Pediatric Sleep Disorders

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March 10, 2023

Disclosures

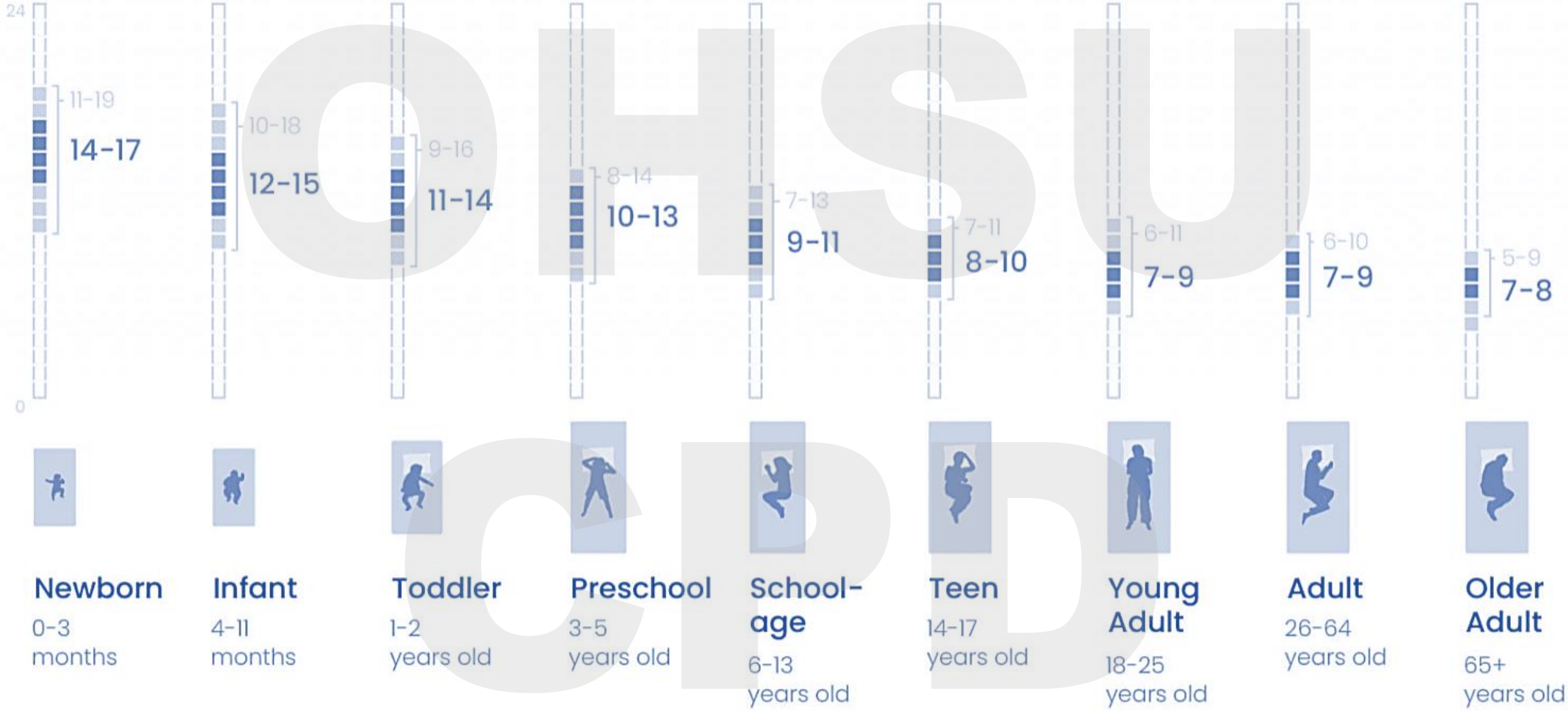
- No financial disclosures
- Discuss off label use of prescribing hypnotic medications

Objectives

1. Review normal sleep in childhood and adolescence and the consequences of disrupted sleep.
2. Discuss the screening and evaluation of common pediatric sleep disturbances.
3. Summarize behavioral treatment options and identify commonly used off label medications for pediatric insomnia.

Recommended Hours of Sleep (per 24 hour day)

Sleep Foundation
A OneCare Media Company



■ Recommended Range of Hours ■ Appropriate Hours of Sleep □ Not Recommended Range of Hours

Summary of Normal Sleep Parameters in Children and Recommended Amounts of Sleep

Age	Total sleep time (hours) per 24 hours	Average number of naps per day
4 to 12 months	12 to 16, including naps	2 at 12 months of age
1 to 3 years	11 to 14, including naps	1 at 18 months of age
3 to 5 years	10 to 13, including naps	50% of children who are 3 years of age do not nap
5 to 12 years	9 to 12	Daytime naps stop by 5 years of age in 95% of children
13 to 18 years	8 to 10	Napping in this age group suggests insufficient sleep or a possible sleep disorder

Daytime symptoms when sleep is disrupted

hyperactivity, poor impulse control, attention deficit

fatigue or daytime sleepiness, irritability

Pediatric symptoms **Adolescent symptoms** **Adult symptoms**

BEARS Screening Tool

- Intended for primary care settings as a quick screen
- Ask about the 5 domains, and if parent or teen answers YES, then ask for clarification
- The use of BEARS increases the detection of sleep problems by 4-fold compared with usual care

BEARS Sleep Screening Tool

	Preschool (2-5 years)	School-aged (6-12 years)
Bedtime problems	Does your child have any problems going to bed? Falling asleep?	Does your child have any problem at bedtime? (P) Do you have any problems going to bed? (C)
Excessive daytime sleepiness	Does your child seem over tired or sleepy a lot during the day? Does she still take Naps?	Does your child have difficulty waking in the morning, seem sleepy during the or take naps? (P) Do you feel tired a lot? (C)
Awakenings during the night	Does your child wake up a lot at night?	Does your child seem to wake up a lot at night? Any sleepwalking or nightmares? (P) Do you wake up a lot at night? Have trouble getting back to sleep? (C)
Regularity and duration of sleep	Does your child have a regular bedtime and wake time? What are they?	What time does your child go to b and get up on sch days? weekends' Do you think s/he is getting enough sleep? (P) How much sleep do you usually get? (C)
Sleep-disordered Breathing	Does your child snore a lot or have difficulty breathing at night?	Does your child have loud or nightly snoring or any breathing difficulties at night? (P) Does your teenager snore loudly or or nightly? (P)

	Preschool (2-5 years)	School-aged (6-12 years)	Adolescent (13-18 years)
Bedtime problems	Does your child have any problems going to bed? Falling asleep?	Does your child have any problems at bedtime? (P) Do you have any problems going to bed? (C)	Do you have any problems falling asleep at bedtime? (C)
Excessive daytime sleepiness	Does your child seem over tired or sleepy a lot during the day? Does she still take Naps?	Does your child have difficulty waking in the morning, seem sleepy during the day or take naps? (P) Do you feel tired a lot? (C)	Do you feel sleepy a lot during the day? in school? while driving? (C)

BEARS Sleep Screening Tool

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Regularity and duration of sleep	Does your child have a regular bedtime and wake time? What are they?	What time does your child go to bed and get up on school days? weekends? Do you think s/he is getting enough sleep? (P)	What time do you usually go to bed on school nights? Weekends? How much sleep do you usually get? (C)
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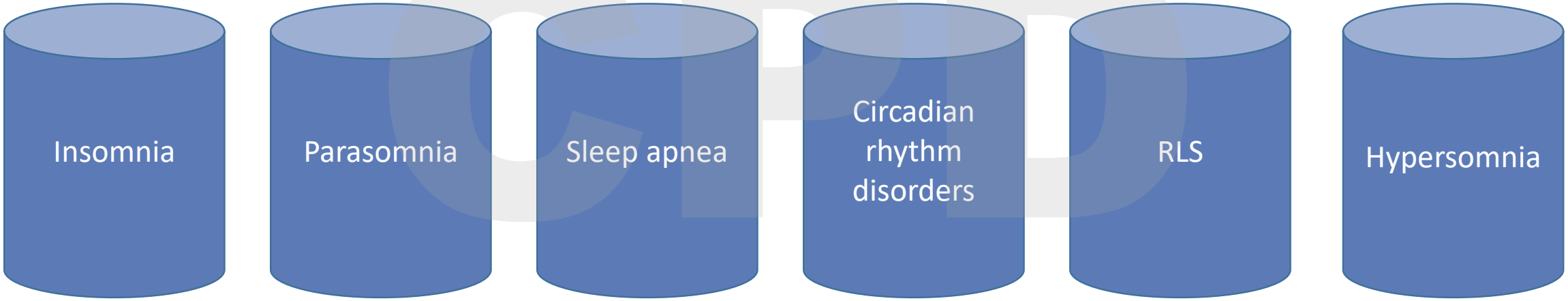
Classifying sleep disorders

- International Classification for Sleep Disorders, 3rd Edition (ICSD-3)
- Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5)
- International Classification of Diseases, 10th Edition, the Clinical Modification (ICD-10-CM)



Case: 3yo with frequent nighttime awakenings

Goes to bed at 8PM, mom stays in his room until he falls asleep. The patient wakes 3-6 times per night crying. Parent responds by going to his room and lying next to him until he has fallen back asleep (5-10 minutes each time). After the 3rd awakening, mom usually stays in the child's room for the rest of the night. Wakes at 7AM. Takes a 1.5h daytime nap that ends at 2PM.

No sleep apnea symptoms, parasomnias, or concern for restlessness. No medical problems or medications. Typical development and BMI.

Behavioral insomnia is common in children

- 3 subtypes: Onset association, Limit setting, and Combined
- Both sleep-onset association type and limit-setting type occur in 10% to 30% of children
- Leads to sleep loss for both caregiver and child
- Behavioral treatments, not medication are recommended
- Sleep training is generally appropriate after 6 months

Onset association type

- Patient needs “x” to fall asleep and then needs “x” to fall back asleep (e.g. rocking, watching TV, parent presence, etc.)
- Normal to wake 2-6 times per night
  - Signalers vs self soothers

The goal of sleep training is to teach a child how to sleep independently by self soothing (they will still wake!)

Limit setting type

- Generally seen in toddlers
- Lack of parental limit setting opens the door for many curtain calls
  - Crying
  - Stalling
  - Refusal to stay in bed
  - “One more kiss”, “one more hug”, “one more story”

Combined type

- Has features of both onset association type and limit setting type

Sleep training methods

- Unmodified extinction (cry it out)
- Quickest method, but caregiver uptake is variable

Self soothing at bedtime has been shown to generalize to other night awakenings within 2 weeks

Sleep training methods

- Modified extinction (“checking method”)
  - Takes longer, but still effective, may be better accepted by caregivers, many variations
  - Complete the bedtime routine ending in the child’s room and say “I love you, good night, I will be back in a minute”
  - On return, the parent will repeat the phrase until the child has fallen asleep waiting for them to return

Sleep training methods

- Graduated extinction (“chair method”)
  - Laying in bed with child
  - Sitting next to chair holding hand
  - Sitting in chair no touching
  - Move chair halfway to door
  - Move chair to doorway
  - Move chair to hallway and then done

“We went out of town and let him sleep in our bed one night.”

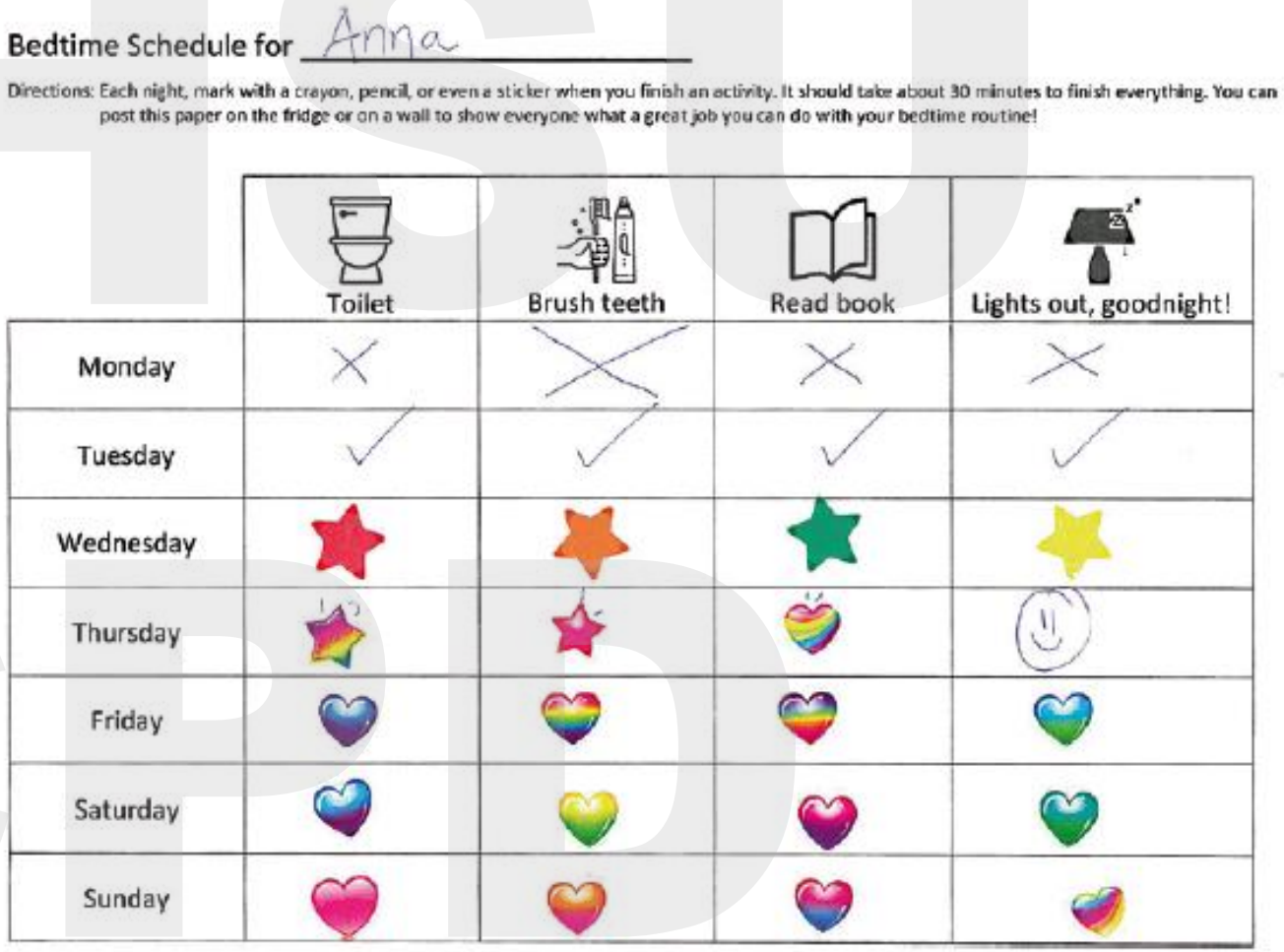
- Intermittent or inconsistent use of behavioral interventions is the most common reason for treatment failure – no JACKPOT nights!

Sleep training tips

- Be consistent, pick the right time and the right person
- Sleep environment: quiet, dark, comfortable
- Consider delay bedtime (can always “fade” back again)
- Setting expectations
  - Parents: be honest with your child
  - Providers: discuss the extinction burst

Consistent, Positive Routines

- Keep the same bedtime and wake time
- Relaxing bedtime routine that lasts 20 minutes or less, using the same cues in the same order



Bedtime Schedule for Anna

Directions: Each night, mark with a crayon, pencil, or even a sticker when you finish an activity. It should take about 30 minutes to finish everything. You can post this paper on the fridge or on a wall to show everyone what a great job you can do with your bedtime routine!

	Toilet	Brush teeth	Read book	Lights out, goodnight!
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

Build confidence and track progress

- Sticker charts
  - Set appropriate behavioral goals
  - Timing of the rewards should be age appropriate (daily AM
  - Post on the fridge and praise at random times to reinforce
- Reward systems
  - Okay-to-wake clocks or stoplight clocks
  - Bedtime passes good for brief visits with parents
    - Unused passes can be exchanged for rewards
    - Extinction procedures used when all passes have been used

Wrap up: 3yo with behavioral insomnia

- *Delay bedtime to 8:30pm and keep same wake time and nap schedule*
- *Parent combines graduated and modified extinction, and chooses to use a sticker chart to track progress*
  - *First step is to be in a chair further from the bed (not touching)*
  - *Then institutes the checks at bedtime (dad does them)*

At a 6 week follow up visit, patient is falling asleep and staying asleep independently. Patient showed their sticker chart to the Amazon delivery driver- so proud!

Case: 14yo needs two+ alarm clocks to wake up

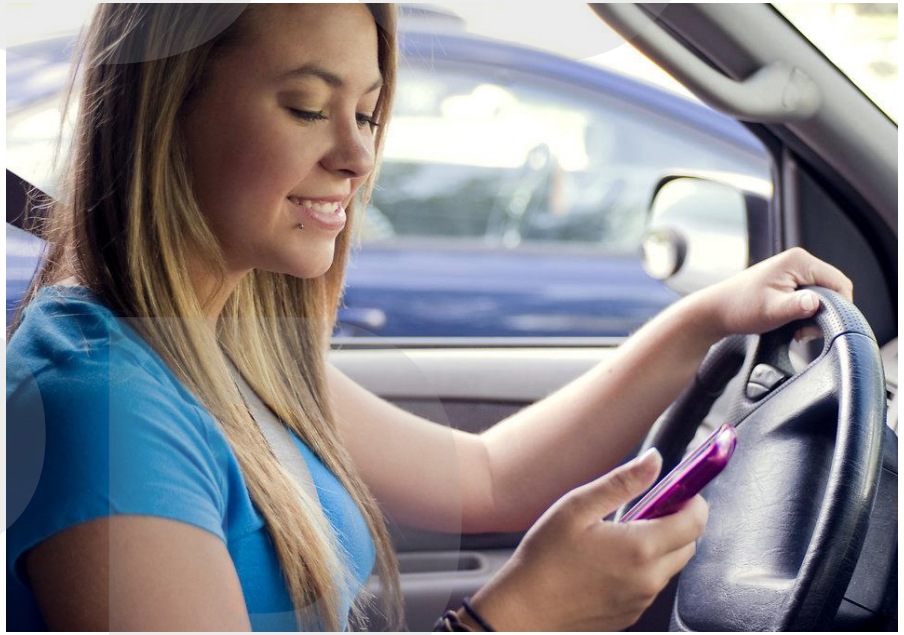
Bedtime is 10PM and falls asleep at 1AM. Gets on their phone when unable to fall sleep. Has to be up at 6-7AM to get ready for school. Weekends and summers are more manageable, with bedtime at 3AM and wake up time of 1PM. Falls asleep easily on weekend nights. No nighttime awakenings.

No RLS symptoms. In counseling for comorbid anxiety. Has seasonal allergies, not taking any medications right now. Grades are slipping.

Delayed sleep phase disorder

- (Conditional) onset insomnia: inability to fall asleep and awaken on a conventional schedule caused by circadian misalignment with the environment
- Once asleep, able to stay asleep (classic presentation)
- Leads to daytime functional impairment

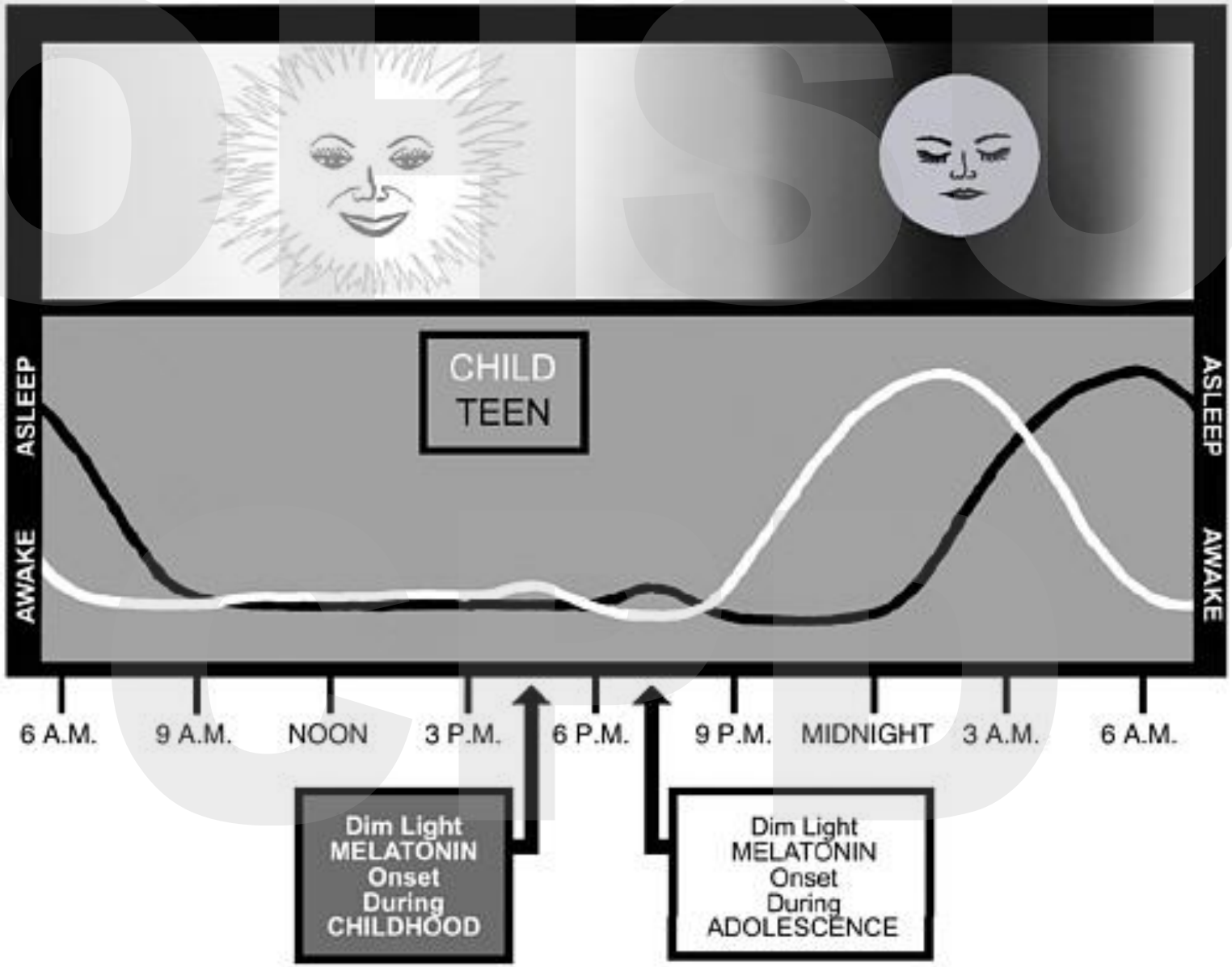

STOP

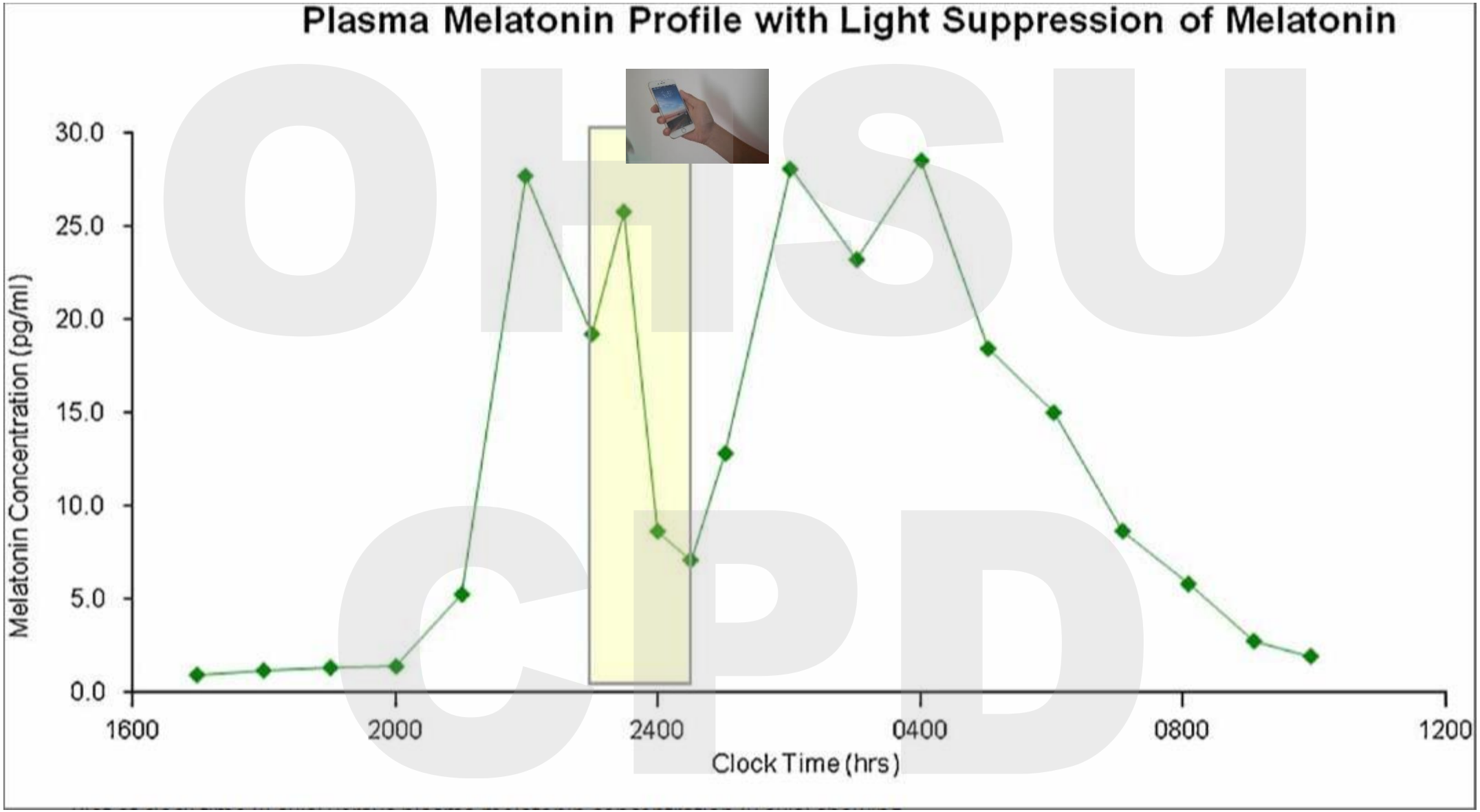


Delayed sleep phase disorder

- Delayed sleep phase in adolescents has a prevalence as high as 16%
- Frequently comorbid with mood disorders
- Treatable, but patients must be motivated to make changes

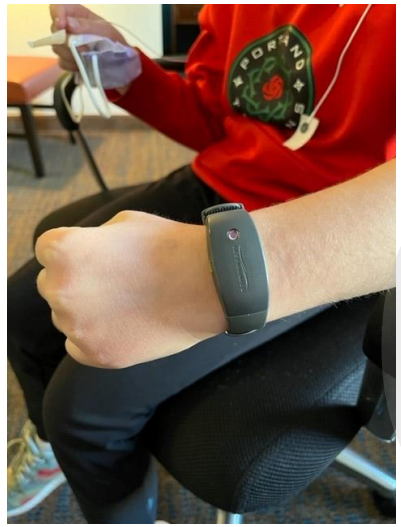
Delayed melatonin secretion in teens




Plasma Melatonin Profile with Light Suppression of Melatonin
Melatonin Concentration (pg/ml)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1600
2000
2400
0400
0800
1200
Clock Time (hrs)

Delayed sleep phase evaluation

- History
- Sleep Logs
- Actigraphy



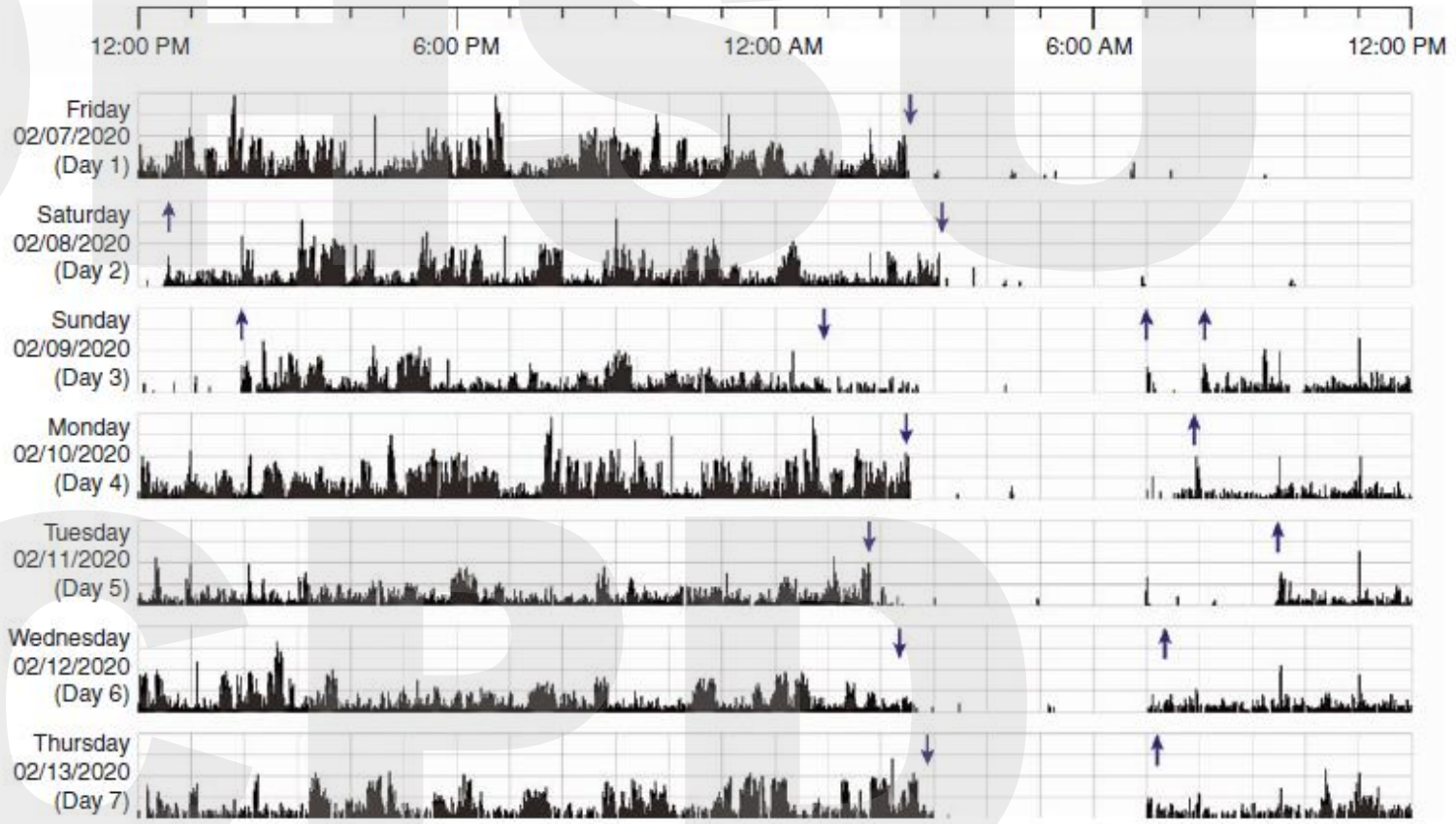
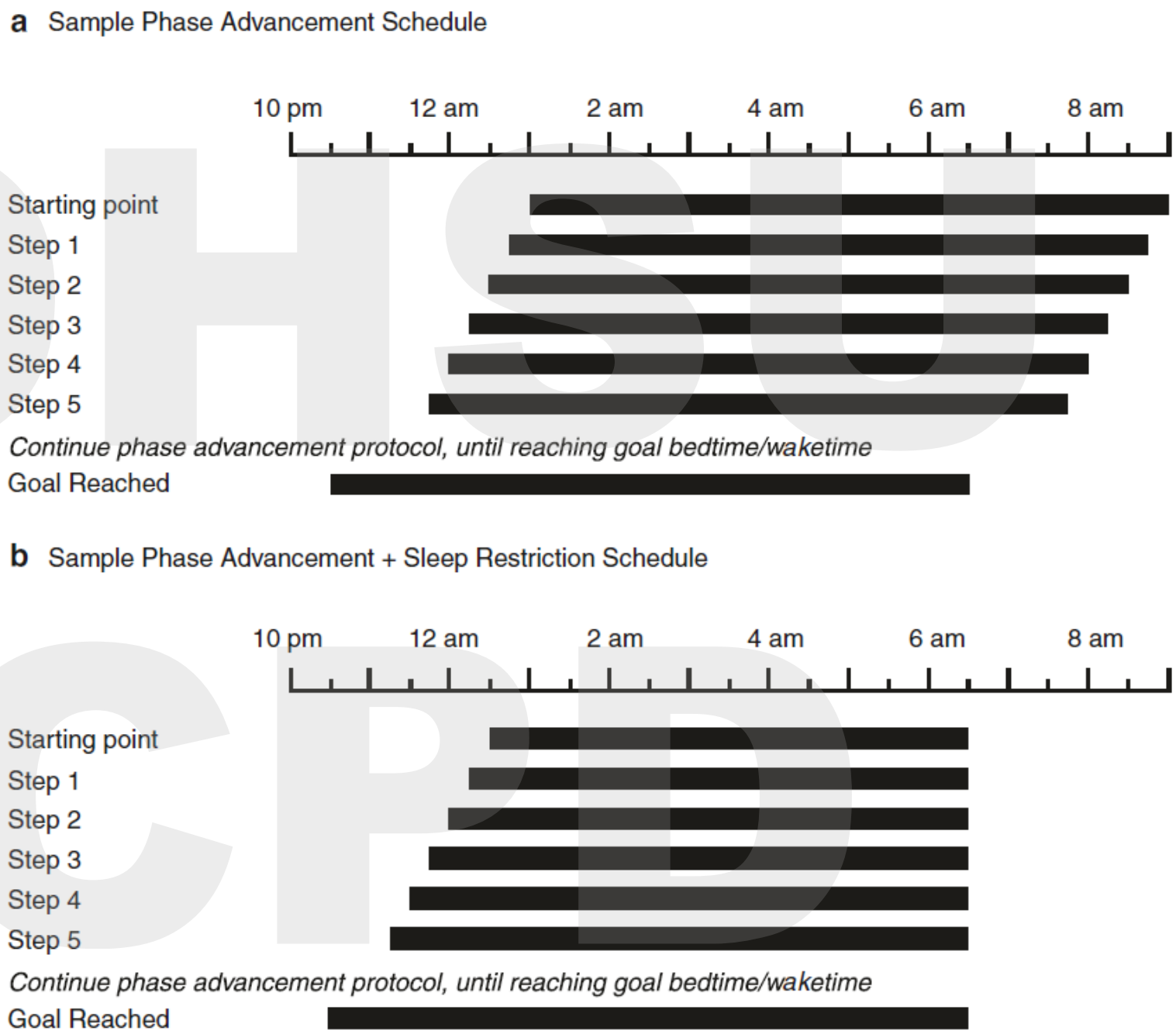


Fig. 32.1 Actigraphy. A schematic example of a week's worth of wrist actigraphy data. Successive days are plotted beneath each other. The black tick marks represent movement measured by a wristwatch-sized accelerometer. The blue arrows are times the patient pressed an event marker on the device to denote bedtimes (down arrows) and wake times (up arrows). The patient has delayed bedtimes and wake times on the weekends after 2 am and after 12 pm, respectively. On school days, bedtimes remain delayed and there are examples of the patient having insomnia when they attempt to go to bed at an earlier time (Sunday evening, third line) as well as oversleeping on school days (Monday and Wednesday mornings, third and fifth lines)

DSWPD Treatment

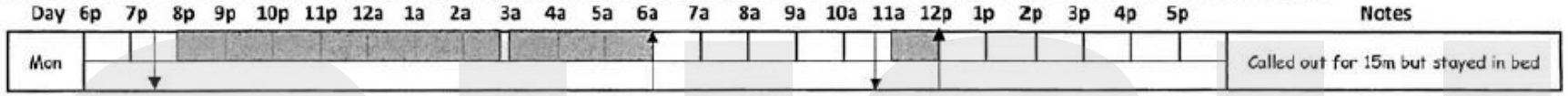
- Appropriate light exposure during the 24 hour day
- Sleep schedule modifications (generally wake at the same time every day and delay the bedtime)
- Low dose melatonin
- Relapse is possible

Fig. 32.3 (a, b) Sample sleep schedule modifications. Examples of prescribed sleep/wake scheduling to reset the circadian clocks of patients with delayed sleep–wake phase disorder

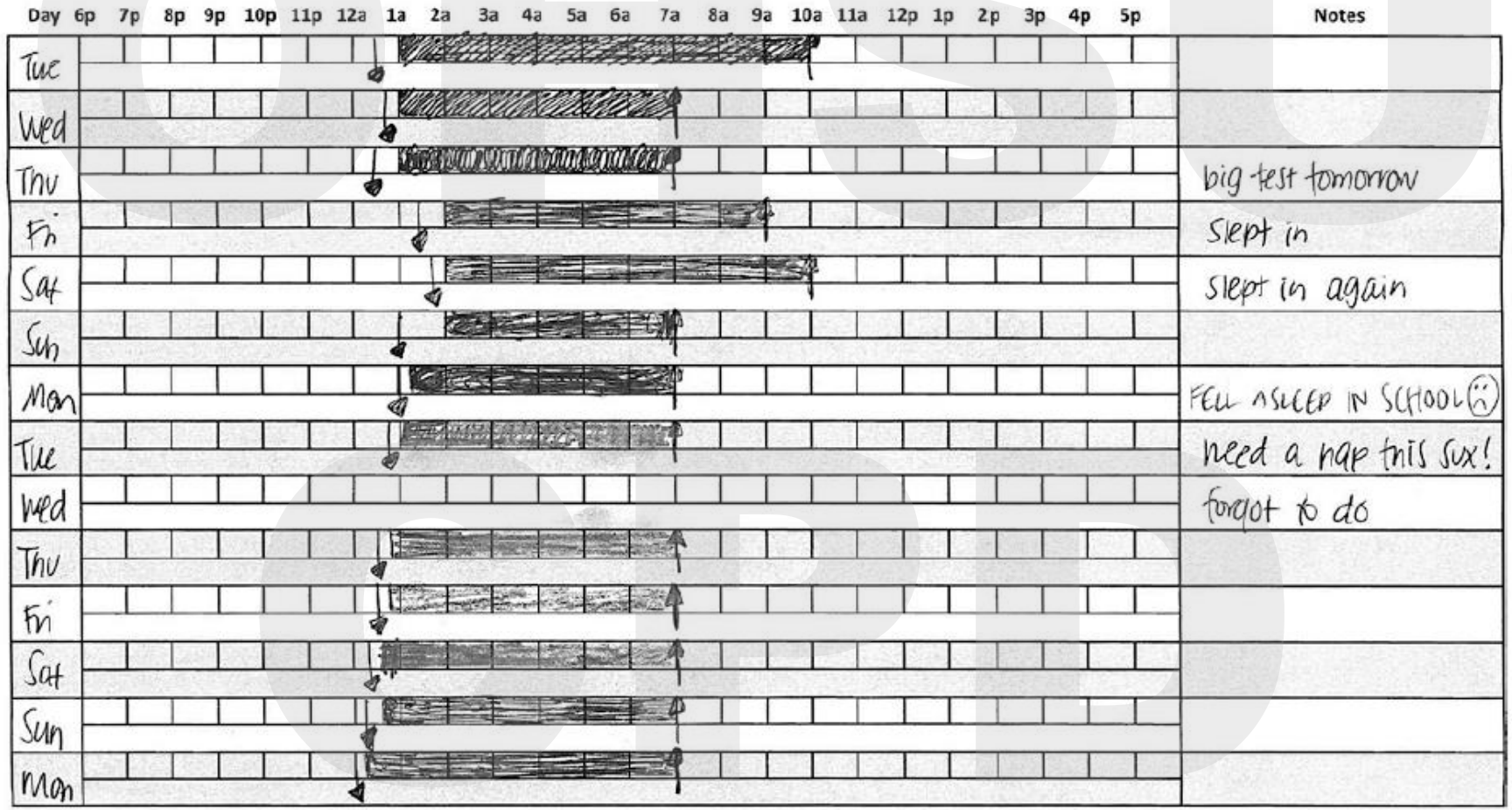


Directions: Fill out every morning when you wake up. It is okay to use estimated times.

EXAMPLE: Gets into bed at 7:30pm, falls asleep at 8pm. Awake for 15 minutes, calling out for caregiver. Wakes up at 6am. Takes a nap from 11am-12pm.



Key: ↓ = Get into bed ↑ = Get out of bed Shade in all time spent asleep, including naps



Staff use only. Provider: Write MRN if needs to be scanned to chart.

Wrap up: 14yo with delayed sleep phase

- *Restrict sleep from 1AM-7AM all days of the week. After 4 days, shift the bedtime back by 15 minutes and keep the wake up time the same. Repeat until achieves 8 hours of sleep (11PM-7AM).*
- *Set up a family charging station to keep electronics out of the teen's room. Okay to use white noise machine, fan, etc.*
- *Declines melatonin.*

At a 2 month follow up visit, patient is on prescribed sleep schedule and feels more rested. They have been able to catch up on their school work and have started college applications.

Case: 17yo with onset insomnia

Born at 27 weeks complicated by neonatal intraventricular hemorrhage, h/o epilepsy, cerebral palsy, dysphagia with GT dependence, communicates with ASL, resolved mild OSA s/p T&A 6yo, adopted. Referred from Peds Neuro due to RLS symptoms and has been on iron therapy for 3 years without any benefit.

Goes to bed at 10PM and takes 1.5 hours to fall asleep. Wakes at 6:30AM for school. Because of shared walls, parent can hear patient moving in bed and playing on phone. The patient is tired in the morning but doesn't nap. No snoring.

RLS is a clinical diagnosis (2-4% prevalence)

- Urge to move +/- leg sensations (e.g. spiders, tingly, wiggly, pain, or funny in their legs)
- Evening predominance
- Gets better with movement

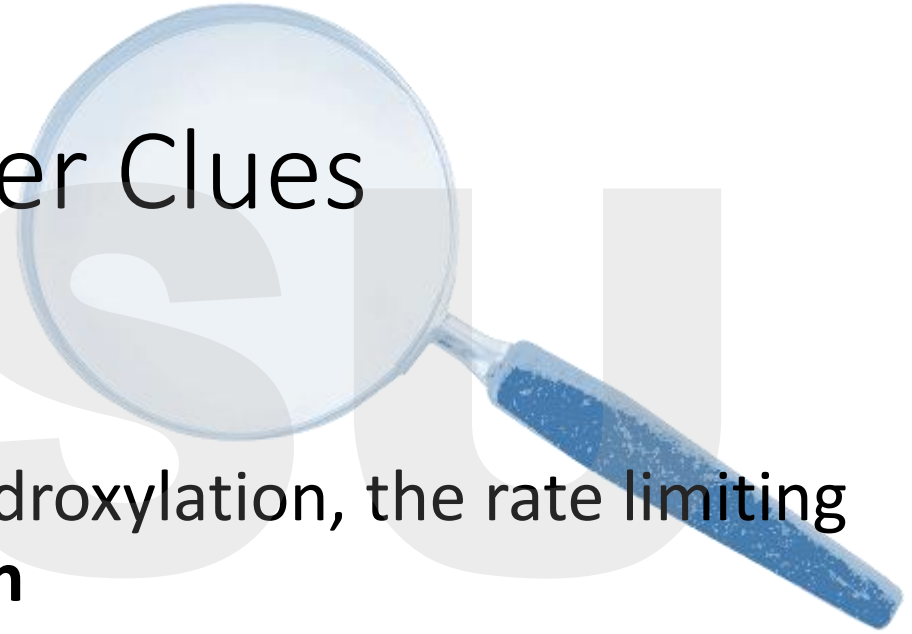
Should be described in a child's own words and can cause significant daytime functional impairment.

Delayed diagnosis is common- difficult for children to articulate

How to differentiate RLS from mimics

- **Growing pains** occur intermittently in the evening and aren't associated with the urge to move / relief with movement
- No urge to move or evening predominance with leg cramps
- Skin exam can rule out **eczema** and **bruises**
- H&P may help exclude others: **musculoskeletal causes** (ligament tear, tendon or muscle pain), **peripheral neuropathy, fibromyalgia, sickle cell disease**

Pathophysiology and Other Clues



- **Dopaminergic theory of RLS**
  - **Iron**→ is necessary for tyrosine hydroxylation, the rate limiting step for →→**dopamine production**
- Early onset cases (<35yo) usually have a **+FMHx**
  - 80% of children with RLS have a positive parental history of RLS
  - Associations with multiple gene variants BTBD9, MEIS1, MAP2K5/LBXCOR, PTPRD

Comorbid with psychiatric disorders

- Children with RLS have a higher incidence of ADHD, oppositional defiant disorder, anxiety disorders, and depression
- Lack of data on the link between RLS and depression/anxiety
- Most commonly studied in ADHD, but unclear directionality between the conditions
  - About one-fourth of individuals with RLS have attention-deficit/hyperactivity disorder symptoms, and conversely, about 12% to 35% of those with attention-deficit/ hyperactivity disorder have RLS

Meds/substances can exacerbate symptoms

- SSRIs
- TCAs
- Metoclopramide
- Antihistamines
- Caffeine
- *Nicotine*
- *Alcohol*

Evaluation

- H&P
- Ask about FMHx and medications/substances
- Check iron studies: iron level, CBC, **ferritin**
- *Sleep study*

Non pharmacologic treatment options

- Adequate sleep hygiene and quantity of sleep
- Avoid medications/substances before bedtime
- Exercise in the afternoon or evening
- Stretching, rubbing, massage of legs
- Cooling pads or heating pads

Pharmacologic treatments

- First line therapy for children is **oral iron therapy**
  - <12yo take 3mg/kg/day with max dose 130mg elemental/day
  - 12yo+ take 1-2 tablets of 65mg elemental iron daily
  - Recheck labs every 3-6 months
  - Constipation, vitamin C/dairy
  - Every other day therapy may be better (adult studies)
  - IV iron therapy
- **Clonidine and gabapentin** are second line agents

Wrap up: 17yo with RLS

- *Recommended healthy sleep hygiene (remove electronics) with 8 hour sleep opportunity.*
- *Had already tried exercise/massage and no benefit.*
- *1 month trial of gabapentin, and send message before runs out.*
- *Keep track of symptoms in a daily journal.*

At 1 month visit, patient wanted refills. Doing well on stable dose and eventually transferred care to adult sleep medicine.

Case: 2yo crying in their sleep since 6mo

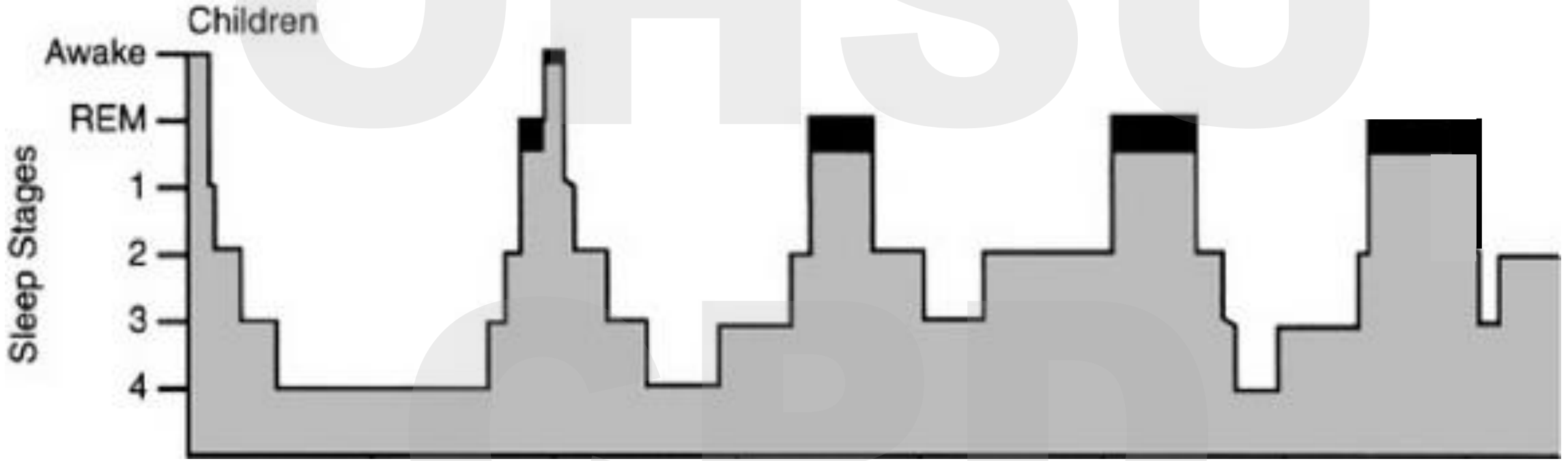
Goes to bed at 7-8pm and starts crying at 10pm. Repeats multiple times per night every 2-3 hours. Wakes up at 6am. Takes a 2 hour nap during the day, but misses it some days due to errands. Snores on some nights.

No medical problems or history of prematurity. Takes vitamin D and fluoride. Normal growth and development. Stays at home with parent during the day, no daycare.

Parasomnias

- Greek “para” means around; Latin “somnus” means sleep
- Undesirable physical events or experiences that occur during entry into sleep, within sleep, or during arousals from sleep
- Pathogenesis poorly understood
- Generally benign, but can affect quality of life

Sleep hypnogram and parasomnias



1st half=NREM Parasomnias

2nd Half=REM Parasomnias

TABLE 6

Differentiating Common Childhood Parasomnias

Parasomnia	Timing in sleep period	Sleep stage	Amnesia	Out of bed?	Behavior	Autonomic nervous system
Confusional arousals Onset <5yo Prevalence 17% in 3-13yo	First half	Non–rapid eye movement	Yes	No	Confused appearance, eyes open or closed; attempts to wake child are unsuccessful and often resisted by the child	No
Nightmare Infrequent: 60-75% prevalence Nightmare d/o: 1.8-6% prevalence	Last half	Rapid eye movement	Age-appropriate dream recall is present	No	Frightening dream resulting in a period of wakefulness	Absent to mild
Sleep terror Onset 2-4yo, peak 5-7yo Prevalence 1-6%, > in boys	First half	Non–rapid eye movement	Yes	Yes	Child precipitously sits upright and screams; may jump out of bed and run blindly; child can be agitated or disoriented	High level of autonomic activation; tachy-cardia, mydriasis, sweating
Sleep walking Onset 4-8yo, peak 10yo 15-30% sporadic prevalence 3% frequent prevalence	First half	Non–rapid eye movement	Yes	Yes	Partial arousal from sleep with some ambulation; young child may crawl out of bed; older child may be found asleep in a different location	No

Information from references 55-57.

Nightmares

- Healthy sleep hygiene with adequate sleep on a regular schedule
- Psychology referral, especially if PTSD or anxiety is present
- Relaxation, comfort items, imagery rehearsal techniques
- TV out of room, avoid violent or scary content
- Dental evaluation for bruxism, if comorbid
- Reassurance for children: night light, pictures of family or super heroes on the wall
- *Medications rarely prescribed*

Parasomnia history taking

1. Timing of appearance of the symptom
2. Movements or other symptoms
3. Reaction to caregiver intervention
4. Presence of rhythmic, repetitive movements
5. Recall of the episode in the morning

Parent recall can be inaccurate and home video (smartphone recordings) can be helpful.

NREM Parasomnia Triggers

- Insufficient sleep (leads to increased N3)
- Meds: zolpidem, lithium, sodium oxybate
- Comorbid OSA, RLS, anxiety (increased arousals)
- Sleep environment: noisy, temperature
- Sleep disruptors
  - Fever, illness, eczema, asthma, sleeping with full bladder
- +FMHx is found in up to 80% of children with a DoA

NREM Parasomnia Management

- Reassurance for parents: don’t discuss, don’t wake from episodes, may persist until puberty
- Sleeping bag, move the mattress to the floor
- Safety measures: locks, gates, alarms or bells
- **Sleep extension**

NREM Parasomnia Management

- Scheduled awakenings
  - If having nightly episodes and predictable, wake 15-30 minutes before the usual episode time and continue for 2-4 weeks (may repeat as needed)
- Meds if injury/harm (rare): Benzodiazepines with a taper to prevent N3 rebound
- Refer to Peds Neuro if concerned about nocturnal seizures
- Sleep study if snoring/OSA symptoms are present as well

http://dx.doi.org/10.5665/sleep.2190

Practice Parameters for the Non-Respiratory Indications for Polysomnography and Multiple Sleep Latency Testing for Children

3. Children with frequent NREM parasomnias, epilepsy, or nocturnal enuresis should be clinically screened for the presence of comorbid sleep disorders and polysomnography should be performed if there is a suspicion for sleep-disordered breathing or periodic limb movement disorder. (GUIDELINE)

Review/Summary of Records/Prior Sleep Work-Up:
*3/16/20 Econsult to Sleep Medicine from ENT (Milczuk): Referred for sleep apnea concerns
*7/20/20 Video sleep clinic (Sanford): Rec PSG to evaluate for sleep apnea, reassurance for night terrors, encourage 11-13 hours of nightly sleep, f/u 1 week after sleep study
*10/25/21 ENT visit (Hargunani): Rec PSG and consider T&A, tonsils 3+
*1/11/22 Dx PSG: Severe OSA, titrated on o2 alone, CPAP alone, BPAP alone; no optimal pressure reached, URGENT T&A recommended, see report for details
*1/14/22 (OHSU, Tan) T&A

HPI:
Did well with the surgery. Already sleeping better at night. The anesthesiologist said that he was breathing much better after surgery already. His night terrors resolved.

Wrap up: 2yo with night terrors

- *We ordered a sleep study and discussed being more consistent with the daytime nap- parent able to move errands to other times of the week and be consistent.*

In a follow up visit 3 months later: sleep study negative for sleep apnea and night terrors resolved. Parent feels reassured.

Case: 13yo with anxiety & trouble sleeping

Goes to bed at 7pm and lays in bed for 2 hours before falling asleep. Has tried melatonin up to 5mg and hasn't helped. Wakes briefly multiple times per night. About half of nights will wake and be unable to go back to sleep, takes about 1 hour. Will get on phone. Wakes at 6am during the week for school and 7am on the weekends. Not napping, but very tired. No snoring, restless sleep. Night terrors as a young child, none current.

Sleep and anxiety issues started during the pandemic. Maternal grandmother has insomnia. Takes MVI when able to remember. Doing well in school. Normal BMI.

Insomnia

- Can be defined as trouble falling asleep, staying asleep, or waking up earlier than desired
  - One or more of these is present at least 3 times a week for 3 months
  - Affects a child during the daytime (mood, attention, behavior, school, etc.)
- Prevalence is highly variable by age group and is even higher in groups with mental health and neurodevelopmental disorders like anxiety, ADHD, and autism spectrum disorder

Spielman's 3P Model of Insomnia

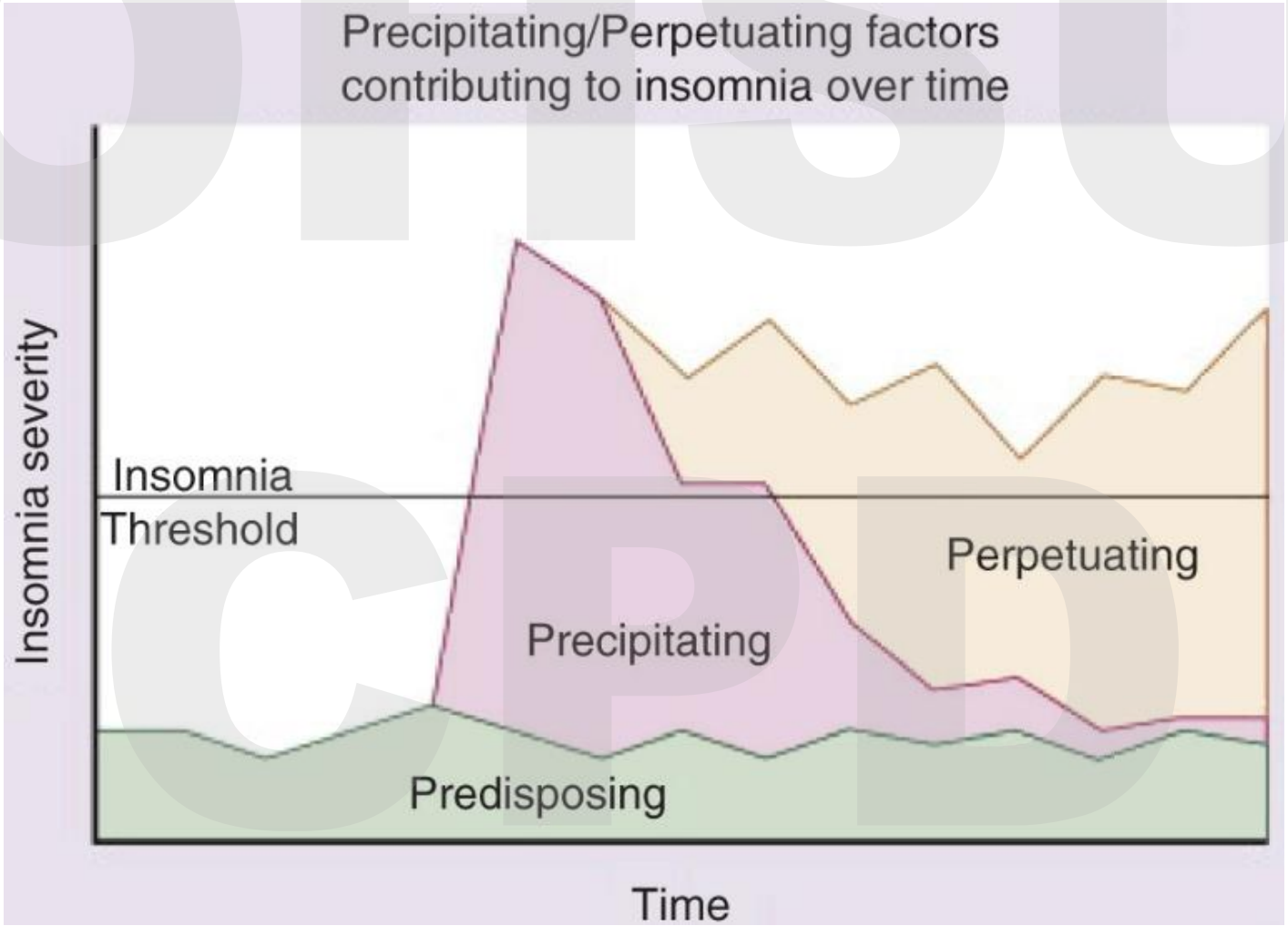


Table 2
Components of Cognitive Behavioral Therapy for Insomnia

Therapy Component	Description
Stimulus control	Aims to break conditioned arousal between the bed and wakefulness/worry, and rather strengthen the association between the bed and sleep.
Sleep restriction	Limits the time allowed in bed to the patient's average reported actual sleep time, and subsequently and slowly increases the time allowed in bed as sleep improves.
Cognitive therapy	Targets beliefs and thoughts that directly interfere with sleep by increasing arousal in bed, or indirectly by interfering with adherence to stimulus control and sleep restriction.
Sleep hygiene education	Teaches patients about sleep and encourages them to limit caffeine intake, avoid alcohol prior to bedtime, incorporate daily exercise, and keep the bedroom quiet, dark, and at a comfortable temperature.
Relaxation techniques	Incorporates techniques such as diaphragmatic breathing, progressive muscle relaxation, and visual imagery to reduce psychic and somatic anxiety related to sleep.

Sleep hygiene education

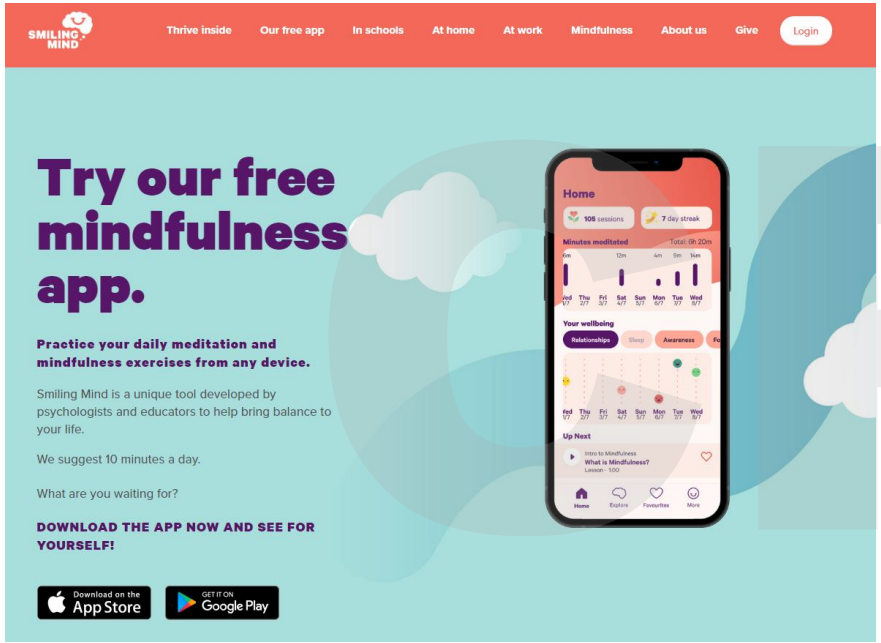
- Quiet, dark, cool sleep environment; lights on in the morning
- Consistent sleep AND wake schedule
- Relaxing and predictable bedtime routine, leads to bed and 20min
- Snack before bed is okay
- Exercise during the day to increase sleep drive
- Avoid caffeine (6h min) and electronics (1h min ideal)
- No daytime naps (unless age appropriate)

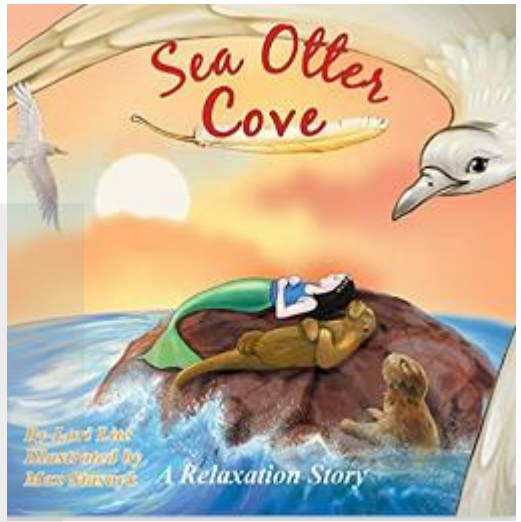
Cognitive therapy

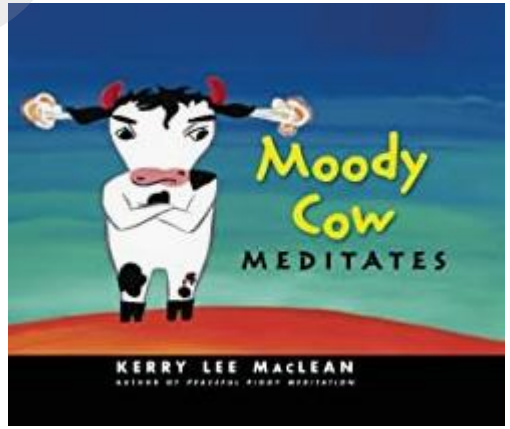
- Address thoughts and beliefs that interfere with sleep
- **It gets worse before it gets better!**
- Everybody has a “bad” night of sleep- normalize it
- “Worry time” or “special time” in the afternoon or early evening

Relaxation techniques

- Teaches you how to relax your mind and body
- Muscle relaxation, deep breathing, mental focusing
- Smiling Mind Mindfulness App



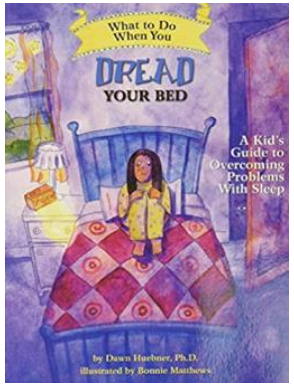




Stimulus control

- Strengthen bed and bedroom as sleep cues
- The bed is for sleep only!
- If you haven’t been able to fall asleep after 20 minutes, go to a “relaxing place” and return once you get the “sleepy” feeling again

Sleep restriction



- Restrict time in bed to increase sleep drive and consolidate sleep
- Our patient, goes to bed at 7pm and wakes at 6-7am (11-12h in bed); takes 2h to fall asleep → each night is getting 9-10h of sleep
  - Weekdays: 9h x 5d = 45h / Weekends: 10h x2d = 20h sleep → **65h/wk**
  - Spends 1h awake at night 3-4 nights per week → **3.5h/wk**
  - 65-3.5=**61.5h of sleep each week** divided by 7 days = 8.78h or 8h 45m per day
- Suggested: get in bed 9:30pm, asleep by 10pm, wake at 6am (8h)
  - May fade bedtime back to increase total sleep time toward 9 hours

When behavioral treatments aren't enough…

- You can consider prescribing a hypnotic sleep medication
- Lack of data: borrowed from adult studies or case reports or case series in children
- Medication selection should be based on clinician's judgment and choosing medications that treat insomnia and a comorbidity (if able)
- Set clear, realistic, and measurable expectations with a defined end point
- Behavioral treatments should continue in tandem
  - Taking a late afternoon nap will decrease sleep drive and even large doses of a medication will be ineffective

Table 3. Medications for Insomnia and Common Side Effects

Medication	Common Side Effects	Primary Reason for Use F = Primarily used to help fall asleep S = Primarily used to help stay asleep
Over-the-Counter Medications		
Antihistamines*	• Morning grogginess, blurry vision, dry mouth, and constipation • Some children may experience an "opposite" effect with hyperactivity and excitability • Long-term use may cause a child to struggle emptying their bladder or with constipation	F
Melatonin	• Morning grogginess, bedwetting, nightmares, headache, dizziness, mood changes, and stomachaches	F
Prescription Medications		
Alpha adrenergic medications* (clonidine and guanfacine)	• Low blood pressure (clonidine), and problems such as blurry vision, dry mouth, and constipation. Other side effects include lightheadedness, confusion, and irritability. Clonidine may increase confused behaviors especially in children with a history of sleepwalking or sleep terrors. Rarely, an increase in blood pressure can be seen when stopping suddenly (clonidine).	F/S
Antidepressants* (such as trazodone)	• Dizziness, drowsiness, agitation, irregular heartbeat, reduced blood pressure, blurred vision, and nausea and vomiting • Priapism (painful long-lasting erection in males) is a serious but rare side effect	F/S
Antipsychotics* (quetiapine, olanzapine, and risperidone)	• Daytime grogginess, dizziness, and increased appetite; in rare cases may cause abnormal movements that are a serious side effect	F/S
Melatonin receptor agonist** (ramelteon)	• Dizziness, nausea, and daytime grogginess	F
Nonbenzodiazepines** ("Z medications")	• Unusual behaviors during sleep, such as sleep-driving and sleep-eating, have occurred in adults taking these medications	F/S
Orexin receptor antagonists ** (suvorexant, lemborexant)	• Daytime grogginess, nightmares, sleep terror	F/S

* FDA approved to treat conditions other than sleep-related conditions in adults

**FDA approved for the short-term treatment of insomnia in adults

If your child develops any side effects, it is recommended to discuss with your provider as soon as possible.

Melatonin

- Endogenous hormone derived from tryptophan in the pineal gland
- Stimulated by dark and inhibited by light
- Binds to MT1 and MT2 receptors in the brain
- Categorized as a dietary supplement by the FDA
- Exogenous melatonin does NOT alter endogenous melatonin production

Melatonin

Pros

- Helpful for sleep onset in typically developing children and those with ASD/ADHD
- Accepted by many caregivers
- Low side effect profile
- Readily available, low cost
- Multiple preparations

Cons

- Long-term side effects uncertain
- Dose timing is important
- Little evidence to support use of extended release form for sleep maintenance insomnia
- Reliability of OTC preparations has been called into question

Antihistamines

- Diphenhydramine (ethanolamine); half life is 4-6 hours
- Hydroxyzine (piperazine); half life is 6-24 hours

Antihistamines

Pros

- Rapid onset
- Caregiver acceptance is high
- Well-tolerated
- Low cost
- Liquid and tablets available

Cons

- Mixed evidence on efficacy
- Anticholinergic side effects (dry mouth, constipation, blurred vision)
- Paradoxical reaction in 10%
- Tolerance is common

Alpha-adrenergic agonists

- Clonidine and guanfacine
  - Clonidine is more sedating (central A2 agonist vs selective A2 agonist)
- Both are also available in an extended-release form (clonidine CR is Kapvay and guanfacine ER is Intuniv)
- Tolerance common, can affect blood pressure
- Should be tapered slowly, can lead to rebound HTN
- Helpful in children with ADHD and anxiety that experience onset insomnia

Benzodiazepines

- Half lives vary (clonazepam vs lorazepam)
- Marked dependence/abuse potential
- Impairment of respiratory drive, cognitive impairment
- Can lead to daytime sedation
- Rebound insomnia on discontinuation
- Rarely used in pediatric patients

Nonbenzodiazepine receptor agonists

- Work on the same GABA receptors as benzos, but are more selective for the alpha 1 subunit
- Little empirical evidence of efficacy in children
- “Z drugs”
  - Zolpidem (Ambien): 2-4 hour half life
  - Zaleplon (Sonata): 1 hour half life
  - Eszopiclone (Lunesta): 3-6 hour half life
- Compared to benzos, less dependence/abuse potential, impairment of respiratory drive, and rebound insomnia when dc’d
- Associated with sleep related eating disorder (parasomnia)

Antidepressants

- Doxepin (Silenor): Tricyclic antidepressant with sedating effects due to selective histamine receptor agonist, approved for sleep maintenance insomnia in adults
- Trazodone (Desyrel): Inhibits binding of serotonin and blocks histamine receptors, “hangover” effect, priapism
- Mirtazapine: Atypical antidepressant with noradrenergic and specific serotonergic actions, strong sedative properties at low doses (7.5mg) and can lead to weight gain

Orexin receptor antagonists

- Suvorexant (Belsomra) and Lemborexant (Dayvigo)
- New generation of medications that limit the effects of orexin, a chemical messenger in the brain that regulates sleep and alertness
- FDA approved in adults for sleep onset and/or maintenance

No hypnotic medication is FDA approved for pediatric insomnia (all are used off label), side effects are possible, tolerance can develop, medications increase the likelihood that an individual will fall asleep but does not guarantee sleep, and medications are best used in combination with behavioral interventions.

Wrap up: 13yo with chronic insomnia, anxiety

- *CBTI treatments recommended, asked to keep sleep logs. Falling asleep and staying asleep greatly improved.*

In follow up, forgot to bring the sleep logs, but sleep is improving. Persistent worries prompted visit with PCP. Started sertraline and will likely be going up on dose. Will follow up in 3 months.

Thank you!


FIRST DAY OF
When I grow up, I want to be...
MAMA
Today is:
Sept 6,
2022
Age
2
Teacher
MS.
RADJI
School
FAIS
(TPS)