School Start Times Literature Review
Robbinsdale Area Schools
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Author(s)	Article	Abstract	Key Point(s)
American Academy of Pediatrics (2014)	Policy Statement on School Start Times for Adolescents	The American Academy of Pediatrics recognizes insufficient sleep in adolescents as an important public health issue that significantly affects the health and safety, as well as the academic success, of our nation's middle and high school students. Although a number of factors, including biological changes in sleep associated with puberty, lifestyle choices, and academic demands, negatively affect middle and high school students' ability to obtain sufficient sleep, the evidence strongly implicates earlier school start times (i.e. before 8:30 AM) as a key modifiable contributor to insufficient sleep, as well as circadian rhythm disruption, in this population Furthermore, a substantial body of research has now demonstrated that delaying school start times is an effective countermeasure to chronic sleep loss and has a wide range of potential benefits to students with regard to physical and mental health, safety, and academic achievement. The American Academy of Pediatrics strongly supports the efforts of school districts to optimize sleep in students and urges high schools and middle schools to aim for start times that allow students the opportunity to achieve optimal levels of sleep (8.5-9.5 hours) and to improve physical (e.g. reduced obesity risk) and mental (e.g. lower rates of depression) health, safety (e.g. drowsy driving crashes), academic performance, and quality of life.	Despite the many benefits associated with more sleep when schools delay start times, the net impact on student achievement has not consistently been found to be statistically significant.

Brookings Institute (2017)	Start High School Later for Better Academic Outcomes	Jacob and Rockoff propose three low-cost ways to organize schools to maximize student performance: combining elementary and middle schools into single buildings; optimizing teacher assignment policies; and starting school later in the day for middle and high school students. Of Jacob and Rockoff's proposals, this third idea seems particularly actionable: New buildings need not be built or retrofitted, and the nature of teachers' jobs would not appreciably change. School districts that start elementary schools later and high schools earlier could potentially swap these schedules without major transportation disruptions. This would permit adolescents to sleep later and therefore arrive at school more ready to learn.	The positive findings associated with changing start times include: (1) small increases in achievement on standardized tests; (2) positive health and safety benefits due to physiology of teenagers; and (3) potentially more alert teenage drivers in the morning. The negative findings associated with changing start times include: (1) safety and childcare issues associated with elementary children having days starting two hours earlier; (2) coordination issues for after-school sports and co-curricular activities for high school students; and (3) increased transportation costs if the start time change is not a flip-flop between elementary school and high school.

Buckhalt, J. (2011)	Insufficient Sleep and the Socioeconomic Status Achievement Gap	Research with adults and children has shown that sleep plays a vital and complex role in multiple physiological systems that maintain health and promote optimal functioning across many domains. For children, school is an important domain of functioning, and emerging research links sleep to academic achievement. Many children from lower socioeconomic status (SES) families sleep poorly, and when their sleep is compromised, the effects on cognitive functioning and academic achievement may be greater than for less disadvantaged children. Understanding how sleep affects performance may enrich theory relating to the achievement gap between groups of children differing in SES, and constitutes a new focus for prevention and intervention.	Sleep is part of a multisystem dynamic, but if it can be shown to account for any significant part of relations between SES and school performance, there are potentially important implications for enriching theory and formulating interventions. It has yet to be determined, however, if sleep interventions by themselves or coupled with direct academic interventions will be successful in improving achievement in all children and in narrowing the SES achievement gap.

Dexter, D.; Bijwadia, J.; Schilling, D.; Applebaugh, G. (2003)	Sleep, Sleepiness and School Start Times: A Preliminary Study	*Background:* High school students are reported to be excessively sleepy, resulting in decreased academic performance, increased psycho-social problems and increased risk of morbidity and mortality from accidents. Early school start times have been noted to contribute to this problem. This report attempts to confirm the relationship of early school start times with decreased sleep and increased sleepiness. *Methods:* We examined sophomore and junior students in 2 local high schools with different start times and measured the amount of time slept and sleepiness. *Results:* We found that students at the early start school reported reduced sleep time and more sleepiness than their counterparts at the later starting school. *Conclusion:* Early school start times are associated with student reports of less sleep and increased sleepiness. Further studies in larger groups are recommended in view of the potential significant impact of sleep deprivation in this age group.	Later school start times moved students from the pathologically sleepy range to barely into the normal sleepiness range.

Edwards, F. (2012)	Early to Rise? The Effect of Daily Start Times on Academic Performance	Local school districts often stagger daily start times for their schools in order to reduce busing costs. This paper uses data on all middle school students in Wake County, NC from 1999-2006 to study the impact of start times on academic performance. Using variation in start times within and across schools, I find that starting school one hour later leads to a three-percentile point gain in both math and reading scores. Using only variation in start times within schools over time, the effect is a two-percentile point gain. I find evidence that later start times are associated with decreased absences, less time spent watching television and a greater amount of time spent on homework, indicating that these factors may explain why later starting students have higher test scores.	Achievement gains of 2-3 percentile points can be expected for delaying school start times for an hour.
Fattal, I. (2017)	Why Are Parents Afraid of Later School Start Times?	Abstract not available from *The Atlantic*	Despite research demonstrating early school start times do not square with adolescents' sleep needs, which negatively impacts mental and physical health as well as academic performance, many school districts have been mired in years-long debates over the issue. Sports, after-school activities, and transportation costs appear to be the primary obstacles to delaying school start times.

Hysing, M.; Haugland, S.; Stormark, K.; Tormod, B.; Sivertsen, B. (2014)	Sleep and school attendance in adolescence: Results from a large population-based study	*Background:* The aim of this study was to examine the link between adolescent sleep and non-attendance in school. *Methods*: A large population-based study from Norway conducted in 2012, the youth@hordaland study, surveyed 8,347 adolescents aged 16–19 years (54% girls). Self-reported sleep measures included bedtime, rise time, sleep duration, sleep efficiency, sleep onset latency (SOL), wake after sleep onset (WASO), insomnia symptoms, tiredness, and sleepiness. School attendance was obtained from national administrative registries. *Results*: Most sleep parameters were associated with increased risk of school non-attendance. After adjusting for gender and socioeconomic status, short sleep duration and sleep deficiency were the sleep measures with the highest odds of non-attendance (OR=4.61, CI 95% 3.29–6.46) and (OR=3.26, CI 95% 2.67– 3.99), respectively). Also, large bedtime discrepancies in weekend versus weekdays were associated with non-attendance (OR=2.43, CI 95% 1.93–2.02), as well as insomnia (OR=2.25, CI % 1.89–2.67) and daytime tiredness (OR=2.09, CI 95% 1.70–2.57). The associations were somewhat reduced after additional adjustment for depression, but remained significant in the fully adjusted model. *Conclusion*: The demonstrated relationship between sleep problems and school absence suggests that careful assessment of sleep is warranted when adolescents present with extensive school absence. Future studies on how the sleep–school absence relationship in adolescence may impact later work affiliation in adulthood are needed.	The benefits of later start times were primarily found through reduced absences.

Jacob, B.; Rockoff, J. (2011)	Organizing Schools to Improve Student Achievement: Start Times, Grade Configurations, and Teacher Assignments	Education reform proposals are often based on high-profile or dramatic policy changes, many of which are expensive, politically controversial, or both. In this paper, we argue that the debates over these "flashy" policies have obscured a potentially important direction for raising student performance—namely, reforms to the management or organization of schools. By making sure the "trains run on time" and focusing on the day-to-day decisions involved in managing the instructional process, school and district administrators may be able to substantially increase student learning at modest cost. In this paper, we describe three organizational reforms that recent evidence suggests have the potential to increase K–12 student performance at modest costs: (1) Starting school later in the day for middle and high school students; (2) Shifting from a system with separate elementary and middle schools to one with schools that serve students in kindergarten through grade eight; (3) Managing teacher assignments with an eye toward maximizing student achievement (e.g. allowing teachers to gain experience by teaching the same grade level for multiple years or having teachers specializing in the subject where they appear most effective). We conservatively estimate that the ratio of benefits to costs is 9 to 1 for later school start times and 40 to 1 for middle school reform. A precise benefit-cost calculation is not feasible for the set of teacher assignment reforms we describe, but we argue that the cost of such proposals is likely to be quite small relative to the benefits for students. While we recognize that these specific reforms may not be appropriate or feasible for every district, we encourage school, district, and state education leaders to make the management, organization, and operation of schools a more prominent part of the conversation on how to raise student achievement	Gains of approximately 0.15 standard deviations can be expected from delaying school start times in middle and high school, an effect nearly one-sixth the size of achievement gaps. Transportation costs and planning as well as outdoor sports, however, should be considered before moving to delay school start times.

Minges, K.; Redeker, N. (2016)	Delayed school start times and adolescent sleep: A systematic review of the experimental evidence	Many schools have instituted later morning start times to improve sleep, academic, and other outcomes in response to the mismatch between youth circadian rhythms and early morning start times. However, there has been no systematic synthesis of the evidence on the effects of this practice. To examine the impact of delayed school start time on students' sleep, health, and academic outcomes, electronic databases were systematically searched and data were extracted using the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. Six studies satisfied selection criteria and used pre-post, no control (n = 3), randomized controlled trial (n = 2), and quasi-experimental (n = 1) designs. School start times were delayed 25-60 min, and correspondingly, total sleep time increased from 25 to 77 min per weeknight. Some studies revealed reduced daytime sleepiness, depression, caffeine use, tardiness to class, and trouble staying awake. Overall, the evidence supports recent non-experimental study findings and calls for policy that advocates for delayed school start time to improve sleep. This presents a potential long-term solution to chronic sleep restriction during adolescence. However, there is a need to rigorous randomized study designs and reporting of consistent outcomes, including objective sleep measures and consistent measures of health and academic performance.	Later school start times reduced tardiness and absenteeism; however, more systematic research on the effects on academic achievement needs to be conducted.
Wahlstrom, K. (2002)	Changing Times: Findings from the First Longitudinal Study of Later High School Start Times	In the early 1990s, medical research found that teenagers have biologically different sleep and wake patterns than the preadolescent or adult population. On the basis of that information, in 1997 the seven comprehensive high schools in the Minneapolis Public School District shifted the school start time from 7:15 a.m. to 8:40 a.m. This article examines that change, finding significant benefits such as improved attendance and enrollment rates, less sleeping in class, and less student-reported depression. Policy implications are	Later school start times resulted in students getting more sleep, and lower levels of absence and tardiness. Sports were impacted somewhat, and the move caused uneasiness with many stakeholders.

		briefly discussed, acknowledging this to be a highly charged issue in school districts across the United States.	

Wolfson, A.; Spaulding, N.; Dandrow, C.; Baroni, E. (2007)	Middle School Start Times: The Importance of a Good Night's Sleep for Young Adolescents	With the onset of adolescence, teenagers require 9.2 hr of sleep and experience a delay in the timing of sleep. In the "real world" with early school start times, however, they report less sleep, striking differences between their school-weekend sleep schedules, and significant daytime sleepiness. Prior studies demonstrated that high schoolers with later school starts do not further delay bedtimes but obtain more sleep due to later wake times. This study examined sleep-wake patterns of young adolescents attending urban, public middle schools with early (7:15 a.m.) versus late (8:37 a.m.) start times. Students (N = 205) were assessed at 2 time periods. Students at the late-starting school reported waking up over 1 hr later on school mornings and obtaining 50 min more sleep each night, less sleepiness, and fewer tardies than students at the early school. All students reported similar school-night bedtimes, sleep hygiene practices, and weekend sleep schedules.	Middle school students at schools with later start times slept more, and were less likely to be tardy or absent.