

Towards Zero Deaths Conference

Attacking the Roadway Sleep Zombies

Birdie Cunningham, MA, University of St. Thomas

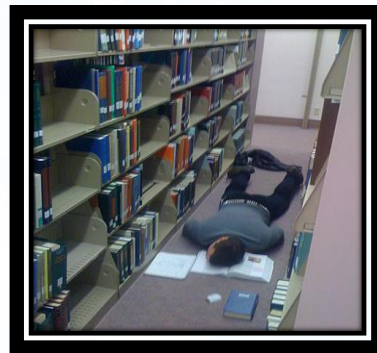
J. Prichard, Ph.D, University of St. Thomas

Gail Weinholzer, M.B.C., AAA-The Auto Club Group

Sleep Problems in Young Adults: A Public Health Crisis


Birdie Cunningham, MA
Associate Director Health & Wellness
Director of Operations & Programming, Center
for College Sleep

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Associate Prof. of Psychology/Neuroscience
Scientific Director, Center for College Sleep



Student Sleep Problems– In their own words

 **Dannnnnah**  @DannahBanana5 · 4m
This class NEVER ENDS. My first semester of **college**, I am definitely not taking an 8 a.m. class. I would fail it via **sleep**.

 **Abbey** @Abbey56 · 38m
All that's keeping me going is the thought of coming home from my test, taking an **Ambien**, and hibernating. #ihatetests #imissyousleep 😊
📍 from Lubbock, TX [Reply](#) [Retweet](#) [Favorite](#) [More](#)

 **Brittany Fehre** @brittanymfehre · 4m
4 hours of **sleep**  #college
Expand [Reply](#) [Retweet](#) [Favorite](#) [More](#)

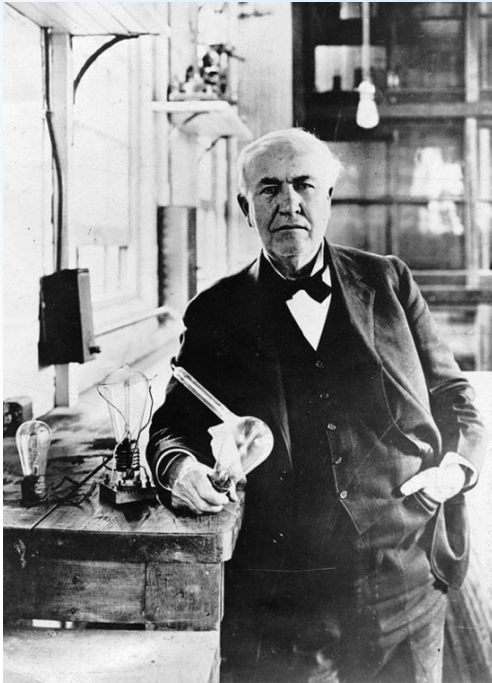
 **Larry Wentworth** @LarryWentworth · 8m
I got two and a half hours of **sleep** last night aka the **college** standard. Come to me Red Bull.
Expand [Reply](#) [Retweet](#) [Favorite](#) [More](#)

Our culture of Chronic, Insufficient Sleep



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





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

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Maslow's hierarchy of needs



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Yet, sleep is required for life.



Chinese man dies after Euro 2012 viewing marathon

A football-obsessed man from Changsha in south-central China has reportedly died after staying up for 11 successive nights to watch Euro 2012 matches.



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



Required Sleep Amounts

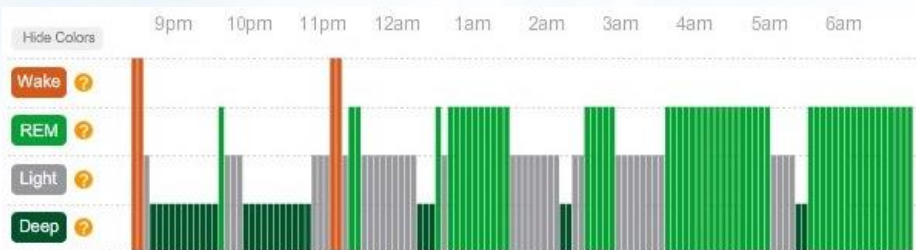
Newborns/Infants	0 - 2 months: 2 - 12 months:	10.5-18 hours 14-15 hours
Toddlers/Children	12 mo - 18 mo: 18 mo - 3 years: 3 - 5 years: 5 - 12 years:	13-15 hours 12-14 hours 11-13 hours 10-11 hours
Adolescents	On Average:	9.25 hours
Adults/Older Persons	On Average:	7-9 hours

Sleep Stages

	Awake	NREM	REM
EEG	Fast, asynch	Slow, synch	Fast, asynch
Sensation	Vivid, external	Dull, Absent	Vivid, internal
Thought	Voluntary	Idle	Vivid, illogical
Movement	Voluntary	Rare, involuntary	Muscle paralysis
Eye moves	Often	Rare	Often

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Different stages of sleep accomplish different tasks.

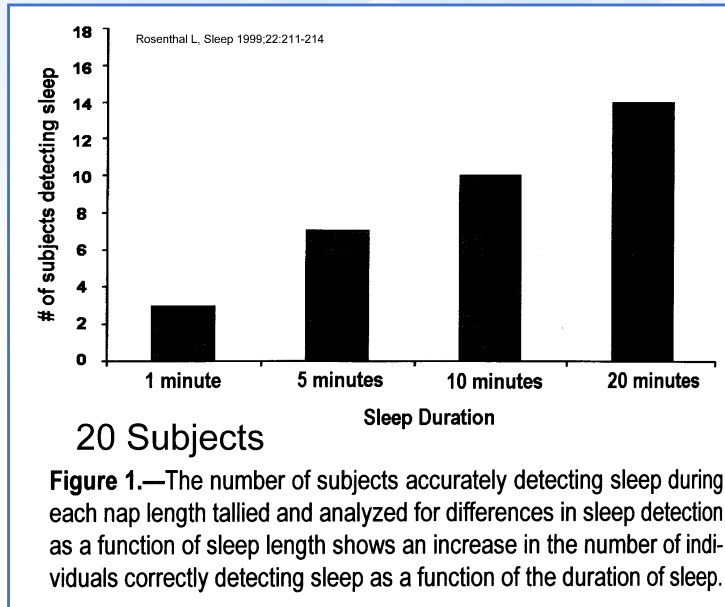


Cellular repair; Glymphatic clearance;
Neuroendocrine balance;
Immune responses

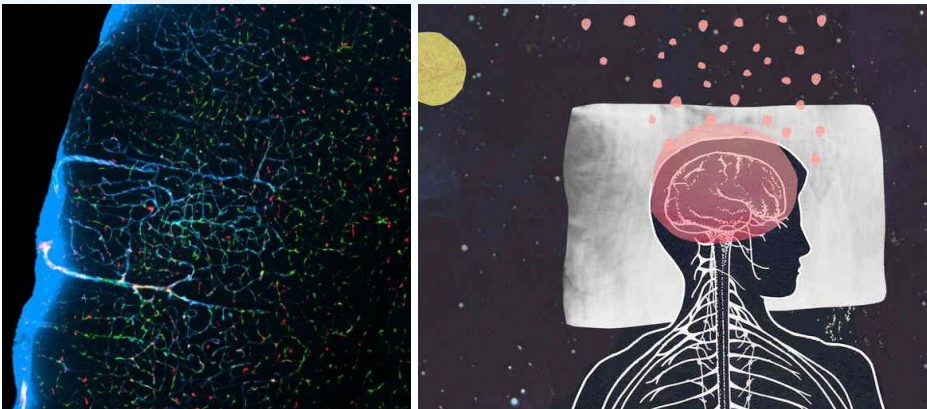
Emotional "Reset" Button;
Memory Processing;
"Offline" Problem Solving

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Sleep Perception

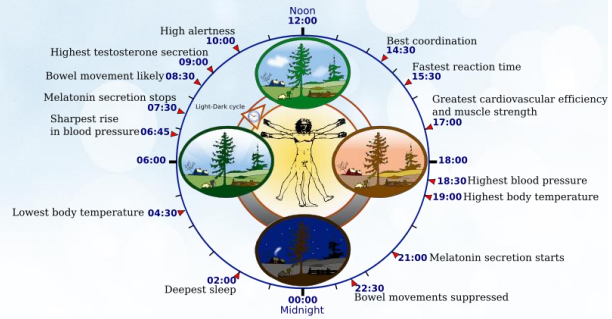


Sleep Drives Metabolite Clearance from the Adult Brain. Xie et al. (2013) *Science*





Sleep Homeostat



Circadian Rhythms

Sleep timing is controlled by synchronizing four processes.



Zeitgebers



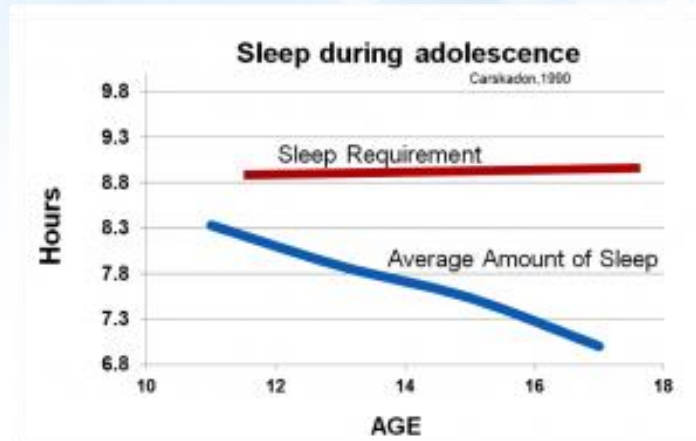
Psychoactive Substances



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.

We have a culture of Sleep Deprivation



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High School Start Times in Minnesota 2016-2017

Start Time	Number of districts with that start time	Enrollment in grades 9-12 affected by the start time
8:30 a.m. or later	43	31,248 (13%)
8:15-8:29 a.m.	138	59,841 (25%)
8:00-8:14 a.m.	107	66,735 (28%)
Before 8 a.m.	37	81,975 (34%)
TOTAL	325 Districts	239,799 Students

Source: Center for Applied Research and Educational Improvement (CAREI) 2012, 2016

87% of high school students in MN start before 8:30 am impacting over 200,000 teenagers

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Later High School Start Times Are Associated with Reduced Accidents

Teens and Auto Accidents

- Fayette County, Kentucky, two-year study, 1998
 - crash rates dropped 16.5% when high school start time went from 7:30 am to 8:30 am.
 - Auto accidents of teens in the rest of state increased 7.8%
 - A comparable decrease of 24.3%

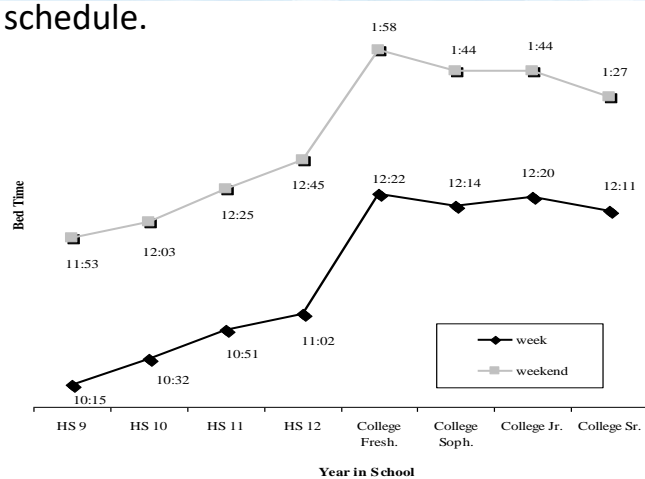
(Danner and Phillips, 2008)

- Virginia, 2007-2008 study of two similar, neighboring districts
 - 41% higher crash rates in Virginia Beach than in Chesapeake, Virginia where classes started 75 minutes later.

(Vorona, 2010)

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The first year in college is associated with an abrupt shift in sleep schedule.



High School Data from
2006 Sleep in America Poll (n = 1,602)

Lund et al. 2010 J. Adolescent Health

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Self-reports in college students show inconsistent, insufficient & low quality sleep.

- Mean total sleep time was 7.02 hours
- Only 11.6% got >8hrs sleep a night
- 20% pulled all-nighters at least once in the last month
- 35% stayed up until 3AM at least once a week
- 15% fell asleep in class >1x/week

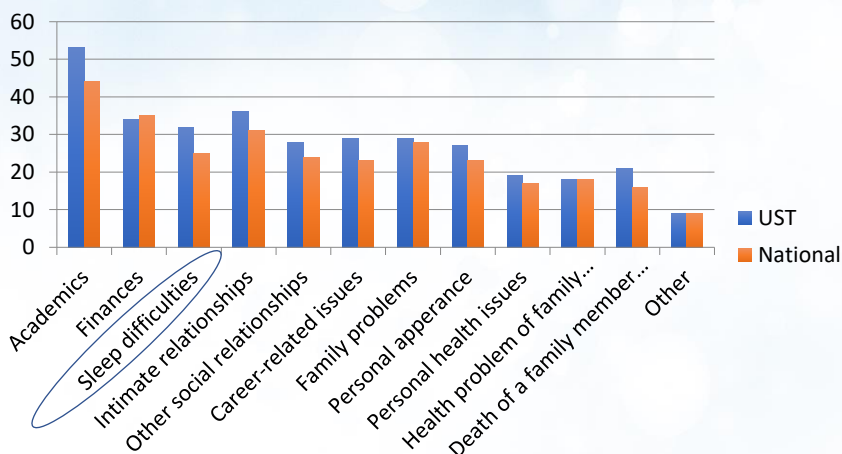
Only 37% of male students and 33% of female students met the criteria for healthy sleep on the PSQI.



Lund et al., 2010

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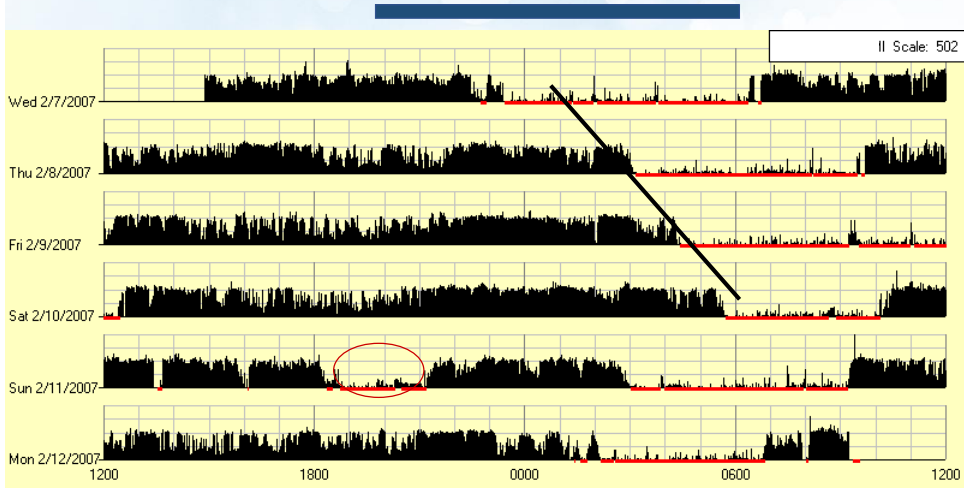
Within the last 12 months, have any of the following been traumatic or very difficult for you to handle?



42% of students report having **sleep difficulties**

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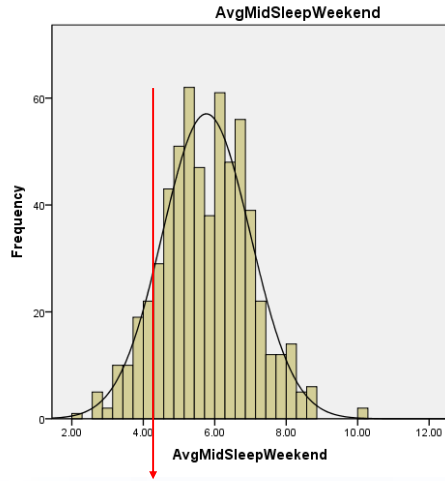
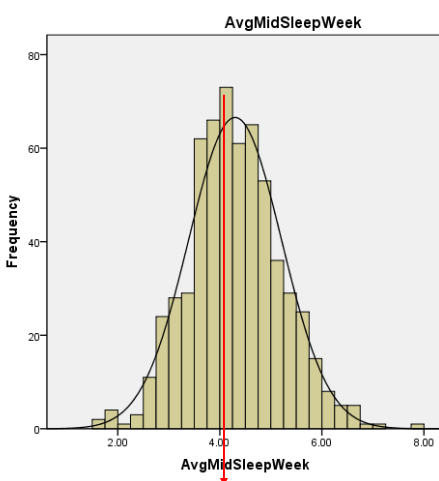
The majority of students experience social jetlag, irregular schedules, and inadequate sleep.



Sleep Debt: 8 hrs.

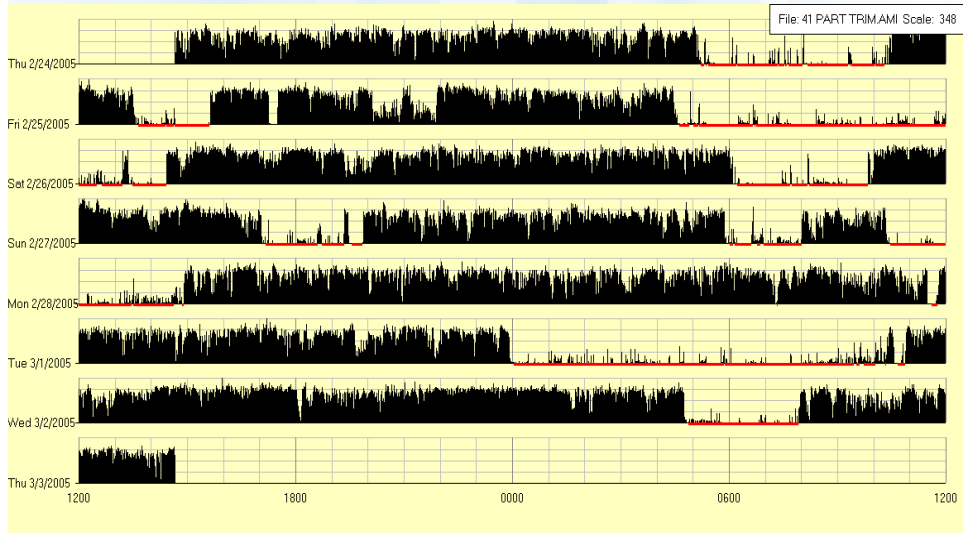
Prichard, ACHA 2013 presentation

Social Jetlag:
Equivalent to Flying from Chicago to LA
and back every weekend



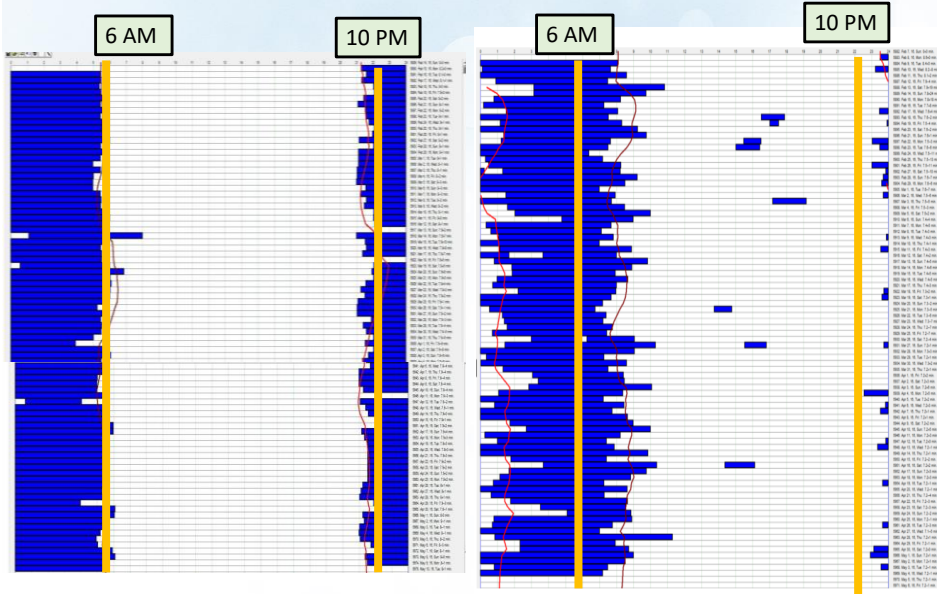
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Or worse...



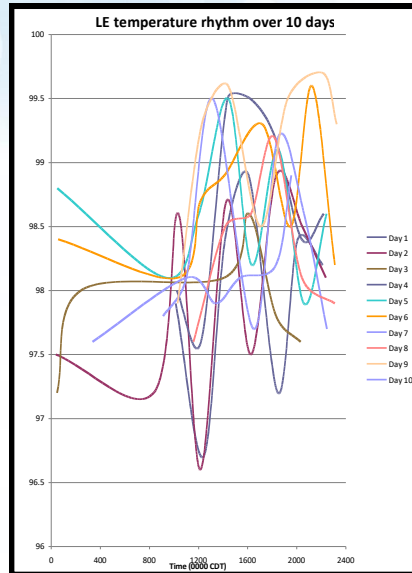
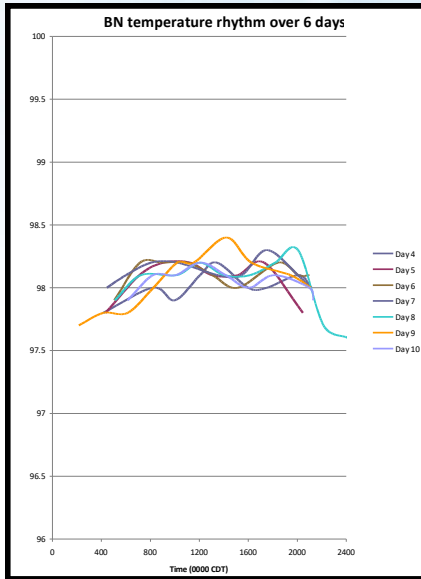
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A Tale of Two Sleep Schedules



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Circadian Temperature Rhythms and Erratic Schedule



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What's contributing to this poor sleep?



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Campus stores often promote pharmacological “solutions” to sleep problems.

- 70% sell energy beverages on campus
- 60% sell energy nutritional supplements
- 40% sell caffeine pills



COLLEGE SLEEP

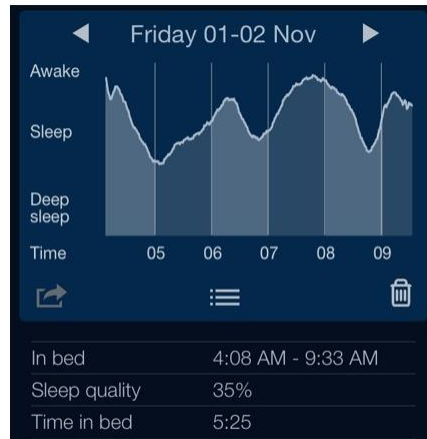
The Sleep Cycle app tracks sleep patterns and the alarm function increases the probability of waking while in REM sleep.



COLLEGE SLEEP

Normal Night

Caffeine induced SWS suppression



Normal Night

Alcohol induced REM suppression



Inadequate Sleep Hygiene Disorder

Insomnia for at least one month + presence of at least one of the following:

- ✓ Frequent daytime napping
- ✓ Highly variable bedtimes or rising times
- ✓ Routine use of nicotine, alcohol or caffeine
- ✓ Mentally stimulating, physically activating, or emotionally disturbing activities in bed
- ✓ Spending excessive amounts of time in bed and/or using bed for non-sleep/sex purposes



What does it really mean to be sleepy?



The Stanford Sleepiness Scale

<http://web.stanford.edu/~dement/sss.html>

Degree of Sleepiness	Rating
Feeling active, vital, alert, or wide awake	1
Functioning at high levels, but not at peak; able to concentrate	2
Awake, but relaxed; responsive but not fully alert	3
Somewhat foggy, let down	4
Foggy; losing interest in remaining awake; slowed down	5
Sleepy, woozy, fighting sleep; prefer to lie down	6
No longer fighting sleep, sleep onset soon; having dream-like thoughts	7
Asleep	X



Epworth Sleepiness Scale (ESS)

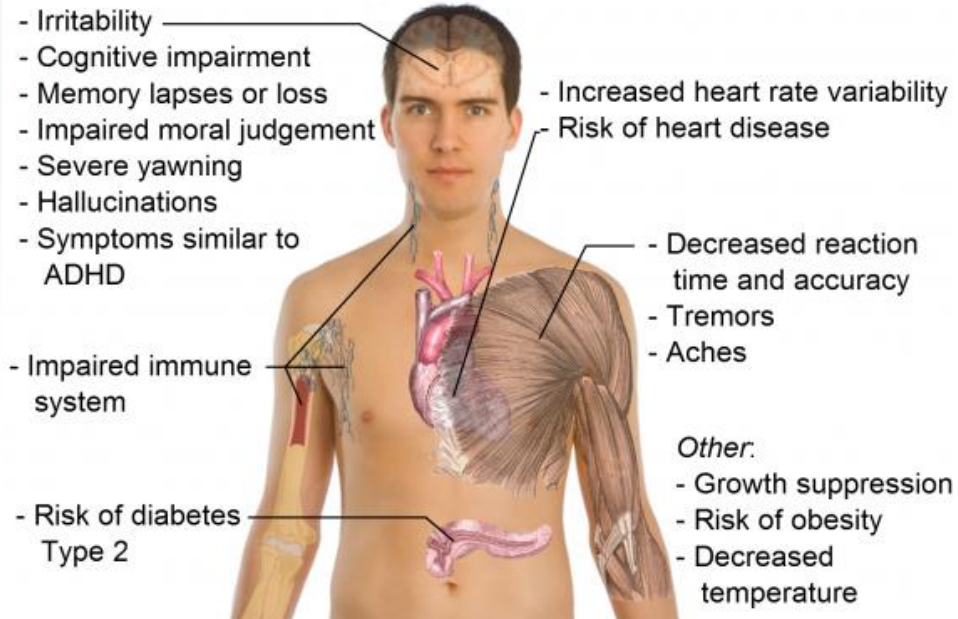
Situation	Chance of dozing (0-3)			
Sitting and reading	0	1	2	3
Watching television	0	1	2	3
Sitting inactive in a public place—for example, a theater or meeting	0	1	2	3
As a passenger in a car for an hour without a break	0	1	2	3
Lying down to rest in the afternoon	0	1	2	3
Sitting and talking to someone	0	1	2	3
Sitting quietly after lunch (when you've had no alcohol)	0	1	2	3
In a car, while stopped in traffic	0	1	2	3
Total Score				

0 = would never doze 1 = slight chance of dozing 2 = moderate chance of dozing 3 = high chance of dozing

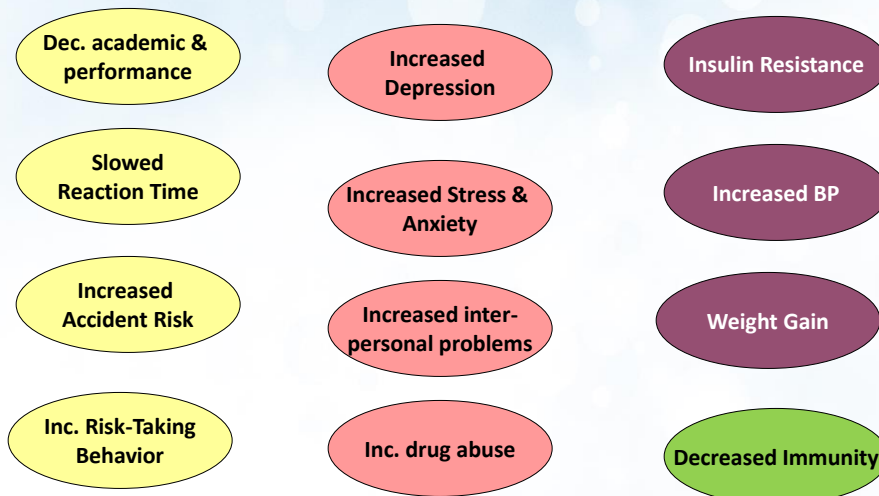
Johns MW. *Sleep*. 1991;14:540.



Sleep deprivation



Consequences of poor sleep in college students



Chronic Mild Sleep Deprivation & Cognition

- Subjects slept for 4-6 hours a night for 14 consecutive nights
- Deficits in cognitive performance equivalent to 3 days without sleep
- Subjects reported not feeling sleepy



(Nat. Institute of Health, 2003)



Sleep Deprivation & Cognition

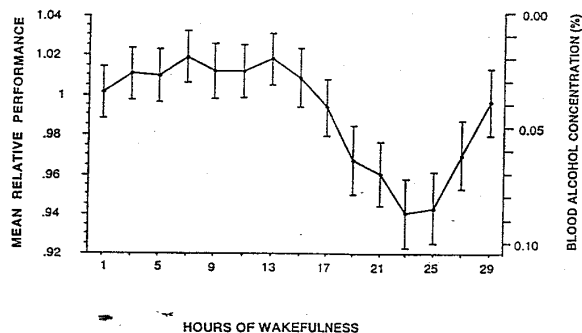
• Cognitive performance:

- Tracking task on computer
- No change for 12 hrs
- Drops from 12-24 hrs
- Rebounds 24-29 hrs!

• Conclusion:

- Performance declines between 12 and 6 a.m. due to fatigue and Circadian rhythm.

Nature 1997



COLLEGE VOICES CAMPUS LIFE CAREER PATH STUDY ABROAD COLLEGE CHOICE TECH


VOICES FROM CAMPUS

Effects of sleep deprivation equal to binge drinking or marijuana use, study shows

By: Jayson Flores June 6, 2014 2:30 pm

5.4k shares

SHARE TWEET EMAIL



BUYPOWER CARD™

MEET THE BUYPOWER FROM CAPIT.

Capital One

MOST SHARED TODAY

Student creates ne movement' Not a

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Each additional day per week a student experiences sleep problems raises the probability of dropping a course by 10% and lowering their cumulative GPA by 0.02.

Hartmann and Prichard 2017

Last 12 months Injury Rate:

Non-Athlete- 11.3%

OK Sleep- 7.1%

Sleep Difficulties- 14.8%



Varsity Athlete- 26.3%

OK Sleep- 18.4%

Sleep Difficulties- 34.4%



N=103,233 NCHA-II Spring 2011 Cohort

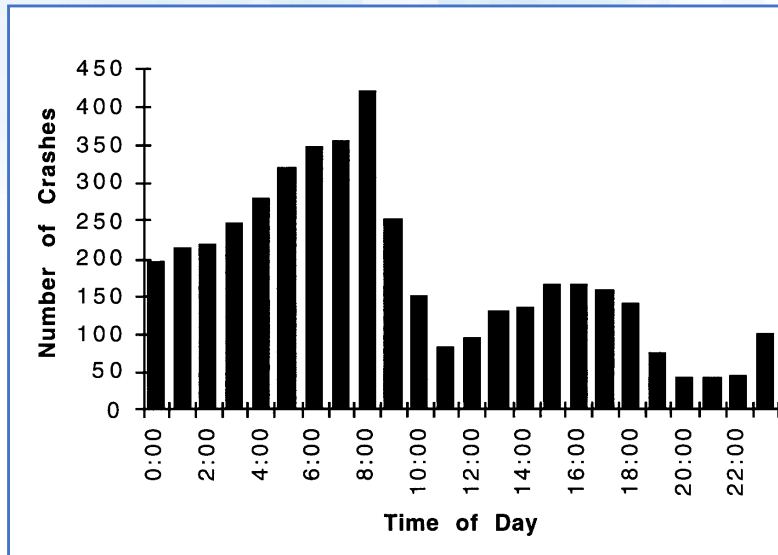


Behavioral Risk Factor Surveillance System, CDC 2009

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%

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

100,000 sleep-related crashes per year; 1,500 fatalities and 71,000 injuries
 51% of adults report driving drowsy; 17% dozed off at the wheel



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Sleeping Behind the Wheel

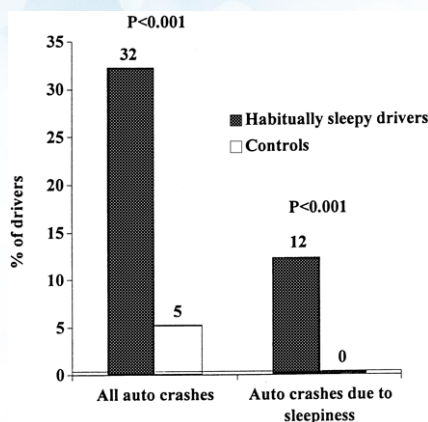
Prior Lake track star returning from college meet dies in car crash

By Chris Graves
Star Tribune Staff Writer



Katie Drentlaw drove from Prior Lake to Iowa before the sun rose Friday to take a peek at her future. It would be as close as the 18-year-old Prior Lake High School track star would ever get. Drentlaw — feisty, strong-spirited and full of energy — was killed when the sport-utility vehicle she was driving left Interstate Hwy. 35 near Faribault, Minn., hit a dirt embankment and rolled onto its driver's side about 12:30 a.m. Saturday. "She apparently fell asleep," said Jodi Hodstrom, a close friend of the Drentlaw family. "She was just tired; she had had a big day. She should have stayed, but she had a mind of her own."

Katie Drentlaw and a friend went to watch the Drake Relays.



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

Masa et al. 2000 OR COLLEGE SLEEP

LEADING HEALTH INDICATOR **SLEEP**

FIRST YEAR GUIDE TO COLLEGE SLEEP
GET MORE ZZZZZZ's TO GET MORE A's

GET MORE ZZZZZZ's TO GET MORE A's SLEEP CHALLENGE
COMING OCTOBER 10-29

Win prizes and gain knowledge about sleep. Improving sleep can mean improving your academic performance, physical and mental health, and relationships.

For more info and to sign up: sthomas.edu/wellness

Wellness Center | #StThomas

LEARN HOW TO GET BETTER SLEEP!

Take the College Sleep Questionnaire
www.thecsq.com/#/stthomas

WELCOME TO CAMPUS!

Research shows that a student's sleep quality is highly related to their overall wellbeing and satisfaction.



Students say they get better sleep when they have:

- Ear plugs and/or a white noise generator or app to mask background noise
- A fan to circulate air and help keep you cool
- Eye mask and/or black out curtains on a tension rod to keep the room dark
- Dim lamps or a small book light
- Good quality pillows and comfortable bedding

GET MORE ZZZZZZ's TO GET MORE A's

Start a conversation with your roommate about your preferences for quiet hours, bedtime, ambient noise, and the wake up process. If you have questions, the Wellness Center can assist you!

sthomas.edu/wellness

Wellness Center | www.stthomas.edu

YOUR UNIVERSITY LOGO HERE

Name: _____ Date: _____

COLLEGE SLEEP QUESTIONNAIRE | RESULTS

YOUR WEEKLY SLEEP

SLEEP SCHEDULE

Note how the sleep schedule you reported differs from the sleep schedule recommended for your circadian preference. Irregular sleep schedules are linked to decreased academic performance, increased stress, and more illness. Going to bed and waking up at approximately the same time (within an hour) every night, even on the weekends, helps you fall asleep faster, stay asleep through the night, and wake up feeling more refreshed.

YOU REPORTED:

- Taking a long time to fall asleep
- Not feeling alert when you wake up
- Not feeling tired when it's time for bed
- Having an inconsistent sleep schedule

RECOMMENDATIONS:

- Make a plan for your sleep
- Include your sleep time into your schedule
- Set an alarm one hour before bedtime as a reminder

TOTAL SLEEP TIME

Most college students need between 8 and 9 hours of sleep a night to feel fully rested. Needing an alarm to wake up is a sign that you're not getting enough sleep.

Last week, you reported getting 4 hrs., 50 min. of sleep on average, 60% of the recommended daily amount.

EXCESSIVE SLEEPINESS

Feeling sleepy throughout the day is a sign of sleep deprivation and/or non-restorative sleep. If you experience excessive sleepiness, please consider these results to see what changes you can make to improve your sleep.

YOU REPORTED:

- Frequently feeling tired during the day
- Dangerous behaviors like drowsy driving

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CSQ Institutional Data Snapshot

University Logo

TOTAL SLEEP TIME

Mean Total Sleep Time by Day of Week (including naps)

The average total amount of student sleep (including naps) per day on your campus.

SLEEP TIME

According to the American Academy of Sleep Medicine, adults need between 7 and 9 hours of sleep in a 24-hour period for optimum health, and some young adults might need closer to 10 hours of sleep. Chronic sleep deprivation is linked to increased accident risk, mental illness, and physiological illness.

SLEEP LATENCY IN MINUTES

Sleep latency is the amount of time it takes a person to transition from wakefulness to sleep. Falling asleep in less than 5 minutes often indicates excessive sleepiness, whereas taking longer than 20 minutes to fall asleep can be a sign of anxiety, depression, circadian misalignment, or excessive caffeine/alcohol use. Having a consistent bedtime and pre-sleep routine that includes shutting off electronic devices helps students achieve a healthy sleep latency.

AVERAGE BED AND RISE TIME

SOCIAL JETLAG

0.6 hrs

Social jet lag is calculated as a difference in hours between the midday point in sleep on the weekends versus the weekdays. Students who stay out later at night and sleep in on the weekends might experience social jet lag, when their bodyrhythms are out of sync with the academic schedule, making it particularly difficult to get to sleep on Sunday mornings and wake up Monday evenings at the preferred time.

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College Sleep Environmental Scan

COLLEGE SLEEP ENVIRONMENTAL SCAN™

Purpose: According to the American College Health Association, sleep problems are one of the top five concerns of college students and one of the major impediments to their academic success. Environmental scans are surveys used to help individual organizations and communities recognize difficulties and opportunities for improvement regarding a particular issue. This environmental scan was created as a tool to help college administrators identify areas of strength and growth in order to foster college environments that are conducive to good sleep.

Instructions: For each section, please contact the appropriate department or person(s) for their input and report answers to the best of your ability. Please verify your answer for each item; assumptions are often incorrect. Upon completion, please upload your results as detailed in the instructions you received.

SECTIONS

1. Campus Facilities
2. On-Campus Sales
3. Vending Machines
4. Academics
5. Accommodations
6. Residence Housing
7. Residence Policies
8. Programming
9. Student Health
10. Sleep Education
11. Assessment

Scoring: Scores are listed by each question. Higher numbers indicate better scores. Please calculate your score per section.

The College Sleep Environmental Scan™ was developed by Lisa Brook, M.A., C.A.S.E.S. of Middlebury College and by Brooke Cunningham, M.A. and a former student of Middlebury College. For information about the College Sleep Environmental Scan™, including licensing arrangements, contact CollegeSleep@middlebury.edu.
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HOW SLEEP FRIENDLY IS YOUR CAMPUS?



Poor sleep has a detrimental effect on academic success similar in magnitude to marijuana use and high-risk drinking.

COLLEGE SLEEP ENVIRONMENTAL SCAN

- The College Sleep Environmental Scan is a free tool designed to help analyze how institutional policy, programming and structures contribute to or impede healthy sleep on your campus.
- Formative data provided to help evaluate making institution-wide changes to address poor sleep.
- Participating institutions receive evidence-based annotated bibliography and yearly aggregate report.



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stthomas.edu/collegesleep

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