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**LONDON**

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**INSTITUTE OF PSYCHIATRY,  
PSYCHOLOGY &  
NEUROSCIENCE**



# ADHD and Sleep

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**MRC**

Medical  
Research  
Council

**E-RiSK**  
Environmental Risk  
Longitudinal Twin **Study**

# Who am I?

## Who I am:

- ADHD researcher
- Parent

## Who I am not:

- Clinician
- Sleep expert



Kate, age 1 ½, 2 am

# Overview

- Why sleep?
- Science of sleep
- Sleep problems → ADHD
- E-Risk study on sleep & ADHD
- ADHD → sleep problems & what you can do
- Further reading



# Sleep is important!

- Don't need a scientist to tell you that!
- One of the most common complaints to pediatricians
- Poor sleep →
  - Lower motivation and concentration
  - Increased irritability
  - Poorer adaptability
  - Weight gain
  - Poorer well-being in family members

This is why you  
are here!



# Science of sleep

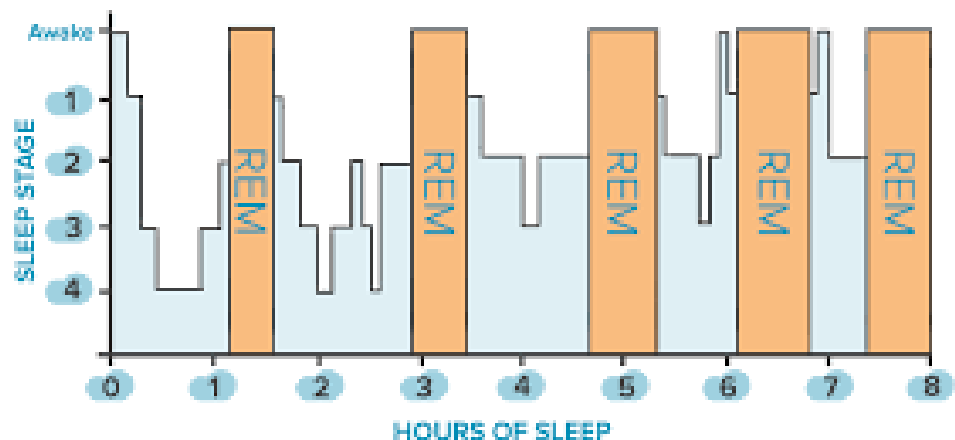
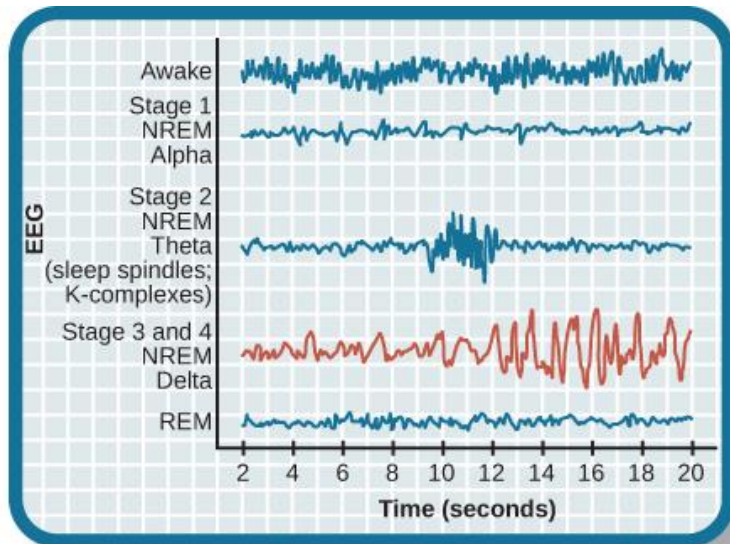
- Two main stages of sleep

## REM (Rapid Eye Movement)

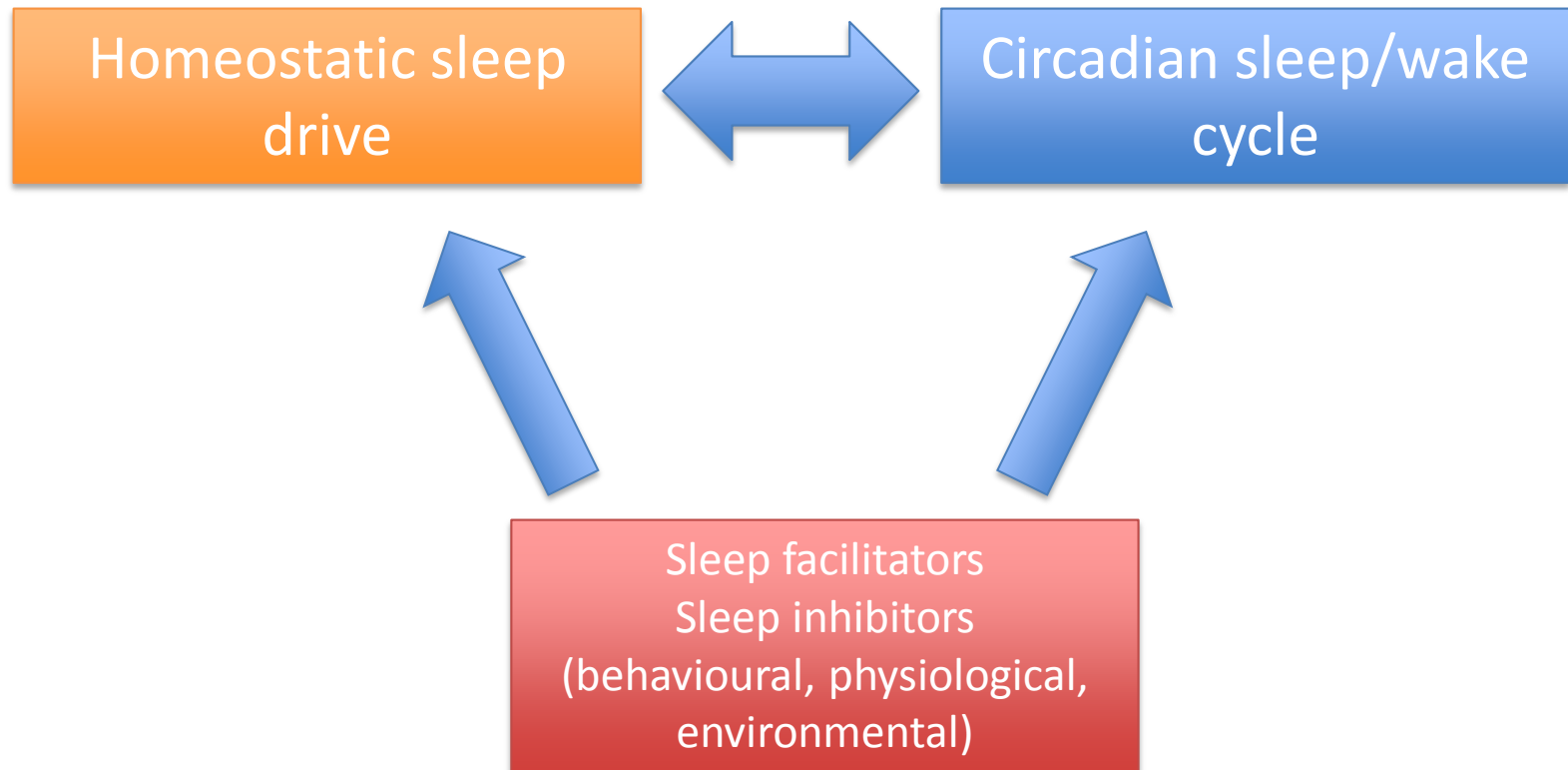
- When we dream
- Muscles are paralyzed
- High levels of brain activity

## Non-REM (Non Rapid Eye Movement)

- How we begin our sleep (Stage 1)
  - Deeper (Stage 2)
- Deepest sleep (Stage 3 & 4)
- More difficult to awaken
- Muscles not paralyzed

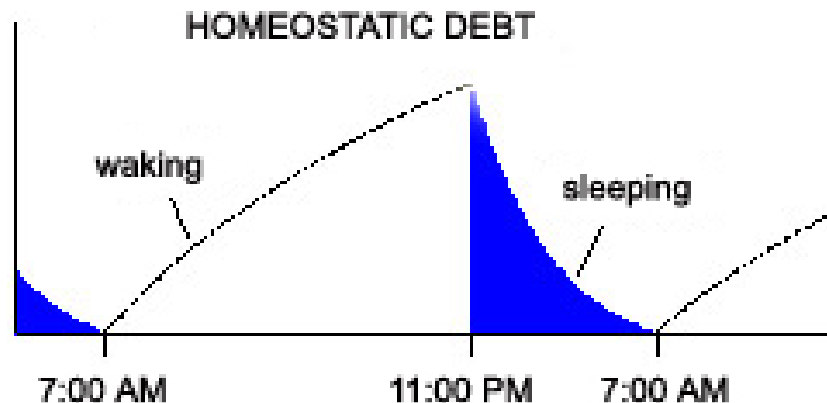


# How does the body regulate sleep?



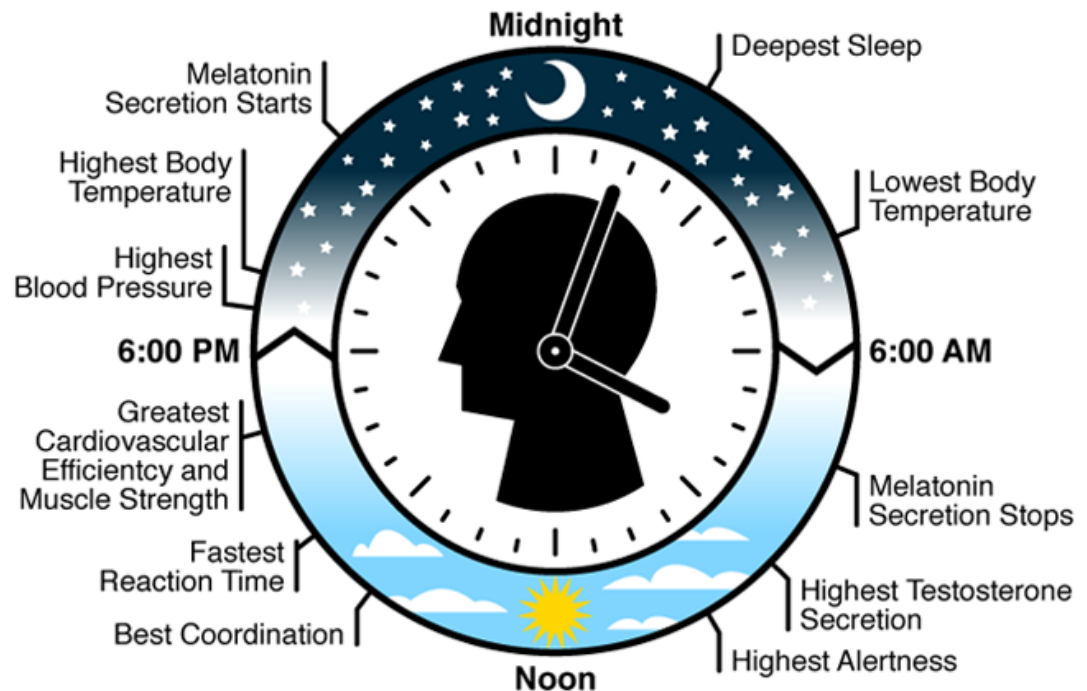
# Homeostatic regulation

- Homeostasis:
  - “same” “state”
  - Our tendency to auto-regulate and maintain a stable internal environment
  - Poorer sleep one night → strong drive for sleep the next day

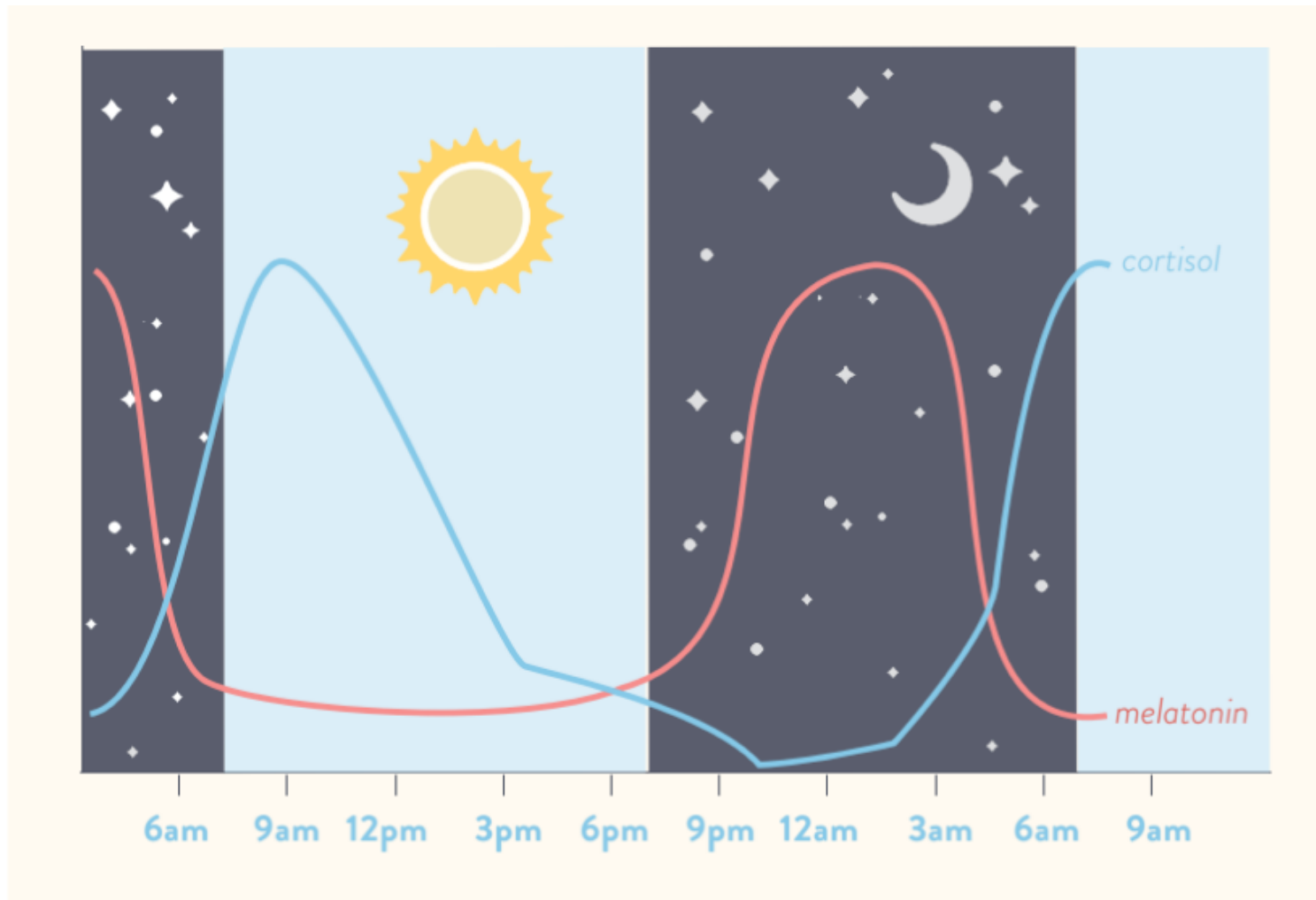


# Circadian rhythm

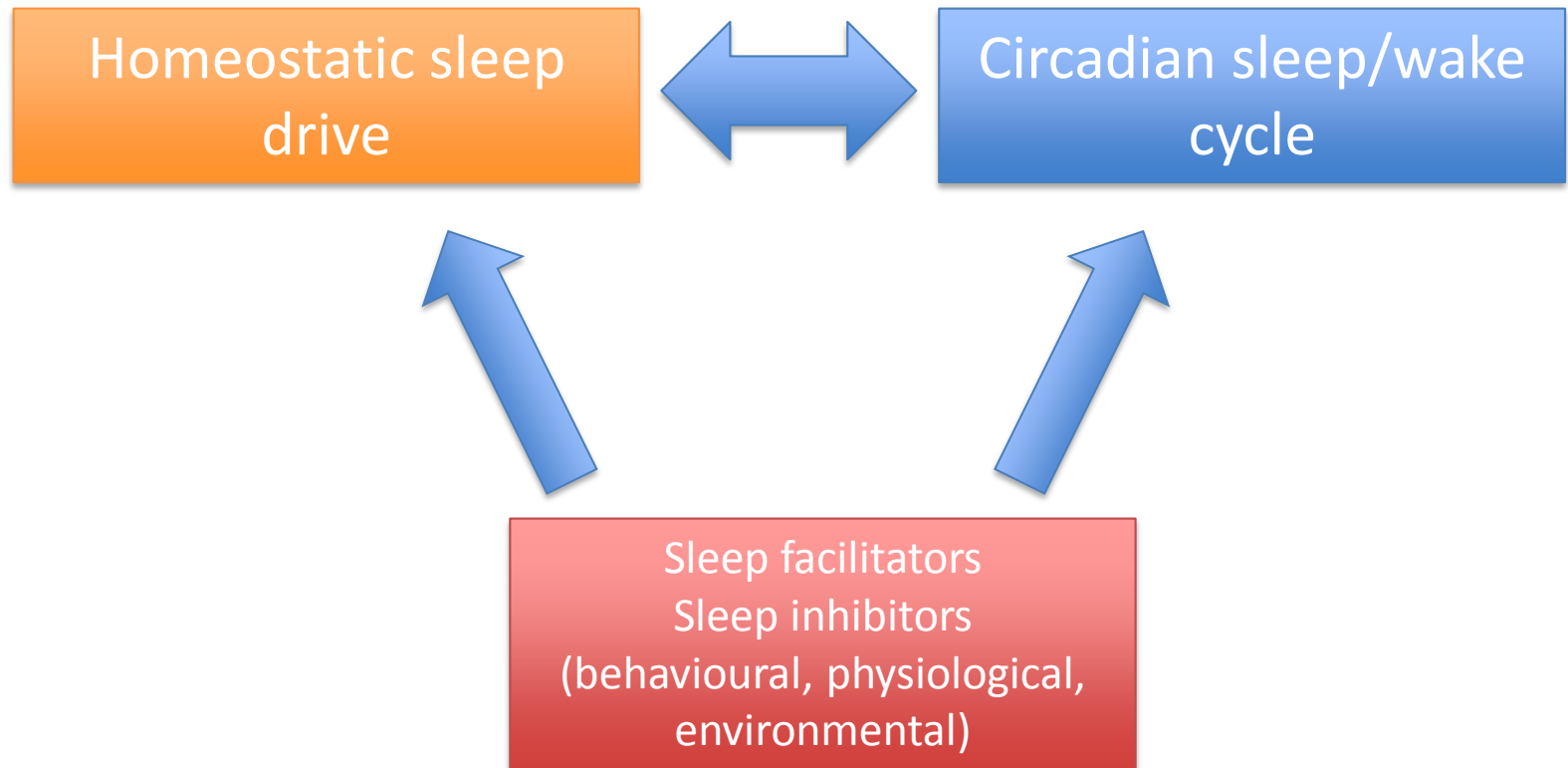
- “Biological clock”
  - Synched to *about* a 24-hour cycle
  - Influences the timing and duration of daily sleep/wake cycles



# Circadian rhythm



# Sleep

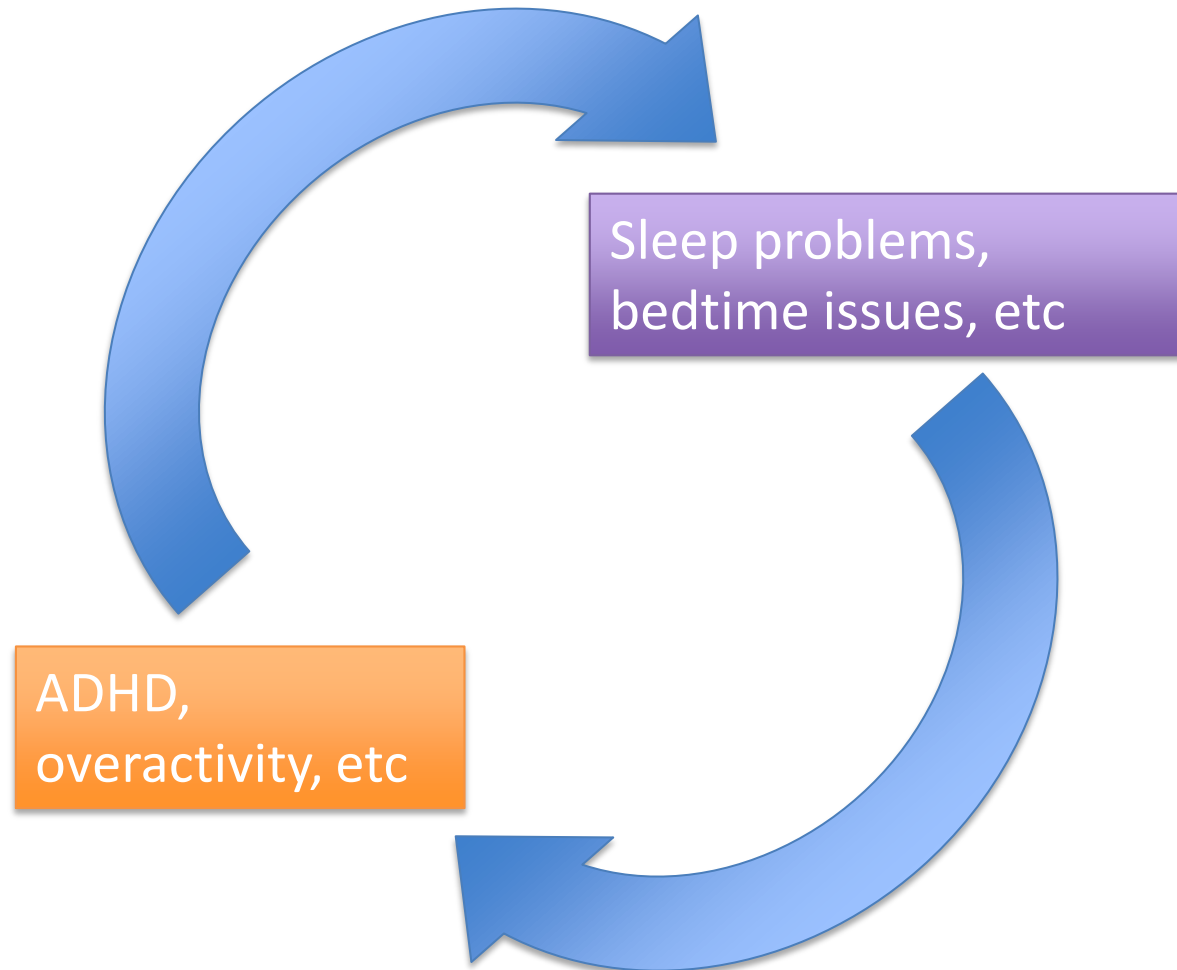


# Sleep disorders

- Insomnia
  - Sleep onset association-type
  - Limit setting-type
- Sleep phase problems
  - Delayed sleep phase syndrome
  - Advanced sleep phase syndrome
- Sleep disordered breathing
  - Obstructive sleep apnea
- Restless leg movement
- Periodic limb movement disorder
- Other problems
  - Nightmares, night terrors
  - Night wakings
  - Bedtime resistance



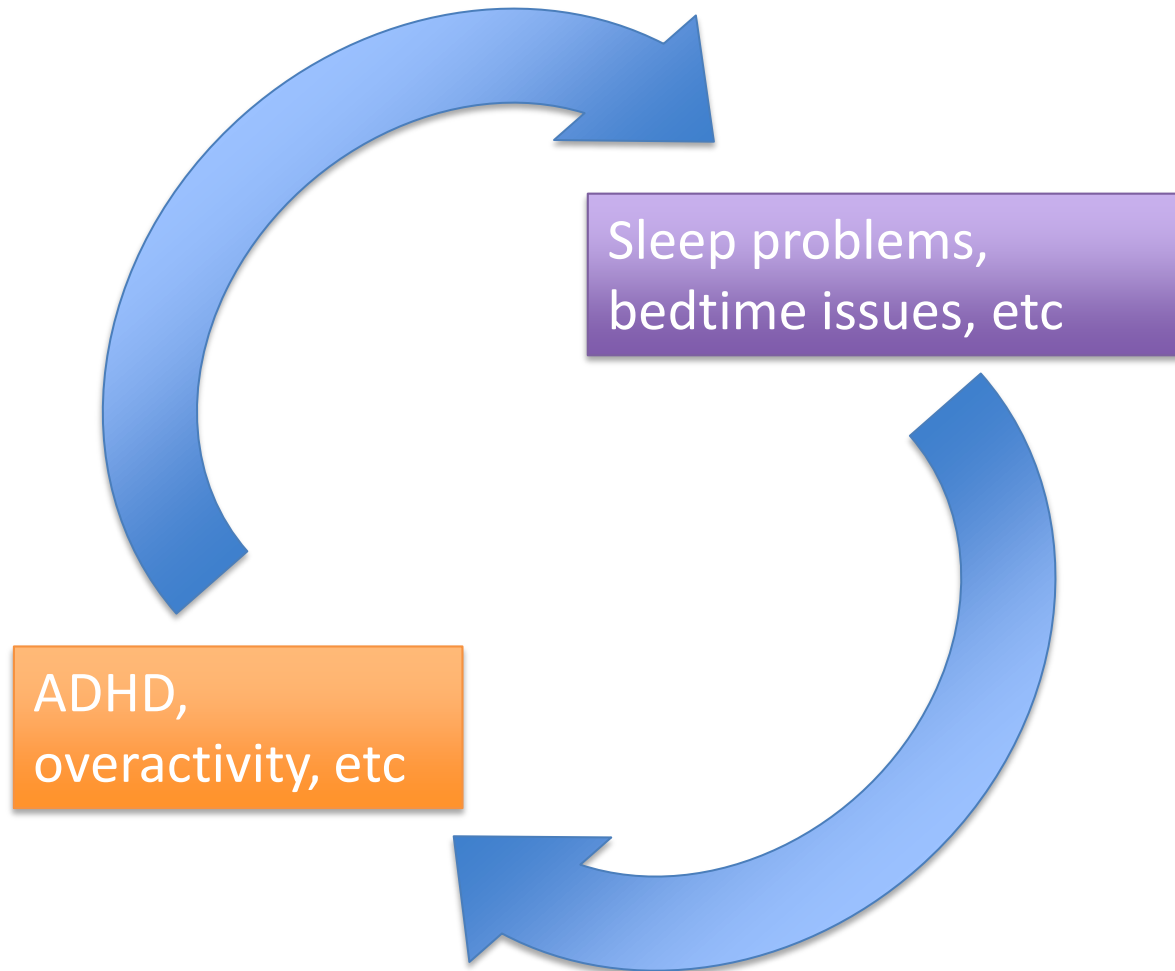
# Vicious cycle



# Sleep problems → ADHD?

- ADHD symptoms more common among children with sleep disorders:
  - Children with sleep disordered breathing and sleep movement disorders have more ADHD-like symptoms
- Studies find sleep disorders associated with:
  - Deficits in attention, working memory and executive functioning
  - Mood disturbance
  - Problem behaviours reported by parents
  - Lower academic performance

# Vicious cycle



# My study on sleep and ADHD

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## ADHD and Sleep Quality: Longitudinal Analyses From Childhood to Early Adulthood in a Twin Cohort

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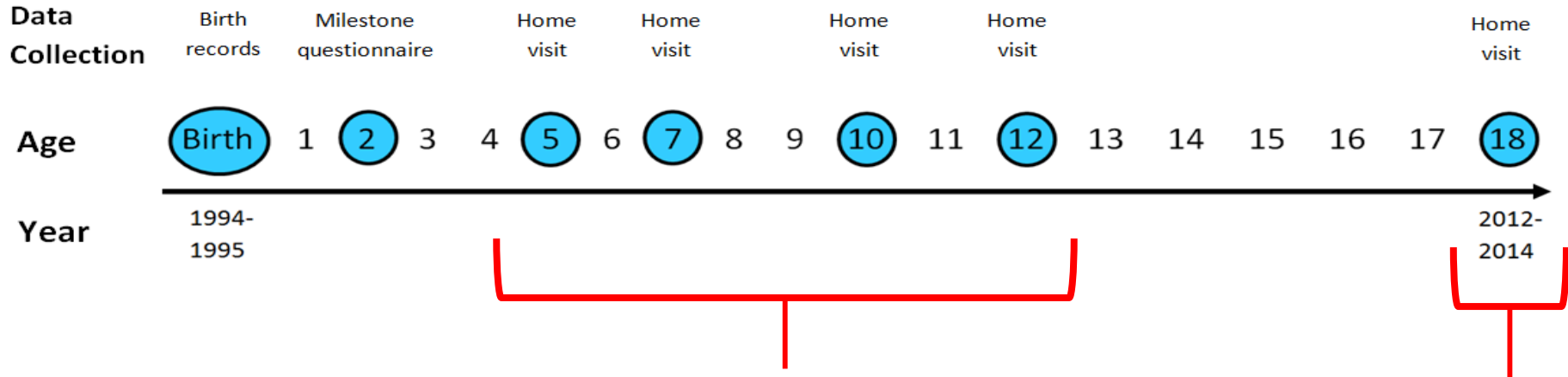
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# Environmental Risk (E-Risk) Longitudinal Twin Study



## Childhood ADHD

- Based on mother (face-to-face interview)
- Teacher (mailed questionnaire)

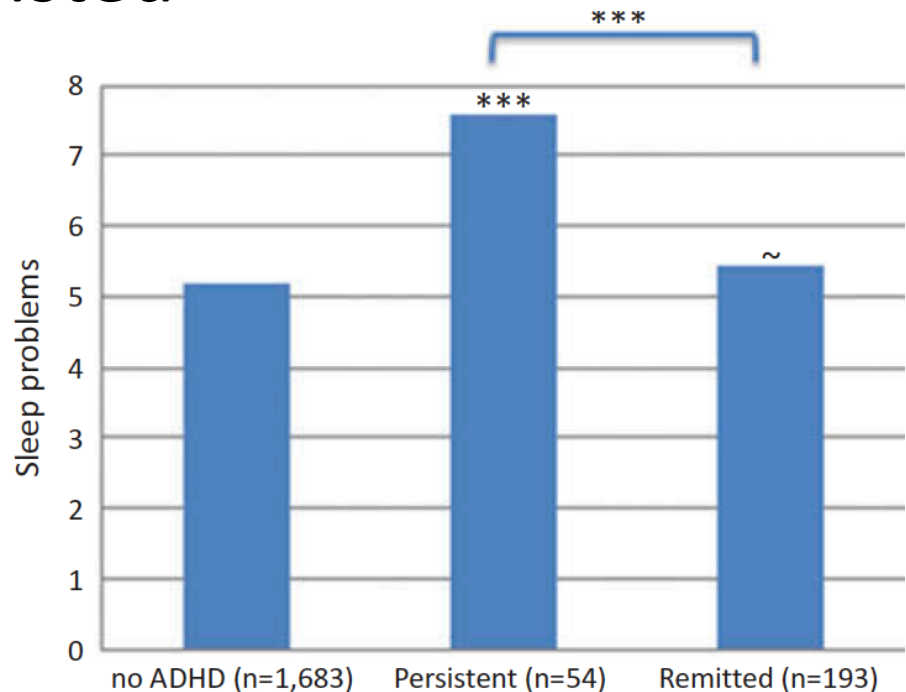


## Young Adult ADHD

- Self-report in private face-to-face interview

# E-Risk study

- Childhood ADHD was associated with poorer sleep at age 18...
- But only if ADHD persisted



# ADHD → sleep problems?

- Between 25-70% of parents of children with ADHD report a sleep problem
  - Insomnia
    - Bedtime resistance
    - Sleep-onset difficulties
  - Night awakenings
  - Difficulty waking in the morning
  - Sleep disordered breathing

# Don't give up hope!

- Children with ADHD might be more likely to have sleep problems, but
  - Doesn't mean they are inevitable
  - Or that there is nothing you can do



# Keep a sleep diary/behaviour journal

- Help you identify patterns/triggers

**Sleep Diary** #it'sBedtime 

Keep track of each of your children's sleep patterns with this simple Sleep Diary. Most questions can be answered at bedtime. The rest you'll know the answer to at breakfast. Complete it each evening and morning. It will only take a minute.

Child's Name

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Summary
What time did you start your bedtime routine?								
What time did your child go to bed?								
What time did they get to sleep?								
What time did they get up the next morning?								
How many hours did they sleep?								
What activities did they do in the hour before they went to bed? Did they read, watch TV, play with toys or video games, do homework? Something else?								
Were they up during the night?								
Did bedtime go as planned, Yes or No								
How was their energy the next day? On a scale of 1-5 (5 = full of energy, 1 = no energy)								
What worked well in getting them off to sleep?								
What got in the way of getting to sleep?								

Focus on what worked well and try to tackle the thing that got in the way of a good sleep.

 Find out more about improving your child's sleeping habits at [www.safefood.eu](http://www.safefood.eu)

# ADHD & insomnia



- Sleep-onset association type:
  - Falling asleep is associated with a specific form of stimulation (e.g., watching TV) or setting (e.g., parents' bed)
  - Associations are problematic/demanding
- Limit-setting type:
  - Parental difficulty in setting limits/managing behavior
  - When limits are instituted, sleep onset not delayed

# What can you do?

## **Try to maintain good sleep habits**

- Have a regular bedtime routine (wind-down time)
  - Kids with ADHD may need longer to wind-down
- Regular bedtime and time to awaken
- No vigorously exercise before bedtime
- Regular exercise during the day
- Activities in bed restricted to those associated with sleep
- Reduce light and noise in the bedroom

# What can you do?

## Reward charts

### Reward Chart

#itsBedtime 🌙

Children need plenty of sleep at night to help them grow and develop.  
 Agree a bedtime goal with your children and decide what the reward will be together.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Reward
<b>EXAMPLE</b>								
Child: Deborah Bedtime goal: Go to bed on time	😊	😊	😊	😞	😊	😊	😊	New Football
Child 1: Bedtime goal:								
Child 2: Bedtime goal:								
Child 3: Bedtime goal:								
Child 4: Bedtime goal:								

- Here are some ideas to get you started on your bedtime goals...
- Going to bed on time
  - Sleep all night
  - Stay in my own bed
  - Leaving the tablet / phone elsewhere

The recommended hours of sleep per night are:

- 11+ hours for under 5 year olds
- 10+ hours for over 5 year olds
- 9+ hours for over 10 year olds



Find out more about improving your child's sleeping habits at [www.safefood.au](http://www.safefood.au)

# What can you do?

## **Graduation extinction**

- “Gentler” version of “cry it out”
- Some crying, followed by brief check in, at regular (and growing) intervals
- Pros:
  - Can be effective in just a few days
- Cons:
  - Can be difficult for parents to implement
  - May not be possible with older (more creatively destructive) children

# What can you do?

## **Bedtime fading**

- Moving bedtime so far back child falls asleep on their own
- Gradually moving bedtime forward by small (eg 15 minute) intervals until reaching desired bedtime
- Pros
  - Limited crying for parents to listen to
- Cons
  - Requires parent(s) to stay up late
  - Can take weeks to reach normal bedtime

# What can you do?

## Medication

- Medications include clonidine, zolpidem, mirtazapine
- Not a large amount of research on sleep medication in children
  - A bit more substantial research on melatonin
- Behavioral interventions recommended as first-line strategy
- Ask your clinician whether could be appropriate



# ADHD & sleep schedule problems

- Adults with ADHD more likely to have extreme evening chronotype, later peaks in melatonin
  - > Difficulty falling asleep
- Some therapies include:
  - Phototherapy (Light therapy): exposure to bright light in the morning
  - Melatonin supplementation: 4 hours prior to bedtime
    - Some, but not extensive, evidence for these therapies

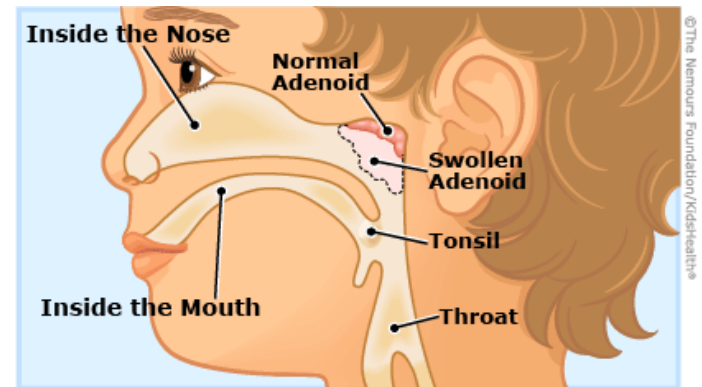


# ADHD & sleep breathing problems

- Can lead to night awakenings that go unnoticed but lead to daytime sleepiness
- Frequent snoring may be a sign of a sleep breathing problem
- Clinicians can perform simple assessment of symptoms and risk factors:
  - Physical examination of the throat, nasal passages
  - Asking parent to watch their child sleep to see if they snore or move during sleep
  - Looking for mouth breathing and allergy symptoms

# ADHD & sleep breathing problems

- One treatment is adenotonsillectomy
- Some evidence this can help ADHD symptoms in children with ADHD and SDB
  - In one study, 50% of children with ADHD no longer met criteria at 1 year post surgery



# ADHD & sleep movement disorders

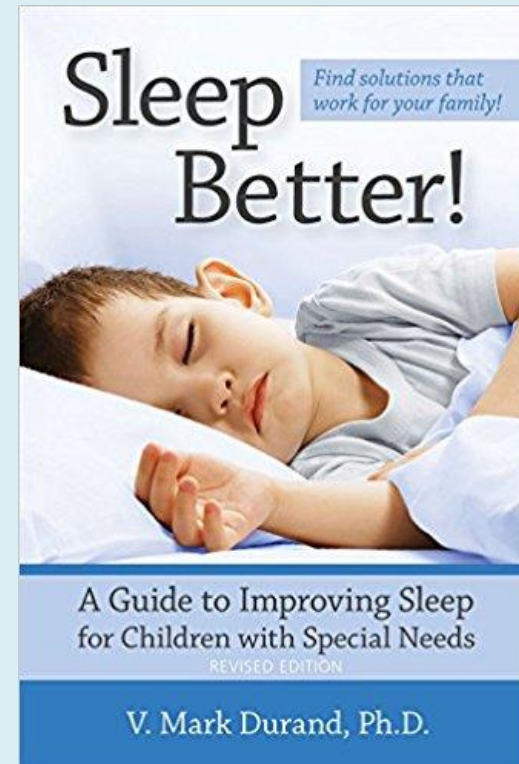
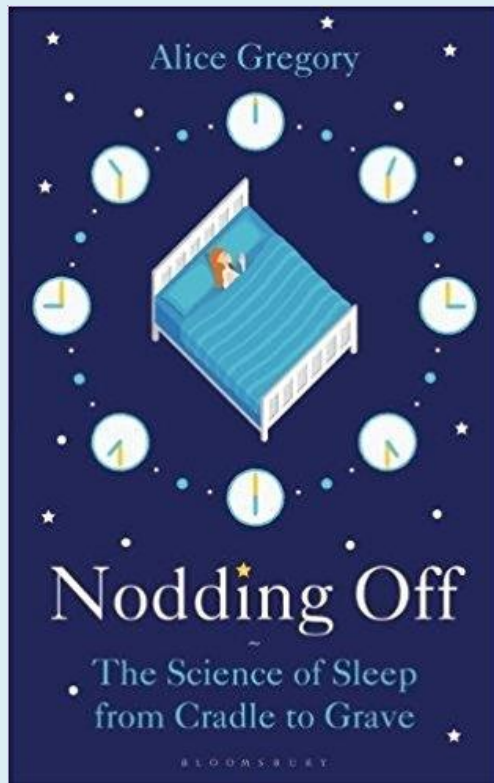
- Restless leg syndrome, periodic limb movement disorder
  - 30-64% of children with ADHD in a pediatric neurology clinic found to have clinical & polysomnographic evidence
- Some treatments include:
  - Establishing healthy sleep habits
  - Physical exercise
  - Avoiding exacerbating factors
    - Irregular sleep schedule
    - Low body iron
    - Caffeine (soda, tea, chocolate)
    - Certain drugs (antihistamines, neuroleptics)

# Stimulant medication & sleep

- Stimulant medication may lead to
  - sleep-onset delay
  - sleep phase shift
  - difficulty getting up in the morning
- Sleep difficulties may reduce during titration, improve over time
- Rebound effect
  - ↑ADHD symptoms when the medication wears off
  - Falling asleep when in medication rebound is more difficult for some than falling asleep after a low evening dose of stimulant



# Further reading



# References

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# Thank you for your time

UK **M**edical **R**esearch **C**ouncil



&

**E-Risk** twins, families, research team

