



Teen Sleep During a Pandemic

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OBJECTIVES

- ▶ Identify teenage sleep need and forces that decrease sleep opportunity.
- ▶ Describe research suggesting that teen sleep has improved during the pandemic.
- ▶ Propose framework providers can use to concretely counsel teens and parents to improve sleep.

14 year old male with ADHD

- ▶ 9th grade distance learning
- ▶ Parents report schedule is a mess.
- ▶ On and off school throughout the day
- ▶ Catching up on homework from 9-11 pm
- ▶ Unclear what he is getting done during the day, parents are at work.
- ▶ Not participating in basketball this fall.
- ▶ How can we best support him?

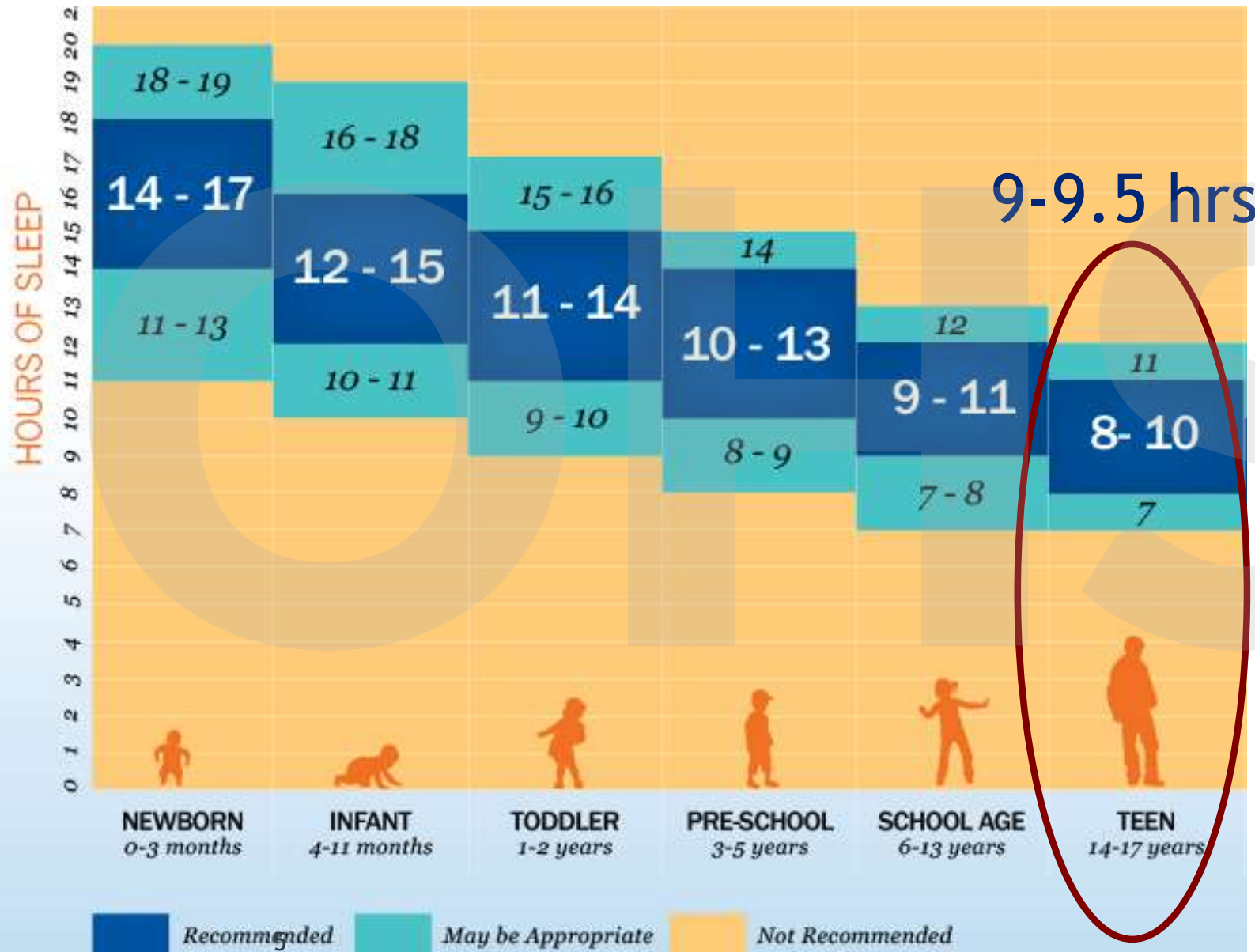


16 year old female with anxiety

- ▶ 11th grade distance learning
- ▶ Spending most of the day in her room
- ▶ Unclear sleep schedule
- ▶ Anxiety symptoms have decreased since March
- ▶ How can we best support her?



How much sleep do teens need?

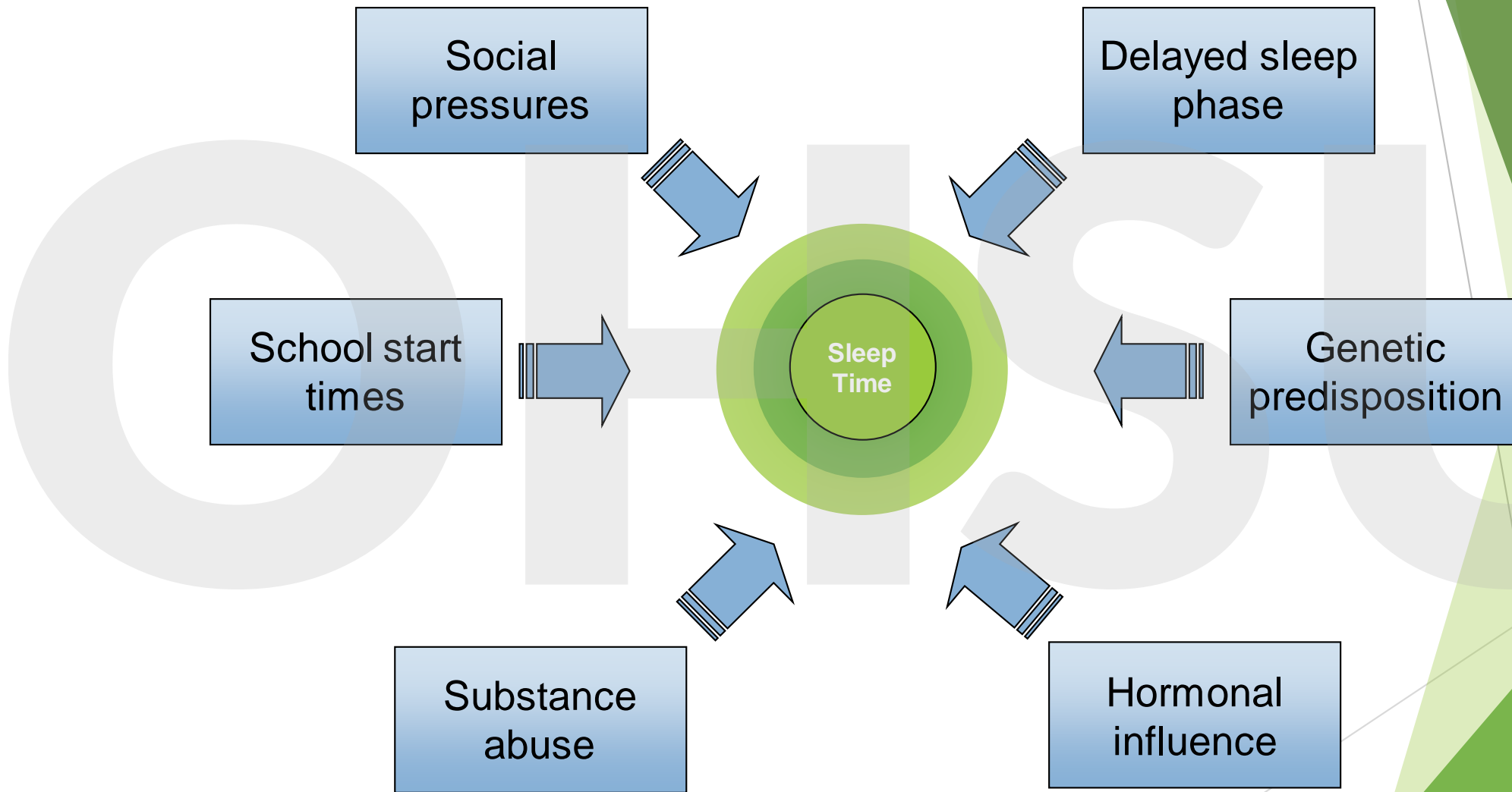


- Sleep should be sufficient to:
 - Allow awakening without an alarm
 - Maintain a consistent amount of sleep through the entire week (including weekends)
- Prevent daytime sleepiness

Insufficient Sleep

- ▶ 17% of youths reported an optimal sleep of 9 hours/night
- ▶ Prevalence for short sleep was 20% for week nights and 10% for week nights and weekends.

Roberts RE, Roberts CR, Duong HT. Sleepless in adolescence: prospective data on sleep deprivation, health and functioning. *J Adolesc* 2009;32(5):1045-57.



Prevalence of Insomnia Symptoms

18% of adolescents
report
nonrestorative
sleep

6% report difficulty
initiating sleep

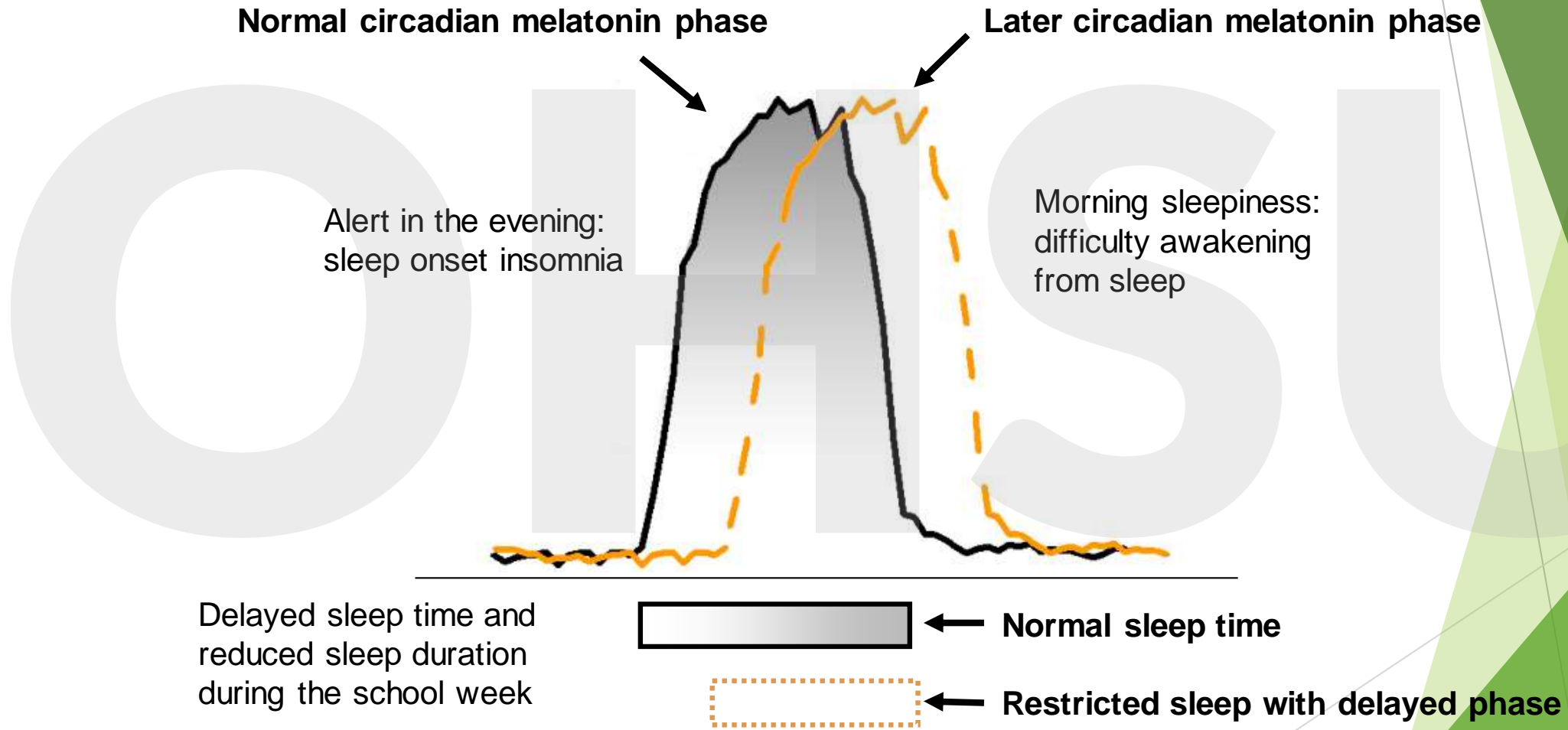
5% wake up
frequently during
the night

3% report early-
morning awakening

5% report daytime
sleepiness.

Symptoms of insomnia are fairly prevalent in adolescents and are associated with significant daytime consequences. Roberts RE, Ramsay Roberts C, Ger Chen I. Impact of insomnia on future functioning of adolescents. J Psychosom Res 2002;53(1):561-9.

Delayed Sleep-Wake Phase Disorder



Delayed Sleep-Wake Phase Disorder

- ▶ Phase delay in circadian timing may be related to biological (circadian physiology) and behavioral (Social jet lag e.g., social activities, academic or peer pressure, increased light exposure in the evening), changes that occur during adolescence
- ▶ Early school start contributes to poor school performance and reduced sleep during the week.



Treating Adolescent Delayed Sleep-Wake Phase Disorder

- ▶ Pharmacologic treatment in the evening
 - ▶ Melatonin
 - ▶ Hypnotics - not standard treatment
- ▶ Cognitive Behavioral Therapy (CBT)
 - ▶ Learning the importance of sleep
 - ▶ Resetting habits and associations
 - ▶ Bright Light Therapy (BLT)

MELATONIN

- ▶ 0.3-0.5 mg dose 3 hours before desired sleep time in conjunction with sleep hygiene and timed light exposure on awakening
- ▶ Has phase shifting property (chrono-biotic effect) with sleep advancing effect and reduced sleep latency
- ▶ Safe for short term use
- ▶ No adverse effect on long term use in children with ADHD

1. Van der Heijden KB, Smits MG, Van Someren EJ, et al. Effect of melatonin on sleep, behavior, and cognition in ADHD and chronic sleep onset insomnia. *J Am Acad Child Adolesc Psychiatry* 2007;46(2):233-41.
2. Wirojanan J, Jacquemont S, Diaz R, et al. The efficacy of melatonin for sleep children with autism, fragile X syndrome or autism and fragile X syndrome. *J Clin Sleep Med* 2009;5(2):145-50.

Parents still matter: the influence of parental enforcement of bedtime on adolescents' depressive symptoms

- ▶ *Parent-enforced bedtimes—along with later school start times—are* the greatest predictors of sleep duration, daytime energy level, and depressive symptoms.
- ▶ More than 50% of parent respondents reported no specific or enforced bedtime rules, consistent with rates measured in previous research across families in the US.
- ▶ *Evening screen time and caffeine consumption* did not, contrary to the researchers' hypotheses, significantly affect teenagers' sleep duration over the course of the study.

Earlier school times (before 8:30 AM) is one modifiable contributor to insufficient sleep and circadian rhythm disruption

- ▶ Studies comparing high and middle schools with start times as little as 30 minutes earlier versus those with later start times demonstrate such adverse consequences as shorter sleep duration, increased sleepiness, difficulty concentrating, behavior problems, and higher absenteeism.
- ▶ Potential issues, such as impingement on afterschool activities, more involved transportation system and child care arrangements for younger siblings, still hold back schools for implementing earlier school start times.

1. Wahlstrom KL. Accommodating the sleep patterns of adolescents within current educational structures: An uncharted path. In: Carskadon MA, ed. Adolescent sleep patterns: Biological, social and psychological influences. New York, NY: Cambridge University Press; 2002:172-97.
2. Wolfson AR, Carskadon MA. A survey of factors influencing high school start times. NASSP Bull. 2005;89(642):47-66

Positive Outcomes from Later School Start Time

- ▶ Minneapolis study, 1997-1998 school year:
 - ▶ Assessed more than 18,000 high school students before and after the district's school start time changed from 7:15 AM to 8:40 AM:
 - ▶ Similar bedtime, resulting increased sleep time in 1 hour
 - ▶ Improved attendance rate
 - ▶ Less tardiness
 - ▶ Students are more “calm” and less tired
 - ▶ No improvement in grades
 - ▶ Improvement in teacher satisfaction
 - ▶ Fewer visits to the campus health center

Early School Start Time - Improved Academic Performance

Chicago public high schools

- improved academic performance in first-period classes compared with afternoon classes

North Carolina 1999-2006

- 1-hour later shift in school start linked with an increase in reading test scores and in math test scores

Multi site study

- significant increase in grade point average in core subjects of math, English, science, and social studies

1. Cortes KE, Bricker J, Rohlfs C. The role of specific subjects in education production functions: Evidence from morning classes in Chicago public high schools. *The BE Journal of Economic Analysis & Policy*. 2010;12(1):1-36.
2. Edwards F. Early to rise: the effect of daily start times on academic performance. Working Paper, University of Illinois at Urbana-Champaign; 2010. Available at: <http://ssrn.com/abstract=1628693>
3. Wahlstrom K, Dretzke B, Gordon M, Peterson K, Edwards K, Gdula J. Examining the Impact of Later School Start Times on the Health and Academic Performance of High School Students: A Multi-Site Study. Center for Applied Research and Educational Improvement. St Paul, MN: University of Minnesota; 2014.

Early School Start Time: Effect on Motor Vehicle Accidents

- ▶ Car crash rates in one county in Kentucky with delayed school start times decreased by 16.5% after implementation.
- ▶ A study from Minneapolis showed a crash rate reduction in 16- to 18-year-olds of 65% and 70%, respectively.

1. Danner F, Phillips B. Adolescent sleep, school start times, and teen motor vehicle crashes. *J Clin Sleep Med* 2008;4(6):533–535.
2. Wahlstrom K, Dretzke B, Gordon M, Peterson K, Edwards K, Gdula J. Examining the Impact of Later School Start Times on the Health and Academic Performance of High School Students: A Multi-Site Study. Center for Applied Research and Educational Improvement. St Paul, MN: University of Minnesota; 2014.

California law SB328

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1. Section 46148 is added to the Education Code, to read:

- 46148.** (a) (1) The schoolday for high schools, including high schools operated as charter schools, shall begin no earlier than 8:30 a.m.
- (2) The schoolday for middle schools, including middle schools operated as charter schools, shall begin no earlier than 8:00 a.m.

- ▶ Passed into law in October 2019.
- ▶ Three year implementation period
- ▶ Unprecedented opportunity for sleep and circadian researchers from a wide variety of disciplines from both California and across the nation to assess the impact of start time change across a broad range of outcomes.





ELSEVIER

Sleep Medicine

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In Press, Journal Pre-proof 



Brief Communication

The Impact of COVID-19 Related School Shutdown on Sleep in Adolescents: A Natural Experiment

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- ▶ A qualitative study was conducted between April 28 and June 3, 2020 with 45 adolescents using one-on-one semi-structured phone interviews to explore *pre- and during-pandemic sleep schedules, duration and quality of their sleep, daytime sleepiness and their methods of waking up.*

32 girls

Mean age 13.5 yrs (SD 1.9)

96% Caucasians; 2% Asian; 2% multiethnic

- ▶ Following the outbreak of the COVID-19 pandemic in 2020, high schools closed or transitioned to remote teaching.
- ▶ School day started at 10AM with 30 minute subject specific sessions in which students were assigned tasks they had to complete online until noon.
- ▶ Next, in the afternoon, the students participated in arts or physical education classes and were able to seek academic support with their teachers in smaller online group settings.

RESULTS

- ▶ **Changes in sleep quality and duration following in-person school shutdown.**

The majority of the participants reported that since school shutdown their sleep improved in quality and/or duration and that their sleep schedule had been delayed by about 2 hours (they went to bed later and woke up later).

They cited not having to wake up early and lower school-related stress as the main reasons for these changes.

RESULTS

► **Daytime sleepiness during the pandemic:**

55% of the participants described being sleepy during the school day **before the pandemic** and attributed this to their need to wake up early to get to school and to getting less sleep.

78% reported that under the pandemic shutdown they were **not sleepy** and they attributed this primarily to getting more sleep.

RESULTS

- ▶ **Methods used to wake up during the pandemic:**
- ▶ During the pandemic most participants reported waking up naturally; a few cited being awakened by a parent or alarm.

- ▶ Allowing adolescents to follow their naturally delayed sleep pattern by delaying school-start time could be a feasible, affordable and efficient way to improve their sleep health.
- ▶ This is expected to improve their resilience in the face of the challenges and stress caused by COVID-19.

Portland Public School Informal Qualitative Study:

- ▶ N=3 (male; mean age 14)
- ▶ Unstructured parent interview: Cleveland High School: now starting at 9:15 am
- ▶ *“First year for as long as I can remember that my kids are all getting enough sleep.... And my anecdotal experience is that bedtime hasn’t shifted to a later time... of course while sleep used to be why teens might drift off, now its’ excessive online time and no teacher walking around requiring kids to be off phones, so on balance, I’d take sleep deprivation! Can’t we just have in-person school that starts at a reasonable time??”*

14 year old male with ADHD

- ▶ **ASK:**
How is sleep going? Do you have a routine?
What time is bedtime and wake time? Weekends?
Are you waking without an alarm?
- ▶ **REASSURE:**
 - ▶ Later bedtime is OK: Keep scheduled wake time on weekdays and weekends. Make sure you are waking without an alarm.
- ▶ **RECOMMEND:**
 - ▶ 30 minute wind down time before bed without electronics
 - ▶ Use bed for sleep, sleep only in the bed.
 - ▶ Parent involvement in bedtime, regardless of age.



16 year old female with anxiety

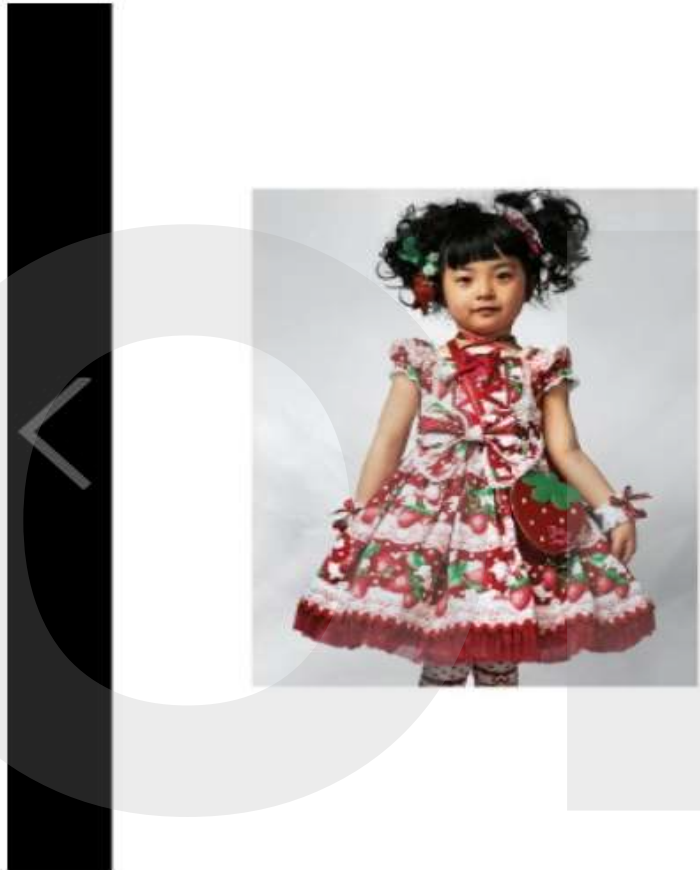
- ▶ **ASK:**
How is your sleep going?
What time is bedtime, wake time?
What time on the weekends?
- ▶ **REASSURE:**
 - ▶ Later bedtime is OK, as long as there is a scheduled wake time on weekdays and weekends.
- ▶ **RECOMMEND:**
 - ▶ 30 minute wind down time before bed without electronics
 - ▶ Use bed for sleep, sleep only in the bed.
 - ▶ Parent involvement in bedtime, regardless of age





OHHSU

QUESTIONS?



Photos: Where children sleep

A world of poverty and privilege is portrayed in "Where Children Sleep," a photo series by James Mollison, which depicts children's bedrooms around the world. Pictured is 4-year-old Kaya, who lives in a small apartment with her parents in Tokyo.





Photos: Where children sleep

Anonymous, 4, Rome





JAMES HOLLIBORN

Photos: Where children sleep

Indira, 7, Kathmandu, Nepal





JAMES HOLLIBON

Photos: Where children sleep

Dong, 9, Yunnan, China





JAMES HOLMES

Photos: Where children sleep

Alex, 9, Rio de Janeiro





ROBERTO MONTES

Photos: Where children sleep

Jaime, 9, New York





Photos: Where children sleep

Tzvika, 9, Beitar Illit, West Bank





JAMES HOLLISON

Photos: Where children sleep

Ryan, 13, Pennsylvania





JAMES HOLLISON

Photos: Where children sleep
Irkena, 14, Kaisut Desert, Kenya





JAMES MOLLISON

Photos: Where children sleep

Prena, 14, Kathmandu, Nepal

