

Sleep and Adolescents

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What is a Normal Amount of Sleep?

Preschool Child (3-5 yrs)	10-11 hours
Elementary School Child (6-12 yrs)	10 hours
Adolescent (>12yrs)	9-9.5 hours
Adult	7.5-8

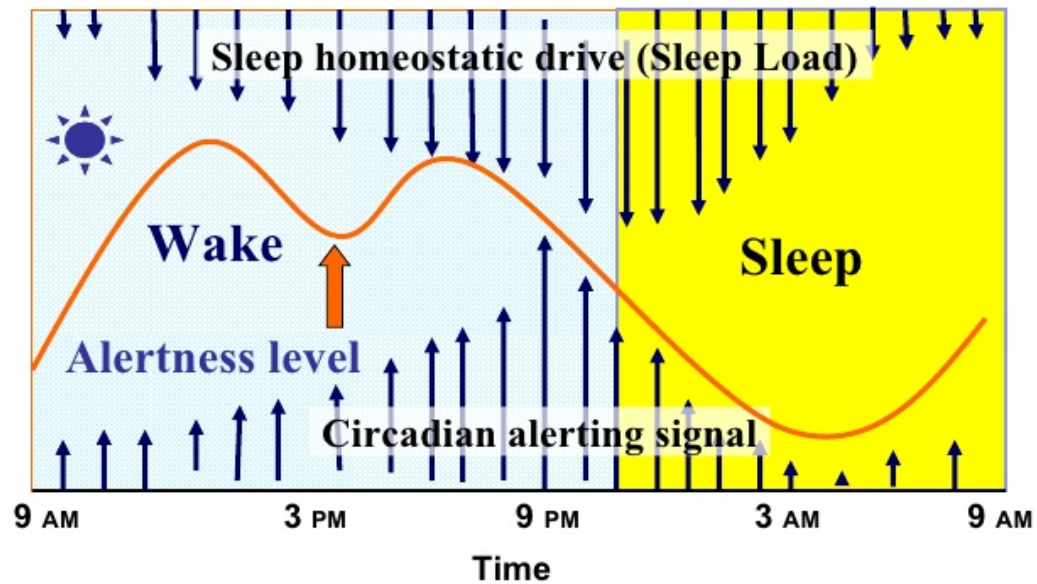
Sleep in Adolescents

- 6th- 8th grade adolescents
 - 21% insufficient sleep
 - 38% borderline amount of sleep
 - 35% optimal amount of sleep
- 9th-12th grade adolescents
 - 63% insufficient sleep
 - 25% borderline amount of sleep
 - 9% optimal amount of sleep

Changes to Adolescent Sleep

- Melatonin, sleep promoting hormone, is released later
- Teenager circadian rhythm is shifted up to 2 hour
- Adolescents have a longer internal day (24.27 hours)
- Slowed sleep drive
- Biologically teens are programmed to wake later and go to bed later

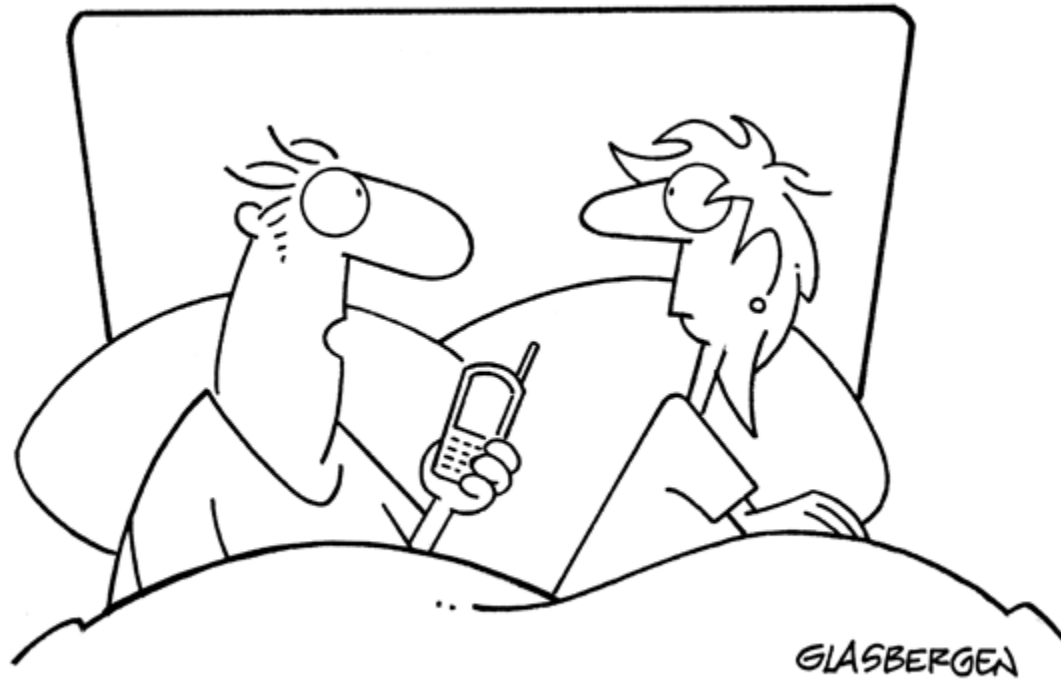
Circadian Rhythms and Sleep



Additional Changes in Adolescence

- Increased academic demands
- Increased societal demands
- Bedtime autonomy
- Screen time
- Social networking

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“Aren’t you going to tweet me goodnight?”

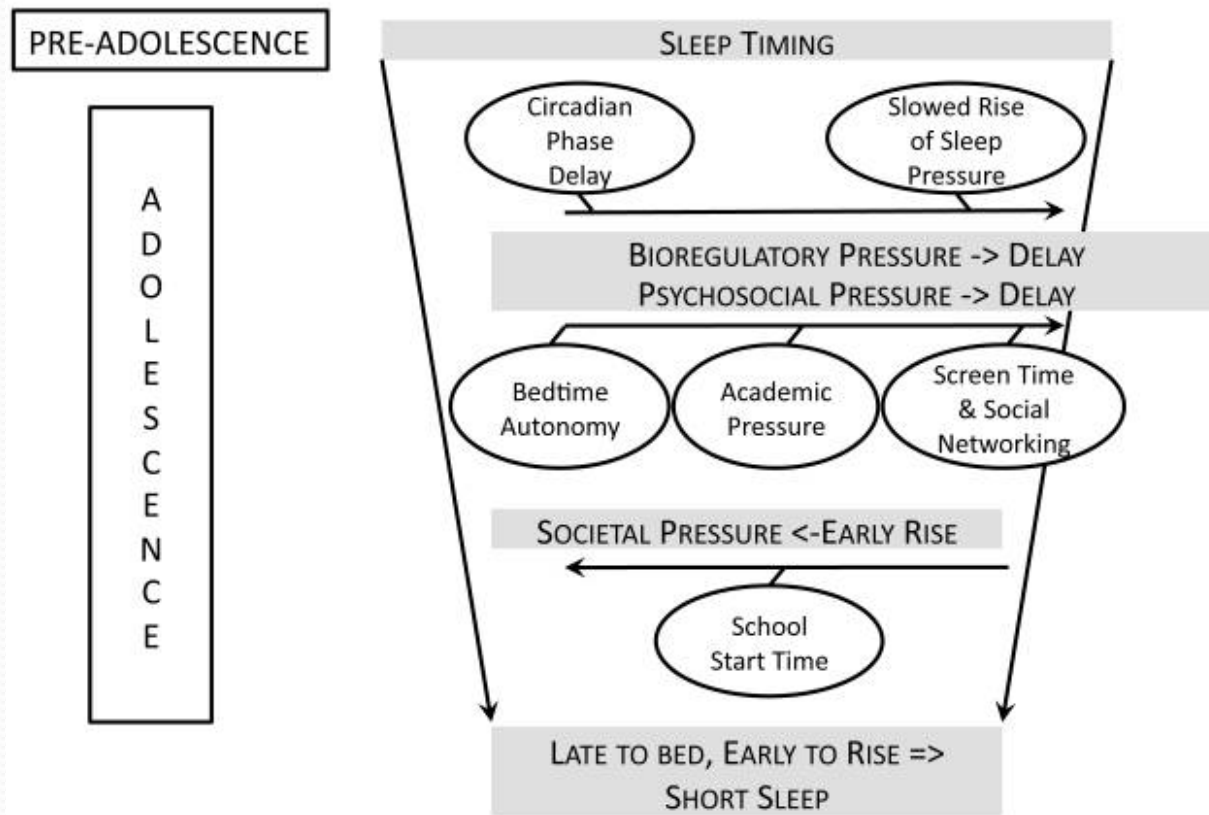
Computers/Cell Phones

- Emit a blue wave length of light
- Suppresses melatonin release
- Can reset your internal clock
- Study of participants with LE-eBooks
 - Longer to fall asleep
 - Reduced melatonin secretion
 - Reduced next morning alertness
 - Reduced REM sleep

Chang AM et al PNAS 2015 p1232-1237

The Perfect Storm

Adolescent Development & Sleep: The Perfect Storm

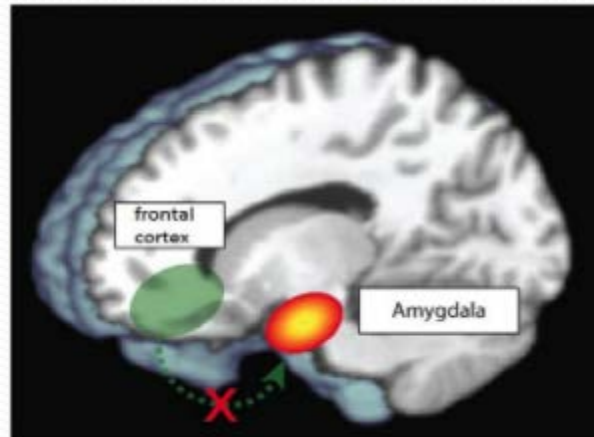




Sleep Deprivation in Children

- More severely affected by sleep deprivation than adults
- Mood disturbances
- Irritability
- Emotional lability
- Depression
 - Seven times more likely to attempt suicide in a study in Fairfax VA
- Anger

- Prefrontal cortex (problem solving/decision making) is unable to communicate well with the amygdala (emotional center of the brain)





Sleep Deprivation in Children

- Memory problems
- Difficulty paying attention
- Difficulty with problem solving and decision making
- Somatic complaints
- Behavioral problems such as over activity, impulsivity
- Relationship problems

Insufficient Sleep and Weight

- Insufficient sleep increases ghrelin, cortisol and decreases leptin hormones
- Increased craving for high calorie, carbohydrate rich food
- Shortened duration of sleep is linked to obesity in children and adults

Cappuccio FP et al Sleep 2008 p 619-626

- Potential risk factor for Type 2 diabetes

McNeil J et al CJD 2013 p 103-8.



Sleep Deprivation in Teens

- Teen drivers sleeping < 8 hours are 1/3 more likely to crash than those sleeping 8 or more hour. Hutchens L, et al. Teen Driver Crash Risk and Associations with Smoking and Drowsy Driving. *Accident Analysis and Prevention*. May 2008s
- Increase in risk taking behavior
- Increase in alcohol, substance abuse, cigarette use
Johnson et. al. *Drug Alcohol Depend*, 64 (2001), pp. 1-7
- Adolescents who sleep more than 8 hours have fewer athletic injuries



Sleep Deprivation and Academics

- Study of over 3,000 high school students
- Students describing themselves as struggling in school reported 25 minutes less sleep per night and bedtime of 40 minutes later compared to A and B students
- Reported greater weekend delay in sleep schedule

Wolfson et al Child Dev 1998; 68(4):875-87

- Study of college students revealed short sleepers had lower GPAs than long sleepers

Kelly et al Coll Student J p84-6

What are the Effects of a Delayed Start Time?



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School Start Time

- Longer sleep durations
 - Upwards of 1 hour
 - Bedtimes are similar Wahlstrom et al NASSP Bull 2002; p 3-21
- Number of students reporting at least 8 hours of sleep increased from 16% to 55%
- Number of students with <7 hours of sleep fell by 79%
Owens et al Arch Pediatr Adolsc Med 2010 p 608-614
- Decreased daytime sleepiness and propensity to fall asleep during class

Academics

- There is a trend towards improved grades
 - Wake County NC found an improvement in standardized math and reading scores by 3% points
 - Letter grades increased in both Arlington County and Minneapolis

Wheaton AG et al Journal of School Health 2016 p363-381

- Cautionary Note
 - Not all studies document an improvement in grades
 - Results on standardized test scores are conflicting

School Start Times

- Lower depression scores
- Decrease in teen crash rates
 - Two studies saw a decrease of 65%
- Improved attendance

Wheaton AG et al Journal of School Health 2016 p363-381

National Recommendations

- American Academy of Pediatrics Policy Statement 2014
 - Urges school districts to aim for a delayed school start time
- American Medical Association 2016
- American Academy of Sleep Medicine 2017
 - Recommends a delayed school start time
- Centers for Disease Control



Benefits of Delayed School Start Times

- Longer total sleep time
- Decreased risk of suffering depression
- Less likely to be involved in an MVA
- Improved reaction times
- Reduced tardiness and absences

Benefits of Delayed School Start Times

- Reduced obesity risk
- Increased engagement in class activities
- Potential for better grades
- Better quality of life

Benefits of Delayed School Start Times

- Improved physical and mental health
- Improved safety
- Athletic performance
- Potential for improved academic performance

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You know what they say Mum:
The early bird catches the worm! So I'm sleeping in...