



Adolescent Sleep: The Case for Later School Start Times

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The Importance of Sleep

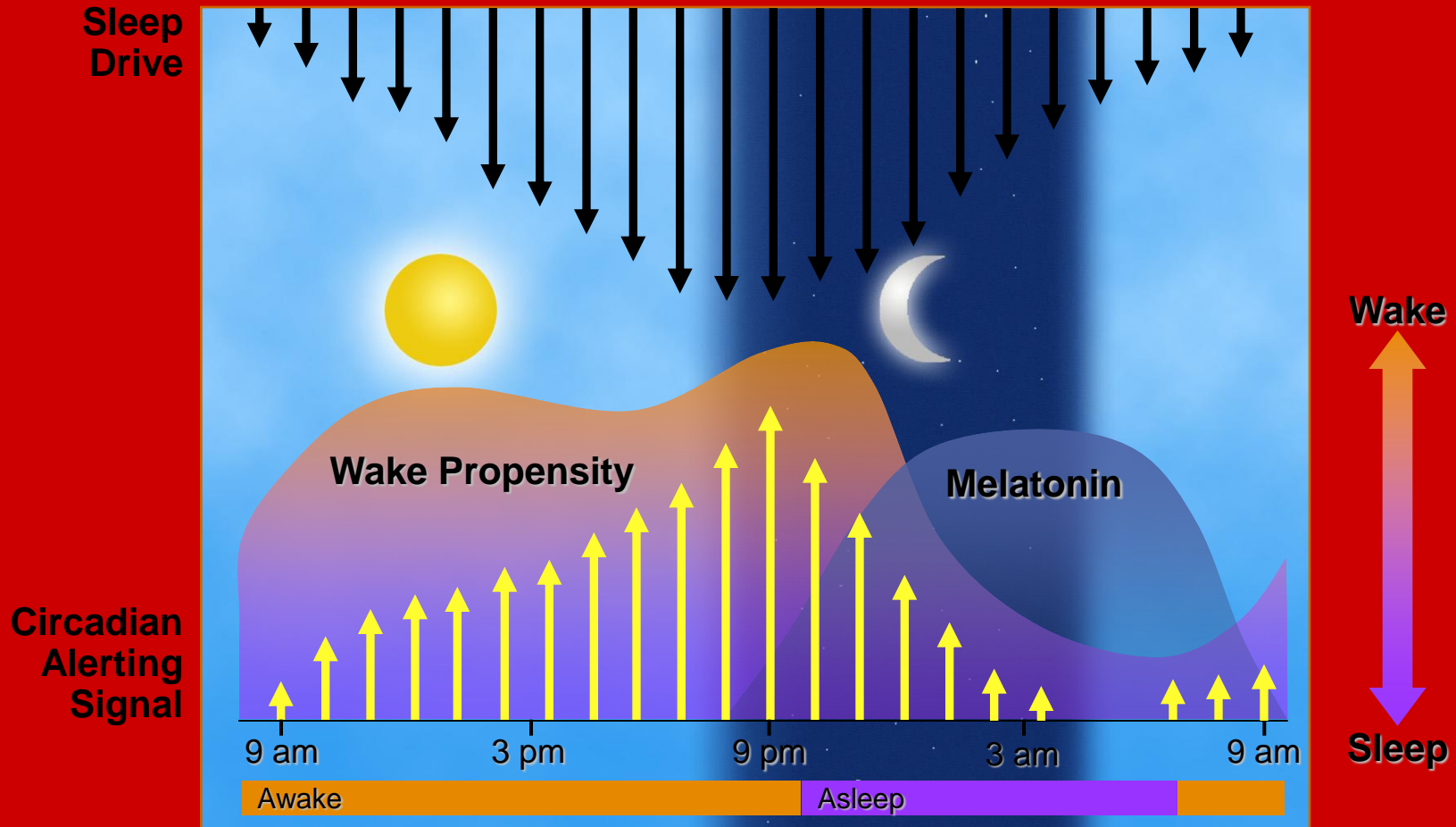
- Proper sleep quality/quantity is *equally* important to nutrition and exercise
- **THERE IS NO SUBSTITUTE FOR SLEEP**

Myths about Sleep

- My kids do fine with 6 hours a night
- Parents aren't forceful enough with earlier bedtimes
- This will be solved by taking away the cell phones and computers earlier in the evening
- If school starts later, they'll just stay up later
- They can make up for lost sleep on the weekends
- They'll deal. I had to.

Sleep-Wake Cycle: Two Opposing Processes

Circadian and Homeostatic Regulation of Sleep



Teens: Night Owls by Nature

- Puberty leads to a shift in circadian rhythms
 - Delay in bed AND wake times
- It almost impossible for the average adolescent to fall asleep much before 11pm on a regular basis
 - Teens cannot “make” themselves fall asleep earlier

Contributing factors

- Homework, activities, after-school employment, “screen time”, social networking
- Circadian phase delay may be further worsened by evening bright light exposure
 - Suppresses brain release of melatonin
 - Most homework is done ON computers now

Adolescents: Later Wake Times

- Teens are biologically programmed to wake at 8am or later
- Teens currently wake for the day and function during the the lowest level of alertness during the 24 hour day
 - We're asking teens to essentially wake up at what's an adult's 4 or 5am
- Early awakenings take away REM sleep, which is critical for learning new information and memory
 - REM is the brain's filing cabinet

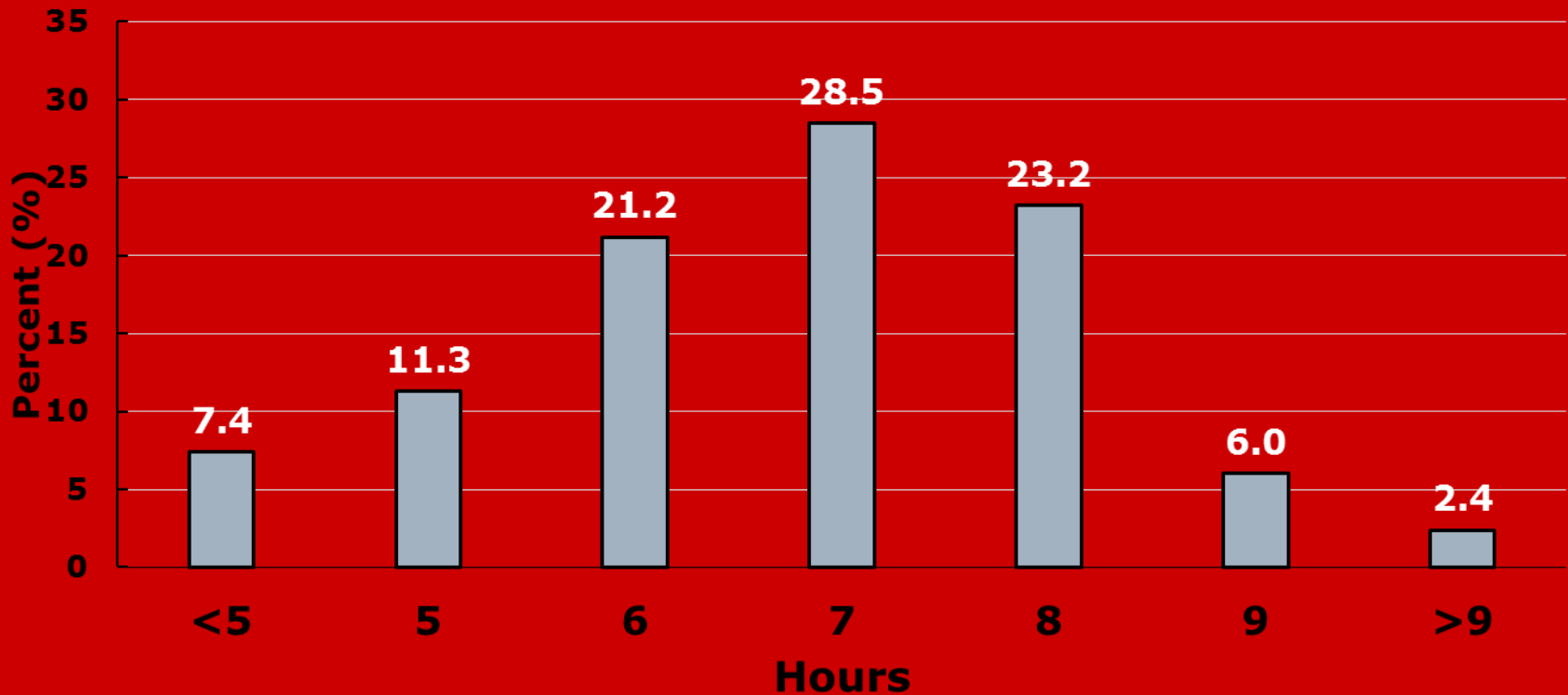
“Sleeping in” on the Weekend

- Leads to “circadian misalignment”
 - Worsens circadian phase
- Leads to Sunday night insomnia
- Effects last up to 3 days, “social jet lag”

Adolescent Sleep: The Bottom Line

- 8-10 hours for 13-18 year olds
- Sleep duration needs don't decrease between middle to high school
- Approximately 90% of high school aged teens get insufficient sleep or barely, consistently meet the necessary amount (American Academy of Sleep Medicine)

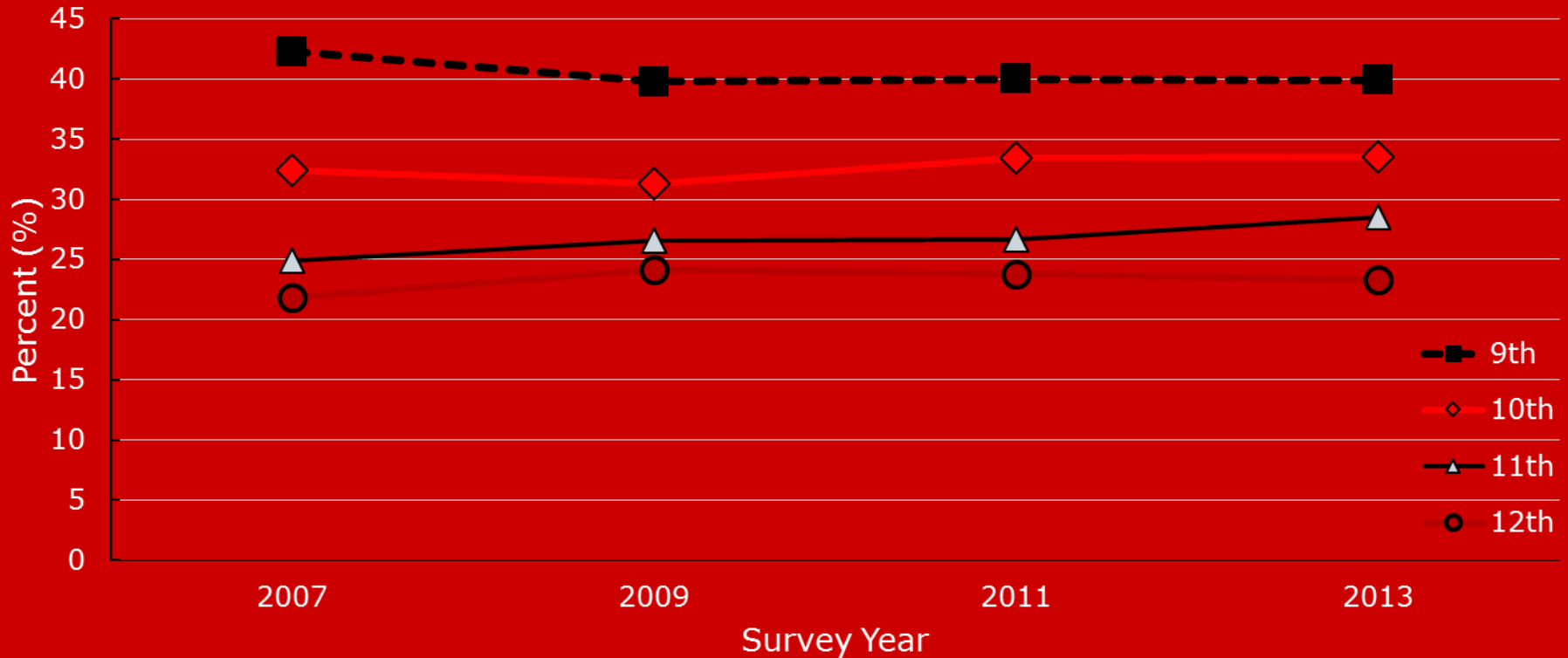
Sleep Durations among 12,050 High School Students: US, 2013



YRBS 2017: 43% of teens get fewer than 6 hrs per night

Data Source: CDC. National Youth Risk Behavior Survey (YRBS) 2013

Percent of High School Students who Report Sleeping ≥ 8 hours/school nights, by Grade: United States, 2007-2013



Data Source: CDC. National Youth Risk Behavior Surveys (YRBS) 2007-2013
Slide by J. Owens

2017 YRBS: % of Students who got 8 or more hours of sleep

Category	Sex				Total	
	Female		Male			
	%	CI [†]	%	CI	%	CI
Total	24.6	(22.8–26.5)	26.3	(24.6–28.2)	25.4	(24.0–26.9)
Race/Ethnicity						
White [§]	25.6	(23.5–27.8)	28.1	(25.8–30.5)	26.7	(25.1–28.4)
Black [§]	22.8	(18.3–28.0)	25.6	(21.3–30.4)	24.1	(21.4–27.1)
Hispanic	25.3	(22.9–27.9)	25.7	(22.2–29.5)	25.5	(23.1–28.0)
Grade						
9	32.3	(29.1–35.7)	37.5	(34.0–41.1)	34.8	(32.1–37.6)
10	26.0	(22.8–29.5)	27.0	(23.4–31.0)	26.6	(23.9–29.4)
11	21.1	(18.8–23.7)	21.6	(18.4–25.2)	21.4	(19.3–23.5)
12	17.9	(15.1–21.1)	17.3	(14.7–20.2)	17.6	(15.8–19.5)
Sexual identity						
Heterosexual (straight)	25.6	(23.6–27.7)	26.4	(24.5–28.3)	25.9	(24.3–27.6)
Gay, lesbian, or bisexual	18.1	(15.1–21.5)	18.0	(12.4–25.4)	17.8	(14.5–21.5)
Not sure	20.5	(15.6–26.4)	32.1	(24.0–41.5)	24.7	(20.1–30.1)
Sex of sexual contacts						
Opposite sex only	21.2	(19.5–23.0)	22.5	(20.3–24.7)	21.9	(20.3–23.5)
Same sex only or both sexes	16.6	(13.1–20.8)	13.5	(9.0–19.7)	15.8	(12.5–19.8)
No sexual contact	28.4	(25.9–31.0)	31.3	(28.5–34.2)	29.8	(27.6–32.0)

* On an average school night.
[†] 95% confidence interval.
[§] Non-Hispanic.

75% of US High schoolers get less than 8 hours on school nights, 43% get less than 6 hours. This is a worsening trend since 2011, 2013, 2015 surveys

Chronic sleep loss in teens:
About time we take it seriously

Mood Changes

- Adolescents who are sleep deprived are at a higher risk for anxiety and depression
 - More likely to have suicidal thoughts and action (AAP 2014)
- Youth Risk Survey (2010-12)
 - 40% of teens getting less than 6 hours of sleep report depression symptoms (sadness, hopelessness)

Sleep and Risk Taking Behaviors

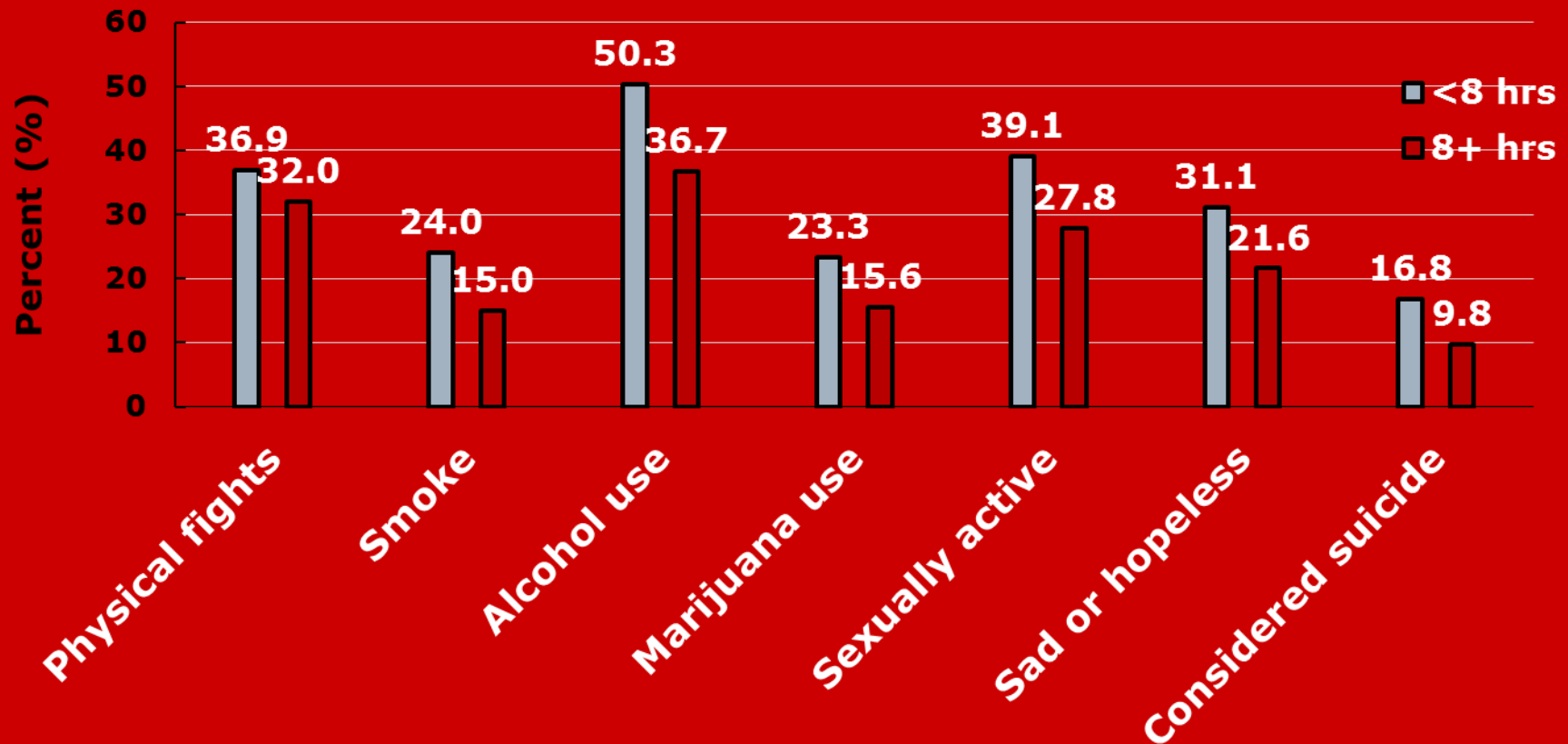
- Studies suggest insufficient sleep linked to changes in reward-related decision making
- Sleep deprived teens perceive fewer negative consequences, and as a result, take greater risks

*O'Brien & Mindell 2005; Giedd 2009;
Holm et al 2009*

Risky Behaviors

- Sleep duration is a significant negative predictor for alcohol-related problems such as:
 - binge drinking
 - drunk driving
 - regretful drinking-relating behaviors
- Teens with the least amount of sleep at night have the highest reported use of alcohol use

Comparison* of Selected Risk Behaviors among 12,154 High School Students, by Sleep Duration: YRBS, 2007



All comparisons significant at $p < 0.05$.

Adapted from McKnight-Eily LR et al. *Preventive Medicine* 2011;53:271-273

Slide by J Owens .

Sleep and Weight

- Multiple studies suggest shorter sleep associated
 - Hunger
 - Obesity
 - Type 2 Diabetes
 - Food intake: increased amount, more calories, more fat
 - Eating patterns (skipping breakfast, increased night eating)
 - Less physical activity
 - Sleep apnea more common in obese children, further compromising cardiovascular and metabolic health

Sleep and Safety: Accidental Injuries

- Drowsy driving
 - Over 50% of the 100,000 police-reported fatigue-related traffic crashes each year involve drivers age 16-25
 - 68% of high school seniors have driven while drowsy; 15% at least once per week
 - ***Sleep loss impairments are equal or greater than those due to alcohol intoxication (ie, 3-4 beers)***
- Sleep loss is associated with increased sports-related injuries in high school students

Delay School Start Time until 8:30 am or Later

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.

Recommended as well by the CDC and American Medical Association!

Later SST = MORE SLEEP, not just delayed

- Bedtimes remain the same or even a bit earlier
- Students obtain significantly more sleep
 - More morning sleep
 - Even a 30 minute delay helps!
- Students report less daytime sleepiness

Wheaton AG et al. 2016; Owens et al. 2017;
Nahmood et al.,2017, Wahlstrom, 2014

Sleep = Better Performance and Mood

- Attendance improves
- Lateness and drop-out rates decline
- Grades improve
- Standardized test scores improve
- Improved mood (fewer report feeling unhappy, depressed)
- Improved health (decreased health center visits)

Outcomes: Health & Safety

- Delayed SST improve:
 - 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)

What Can Schools Do?

- Teach time management to better make sleep a priority
- Consider homework burden
- Set limits on evening activities at school as well as early morning/ late evening athletic practices
- **Set healthy school start times for middle and high school students (8:30am or later)**

What Can Schools Do?

- Teach sleep health to students, faculty and families
- Include sleep as part of student health education, biology classes
- Teach more about drowsy driving in Drivers Ed
- Get rid of caffeinated beverages in vending machines = **YOU CAN'T FAKE WAKE**