

Lexington Public Schools
School Start Times Task Force
March 5, 2018

Background

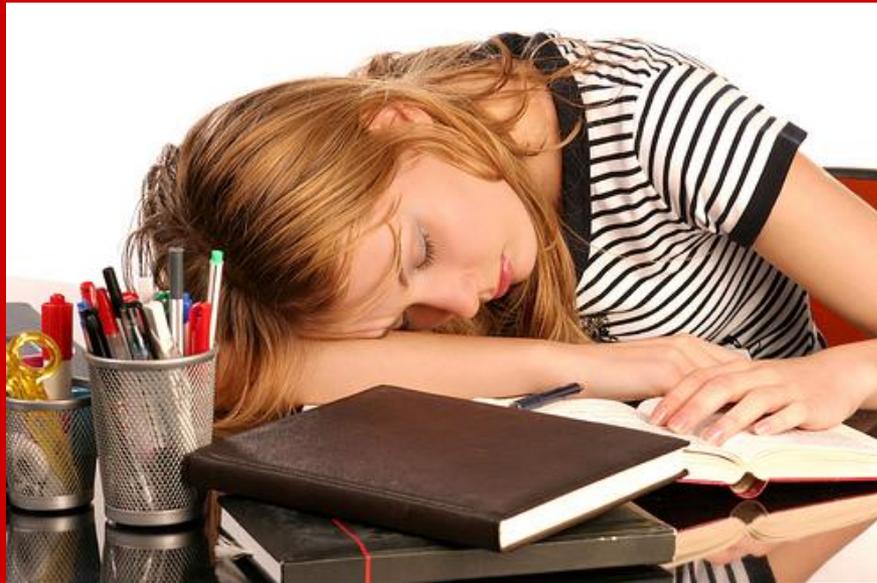
- March 2016 Letter from Middlesex League of Superintendents
- March 2017 Start Times Task Force begins
 - Comprehensive group of stakeholders
- Start Times Task Force work:
 - Review research on topic
 - Establish website
(<https://lps.lexingtonma.org/Page/10330>)
 - Conduct surveys - staff, students, parents
 - Host Community Forum with Dr. Judith Owens
 - Conduct staff meeting to review research with Dr. Owens
 - Develop options, considerations, and recommendations to Superintendent for School Committee consideration

Start Times Task Force Membership

- Jeff LaBroad, Estabrook Assistant Principal
- Anna Monaco, Clarke Principal
- Scott Kmack, LHS Dean
- Barbara Hamilton, METCO Director
- Naomi Martin, Athletic Director
- Andrew Baker, LEA President
- Elaine Celi, Transportation Coordinator
- Kathleen Lenihan, School Committee Member
- Jessie Steigerwald, School Committee Member
- Sara Cuthbertson, Parent
- Beth Murnaghan, Parent
- Ian Dailey, Assistant Superintendent for Finance and Administration

Project Timeline & Next Steps

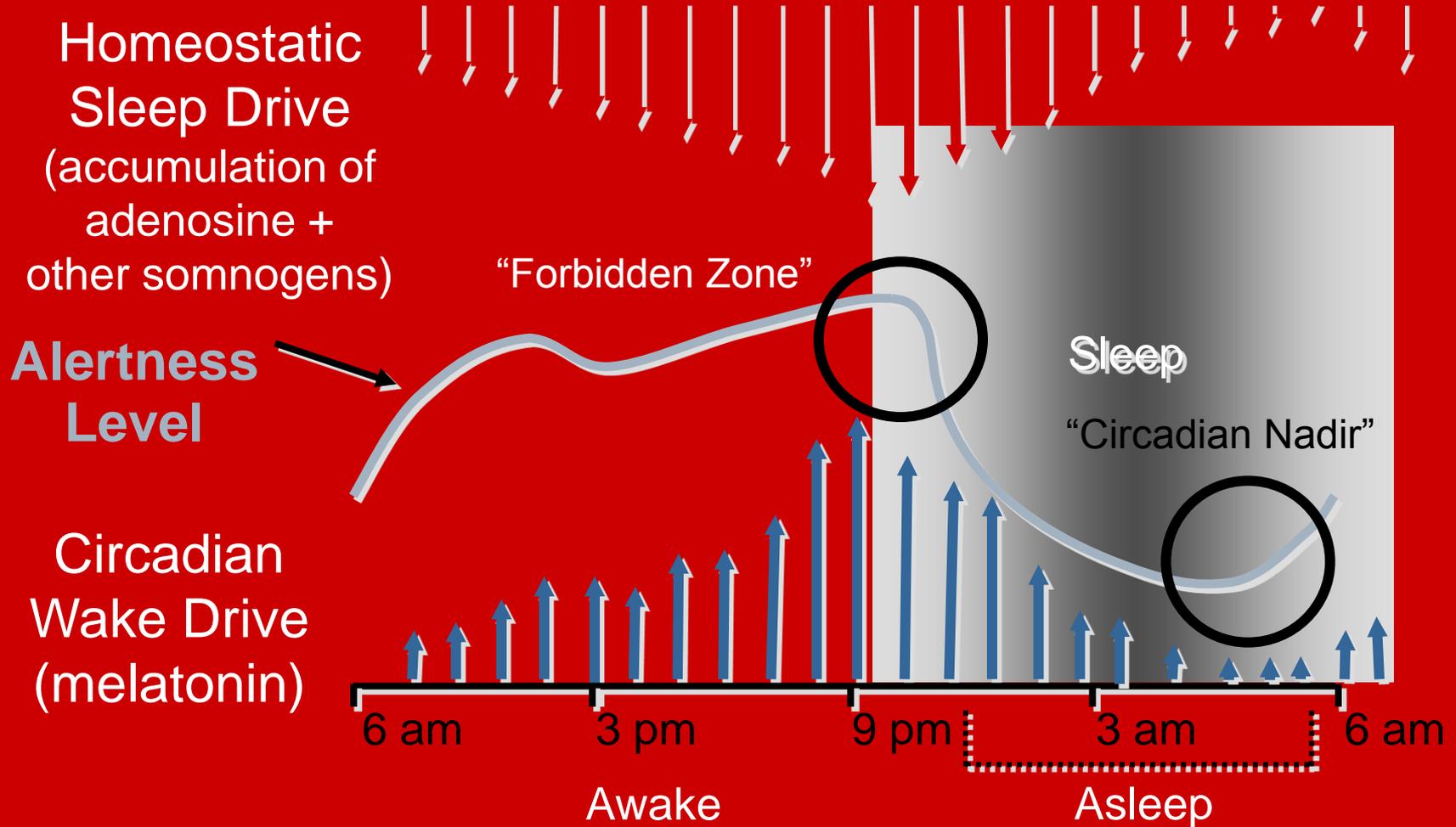
- Earliest impact, if any, is 2019-20 school year
- Gather feedback from staff after today; link to be emailed
- March/April 2018: Finalize options, considerations, and present recommendation(s) to School Committee; communicate information with District
- April/May 2018: Conduct public hearings on options; continued discussions with School Committee
- By June 2018: Seek School Committee decision



The Impact of School Start Times on Student Health and Performance

Judith Owens MD MPH
Director of Sleep Medicine
Boston Children's Hospital

“Two Process” Model of Sleep Regulation



Now, imagine all of this shifting later by 2 hours...

Adolescent Sleep: The “Perfect Storm”?



*Includes middle and high school students

Sleep in Adolescents: Later Bedtimes

- All adolescents experience a normal shift in circadian rhythms with age and in association with the onset of puberty
- This results in a biologically-based shift (delay) of up to several hours in both the natural fall sleep and morning wake times
- On a practical level, due to the “forbidden zone” this means that it’s almost impossible for the average adolescent to fall asleep much before 11pm on a regular basis
- Teens cannot “make” themselves fall asleep earlier

Sleep in Adolescents: Later Bedtimes

- Environmental factors
 - Competing priorities for sleep: homework, activities, after-school employment, “screen time”, social networking
 - Circadian phase delay may be further exacerbated by evening light exposure
 - Suppresses brain release of melatonin



Adolescents: Later Wake Times

- These biological changes are in direct conflict with earlier high school start times (before 8:30am) because adolescents are biologically programmed to wake at 8am or later
- As a result, students are required to wake for the day and function during the “circadian nadir” (the lowest level of alertness during the 24 hour day)
- Early wake times also selectively rob teens of REM (rapid eye movement) sleep, which is critical for learning (*of new information in particular*) and memory

Adolescents: “Make-Up” Sleep

- Increasing discrepancy between bed and wake times weekday/end
 - Associated with learning deficits, behavior problems in school
- Adequate compensation for sleep loss?
 - Does not address compromised alertness on school days
 - Does not reverse performance impairments



“Weekend Oversleep”

- Leads to “circadian misalignment”
 - Exacerbation circadian phase delay
 - Shift melatonin onset
- Prevents sufficient build-up of sleep drive
 - Difficulty falling asleep Sunday night
- Result: permanent state of “social jet lag”
 - Adjustment takes 1 day/time zone crossed
 - Effects persist up to 3 days
 - Associated daytime sleepiness, poor academic performance, depressed mood



Adolescent Sleep: The Bottom Line

- For optimal health, safety and achievement the average middle and high school student needs: 8-10 hours of sleep*
- In Massachusetts:
 - At Algonquin Regional High School, 52% of students surveyed got < 6 hours of sleep/school night (2014)
 - 82% of Masconomet Regional students surveyed get ≤ 7 hrs of sleep (2016):
 - 41% ≤ 6 hrs
 - 18.2% recommended 8-10 hrs

**2016 AASM recommendations based on 10 month review by 13 sleep experts of published scientific evidence addressing the relationship between sleep duration and health (total of 864 scientific articles)*

Elementary School Start Times

- Sleep needs: 9-12 hrs*
- Circadian preference (chronotype): owl vs lark**
- School, activities, electronic media, later bedtimes, earlier rise times, irregular sleep/wake schedules contribute to deficient sleep
- However, as opposed to adolescents, they are biologically, environmentally and socially more amenable to manipulation of bedtimes (ie, to move sleep onset earlier) if required
- Is there a sweet spot?
 - Data is mixed but suggest 7:30-9am
 - Earlier start times more impact on academics, behavior
 - Issues of civil twilight, safety concerns

*AASM 2016

**But most school-aged (pre-pubertal) children have a “morningness preference”



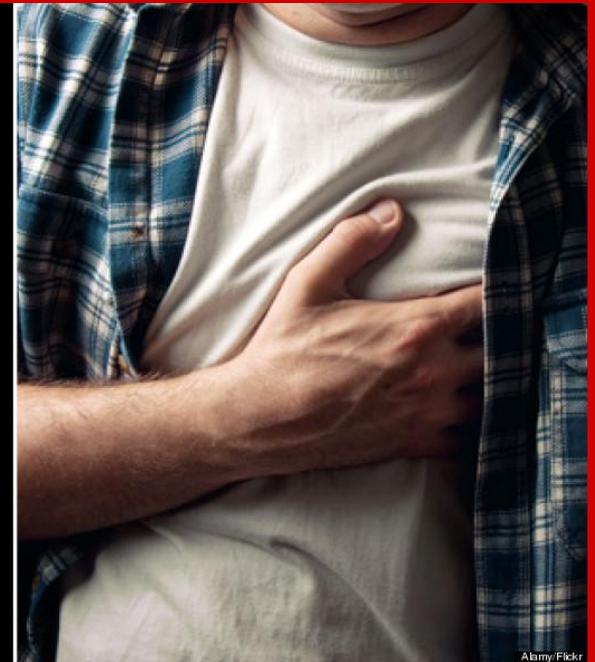
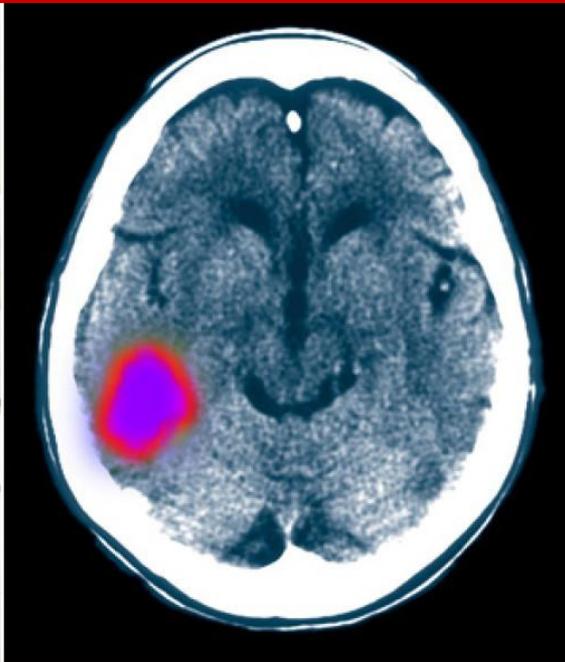
Elementary School Start Times: The “Flip”

- Impact of School Start Time Changes:
- HS students delayed from 7:30am to 8:15am
- Students in grades 3-5 advanced from a start time of 8:20am to 7:45am
- HS students got 35 minutes more sleep
- 3rd graders also got more sleep (+24 minutes) after the change
- Sleep duration changes in 4-5th graders negligible
- No differences in behavior measures post-change

Grade	SST 1 BT/WT (SD)	SST 2 BT/WT (SD)	Sleep Duration Difference (Min)
3	8:37p/6:49 a (10:11)	8:22p/6:57a (10:35)	+24*
4	8:52p/6:56 a (10:03)	8:22p/6: 22a (9:59)	-4
5	9:10p/6:59 a (9:49)	8:43p/6:23a (9:40)	-9
10	(7:42)	(8:17)	+35**

*Largely accounted for by earlier bedtimes
 **Completely accounted for by later rise times; 0 min difference bedtimes

Effects on Performance, Health and Safety



Impact on the Brain

- “Deficient” sleep (insufficient sleep for sleep needs and circadian mis-timing) negatively impacts:
 - Cognitive function (decision-making, problem solving, planning, organization and other “executive functions”)
 - Attention
 - Memory
 - Learning of new tasks
 - Emotional regulation
 - Risk-taking behaviors and misinterpretation of relative rewards/consequences

Impact on Health

- “Deficient” sleep (insufficient sleep for sleep needs and circadian mis-timing) is associated with:
 - Risk of obesity
 - Poor cardiovascular health
 - Metabolic dysfunction (eg, type 2 diabetes)
 - Accidental injuries
 - Sports-related
 - Work-related
 - MVAs
 - Pedestrian accidents
 - Lower use of seatbelts, bicycle helmets, increased texting and driving, drinking and driving
 - Depression and suicidal thoughts
 - Alcohol and substance use

Impact on Performance

- Academic performance
 - GPA
 - Especially first period classes
 - Standardized test scores
 - Tardiness and attendance rates
 - Graduation rates

AAP Recommendation: Delay School Start Time until 8:30 am or Later

American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

Let Them Sleep: AAP Recommends Delaying Start Times of Middle and High Schools to Combat Teen Sleep Deprivation

8/25/2014

For Release: August 25, 2014

Studies show that adolescents who don't get enough sleep often suffer physical and mental health problems, an increased risk of automobile accidents and a decline in academic performance. But getting enough sleep each night can be hard for teens whose natural sleep cycles make it difficult for them to fall asleep before 11 p.m. — and who face a first-period class at 7:30 a.m. or earlier the next day.

Pediatrics 2014;134:642-649.

Brief History of School Start Times

- BUT less than 1 in 5 middle and high schools in the US (N=40,000) start at the recommended 8:30am or later*
- In **MA**, average SST in 2015 for public middle and high schools was 7:37am (from 7:53am 2011-12) and only 2 schools (1%) of start at 8:30am or later*
 - >80% start before 8am
- Students in earlier starting schools more likely to belong to an ethnic minority, be eligible for free lunches and have less educated parents

*MMWR 2015

Outcomes: Sleep*

- Bedtimes remain the same or in some studies actually shift earlier
- Students obtain significantly more sleep
 - More morning sleep
 - The later the start time, the greater the sleep amounts
 - But even a 30 minute delay results in improvements
- Students report less daytime sleepiness (falling asleep in class, doing homework)

*Wheaton AG et al. *J School Health* 2016

Review of 38 reports examining the association between school start times, sleep, and behavioral, health and academic outcomes among adolescent students

Outcomes: School Performance*

- Attendance improves
- Tardiness rates drop
- Drop-out rates decline
- Standardized test scores improve
 - In one study SAT scores for the top 10% of students increased by more than 200 points
- Grades improve
 - 5/6 schools showed significant increase in GPA pre-post in English, math, science and SS
 - Disadvantaged students may benefit more
 - Larger effects of start times at lower end grade distribution**
 - Effects of 1st period classes larger for black students***

Wheaton AG et al 2016 **Edwards 2012 *Cortes et al 2012*

Outcomes: Health & Safety

- Delayed SST are associated with improvements in:
 - Mood (fewer report feeling unhappy, depressed)
 - Health (decreased health center visits)
 - Safety
 - Kentucky: 7:30 to 8:40a start time; teens involved in car crashes down by 16% (vs 9% increase in the rest of the state)
 - Virginia: Adolescent crash rates VA Beach (7:20a) vs Chesapeake (8:40a) 40% higher and peak 1 hour earlier
 - CDC study (2014): Reduction crash rates in 16-18yo by as much as 65-70% (Minnesota, Colorado, Wyoming)

Outcomes

- There is mounting evidence that an evening “chronotype” (strong preference for later fall asleep and wake times) is as or more important than short sleep duration for negative outcomes in teens (eg, poor executive function, drowsy driving and crash risk)
- Later start times allow for more sleep and increased circadian-based alertness
- ≥8:30am-the sleep and circadian “sweet spot”?

Outcomes: \$\$\$

- Brookings Institute Report: “Organizing Schools to Improve Student Achievement: Start Times, Grade Configurations, and Teacher Assignments” (2011)
- Moving school start times one hour later would have a substantial benefit: cost ratio (9:1)
 - Based on a conservative estimate of both costs per student (\$0-\$1950; largely related to transportation), and the increase in projected future earnings per student in present value due to test score gains (approximately \$17,500)
- “A later start time of 50 minutes in our sample has the equivalent benefit as raising teacher quality by roughly one standard deviation”

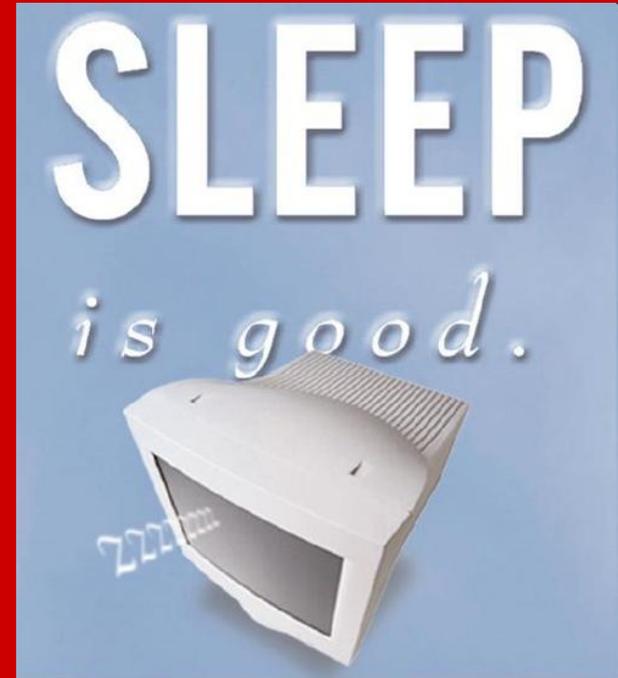
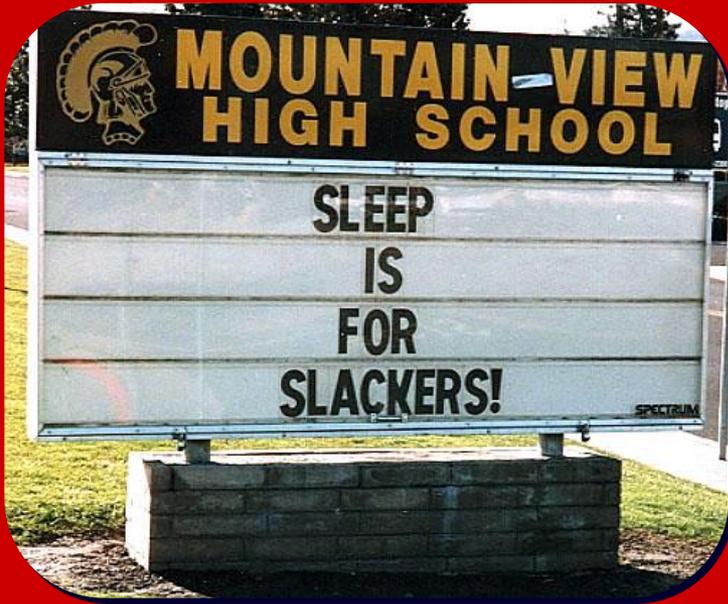
Lessons Learned

- District superintendent support and leadership critical
- School board involvement key
- School leadership (ie, principals) and teacher support vital
- Importance of middle/elementary school principal, teacher, parent involvement
- Importance of student engagement
- Critical role of community *education*
 - Health, safety *and* academics
- Critical role of community *engagement*
 - Identification and involvement of key stakeholders

Lessons Learned

- Critical to allow adequate time for families to become informed and make sufficient plans prior to implementation
- Each community faces different, unique challenges
 - But you don't have to "reinvent the wheel"
- Not all students will benefit equally
 - The goal is to provide "the greatest good for the greatest number of students"
- Anticipation often worse than reality (impact on athletics, teacher retention, after-school programs, childcare issues)
- Initial challenges reduced over time

What is your vote?



Thanks for your attention!