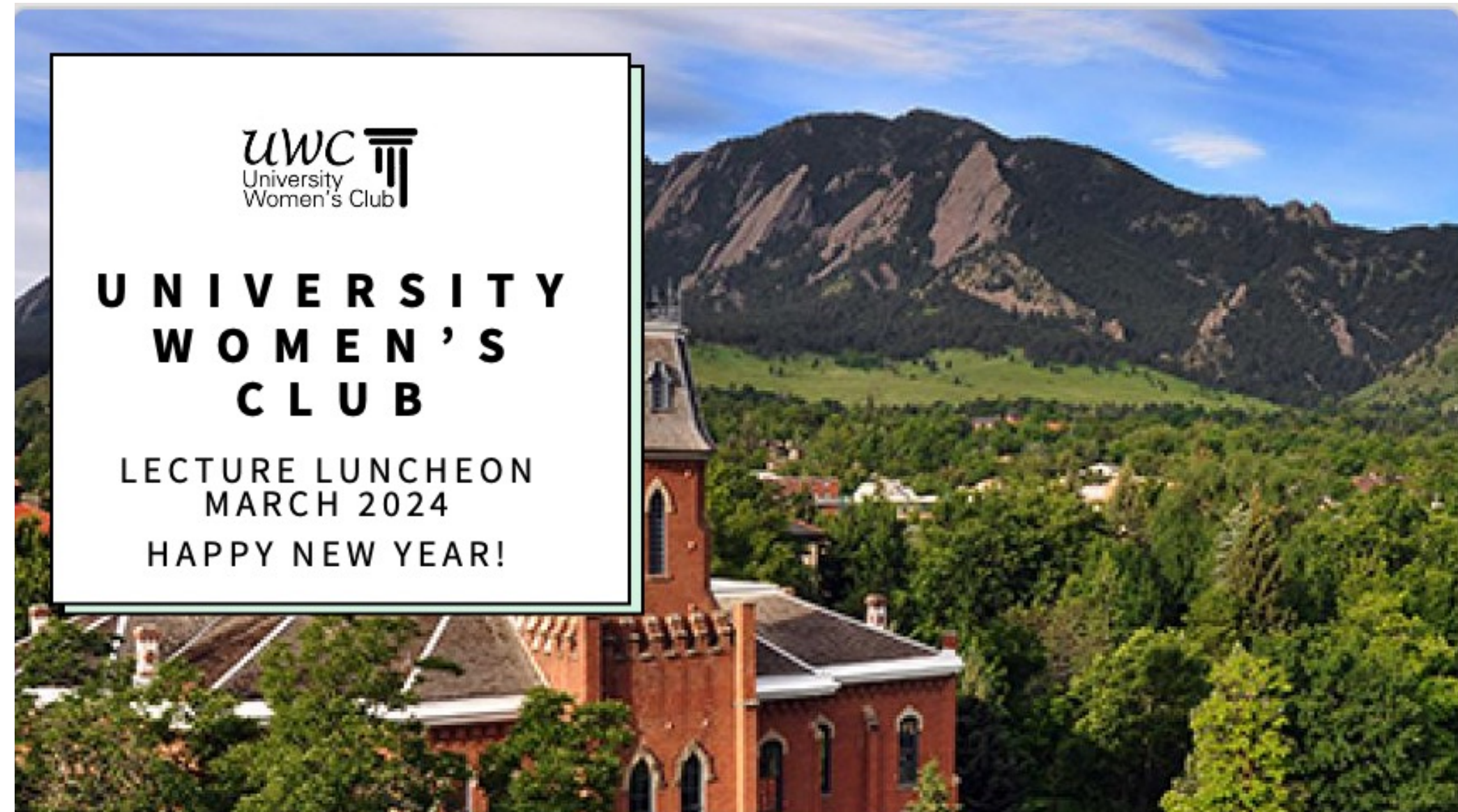




**U N I V E R S I T Y
W O M E N ' S
C L U B**

**LECTURE LUNCHEON
MARCH 2024**

HAPPY NEW YEAR!





Today's Program

Sleep, Insomnia, and Aging

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University of Colorado





Sleep 101

Sleep continuity

Sleep metric	Definition
Sleep duration	Total amount of time from sleep onset to sleep offset
Sleep onset latency (SOL)	Amount of time to fall asleep
Wake after sleep onset (WASO)	Amount of time spent awake from sleep onset to sleep offset
Sleep quality	Subjective perception of quality of sleep
Sleep efficiency	Sleep duration/time in bed (%)

Sleep Stages

- Non-rapid eye movement (NREM)
 - 3 Stages
 - Progress from lighter to deeper sleep
- Rapid eye movement (REM)
 - Characterized by rapid eye movements, muscle paralysis, and mixed frequency EEG activity



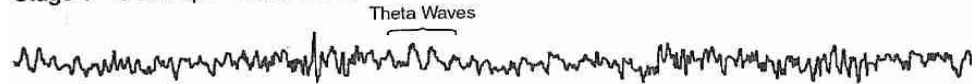
Awake – low voltage – random, fast



Drowsy – 8 to 12 cps – alpha waves



Stage 1 – 3 to 7 cps – theta waves



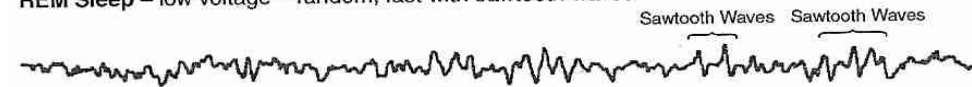
Stage 2 – 12 to 14 cps – sleep spindles and K complexes



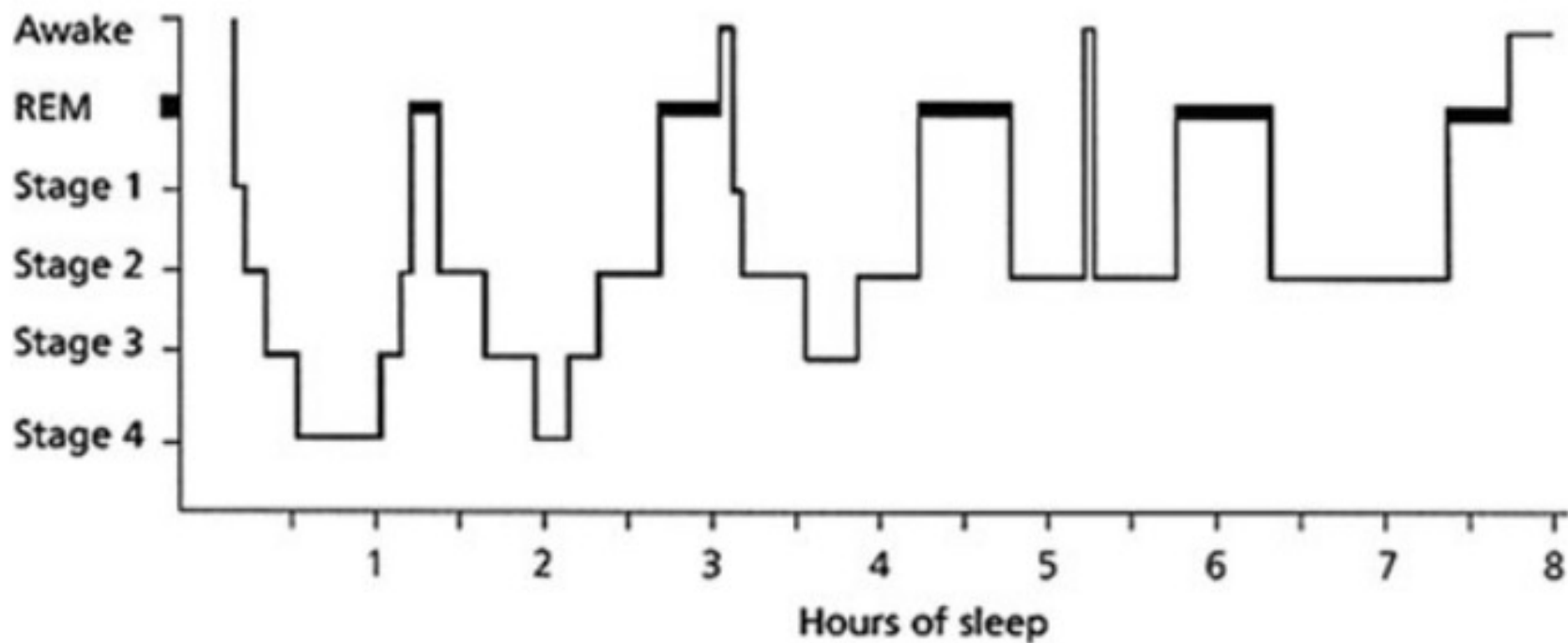
Delta Sleep – 1/2 to 2 cps – delta waves $>75 \mu$ V



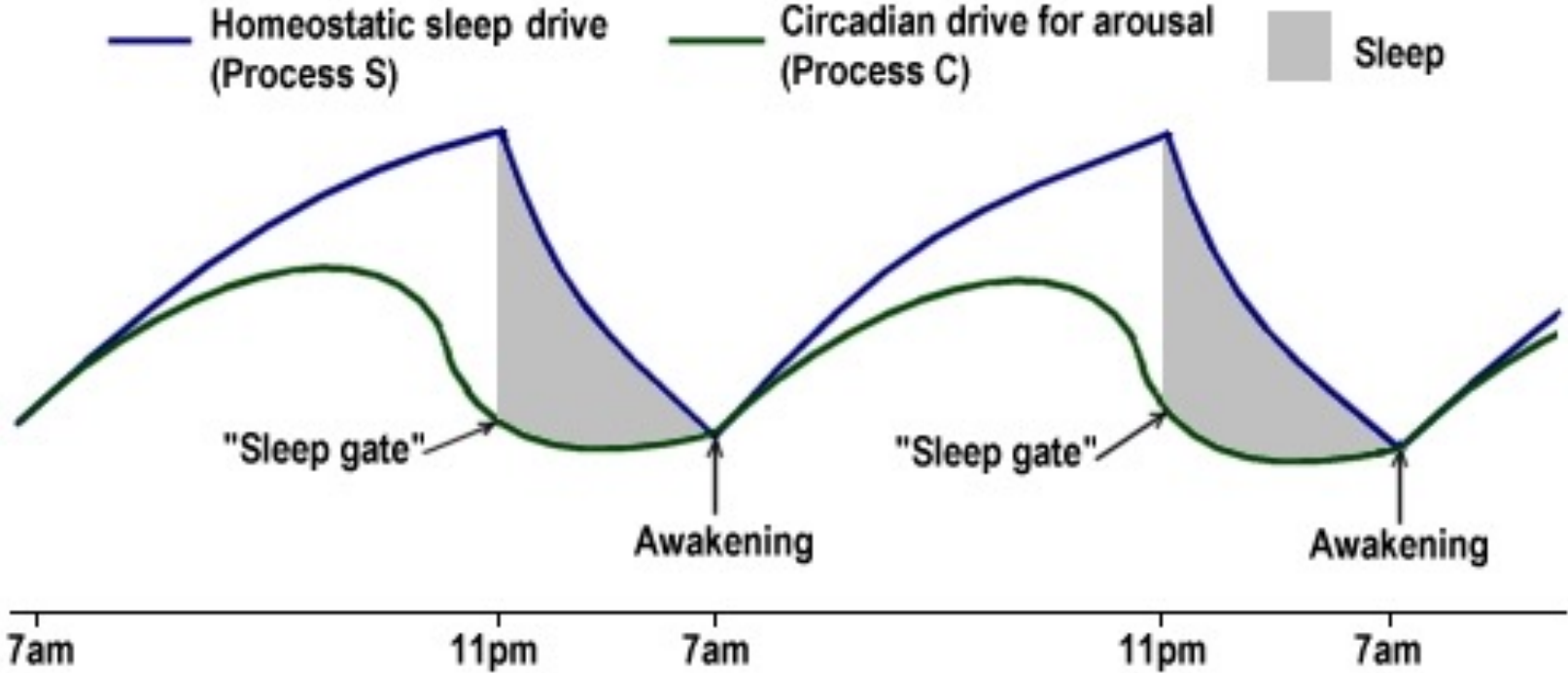
REM Sleep – low voltage – random, fast with sawtooth waves



Sleep architecture

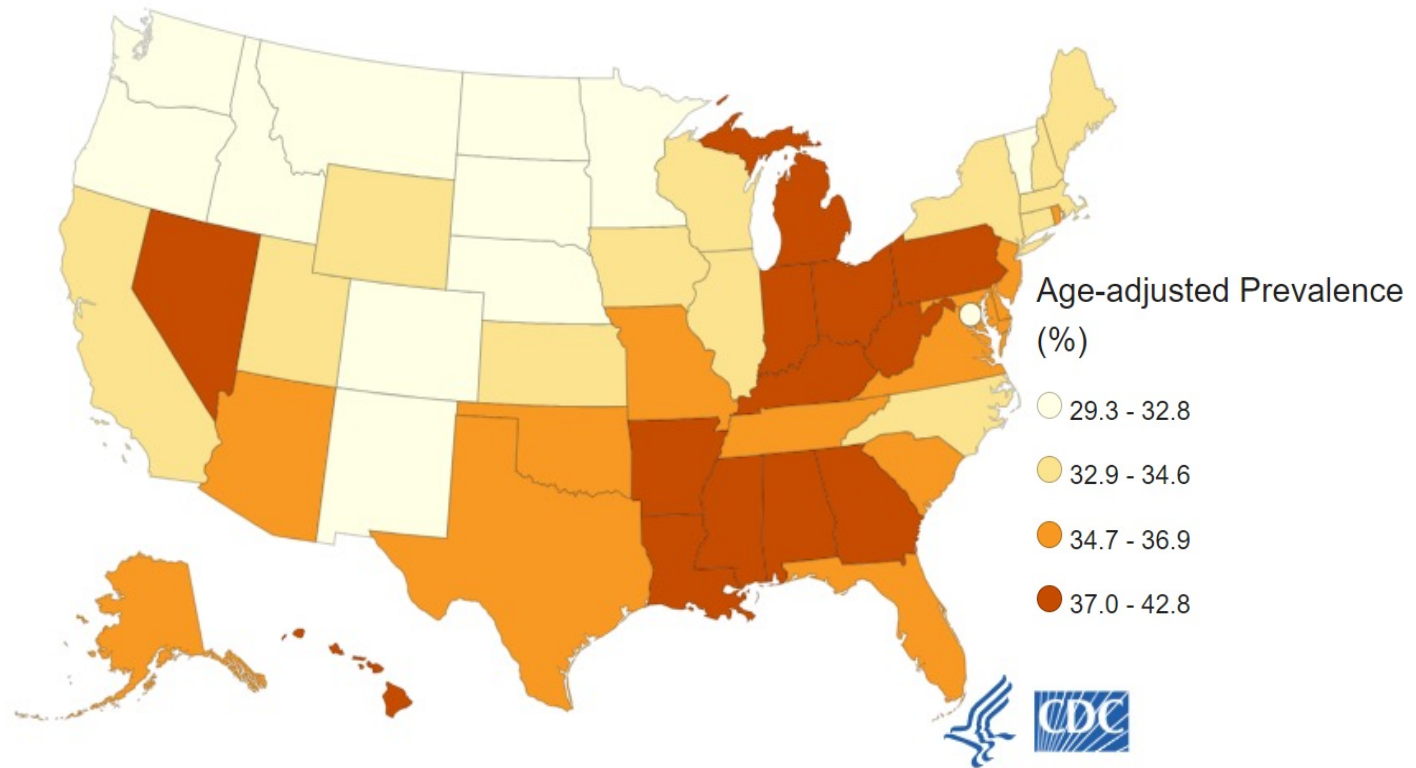


Sleep/wake regulation



- Recommended sleep duration for adults = 7 hours/night

Prevalence of sleep duration < 7 hours/night



Insomnia: Criteria

- Disturbance in sleep quality or quantity due to:
 - Problems initiating sleep
 - Problems maintaining sleep
 - Early morning awakenings
- Causes distress or impairment
- Occurs 3 nights/week for at least 3 months
- Occurs even with adequate sleep opportunity
- Not due to another sleep disorder or effects of a substance

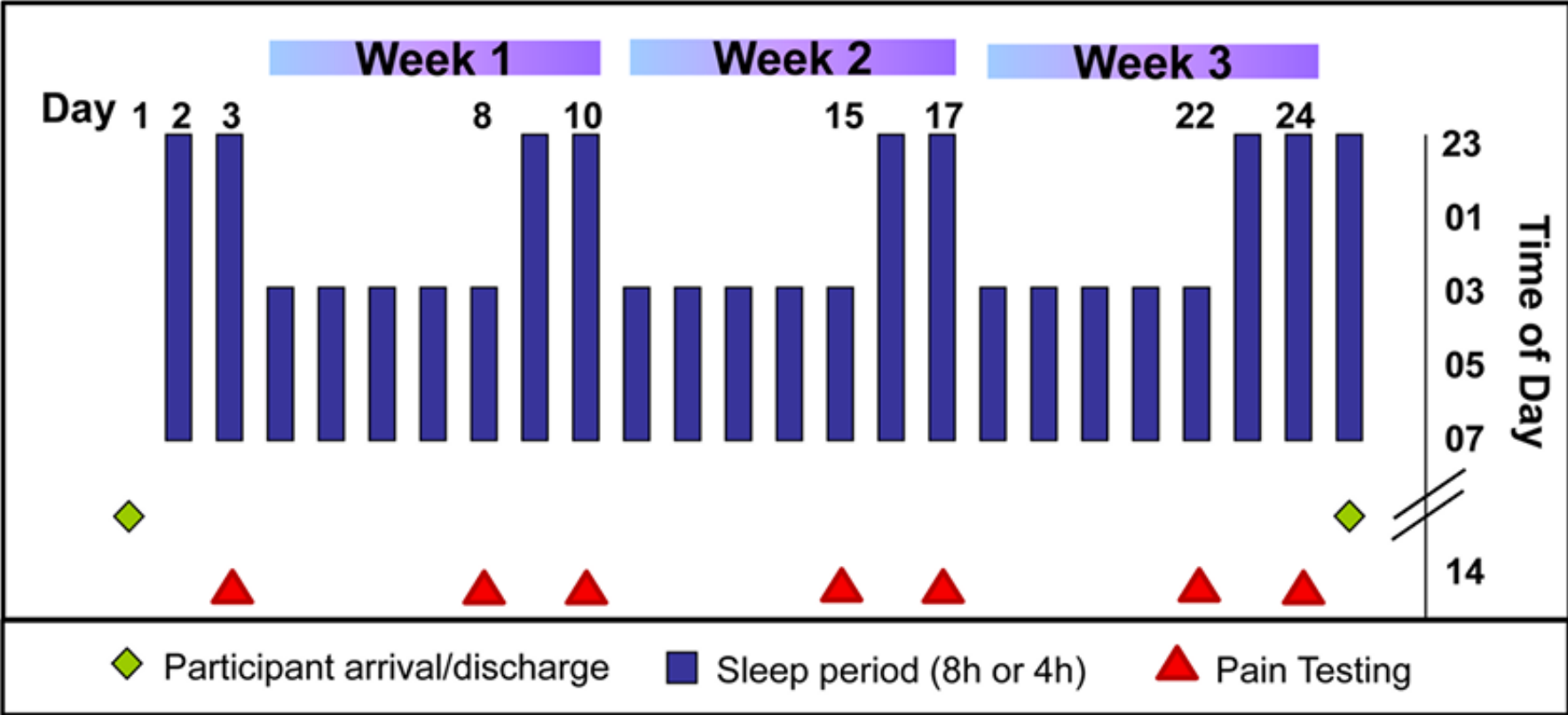
Insomnia: Characteristics

- 1-year prevalence rates
 - Acute insomnia (3 days-3 months): 37%
 - Insomnia symptoms: 31%
 - Clinical insomnia: 7%
- Risk factors (higher chances of insomnia)
 - Previous insomnia episode
 - Family history of insomnia
 - Pain
 - Medical conditions
 - Psychiatric disorders

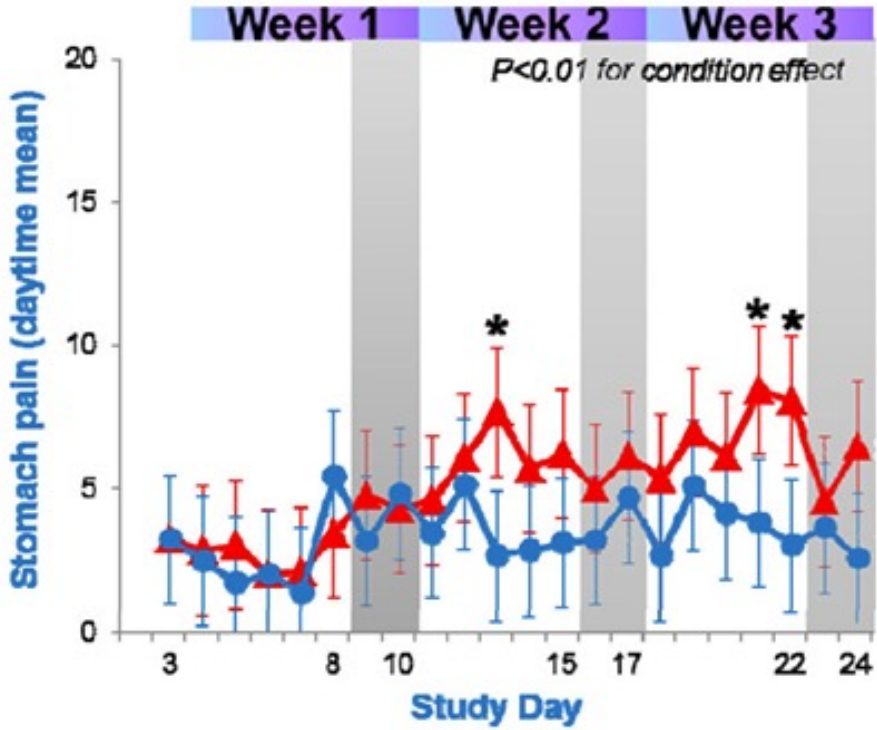
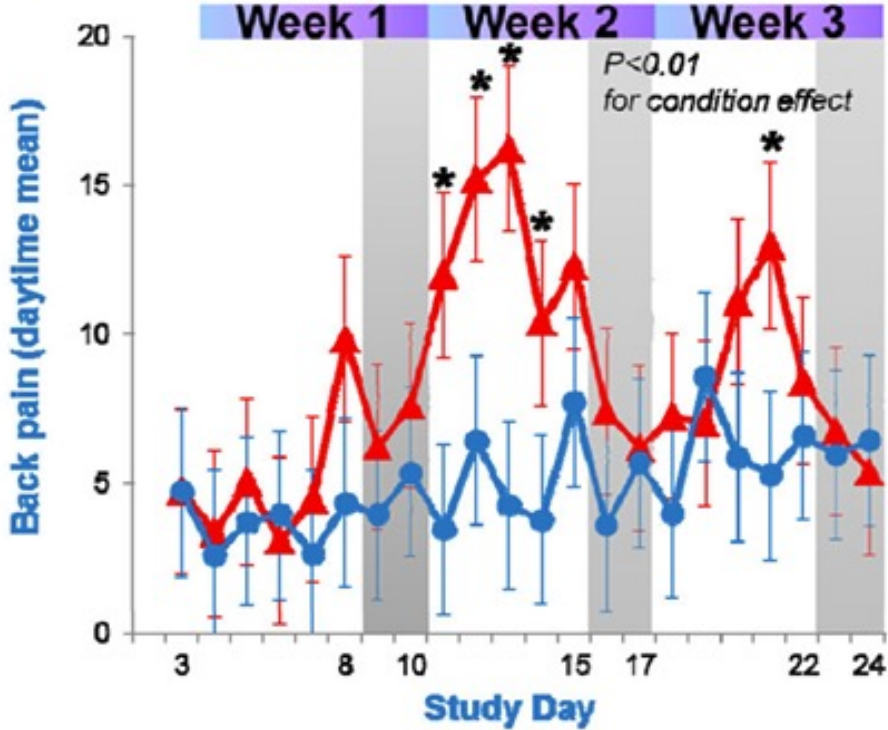
Consequences of sleep loss



Sleep restriction increases subjective pain

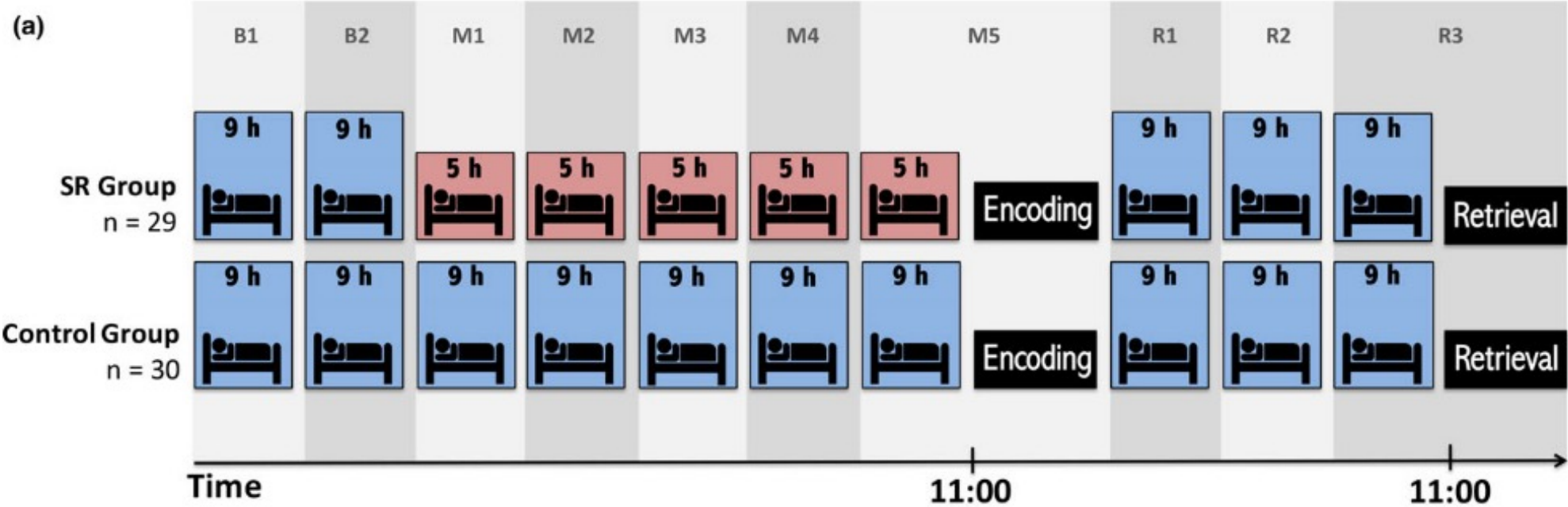


Sleep restriction increases subjective pain

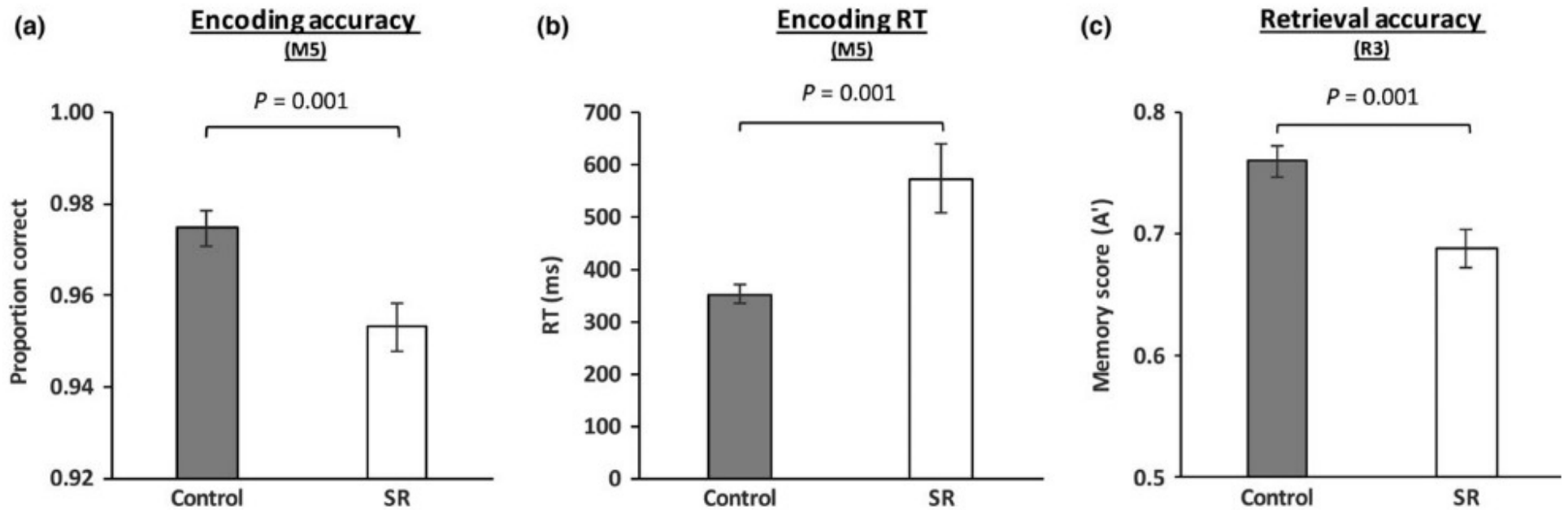


Sleep restriction impairs memory

(a)



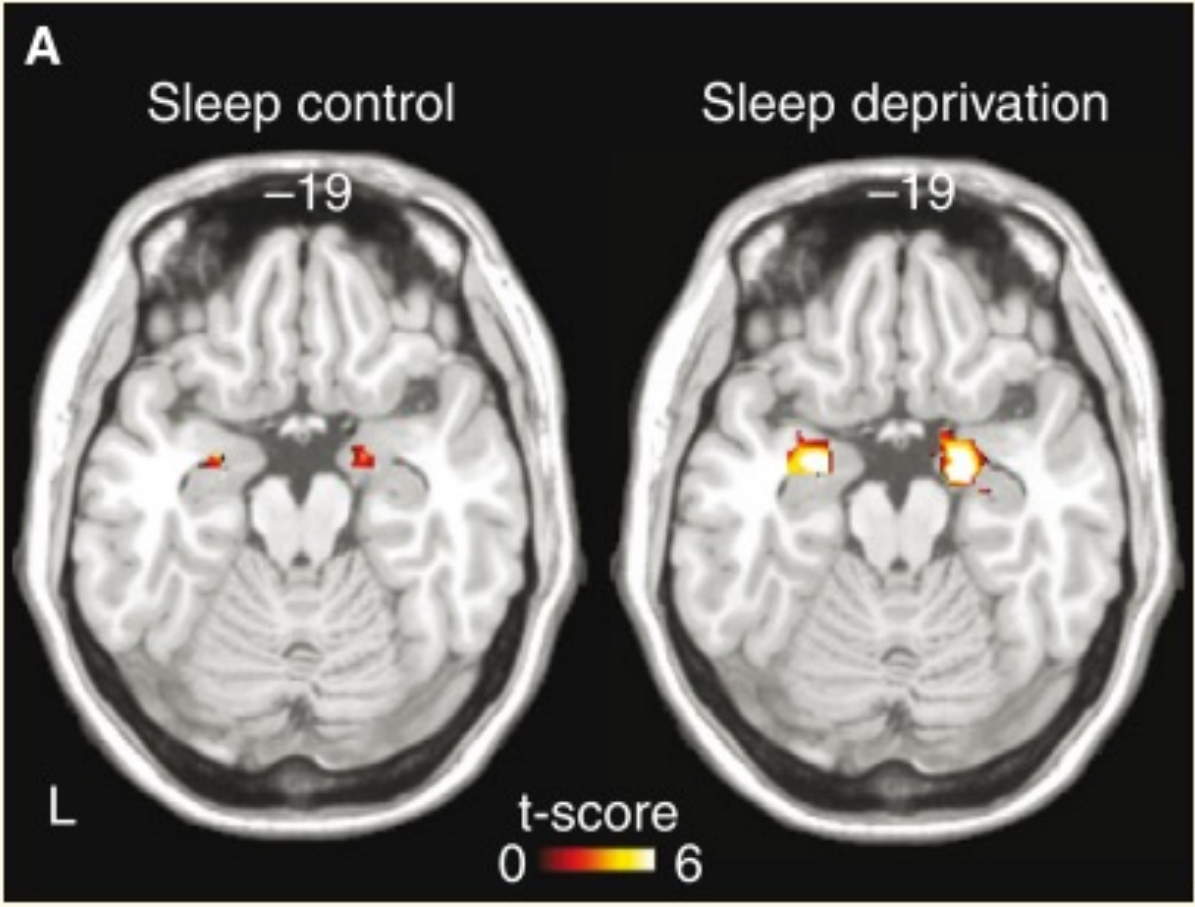
Sleep restriction impairs memory



Greater vulnerability to stress when sleep deprived

Condition	Mood subscale	Rested (<i>n</i> = 24)	Sleep-deprived (<i>n</i> = 28)	Cohen <i>d</i>	<i>p</i>
Low Stressor	Subjective Stress	8.3 (10.9)	17.6 (24.3)	0.61	.02
	Anger-Hostility	0.9 (1.9)	4.0 (4.7)	0.91	<.01
	Depression-Dejection	1.0 (1.8)	2.8 (4.0)	0.56	.07
	Tension-Anxiety	8.6 (5.4)	14.0 (7.8)	0.81	<.01
	Fatigue-Inertia	4.8 (6.3)	32.4 (18.2)	2.33	<.001
High Stressor	Subjective Stress	29.2 (25.2)	33.8 (31.5)	0.17	.38
	Anger-Hostility	5.8 (9.8)	5.2 (8.0)	-0.09	.45
	Depression-Dejection	3.5 (8.6)	3.0 (5.0)	-0.10	.80
	Tension-Anxiety	14.4 (9.0)	16.7 (12.2)	0.26	.28
	Fatigue-Inertia	8.5 (10.3)	31.6 (17.9)	1.67	<.001

Decreased frontal control of emotional brain regions when sleep deprived

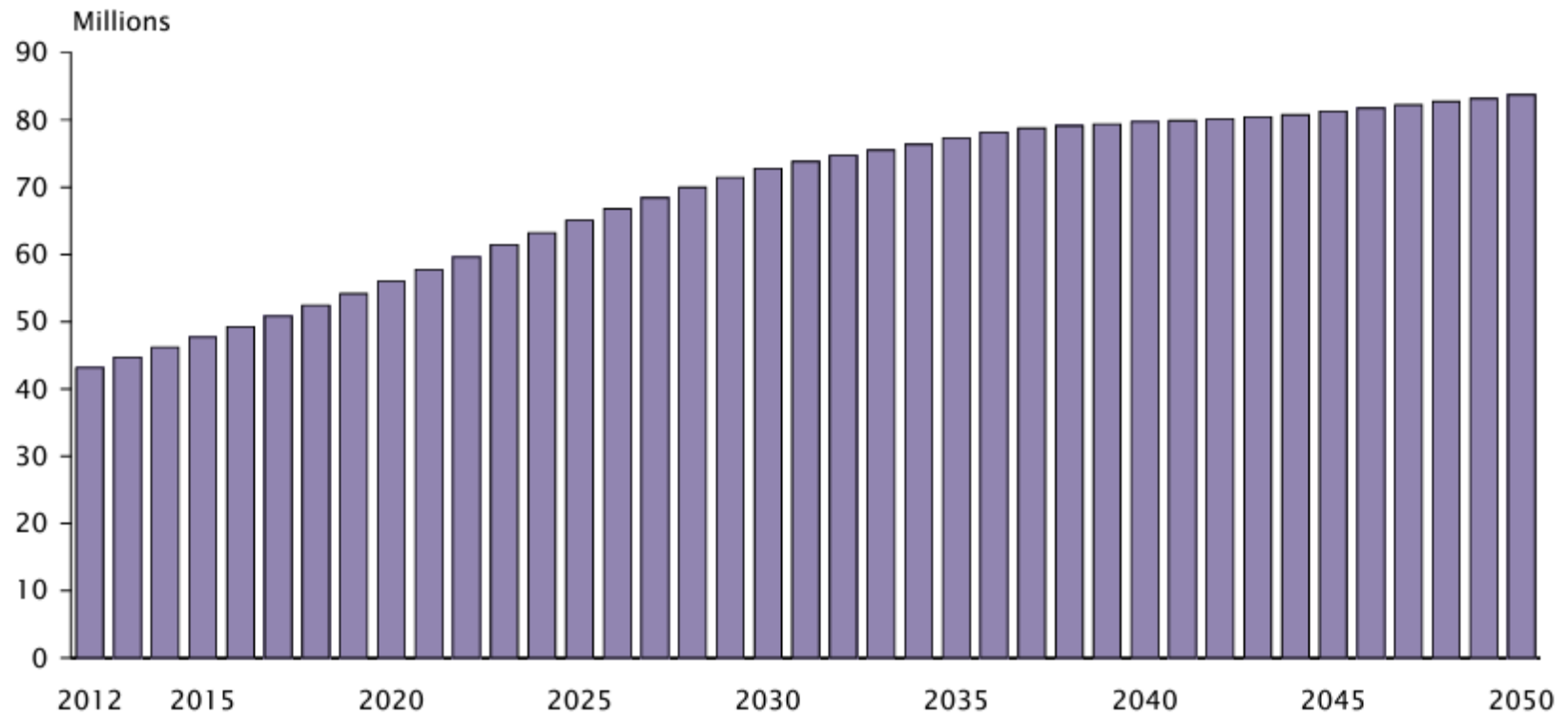




Sleep & aging

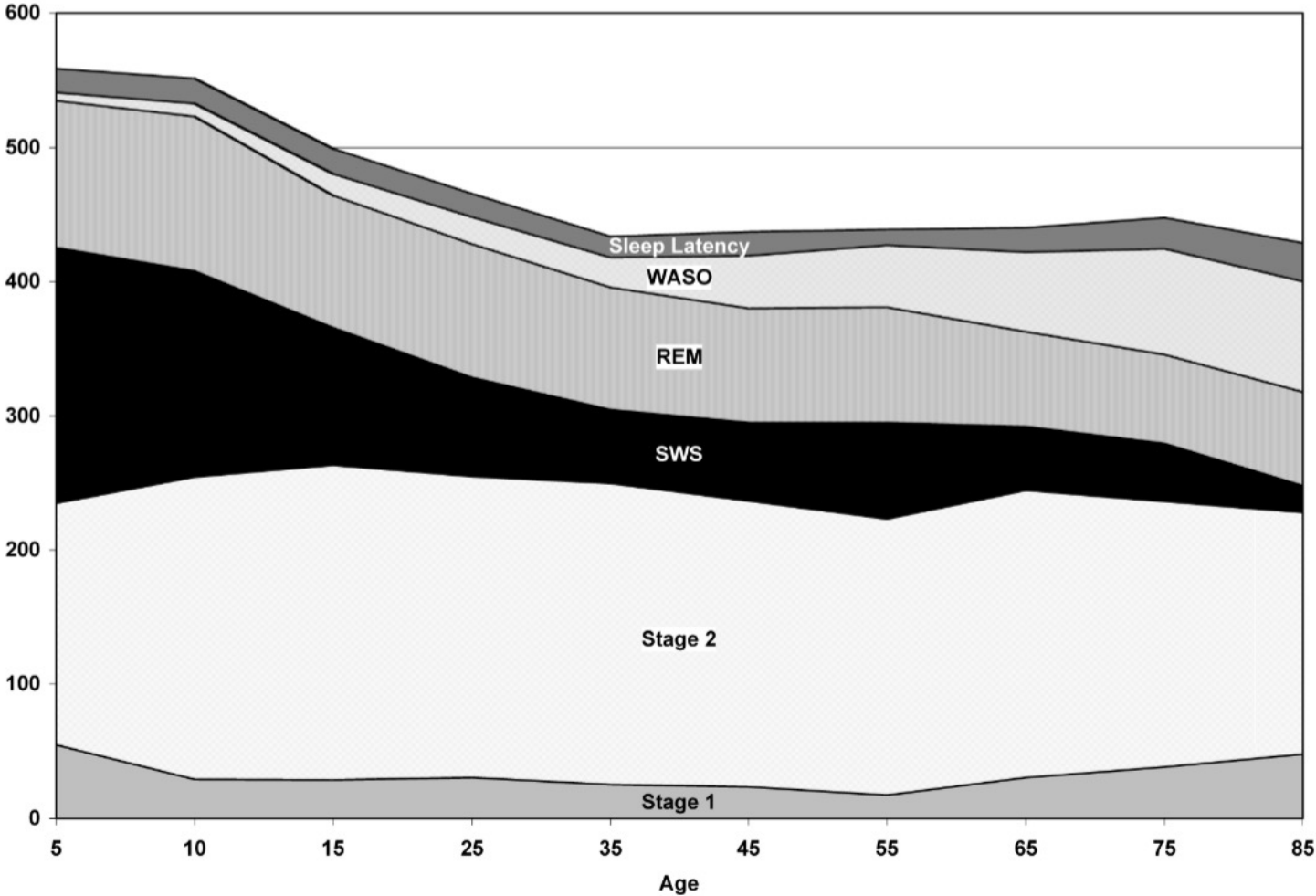
An aging nation

Population Aged 65 and Over for the United States: 2012 to 2050

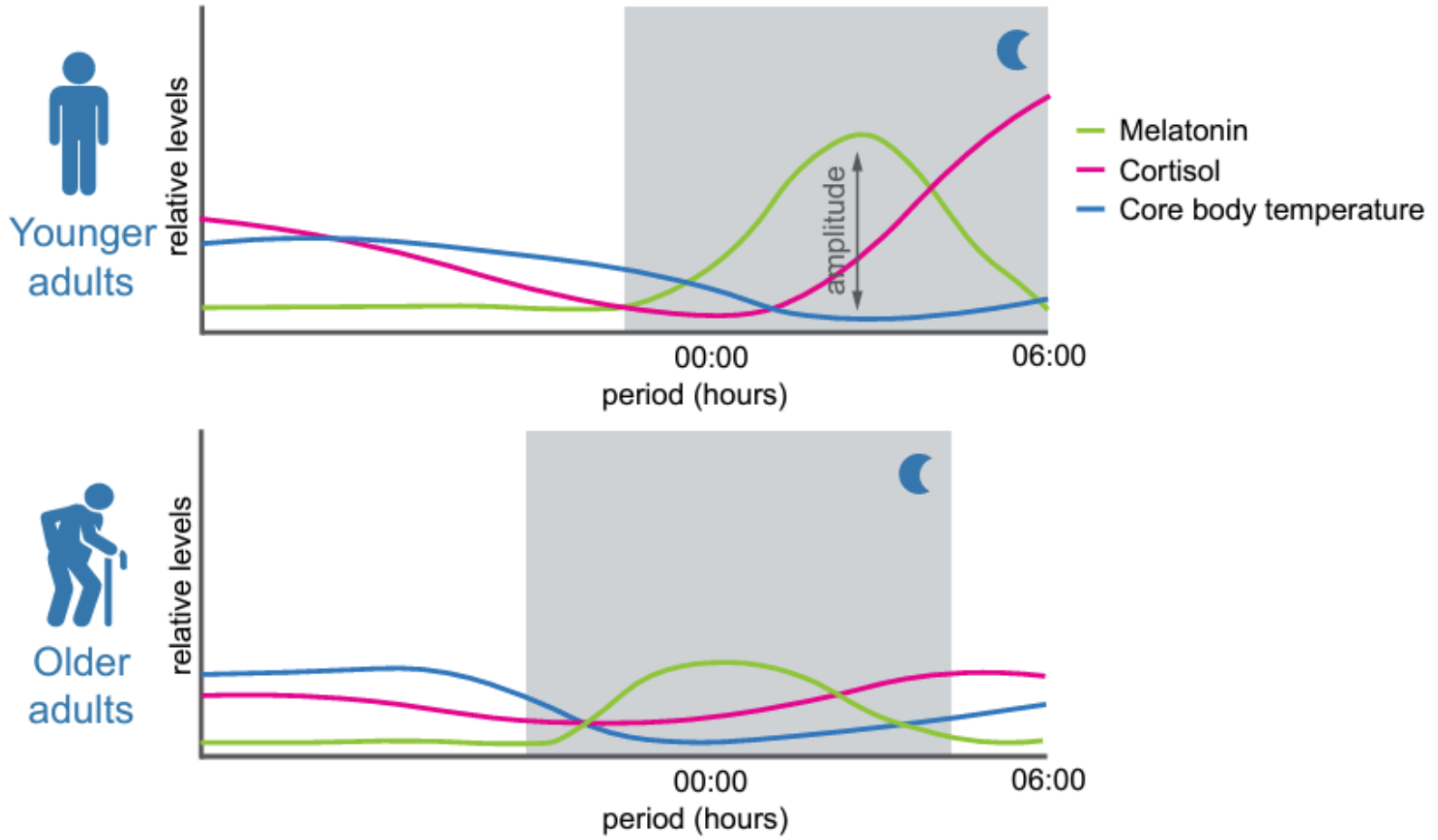


Modified from CDC, 2011

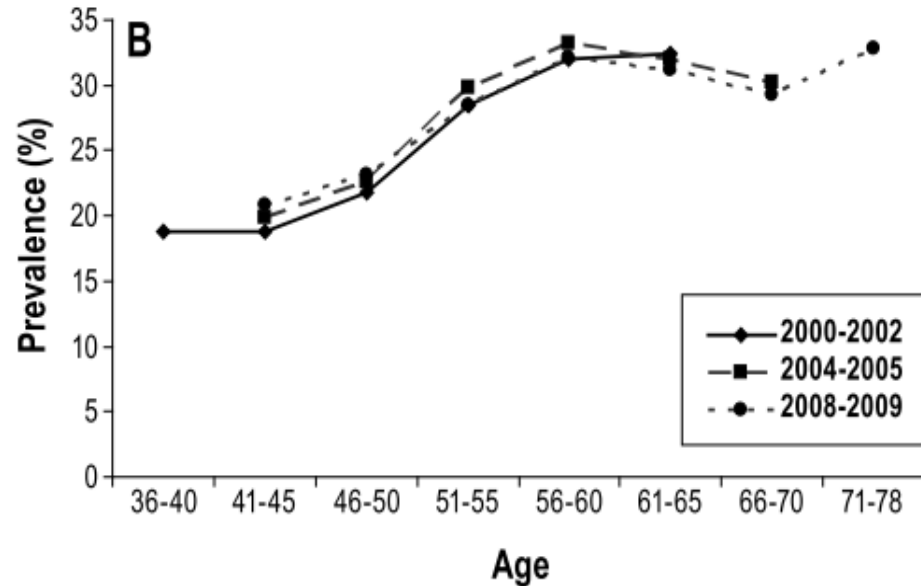
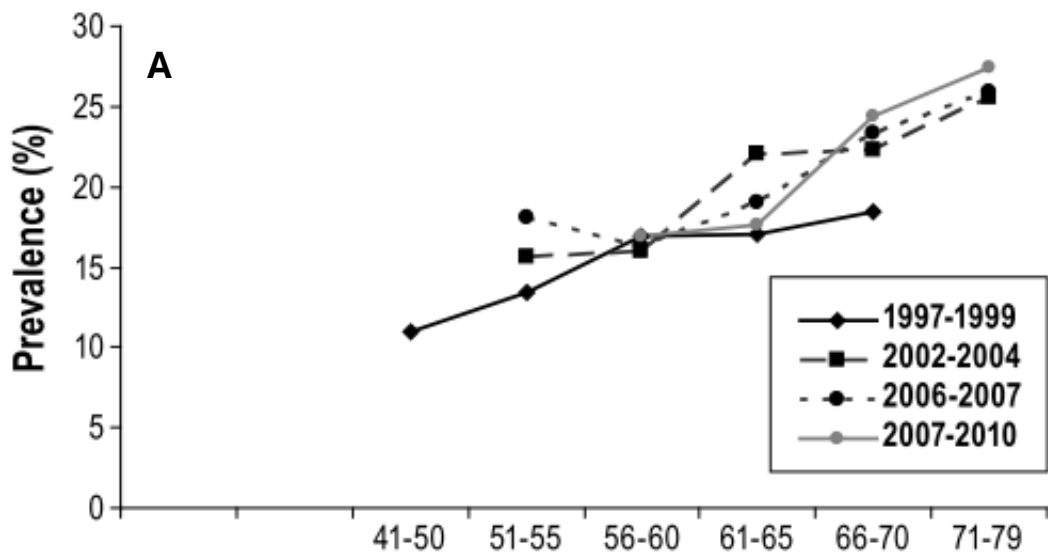
Sleep changes with age



Ohayon et al., 2004

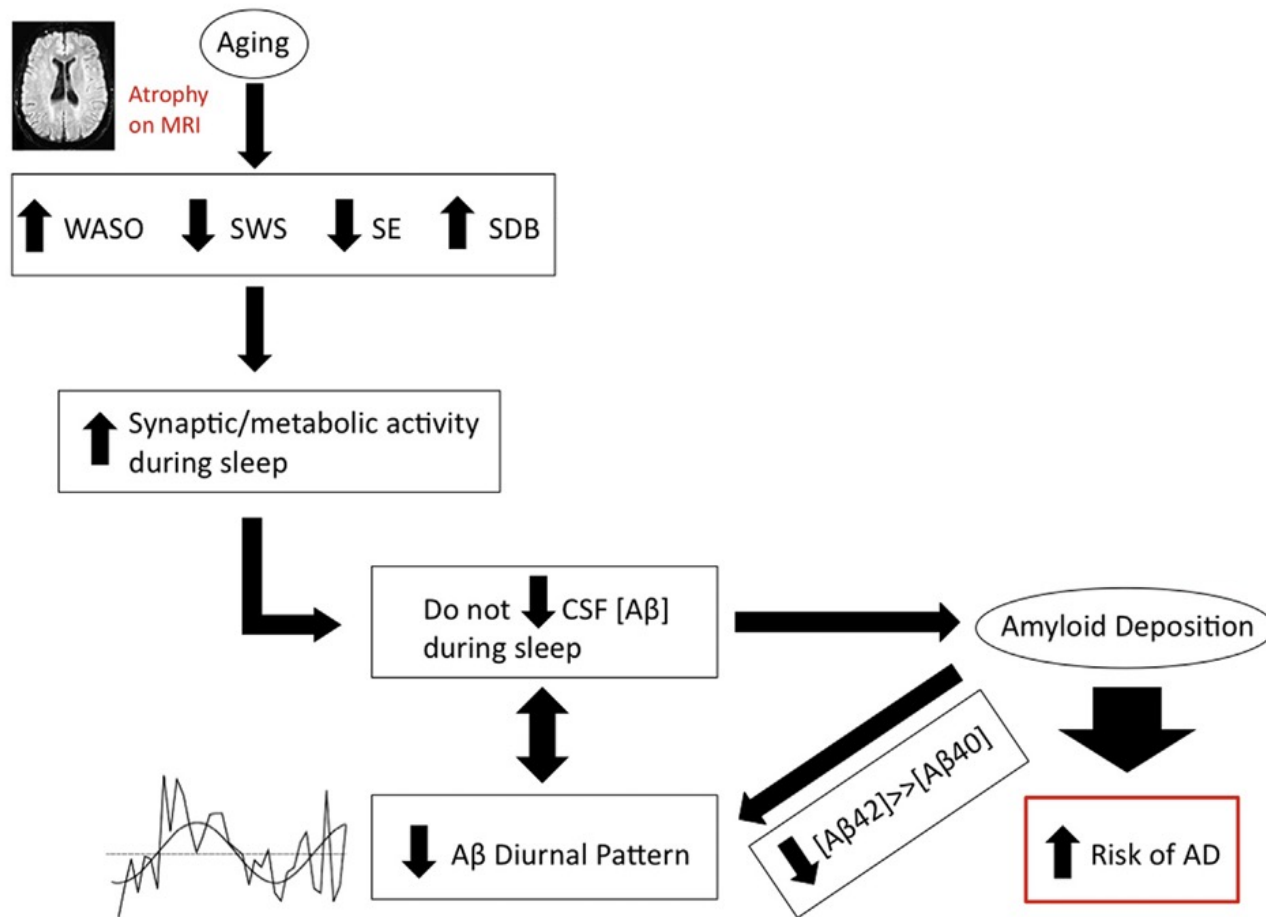


Prevalence of insomnia symptoms increases with age

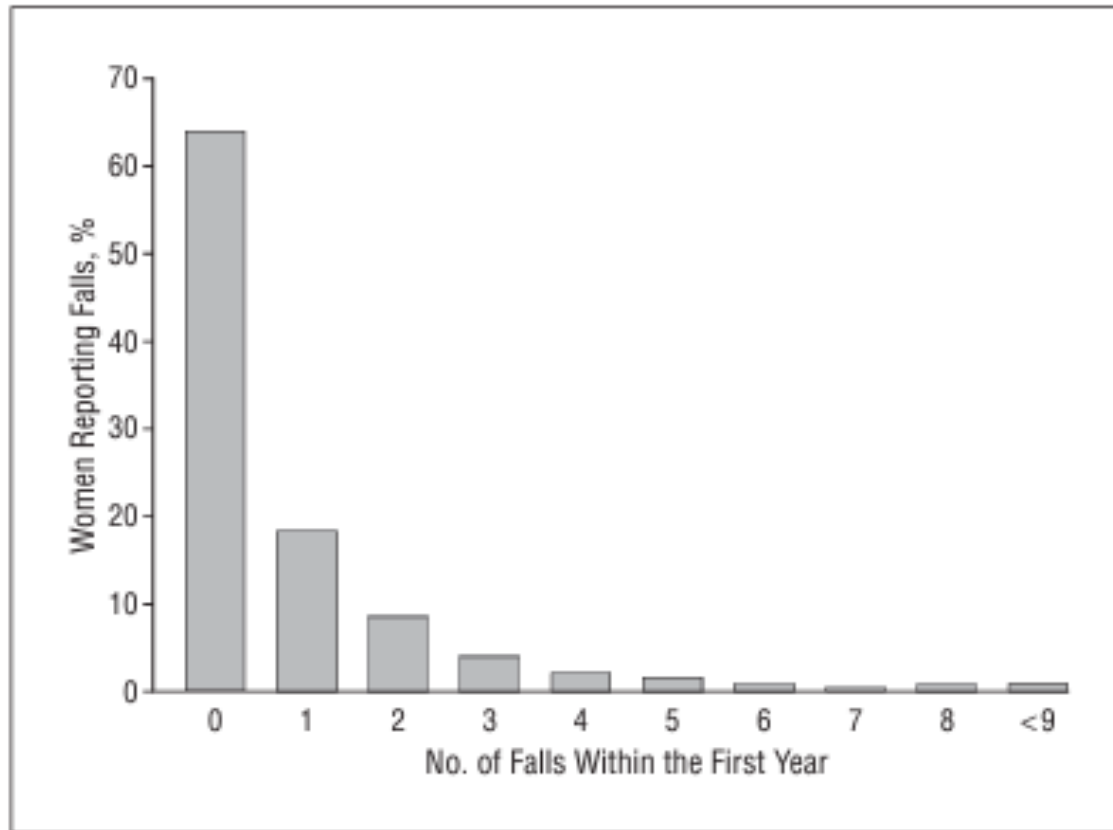


Insomnia and dementia risk

- Sleep maintenance insomnia associated with 40% increased risk of dementia
- Short sleep duration (<6 hrs) associated with 36% increased risk of dementia in older women

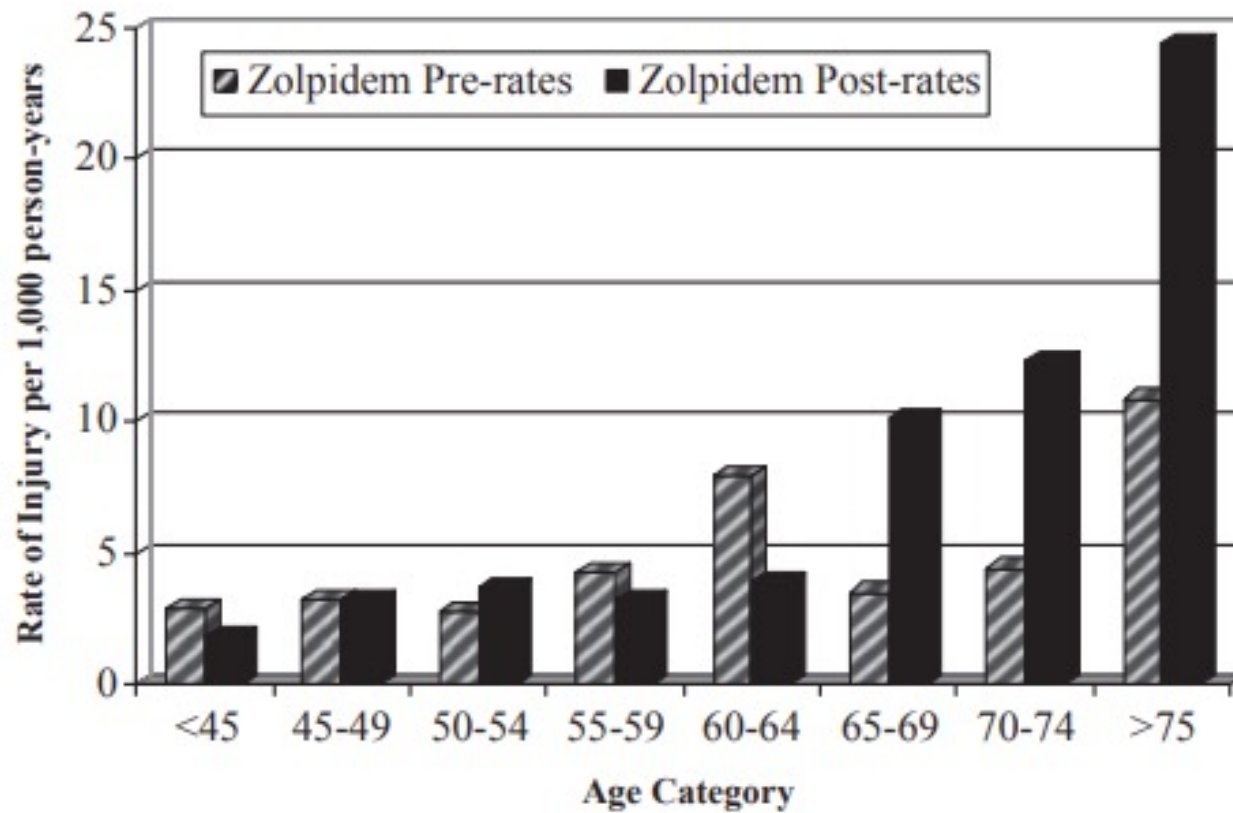


Sleep disturbance and fall risk



- Shorter sleep duration and more fragmented sleep associated with greater fall risk over the following year

Injury associated with zolpidem use

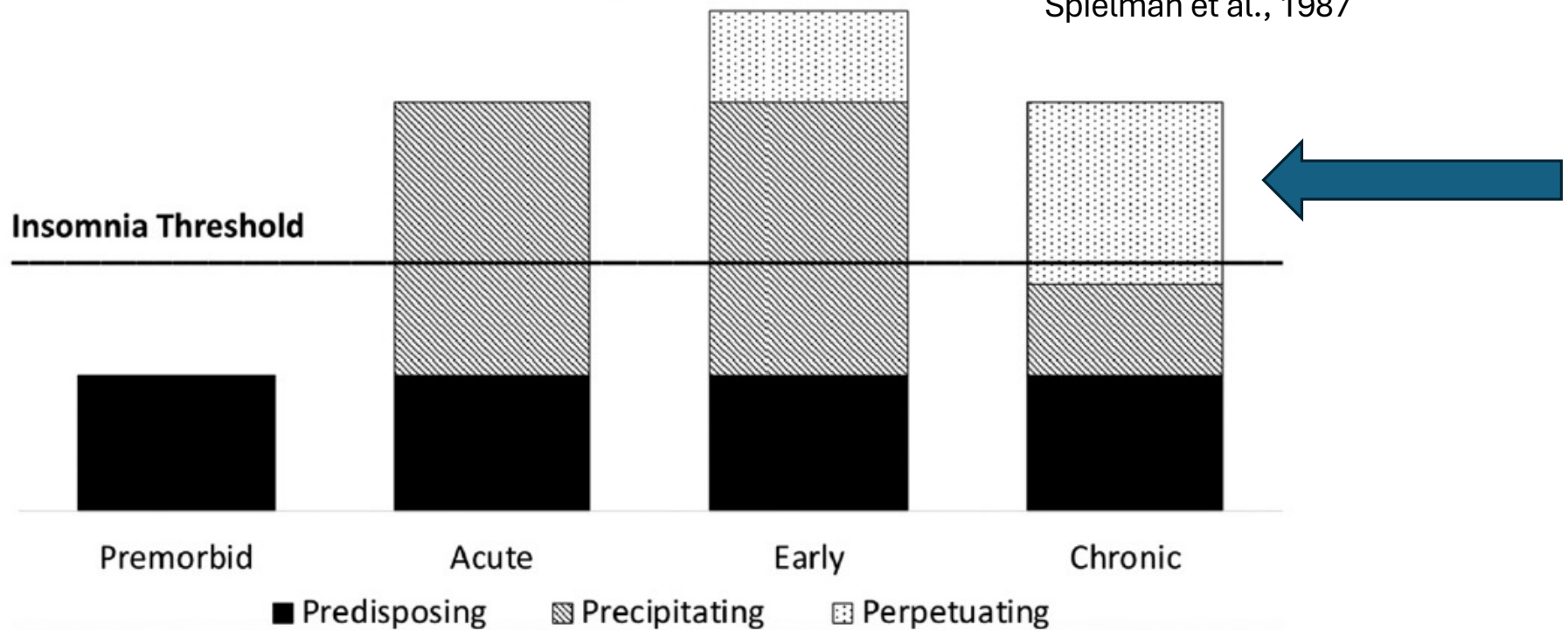


A female doctor with dark hair, wearing a white lab coat over blue scrubs, is smiling warmly at a patient. The patient, seen from the back, has short, curly grey hair and is wearing a blue shirt. They are in a clinical setting with a window and shelves in the background. A dark grey banner with white text is overlaid on the bottom of the image.

Treatments for insomnia

Cognitive behavior therapy for insomnia (CBTI)

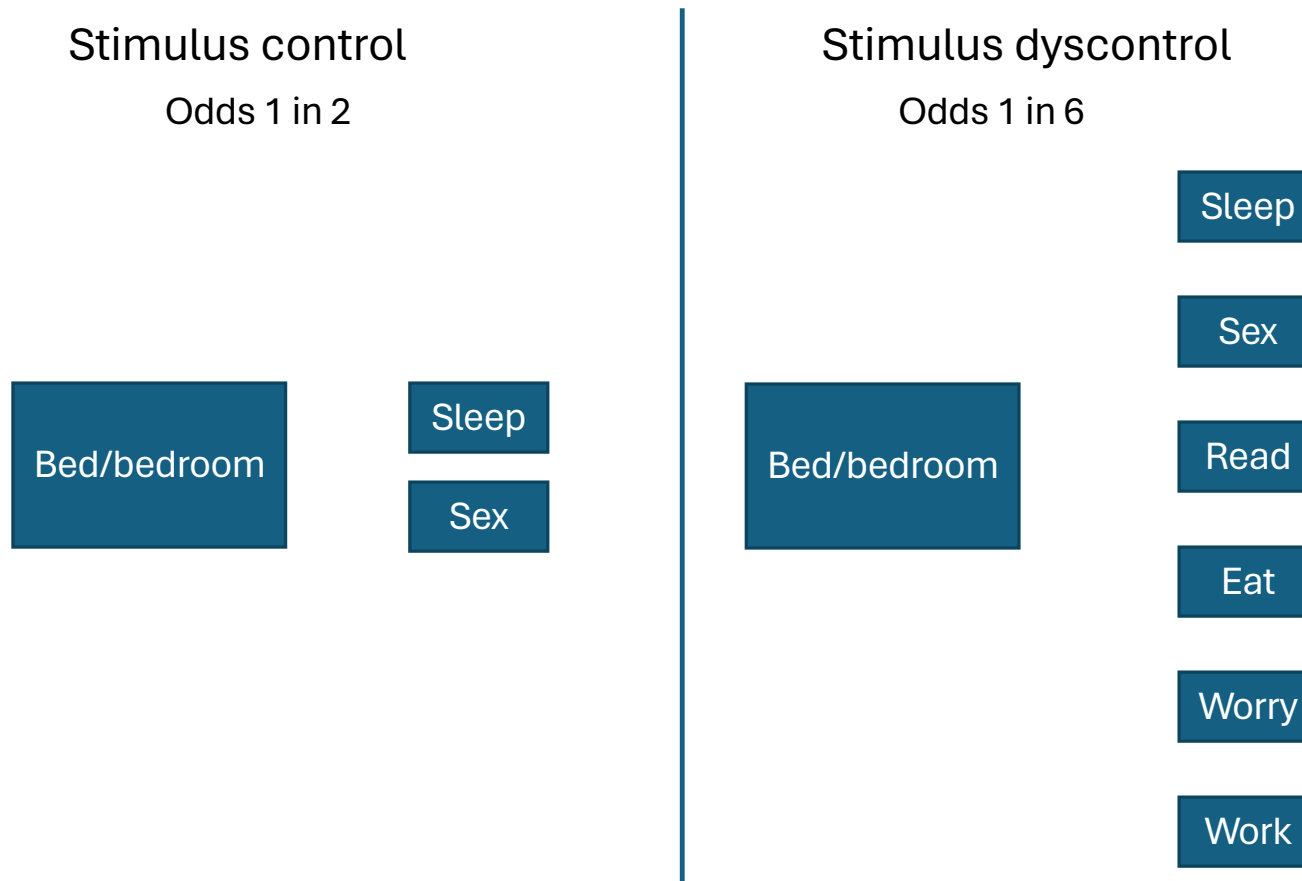
3P model of insomnia adapted from Spielman et al., 1987



The problem with perpetuating factors

- Mismatch between time in bed and sleep duration
- Stimulus dyscontrol

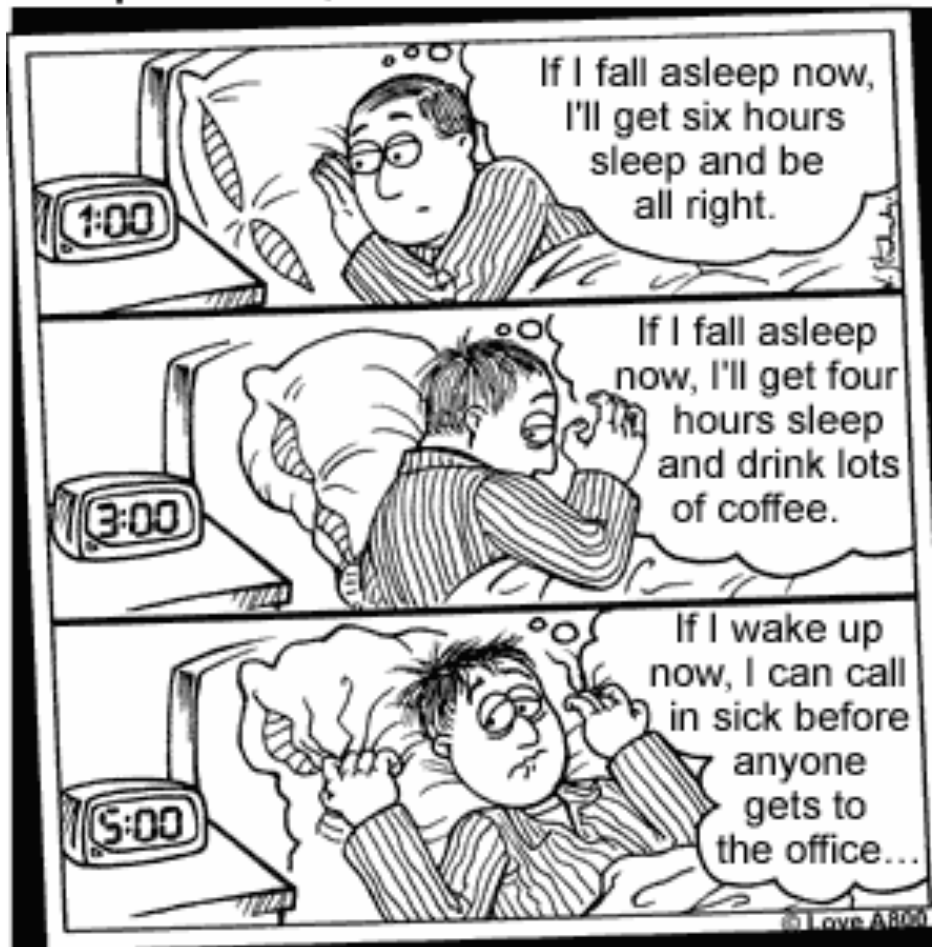
Stimulus control: playing the odds



The problem with perpetuating factors

- Mismatch between time in bed and sleep duration
- Stimulus dyscontrol
- Conditioned arousal

Snapshot at jasonlove.com



Environment	<p>Excessive noise, hot or cold temperatures, light during the sleep period,</p> <p>Moving to a new home or downsizing to a smaller space or a retirement community or related facility</p> <p>Institutionalization</p>
Behavioral/Social	<p>Irregular sleep schedules, caffeine use later in the day, alcohol close to bedtime.</p> <p>Caregiving, hospitalizations, new medical problems</p> <p>Retirement or lifestyle change</p> <p>Death of a family member or friend</p> <p>Inappropriate use of social drugs, e.g. alcohol (Note that alcohol is frequently used to self-medicate for sleep problems. It helps with falling asleep; however, when the effect wears off, sleep becomes light and disrupted.)</p> <p>Napping</p>
Medical	<p>Medications: Theophylline, thyroid hormone, anti-cholinergics, stimulants, oral decongestants, antidepressants, corticosteroids, antihypertensives, opioids, non-steroidal anti-inflammatory drugs</p> <p>Sleep disorders: Sleep apnea, restless leg syndrome, periodic limb movement disorder, rapid eye movement disorder, Age-related circadian rhythm change (phase advance)</p> <p>Psychiatric and cognitive conditions Depression, anxiety, mania, panic attacks, schizophrenia, substance abuse, dementia</p> <p>Other Medical conditions: diabetes, fibromyalgia, hypertension, cardiovascular disease, stroke, chronic pain</p>

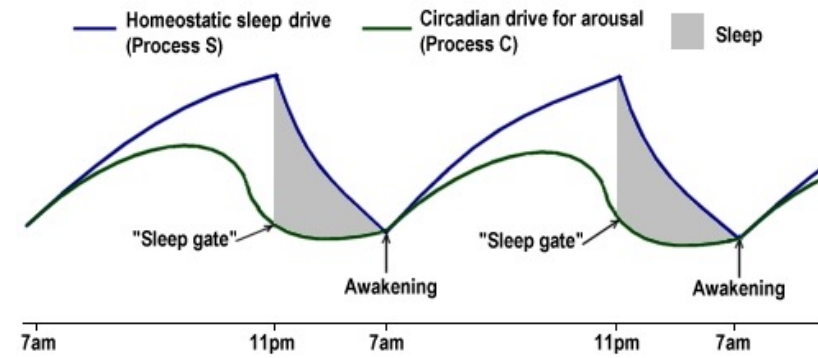
Stimulus control



- Aims to limit amount of time spent in bed/bedroom awake
- Instructions:
 - Go to bed only when sleepy
 - Avoid any behavior in the bed or bedroom other than sleep and sexual activity
 - Leave the bedroom if awake more than 15 minutes
 - Return to bed only when sleepy
- Goal: reduce stimulus dyscontrol; create new conditioning history

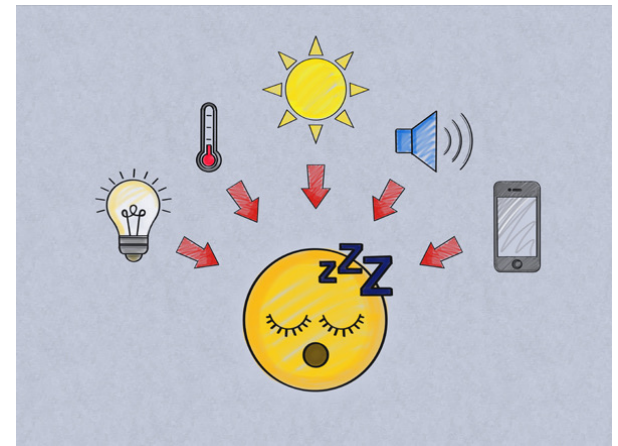
Sleep restriction

- Limit sleep opportunity to current sleep duration
- Sleep prescription
 - Set fixed wake time based on patients weekday needs
 - Set bedtime based on average sleep duration
- Goals
 - Reduced mismatch between time in bed and time asleep
 - Increase sleep pressure -> more consolidated sleep
- Weekly upward titration by 15 minutes if > 90% sleep efficiency



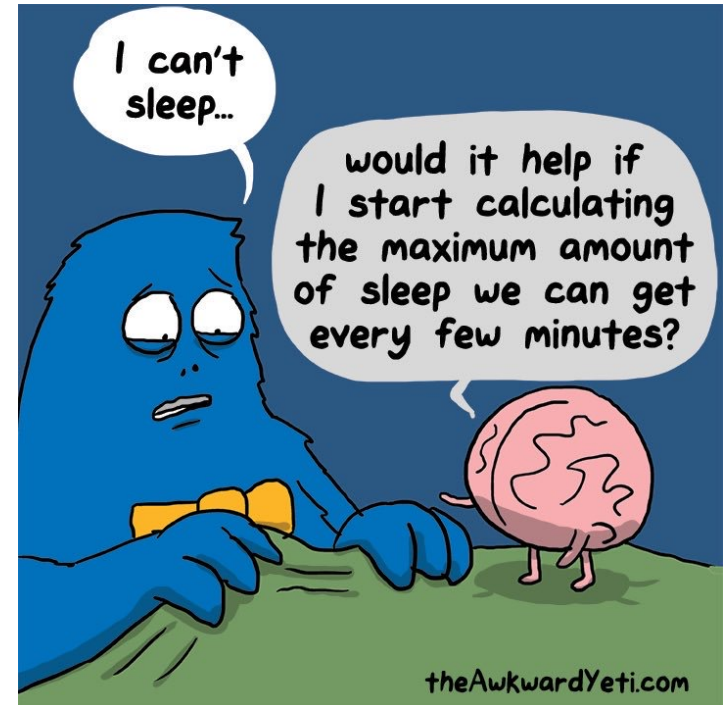
Sleep hygiene

- Aims to address problematic sleep-related behaviors/environment
- Not effective monotherapy
- Example sleep hygiene instructions
 - Exercise regularly
 - Make sure your bedroom is at a comfortable temperature
 - Don't watch the clock



Optional components

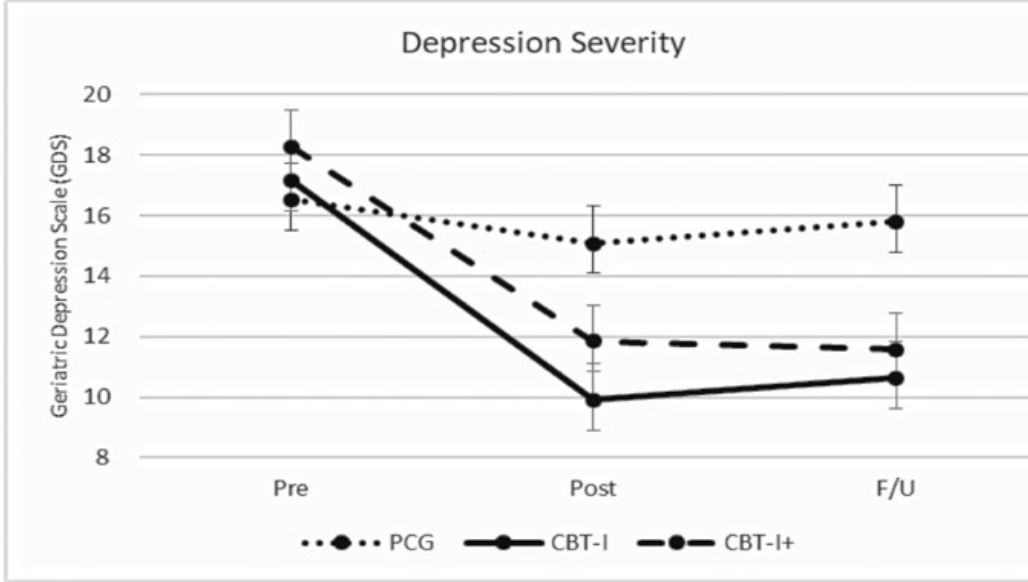
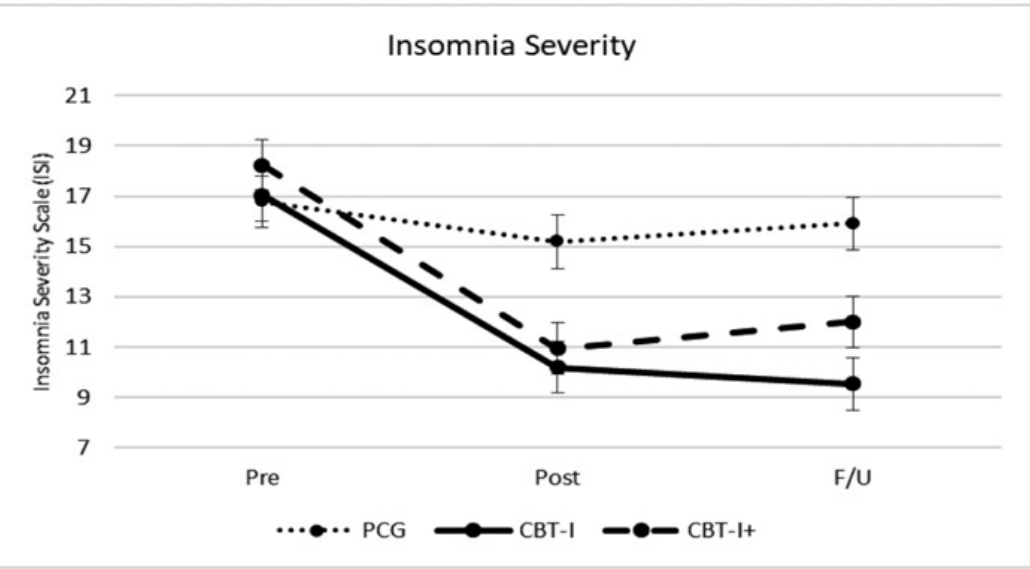
- Cognitive therapy
 - Reduce preoccupation with or anxiety about insomnia
- Relaxation/mindfulness
 - Reduce physiological arousal in the pre-sleep period
- Light therapy
 - Reduce circadian phase delay/advance



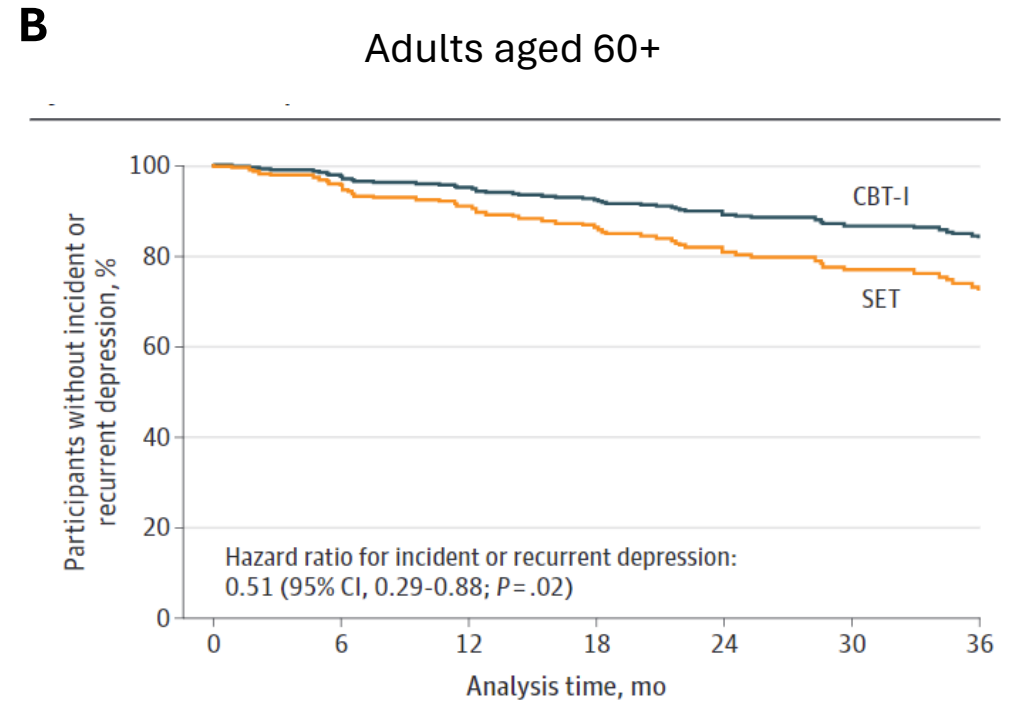
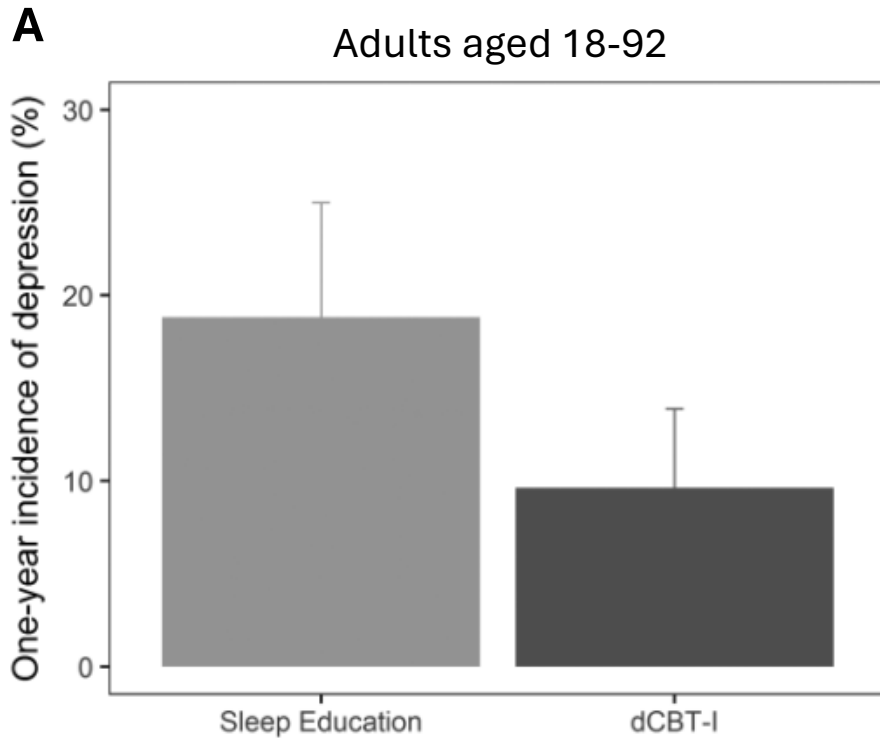
CBTI efficacy

- Recommended as first-line treatment for insomnia by American College of Physicians
- Reduces sleep onset latency and wake after sleep onset by ~50%
- 60-80% have a therapeutic response to treatment
- Improvements stable up to 24 months
- Small acute increases in sleep duration but ~1 hr increase over long term follow up

CBTI decreases insomnia and depression symptoms in older adults



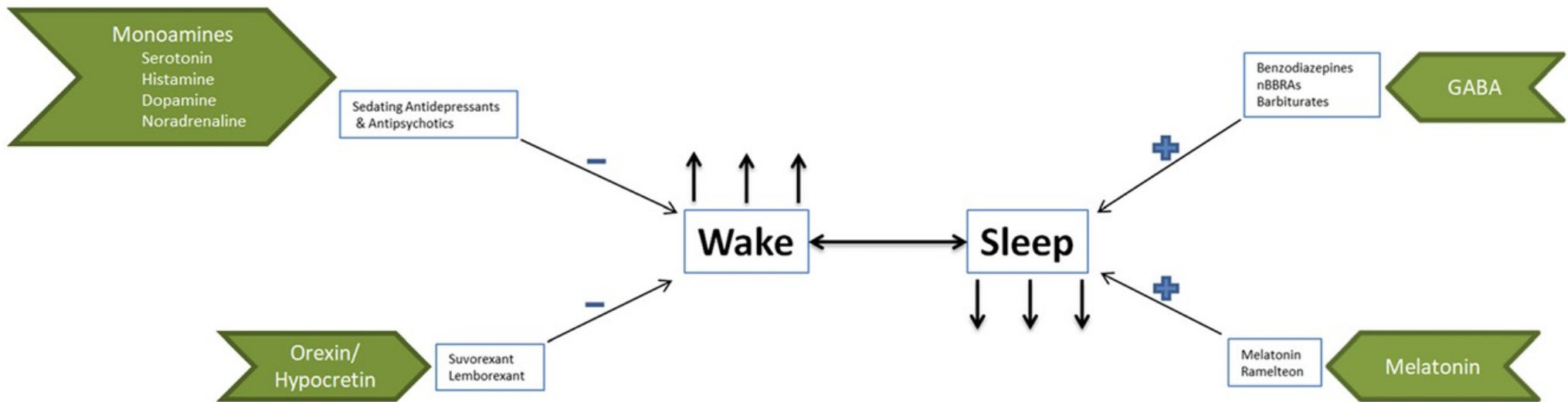
CBTI prevents incidence of depression



CBTI decreases pain in older adults

Parameter	SMW ^c (n = 28)				CBT-I ^d (n = 23)			
	Before	After	p Value ^a	ES ^b	Before	After	p Value ^a	ES ^b
TST, min	342 (84)	370 (71)	0.059	0.255	351 (60)	372 (59)	0.069	0.250
SE, %	70.2 (14.1)	75.2 (14.0)	0.069	0.252	71.0 (12.3)	84.0 (8.1)	0.000	0.883
SLAT, min	36.9 (27.1)	33.4 (31.0)	0.360	0.085	40.4 (21.4)	23.5 (22.0)	0.014	0.551
WASO, min	67 (45)	55 (41)	0.134	0.197	62 (47)	25 (21)	0.000	0.719
Naps, min/wk	15.5 (20.7)	11.4 (15.7)	0.084	0.158	9.9 (31.1)	5.4 (6.8)	0.067	0.141
MPQ score ^e	11.1 (9.6)	11.6 (10.8)	0.704	0.035	10.1 (9.6)	8.0 (7.1)	0.221	0.176
SF-PAIN score ^e	50.3 (21.4)	53.1 (25.0)	0.371	0.085	56.4 (19.7)	66.1 (24.3)	0.010	0.310
GDS score	5.3 (4.5)	4.6 (4.5)	0.327	0.110	5.6 (3.8)	5.1 (4.7)	0.608	0.083

Pharmacologic treatment



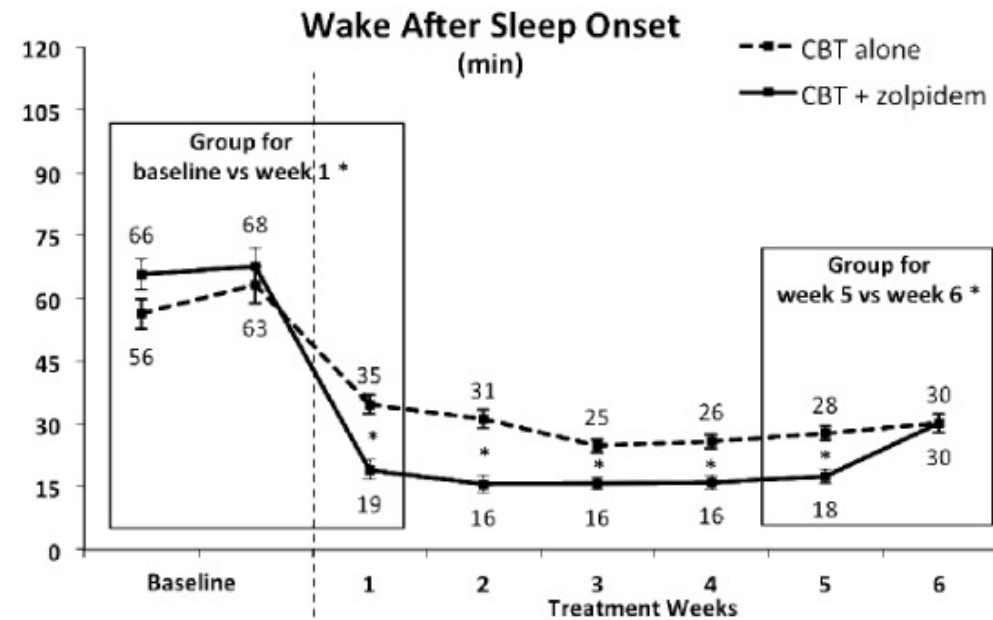
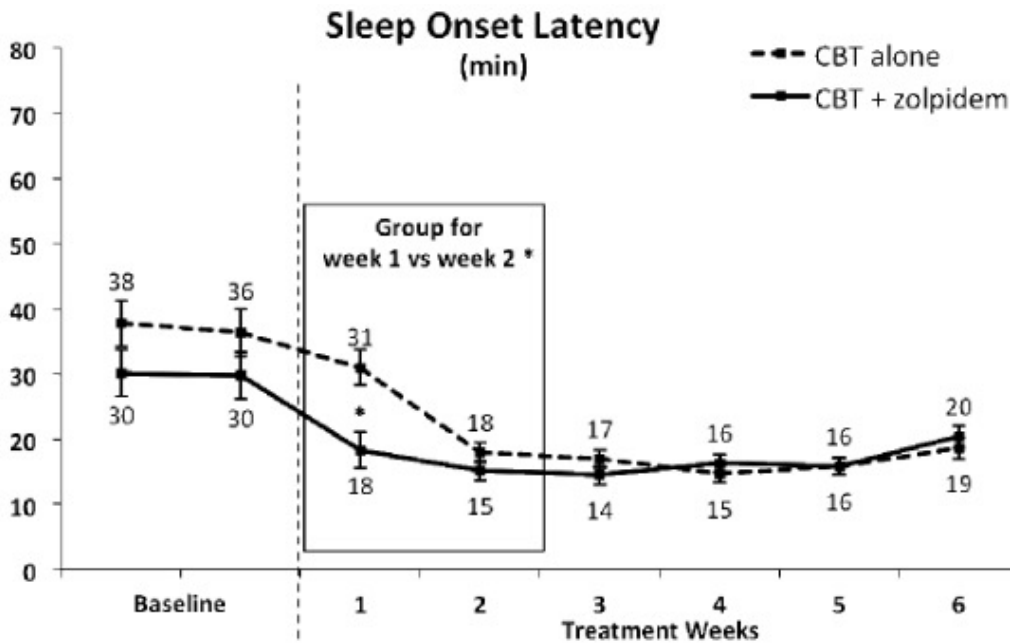
Comparative efficacy of hypnotics in older adults

- Eszopiclone (Lunesta) and doxepin most effective for increasing sleep duration vs placebo
- Zaleplon (Sonata) most effective for reducing sleep onset latency vs placebo
- Temazepam (Restoril) most effective for reducing wake after sleep onset vs placebo

CBTI vs hypnotics

- Similarly effective in short-term
- CBTI treatment responses maintained up to 24 months
- Gains from medications diminish after medication cessation

CBTI + hypnotics?



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Questions?