



# Healthy Sleep in Children\*

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\*Sleep through the Ages

# Does it Matter? Yes....but.....

- Most infants do not sleep through the night
- No significant associations with psychomotor development, concurrent or later mental development, or maternal mood



# Objectives

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- Review typical sleep requirements
- Discuss the assessment of sleep concerns in children
- Offer first line management recommendations for healthy sleep in children

# Sleep is essential: for healthy cognitive and physical development

- Cognition
  - Memory consolidation
  - Attention
  - Executive functioning
  - Creativity
- Mental Health
  - Fatigue
  - Hyperactivity
  - Irritability/aggression
  - Anxiety/depression
  - Stress management
- Performance
  - Work/school
  - Accidents
- Growth disturbances
  - Obesity
  - Failure to thrive
- Motor skills
  - Hand eye coordination
  - Reaction time
- Immune function
- Chronic illness (headaches, DM, hypertension)
- And....



## ...Family stress

# Children with sleep disorders can impair parents' functioning

*Mothers may be especially sensitive to child sleep disorders*

Parents of children with sleep problems are more likely to have sleep-related problems themselves, including more daytime sleepiness, according to a new study by researchers at the Bradley Hasbro Children's Research Center and Brown Medical School.

"While most parents can testify that having a child with sleeping problems affects their own sleep, few scientific studies have looked at the relationship between children's and parents' sleep," says lead author Julie Boergers, PhD, with the Bradley Hasbro Children's Research Center and Brown Medical School, and co-director of the Pediatric Sleep Disorders Clinic of Hasbro Children's Hospital.

The authors studied 107 families seeking treatment for their children aged 2 to 12 at a pediatric sleep disorders clinic, and found a link between children's and parents' sleep problems. For both parents, having a child with more than one sleep disorder was associated with greater parental daytime sleepiness. Children in the study had a broad range of sleep problems, including obstructive sleep apnea, sleep terrors, insomnia, and bedtime refusal.

The study appears in the March 2007 issue of the *Journal of Family Psychology*.

They also found that the link between parental and child sleep was particularly apparent for mothers. That is, within families, mothers of children with sleep disorders had significantly greater daytime sleepiness than fathers, even though

they reported about the same number of hours of sleep per night.

"We think this might be because mothers tend to bear more responsibility for responding to children's sleep problems during the night, and this may disrupt their sleep to a greater extent than fathers' sleep," says Boergers.

Prior studies have shown that approximately 20 to 30 percent of preschool and school-aged children have sleep disturbances, and in turn, 53 percent of parents say they are awakened by their child at least once a week, according to a recent poll by the National Sleep Foundation.

Getting a good night's sleep can have an enormous impact on quality of life, both for children and parents, Boergers says, so parents need to recognize that their children's sleep problems can take a toll on them, as well.

"Anecdotally, we have found that parents of children whose sleep disorders are successfully treated show great improvements in their own sleep and daytime functioning. Clinicians who treat sleep problems should be attentive to the possible presence of sleep problems or daytime sleepiness in other members of the family," says Boergers.

Founded in 1931, Bradley Hospital ([www.bradley-hospital.org](http://www.bradley-hospital.org)) was the nation's first psychiatric hospital operating exclusively for children. Today, it remains a premier medical institution devoted to the research and treatment of childhood psychiatric illnesses.

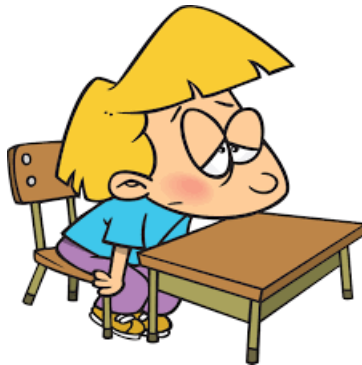
In your office....

33% of 5-13 year olds, and  
45% of 14-17 year olds report  
either having trouble going to  
sleep or falling asleep at least  
some of the time

# Symptoms of Insufficient Sleep

## Overtired

- Falling asleep: car, in front of the tv/screen
- Poor attention, concentration



## Overwired

- Irritable
- Distressed
- Aggressive
- Can't focus, inattention



# Sleep

What is “normal”?

Why won't my child go to sleep?

Why won't my child stay asleep?

(Why is my child sleeping so much?)

How can we help this child?



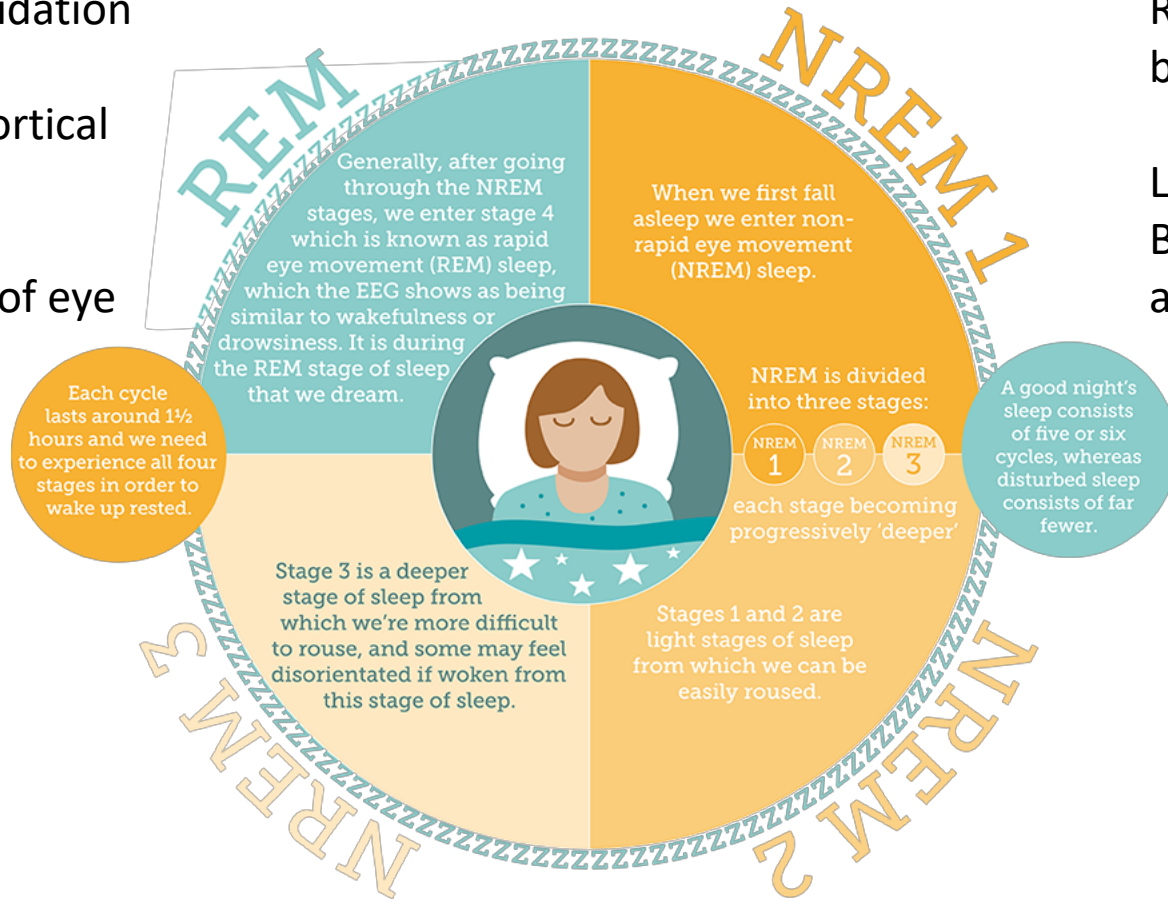
# Sleep Cycle

REM (25%): Learning, memory consolidation

High levels of cortical activity  
Paralysis  
Episodic bursts of eye movements

NREM (75%): Restoration of body functions

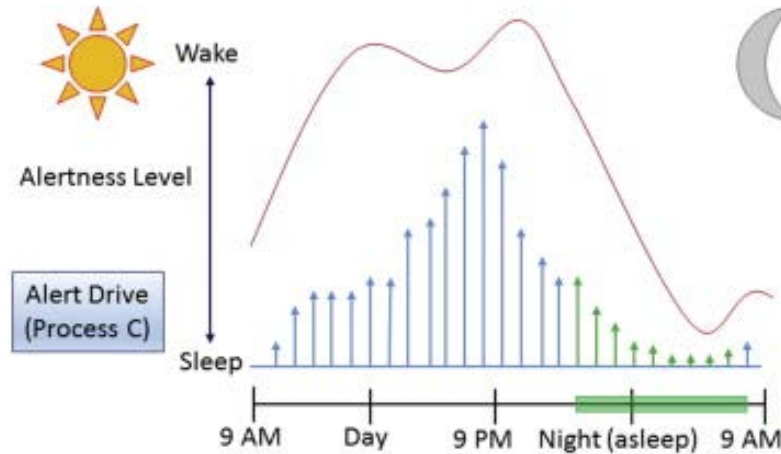
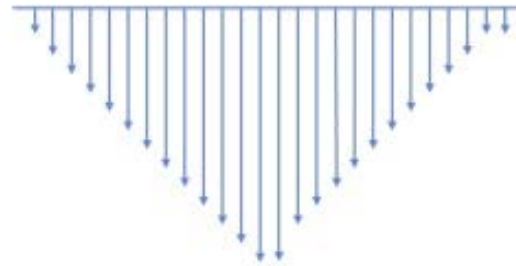
Low brain activity  
Body movements are preserved



# Sleep Cycle

Sleep drive

Sleep Drive  
(Process S)



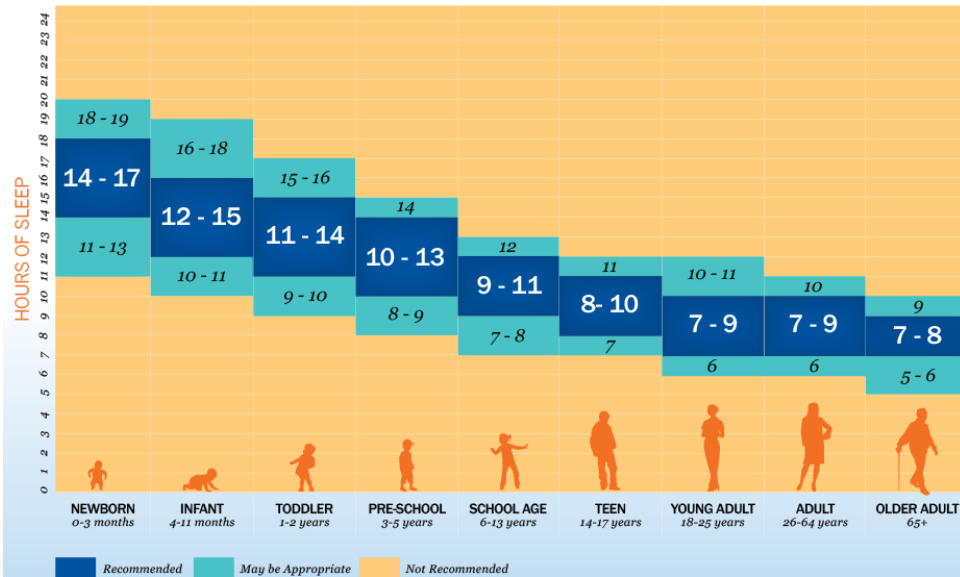
Wake drive/  
circadian rhythm

Alert Drive  
(Process C)

# How much sleep?



## SLEEP DURATION RECOMMENDATIONS



SLEEPFOUNDATION.ORG | SLEEP.ORG

Hirshkowitz M, The National Sleep Foundation's sleep time duration recommendations: methodology and results summary, Sleep Health (2015), <http://dx.doi.org/10.1016/j.sleh.2014.12.010>



## How much sleep does my child need?

[http://www.caringforkids.cps.ca/handouts/healthy\\_sleep\\_for\\_your\\_baby\\_and\\_child](http://www.caringforkids.cps.ca/handouts/healthy_sleep_for_your_baby_and_child)

Every child is different. Some sleep a lot and others much less.

This chart is a general guide to the amount of sleep children need over a 24-hour period, including nighttime sleep and daytime naps.

Newborns (birth to 2 months)	16-18 hours a day (3 to 4 hours at a time)
Babies (2 months to 6 months)	14-16 hours
Older babies (6 months to 1 year)	14 hours
Toddlers (1 to 3 years)	10-13 hours
Preschoolers (3 to 5 years)	10-12 hours
School aged children (5-10 years)	10-12 hours

## GUIDELINES

For optimal health benefits, children and youth (aged 5–17 years) should achieve high levels of physical activity, low levels of sedentary behaviour, and sufficient sleep each day.

A healthy 24 hours includes:



### SWEAT

#### MODERATE TO VIGOROUS PHYSICAL ACTIVITY

An accumulation of at least 60 minutes per day of moderate to vigorous physical activity involving a variety of aerobic activities, vigorous physical activities, and muscle and bone strengthening activities should each be incorporated at least 3 days per week.

Preserving sufficient sleep, trading indoor time for outdoor time, and replacing sedentary behaviours and light physical activity with additional moderate to vigorous physical activity can provide greater health benefits.

### STEP

#### LIGHT PHYSICAL ACTIVITY

Several hours of a variety of structured and unstructured light physical activities.

### SLEEP

#### SLEEP

Uninterrupted 9 to 11 hours of sleep per night for those aged 5–13 years and 8 to 10 hours per night for those aged 14–17 years, with consistent bed and wake-up times.

### SIT

#### SEDENTARY BEHAVIOUR

No more than 2 hours per day of recreational screen time; Limited sitting for extended periods.



2016  
The ParticipACTION Report Card on  
Physical Activity for Children and Youth



## ParticipAction 2016 Report Card

Many kids are too tired to get enough physical activity during the day, and not active enough to be tired at night.

<https://www.participaction.com/en->

# Newborns



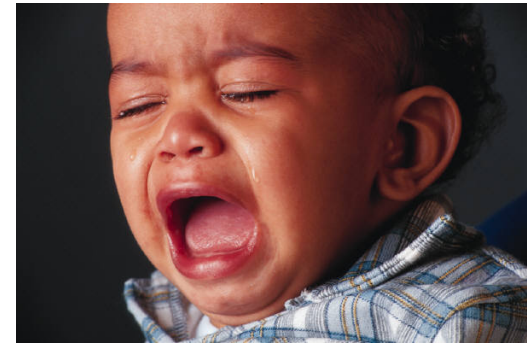
- Average sleep duration: 16 - 20 hours
- Sleep pattern: 1 - 4 hour sleep periods, followed by 1 to 2 hour awake periods
- Amount of daytime sleep = amount nighttime sleep
- 3 sleep states:
  - Active (REM-like): 50%
  - Quiet (nonREM-like)
  - Indeterminate

# Infants (1-12 months)

- Average sleep duration: 14-15 hours at 4 mo., 13-14 hours total at 6 months
- Day/night differentiation develops between 6 weeks and 3 months
- Nocturnal sleep: 9-12 hours
  - 1st 3 months: 3-4 hour sleep periods
  - 4-6 months: 6-8 hour sleep periods
- 70 - 80% “settle” (sleep through the night) at 9 months
  - Nap 2-4 hours in 2 naps per day
- Active/REM sleep declines
- Development of stages of NREM sleep
- Sleep cycles every 50 minutes
- Enter sleep through NREM



# Infant sleep



- Nighttime arousals are normal
  - Self-soothers
  - Signalers
- Self-soothing is a developmental skill
  - Highly dependent on temperament and parenting



# Toddler sleep



- Ave. sleep duration: 12-14 hours
- 1 nap by 18 months -- 1.5-3.5 hours in duration
- REM sleep continues to decline
- Sleep problems common (20-40%):
  - Developmental factors
  - Limit setting
  - Separation anxiety
  - Sleep associations
- Bedtime routines, transition object important
- Development of nighttime fears as early as 2.5-3 years

# Preschool Sleep



- Average sleep duration: 11-13 hours
- Napping declines; most stop by 5 years
- REM sleep continues to decline
- Sleep cycles every 90 minutes
- High levels of slow wave sleep
- Problems relate to:
  - Difficulties falling asleep
  - Nightwakenings
  - Parasomnias
  - Nighttime fears and nightmares

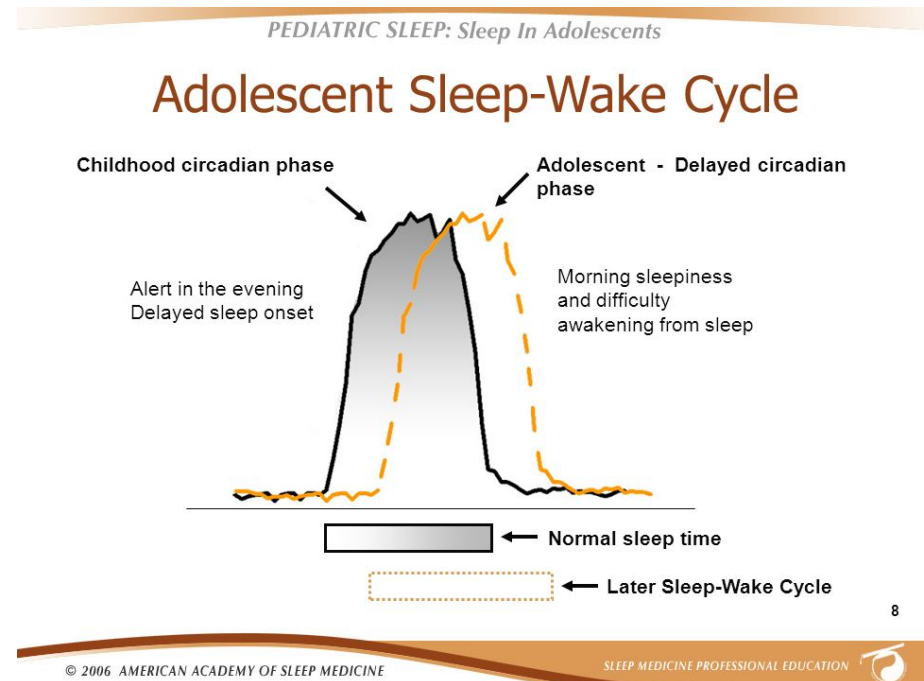
# School Age Sleep

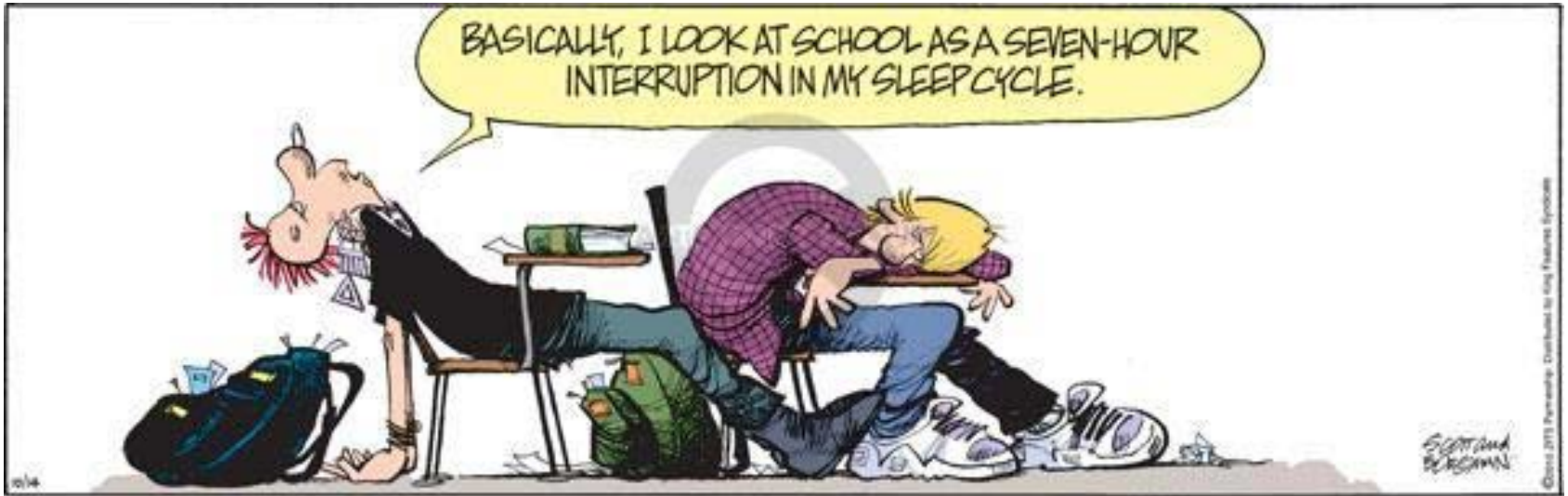


- Generally require about 10-11 hours sleep (age 5-13 years)
- Increased demands on time
- Media (phones, ipads, computers, TV)
- caffeine
- Bedtime resistance
- Concerns relate to:
  - Insomnia leading to daytime behavioral concerns, hyperactivity, school functioning

# Adolescent Sleep

- Generally require about 8.5 to 9.5 hours sleep but
  - only 15% report getting 8 hours
  - 26% sleep less than 6 hours (1998)
- Delayed sleep phase becomes apparent





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# Adolescents, screens, and sleep

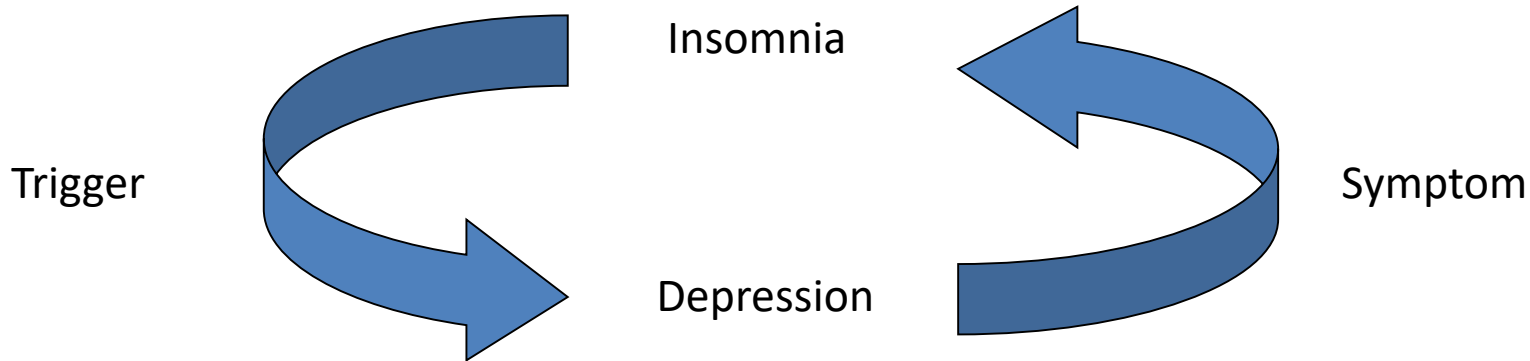
- Screens affect biology of sleep
  - Circadian rhythms -- sleep loss, worsening phase shift
  - Suppression of melatonin
  - Loss of sleep regulation
- 43% teens sleep <7 hrs/night
- 80% use phones when they are supposed to be sleeping

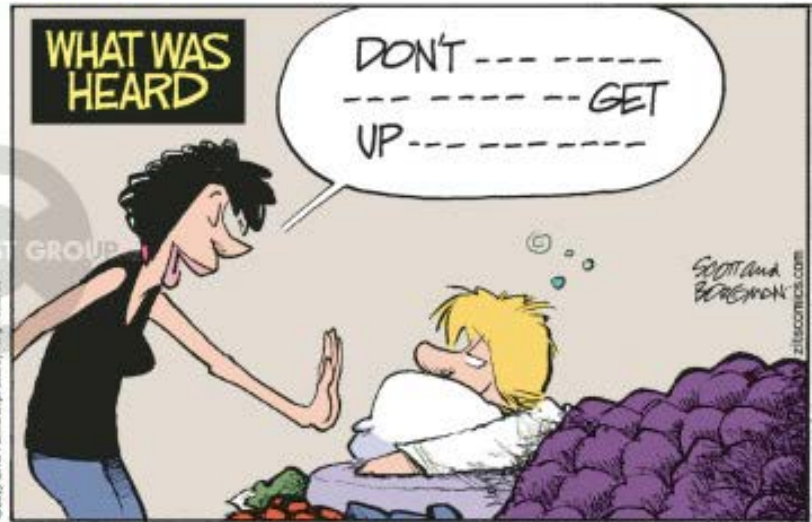


“No phones in the bedroom after bedtime”

# Teens and “social jet lag”

- “Social Jet Lag” (M. Carskadon) – shifting sleep patterns on the weekends out of sync with weekday rhythms
- Insomnia may be a predictive factor in later depression and severe mental disorders (Johns Hopkins)







# Sleep Wake Disorders

## **DSM-5 (2013) / ICSD-3 (2013)**

1. Insomnia Disorder
2. Hypersomnolence Disorder
3. Narcolepsy
4. Breathing-related sleep disorders
5. Circadian rhythm sleep-wake disorders
6. Non-rapid eye movement (NREM) sleep arousal disorders
7. Nightmare disorder
8. Rapid eye movement (REM) sleep behavior disorder
9. Restless legs syndrome
10. Substance/medication-induced sleep disorder

# Prevalence of Sleep Disorders in Children

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- Overall prevalence: 20-30%
  - Parasomnias: NREM 13% REM 5%
  - Circadian Rhythm Disorders 7%
  - Sleep Disordered Breathing 2-3%
  - RLS 2-6%
  - Narcolepsy 0.05%
- Much higher in children with NDD – 70-85%

# Criteria for Insomnia (DSM 5 & ICSD-3)

- Difficulties falling asleep/difficulty initiating sleep without parent/caregiver intervention, staying asleep, and early waking
  - resistance to going to bed; ICSD-3 only
- Impairment/Daytime consequences of sleep problem
  - e.g., daytime sleepiness, attention problems, mood disturbance/irritability, behaviour problems, low motivation/energy/initiative
- Sleep problem cannot be explained by inadequate opportunity for sleeping
- Frequent ( $\geq 3$ x/wk) and chronic ( $\geq 3$  mos)
- Not explained by or occur exclusively during another sleep-wake disorder, medical condition, or mental health disorder

# Developmental Presentations

- Children (up to 30%)
  - sleep-onset association
  - limit-setting
- Adolescents (30%)
  - sleep hygiene problems
  - delayed sleep phase
- Young Adult (15%)
  - psychophysiological insomnia



# Sleep associations

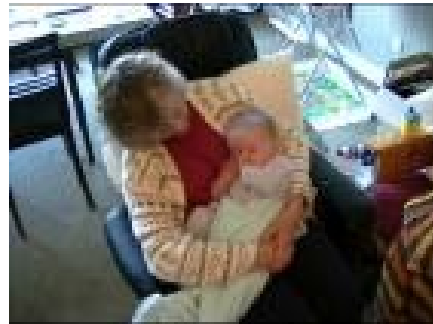
- Those conditions that are present when you fall asleep
- Usually required again following normal nighttime arousals
- Primary cause of frequent wakings during the night



# Positive sleep associations

- It is recommended that they encourage independence and self-soothing
  - An environment always associated with sleep ie. stimulus control
  - Eg. comfortable bedding, music
- Unhelpful associations can include electronics, soothers and bottles

# Environmental associations



# Limit setting

- “Characterized by the inadequate enforcement of bedtime limits by a caretaker, with resultant stalling or refusal to go to bed at an appropriate time”

Mindell, 2003





“Bedtime starts before it is time to say  
goodnight” [www.fgi.org](http://www.fgi.org)





# Clinical Assessment

- Ask about sleep!
  - What are the sleep concerns?
  - Sleep/wake symptoms at night
  - Sleep/wake symptoms during day
  - Impact on functioning
  - Past sleep concerns
  - Family concerns/situation
  - Treatments tried/family management
- Medical history
  - Medication history
- Family history



## BEARS Sleep Screening Tool

BEARS is divided into 5 major sleep domains (B=Bedtime Issues, E=Excessive Daytime Sleepiness, A=Night Awakenings, R=Regularity and Duration of Sleep, S=Snoring) and helps clinicians evaluate potential sleep problems in children 2 to 18 years old. Each sleep domain has a set of age-appropriate “trigger questions” for use in the clinical interview. The screen is free to use.

	TODDLER/PRESCHOOL (2-5 YEARS)	SCHOOL-AGED (6-12 YEARS)	ADOLESCENT (13-18 YEARS)
<b>B</b> EDTIME 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)
<b>E</b> XCESSIVE DAYTIME SLEEPINESS	Does your child seem overtired or sleepy a lot during the day? Does he/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)
<b>A</b> WAKENINGS 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)	Do you wake up a lot at night? Have trouble getting back to sleep? (C)
<b>R</b> EGULARITY 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 he/she 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)
<b>S</b> NORING	Does your child snore a lot or have difficult breathing at night?	Does your child have loud or nightly snoring or any breathing difficulties at night? (P)	Does your teenager snore loudly or nightly? (P)

(P) Parent-directed question (C) Child-directed question

Source: *A Clinical Guide to Pediatric Sleep: Diagnosis and Management of Sleep Problems* by Jodi A. Mindell and Judith A. Owens, Lippincott Williams & Wilkins



# Clinical Assessment

- Physical Examination
  - Physical
  - Neurologic
  - Developmental
  - Mental Status review

# Clinical Assessment Tools

- Pediatric sleep questionnaires
- Sleep Log
- Polysomnography
- (Actigraphy)



# Treatment Principles



- Psychoeducation
- Sleep Hygiene
- Behavioral
- Pharmacologic





KIRKMAN & SCOTT



# HEALTHY SLEEP HYGIENE IN KIDS

**For the first time, sleep was included in the 2016 ParticipACTION Report Card on Physical Activity for Children and Youth.**

**Research shows that almost a third of Canadian children and teenagers aren't getting enough sleep each night.** Those that are getting enough sleep may not be getting good quality sleep and the negative implications of poor sleep may impact other areas of their lives. For example, too little sleep is associated with excess body weight, lower academic achievement, and shorter attention span.

**So what can you do?** That's where sleep hygiene comes in. Sleep hygiene describes the habits and practices that are conducive to sleeping well on a regular basis. Below are tips to help give children and teens the good quality rest they need.

### GENERAL TIPS FOR HAVING HEALTHY SLEEP HYGIENE

 <b>Go to bed and wake up at the same time</b> every day (even on the weekends!)	 <b>Don't go to bed feeling hungry</b> , but also don't eat a heavy meal right before bed
 <b>Avoid caffeine consumption</b> (e.g., coffee, soft drinks, chocolate) starting in the late afternoon	 <b>Develop a relaxing routine</b> before bedtime - ideas include bathing, music, and reading
 <b>Expose yourself to bright light in the morning</b> - sunlight helps the biological clock to reset itself each day	 <b>Reserve your bedroom for sleeping only</b> - keep cell phones, computers, televisions and video games out of your bedroom
 <b>Make sure your bedroom is conducive to sleep</b> - it should be dark, quiet, comfortable, and cool	 <b>Exercise regularly during the day</b>
 <b>Sleep on a comfortable mattress and pillow</b>	 <b>Don't have pets in your bedroom</b>



The full 2016 Report Card and additional tools and resources are available online at [www.participACTION.com/reportcard](http://www.participACTION.com/reportcard)

References:

ParticipACTION. Are Canadian kids too tired to move? The 2016 ParticipACTION Report Card on Physical Activity for Children and Youth. Toronto: ParticipACTION; 2016.

Chaput JP, Gray CE, Poitras VJ, Carson V, Gruber R, Olds T, Weis SK, Gorber SC, Kho ME, Sampson M, Belanger K, Eryulu S, Callender L, Tremblay MS. Systematic review of the relationships between sleep duration and health indicators in school-aged children and youth. *Applied Physiology Nutrition and Metabolism*. 2016; 41(6): 5266-5282.



# ABCs of Sleeping

	Concept	Details & Recommendations
<b>A</b>	<b>AGE</b> appropriate	It is important that children go to bed and wake up at times that ensure they receive an age-appropriate amount of sleep. For children who have outgrown naps (which usually occurs during the preschool age period), napping during the day may indicate insufficient quality and/or quantity of sleep at night.
<b>B</b>	<b>BEDTIMES</b>	Set bedtimes and wake times, as well as evening and morning routines, are key to good sleep. It is recommended that bedtimes be no later than 9pm across childhood.
<b>C</b>	<b>CONSISTENCY</b>	It is very important that bedtimes and wake times are consistent, even on weekends (i.e., no more than 30-60 min. difference between weekday and weekend bedtimes and wake times).
<b>S</b>	<b>SCHEDULE</b>	In addition to bedtime and wake time routines, it is also important that children have consistency throughout their day, including the timing of homework, extra-curricular activities, and so forth.
<b>L</b>	<b>LOCATION</b>	It is important that your child's location for sleep is consistent and familiar, and includes a comfortable bed in a quiet, dark, and cool room. Your child's bedroom should only be used for sleeping and, therefore, should be conducive to relaxation (i.e., not too exciting or distracting).
<b>E</b>	No <b>ELECTRONICS</b> in the bedroom or before bed	Children should not use stimulating electronic devices (e.g., iPods, cell phones, laptops, etc.) too close to bedtime (one hour prior to going to bed), and these items should not be stored in the bedroom.
<b>E</b>	<b>EXERCISE</b> and diet	Physical activity during the day is important to healthy sleep, but should not be undertaken too close to bedtime. Your child's day should include a cool-down period before bedtime, where he or she slowly comes down from regular activity level to a quiet, more restful state.  Diet includes things like caffeine consumption—children should limit or eliminate caffeine consumption—as well as the timing of meals. Children should not go to bed hungry, but they also should not consume a large meal right before bedtime. A healthy balanced diet is important to your child's sleep and overall health.
<b>P</b>	<b>POSITIVITY</b>	Parents should have a positive attitude towards sleep and the bedtime/wake time routine, and the atmosphere in the house should be positive, in order to promote a positive mood in children. It is important that this positive mood is relaxing and calming, rather than fun and exciting; we want children to wind down before bedtime. Also, doing frustrating activities right before bed (i.e., math problems for a child who struggles with math) is not recommended, as this may interfere with your child's ability to fall asleep.
<b>I</b>	<b>INDEPENDENCE</b> when falling asleep	Once your child reaches an age where he or she is capable of settling into sleep without parental involvement, independence when falling asleep should be encouraged. For children, independence means no calling out or getting out of bed, and for parents, no responding to their child calling out and returning the child to their room if he or she does get out of bed.
<b>N</b>	<b>NEEDS</b> met during the day	Finally, the needs of your child should be met throughout the day. This refers to children's emotional needs (e.g., love, support, hugs, etc.), as well as basic physiological needs (e.g., thirst, hunger, etc.).
<b>G</b>	All of the above = <b>GREAT</b> sleep!	

# Evidence supported treatments

- Extinction
  - Graduated extinction
  - Scheduled night awakenings
  - Positive bedtime routines
  - Early intervention/parental education
- *Also promising*
- Disassociating feeding from sleep/wake transitions
  - Cognitive Behavioral Treatments

# Sleep Training Tips for Parents



1. Establish a set bedtime and regular sleep schedule
2. Develop a consistent bedtime routine
3. Ignore complaints or protests about bedtime
4. Put baby to bed drowsy but awake \*\*
5. Check on the baby -- BRIEF and BORING
6. Respond to baby as usual following nighttime awakenings
7. Be persistent and consistent
8. Possible extinction burst



# Who may not be a candidate for sleep training

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- Child with history of trauma
- Child in and out of hospital
- Child newly adopted

# Websites

- Canadian Sleep Society
  - Brochure and eBook - <https://css-scs.ca/resources/brochures>
  - Insomnia Rounds - <https://css-scs.ca/resources/insomnia>
- Pediatric Sleep Council
  - <https://www.babysleep.com/>
- Canadian Pediatric Society
  - [https://www.caringforkids.cps.ca/handouts/healthy\\_sleep\\_for\\_your\\_baby\\_and\\_child](https://www.caringforkids.cps.ca/handouts/healthy_sleep_for_your_baby_and_child)
- Sleep for Kids
  - <http://sleepforkids.org/>
- Participaction
  - <https://www.participaction.com/>
- National Sleep Foundation
  - <https://www.sleepfoundation.org/>  <https://www.sleep.org/>

# Pharmacologic Management



Most pharmacologic guidelines developed for adults



Medications typically not approved for either the specific sleep disorder or the pediatric age range



**ALWAYS** optimize sleep hygiene first



# Principles of Medication Usage



Combine with behavioral therapy



Treatment goals: realistic, clearly defined, measurable, agreed upon by caregivers



Plan for follow-up



Initiate lowest dose; titrate as needed



Shortest possible duration of therapy

# Commonly Used Medications

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- Melatonin
- Alpha agonist
- Psychotropics
- Anti-histamines
- Herbs/Supplements

# Conclusions

- Sleep disturbance common in pediatrics – need to ask
  - Multifactorial – need to explore
- Good evidence for behavioural interventions
- Sleep hygiene extremely important and undervalued
- Medication adjunct to hygiene and behavioural intervention
- Treat child in context of family and environment



Thanks

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