School Start Times: Implications for School Psychologists

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2020 Virtual Fall Conference
November 4 & 5, 2020
Objectives

• What is Healthy Sleep?
• Sleep Research and Adolescents
• History and Research on Sleep
• Consequences of Short Sleep/Benefits of Healthy Sleep
• Pennsylvania Joint State Government Commission
• The Role of Educators
• Words of Wisdom
**NORMAL SLEEP**  
(National Sleep Foundation)

<table>
<thead>
<tr>
<th>AGE OF CHILD IN YEARS</th>
<th>NEEDED HOURS OF SLEEP</th>
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<tbody>
<tr>
<td>• 1 – 3</td>
<td>• 12 – 14</td>
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<td>• 3 – 6</td>
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<td>• 11 - 18</td>
<td>• 9 – 9 ½</td>
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Stages of Sleep

The National Sleep Foundation describes five stages:

- Stage 1: Lightest Sleep, Theta Waves
- Stage 2: Light Sleep, Sleep Spindles
- Stage 3: Deep Sleep, Delta Waves
- Stage 4: Deepest Sleep, Delta Sleep
- Stage 5: REM Sleep, Dreaming Occurs
Stages of Sleep

- **REM Sleep**: Brain activity is high, most similar to being awake and dreaming occurs.
- **Stage 1**: Light sleep, feeling very drowsy.
- **Stage 2**: Stable sleep, heart rate slows, breathing very regular.
- **Stages 3 & 4**: Transition between light and deep sleep, slow high amplitude delta waves.

The cycle repeats every 90–120 minutes.
Sleep Cycles

• Humans cycle through the five stages of sleep 4 to 6 times nightly
• Each cycle takes about 90 to 110 minutes
• Recycling is not always in order
• Interference with the five stages of sleep or the sleep cycles can cause tiredness and irritability the next day
Sleep Cycles

![Graph showing sleep cycles with stages and REM periods](image-url)
The Brain

- Frontal cortex
- Primary visual cortex
- Anterior cingulate gyrus
- Posterior cingulate gyrus
- Amygdala
- Hippocampus
- Pons

- Reduced activity
- Increased activity
- Extrastriate visual areas
SLEEP AND TEENS

• Research has revealed that adolescents have a unique internal clock that acts as a form of delayed sleep phase disorder.
• The melatonin secretion, which induces sleepiness, starts much later in the evening.
• It is difficult for teens to fall asleep much before 11:00 p.m. Teens cannot make themselves fall asleep earlier.
• Most teens need to wake about 6:00 a.m. to arrive to school on time.
Melatonin Peaks Later For Teens

Figure 1: Fluctuation in melatonin levels over a 24-hour period

- Melatonin levels peak in the middle of the night.
- The pineal gland begins producing melatonin in the evening.
- Melatonin levels decline to low daytime amounts.
According to the United States Department of Education for Statistics, only 15% of public high schools start 8:30 AM or later.
DO THE MATH
Chronic sleep deprivation results in a form of perpetual pseudo-jet lag.
THE CONCERNS

Chronic sleep deprivation is associated with a number of cognitive, educational, emotional, physical, athletic, risk-taking, substance abuse, and safety problems.
THE CONCERNS

- The biological changes in adolescence are in direct conflict with schools starting before 8:30 a.m. Teens have a predisposition to wake at 8:00 a.m. or later.
- Students with early wake times are required to wake for the day at the lowest level of alertness during a 24 hour day.
- Early wake times rob teens of REM sleep which is critical for learning and memory.

(Owens, 2016)
THE CONCERNS

Sleep deprivation/prolonged wakefulness affects neuronal functions

- Neuronal plasticity
- Gene activation/expression
- Brain cell protection/repair from stress
- Highest susceptibility during critical developmental period
- Interferes with the “glymphatic system” which eliminates toxins in the brain during sleep and allows the brain to have a clean slate upon awakening
- Increases the stress response and stress hormones

(Owens, 2016)
How did we get here?

- During the 60’s and 70’s educators were facing reduced revenues due to increasing gas prices and inflation/recession.
- Educators were facing increase student population from the “baby boomers.”
- Court-ordered busing was mandated to desegregate the schools.
- Daylight Saving time was extended over 42 weeks to conserve energy. Children would be waiting in the dark for their buses.
- Cuts in costs affected districts’ transportation budgets. This gave rise to the three tier transportation system to reduce the number of buses needed.
HISTORY

- WITH LITTLE TO NO SLEEP SCIENCE RESEARCH, THE EARLIEST START TIMES WERE INSTITUTED FOR HIGH SCHOOL STUDENTS.

- VOLUMES OF SUBSEQUENT RESEARCH HAS SUGGESTED THAT THIS DECISION HAS HAD DELETERIOUS EFFECTS.
Sleep Benefits

Owens, et al., (2014) prepared an in-depth examination of the school start times issues in school districts in the United States. Benefits of later start times indicated:

- Increased attendance
- Reduced tardiness
- Improved standard test scores
- No reported problems with traffic patterns
- Cost savings resulted from increasing bus tiers
- No reduction in student extracurricular activities
BENEFITS OF ADEQUATE SLEEP: COGNITIVE

Adequate sleep improves:
- School achievement
- Reaction speed
- Attentiveness
- Memory
- Information processing
- Time on task
- Reaction to response shifts
- Executive function
- Problem-solving
BENEFITS OF ADEQUATE SLEEP: EDUCATIONAL

Adequate Sleep reduces:
• Sleepiness in class
• Tardiness
• Absenteeism
• Discipline problems
• Drop-out rates
• Visits to the school nurse
BENEFITS OF ADEQUATE SLEEP: EDUCATIONAL

Adequate sleep improves:

• School motivation
• Grades
• Homework completion
• Test Scores
BENEFITS OF ADEQUATE SLEEP: EMOTIONAL AND BEHAVIORAL

Adequate sleep reduces:

• Depression
• Anxiety
• Anhedonia
• Drug and alcohol use/abuse
• Suicidal ideation
• Irritability
BENEFITS OF ADEQUATE SLEEP: PHYSICAL

Adequate sleep reduces incidences of:

- High blood pressure
- Diabetes
- Obesity
- Immune system ineffectiveness
- Headache frequency
- Metabolic dysfunction
- Food cravings
BENEFITS OF ADEQUATE SLEEP: PHYSICAL

Healthy sleep *improves* many aspects of physical health:

- Hormone regulation
- Glucose metabolism
- Insulin resistance
- Inflammation processes
- Pain perception
- Reduced immune function.
BENEFITS OF ADEQUATE SLEEP: PHYSICAL

• Levels of leptin, a hormone that regulates hunger and appetite, drop during partial sleep deprivation. This can have effects on dietary choices, obesity, diabetes, high blood pressure, and cardiovascular disease, now referred to as *cardio-metabolic disease*.

• Circadian and sleep disruptions also cause a metabolic slowdown that can be attributed to a weight gain of about 10 pounds per year. Children and teens showed stronger associations between shortened sleep and these disorders, suggesting greater vulnerability to sleep loss in youth.
BENEFITS OF ADEQUATE SLEEP: SAFETY

Adequate sleep reduces incidences of:

- Car crashes
- Pedestrian accidents for drowsy students
- Athletic injuries
BENEFITS OF ADEQUATE SLEEP: SAFETY

- Sleepiness can impair driving performance as much or more so than alcohol, studies show. (Dawson and Reid, 1997; Powell, 2001)

- The American Automobile Association (AAA) estimates that one out of every six (16.5%) deadly traffic accidents, and one out of eight (12.5%) crashes requiring hospitalization of car drivers or passengers is due to drowsy driving. (AAA, 2010)
A WORD ABOUT SAFETY

Ensuring the safety of our children and others by eliminating early, darkened, unsafe bus stops and walking routes must become more of a priority than the expense of bus runs.
BENEFITS OF ADEQUATE SLEEP: ATHLETIC

- Improved speed
- Improved reaction time
- Improved aim accuracy
- Reduced risk of injury
- Improved benefit of technique study
A WORD ABOUT ADHD

• Children with ADHD are commonly known to have sleep problems.
• Children with sleep disorders and attention disorders often have similar symptoms: over-activity, inattentiveness, restlessness, and impulsivity.
• Drowsy adults are less active when sleep deprived; drowsy children often have the opposite response.
• Diagnoses may be mistaken because of symptom overlap.
• When diagnosing ADHD, interview for the child’s sleep patterns to rule out a sleep disorder or poor sleep hygiene.
OBSTACLES TO LATER START SCHOOLTIMES

Owens research discussed the obstacles (challenges) to later middle/high school start times were:

- Parent work schedules
- Teacher work schedules
- Transportation issues
- Sports schedules/activities
- Family daycare issues
- Teachers’ Unions
- Student jobs
OTHER OBSTACLES

Contemporary problems include the electronic screens which emit a blue light that interferes with the melatonin secretion.
<table>
<thead>
<tr>
<th>SCHOOL DISTRICT</th>
<th>HIGH SCHOOL START TIME</th>
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<tbody>
<tr>
<td>Blue Ridge School District</td>
<td>8:15 AM</td>
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<tr>
<td>Erie City School District</td>
<td>8:30 AM</td>
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<tr>
<td>Milliones Schools</td>
<td>8:38 AM</td>
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<tr>
<td>Radnor Township School District</td>
<td>8:30 AM</td>
</tr>
<tr>
<td>State College Area School District</td>
<td>8:40 AM</td>
</tr>
<tr>
<td>Unionville-Chadds Ford School District</td>
<td>8:00 AM</td>
</tr>
</tbody>
</table>
MYTHS

- It will cost too much
- We are coddling our teenagers
- We need to prepare the students for the world of work
- With later school start times, teens will go to bed later
- With later school start times, extra-curricular activities will be negatively impacted
- Students will lose their after school jobs
- It was good enough for us
- Later school start times will be horrible for parents and daycare/babysitting
Moving a middle or high school time to 8 a.m. or later is not the cause of problems, and, in fact, resolves as many problems as it may seem to cause.
The Rand Corporation

• Using a macroeconomic modeling approach, the Rand Corporation (2017) conducted an analysis of the economic performance of 47 US states following a delayed school start time. The study shows later school start times could lead to a $83 billion economic gain nationally over a ten-year period.
No gains the first year

$150 per student per year cost the first year in transportation costs

$110,000 for school costs to upgrade infrastructure

In second year, benefits are predicted to outweigh costs

In 10 years, benefits doubled the costs

In 15 years, benefits tripled the costs
The Role of the Educator: Advocacy

- Communicate the message to parents that you work with and/or Home and School Associations.
- Talk to teachers about the impact of sleep deprivation in the classroom.
- Educate students about the need for healthy sleep.
- Talk to secondary school administrators about the students who are struggling to attend school and to arrive on time.
- Talk to school district administrators about the problem with early high school start times.
- Prepare opinion pieces for the local media sources.
With any school innovations, one should consider collecting pre- and post-data on the following variables:

- Daily number of absences
- Daily number of tardies
- Daily number of class cuts
- Daily number of students reported to be sleeping in class
- Daily number of discipline reports
- Daily number of visits to the school nurse
- Students’ GPA’s
- Surveys of teacher observations/opinions
- Surveys of parent observations/opinions
- Surveys of student experiences/opinions
- Student standardized test scores
Political Advocacy

• Find your legislators:
  http://www.legis.state.pa.us/
Senate Resolution 417

Senate Resolution 417 requests that the Pennsylvania Joint State Government Commission conduct a thorough and comprehensive study of secondary school start times in Pennsylvania and report its findings and recommendations to the Senate no later than 12 months from the adoption of this resolution.
A WORD ABOUT LEGISLATION

Many legislators believe that school start times are a matter of local control

- Many aspects of school policy are regulated by state and federal government, particularly when local school systems cannot or will not set policies to protect basic rights, including rights to health, safety, and education. Starting school at later, safe, healthy hours is universally beneficial to all children. This is along the same vein as Child Labor Laws and Child Car Seat Restraint Laws.

The United States has a long history of recognizing the protection of health and safety as a core function of government, and over the years many measures to protect individuals from harm originally thought of as overly intrusive or misguided are now accepted as essential. Many federal mandates have been enacted to ensure minimum levels of health and safety for all children. A few examples are:

- Federal nutrition standards for school meals
- Federally mandated school wellness policies
- Federal gun free schools / zero tolerance
- Federally approved child-safety seats
- The Lead Contamination Control Act of 1988
A WORD ABOUT LEGISLATION

States also mandate state-wide regulations for schools

The number of **state laws to protect child health and safety** is even greater, including laws to reduce sodium in food, protect against sports-related traumatic brain injuries, and prevent drunk driving. Nor does setting guidelines for the timing of classes override "local control" of schools. Indeed, **states already regulate**:

- Number of days per year students must attend school,
- How many hours a day they must be in class,
- State-wide testing
- State-wide curriculum
PA JOINT STATE GOVERNMENT COMMISSION

General Assembly of the Commonwealth of Pennsylvania

SLEEP DEPRIVATION IN ADOLESCENTS:
THE CASE FOR DELAYING SECONDARY SCHOOL START TIMES

Report of the Advisory Committee on Later School Start Times at Secondary Schools

OCTOBER 2019

Serving the General Assembly of the Commonwealth of Pennsylvania Since 1937
PA Joint State Government Commission Report

URL

http://jsg.legis.state.pa.us/publications.cfm?JSPU_PUBLN_ID=489
The Advisory Committee acknowledges the medical community consensus that a public health crisis in the form of an epidemic of chronic sleep loss and daytime sleepiness in U.S. adolescent exists:

- Benefits of later secondary school start times for secondary students are supported by robust research.
- Adapting the daily schedule for adolescents to recognize and accommodate their sleep needs is a potentially manageable response and can be accomplished by establishing later secondary school start times.
Research Review

- Insufficient Sleep and Physical Health
- Insufficient Sleep and Mental Health
- Insufficient Sleep and Behavioral Health
- Insufficient Sleep Accidents, Injury and Public Safety
- Insufficient Sleep and School Performance
- Insufficient Sleep and Demographic Factors
Factors Contributing to Adolescent Sleep Reduction

- Technology
- Self-Medication
- Academic, Social, and Time Pressures
Policy Statements By National Educational, Medical, and Psychological Organizations

American Psychological Association
National Association of School Nurses/Society of Pediatric Nurses
American Medical Association
American Academy of Sleep Medicine
Society of Behavioral Medicine
American Sleep Association
National Parent Teacher Association National Education Association
PA JSGCR

Current Status of Secondary School Start Times in Pennsylvania

Public Schools
Charter Schools
Career and Technical Centers
Non-Public Schools
Common Perceived Challenges and Potential Solutions

- Instructional School Day Requirements
- Transportation
- Bus Driver Shortages
- Transportation Mandates, Coordination, and Logistics
- Athletics and Other Extra Curricular Activities
- Impact on Elementary School Students
- Impact on Teachers and Staff
- Community Support
Experiences in Other States

- Minnesota
- Colorado
- Wyoming
- Seattle, Washington
- California
- Connecticut
- Hawaii
- Maryland
- New Jersey
- South Carolina
- Texas
United States Congress

HR 1861

United States Representative Zoe Lofgren reintroduced the “ZZZ’s to A’s Act.”

This bill was first introduced in 1998. The current version is dated March 2019. It requests the U.S. Secretary of Education conduct a study to determine the relationship between school start times, adolescent health, well-being, and performance.
Given that the main focus of education is to maximize students’ potential, it is imperative that we provide a learning environment that takes into account the biology of the learner. (Carskadon, M.A., 2011)
It is a common sense remedy to improve student achievement that few have implemented; let teens sleep more. Start school later.

(Arne Duncan, Former United States Secretary of Education, 2012).
In view of the research findings, the Pennsylvania Psychological Association supports efforts to educate school administrators and other stakeholders about the risks of adolescent sleep deprivation, and to engage in advocacy for moving to later high school start times at the state and local levels.

(Pennsylvania Psychological Association, 2014)
Middle and high schools should begin no earlier than 8:30 a.m. to allow teenagers to get enough sleep to improve student academic performance and overall well-being.

(American Academy of Pediatrics, 2014)
Insufficient sleep is common among high school students and is associated with several health risks including being overweight, drinking alcohol, smoking tobacco, and using drugs, as well as poor academic performance.

(Centers for Disease Control and Prevention [CDC], 2015)
Sleep deprivation in our students is a public health concern.
(Snider, T., Start School Later Cofounder, 2014)
WORDS OF WISDOM

Remember; to do nothing, is to do harm.

(Owens, J., 2015 speech, Radnor PA)
ORGANIZATIONS THAT ENDORSE LATER SCHOOL START TIMES

American Academy of Pediatrics
American Medical Association
Association of School Psychologists of Pennsylvania
Centers for Disease Control and Prevention
Children’s National Medical Center
Maryland Department of Health and Mental Hygiene
National Association of School Nurses
National Sleep Foundation
Pennsylvania Association of School Nurses
Pennsylvania Chapter of American Academy of Pediatrics
Pennsylvania Psychological Association
Philadelphia Society of Clinical Psychologists
Society of Pediatric Nurses
The Rand Corporation
Our school day really needs to start later. Y'think?
THANK YOU

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