

Introduction

School districts across the country are seeking to revise schedules in response to a substantial body of research finding that middle and high school students benefit from delayed school start times. In [California](#), a new state law requires middle schools to maintain a start time of 8:00 a.m. or later and high schools to maintain a start time of 8:30 a.m. or later beginning in 2022.¹

However, many districts face challenges revising schedules to align with best practices for school start time. In May of 2017, Hanover Research supported a partner evaluating their existing schedules with a literature review titled [Optimal School Start Times](#). Hanover Research also supports partners throughout the process of revising schedules through reports on topics such as scheduling trends at peer districts and best practices for building stakeholder support for delayed start times.

Literature Review

An increasing number of professional organizations support delaying school start times to 8:30 a.m. or later.² These recommendations reflect a consensus around the need for schedules to accommodate adolescents' sleep needs. The American Academy of Sleep Medicine recommends that children between the ages of six and 12 sleep between nine and 12 hours per night while adolescents between the ages of 13 and 18 sleep between eight and ten hours per night.³ Due to biological changes in adolescents' circadian rhythms, many middle and high school students cannot fall asleep early enough to meet these recommendations with earlier school start times.⁴ Figure 1 shows health and behavioral outcomes associated with sleep in adolescents.

Figure 1: Health and Behavioral Outcomes Associated with Sleep in Adolescents

| Outcomes Associated with Recommended Sleep | Outcomes Associated with Insufficient Sleep |
|--|---|
| <ul style="list-style-type: none"> • Improved attention, behavior, learning, memory, and emotional regulation • Improved quality of life • Improved physical health | <ul style="list-style-type: none"> • Attention, behavior, and learning problems • Risk of accidents, injuries, hypertension, obesity, diabetes, and depression • Risk of self-harm, suicidal thoughts, and suicide attempts in teenagers |

Source: American Academy of Sleep Medicine⁵

A substantial body of literature finds positive effects of delayed start times on students' sleep duration.⁶ Although the research base examining academic outcomes of delayed start times is less methodologically rigorous, initial research suggests positive effects of delayed start times on several behavioral and academic outcomes, including those listed in

Figure 2: Behavioral and Academic Outcomes of Delayed Start Times



Source: *Journal of School Health*⁷

To delay start times at the high school level, districts commonly make elementary school start times earlier. To decrease transportation costs, districts often stagger school start times to allow buses to make multiple runs in the morning and afternoon. To delay the start time for high schools, districts often flip start times between elementary and high schools to enable adolescents to sleep in later.⁸

The research examining school start times in the elementary grades is limited compared to research for the middle and high school grades. Although some studies identify negative effects of earlier start times on achievement in the elementary grades, other studies find no significant effects.⁹ Districts should use caution when considering changes to elementary school start times to accommodate later start times in the secondary grades, and monitor the effects of schedule changes on students across grade levels.

Additional Research

Hanover Research uses a variety of methodologies to support partner districts in improving achievement for all students and reducing gaps in achievement. Reports may include:

- **Benchmarking** to examine start times at peer districts.
- **Stakeholder Surveys** to measure stakeholder attitudes towards proposed schedule changes.
- **Literature Reviews** to identify innovative scheduling models.

Caveat

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Endnotes

¹ “California Is First State to Mandate School Start Times.” Associated Press, October 15, 2019. <https://apnews.com/006243f7bf1a452d9b0f2617d979b4eb>

² “AMA Supports Delayed School Start Times to Improve Adolescent Wellness.” American Medical Association, June 14, 2016. <https://www.ama-assn.org/press-center/press-releases/ama-supports-delayed-school-start-times-improve-adolescent-wellness> [2] “AASM Position: Delay Middle School, High School Start Times.” American Academy of Sleep Medicine, April 14, 2017. <https://aasm.org/aasm-position-delaying-middle-school-high-school-start-times-is-beneficial-to-students/> [3] “School Start Times for Adolescents.” *Pediatrics*, 134:3, September 1, 2014. <https://pediatrics.aappublications.org/content/134/3/642>

³ Paruthi, S. et al. “Recommended Amount of Sleep for Pediatric Populations: A Consensus Statement of the American Academy of Sleep Medicine.” *Journal of Clinical Sleep Medicine*, 12:6, June 15, 2016. <https://aasm.org/resources/pdf/pediatricsleepdurationconsensus.pdf>

⁴ Kelley, P. and C. Lee. “Later Education Start Times in Adolescence: Time for Change.” *Education Commission of the States*, 2015. p. 1. <http://www.ecs.org/clearinghouse/01/12/19/11219.pdf>

⁵ Chart contents taken verbatim with minor alterations to wording from: Paruthi et al., Op. cit., p. 785.

⁶ Minges, K.E. and N.S. Redeker. “Delayed School Start Times and Adolescent Sleep: A Systematic Review of the Experimental Evidence.” *Sleep Medicine Reviews*, 28, August 1, 2016. <http://www.sciencedirect.com/science/article/pii/S1087079215000891> [2] Morgenthaler, T.I. et al. “High School Start Times and the Impact on High School Students: What We Know, and What We Hope to Learn.” *Journal of Clinical Sleep Medicine*, 12:12, 2016. <http://sleepeducation.org/docs/default-document-library/high-school-start-times.pdf> [3] Wheaton, A.G., D.P. Chapman, and J.B. Croft. “School Start Times, Sleep, Behavioral, Health, and Academic Outcomes: A Review of the Literature.” *Journal of School Health*, 86:5, 2016.

⁷ Wheaton, Chapman, and Croft, Op. cit., p. 363.

⁸ Buckhalt, J.A. “Earlier School Start Times for Elementary School Students.” *Psychology Today*, February 27, 2017. <https://www.psychologytoday.com/blog/child-sleep-zzzs/201702/earlier-school-start-times-elementary-school-students>

⁹ Astill, R.G. et al. “Sleep, Cognition, and Behavioral Problems in School-Age Children: A Century of Research Meta-Analyzed.” *Psychological Bulletin*, 138:6, 2012. <https://pdfs.semanticscholar.org/ba10/43613932e94a29f69d2f562dbc4072565bd8.pdf> [2] Appleman, E.R., K.S. Gilbert, and R. Au. “School Start Time Changes and Sleep Patterns in Elementary School Students.” *Sleep Health*, 1:2, June 1, 2015. <http://www.sciencedirect.com/science/article/pii/S2352721815000522> [2] Keller, P.S. et al. “Earlier School Start Times Are Associated with Higher Rates of Behavioral Problems in Elementary Schools.” *Sleep Health*, 3:2, April 1, 2017. <http://www.sciencedirect.com/science/article/pii/S2352721817300049> [2] Dupuis, D.N. “The Association between Elementary School Start Time and Students’ Academic Achievement in Wayzata Public Schools.” Center for Applied Research and Educational Improvement, University of Minnesota, December 2, 2015. https://eric.ed.gov/?q=elementary+school+start+times&ft=on&ff1=dtYSince_2015&id=ED574378