



ADOLESCENT SLEEP, HEALTH,
AND SCHOOL START TIMES
THE NATIONAL CONFERENCE

Sleep, School Start Times, and Academic Performance

Amy R. Wolfson

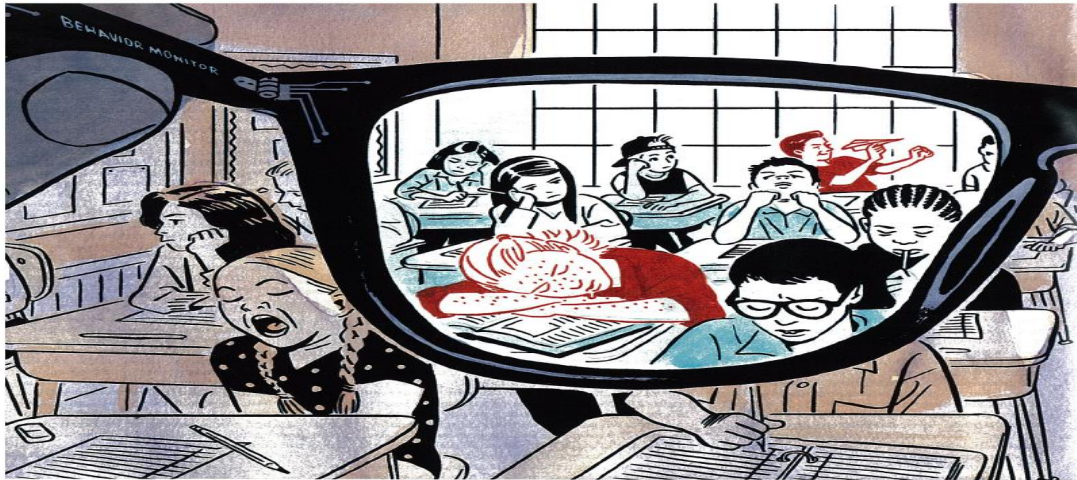
Professor of Psychology

Vice President for Academic Affairs

Loyola University Maryland



LOYOLA
UNIVERSITY MARYLAND



New York Times Magazine,
Sunday, March 7, 2010

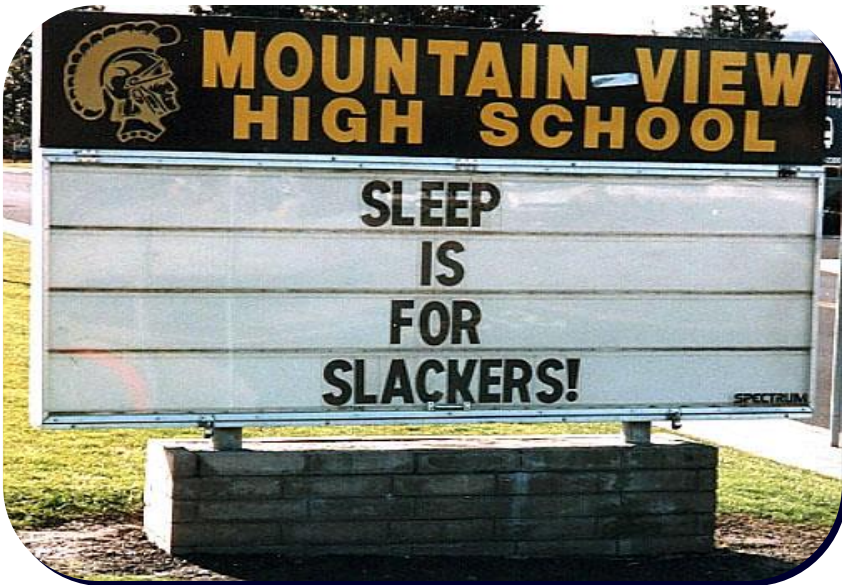
CAN GOOD TEACHING BE LEARNED?

THERE ARE MORE THAN THREE MILLION TEACHERS
IN THE UNITED STATES. AND DOUG LEMOV IS TRYING TO
PROVE THAT HE CAN TEACH THEM TO BE BETTER.

BY ELIZABETH GREEN

Or, Can We Really Teach Sleepy Students?

Secondary and Higher Ed's Thoughts on Sleep!



“Chicago prides itself on being a grind. As the school's own recruitment book dryly warns, ‘You know you're doing well when your GPA is higher than the number of hours you sleep a night.’”

Newsweek, 4/5/1999



University of Chicago
Admissions Staff

School Start Times and Academic Performance

- Early research: Minneapolis–St. Paul (Minnesota):
 - Minneapolis & several suburban districts shifted to later bell times for high schools (starting in 1997-98), but St. Paul and other suburban districts maintained early schedules.
- Wahlstrom examined (2002: Minneapolis) (2014: 8 US High Schools, 3 states, 9,000 students) pre/post change.
- Results:
 - **Attendance rates increased (inconsistent)**
 - **Tardiness decreased (over 50% less)**
 - **Grades (GPA) improved (core courses: Social Studies, Science, Math, English)**



Middle School Start Times and Sleep



Method:

- N = 205 7th & 8th graders from early (**7:15 am**) and late (**8:37 am**) start public Worcester, MA schools; 18% low income families
- Self-reported sleep habits and transcript grades assessed fall & spring

Key Results:

- School L **sleeping 51 min. longer** on school nights due to getting up **71 min. later**.
- 36% at School L reported they obtained **9+ hours sleep** on school nights vs. 18% at School E.
- School L reported significantly less **daytime sleepiness**.
- **School E tardy 4 X more often than at School L.**
- **8th graders at School E had significantly lower grades than School L.**

(Wolfson et al., '07)

School Start Times and Testing

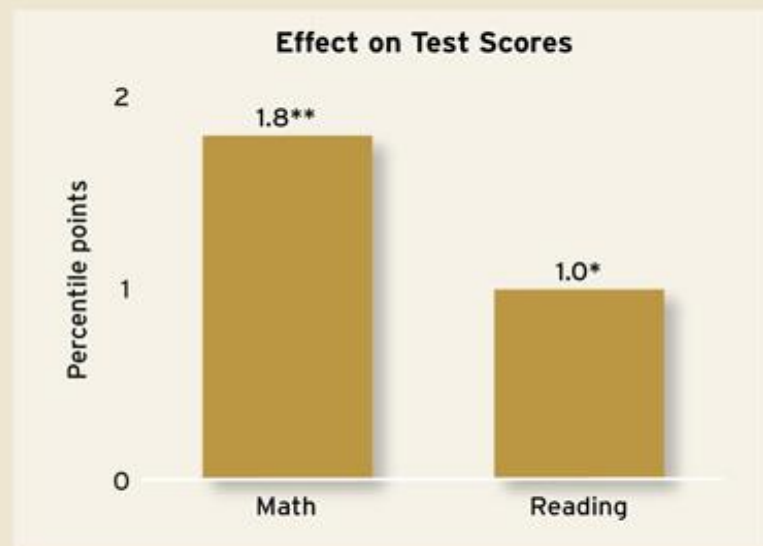
- School start times: 7.30 a.m. - 8.45 a.m.
- 1 hour ST delay tied to 3 percentile point gain in Math and Reading test scores for average student.
- Benefit greatest for students at lower end of grade distribution.
 - Students in 30th percentile of ability distribution perform about 3 percentile points higher on Math due to 1-hour ST delay, while students at 90th percentile perform close to 1 percentile point higher.
- **Benefits persist through 10th grade.**
 - Controlling for HS start time, students whose middle school started 1 hour later in 8th grade continue to score 2 percentile points higher in both Math & Reading in grade 10.



Better Later (Figure 1)

<http://educationnext.org/do-schools-begin-too-early/>

Test scores rise for students attending schools that move their start times later.



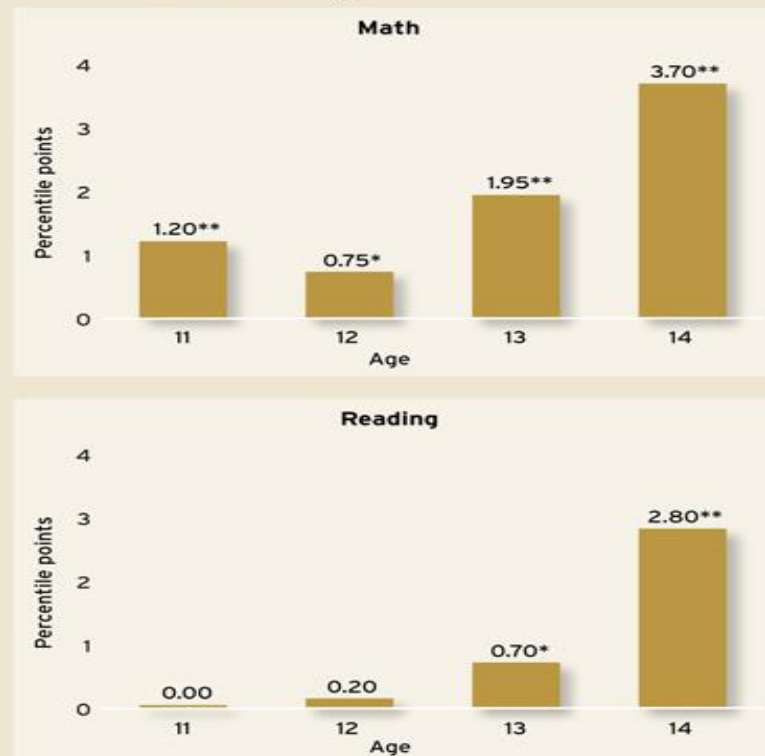
** (*) indicates that the effect is statistically significant at the 99 (95) percent confidence level.

Note: Estimated effects on test scores of starting school one hour later are based on a fixed-effect analysis that compares individual students only to themselves at different points in time while controlling for school and grade.

SOURCE: Author's calculations

A Teen Effect (Figure 2)

In both reading and math, the test-score effects of later start times increase as students age.



** (*) indicates that the effect is statistically significant at the 99 (95) percent confidence level.

Note: Estimated effects on test scores of starting school one hour later are based on a fixed-effect analysis that compares individual students only to themselves at different points in time while controlling for school and grade. Age is as of January 1 of the relevant school year.

SOURCE: Author's calculations

Time of Day and Academic Performance

- H.S. students (Chicago Public Schools) with lower grades & greater absenteeism when class for particular course met in 1st period vs. later in day (particularly for Math, & underrepresented minority students).

(Cortes, Bricker, & Rohlf, 2012)

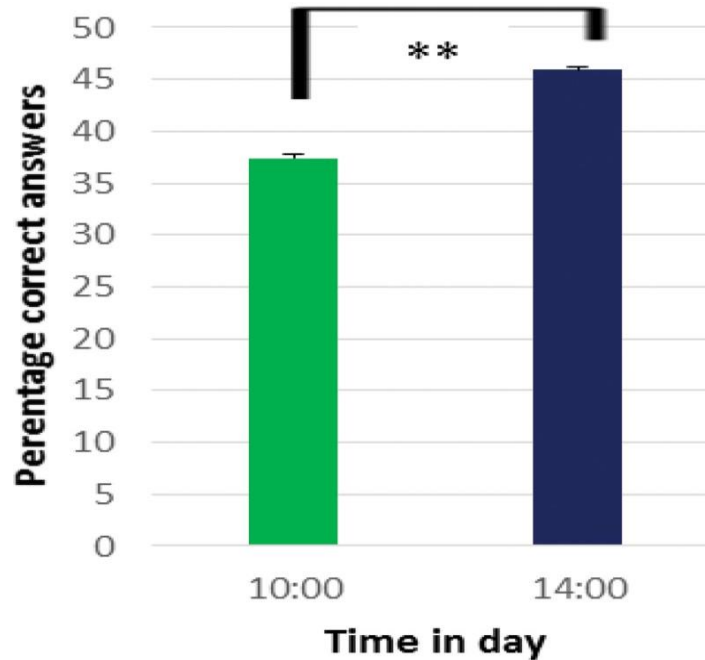
- College students (Clemson University) higher grades if course met later in day.

(e.g., Dills & Hernandez-Julian, 2008)

- High school students performed better on cognitive tests in pm vs. am.

(e.g., Hansen et al. 2005).





Test score percentage increases by time in day. Matching word pairs tests were given to subjects ($n = 120$) at 10:00 and 14:00. Test scores were significantly higher at 14:00.

** T -test repeated measures, $p < .01$; effect size Cohen's $d = 0.32$. All data are means \pm SEM.

Kelley, Lockley, Russell, Foster, & Kelley; *Learning, Media and Technology* **2015**, 40, 210-226.

So, what is happening?



Mechanisms, Time, Family Involvement, etc.

- Start times may affect amount of time that students spend doing --
 - Studying, homework
 - part-time work
 - sports
 - other extracurricular activities
- Starting times may also affect
 - parental employment
 - family schedules
 - amount of time students spend with their parents/adult family members.
- **Each may in turn might influence academic achievement/performance...**



Optimal Amount of Sleep for Mental Efficiency: Not a New Concept!

(Terman & Hocking, 1913)

- Historical assumption: Irregular sleep schedules, inadequate sleep lead to poor school outcomes.
- Current databases allows us to draw research-based conclusions about *sleep patterns and academic performance*.



Educational Considerations, Academic Performance Needs & Sleep Deprivation

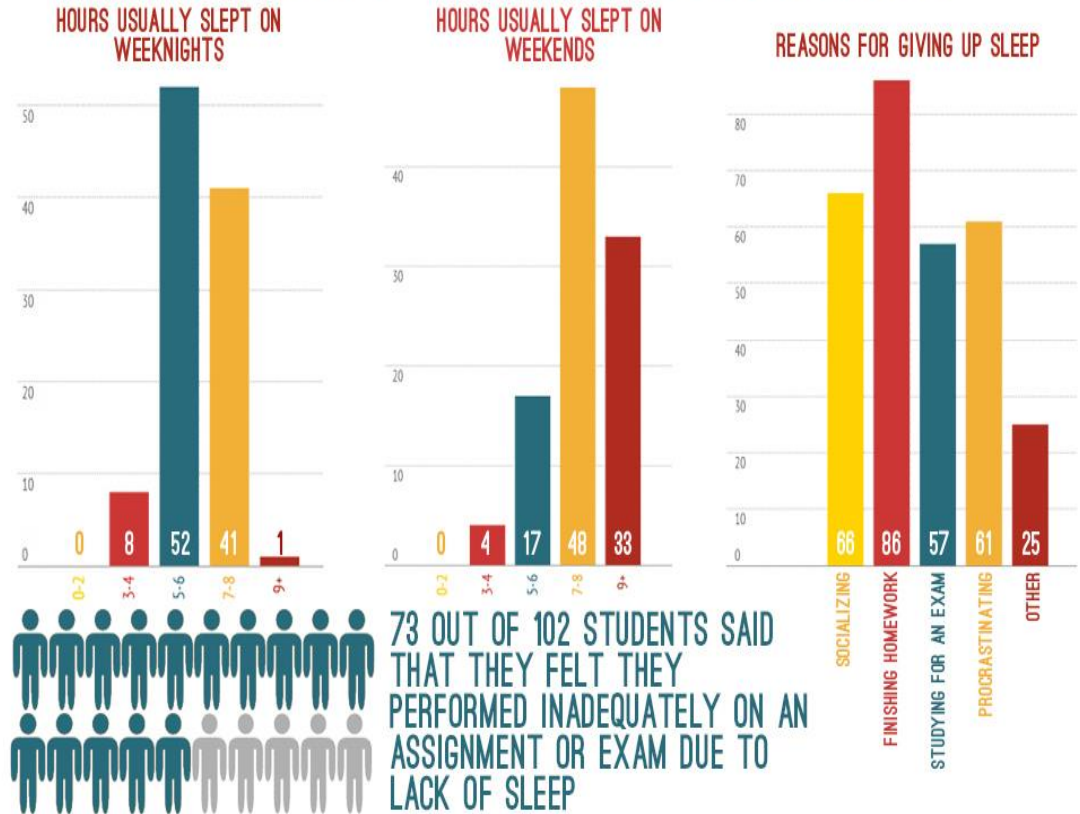
- Concentration
- Performance
- Attention
- Memory encoding
- Memory consolidation
- Multitasking
- Decision making
- Creativity
- Communication



2006 NSF Adolescent Sleep Poll

- At least 1 X week:
 - * 28 percent fall asleep in school
 - * 22 percent fall asleep doing homework
- Teens with insufficient sleep
 - * lower grades
 - * 80% sufficient sleep report As & Bs

STUDENT SLEEP STATISTICS



Review: Sleep Habits and Academic Performance

- 18+ publications
- Largely self-reported grades & sleep habits
- Sample sizes: 100 - 6,000
- Ages (grade) ranged from 5th through 1st year college
- Educational settings: public, private, several countries represented
- Majority looked at self-report GPA (few assessed attendance, tardiness, concentration/attention)

(Wolfson & Carskadon, 2003)

- Wolfson & Carskadon ('03) concluded that self-reported

- **shortened total sleep time**
- **erratic and/or delayed sleep schedules**
- **poor sleep quality**

- **Negatively associated with Academic Performance for middle school thru college years.**

Sleep and School Performance: Meta-Analysis

Method:

- 50 Studies
- Children and Adolescents
- School Performance (self/parent report, GPA, or test scores)
- 3 sleep factors: Sleepiness, Sleep Quality, Sleep Dur (mostly self-report)

Findings:

- All three sleep-school perf. associations had significant effect sizes:
 - **greater Sleepiness**
 - **poorer Sleep Quality**
 - **shorter Sleep Duration****associated with worse Academic Performance!**
- Sleepiness was the strongest, followed by Sleep Quality, & Sleep Duration

(Dewald et al., 2009)

Longstanding Q: To Sleep or To Study?

Longitudinal study: examined nightly variations adolescents' study & sleep time associated with academic problems the next day.

Participants (N = 535, 9th grade) completed daily diaries for 14 days in 9th, 10th, and 12th grades.

(Gillen-O'Neel, Huynh, & Fuligni, 2013)

- **Results:** Regardless of how much student studies each day, if sacrifice sleep time to study more than usual, more difficulties:
 - understanding class material taught
 - struggles on assignment/test next day
- Since adolescents increasingly likely to sacrifice **sleep time VS. studying**, negative dynamic increasingly prevalent over time.
- **WARNING: Must underscore that findings do not suggest that it is problematic for YOU to spend more time studying overall.**



Recent Study:

Sleep & Academic performance: population-based study in Norway

- Survey; N = 7798; adolescents aged 16–19 years (54% girls)
- School performance (GPA) obtained from transcripts
- Controlled for socioeconomic status

- Most sleep factors associated with increased risk for poor school performance

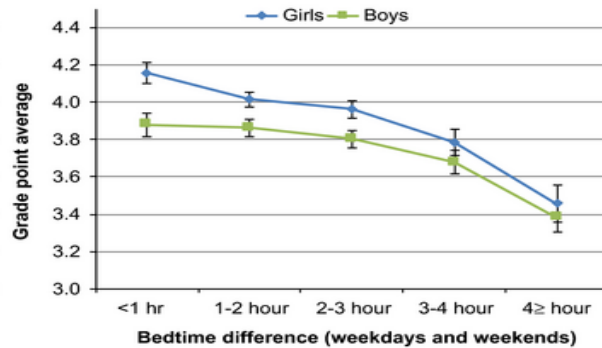
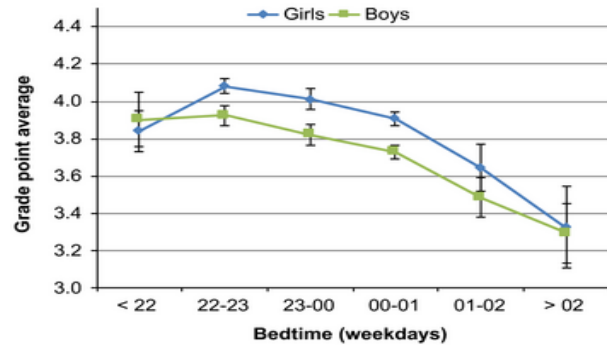
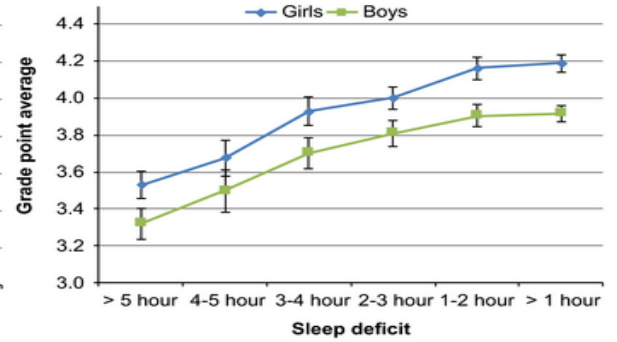
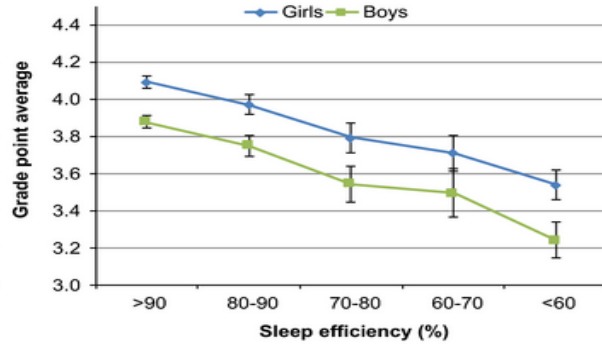
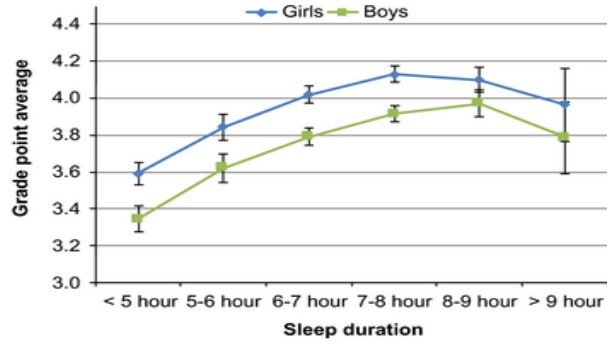
- Short sleep duration & Sleep deficit highest odds of poor GPA (lowest quartile).

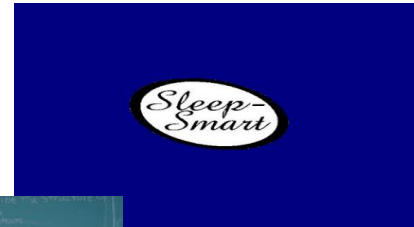
- School night bedtime associated significantly with GPA, with adolescents going to bed between 22:00 and 23:00 had highest GPAs.

- Delayed sleep schedule during weekends associated with poor academic performance. *(Hysing et al., 2016)*



Sleep and academic performance in later adolescence: results from a large population-based study





THANK YOU!!!!