

Changing School Start Times: Findings and Issues

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Literature Overview

- Teens who reported getting an insufficient amount of sleep reported more stress, were more likely to be overweight, and used more harmful substances to help them sleep, such as sleeping pills, cigarettes, and alcohol (Noland et al., 2009).
- Acute sleep loss is linked to increased sleepiness throughout the day, and for many adolescents sleep loss can also affect motivation, emotional regulation, and attention/performance problems (Dahl, 1999).
- Students who experience less sleep exhibit higher levels of depressive symptoms (Fredriksen et al.2004).

Literature (cont'd)

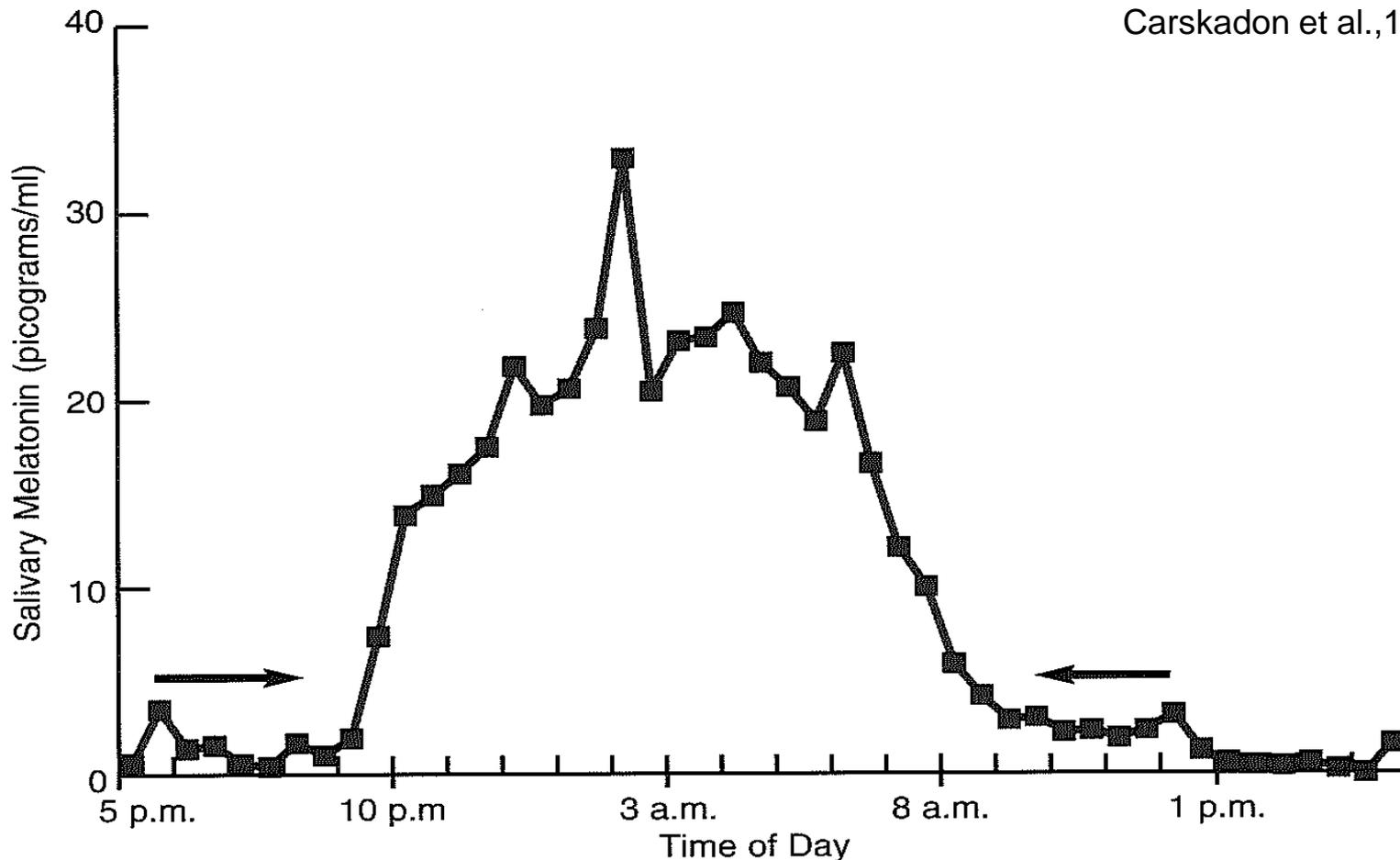
- In a meta-analysis of research on sleep and school performance, investigators found that sleep duration, sleep quality, and sleepiness were related to school performance (Dewald et al., 2010).
- 18.5 hours and 21 hours of wakefulness produced changes of the same magnitude as 0.05 and 0.08% blood alcohol concentration, respectively. (Arnedt, 2001)
- Danner & Phillips (2008) found that the average crash rate for teenage drivers dropped 16.5% in one county in the two years after the school start time was changed to about one hour later for those area high schools, while crash rates throughout the rest of the state *increased by* 8.9% during the same time period.

Literature (cont'd)

- Adolescents with a computer in their room had a tendency towards later bedtimes, later wake-up times, and shortened sleep duration (Shochat et al., 2010).
- More than half of teens who text or surf the internet at bedtime are likely not only to have problems falling asleep, but experience mood, behavior and cognitive problems during the day (Polos et al., 2010).
- High caffeine users experienced more interrupted sleep, especially on nights after increased daytime caffeine use (Pollak & Bright, 2003).

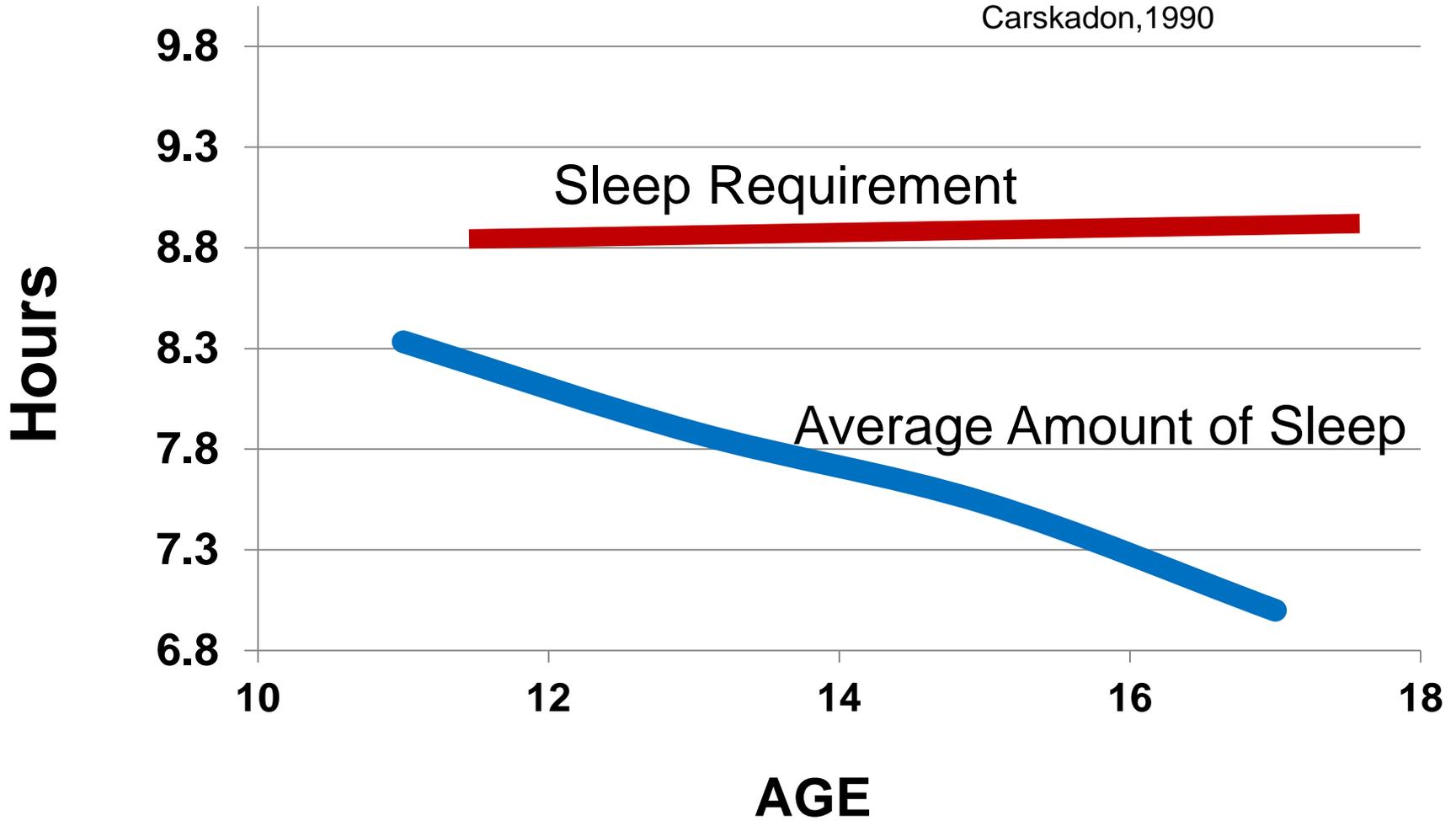
Pattern of Melatonin Secretion in Adolescents (as measured in saliva samples)—controlled by the circadian timing system

Carskadon et al., 1997



Sleep during adolescence

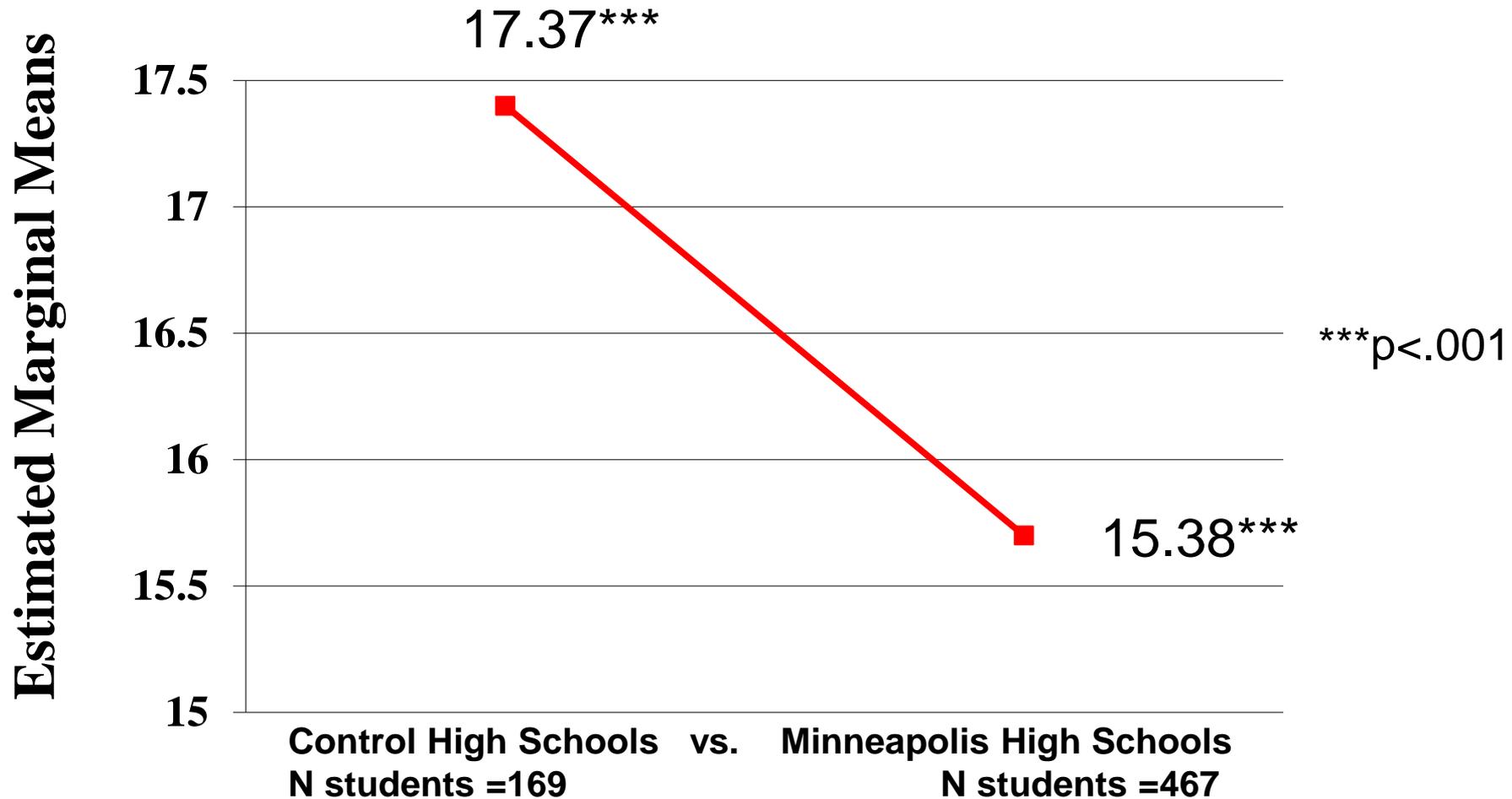
Carskadon, 1990



Earliest Research Completed in 1996-1998 by CAREI

- Edina, MN school district in 1996 was first in U.S. to shift to a later start, based on medical research about sleep phase shift in teens: 7:20 → 8:30
- Minneapolis School District in 1997 also shifted start time, based on findings in Edina: 7:15 → 8:40

Reduction in Sleepiness Scores as Measured by the Student Sleep Habits Survey



Current Research Study (2009-2013) funded by CDC

- Five school districts
- Eight high schools:
 - 5 schools in three Minnesota districts
 - 2 schools in Colorado district
 - 1 high school in Wyoming district
- Grades 9-12 (n=9,395)
- Start times ranged from 8:00 AM to 8:55 AM

Research Methods

- Analysis of achievement and attendance data
- Written student surveys—self report of wake/sleep times, sleepiness, physical and mental health, after school activities, substance use, technology in bedroom
- Analysis of car crash data
- Interviews with decision-makers

Attendance and Tardiness Rates

- Significant positive increases in attendance rate were noted for 11th graders and 12th graders, however, no more than one significant increase was obtained within a single district.
- Statistically significant decreases in ‘tardiness to class’ were obtained for grades 9, 10, 11, and 12 in the school districts that had instituted the latest school start times (8:35 and 8:55 AM).

GPA in 1st and 3rd period classes

- Statistically significant increases in 1st period GPA in core courses of English, math, social studies, and science were obtained in three districts with start times from 8:00-8:35 AM.
- Significant increases in GPA in core courses of English, science, social studies, and math were observed for all semesters in all grades in Jackson Hole HS with start time of 8:55 AM.
- The more days per week that students spend practicing *before* school, the lower the self-reported grades.

Standardized Test Performance

- Pre-post comparison on math scores revealed a statistically significant positive increase for one district.
- All districts provided ACT scores, and one of the four districts' pre-post comparisons resulted in a statistically significant increase.

Health and Wellness Findings: Teen Sleep Habits Survey

- Administered to 9,089 students
- Mean bedtime was 11:32 PM on school nights and mean wake time was 7:20 AM on school mornings, for an average of 7.9 hours of sleep on school nights.
- Mean weekend bedtime was 12:56 PM and mean wake time was 10:36 AM, for an average of 9.4 hours of sleep on weekends.
- Average amount of time from wake up to leaving the house for school was 54 minutes.

Odds associated with insufficient sleep
for health-risk behaviors:
CDC Youth Risk Behavior Survey, 2007
N= 12,154 students in grades 9-12

<8 hrs vs. > 8 hrs

- Used 1+ cigarettes daily 24% / 15%
- Used alcohol in past 30 days 50.3% / 36.7
- Used marijuana in past 30 days 23.3% / 15.6
- Currently sexually active 39.1% / 27.8
- Felt sad or hopeless (felt daily in past 2 wks & stopped usual activities) 31.1% / 21.6

McKnight-Eily, L.R. et al., *Preventive Medicine*, 2011

Percentage of HS students sleeping ≥ 8 hours on school nights by start time

- 8:00 AM 49.7% Mahtomedi, MN
- 8:00 AM 44.5 % Boulder HS, CO
- 8:05 AM 42.5% Fairview HS, CO
- 8:35 AM 57.0% Woodbury HS, MN
- 8:35 AM 58.9% East Ridge HS, MN
- 8:35 AM 60.0 % Park HS, MN
- 8:55 AM 66.2% Jackson Hole, WY

Health and Outside Activities

- Students who work at a job for pay or participate in clubs or other organized activities are statistically significantly more likely to get insufficient sleep (less than 8 hours per night)
- Students who work for a job for pay are statistically significantly more likely to:
 - report symptoms of depression.
 - drink soda and energy drinks, coffee or tea, use tobacco, alcohol, and other drugs than students who do not work for pay.

Effect of Technology on Sleep

- Students who reported more bedroom distractions were statistically significantly more likely to get less than 8 hours of sleep on school nights.
- Teens who reported getting insufficient sleep on school nights were significantly more likely to:
 - Have a computer in their bedroom (46.5% have one in their bedrooms)
 - Have a cell phone in their bedroom (87.6% have one in their bedrooms)
- We found no significant differences in amount of sleep for teens who had a T.V. in their bedrooms.

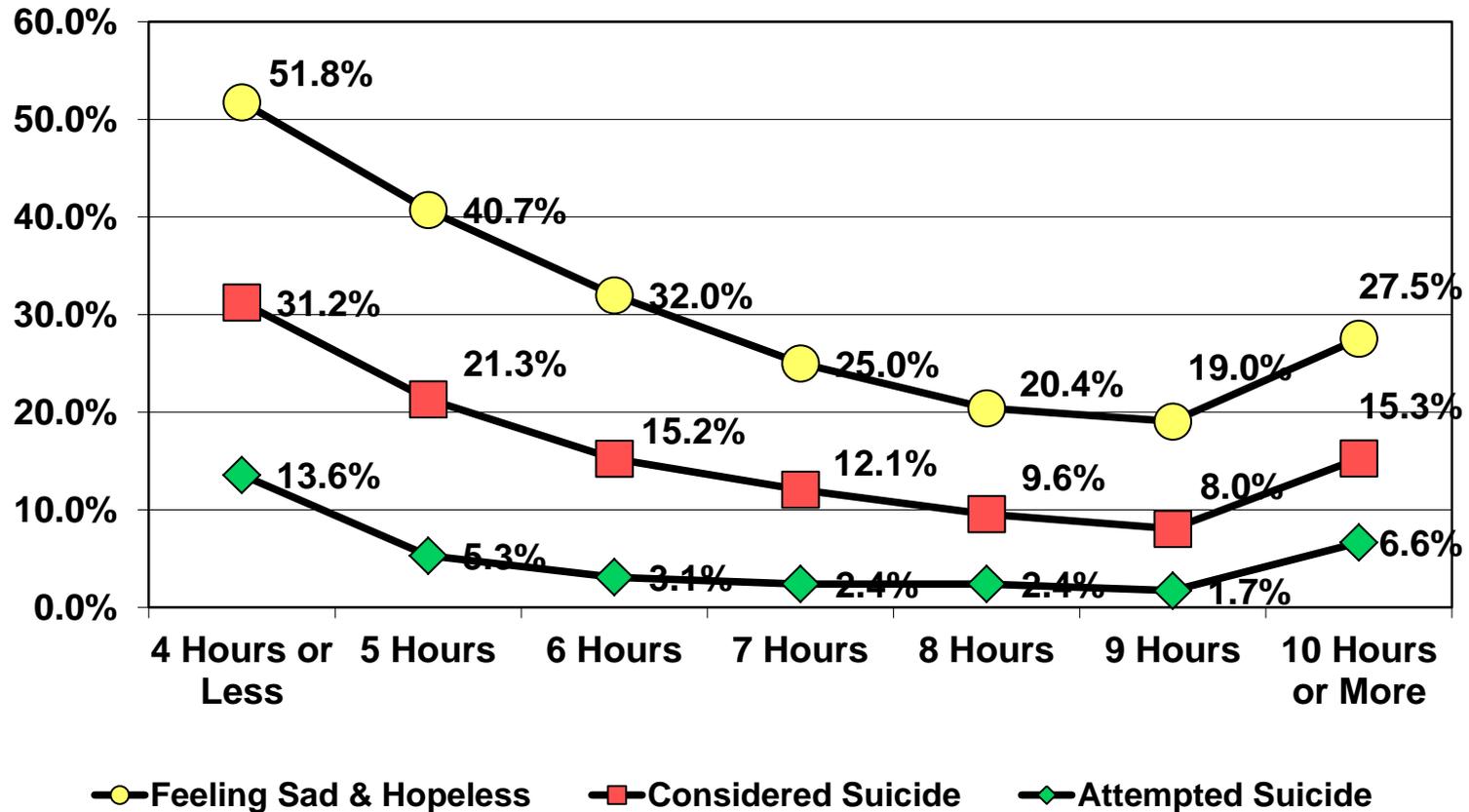
Sleep and the Regulation of Emotions

- Adequate sleep allows brain to balance positive and negative emotional memories.
- Inadequate sleep causes a dominance of negative memories to be retained.
- In addition, inadequate sleep reduces remembering positive and neutral memories.

M. Walker, 2009; R. Stickgold, 2005

Depression and Suicide by Average Number of Hours of Sleep on a School Night

Eighth, Tenth and Twelfth Grade Students
Fairfax County Public Schools, 2009



Source: Fairfax County Department of Neighborhood and Community Services, 2009, Youth Survey

More Sleep results in...

- Significantly fewer days home sick.
- Principals reporting fewer discipline incidents in the halls and in the lunchroom.
- Parents overwhelmingly saying that their teen-agers were “easier to live with”.

Car Crash Analysis

- Crash data were for crashes involving 16- to 18-year-old drivers for the school year months of September through May for the school years before and after the start time delay.
- Data were obtained from the state department of public safety for the districts included in the analysis.

Overall Crash Findings

- In the school year before the start time delay there were 240 crashes in all districts.
- After the start time delay, the number of crashes decreased to 209, an overall reduction of 13%.
- Jackson Hole High School (8:55 start) had a 70% reduction in teen car crashes during the school year after the change to a later start time.

District Decision Processes to Change to a Later Start Time

- Factual information (educational and medical) played a major role in the decisions in all five districts.
- Transportation issues were addressed by shifting around the multi-tiered bus systems.
- A parent engagement network in one district was the strongest catalyst supporting the later start time change.
- All districts had regular meetings for input, including key community stakeholders, in the year before the change. Adequate time for planning for adjustments was essential for a smooth transition.

Secondary Teachers' Opinion of Optimal Start Time for First Class Period for Most Students

<7:30	382	12.8%	
7:45	162	5.5	
8:00	1062	35.2	68.5
8:15	294	9.8	
8:30	707	23.5	35.7
8:45>	371	12.2	
No Opinion	<u>36</u>	<u>1.0</u>	
TOTAL	3,014	100.0%	

Research Findings: Real Issues vs. Concerns Not Substantiated

Real

- Athletics—schedules and last class missed
- Younger children in AM darkness
- Child care schedules for younger kids before and after school
- Parents' work schedules
- Local traffic patterns

Not Substantiated

- Athletics—less participation, fewer games won
- Transportation costs higher
- After-school activities decline
- Teens stay up later
- After-school employment negatively affected

How Late is “Late Enough?”

- Early findings suggested that districts which made a modest move to a later start (e.g., from 7:25 to 7:55; from 7:35 to 8:05) experienced only modest benefits, but have experienced the same amount of community disruption as did the districts that made the change to start at 8:30 or later.

Summary

- There are clear, positive outcomes for adolescents whenever the start time of their high school is moved to a later time.
- Greater benefits exist for teens who reported they got at least 8 hours of sleep per night.
- The starting time of 8:30 AM or later shows the most positive results.

What to do?

- Parents becoming better informed about the importance of sleep and how to support good “sleep hygiene” at home.
- Teens learning about role of sleep and confronting the impact of sleep deficits.
- Administrators and teachers discuss how the sleep needs of students intersect with school activities and actions.

For more information:

<http://www.cehd.umn.edu/CAREI/Resources/Sleep/default.html>

[or](#)

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