

School start times, academic achievement, and time use

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Classes start before 8:00 a.m. at many U.S. high schools. However, these early start times may not be in sync with students' circadian rhythms, which shift to later in the day as the students enter adolescence. As a result, some school districts have moved high school start times to later in the day with the goal of increasing students' sleep, academic achievement, and health.

In “[Snooze or lose: high school start times and academic achievement](#)” (*Economics of Education Review*, October 2019), we examine whether high school start times affect student achievement. To understand the mechanisms through which start times affect student achievement, we also examine the effects of start times on students' time allocation—especially sleep time. Our analysis, conducted separately by gender, is based on longitudinal data from a nationally representative sample of students at public high schools. The data come from the Child Development Supplement (CDS) to the Panel Study of Income Dynamics (PSID). A unique aspect of the CDS is the collection of two 24-hour time diaries (one for a weekday and another for a weekend day), which contain the start and stop times of students' activities occurring throughout the day. Academic achievement is measured by scores on standardized tests in reading and math that are administered to students during their CDS interview. We use several sources (mainly school websites) to obtain start times for the schools that the sample students attended.

The empirical estimates indicate that female students who attend schools with later start times get more sleep (36 minutes more per school night for a 1-hour later start time) and score higher on reading tests (0.16 to 0.28 standard deviations higher for a 1-hour later start time), although not on math tests. This substantial gain in test scores is similar to the effect of reducing class size by one-third. By contrast, male students who attend schools with later start times do not score higher on either reading or math tests. Male students do get more nighttime sleep with later start times, but they do not get more daily sleep (i.e., sleep over the diary day) because of an offsetting decrease in after-school napping when school starts later. This pattern of results indicates that sleep time is the primary mechanism through which start time affects test scores. Indeed, estimates from a model of sleep, start time, and reading test scores for female students indicate that longer sleep leads to greater academic achievement. In addition, our results suggest that students of both sexes who are economically disadvantaged (as measured by eligibility for free or reduced-price lunch) may benefit more academically from delaying start times.

Our analysis of sleep also indicates that later start times affect students' wake-up times but not bedtimes; thus, the effect of later start times on nighttime sleep comes about entirely through a delay in wake-up time rather than a change in bedtime. Beyond sleep, our analysis of time use indicates that later school start times do not reduce

students' time spent on homework, after-school jobs, or sports. However, both males and females spend less time on leisure activities when schools start later. Finally, start times have no effect on student health or tardiness.

In October 2019, California became the first state in the country to mandate later start times. The new law requires public middle schools to begin classes at 8:00 a.m. or later and public high schools to begin classes at 8:30 a.m. or later. The findings from our study suggest that this law can potentially increase students' nighttime sleep and consequently their academic achievement.