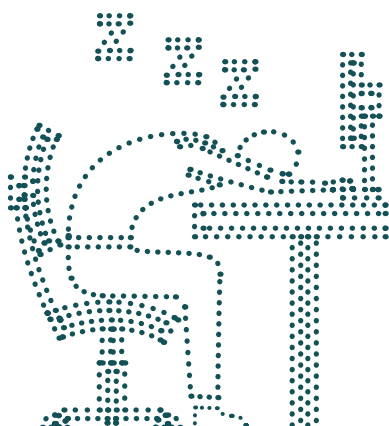
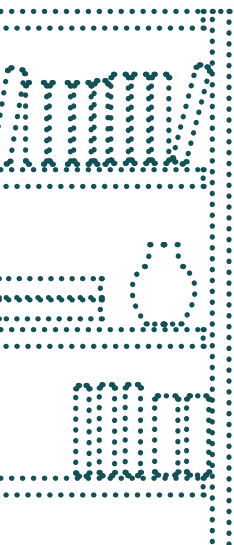


SCHOOL BUS
CONSULTANTS

THE START SCHOOL LATER MOVEMENT IS TRENDING: WHAT YOU NEED TO KNOW



$\sin \alpha = \frac{BC}{c} = \frac{a}{c};$
 $\cos \alpha = \frac{OB}{c} = \frac{b}{c};$
 $\operatorname{tg} \alpha = \frac{OB}{c} = \frac{b}{c};$
 $\operatorname{ctg} \alpha = \frac{OA}{b} = \frac{a}{b};$

$\alpha^\circ = \frac{180}{\pi} \alpha; \alpha = \frac{\pi \alpha^\circ}{180};$
 $360^\circ = 2\pi; 180^\circ = \pi;$

$\sin^2 \alpha + \cos^2 \alpha = 1;$
 $\frac{\sin \alpha}{\cos \alpha} = \operatorname{tg} \alpha;$
 $\sin \alpha \cdot \operatorname{csc} \alpha = 1;$
 $\frac{\cos \alpha}{\sin \alpha} = \operatorname{ctg} \alpha$

$\sin 2\alpha = 2 \sin \alpha \cos \alpha;$
 $\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha;$
 $\operatorname{tg} 2\alpha = \frac{2 \operatorname{tg} \alpha}{1 - \operatorname{tg}^2 \alpha};$

$u = A \sin(\omega t + \varphi)$
 $u = a \sin \omega t + b \cos \omega t$

$x = -\frac{b}{2a};$
 $\Delta = 4ac - b^2$
 $a > 0;$
 $\operatorname{tg} \varphi = \pm a^2 \left(\frac{3}{2}\right)^{\frac{1}{2}};$

THE START SCHOOL LATER MOVEMENT IS TRENDING: WHAT YOU NEED TO KNOW

HOW DECADES OF MEDICAL & EDUCATIONAL RESEARCH IS CAUSING DISTRICTS TO RETHINK THEIR ROUTING & TRANSPORTATION LOGISTICS

Background

It's a familiar scenario – the alarm clock sounds in the morning and weary teenagers snug in the comforts of their beds don't even stir, while busy parents struggle to get everyone out the front door on time. It's an age old conflict between parent and child, but decades of sleep research may finally put the argument to rest with overwhelming evidence that teens are biologically wired for sleep.

The National Sleep Foundation says that adolescents experience certain sleep and wake patterns that keep them up later at night and in bed longer in the morning. A poll by the Foundationⁱ found that 60 percent of children under age 18 complained that they were tired during the day. But with 40 percentⁱⁱ of public high schools in the United States ringing their first bells before 8:00 AM, students are exhibiting a number of alarming signs such as depression, obesity and heart problems, increased injuries and suicidal ideation, all resulting from sleep deprivation.

So what does this have to do with transportation?

The American Academy of Sleep Medicine recommends later school start timesⁱⁱⁱ, saying that more sleep helps adolescent students with alertness during class, reduced tardiness and improved overall attendance. Some schools have adopted later bell times to improve student performance, but other districts cite the logistical complications that come with shifting class and after school schedules with the inherent bus routing adjustments that would need to be involved. Joint high school programs can be affected by changes in bus routes, and traffic and commuting could see delays and increased congestion for teachers, parents and the community as a whole.

But the Start School Later Movement is trending in the school transportation industry, and the evidence supporting bell time change is something that school administrators and transportation directors alike need to take note of.

"The change doesn't affect just students," said Dr. Pam McKeever of Central Connecticut State University, who published an article^{iv} about the improvement of graduation and attendance numbers in the journal *Sleep Health*. "It affects all of society when we increase graduation rates, lower incarceration rates and improve safe driving."

What is the Start School Later Movement?

The evidence supporting teenagers' biological need for more sleep took off in the early 1990's with the University of Minnesota's School Start Time Study^v, which tracked high school students in two districts that had changed their morning bell times from 7:20 AM to 8:30 AM. Researchers saw significant improvement in attendance, enrollment, depression levels, and behavioral issues both in school and at home.

"Students were now awake the first hour of class," said Dr. Kyla Wahlstrom^{vi}, a Senior Research Fellow at the University of Minnesota and the primary investigator of the start time study. "The principal reported fewer disciplinary incidents in the halls and lunchroom, and students reported less depression and feelings of greater efficacy. Over 92% of the parents said their kids were easier to live with."

By 2005, more than 250 high schools had adjusted their start times to later in the morning. And from 2000 to 2010, more than 400 superintendents and principals had contacted Wahlstrom with questions about the impacts of later start times on school grades, seeking further information supporting both the medical and educational arguments. The American Academy of Pediatrics released a stirring policy statement^{vii} which suggested starting class at 8:30 AM, stating that although napping, sleeping on the weekends and consuming caffeine can help, they aren't a sufficient substitute for regular sleep.

In recent years, the Start School Later organization has promoted the idea of pushing back bell times based on all of this scientific research, and helps school districts through the work of local chapters to tackle this in ways that are best for the local communities. Start School Later has 99 chapters in 26 states and has influenced bell time changes in Washington, Maryland and Maine.

What are the benefits?

One of the early advocates of adjusted school start times, Edina, Minnesota, got on board with the Wahlstrom study and in 1996 changed its high school start times from 7:20 AM to 8:30 AM. The change improved attendance, decreased tardiness and left kids more alert, better prepared, less depressed and even less likely to visit school nurses. By the end of the first year, 92 percent of Edina parents also said they preferred the later start.

A study by The Journal of Clinical Sleep Medicine^{viii} suggested that the additional sleep teenagers were getting with later bell times was also contributing to noticeable reductions in teen driving accidents. The study found "significantly" higher crash rates in Virginia Beach, Virginia, where morning classes were beginning at 7:20 AM versus nearby Chesapeake, where classes started at 8:40 AM and teenage driver crash rates were 25 percent less.

"I don't think most people understand how big of an impact this has both on kids' behavior in class and also getting to class," said Lisa Rodvien, a former high school

teacher in Anne Arundel County, Maryland, where public high schools started class at 7:17 AM and school buses left the lot for their morning routes as early as 5:50 AM. Rodvien has said that attendance for her first-period class was "as low as 50 percent or below^{ix}."

Over the past three years, more education and medical groups have issued statements in support^x of later school start times, including the National Parent Teacher Association, American Medical Association, American Psychological Association, National Association of School Nurses, and American Academy of Pediatrics.

School districts that changed their bell times have also seen less chaos in the mornings, not only for the students but for the staff and teachers, as well. In a 2017 report^{xi} produced by the New Jersey Department of Education, the opinions of principals among schools with recent changes in start times to 8:30 AM or later were generally split between those who saw "some" or "much" improvement, and those for whom the change produced no difference. Among those who reported that the impact was beneficial, the most positive changes were reported in the areas of teacher satisfaction, and student engagement and attentiveness.

What are the challenges?

When Fairfax County Schools in Virginia shifted its schedule to later start times, the district investigated 36 transportation options and 7,000 bus routes that would accommodate the district's 137,000 students. In the end, four options were presented to the public, and the final choice shifted high school start times to 8:10 AM.

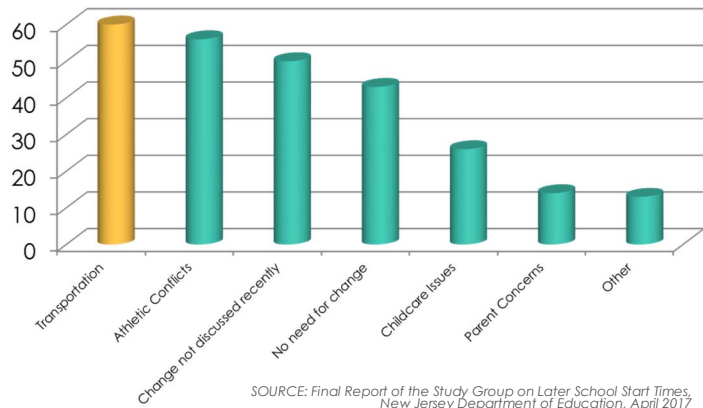
"As the research became more prominent, we talked about it more," said Jeff Platenberg, who directs facilities and transportation for Fairfax County Schools. "It evolved out of keeping on top of what was happening with adolescent health and wellness."

But not everyone is as willing or eager to disrupt their carefully planned routing schedules to accommodate the sleep cycles of teenagers.

While the evidence supporting the movement to delay start times continues to grow, adjusting bell times and the operational support services that go with it, like school bus transportation, can be a logistical headache for school administrators and transportation professionals. If a school delays its start time, the afternoon release time will naturally get pushed back, and with that comes the potential of negatively impacting after school activities, athletic practice, scholastic clubs, after school childcare, homework, and even student employment. Conflicts arise when different school districts meet up to play a game, or when students are bused to recreational athletic matches not associated with the district.

School districts often use the same vehicles to transport their elementary, middle and high school students, and a change in middle or high school bell times typically results in a change for the elementary students. So if the goal of a bell time change is to afford older students the sleep they need with later start times, younger students may find themselves waiting in the dark for the bus on fall and winter mornings.

Factors that prevent Middle/High Schools from having Start Times of 8:30 AM or later



Bell changes affect transportation costs, as well. Transportation directors must think about redesigning routes, looking for efficiencies, recruiting drivers, and potentially purchasing new buses. At Chesterfield County Public Schools^{xii} in Virginia, bell time changes in the proposed implementation plan are projected to cost an additional \$1.9 million, covering expenses for 30 new bus drivers, fuel and vehicle maintenance.

“This is not a perfect proposal, but neither is the current schedule,” said Dr. Javid Siddiqi, Chesterfield’s School Board Chair. “But it is a move in the right direction.”

What’s next?

Organizations such as the Robert Wood Johnson Foundation, the RAND Corporation and higher education universities such as Stanford University, Harvard University, Yale University and Brown University are getting involved with the movement and supporting studies. In April 2017, they held the first national conference on school start times to discuss the latest research and upcoming strategies.

A number of school districts have already announced their plans to switch bell times for the 2018-2019 school year, while others are still debating. Howard County Public Schools in Maryland, St. Paul Public Schools in Minnesota, and Hillsborough County Public Schools in Florida, for instance, have posted detailed instructions on their websites to explain how elementary, middle and high schools will shift to accommodate new schedules next fall.

At Academy School District 20^{xiii} in Colorado Springs, Colorado, administrators and transportation staff were able to push back high school start times by transporting middle and high school students together and eliminating bus routes with low ridership numbers.

Megan Kuhfeld^{xiv}, a graduate student at the University of California-Los Angeles who has been studying the Sleep Later Movement for years, conducted a survey of 35 school districts that switched to later start times. “The things people had feared — how

transportation would be affected, how sports would be affected — became the new normal and people adjusted," Kuhfeld said.

* * * * *

Decades of evidence and countless organizations advocate for later school start times, in an effort to provide adolescents with the sleep needed to support their biological sleep and wake patterns.

"WHAT IS THE PRIORITY?"

"IT SHOULD BE EDUCATION, HEALTH AND SAFETY. ALL THE OTHER STUFF MAY NOT BE PERFECT...BUT IT WILL WORK ITSELF OUT."

HEATHER MACINTOSH,
spokeswoman for the national
Start School Later organization

While any bell time change is a multi-faceted effort that invariably touches student health and safety, afterschool schedules, traffic congestion and transportation costs, these challenges should not prevent a school district from considering change and implementing the necessary studies. The benefits of adjusted bell times can have far reaching impacts, from creating healthier students, reducing adolescent incarceration and increasing graduation rates, to economic gains and even mitigating driver shortage issues with the ability of a district to offer more working hours.

Successfully implementing any bell time adjustment requires a district to balance the financial imperative for efficiency with the operational expectations of excellence. Transportation and logistics experts such as School Bus Consultants work with districts to outline the full range of potential benefits that come with a well structured bell schedule, and help them take the steps needed to achieve this efficiency while promoting the health, safety and academic performance of their students.

About TransPar Group of Companies

The TransPar Group of Companies is a partnership of three leading organizations from across the school transportation industry that offers a diverse portfolio of products and services which represent the most comprehensive and responsible offering in the industry. And this is done while keeping students safe and improving the cost and quality of school transportation operations. The three business units include TransPar, which provides Management and Staffing Services to develop solutions for difficult operational questions and problems; School Bus Consultants which offers Advisory Services to deliver resources and expertise that transportation contractors and organizations often cannot access on their own; and Transportation Services Co. providing Fleet Management Services and Training Products to help customers create the strong foundation necessary to support effective service delivery. So no matter the needs, the TransPar Group of Companies is the all-inclusive solution to creating a successful, reliable, and profitable student transportation program. For more information, please visit www.TransParGroup.com.

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