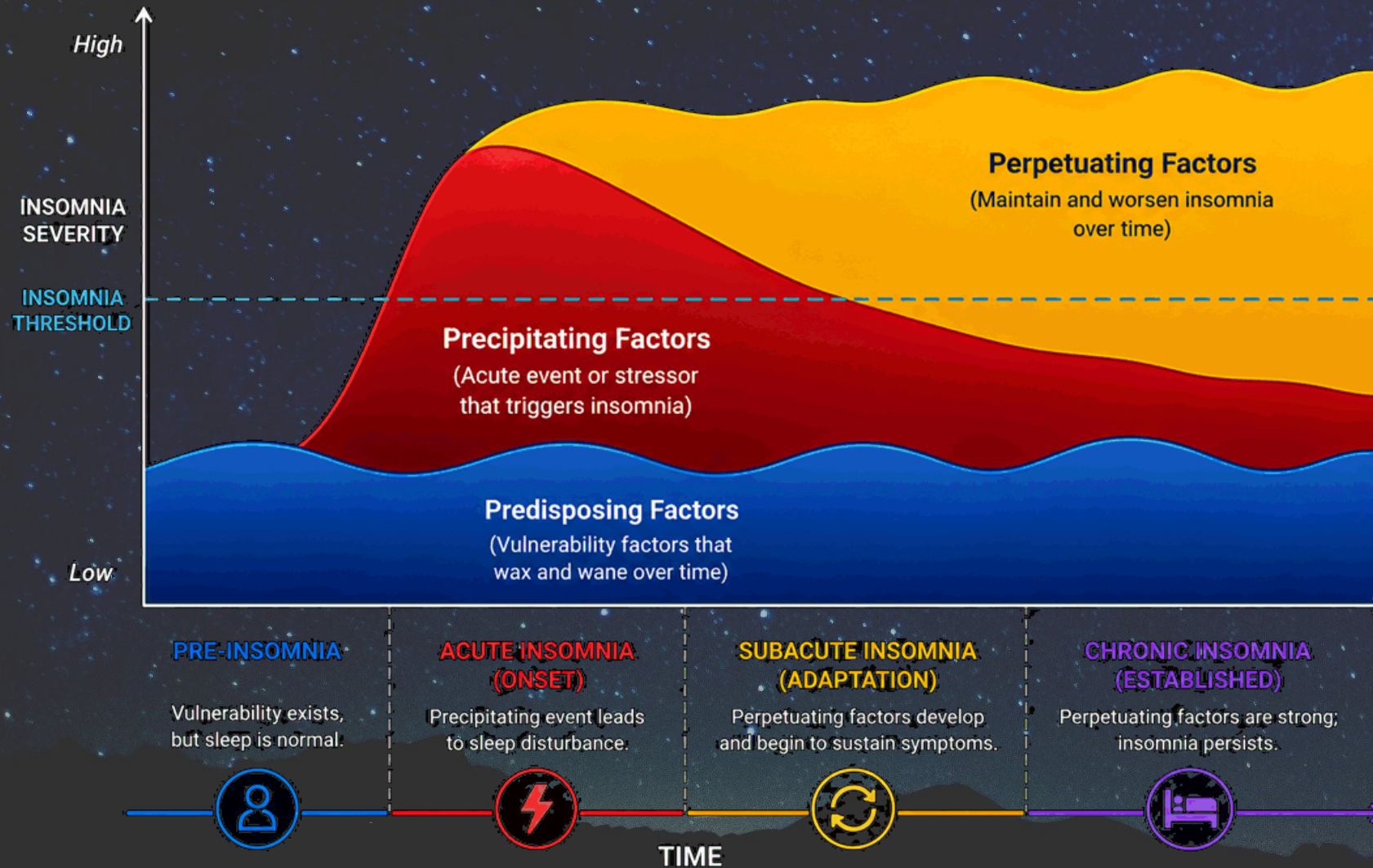
<http://www.michaelgrandner.com> | @michaelgrandner

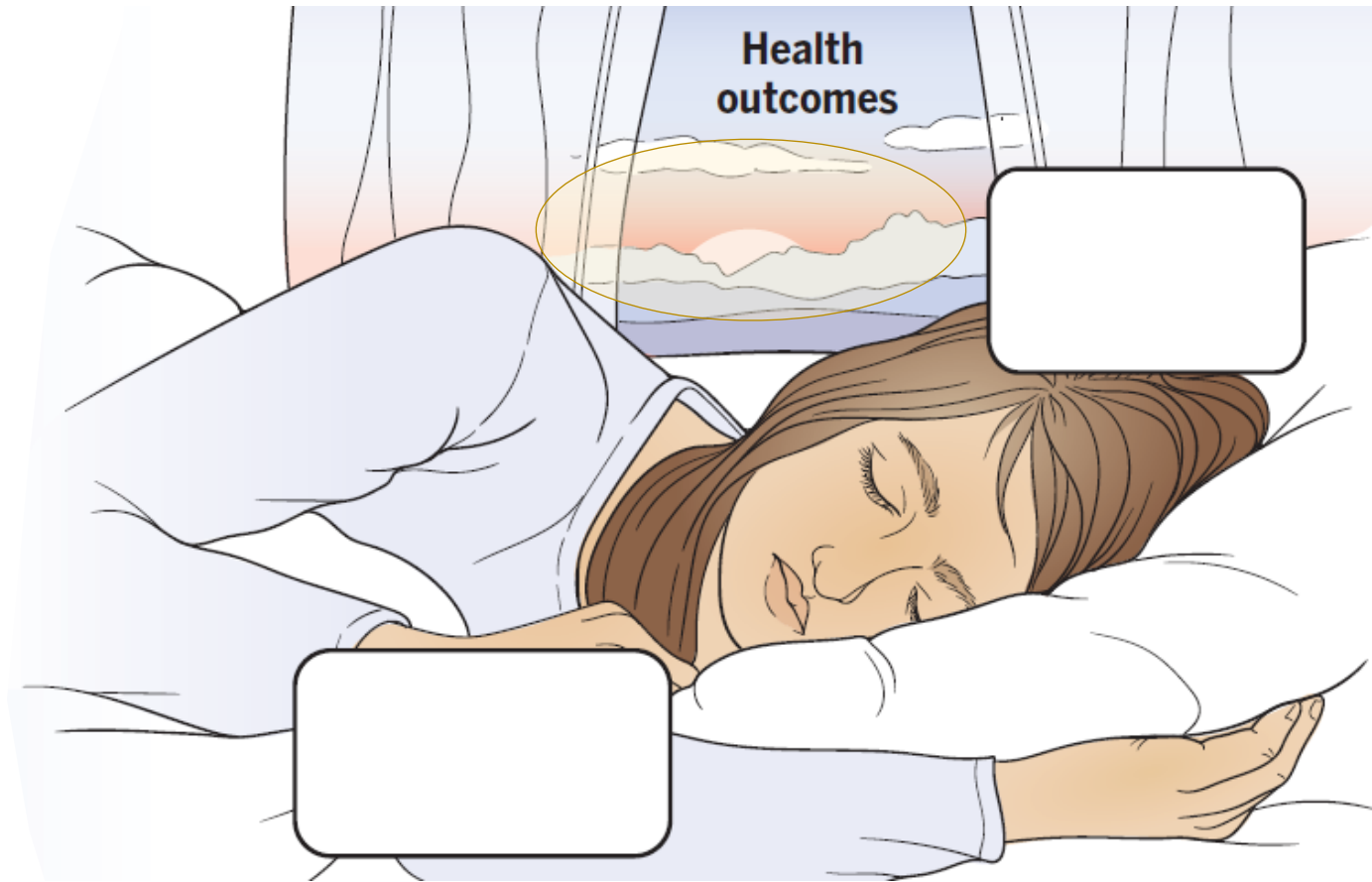
The definition of insomnia

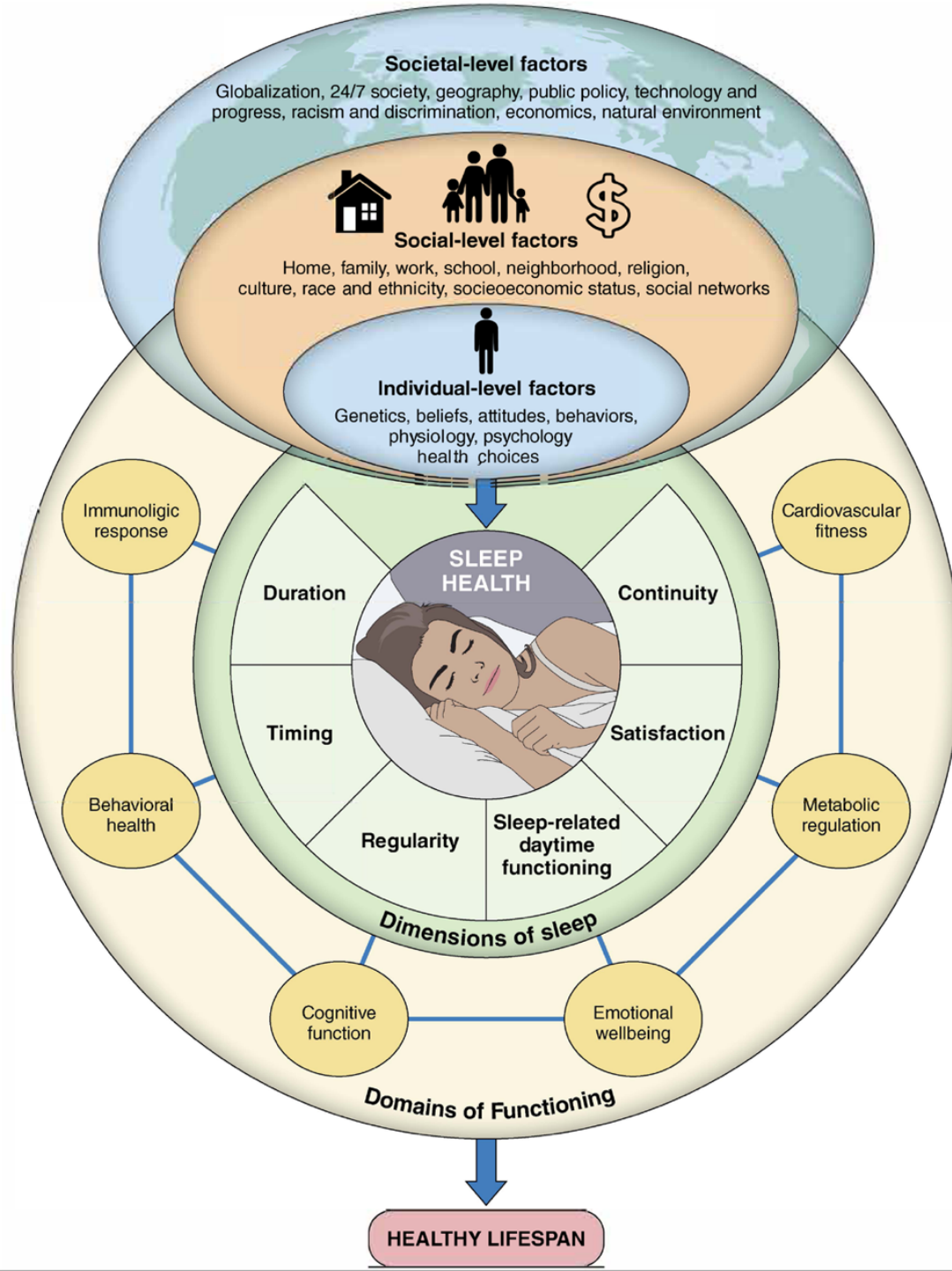
- Insomnia is difficulty falling asleep and/or staying asleep
 - This is the basic definition of what we call “insomnia”
 - But it is problematic
 - When is it a disorder and when is it a symptom?
- What is the definition of “clinically-relevant” insomnia?



Spielman's 3-P Model







AHA SCIENTIFIC STATEMENT

Multidimensional Sleep Health: Definitions and Implications for Cardiometabolic Health: A Scientific Statement From the American Heart Association

Marie-Pierre St-Onge, PhD, Chair; Brooke Aggarwal, EdD; Julio Fernandez-Mendoza, PhD; Dayna Johnson, PhD, MPH; Christopher E. Kline, PhD; Kristen L. Knutson, PhD; Nancy Redeker, PhD; Michael A. Grandner, PhD, Vice Chair; on behalf of the American Heart Association Council on Lifestyle and Cardiometabolic Health; Council on Cardiovascular and Stroke Nursing; Council on Clinical Cardiology; and Council on Quality of Care and Outcomes Research

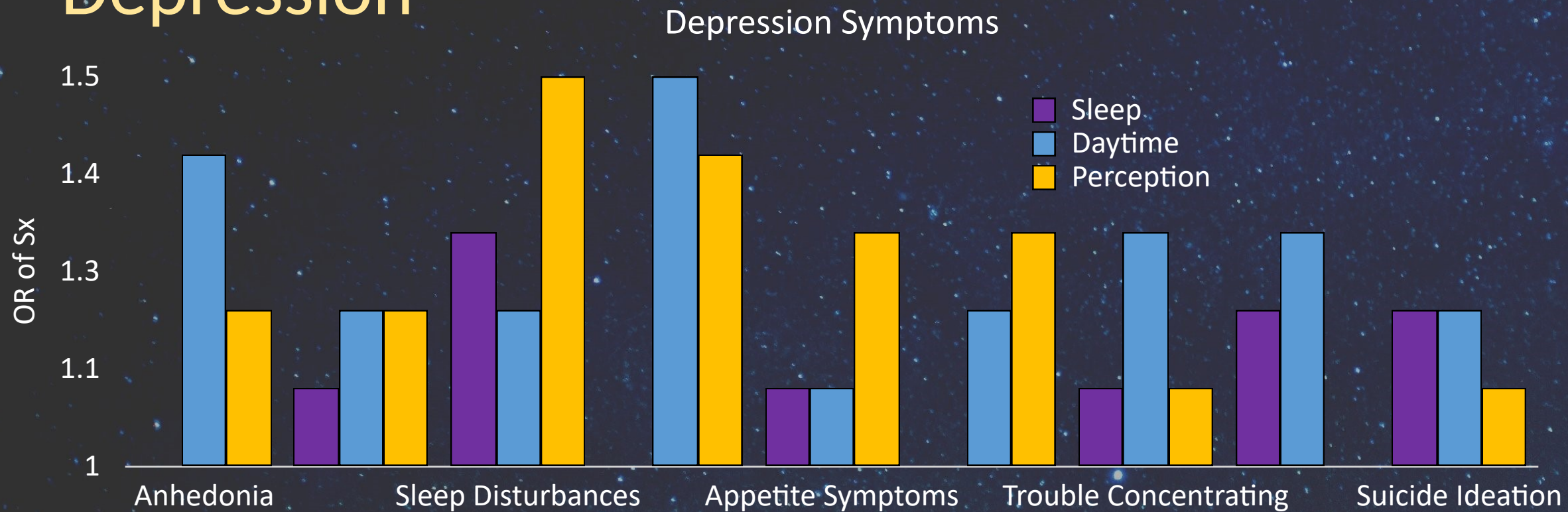
Possible mechanisms / pathways

- Influence on daytime functioning and experience
- Influence on emotional regulation and processing
- Influence on social functioning
- Impacts on resilience
- Exposure to nocturnal wakefulness

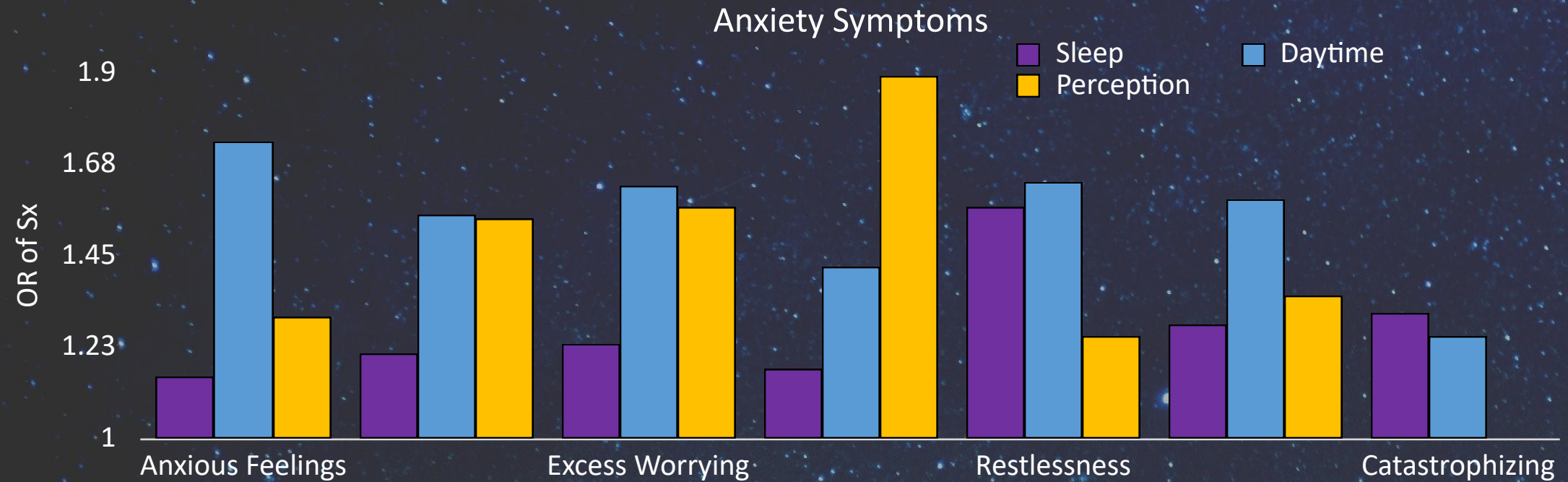
Daytime functioning



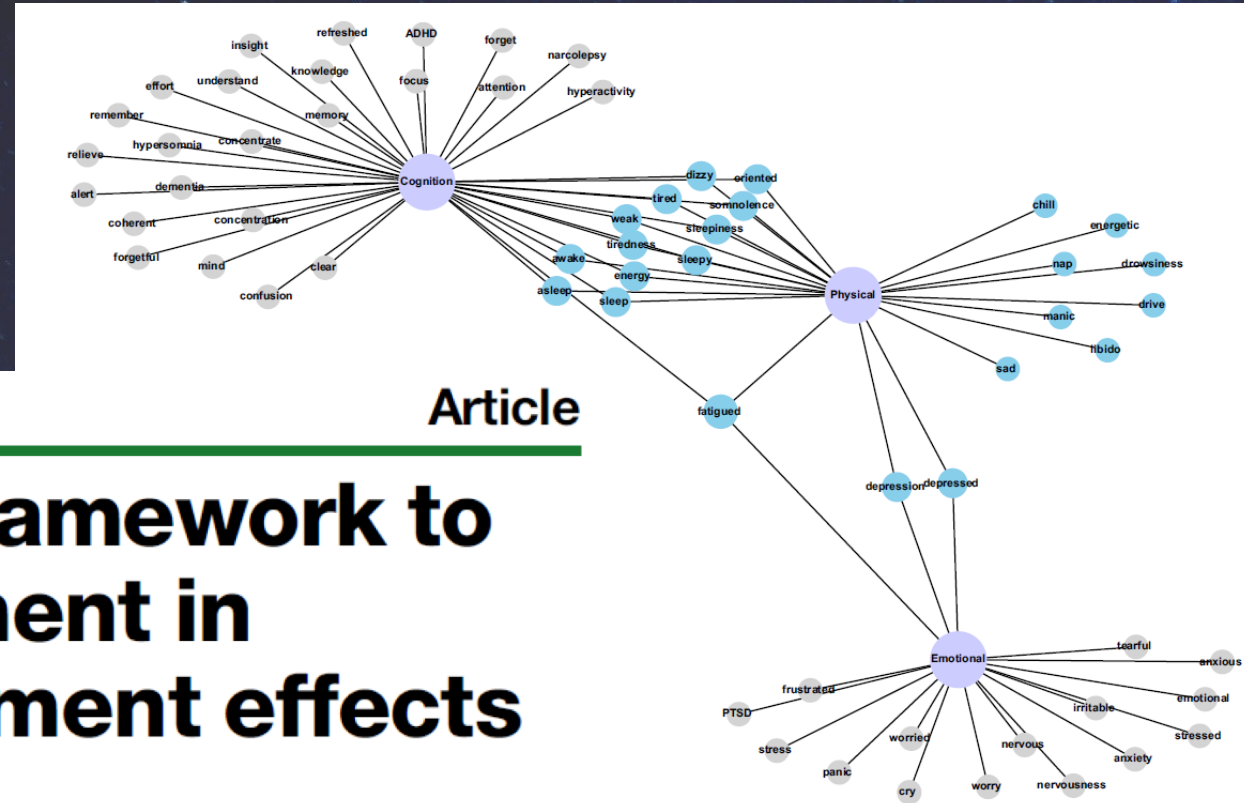
Depression



Anxiety



How do people describe their symptoms?



communications medicine

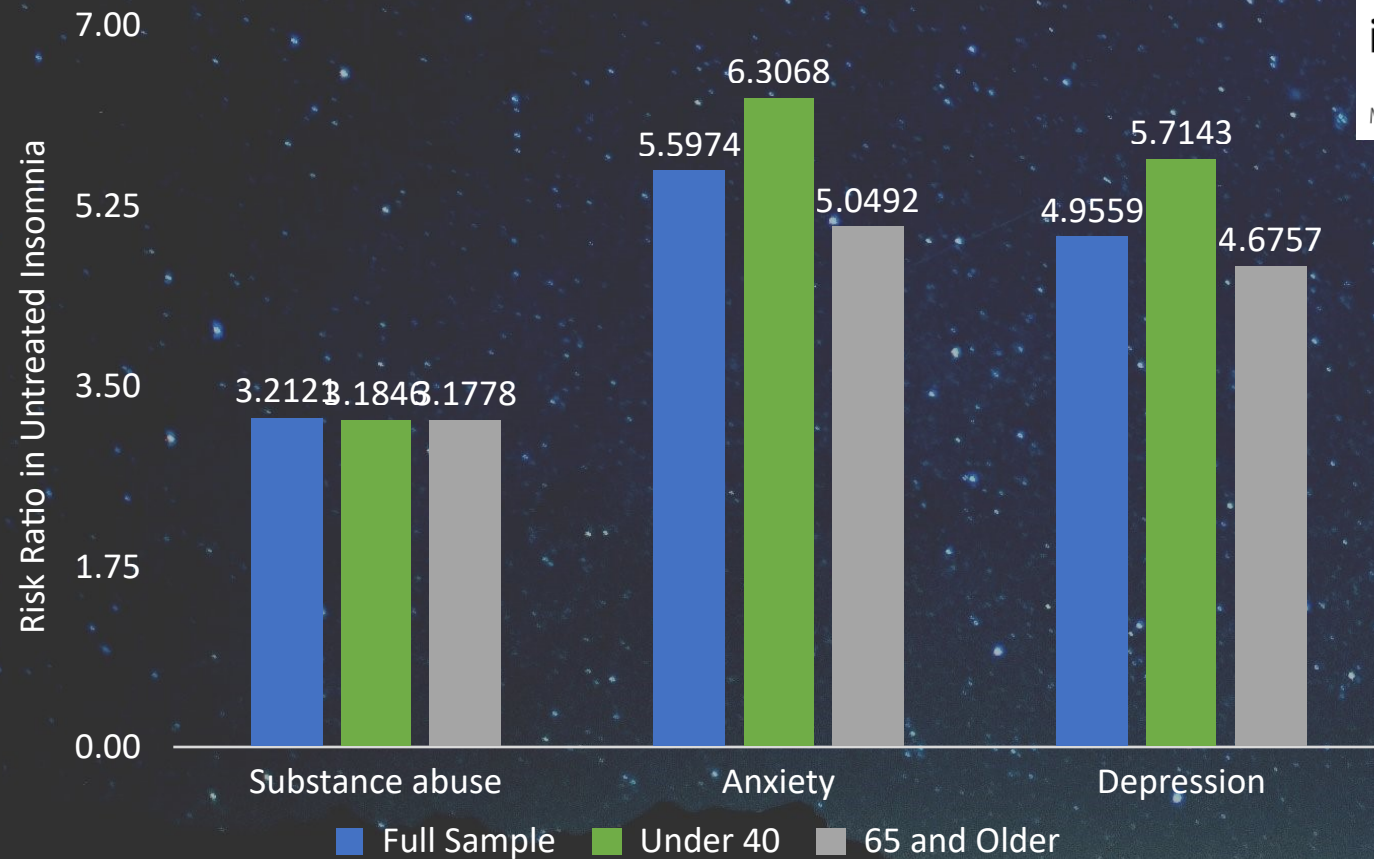
Article

Medical ontology learning framework to investigate daytime impairment in insomnia disorder and treatment effects

 Check for updates

Alexander J. Büsler¹✉, Renato Durrer², Moritz Freidank², Matteo Togninalli², Antonio Olivieri¹, Michael A. Grandner^{3,5} & William V. McCall^{4,5}

The burden of untreated insomnia



RESEARCH

Open Access

The burden of untreated insomnia disorder in a sample of 1 million adults: a cohort study

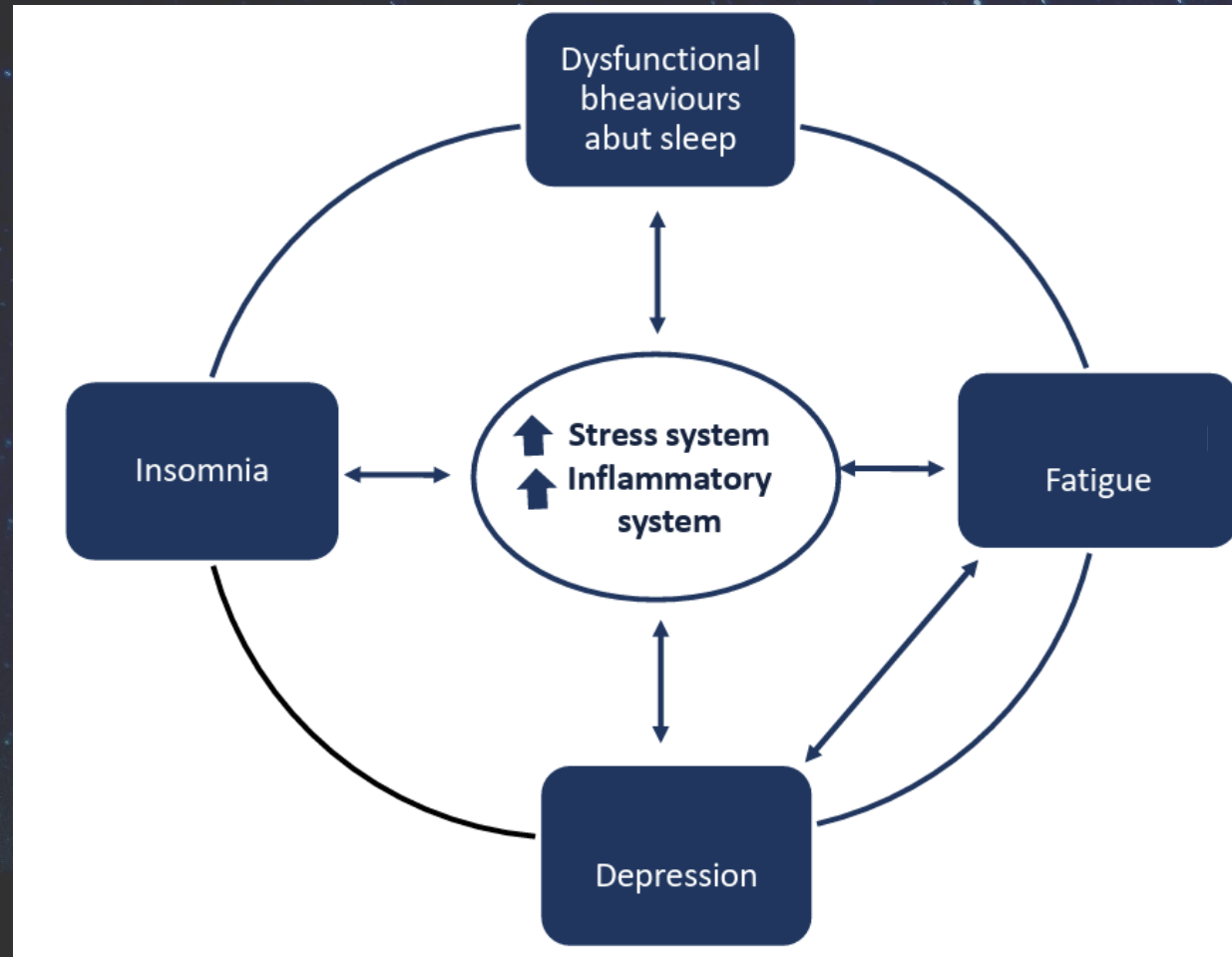
Michael Grandner¹, Antonio Olivieri², Ajay Ahuja³, Alexander Büsner^{2*}, Moritz Freidank⁴ and William V. McCall⁵



Insomnia vs depression

Depression	Insomnia
Debilitating Fatigue, Lack of Energy	Excessive daytime sleepiness
Disturbed Sleep, Difficulty Maintaining Sleep	Excessive daytime sleepiness
Delusional Beliefs	
Psychomotor Problems	
Problems with Work and School Performance	Excessive daytime sleepiness
Isolation, Withdrawal from Others	
Appetite Disruption (Weight Gain or Loss)	
Feelings of Hopelessness	
Feelings of Guilt	Excessive daytime sleepiness
Perceived Laziness	

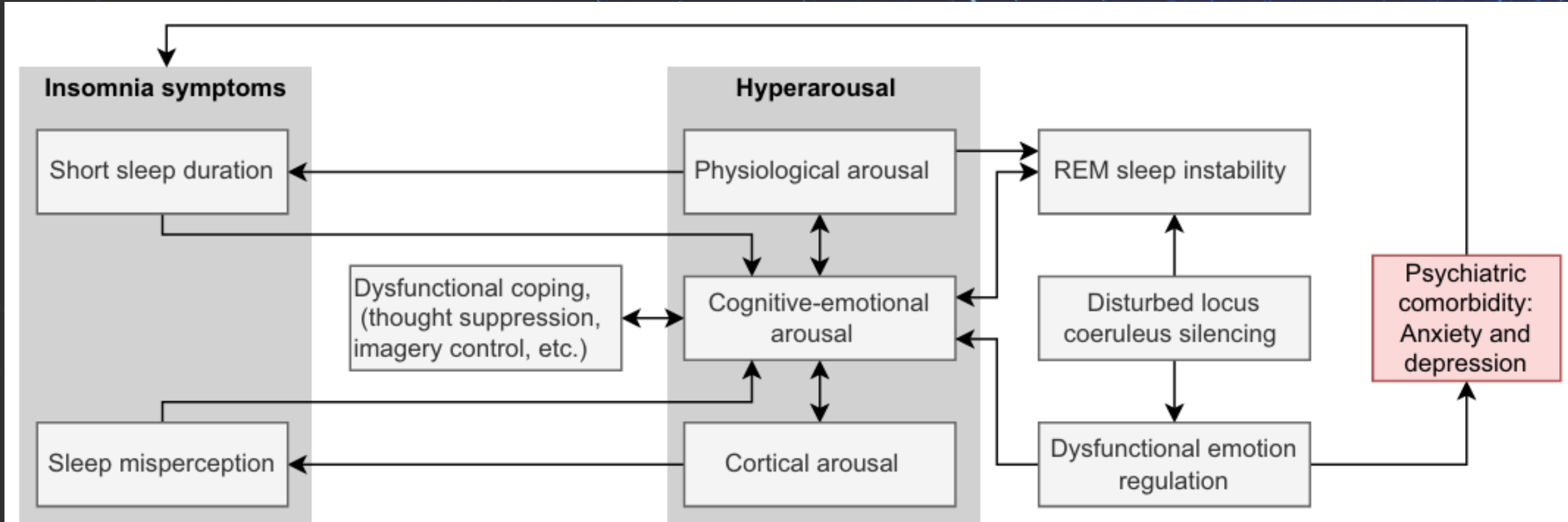
Insomnia, Fatigue, Depression



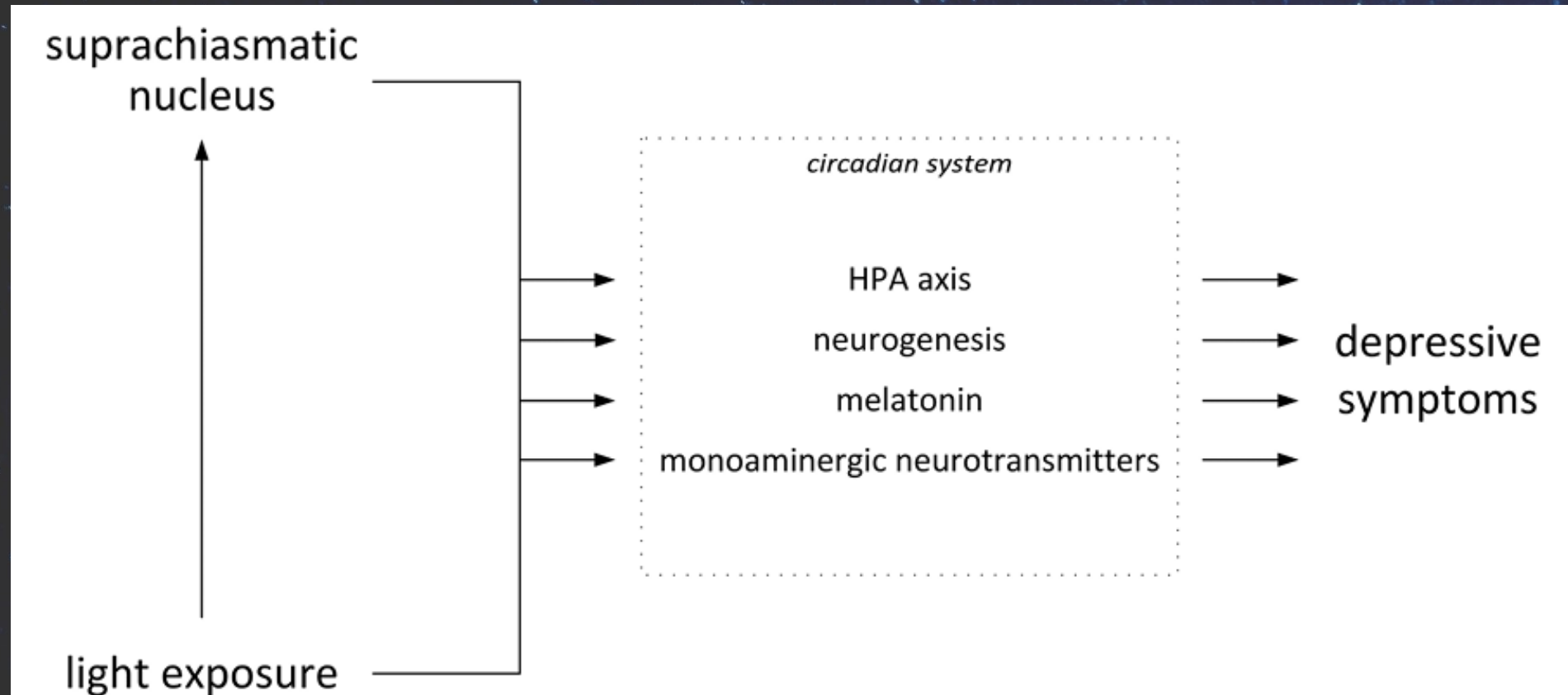
Impaired emotional regulation



Insomnia and hyperarousal: Pathways



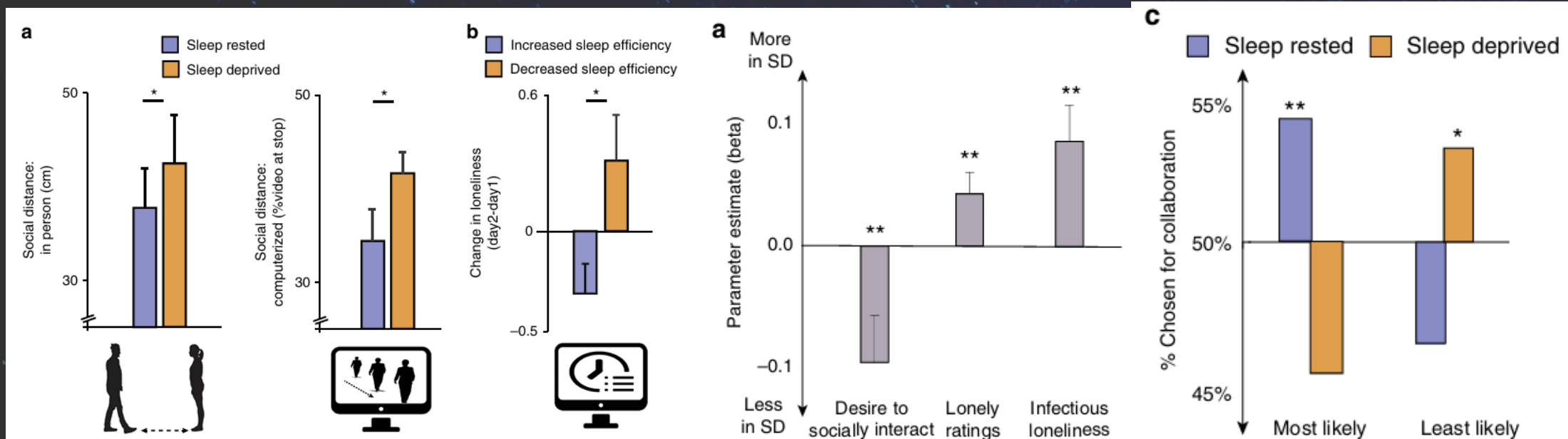
The role of the circadian system



Worse social functioning



Sleep deprivation and social functioning



Poor sleep health and social support

	Family			Friends			Significant Other			Total Score	
	B	95% CI	p	B	95% CI	p	B	95% CI	p	B	95% CI
UNADJUSTED											
Very Short	-2.447	(-3.442, -1.454)	<0.0001	-2.925	(-3.873, -1.977)	<0.0001	-3.266	(-4.286, -2.247)	<0.0001	-8.639	(-11.025, -6.254)
Short	-1.603	(-2.213, -0.993)	<0.0001	-1.500	(-2.083, -0.919)	<0.0001	-1.358	(-1.985, -0.733)	<0.0001	-4.463	(-5.927, -2.999)
Long	-2.321	(-3.643, -1.001)	0.001	-0.976	(-2.237, 0.284)	0.129	-1.427	(-2.783, -0.073)	0.039	-4.725	(-7.897, -1.555)
ADJUSTED											
Very Short	-1.811	(-2.862, -0.761)	0.001	-1.849	(-2.846, -0.853)	<0.0001	-2.539	(-3.622, -1.458)	<0.0001	-6.200	(-8.704, -3.698)
Short	-1.274	(-1.897, -0.653)	<0.0001	-1.104	(-1.694, -0.514)	<0.0001	-1.044	(-1.685, -0.404)	0.001	-3.423	(-4.906, -1.941)
Long	-2.312	(-3.637, -0.988)	0.001	-0.971	(-2.227, 0.284)	0.129	-1.560	(-2.924, -0.197)	0.025	-4.844	(-7.999, -1.689)

	Family			Friends			Significant Other			Total Score		
	B	95% CI	p	B	95% CI	p	B	95% CI	p	B	95% CI	p
UNADJUSTED	-0.178	(-0.222, -0.134)	<0.0001	-0.163	(-0.205, -0.121)	<0.0001	-0.190	(-0.235, -0.146)	<0.0001	-0.531	(-0.636, -0.426)	<0.0001
ADJUSTED	-0.158	(-0.203, -0.112)	<0.0001	-0.123	(-0.166, -0.080)	<0.0001	-0.166	(-0.213, -0.119)	<0.0001	-0.447	(-0.555, -0.339)	<0.0001

Social support, chronotype, and mood

Table 2. Results of regression analyses examining the role of chronotype score (as continuous variable) and outcomes, including depression and social support.

Variable	B	SE*	95% CI **	p***
CESD Depression Score	1.007	0.422	(0.175, 1.839)	.018
MSPSS Social Support	-3.313	0.959	(-5.204, -1.422)	.001
MSPSS Social Support (Family)	-1.235	0.295	(-1.818, -0.653)	<.0005
MSPSS Social Support (Friends)	-1.062	0.295	(-1.644, -0.479)	<.0005
MSPSS Social Support (Significant Other)	-0.340	0.339	(-1.009, 0.329)	.317
MSPSS Social Support (Teammates)	-0.676	0.272	(-1.213, -0.139)	.014

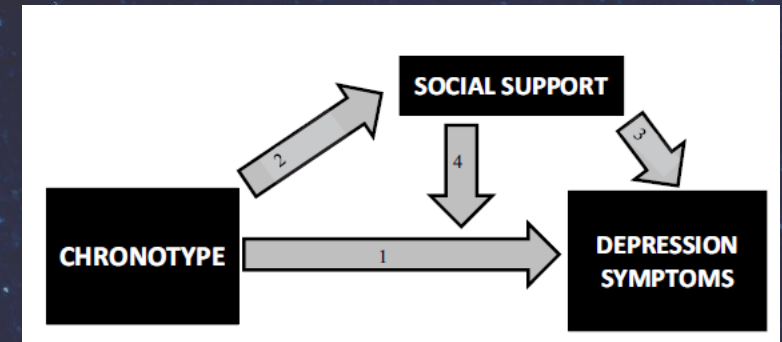


Table 4. Partial mediation analysis.

Mediator Variable	Indirect	Direct	%Mediation	Sobel Test	p_sobel
Total Score	0.626	0.381	0.621	3.044	.002
Family	0.657	0.350	0.652	3.313	.001
Friends	0.593	0.414	0.589	3.050	.002
Significant Other	0.082	0.925	0.081	0.939	.348
Teammates	0.464	0.543	0.461	2.328	.020

Altered social functioning links poor sleep and emotion dysregulation

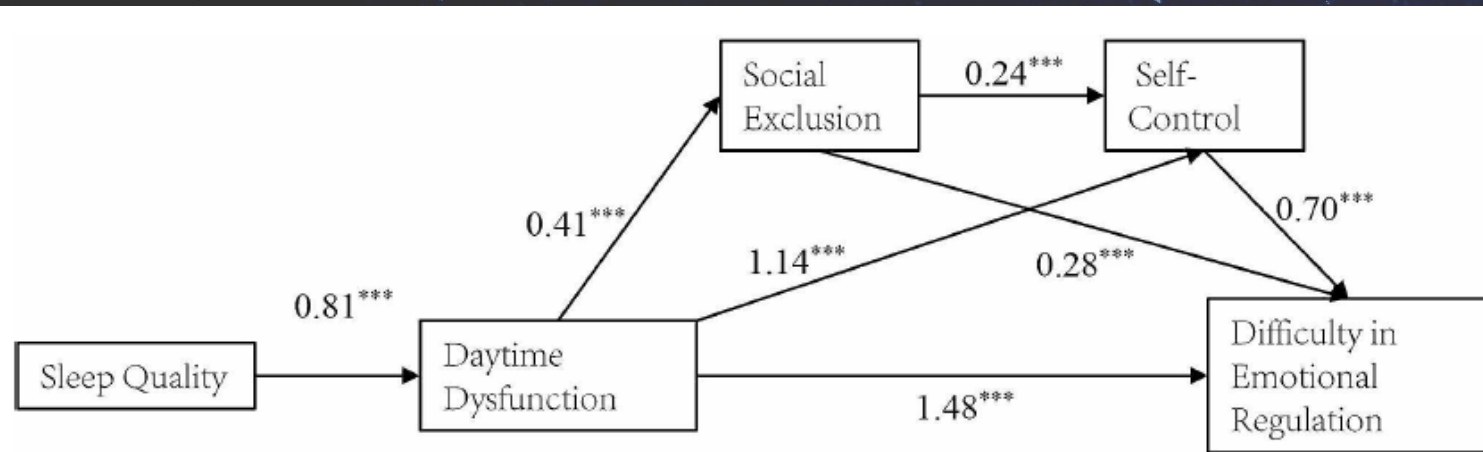


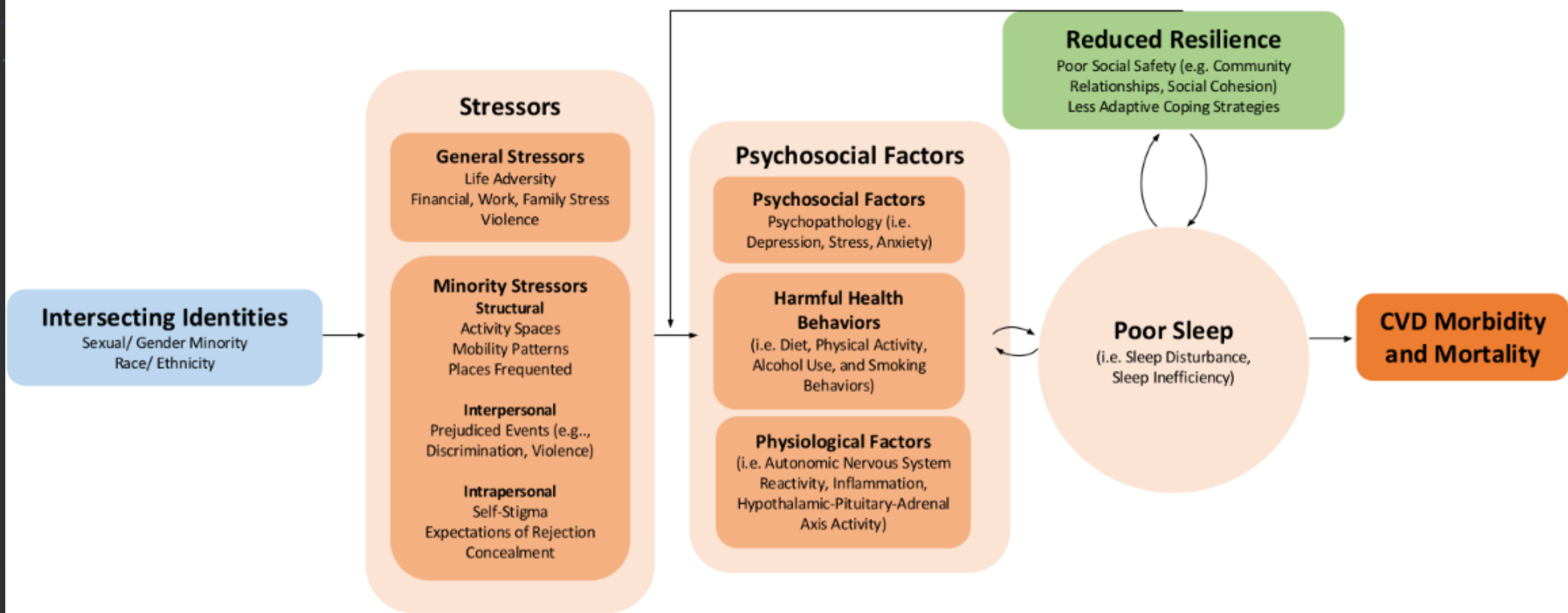
Fig. 2 Model diagram of chain mediation effect

Table 3 Results of mediation effect test in the chain mediation model

	Estimate	S.E.	Z	Boot_95_CI
Sleep Quality → Daytime Dysfunction → Difficulty in Emotional Regulation	1.20	0.27	4.45	[0.70, 1.76]
Sleep Quality → Social Exclusion → Difficulty in Emotional Regulation	0.15	0.10	1.47	[-0.03, 0.37]
Sleep Quality → Self-Control → Difficulty in Emotional Regulation	0.26	0.24	1.08	[-0.21, 0.70]
Sleep Quality → Daytime Dysfunction → Social Exclusion → Difficulty in Emotional Regulation	0.09	0.05	1.94	[0.01, 0.20]
Sleep Quality → Daytime Dysfunction → Self-Control → Difficulty in Emotional Regulation	0.65	0.13	5.05	[0.42, 0.91]
Sleep Quality → Social Exclusion → Self-Control → Difficulty in Emotional Regulation	0.09	0.06	1.56	[-0.01, 0.21]
Sleep Quality → Daytime Dysfunction → Social Exclusion → Self-Control → Difficulty in Emotional Regulation	0.06	0.03	2.13	[0.01, 0.11]
Direct Effect	0.59	0.59	1.00	[-0.53, 1.81]
Total Effect	3.10	0.62	5.04	[1.89, 4.32]

Impaired resilience







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CLINICAL REVIEW

A systematic review and meta-analysis to assess the relationship between sleep duration/quality, mental toughness and resilience amongst healthy individuals

Teresa Arora ^a, Ian Grey ^b, Linda Östlundh ^c, Asma Alamoodi ^a, Omar M. Omar ^d, Kin-Bong Hubert Lam ^e, Michael Grandner ^{f,*}

^a Zayed University, Abu Dhabi, United Arab Emirates

^b Department of Cognitive Sciences, United Arab Emirates University, Al Ain, Abu Dhabi, United Arab Emirates

^c The National Medical Library, College of Medicine and Health Sciences, United Arab Emirates University, Al Ain, Abu Dhabi, United Arab Emirates

^d Birmingham Clinical Trials Unit, University of Birmingham, Birmingham, England, United Kingdom

^e Nuffield Department of Population Health, University of Oxford, Oxford, England, United Kingdom

^f University of Arizona, Tucson, AZ, USA



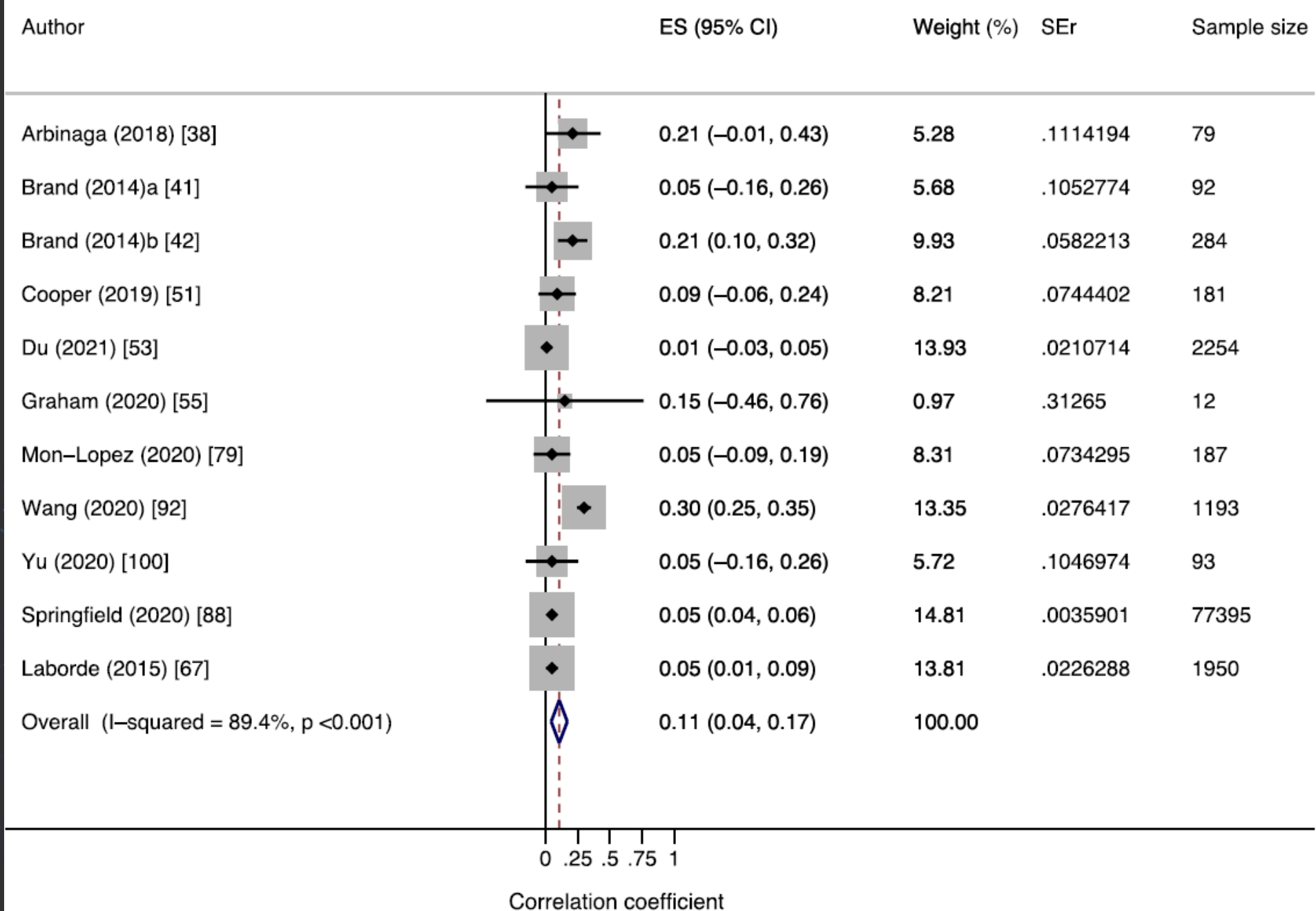
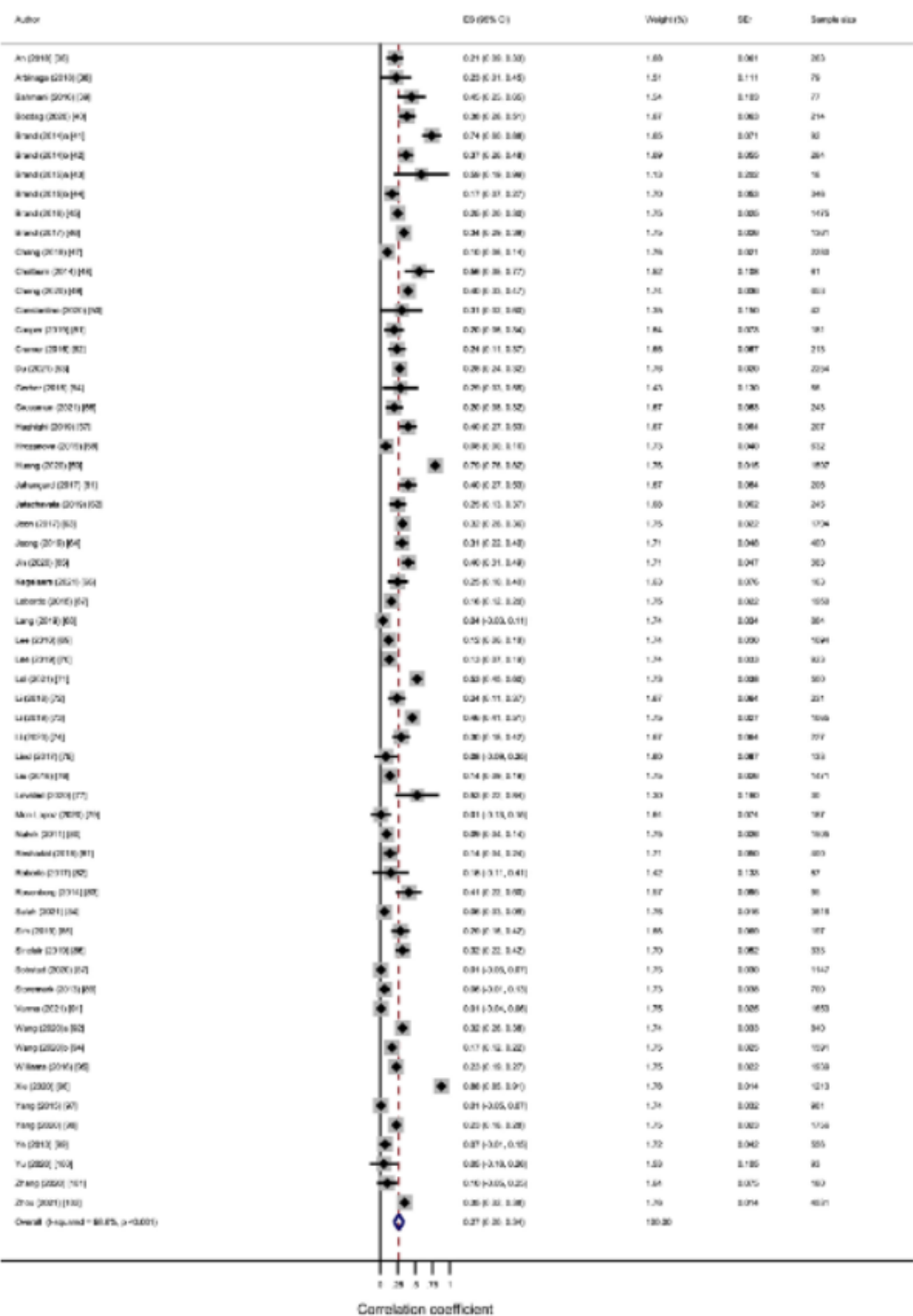


Fig. 2. Forest plot for all included studies that explored the relationship between sleep duration and psychological resilience.



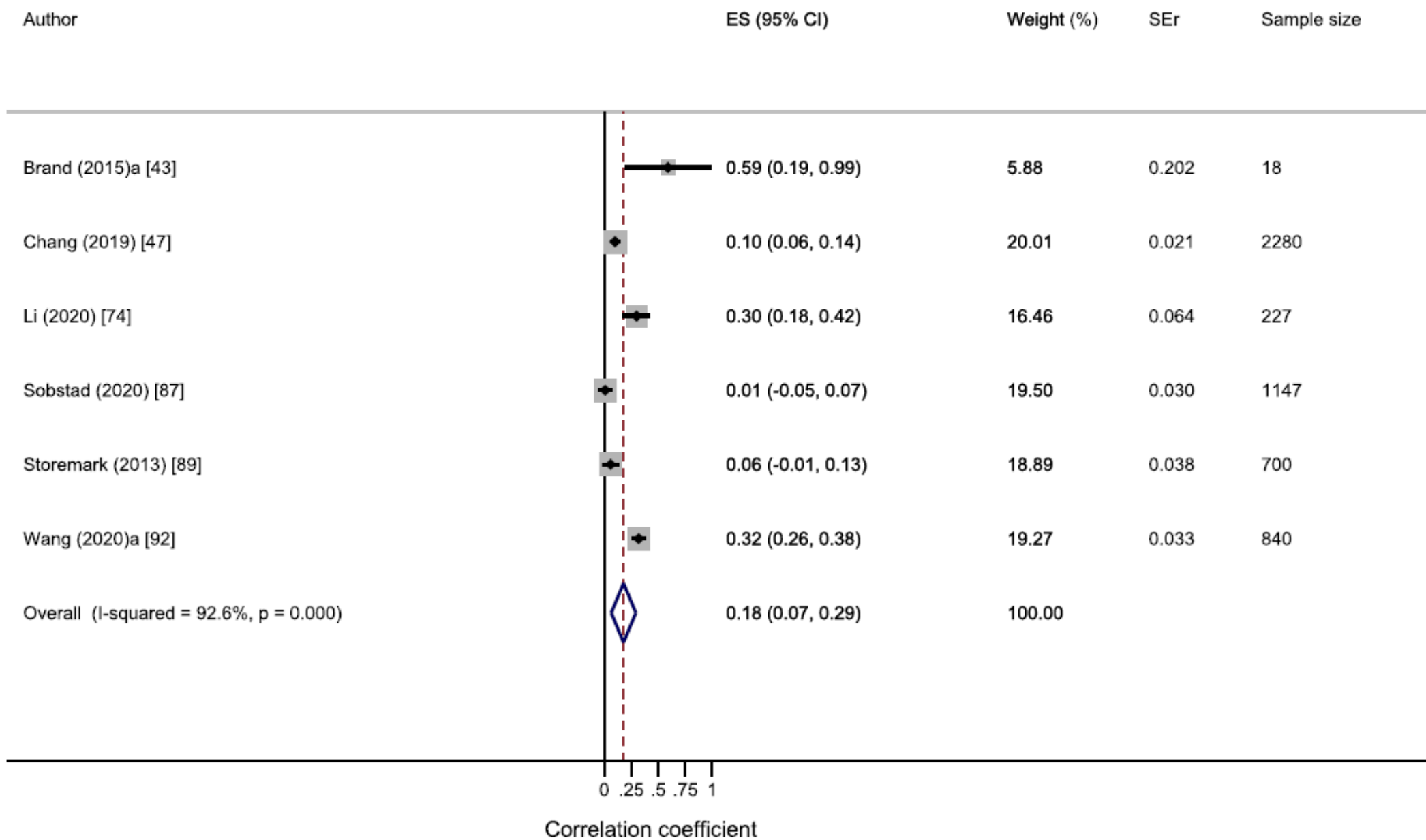


Fig. 4. Forest plot for all included studies that explored the prospective relationship between sleep quality and psychological resilience.

Nocturnal wakefulness



Well-known suicide risk factors

Serious physical health conditions (including pain)

Mental health conditions (especially depression and substance use disorders, as well as serious mental illness)

Hopelessness, feeling trapped, being a burden to others

Traumatic brain injury

Stressful life events, like divorce, rejection, financial crisis, etc.

Exposure to suicide

Access to lethal means, including firearms

Sleep health as a factor in suicide

Sleep is related to injury, illness, and pain

Sleep is related to financial hardship

Sleep is an important factor in mental illnesses

Sleep disturbance is a key factor in substance use

Sleep plays important roles in emotional regulation and mood

Sleep plays important roles in decision making

Sleep, injury, illness and pain

Having a major illness, especially one that is debilitating and/or degenerative, is a major suicide risk factor

Also, extreme pain – whether or not in the context of illness – is a major suicide risk factor

Most major medical conditions, especially those that are degenerative, are associated with poor sleep

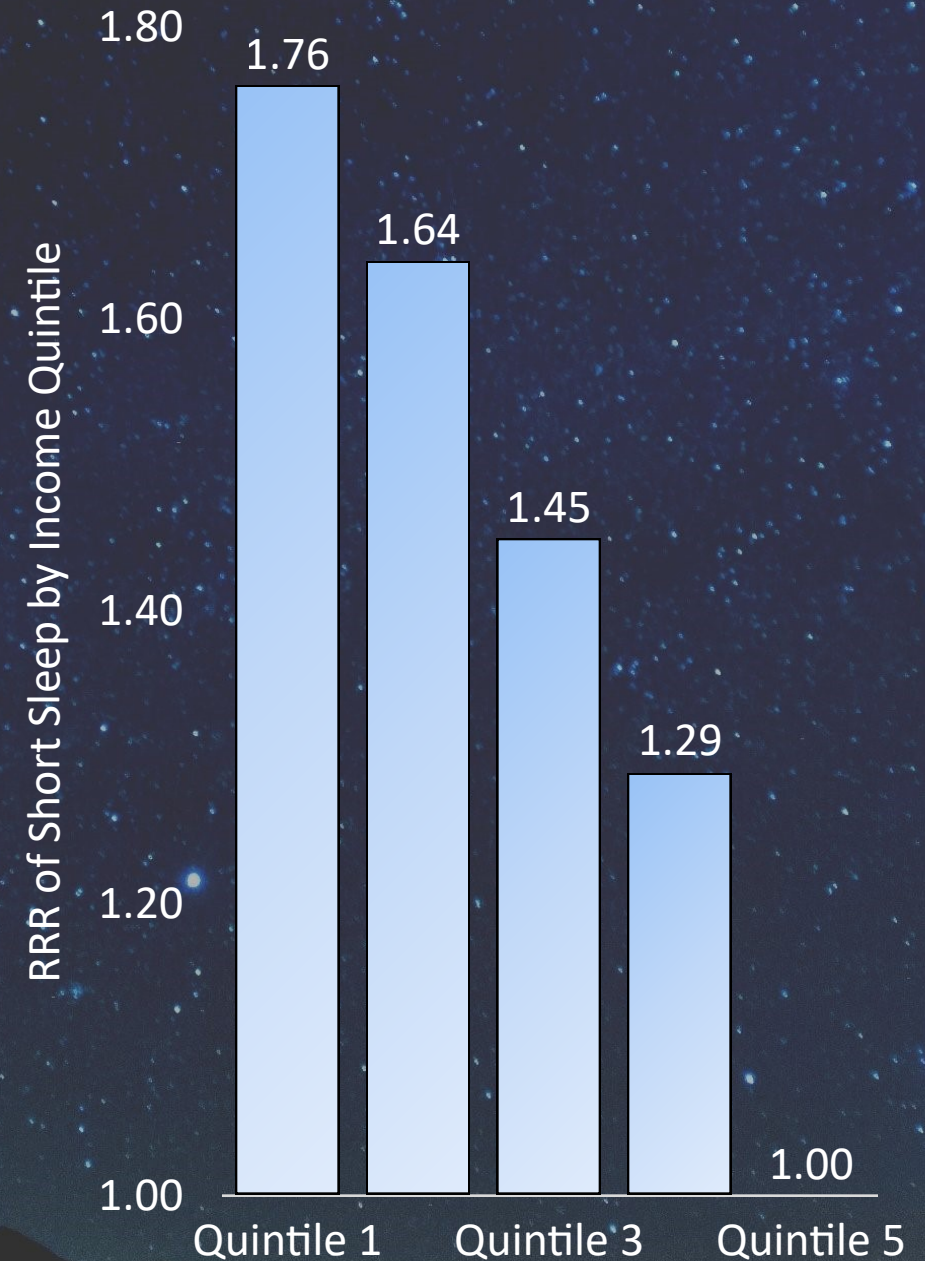
Sleep loss increases pain perception, sensations of pain, and impact associated with pain sensations

Sleep and financial hardship

Poor sleep health is associated with lower household income and increased likelihood of poverty

Also associated with housing-related financial stress and food insecurity

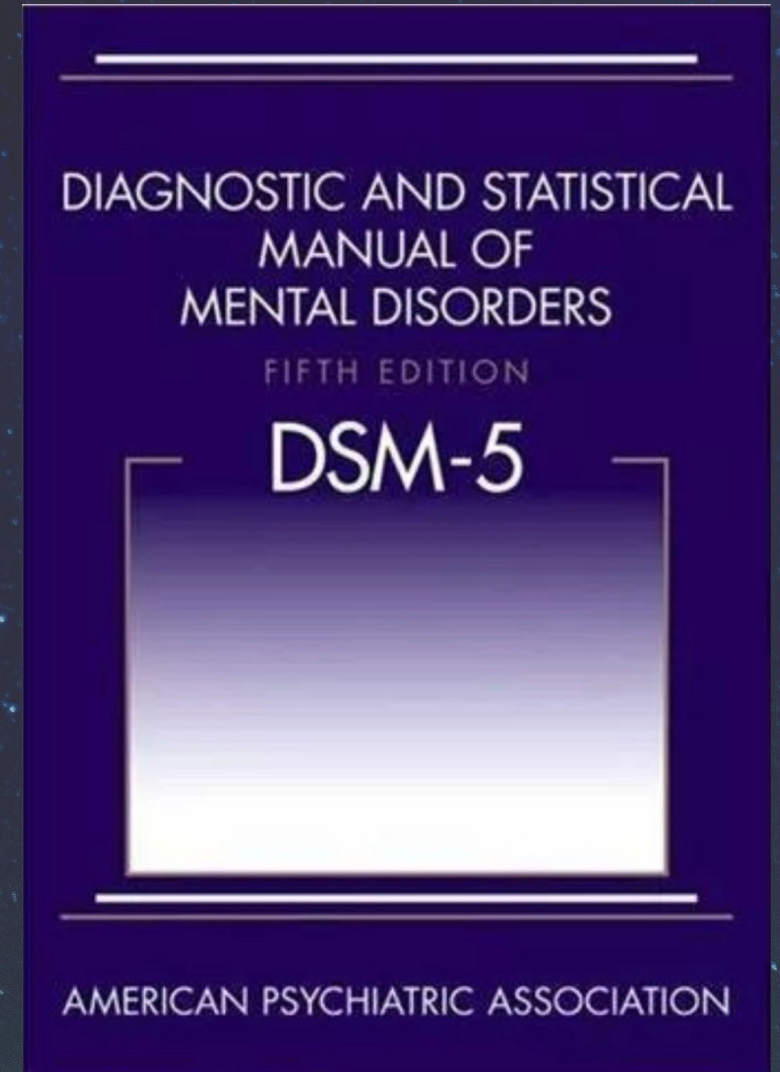
Lack of sleep is also associated with unemployment and suboptimal living conditions



Sleep and mental illness

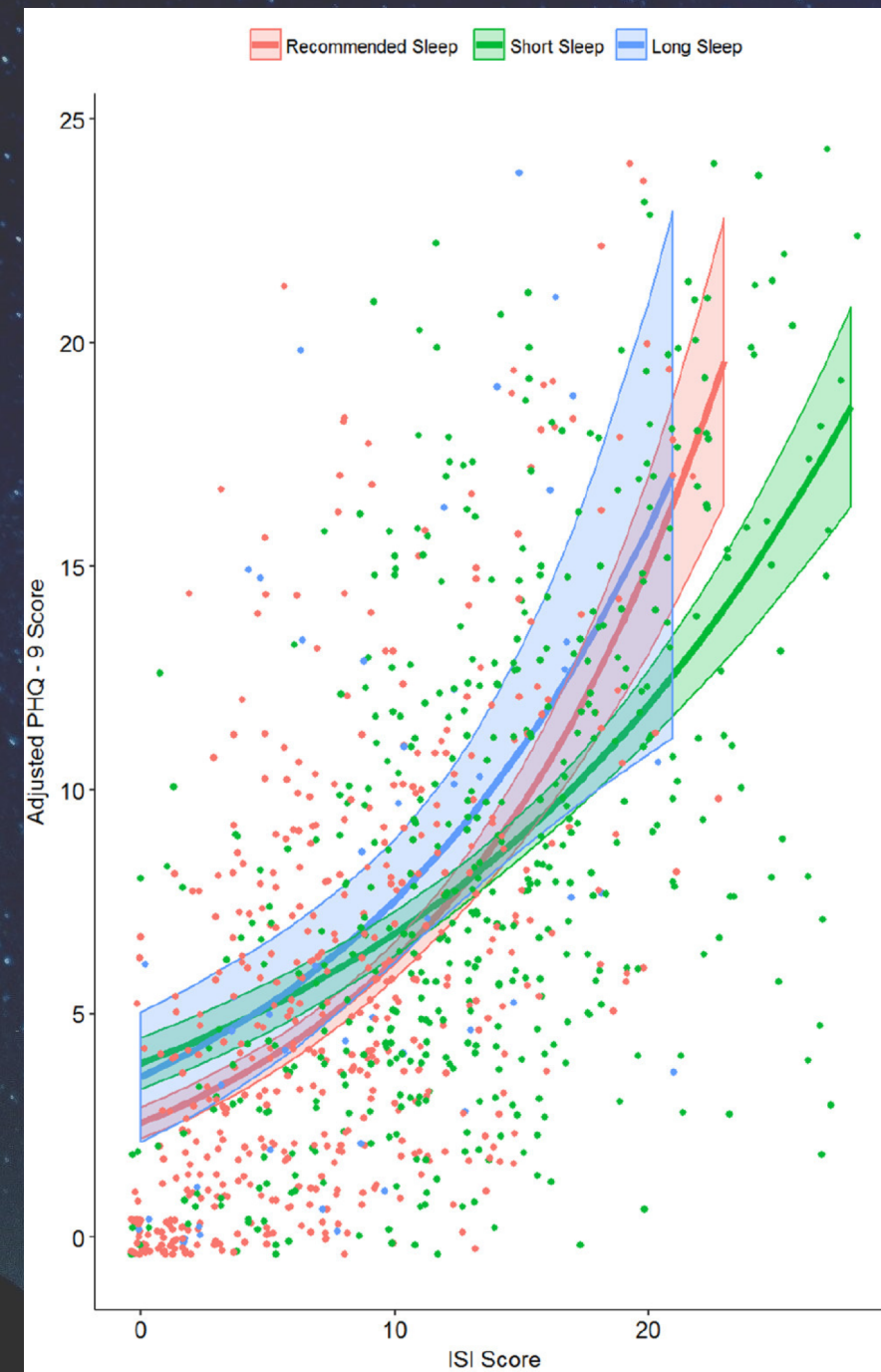
Sleep disturbances are described as a core feature of nearly every single diagnosis across the spectrum of mental illness

- Depression and bipolar disorder
- Anxiety disorders, including PTSD
- Major mental illness, such as schizophrenia
- Attention deficit disorders
- And more



Insomnia and short sleep

- Insomnia is positively associated with depressed mood
- Short sleep duration is also independently associated with depressed mood
- Long sleep is also associated with depressed mood
- In short sleepers, relationship between insomnia and depression is actually weaker



Insomnia as a risk factor

A recent meta-analysis of all existing studies of insomnia and nightmares shows that the presence of insomnia is associated with:

- 2.8-fold likelihood of suicide ideation
- 3.5-fold likelihood of suicide attempts
- 2.4-fold likelihood of death by suicide

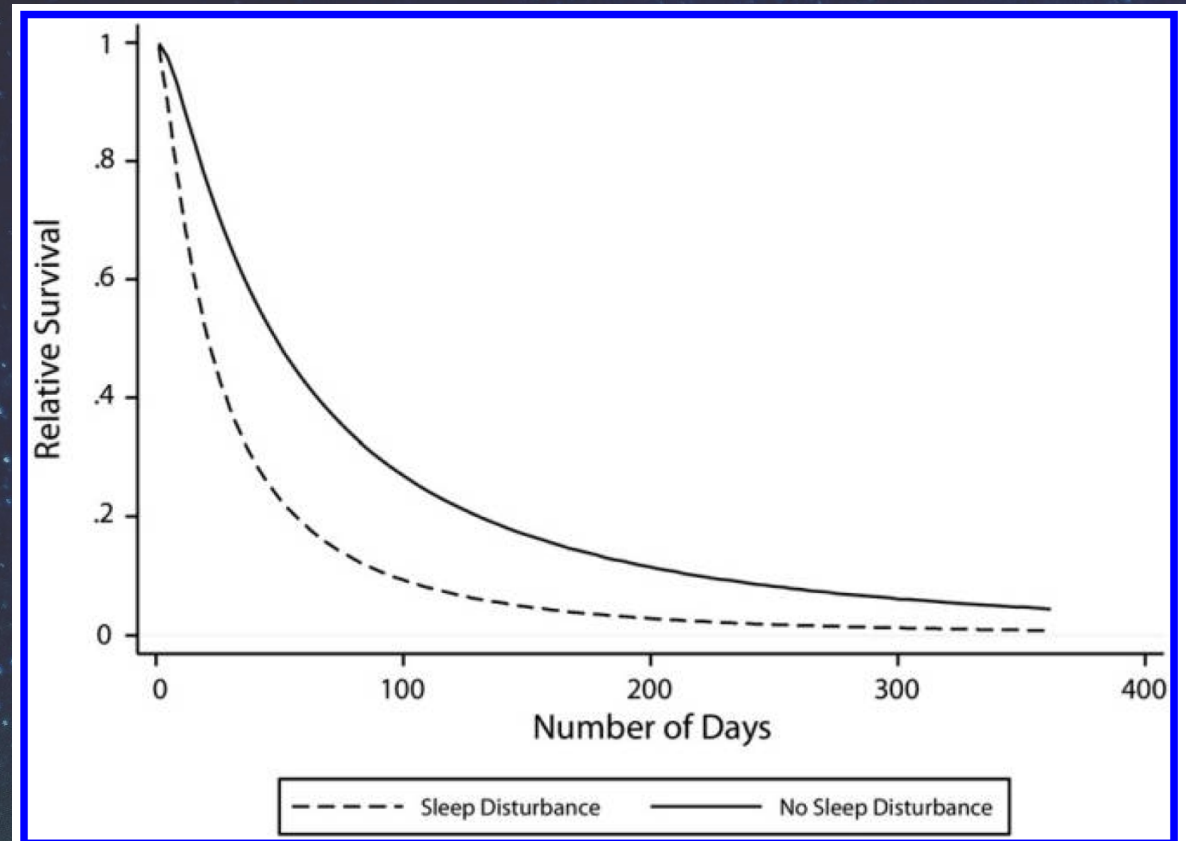


Promising interventions with CBTI

Trockel et al: Among veterans receiving CBTI, reductions in insomnia severity were associated with reduced depression scores and a reduced likelihood of suicide ideation after treatment.

Sleep disturbance

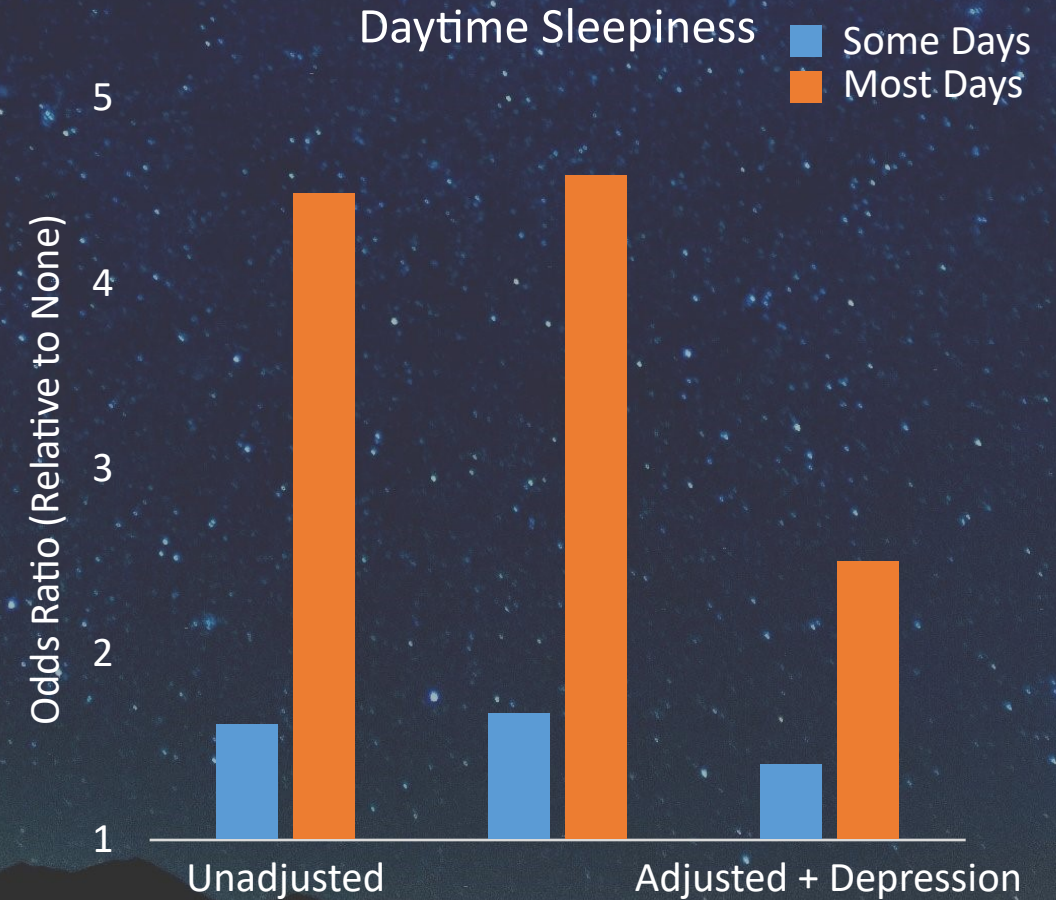
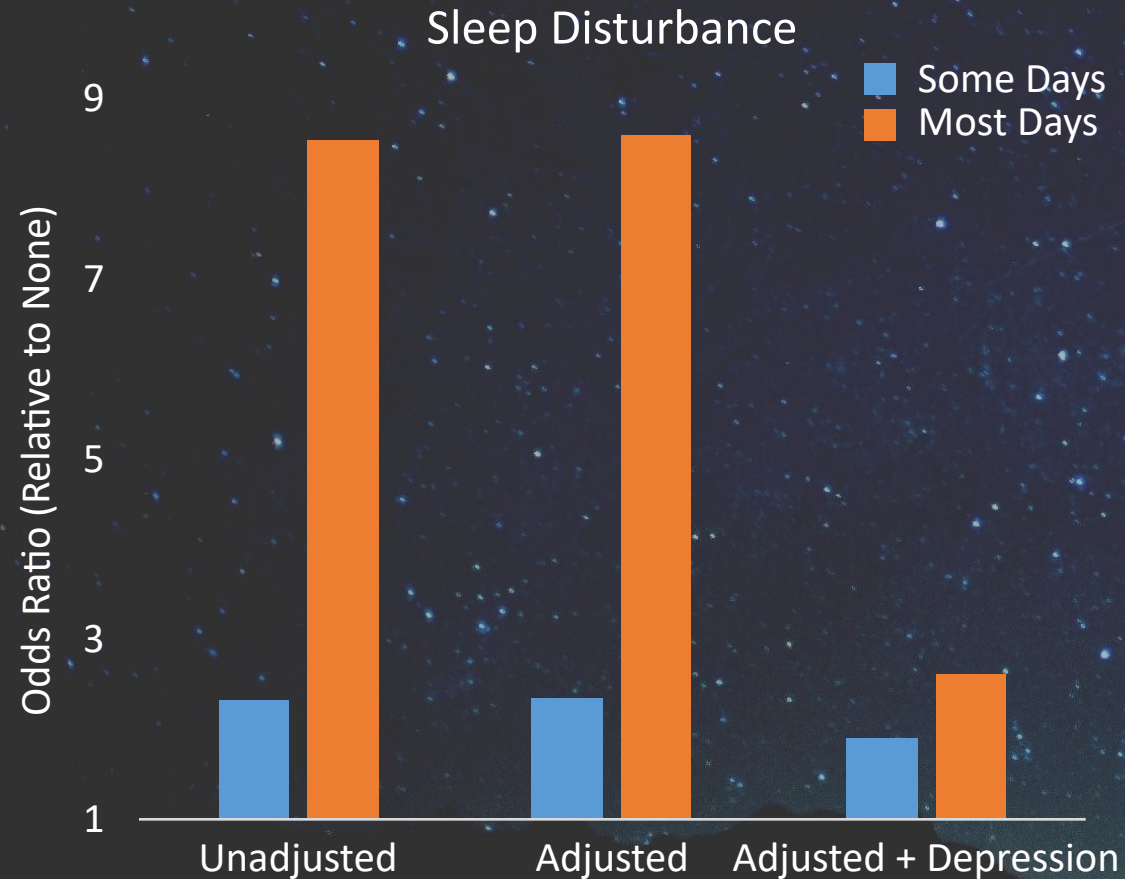
- Risk for suicide is increased among veterans with sleep disturbances



Note. VISN = Veterans Integrated Service Network. The dashed line is sleep disturbance in the year preceding death; the solid line represents no sleep disturbance in the year preceding death.

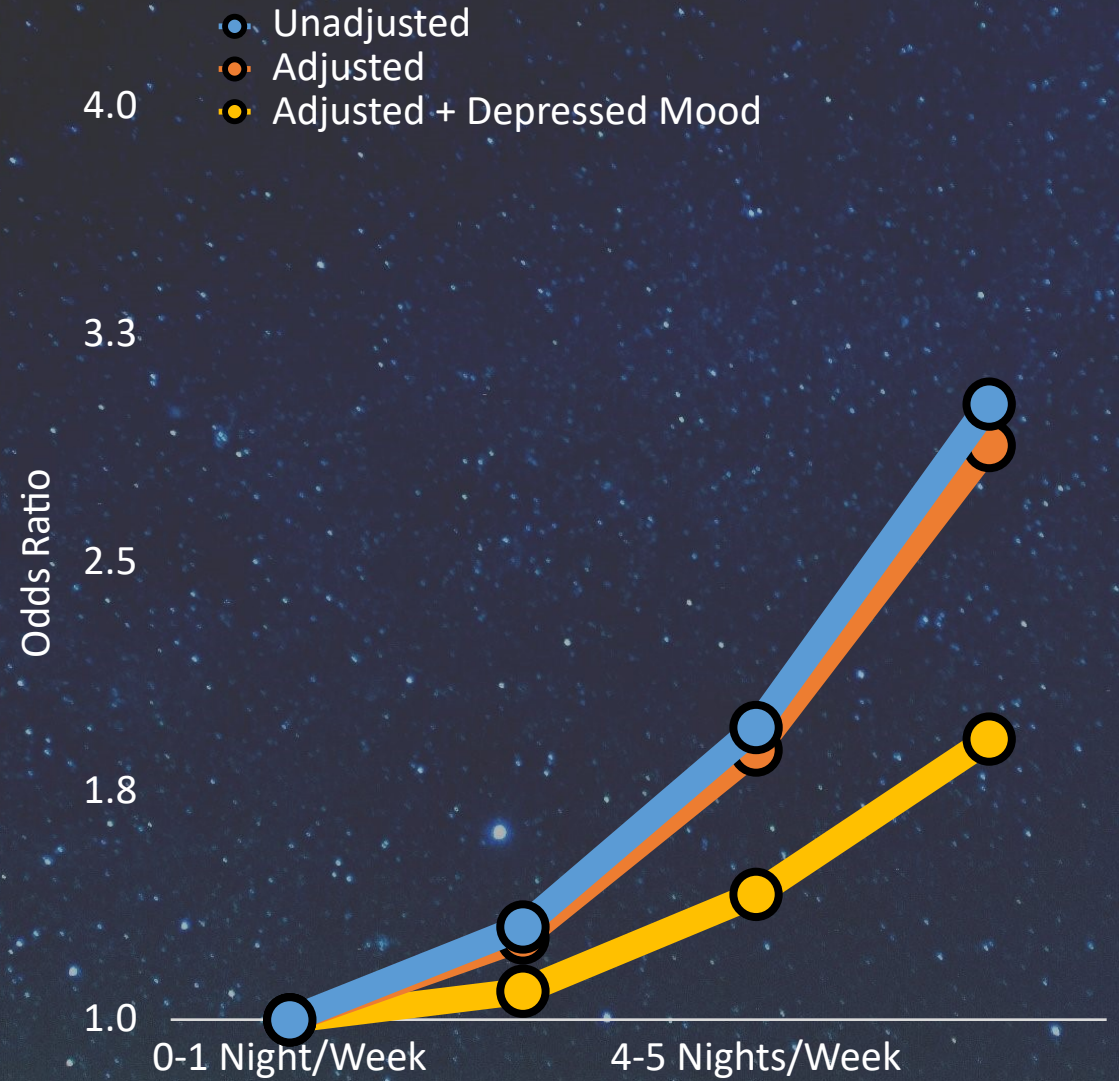
FIGURE 1—Survival time preceding suicide among veterans with and without sleep disturbance: VISN 2 and VISN 11, Fiscal Year 2000–2006.

Sleep disturbance and daytime sleepiness



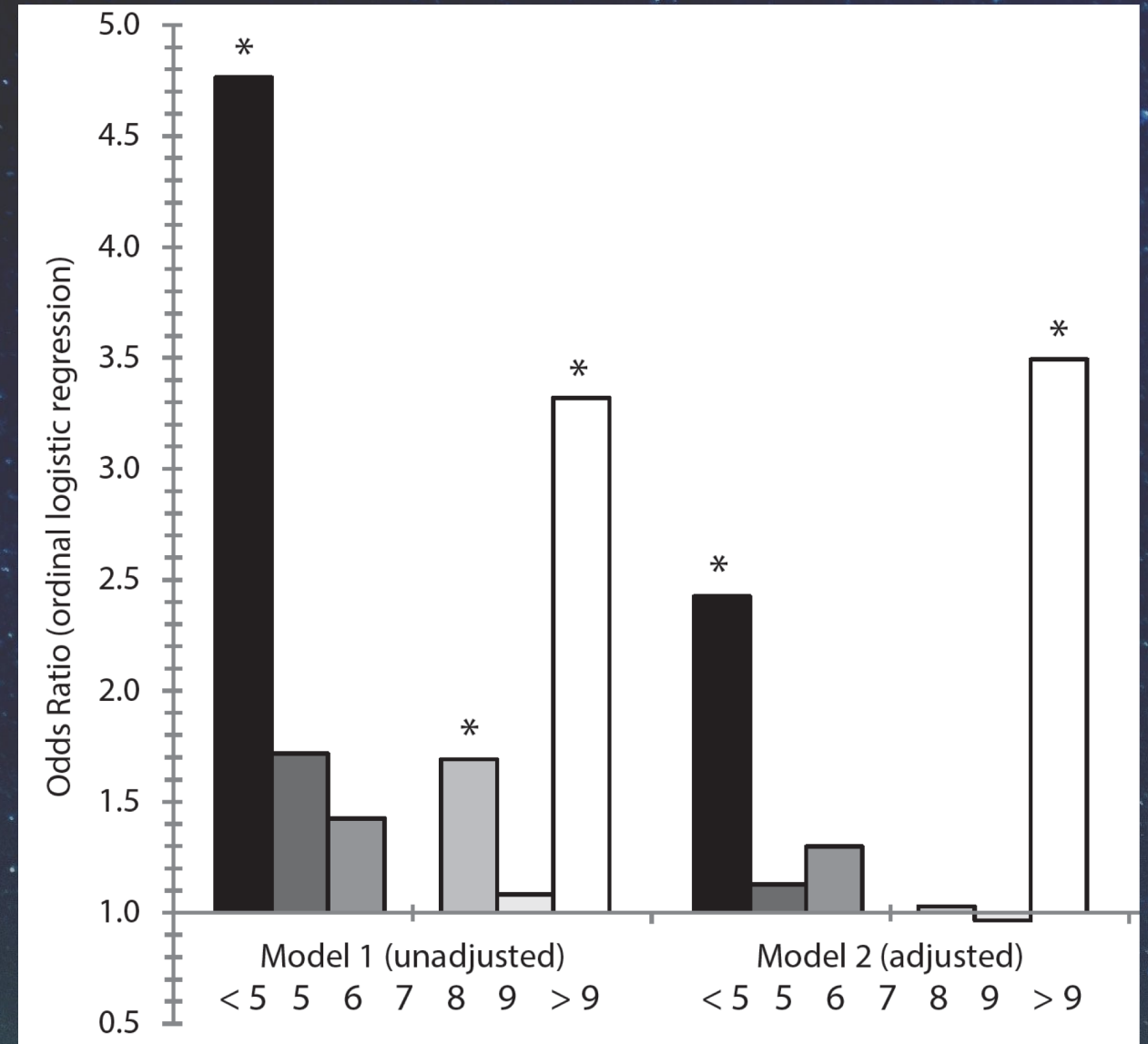
Insufficient sleep

In young adults, each additional night of insufficient sleep was associated with increased risk of suicide ideation



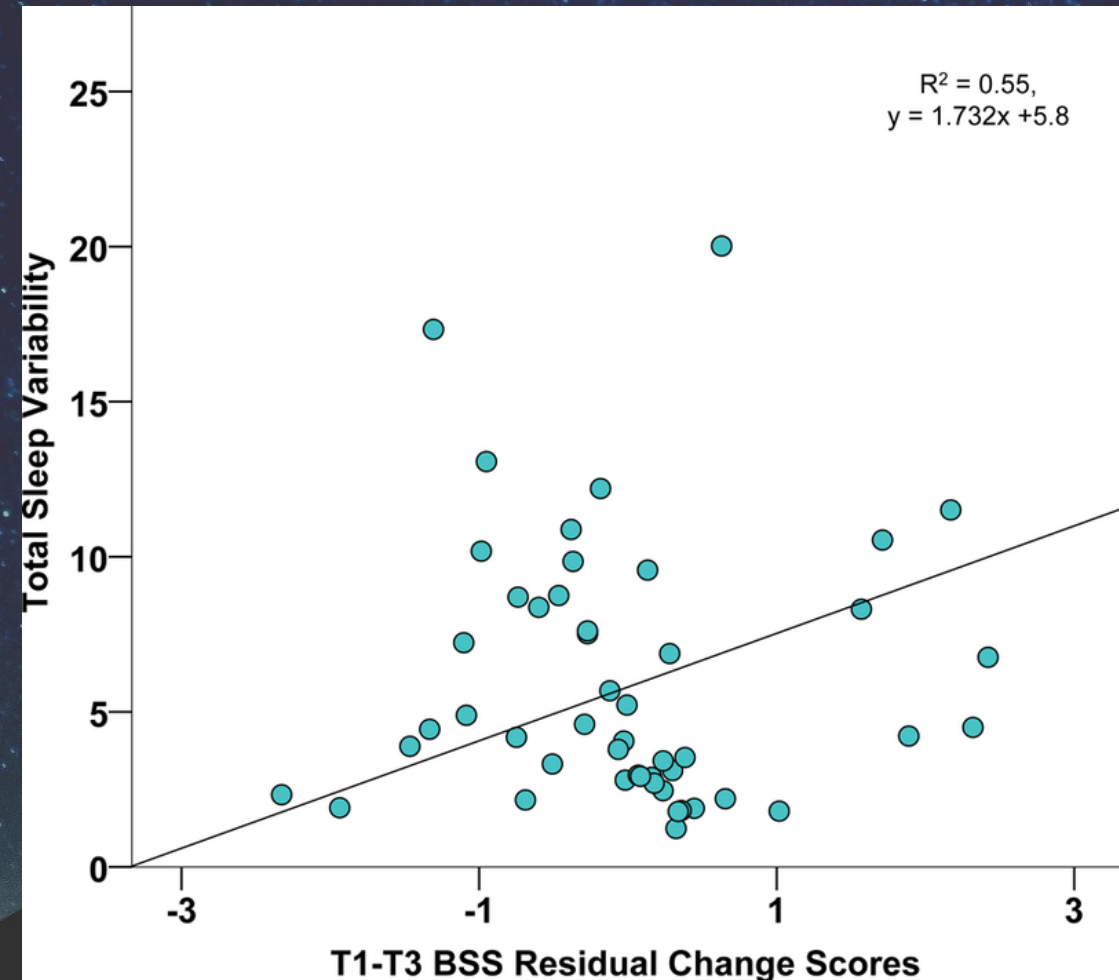
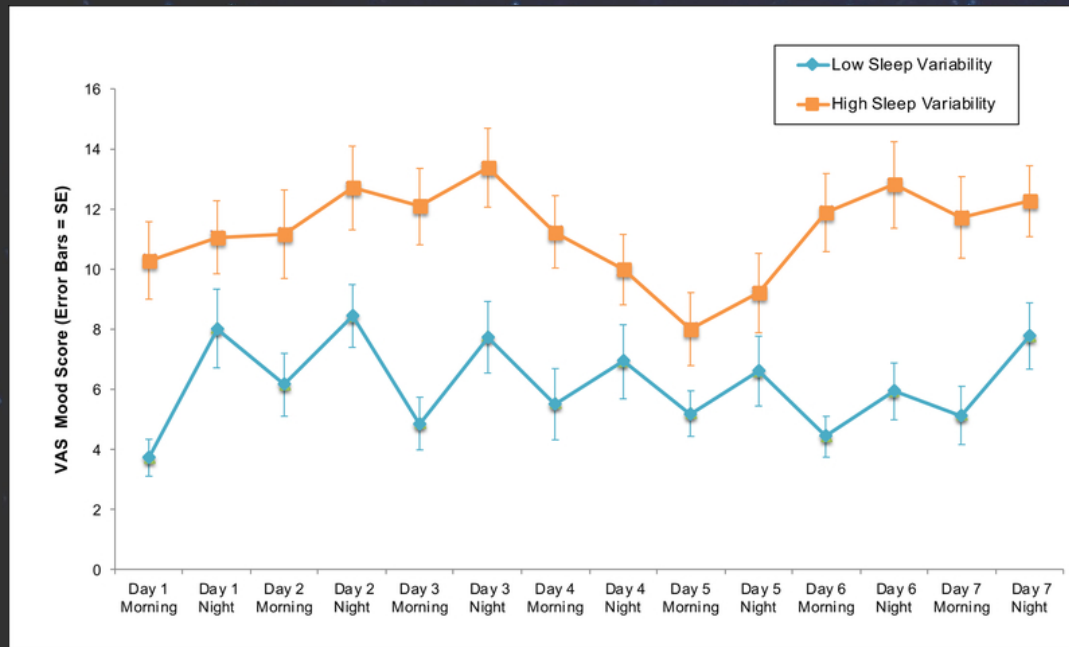
Sleep duration

Both short and long sleep associated with suicide ideation in a general population sample



Sleep variability

Increased sleep variability is associated with increased suicide ideation and worse mood over time



Nightmares as a risk factor

Frequent nightmares are associated with depression and anxiety disorders, especially PTSD

Presence of nightmares associated with about a 3-fold increased risk of suicide-related outcomes

Suicidality in suicide attempters (%) with or without nightmares

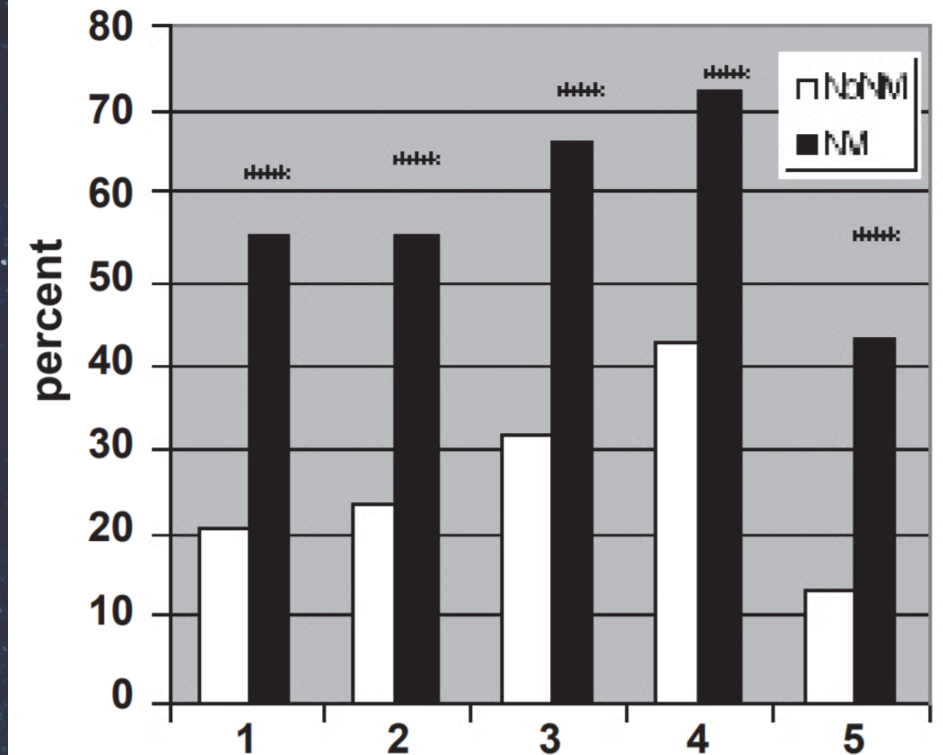


Figure 2—Percentages with scores ≥ 1 on Suicide Assessment Scale (SUAS) suicidality items in patients without (white bars) and with (black bars) frequent nightmares. 1 = suicidal thoughts, 2 = purpose of suicide, 3 = wish to die, 4 = lack of reasons for living and 5 = suicidal actions. *** $p < .001$ (χ^2 test).

Nightmares as a risk factor

Nightmare frequency differentiated multiple from single suicide attempters, even after controlling for symptoms of depression, posttraumatic stress disorder, insomnia, nightmare severity/distress, nightmare chronicity, and age ($P = .019$).

Comparison participants, those not reporting suicide attempts, reported a significantly lower level of nightmare frequency than those reporting single or multiple suicide attempts.

Sleep apnea and suicide risk



Maybe better than depression

Insomnia symptoms predict suicide-related outcomes even after controlling for depression

Ribeiro et al (2012) showed that among suicidal military service members, insomnia at baseline predicted suicide ideation levels one month later

- Depression scores did not
- And the direction of association was only one way
- And the same pattern was seen for suicide attempts

Why?



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THEORETICAL REVIEW

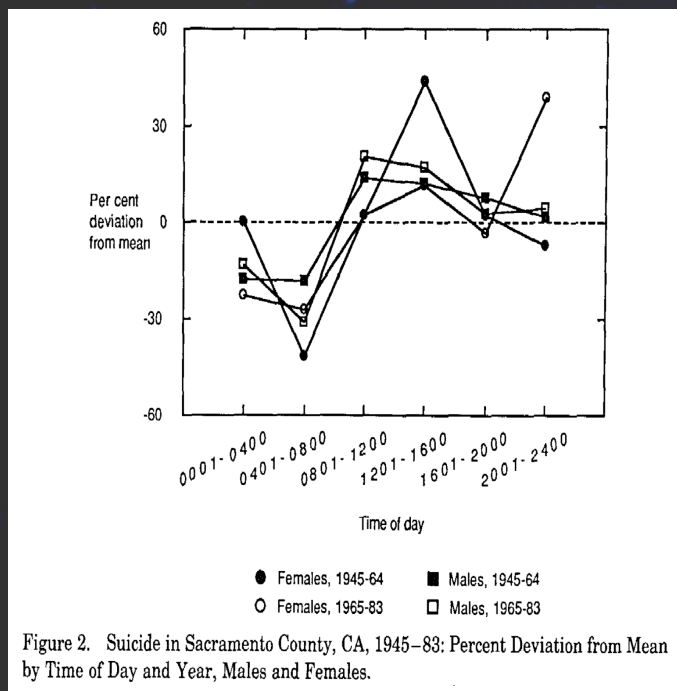
Suicide and sleep: Is it a bad thing to be awake when reason sleeps?



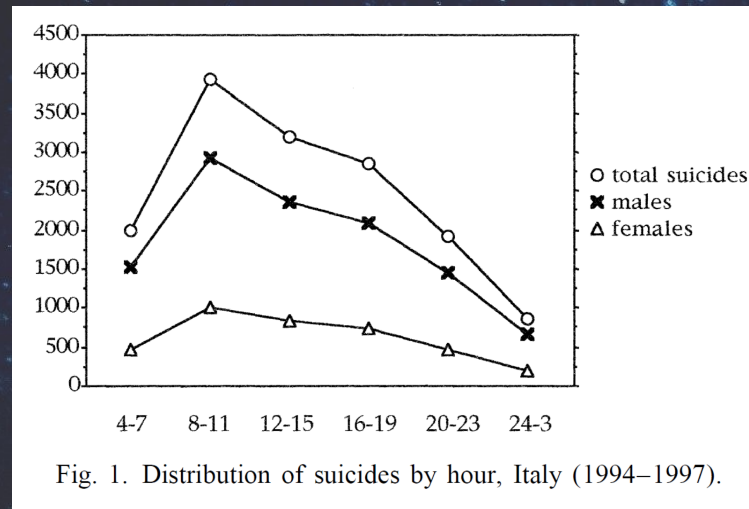
Michael L. Perlis ^{a, b, c, *}, Michael A. Grandner ^d, Subhajit Chakravorty ^{a, e},
Rebecca A. Bernert ^f, Gregory K. Brown ^g, Michael E. Thase ^h

Insomnia and suicide risk

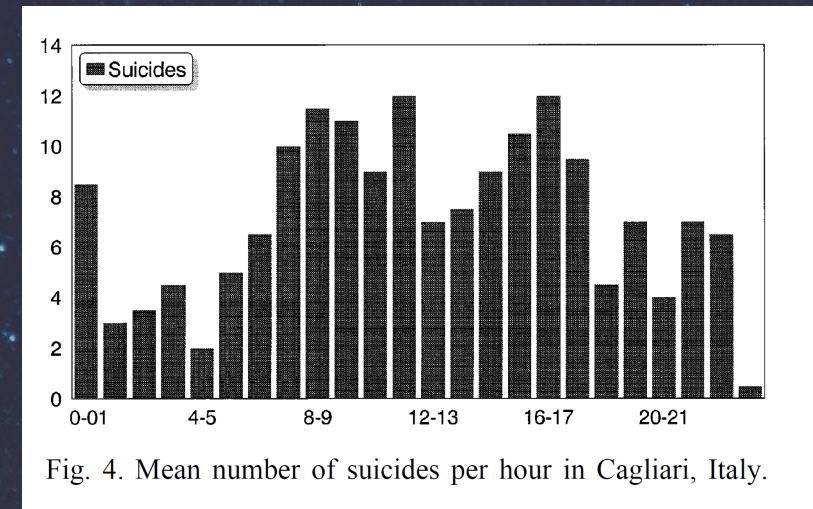
- The presence of insomnia approximately triples suicide risk.
- Interestingly, suicide risk is also elevated in association to other sleep disturbances, including
 - Insufficient sleep duration
 - Irregular sleep timing
 - Sleep-disordered breathing
 - Nightmares
- Perhaps there is a common mechanism?



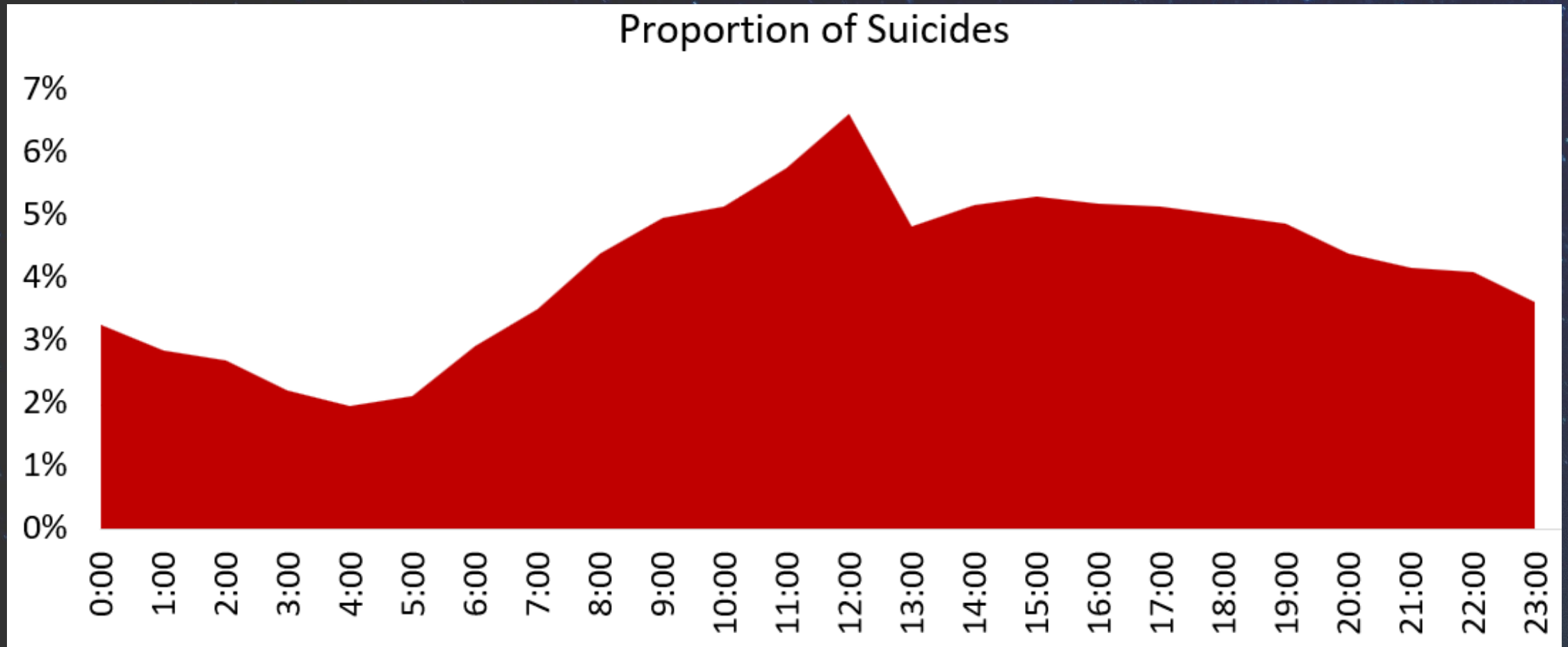
Maldonado and Kraus, 1991



Preti and Miotto, 2001



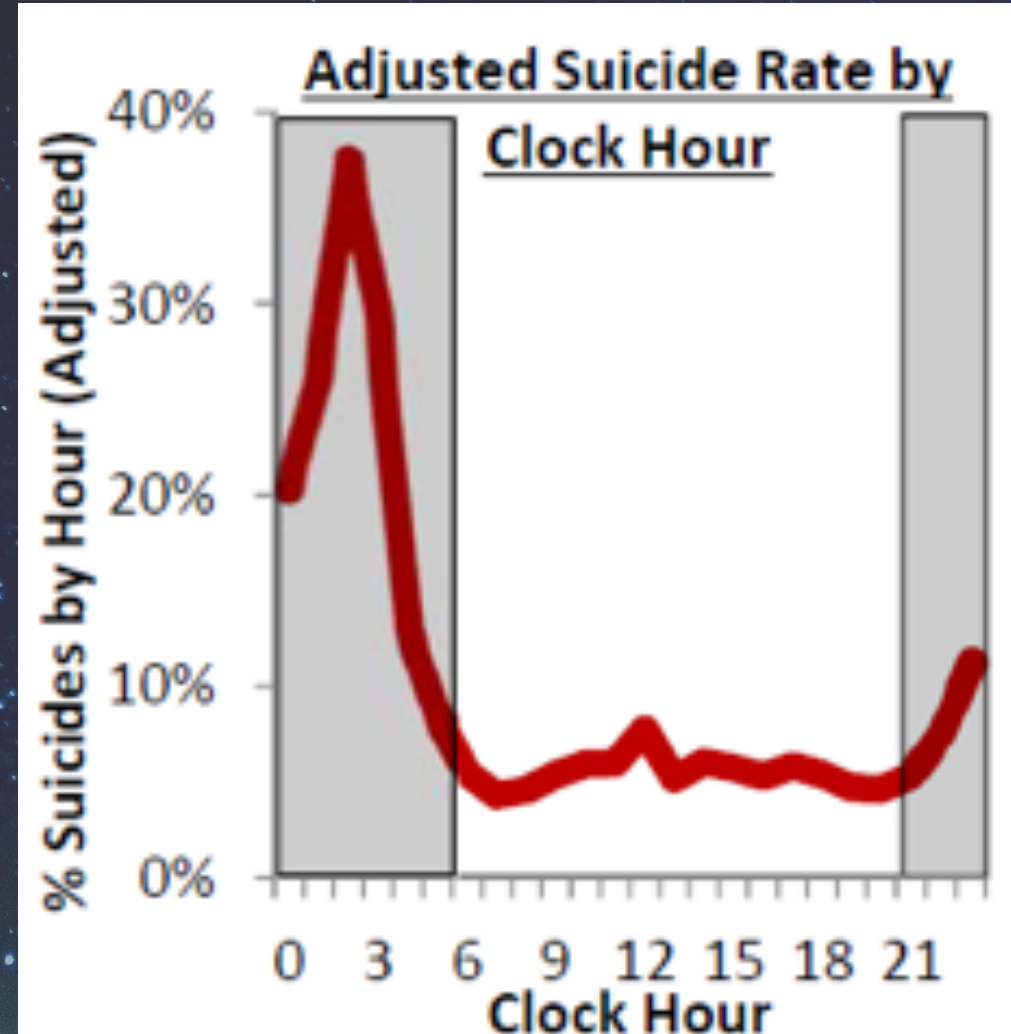
Altamura et al., 1999

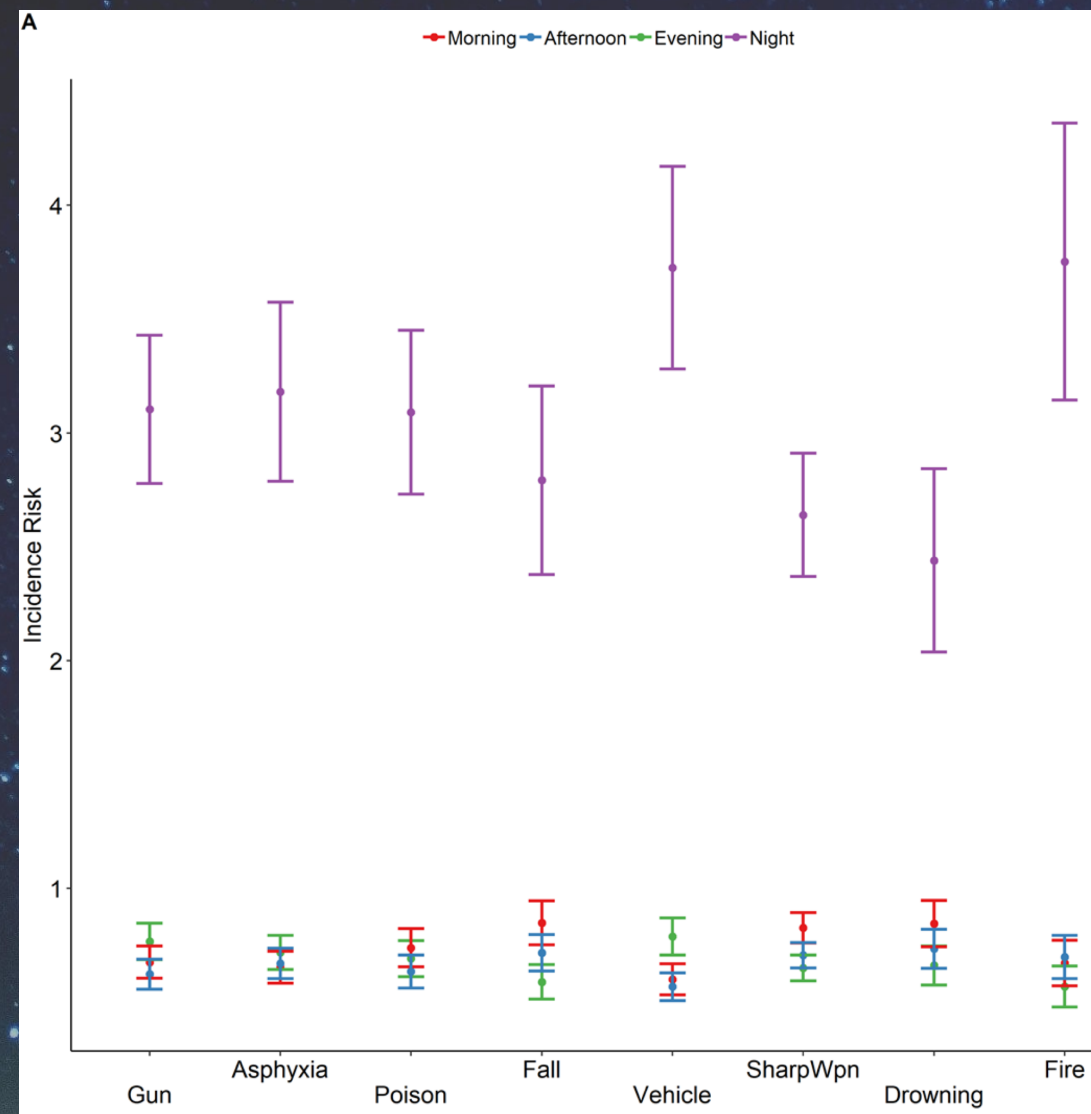
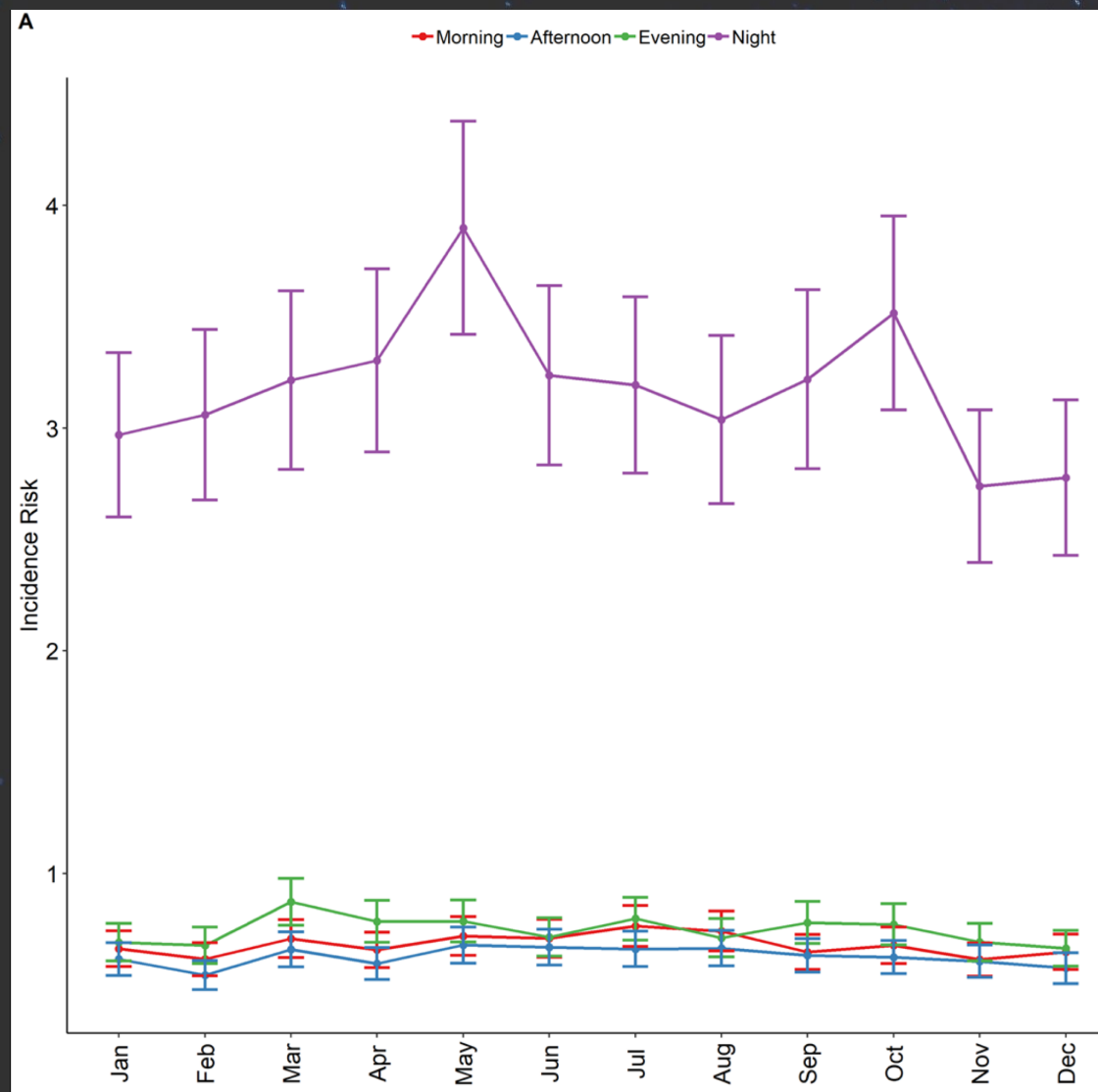


After filtering out the
wakefulness signal...

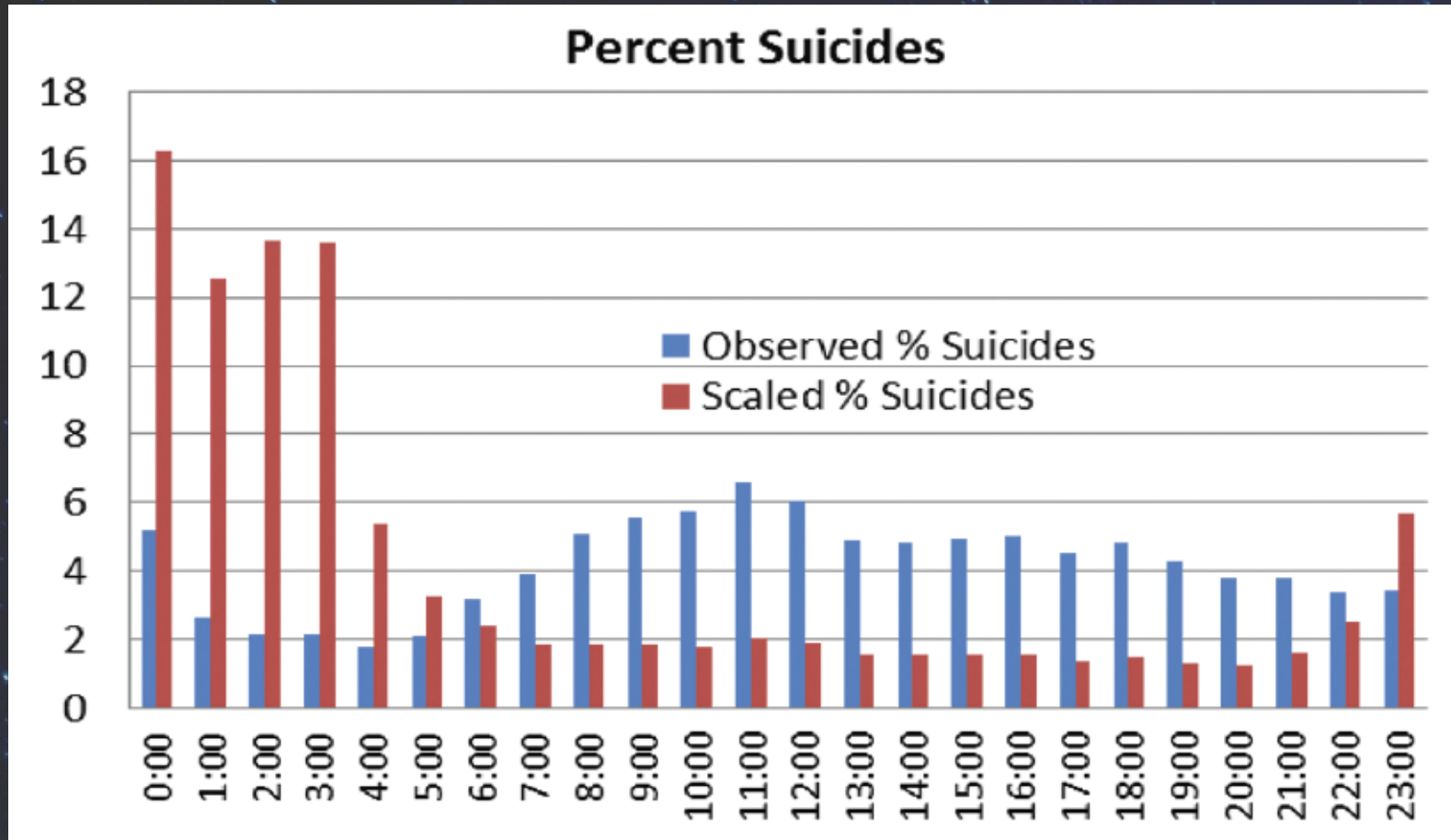
This is what we found:

Nearly all of the increased risk
was at night

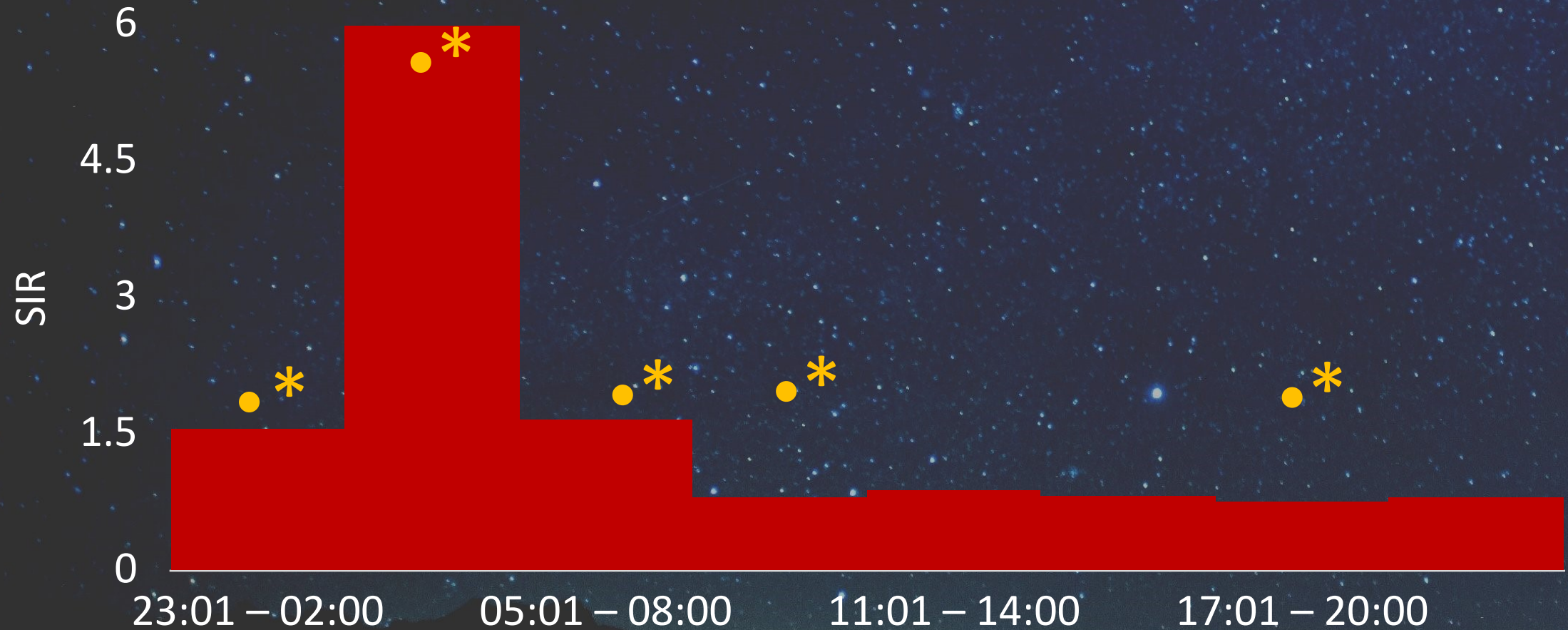




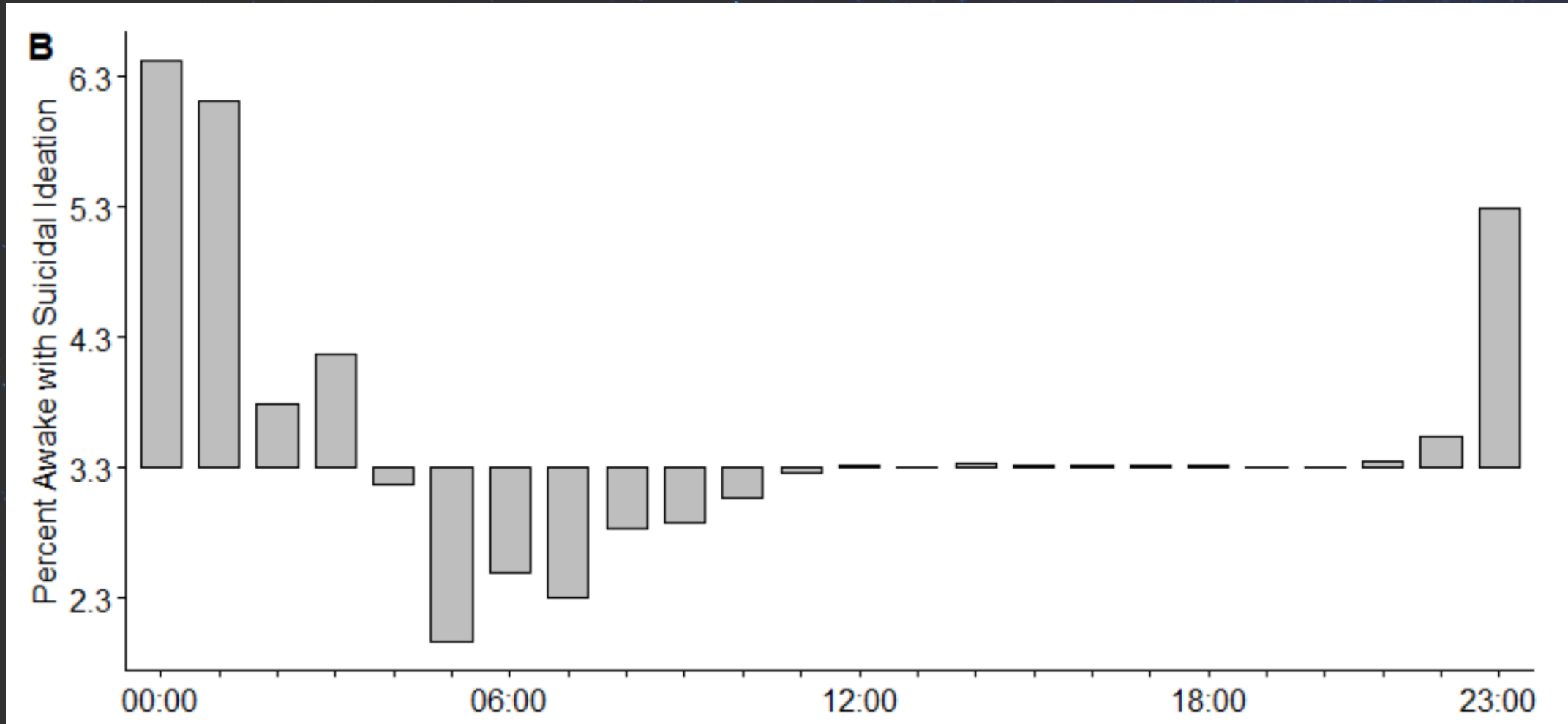
Replicated with veterans



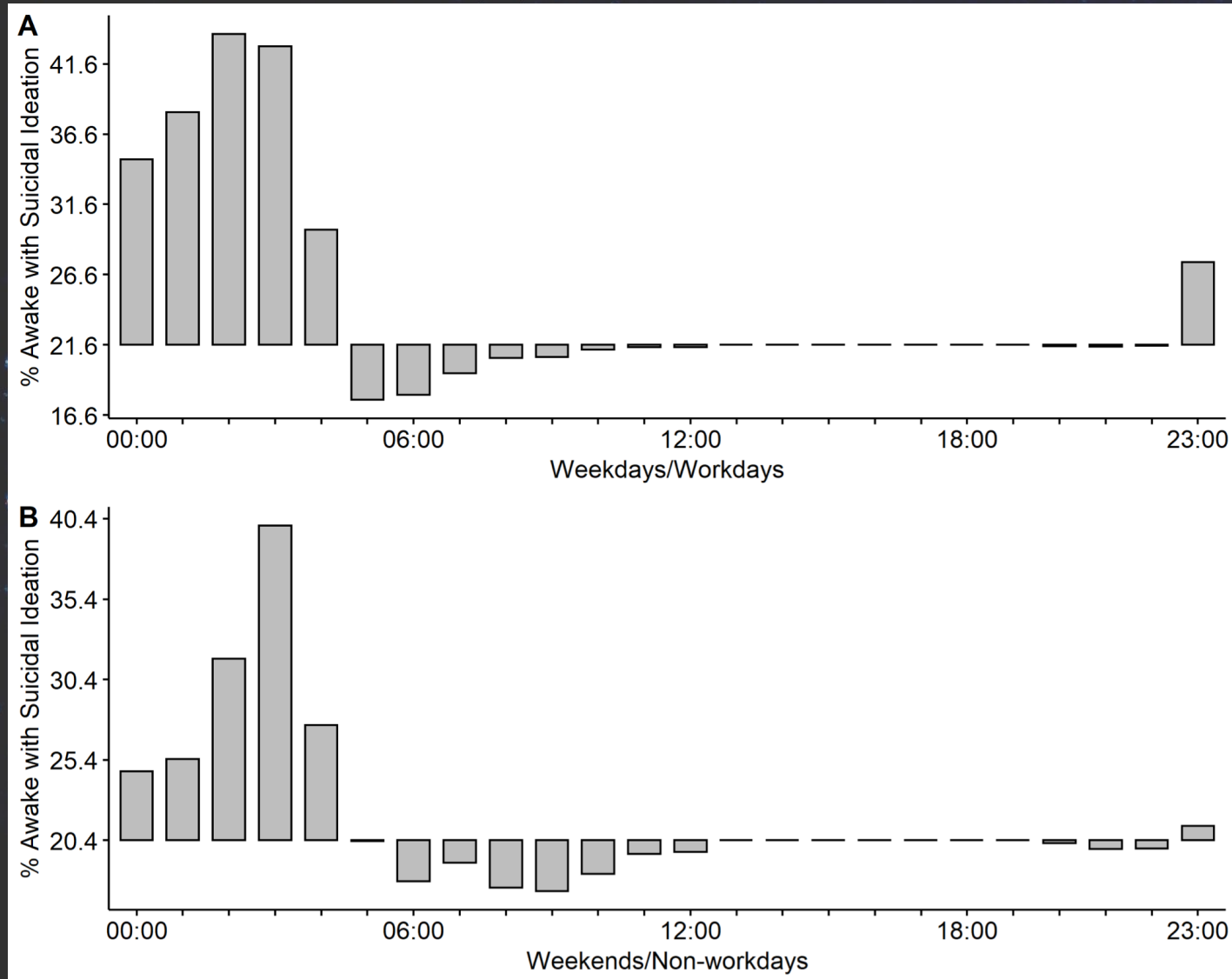
What about a country without firearms?

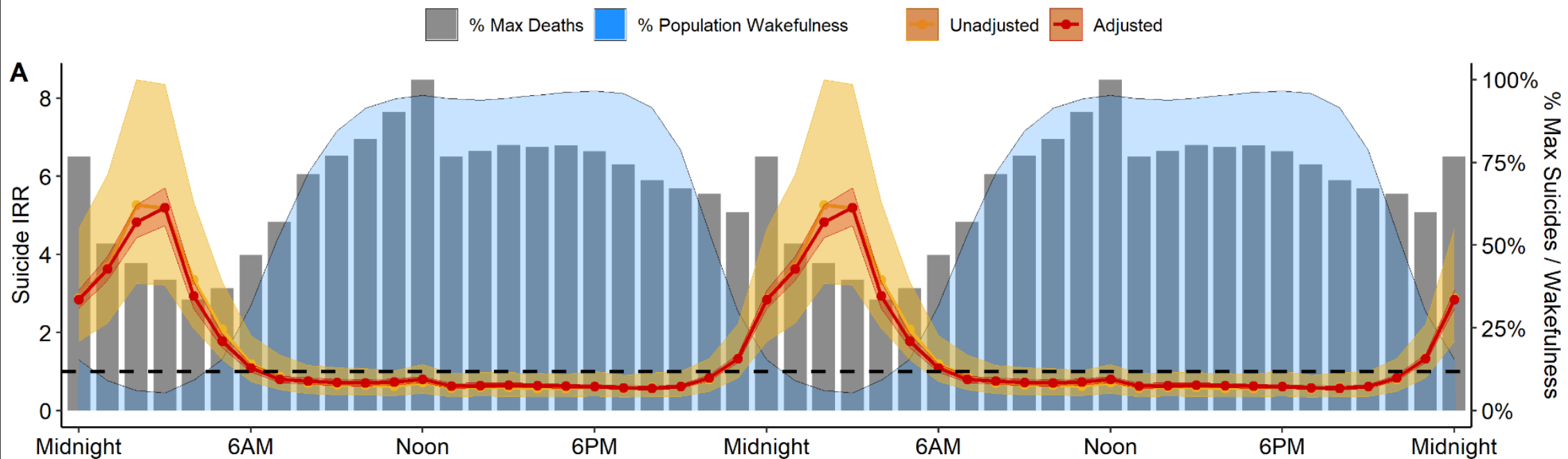


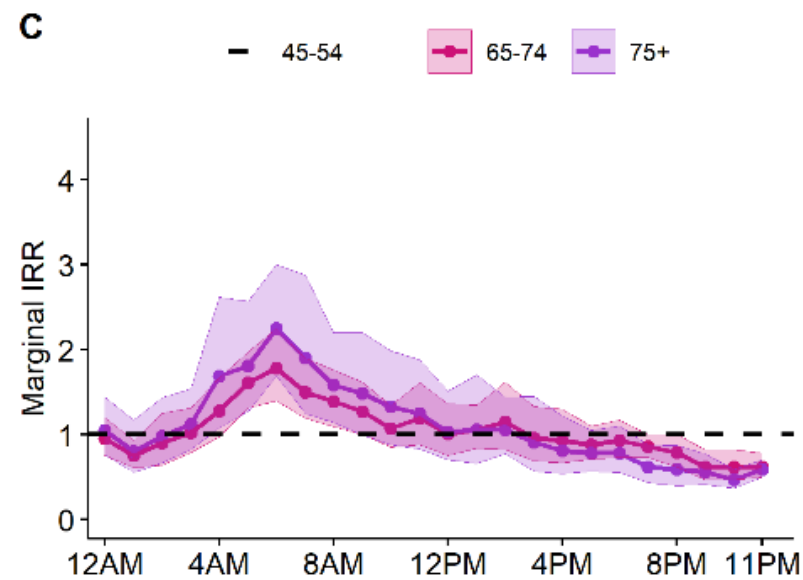
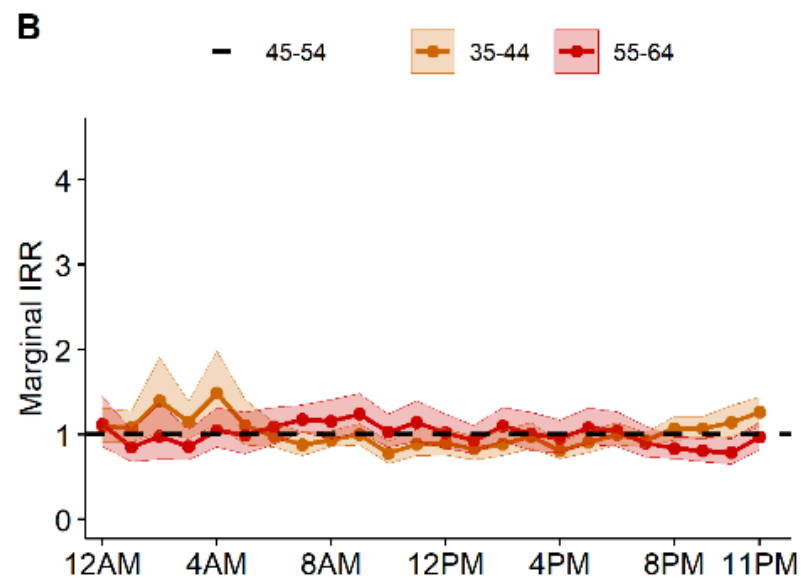
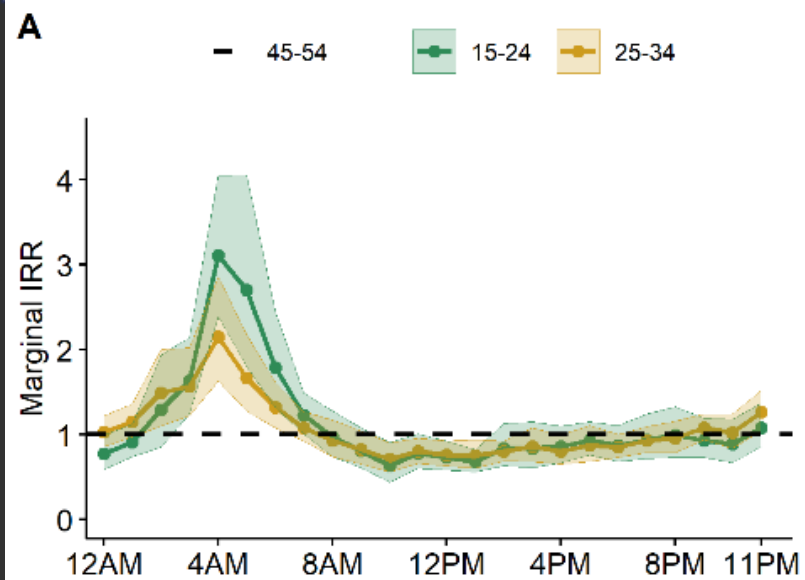
What about people actually up late?



What about at the national level?

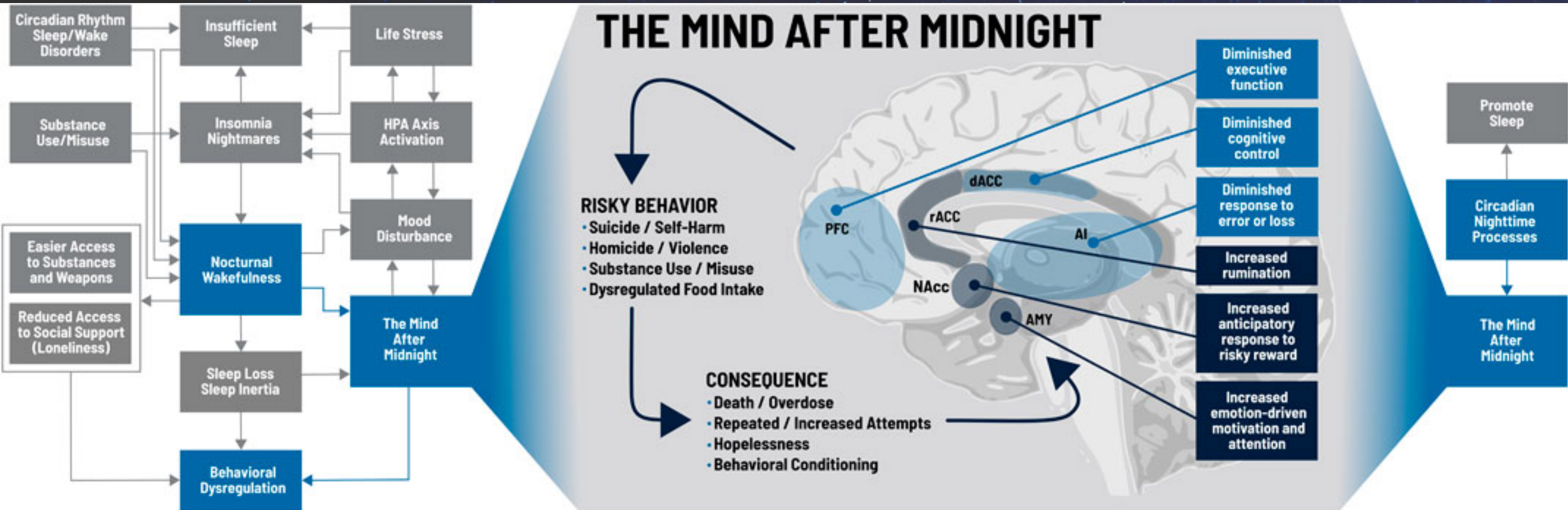






The Mind After Midnight: Nocturnal Wakefulness, Behavioral Dysregulation, and Psychopathology

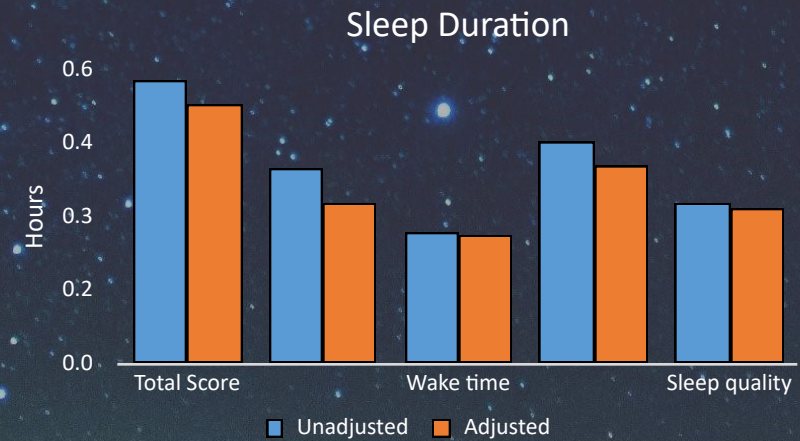
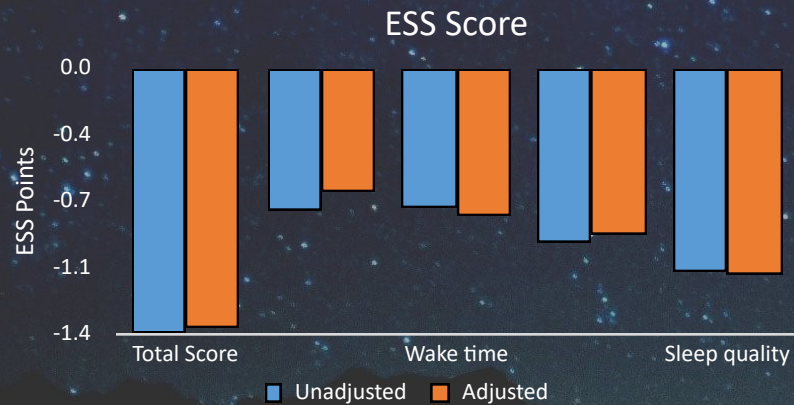
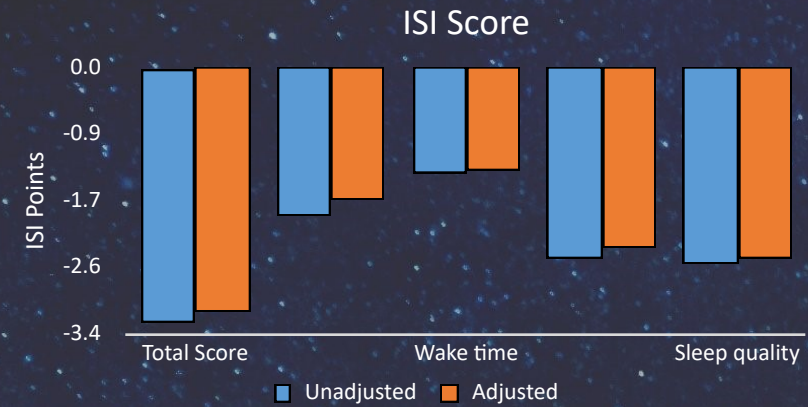
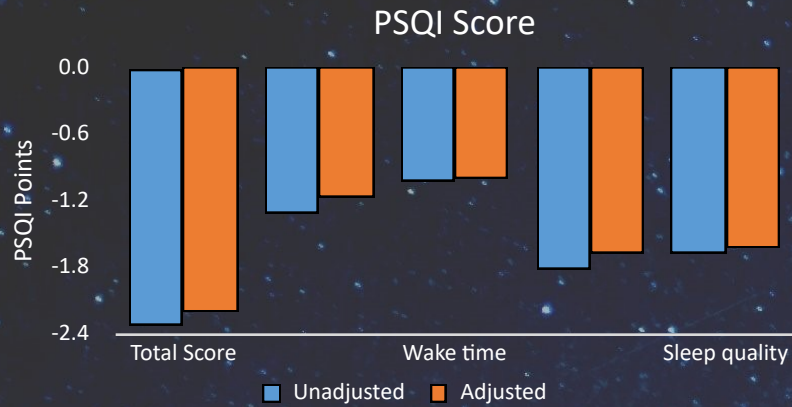
Andrew S. Tubbs^{1†}, Fabian-Xosé Fernandez^{2†}, Michael A. Grandner^{1†}, Michael L. Perlis^{3††} and Elizabeth B. Klerman^{4‡*}



PFC: Prefrontal Cortex | dACC: dorsal Anterior Cingulate Cortex | rACC: rostral Anterior Cingulate Cortex | NAcc: Nucleus Accumbens | AI: Anterior Insula | AMY: Amygdala

Control over sleep

BRISC Brief Index of Sleep Control



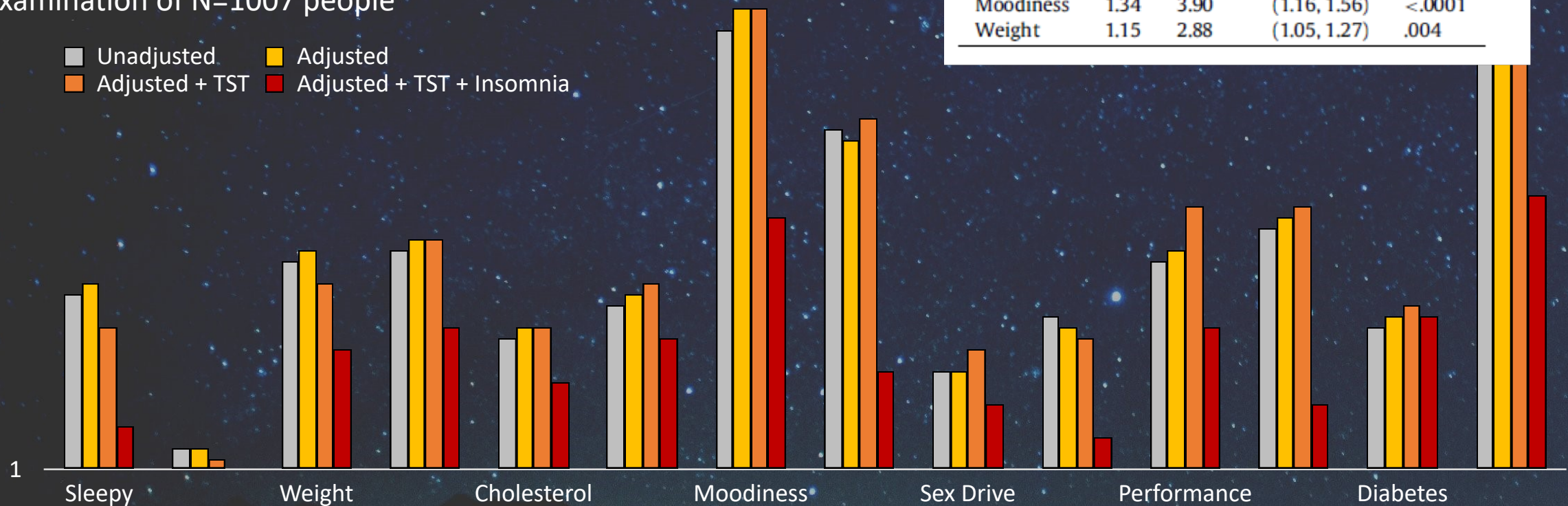
Why would people make changes?

What sleep-related beliefs make people more likely to engage in sleep-promoting behaviors?

Examination of N=1007 people

Ordinal OR for Stage of Change

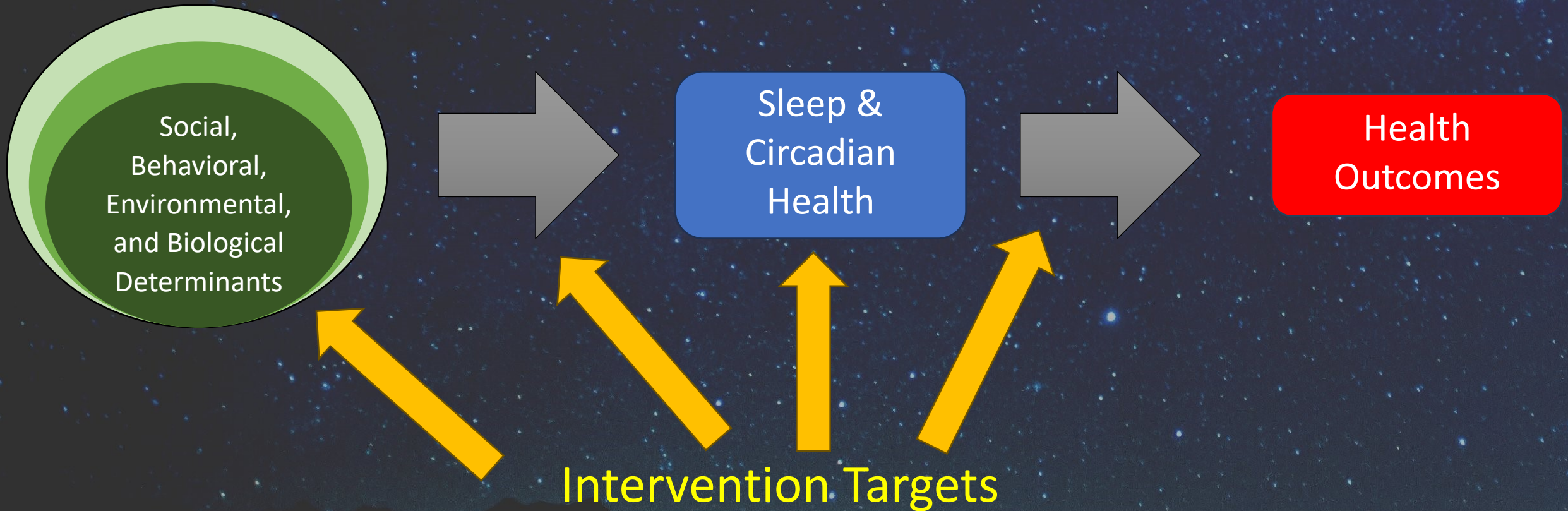
Legend:
Unadjusted (grey)
Adjusted (yellow)
Adjusted + TST (orange)
Adjusted + TST + Insomnia (red)



Results of forward stepwise ordinal regression analyses examining associations between stage of change and beliefs about the impacts of sleep

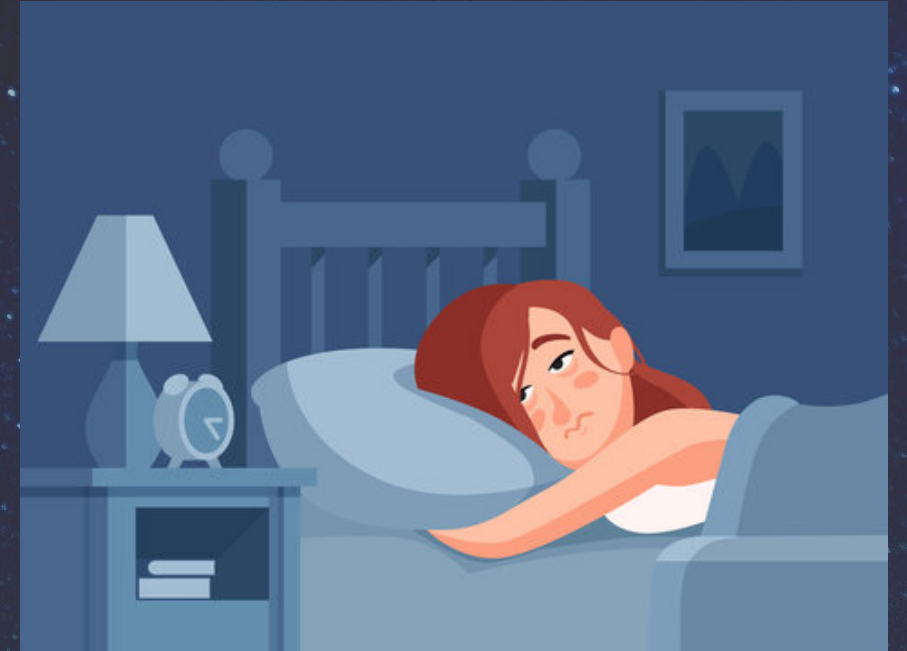
Variable	OR	Z score	95% CI	P
Moodiness	1.34	3.90	(1.16, 1.56)	<.0001
Weight	1.15	2.88	(1.05, 1.27)	.004

Conceptualizing interventions

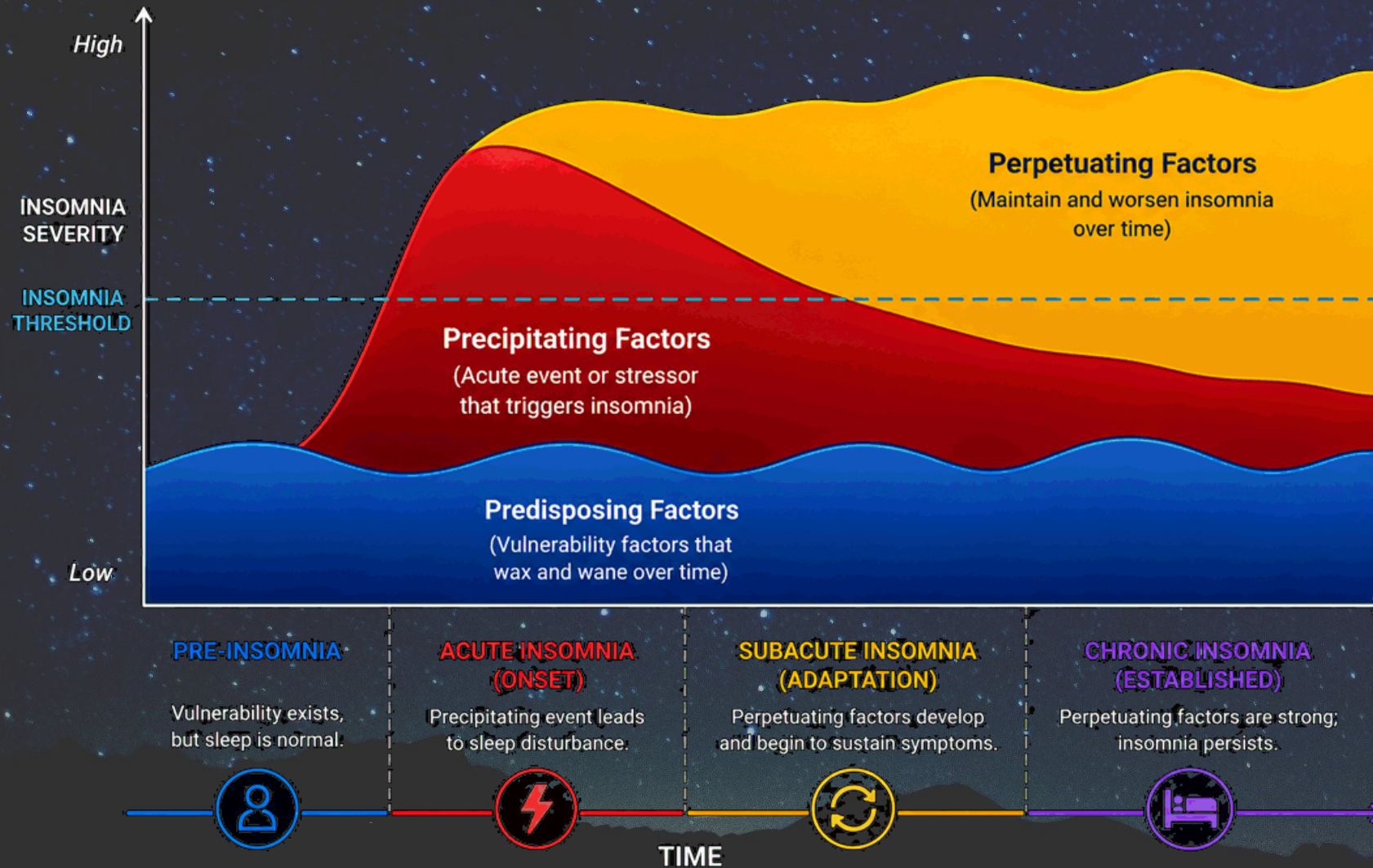


Treating insomnia with CBTI

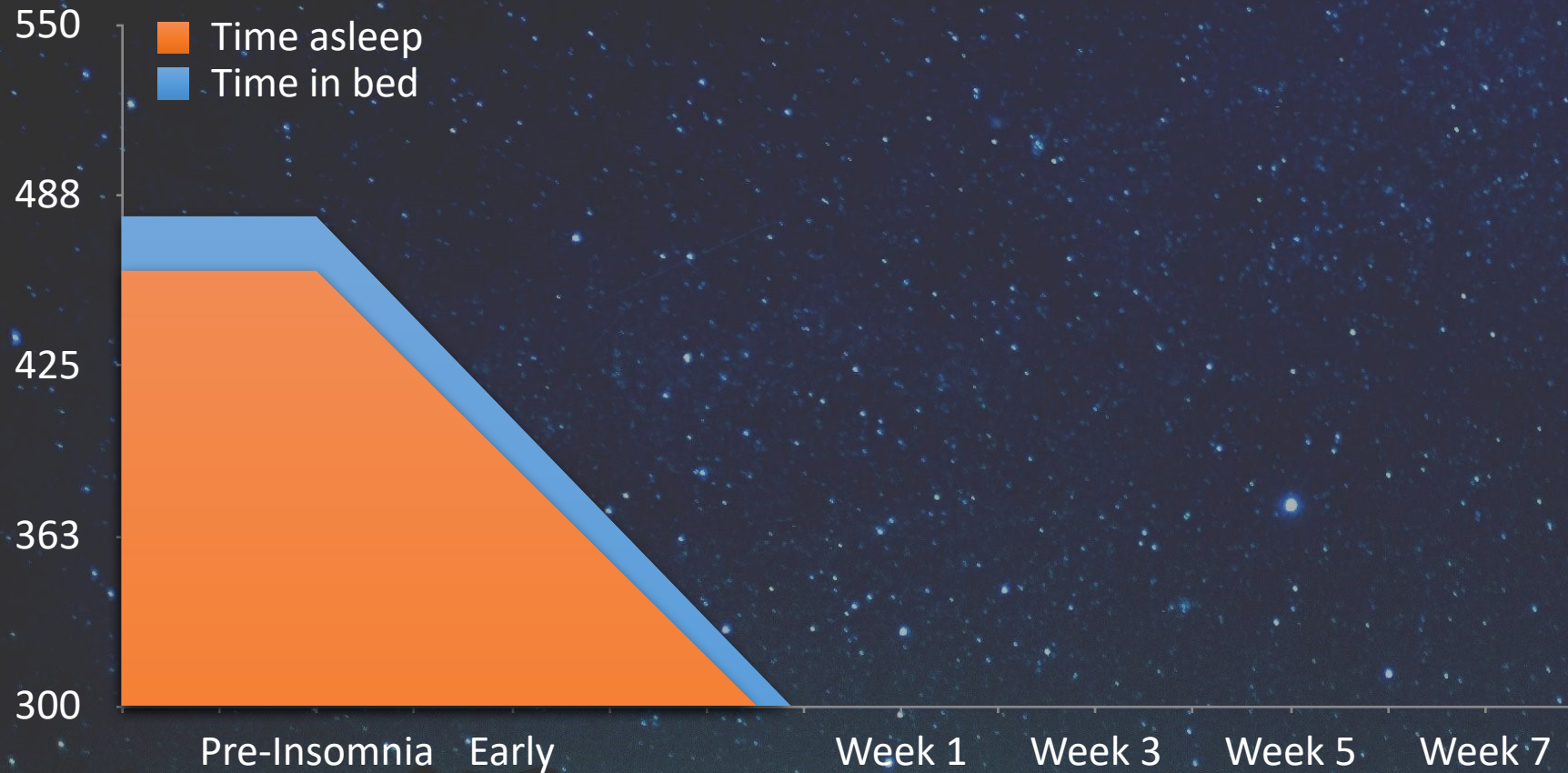
- Cognitive Behavioral Therapy for Insomnia
 - A multicomponent treatment
- Based on cognitive-behavioral framework
 - Thoughts, feelings, behavior, physiology
 - CBT says these are all connected with feedback loops
- CBTI is a unique implementation of CBT that leverages these principles along with specific techniques that support sleep physiology (mostly behavioral)



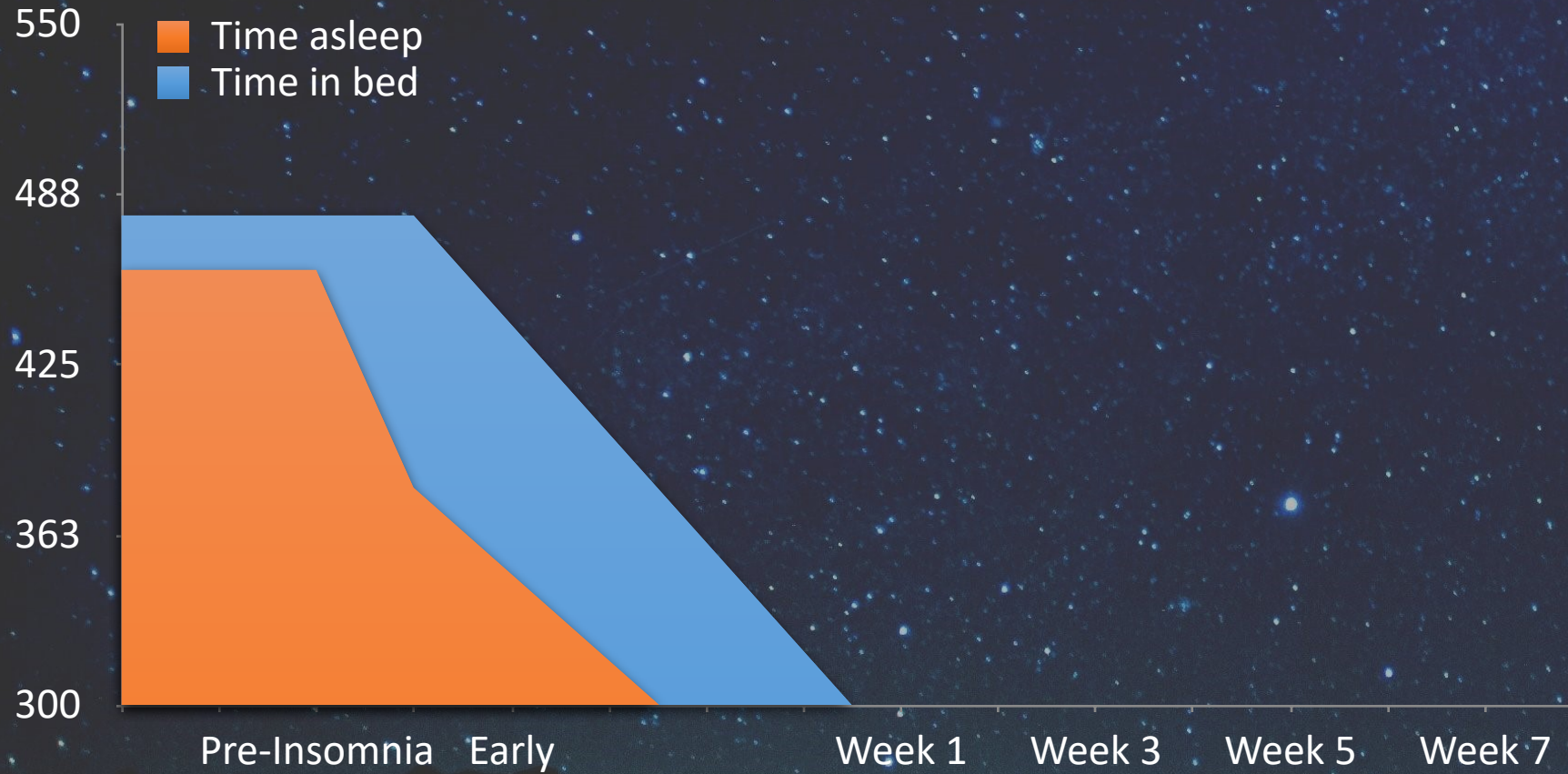
Spielman's 3-P Model



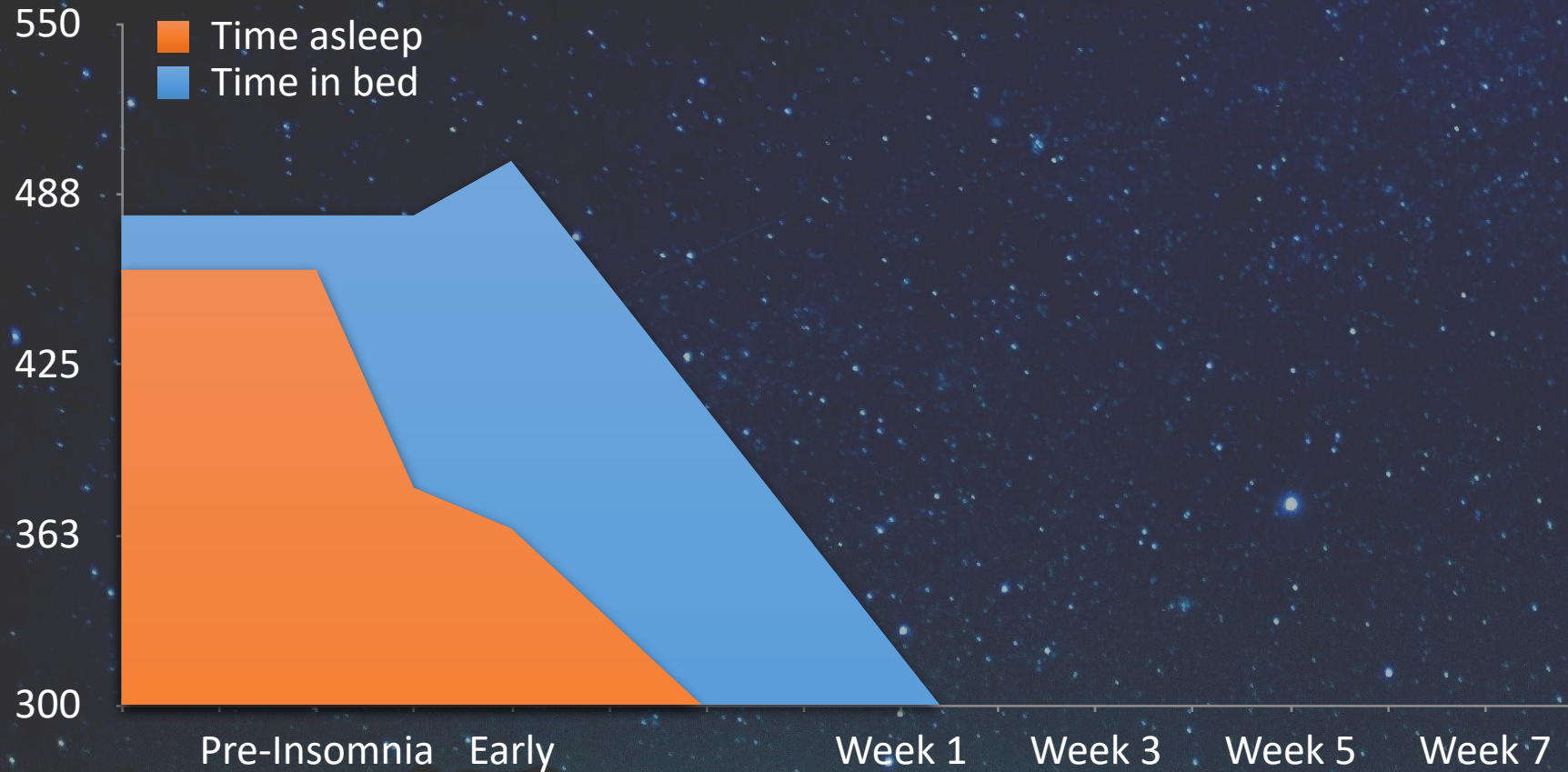
Sleep restriction in action



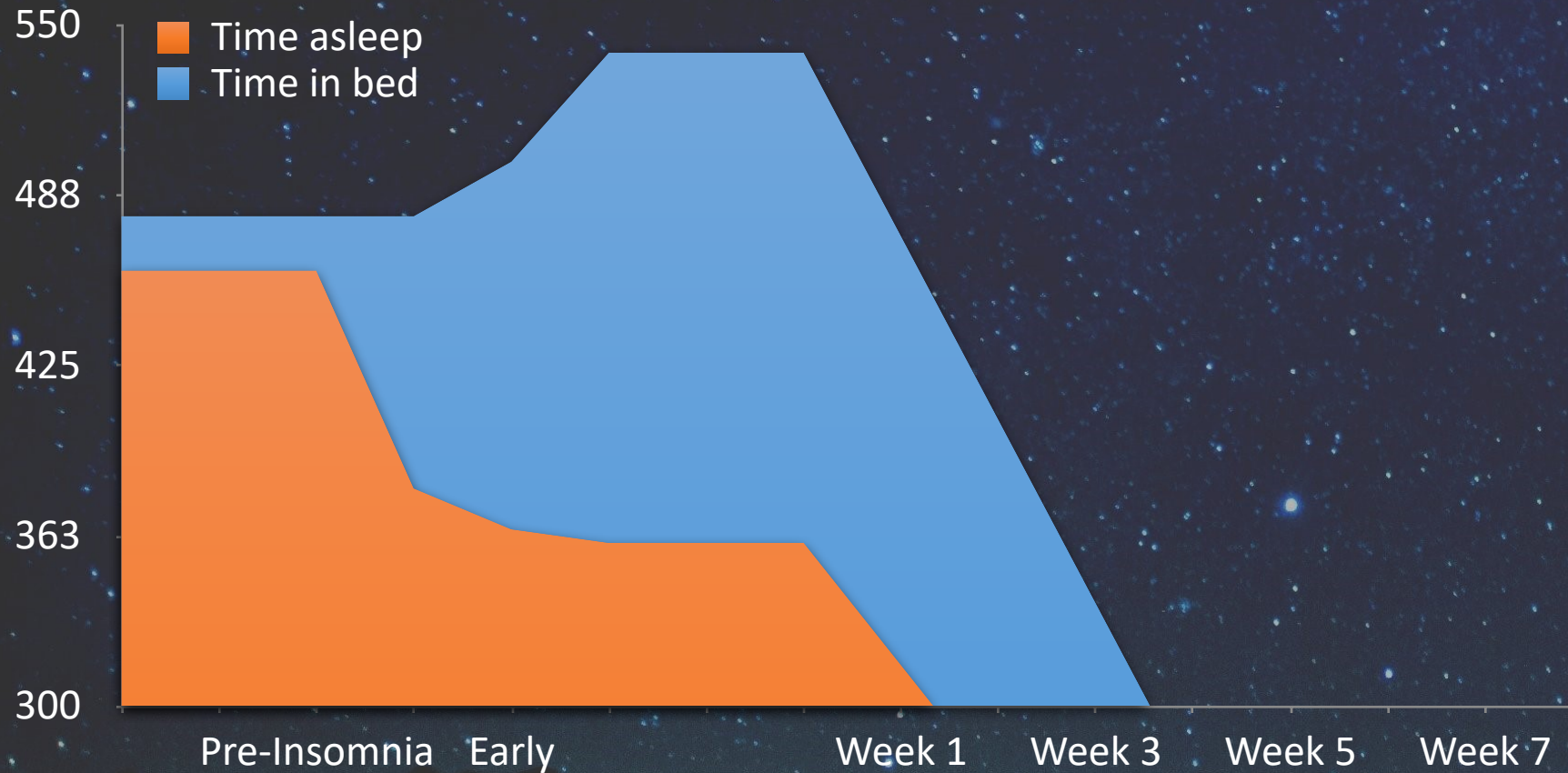
Sleep restriction in action



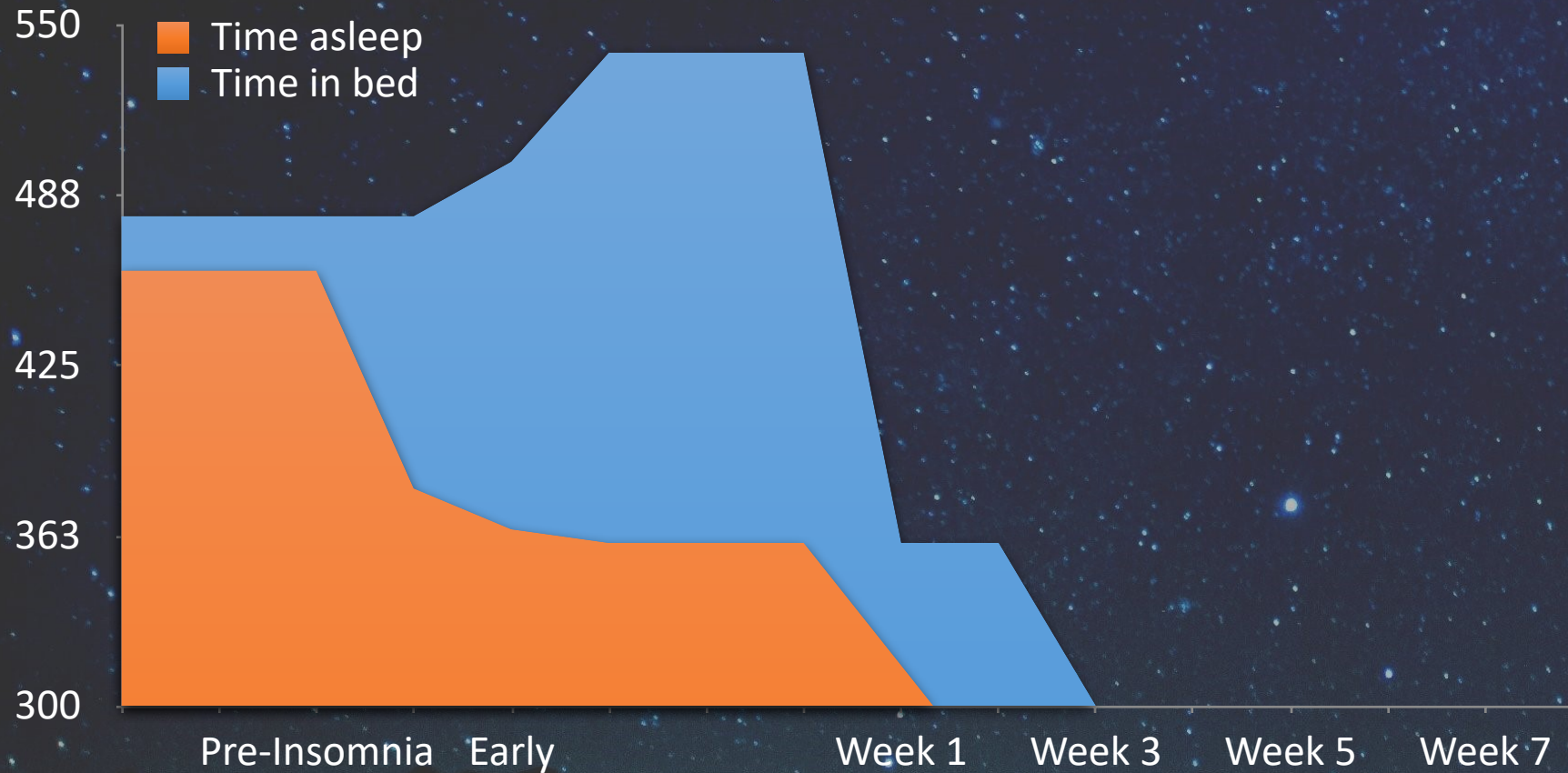
Sleep restriction in action



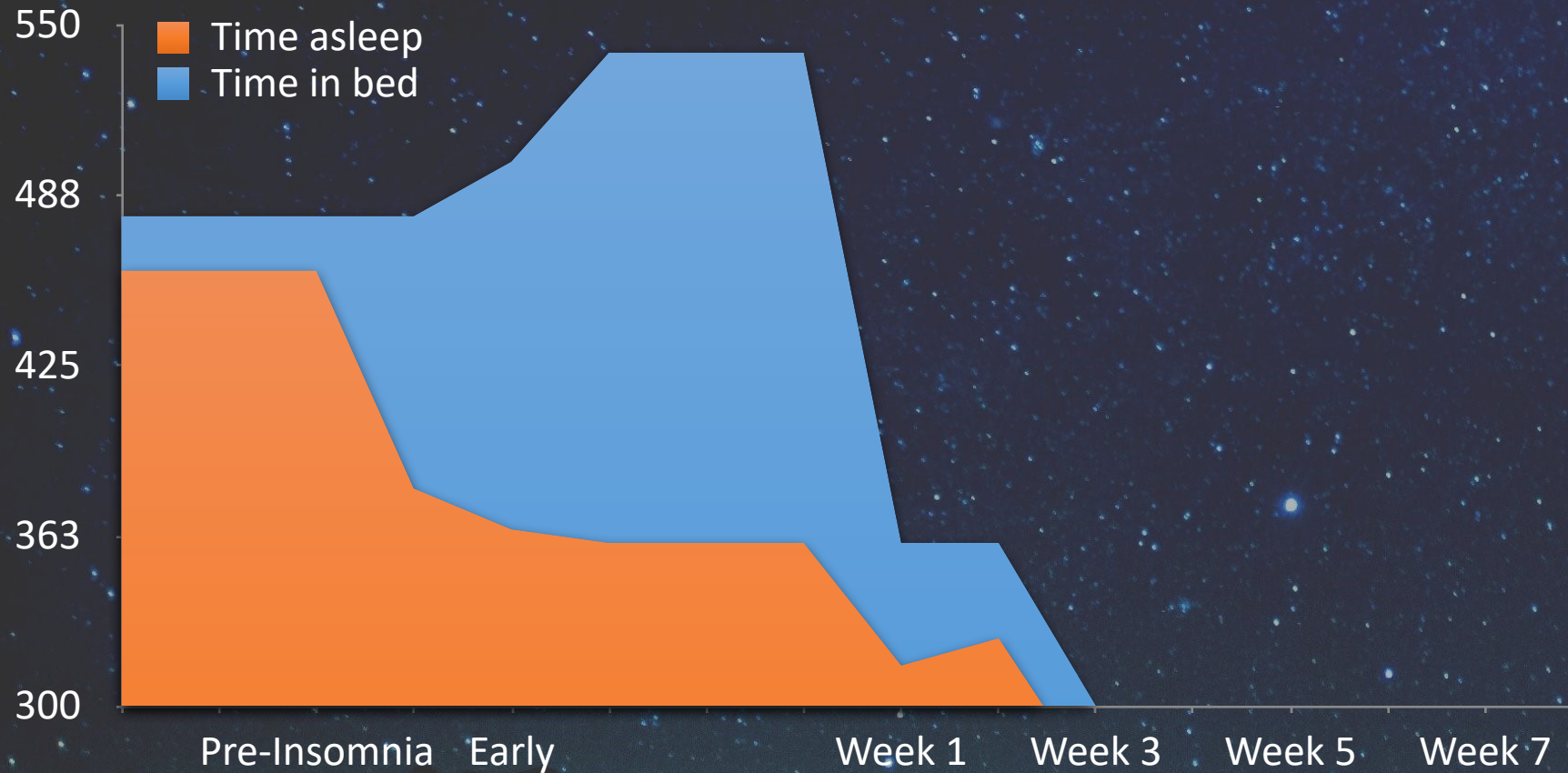
Sleep restriction in action



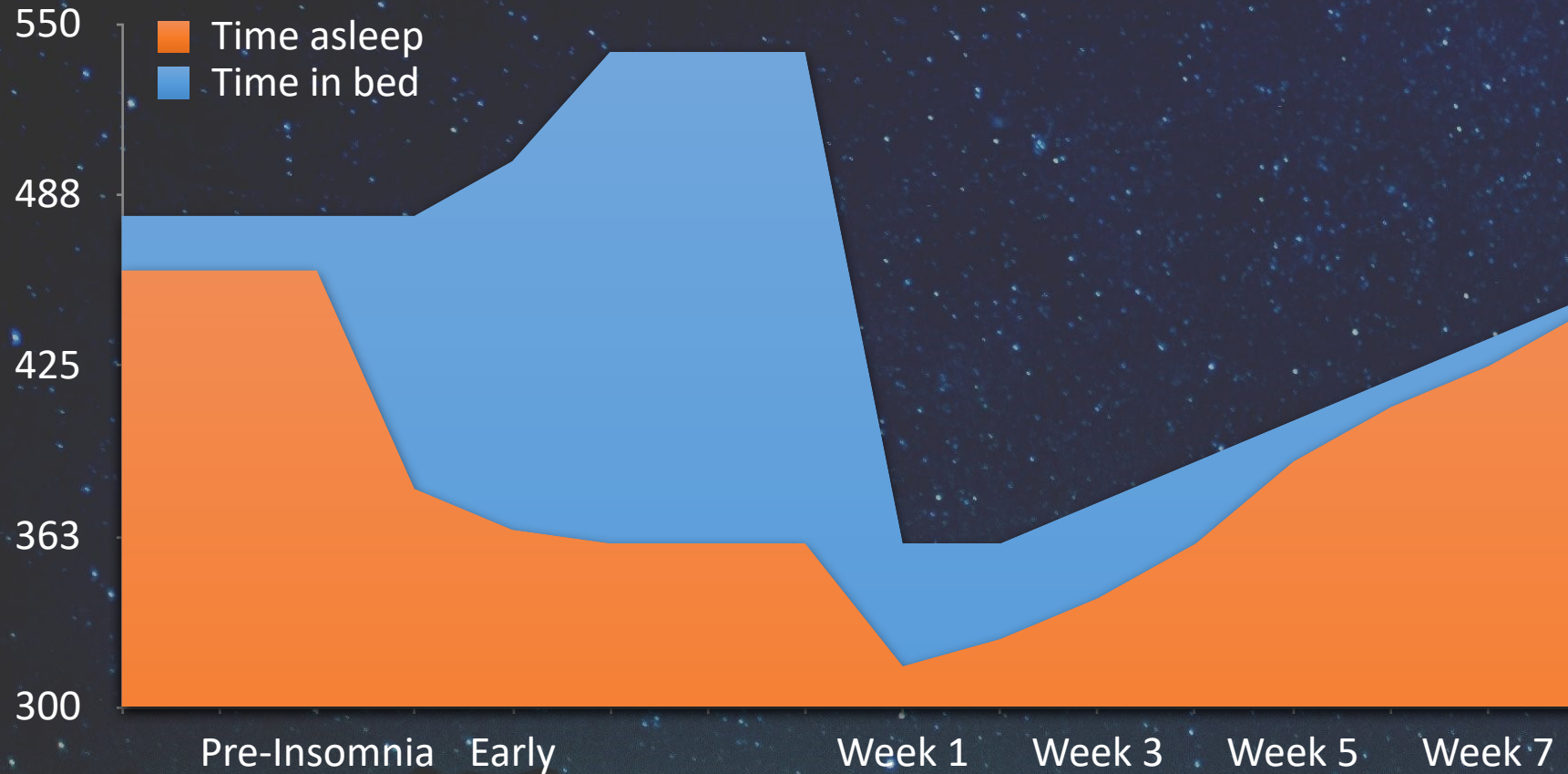
Sleep restriction in action



Sleep restriction in action



Sleep restriction in action



Stimulus Control Therapy

Strengthen the bed-sleep connection

GOOD STIMULUS CONTROL

Strengthens the bed-sleep connection



Sleep

Use bed for sleep **primarily**



Intimacy

Intimacy is **ok** in bed



Sleep is likely



The goal of stimulus control is to make your bed a **cue for sleep**, not wakefulness.

POOR STIMULUS CONTROL

Weakens the bed-sleep connection



Sleep



TV & Videos



Social Media



Eating & Drinking



Worrying



Working



Reading



Sleep is unlikely



BED = SLEEP



WHILE IN BED

- Go to bed only when sleepy
- Do not do other things in bed
- Get out of bed when unable to sleep



DURING THE DAY

- Wake up at a consistent time
- Avoid daytime naps

Cognitive Therapy

“I’m going to fail”
“People will reject me”

Unable to fall
asleep the night

“I need 8 hours sleep
or else I can’t
function.”

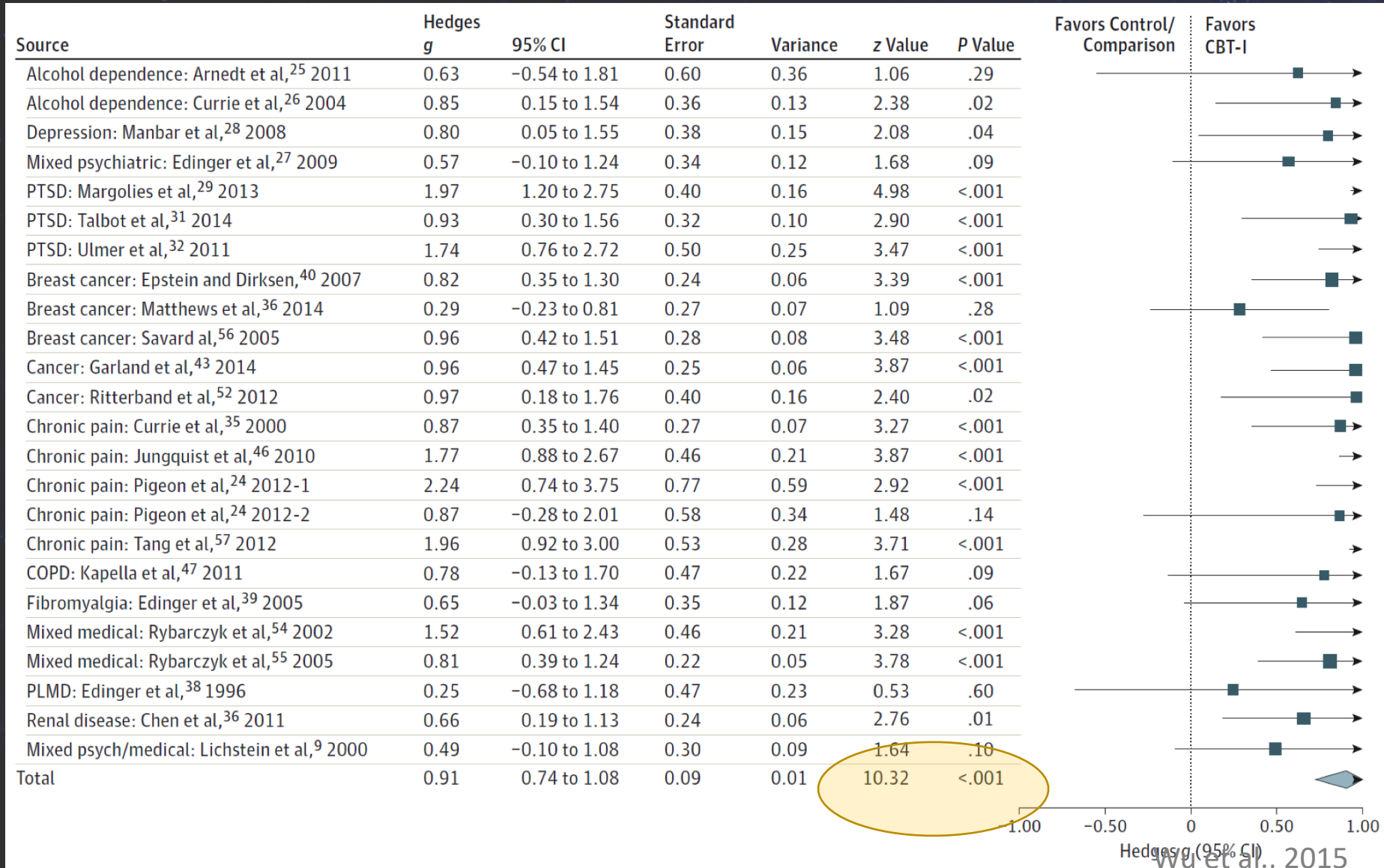
“Everyone’s going to
see how incompetent
I really am”

Fear, humiliation

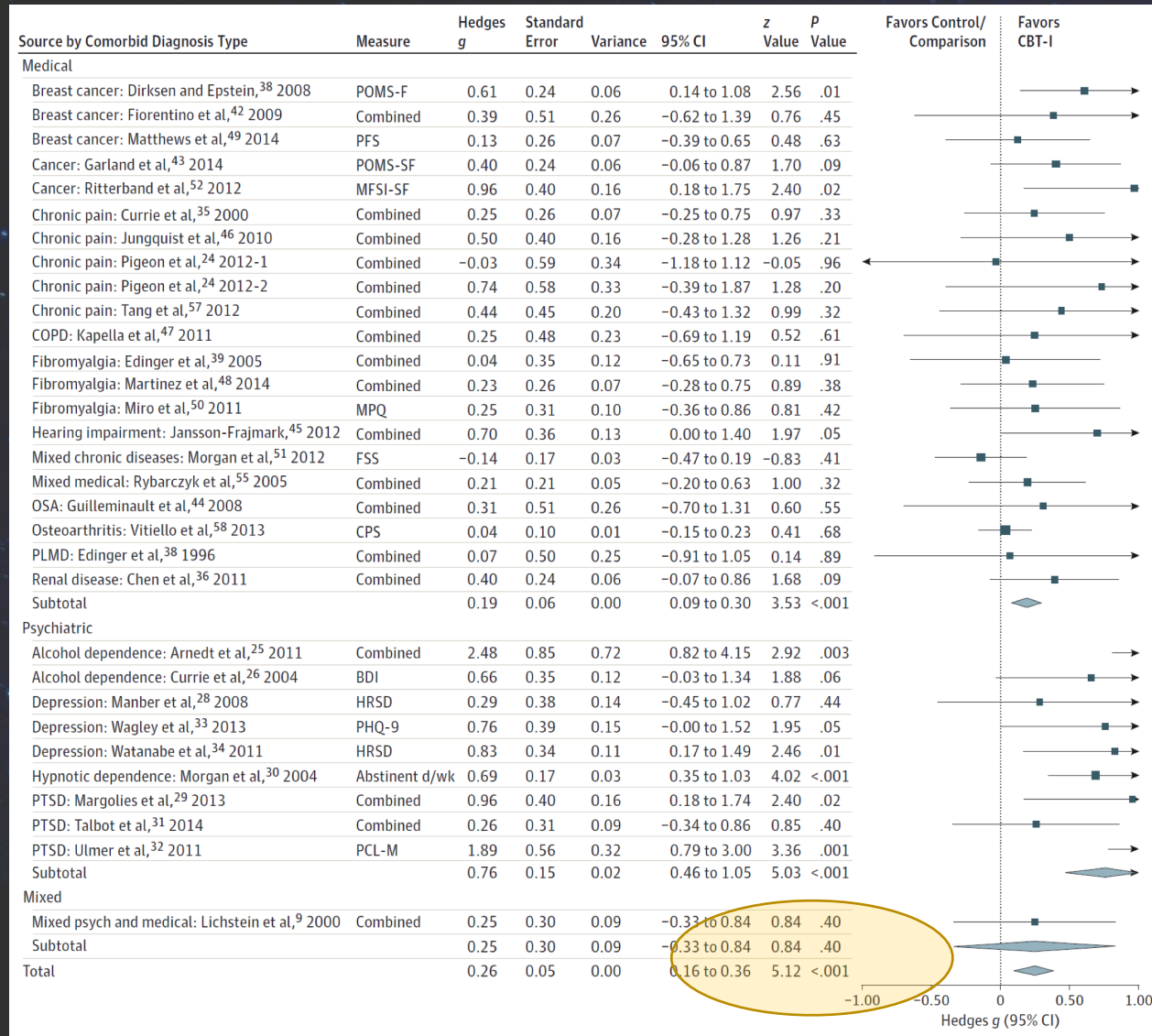
↑HR, muscle tension

Tosses & turns in bed

What about comorbidities?



What about comorbidities?





COLLEGE OF MEDICINE TUCSON
**Sleep & Health
 Research Program**

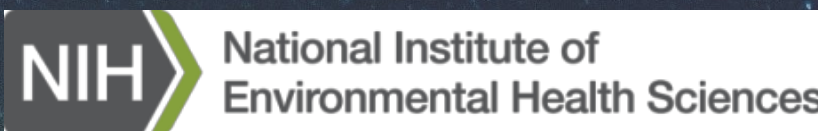
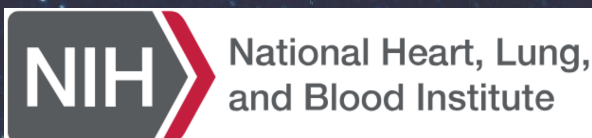
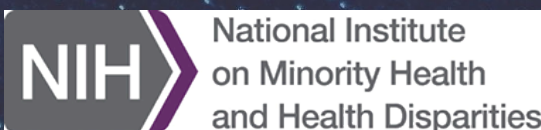
<http://www.sleephealthresearch.com>

SHRP Faculty, Staff & Affiliates

Denisse Armenta
 Suzanne Gorovoy
 Cristina Garcia
 Rina Fox
 Lauren Hartstein
 Andrea Diaz-Pacheco
 Darilyn Rivera-Collazo
 Sherap Sangpo
 Anna Hydych
 Julie Takishima-Lacasa
 Christina Rios
 Sadia Ghani

Arizona Collaborators

Fabian-Xose Fernandez
 Scott Killgore
 Jordan Karp
 Daniel Taylor
 Patricia Haynes
 John Ruiz
 Sai Parthasarathy
 Salma Patel
 Kat Kennedy
 Ruth Taylor-Pilliae





Thank you!

Michael A. Grandner PhD MTR

Director, Sleep and Health Research Program

Director, Behavioral Sleep Medicine Clinic

Professor of Psychiatry, Psychology, Medicine, and Nutritional Sciences

University of Arizona College of Medicine

grandner@arizona.edu

@michaelgrandner