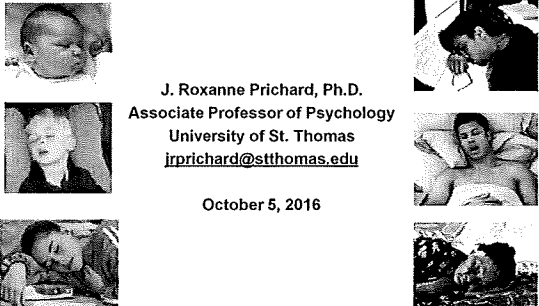
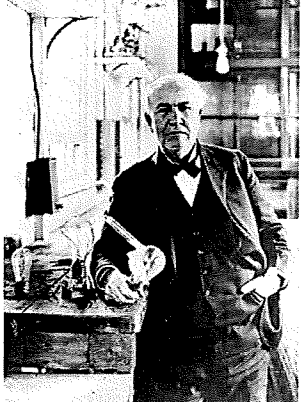


Sleep: A Rising Public Health Concern
 Ramsey County Public Health Services Advisory Committee Meeting



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October 5, 2016




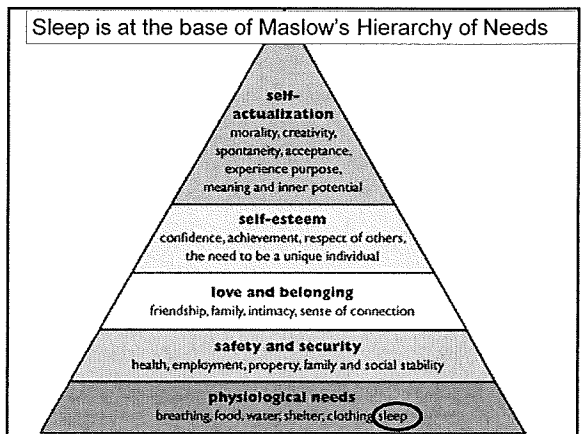
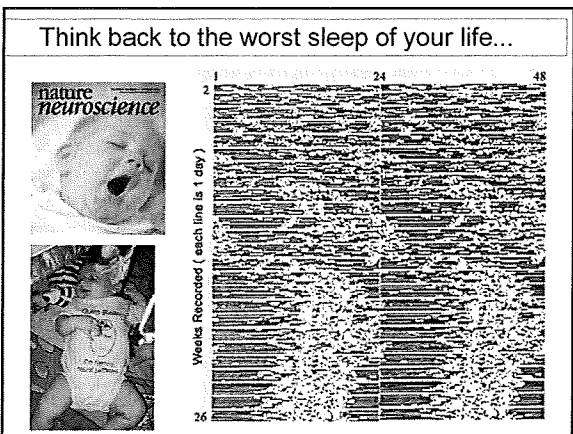
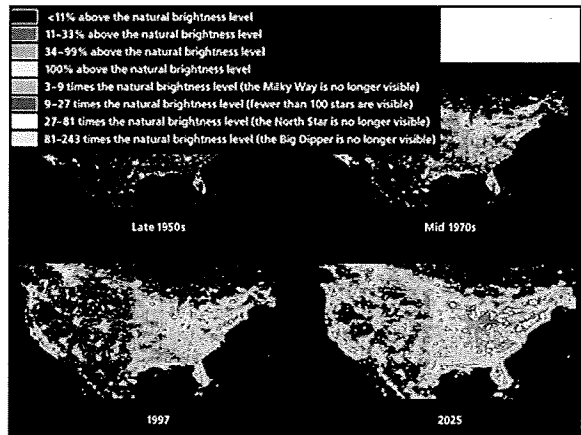
Sleep is an acquired habit. Cells don't sleep. Fish swim in the water all night. Even a horse doesn't sleep. A man doesn't need any sleep.

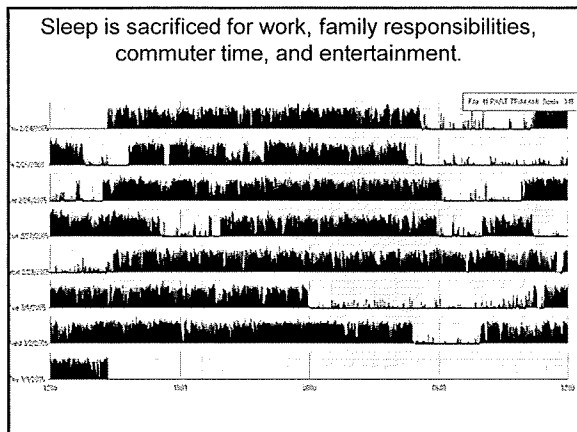
-Thomas Edison

Our culture of Chronic, Insufficient Sleep

As a society, we get 20% less sleep than our ancestors only 100 years ago.



Yet, sleep is required for life.

Mita Diran
30 hours of working and still going strong.

Chinese man dies after Euro 2012 viewing marathon
A Southsill showed fans from Shanghai in south-west China have reportedly died after staying up for 11 hours more nights to watch Euro 2012 matches.

Bank of America Intern Dies After Reportedly Working Three Straight Days With Little Sleep

The majority of US children and adults do not get enough sleep.

	SLEEP NEEDS	
Newborns/Infants	0 - 2 months:	15-18 hours
	2 - 12 months:	14-15 hours
Toddlers/Children	12 mo - 18 mo:	13-15 hours
	18 mo - 3 years:	12-14 hours
	3 - 5 years:	11-13 hours
Adolescents	5 - 12 years:	10-11 hours
	On Average:	9.25 hours
Adults	On Average:	7-9 hours

The Epworth Sleepiness Scale

Use the following scale to choose the most appropriate number for each situation:

0 = would never doze
1 = Slight chance of dozing
2 = Moderate chance of dozing
3 = High chance of dozing

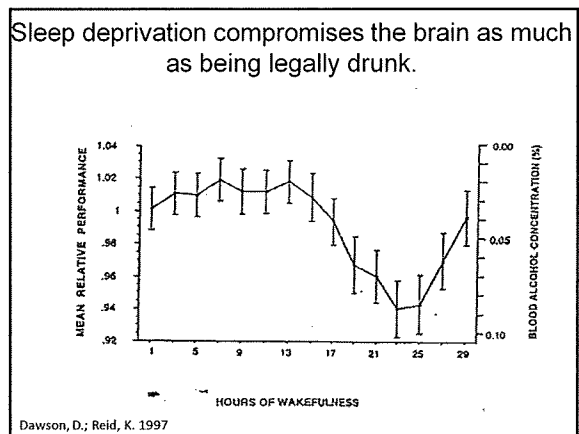
Situation	Chance of dozing
Sitting and reading	<input type="text"/>
Watching TV	<input type="text"/>
Sitting, inactive in a public place (e.g. a theatre or a meeting)	<input type="text"/>
As a passenger in a car for an hour without a break	<input type="text"/>
Lying down to rest in the afternoon when circumstances permit	<input type="text"/>
Sitting and talking to someone	<input type="text"/>
Sitting quietly after a lunch without alcohol	<input type="text"/>
In a car, while stopped for a few minutes in the traffic	<input type="text"/>
Total	<input type="text"/>

<http://epworthsleepinessscale.com/>


Behavioral Risk Factor Surveillance System, CDC 2009

Age (years)	Unintentionally fell asleep during day at least once in the past month	Nodded off or fell asleep while driving in the past month
18 to <25	43.7%	4.5%
25 to <35	36.1%	7.2%
35 to <45	34.0%	5.7%
45 to <55	35.3%	3.9%
55 to <65	36.5%	3.1%
≥65	44.6%	2.0%
Race/Ethnicity		
White non-Hispanic	33.4%	3.2%
Black non-Hispanic	52.4%	6.5%
Hispanic	41.9%	6.3%
Other non-Hispanic	41.0%	7.2%

<http://www.cdc.gov/features/dssleep/>

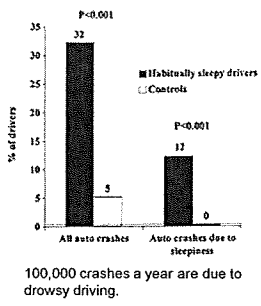


Driving is particularly hazardous for sleepy drivers.



People who drive after being awake for 17 to 19 hours performed worse than those with a blood alcohol level of .05.

Dawson, D.; Reid, K. 1997



100,000 crashes a year are due to drowsy driving.

Masa et al. 2000

Healthy People 2020

25 percent of U.S. adults report insufficient sleep or rest at least 15 out of every 30 days.

The public health burden of chronic sleep loss and sleep disorders, coupled with low awareness of poor sleep health among the general population, health care professionals, and policymakers, necessitates a well-coordinated strategy to improve sleep-related health.

<http://www.healthypeople.gov/2020/topics-objectives/topic/sleep-health>

Healthy People 2020 Sleep Objectives

SH-1 Increase the proportion of persons with symptoms of obstructive sleep apnea who seek medical evaluation.

SH-2 Reduce the rate of vehicular crashes per 100 million miles traveled that are due to drowsy driving.

SH-3 Increase the proportion of students in grades 9 through 12 who get sufficient sleep.

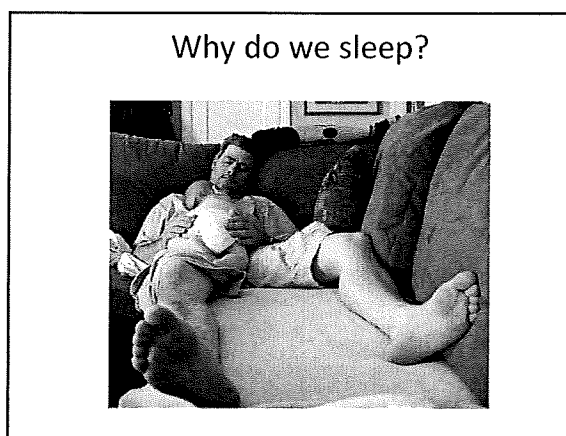
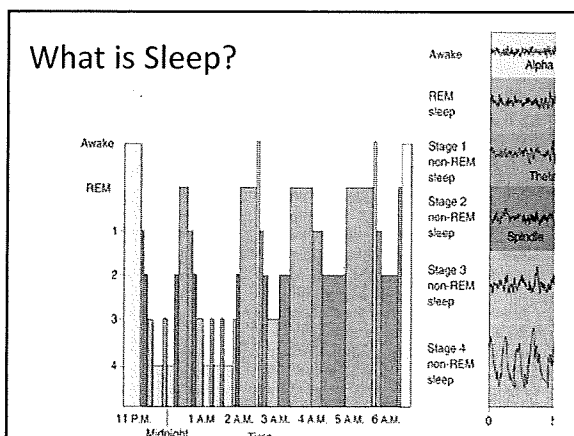
SH-4 Increase the proportion of adults who get sufficient sleep.

<http://www.healthypeople.gov/2020/topics-objectives/topic/sleep-health>

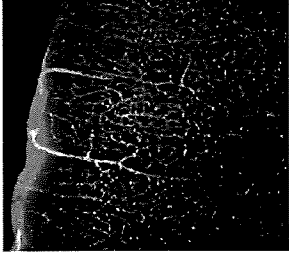
Racial & Economic Disparities in Sleep

- People who work multiple jobs (15% of the workforce) are 61% more likely to report sleeping 6 hours or less on weekdays.
- 25% of live-in domestic workers had responsibilities that prevented them from getting at least 5 hours of uninterrupted sleep during the week.
- African-Americans are over 3x as likely as whites to report less than 5 hours of sleep, while Asians and non-Mexican Hispanics were 2.5x as likely.

Hale, L. Inadequate Sleep Duration as a Public Health and Social Justice Problem: Can We Truly Trade Off Our Daily Activities for More Sleep? SLEEP 2014;37:1889-1906.

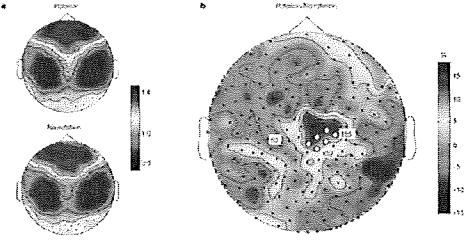


Sleep Rids the Brain of Toxic Cellular Waste.



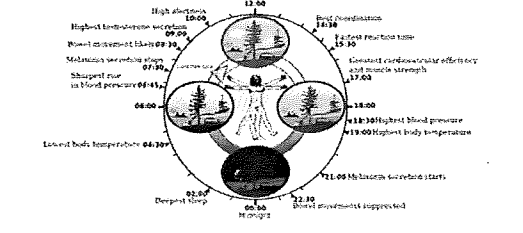
Sleep Drives Metabolite Clearance from the Adult Brain. Xie et al. (2013) *Science*

Sleep Allows the Brain to make Structural Changes Necessary for Learning



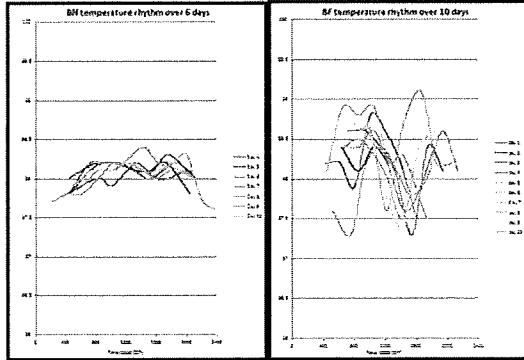
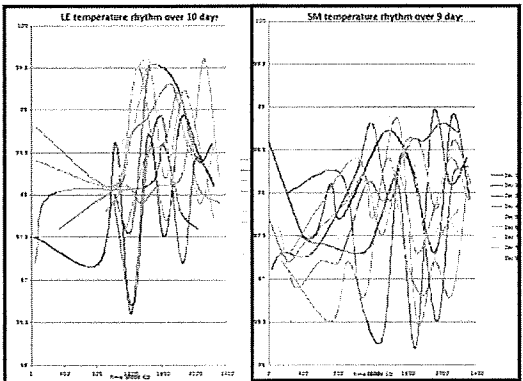
Local Sleep and Learning. Huber R, Ghilardi MF, Massimini M, Tononi G. *Nature*. 2004 Jul 1;430(6995):78-81

Modern Lifestyles Flatten or Mask the Circadian Rhythm.

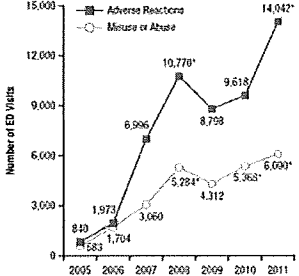


Environmental Signals **Psychoactive Substances**

Circadian Temperature Rhythms in Structured vs. Unstructured Schedules

Expansive growth of Energy Drink Sales— And Emergency Room Visits.


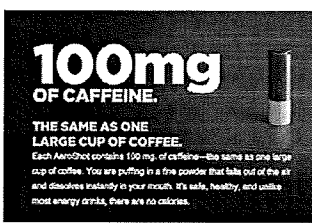
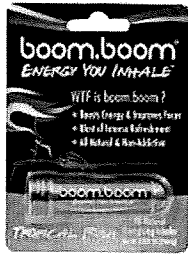


<http://www.samhsa.gov/data/2k13/DAWN126/sr126-energy-drinks-use.htm>

Report #	Received Date	Event/Product Name	Symptoms	Outcomes
12526	02/15/10	3 HOUR ENERGY	DOXALAMINE	HYPEREMESIS, OTHER RISKY BEHAVIOR, IMPROPER MEDICAL EVENTS
12525	02/15/10	3 HOUR ENERGY	SEVERE DENTAL EXPOSURE TO X-RAYS, SEVERE ALLERGIC REACTION, VISCERAL ACHYIA, RASHES	DISASTROUS EVENTS, SEVERE ADVERSE REACTIONS, MEDICAL EVENTS, HOSPITALIZATION
12541	02/15/10	3 HOUR ENERGY	DOXALAMINE, GABAPENTIN	HOSPITALIZATION
12541	02/15/10	3 HOUR ENERGY	DOXALAMINE, GABAPENTIN	HOSPITALIZATION
12501	02/15/10	3 HOUR ENERGY 3 HOUR ENERGY	CONVULSIONS, ABNORMAL LOSS OF COORDINATION, INEQUIVALENT, CONVULSION, ACUTE RESPIRATORY FAILURE, ANGIOS, ENTORAL CHINIFY	HOSPITALIZATION, DEATH
12515	02/15/10	3 HOUR ENERGY	EXHAUSTION, HYPEREMESIS	HOSPITALIZATION
12517	02/15/10	3 HOUR ENERGY	DEATH	DEATH
12518	02/15/10	3 HOUR ENERGY	SEIZURES	DEATH
12522	02/15/10	3 HOUR ENERGY 3 HOUR ENERGY	SEIZURES, FACILITY'S, SEIZURES ATTEST, FASCIAL MUSCLE CONTRACTIONS, ROLICONTARY, BLOOD POTASSIUM DECREASED, BLOOD CAFFEINE INCREASED	HYPEREMESIS, LIFE THREATENING
12515	02/15/10	3 HOUR ENERGY EXTRA STRENGTH		
12515	02/15/10	3 HOUR ENERGY GRAPE	DOXALAMINE BITE	OTHER PERSONS, IMPROPER MEDICAL EVENTS
12515	02/15/10	3 HOUR ENERGY 3 HOUR ENERGY		

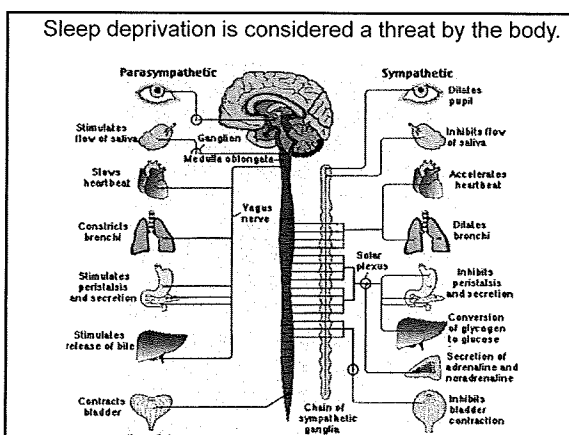
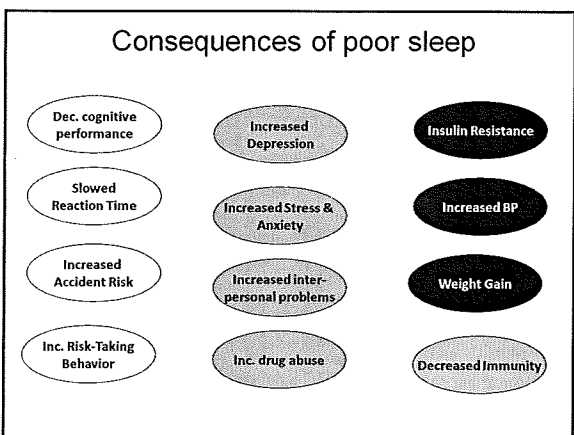
<http://www.fda.gov/downloads/AboutFDA/CentersOffices/OfficeofFood/CFR/CFRANFOIA/ElectronicReadingRoom/UCM1328270.pdf>

"Nutritional Supplement" available now at many stores for any age to buy: Inhalable caffeine.

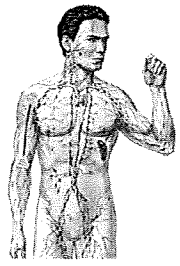
100mg OF CAFFEINE.
THE SAME AS ONE LARGE CUP OF COFFEE.
Each AeroShot contains 100mg of caffeine—the same as one large cup of coffee. You are getting it in a fine powder that lets out of the air and dissolves instantly in your mouth. It's safe, healthy, and unlike most energy drinks, there are no calories.

boom.boom ENERGY YOU INHALE
WTF is boom boom?
• Boosts energy & sharpens focus
• Boosts alertness & endurance
• All Natural & Non-Habitforming



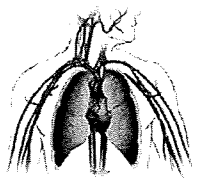
Sleep deprivation impairs the Immune System

- Sleep deprivation is correlated with a significant reduction in cellular immunity (reductions in T-cells)
- Men who received just four hours of sleep a night for four straight nights after receiving a flu shot produced half the antibodies as the control group (Weintraub, 2004)



Sleep deprivation taxes the Cardiovascular System

- Sleep deprivation increases inflammation can damage the inner walls of the arteries, leading to stroke & heart disease.
- Blood pressure and heart rate are higher following sleep deprived nights.
- Men who sleep 5 hours or less a night have 2x as many heart attacks as men who sleep 8 hours or more.



■(Voelker, 1999)

Sleep Deprivation increases Diabetes Risk.

- Chronic sleep deprivation leads to insulin resistance.
- This resistance can result in high blood glucose concentrations, leading to diabetes.
- Young men who sleep 4 hours a night for 6 straight nights lose 30% of their ability to respond to insulin.



Gottlieb et al, 2005

Sleep Deprivation enhances hunger and cravings for junk food.

- Healthy young men were forced to sleep 4 hours a night or 9 hours a night for 4 days straight.
- Short sleepers had a 18% drop in leptin, the fat satiety signal (equivalent drop to subtracting 1100 calorie a day diet).
- 25% increase in hunger, 45% in appetite for junk foods.



(Van Cauter, 2004)

Mental Health and Sleep

A Person with inadequate sleep is...

- 9x more likely to have depressive symptoms
- 17x more likely to have anxiety symptoms

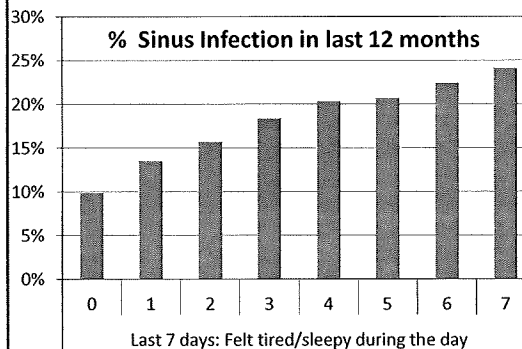


Sleep disruption is predictive of (precedes)

- 50% of depression episodes
- 75% of mania episode
- 90% of suicide attempts

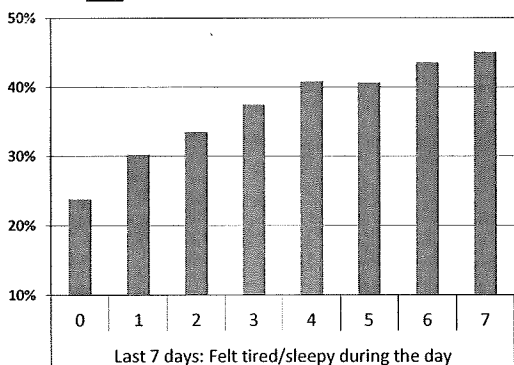
Sateia, M. (2009) Peterson & Benca (2006)

ACHA- National College Health Assessment, n > 80,000

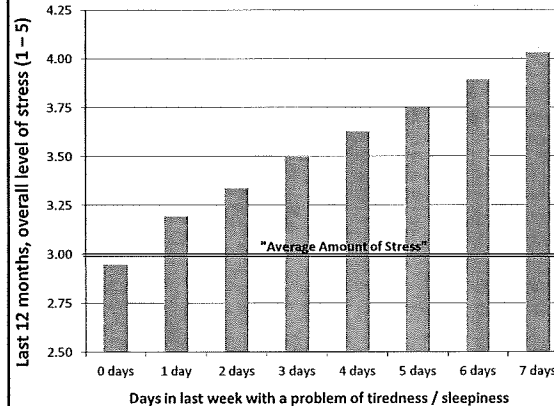


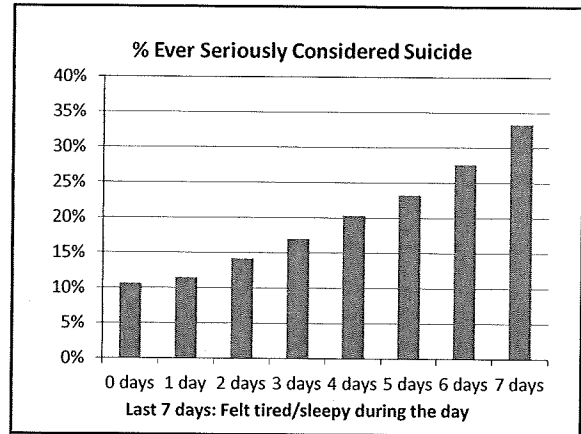
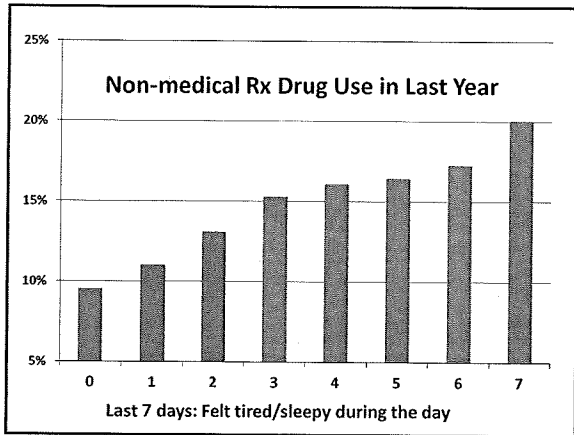
Prichard et al., 2014

Any infectious illness in last 12 months



Prichard et al., 2014





Get sleep on the radar as a major health concern.

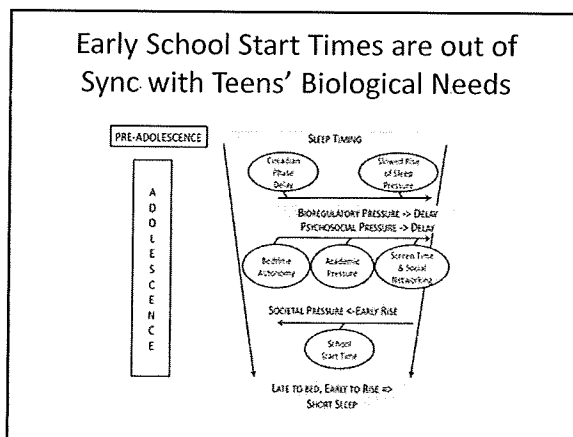
Parent's Top Children's Health Concerns

1. Obesity	6. Alcohol abuse
2. Drug abuse	7. Child abuse
3. Smoking	4. Pregnancy
4. Bullying	9. Internet safety
5. Stress	10. Depression

C.S. Mott Children's Hospital National Poll on Children's Health, 2013

Teens and Sleep

- Teens are biologically more alert in the evening, as compared to younger children. Their natural time for bed is around 10:45 pm, and the brain remains in the 'sleep' mode until about 8:00 AM. This makes it difficult or impossible to fall asleep early enough to achieve the recommended 8-10 hours of sleep when schools start before 8:30 AM.
- A teenager who gets less than 8 hours of sleep per night is more likely to use cigarettes, alcohol, drugs and be sexually active than those who get the recommended 8-10 hours of sleep.



Ramsey Co. High School Start Times

- Only one** district (West St. Paul-Mendota Heights) starts at 8:30 or later, in compliance with AMA recommendations.
- North St. Paul-Maplewood-Oakdale and South St. Paul both start at 8:15 AM.
- Inver Grove Heights is seriously considering moving to 8:30 for the 2017-18 year.

Recommendations

- Follow the American Academy of Pediatrics and AMA recommendations to start high schools no earlier than 8:30 AM.
- Protect domestic workers' right to sufficient sleep.
- Work to improve sleep environments, especially in lower income neighborhoods, through decreased noise and light pollution.

Additional References

- Lund HG, Reider BL, Whiting AB, Prichard JR. (2010). Sleep Patterns and Predictors of Disturbed Sleep in a Large Population of College Students. *Journal of Adolescent Health* 46: 124-32
- Prichard JR, Hartmann ME. What is the cost of poor sleep for college students? Calculating the contribution to academic failures using a large national sample. SLEEP annual conference. Minneapolis, MN June 2014.
- Boehm MA, Lei QM, Prichard JR. Depression, insomnia, and nicotine: Overlapping impediments to sleep in a national sample of college students. Poster presentation. SLEEP annual conference. Minneapolis, MN June 2014.
- Prichard JR, Kelly CK. Energy drinks on college campuses: Motivations, risky behaviors and health. American College Health Association Annual Meeting. Boston, MA, May 2013. Benca, R. M., & Peterson, M. J. (2008). Insomnia and depression. *Sleep Medicine*, 9, Supplement 1(0), S3-S9.
- Salo, P., Sivertsen, B., Oksanen, T., Sjösten, N., Pentti, J., Virtanen, M., Vahtera, J. (2012). Insomnia symptoms as a predictor of incident treatment for depression: Prospective cohort study of 40,791 men and women. *Sleep Medicine*, 13(3), 278-284.
- Taylor, D. J., Bramoweth, A.D., Grieser, E. A., Tatum, J. L., & Roane, B. M. (2013). Epidemiology of Insomnia in College Students: Relationship with Mental Health, Quality of Life, and Substance Use Difficulties. *Behavior Therapy*, 44, 339-348.