

School Start Times: A Review of the Literature

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Background

This paper reviews literature on the impact of school start times beginning with a discussion of the research on the importance of sleep and the impact of insufficient sleep on school-aged children's outcomes, with a particular focus on learning and education. The paper also explores lessons learned when schools and districts have shifted school start times, which usually involves delaying school start times for high school students (and potentially advancing start times for younger children).

The Importance of Sleep Among Youth

According to the American Academy of Pediatrics, "insufficient sleep represents one of the most common, important, and potentially remediable health risks in children." (Owens et al., 2014a, p. 642). On average, preschoolers need between 10 and 13 hours of sleep per night, school-aged children need between 9 and 11 hours, and teenagers need between 8 to 10 hours, according to the National Sleep Foundation (Hirshkowitz et al., 2015). Similarly, Short et al. (2018) found that adolescents need about 9.35 hours of sleep per night to optimize sustained attention.

Unfortunately, numerous studies have documented that American children are "chronically sleep deprived and pathologically sleepy (ie, regularly experiencing levels of sleepiness commensurate with those of patients with sleep disorders such as narcolepsy)" (Owens et al., 2014a, p. 643). Sleep deprivation has also been shown to increase throughout childhood with fewer than a third of high school students getting at least 8 hours of sleep and less than 8% receiving the recommended 9 hours of sleep per night (Eaton, et al., 2010; Fredriksen et al. 2004). Thus, insufficient sleep has been described by the American Academy of Pediatrics as an "epidemic" among adolescents (Owens et al., 2014a, p. 643). Unfortunately, parents may be unaware of the problem. In prior research, 71% of parents reported that their adolescent got sufficient sleep (as cited in American Academy of Pediatrics, 2014).

One of the primary reasons for lack of sleep among adolescents is the incongruence between their "biology" and societal norms. The onset of puberty affects children's central nervous systems and "underlying intrinsic regulatory processes" (Tarohk & Carskadon, 2009, p. 1015). For the purposes of this literature review, two noteworthy changes occur that impact sleep and waking states. First, adolescents' homeostatic sleep drive is delayed. This refers to the pressure that one feels to fall asleep, which accumulates while awake and dissipates as one sleeps. The sleep drive is observed through slow-wave activity and research has found that compared with younger children, mature adolescents take longer to experience a build-up of slow-wave activity (Jenni, Achermann, & Carskadon, 2005). Second, puberty affects children's circadian rhythms, in particular, nocturnal melatonin release. Melatonin, or "the hormone of darkness" is released by the pineal gland in response to light. Light decreases its production and, conversely, darkness increases its production (Singh & Jadhav, 2014). Thus, it serves as the body's "internal biological signal of darkness" or "biological clock that lets us know when sleep should occur" (Gooley et al., 2010, p. 463; Wahlstrom et al., 2014, p.4). As children enter puberty, melatonin release occurs later in the evening, known as a circadian phase delay (Carskadon, et

al., 1997; Tarokh & Carskadon, 2009). Given adolescents lack of optimal sleep, as Tarokh and Carskadon note, “morning alertness specifically is impaired since adolescents wake with elevated homeostatic pressure and also at a circadian phase that does not support alertness” (p. 1020). These biological changes result in adolescents needing more sleep in the morning and being more alert in afternoons and evenings, “a shift of up to 2 hours” (Owens et al., 2014a, p. 642). Further, the finding that adolescents typically fall asleep later and wake later than children and adults has been found across countries, indicating a biological basis (as cited in Alfonsi et al., 2020). Given these maturational changes, on average, adolescents are best suited to sleep from 11 pm to 8 am or later (Owens et al., 2014a).

In contrast, to calls for later wake times for adolescents, as Bastian & Fuller (2022) noted, “The AAP [American Academy of Pediatrics] did not issue a recommendation for elementary school start times in its 2014 report” (p. 3). As Hirshkowitz et al. (2015) explain, although elementary aged children need between 9 and 11 hours of sleep per night, they have not yet experienced the hormonal shifts associated with puberty that were previously described. Thus, elementary school students’ sleep cycles are thought to be more determined by their bedtime/parents (as cited in Bastian & Fuller, 2022). In support of this perspective, Appleman et al. (2015) found that shifting elementary students to an earlier start time did not impact their sleep duration.

Impact on Physical & Mental Health. Studies have documented a variety of adverse physical health outcomes associated with inadequate sleep among children. In particular, numerous studies have examined the impact of sleep on children’s **weight or weight gain**. For example, in a randomized control trial in which the experimental group of school-aged children received an extra 1.5 hours of sleep, Hart and colleagues (2013) found that students in the increased sleep group consumed less calories (about 134 per day) and showed lower fasting leptin levels and lower weight. Studies have also linked inadequate sleep to an increased likelihood of obesity, though results on this issue are somewhat mixed. O’Dea, Dibley, and Rankin (2102) examined 939 Australian children aged 7-12 years and found a difference of about 1 Body Mass Index (BMI) point between children based on whether they received adequate sleep. Lowry et al. (2012) found an association between sleep duration and weight for female high school students only. Study methodology may also play a role. For example, Lytle, Pasch, and Farbaksh (2011) conducted a correlational study and found that sleep duration was associated with Body Mass Index among middle schoolers but not high school students. However, Lytle et al.’s (2013) later study did not find a relationship to weight change when they examined adolescents whose sleep patterns changed. Chen, Beydoun, and Wang (2008) who reviewed the literature on the relationship between sleep and obesity in youth concluded that there is good evidence for a relationship between sleep duration and risk of being overweight or obese in children below the age of 10, however, the research on adolescents is more mixed though they noted that “most studies gave significant results in the expected direction” (with less sleep being associated with higher odds of being overweight or obese; p. 270). Given the epidemic of obesity in the US and among children, shifting school start times may represent an important intervention in tackling the problem.

In addition to examining weight gain, Foti et al. (2011) found that high school students who get insufficient sleep were less likely to get at least an hour of **exercise** each day. Some studies have also linked insufficient sleep to higher blood pressure, cardiometabolic risk, increased headaches, fatigue, and pain (as cited in Alfonsi et al., 2020). Related, researchers who have studied start time delays for adolescents have found that student **illnesses** have declined. Perhaps one of the most compelling cases was Kelley et al. (2017) who reported a 50% decrease in illnesses (which represents a strong effect size of 1.07) 2 years after the delay (10:00 am) was implemented and then a 30% increase in illnesses again after the delay was reversed (8:50 am).

Inadequate sleep has also been associated with **use of drugs and other risk-taking behaviors**. From their study of over 700 10-17 year olds, Pasch et al. (2012) reported that duration of sleep was associated with adolescents' cigarette, alcohol, and marijuana use. Similarly, Wahlstrom (2014) reported greater use of caffeine and greater risk of illegal substance use when teenagers reported receiving less than 8 hours of sleep per night, on average.

Some studies have even linked lack of sleep with **driving safety**. Danner and Phillips (2008) found a 16.5% reduction in teen crashes across a school district two years after a one hour delay in school start times was implemented (in comparison to a 7.8% increase in teen crashes across the state). Similarly, Wahlstrom (2002) found that the number of car crashes among 16 to 18 year olds declined by 70% when a school delayed start times from 7:35 AM to 8:55 AM. Anecdotal evidence also suggests Ft. Wayne may have seen some impacts on teen driving after delaying start times. As one district official explained, the delay lets "ice, fog, or snow melt or burn off. And students are simply *awake*." (Dreilinger, 2019, para. 46).

Research has also linked inadequate sleep in children to poorer **mental health**. Wahlstrom (2012), who surveyed high school students, found that those who reported less than 8 hours of sleep per night had significantly higher rates of depression, with an effect size of 0.44, which is approaching a moderate effect. Fredriksen et al. (2004) examined sleep patterns of over 2000 11-14 year olds and found that sixth grade students who slept less showed lower self-esteem and higher rates of depressive symptoms.

Impact on Educational Outcomes. Though the findings are less conclusive, studies have also examined school start time in relation to student educational outcomes, which will be discussed next, beginning with an overview of three reviews of the literature (Marx et al., 2017; Alfonsi et al., 2020; & Biller et al., 2022)..

Marx et al. (2017) conducted a literature review on the impact of school start time on high school students' education and well-being. Seventeen studies met their criteria for inclusion. Among those 17, only four examined academic outcomes with mixed findings including:

- Milic (2014) who found negative impacts on student GPA (as cited in Marx et al, 2017).
- Hinrichs (2011) who found a non-significant relationship to ACT scores (as cited in Marx et al, 2017).

- Edwards (2012) who examined Wake County NC middle school start times, which were staggered throughout the county and shifted in about half of the schools during the seven year study period, thus permitting the analysis of the impact of differences in start times across and within schools. Edwards conducted a regression analysis, controlling for gender, race, age, socioeconomic status, grade, and parental education, and found that delaying start times by an hour resulted in gain of about 2-3 percentile points in reading and math. Further, the effect was stronger for lower-achieving students. Based on this finding, Edwards argued that, “later start times compare favorably on cost grounds to other education interventions which result in similar test score gains” (p. 970).
- Walstrom et al. (2014) whose findings Marx et al. (2017) described as unclear due to “limited reporting” (p. 38). Wahlstrom et al. (2014) examined students’ grades, achievement, and attendance of over 9,000 high school students in eight high schools in Minnesota, Colorado, and Washington for three years that shifted high school start times. Wahlstrom found that students were more likely to report getting at least 8 hours of sleep on school nights when schools started at 8:30 AM or later and that the number of hours that students slept had a positive, though weak correlation with student GPAs. In addition, GPAs were found to significantly increase in most of the schools and grade levels following implementation of a delayed school start. The researchers also found increased attendance rates and reduced tardiness with later start times. However, results in terms of impact on standardized test scores were more mixed and often not statistically significant.

In their review of the literature, Marx and colleagues also noted mixed findings with regard to student alertness and absenteeism. Although the researchers concluded that the quality of evidence regarding academic outcomes was limited and thus, inconclusive, they noted significant positive relationships between delayed school start times and total amount of sleep across the six studies that examined this issue.

Alfonsi and colleagues (2020) conducted a review of the literature on delayed school start times and its impact on adolescents’ health and education. Some of the health outcomes have already been reported in the previous section. In terms of learning and academics, the researchers noted that with the exception of two studies, researchers have generally reported that later start times and extended sleep is associated with decreased daytime sleepiness. In terms of daytime, executive functioning, Alfonsi et al. reported that the extant literature shows improvements in adolescents’ attention and reaction times when school start times are delayed. The researchers also noted that studies have generally found a reduction in tardies though there is less support for an impact on absences. In terms of achievement, the review cited eight studies, five of which they noted showed better academic performance; one which showed mixed results depending on grade, and two that did not find any significant differences in academic outcomes. Among the 5 that showed positive impacts, two of those studies (Edwards, 2012; Wahlstrom et al., 2014) were also reviewed by Marx et al. (2017). The other studies included:

- Walstrom (2002) who studied the impact of a delayed start (from 7:15 a.m. to 8:40 a.m) on almost 51,000 high school students across five years. Wahlstrom reported increased enrollment in the district due to decreased transience, improved attendance especially

among 11th and 12th graders whose attendance rate went from 73.7% to 77.5%, and significantly less sleepiness in class and while doing homework and less student-reported depression. The researchers found a slight improvement in student grades, however, it was not statistically significant.

- Carrell, Maghakian & West (2011) who found, in a randomized control trial of freshmen at the US Air Force Academy that a delay of 50 minutes was associated with a significant increase in student grades.
- Kelley et al. (2017) who reported on the results when a high school in England uniquely shifted to starting after 10 am and then also shifted back two years later, creating natural/field experiment. Following the delay, the school saw a 12 percentage point increase in the percent of students making adequate progress on national exam performance.

Slightly more recently, Biller et al. (2022) also conducted a literature review on delayed start times for middle and high school students. Among the 21 studies included in their review, about half showed no impact on grades or test scores when school start times were delayed and the other half reported at least some positive results, not allowing the researchers to draw any firm conclusions across studies about the impact of school start time on academic performance. In addition to a lack of true experiments or randomized control trials, the researchers discussed that results may also be mixed due to differences across studies in terms of actual start times, the extent to which start times are delayed, the length of the studies, etc. (also concerns mentioned previously by Marx et al., 2017). While they could not conclude that delaying school start time is associated with better academic outcomes, the authors noted that only one study showed adverse effects, which given positive outcomes (in terms of sleep, mood, etc.) reported in other studies, may still provide support for the decision to delay school start times, despite the lack of clear evidence regarding the impact on achievement.

In a more recent study since Biller et al.'s literature review, James, Erickson, Lammert, and Wisdom (2023) examined the impact of delaying school start times by 50-65 minutes (from 7:30 to 8:20 or from 7:45 to 8:50) in Minneapolis high schools. Their two-year study used a quasi-experimental design that compared attendance and achievement at the Minneapolis high schools that shifted start times to a group of comparison schools that maintained the 7:30 AM bell time. They found that the delay in start time resulted in about three fewer late arrivals, one fewer absence, a 14% lower probability of receiving a referral, and a higher GPA (.07 on an unweighted scale and .17 on a weighted scale).

In another study not included in any of the three previously discussed literature reviews, Heissel and Norris (2018) conducted a longitudinal study on the impact of school start time on achievement among Florida students from 2000 to 2013. Rather than actually assess school start times, their study uniquely compared the performance of Florida's panhandle students in grades 3-10 that live near the Eastern-Central time zone boundary. As they discuss, the "issue" with start time is its relevance to sunrise and students living in the Central zone actually experience an hour less of sun before school begins at 8 AM than their nearby peers living in the Eastern time zone. They found that a one-hour delay in start time showed a non-significant

increase in start time for younger children but increased test scores by 0.07 and 0.05 standard deviations for adolescents in math and reading, respectively. The researchers also examined results by race, gender, and socioeconomic status and found that delayed start times benefited all groups of adolescents. Based on study findings, Heissel and Norris encourage school districts to assign the earliest school start times to young children and ensure high schools have the latest start times. The researchers also noted that the effect size associated with delaying start times is similar (about half) as the impact of reducing class sizes and hiring more qualified teachers on achievement, yet often much less costly.

Bastian and Fuller's (2022) study was also not included in the three literature reviews that were discussed and is unique in that it investigates the impact that earlier start times have on elementary students. Their publication reported on two studies. In the first, they examined start times across North Carolina elementary schools (the average start time was 8:06 am) and in the second, they explored impacts within a North Carolina school district that recently shifted elementary times earlier in order to delay start times for high schoolers. In the second study, 5th graders (only 5th grade was surveyed about their sleep habits) did report less sleep than peers whose schools started later. Across their two studies, elementary students with earlier start times were also absent about a half of a day more. The researchers found no association between start times and suspensions across the state though there was a brief uptick in suspensions in study 2 in which elementary start times shifted. The researchers also examined achievement in grades 3-5 and found no association with reading achievement and a slight increase in math achievement (3.5% of a standard deviation) for schools that started an hour earlier (before 8 am). Based on their findings, the authors concluded that "it may be advisable for elementary schools to start earlier to accommodate later secondary school start times" (p. 20).

Marx et al. (2017), Alfonsi et al. (2020), and Biller et al. (2022) all make it clear that results regarding academic outcomes associated with school delays for adolescents are mixed. Despite the mixed findings and need for more research, in this paper, several studies with "positive findings" were reviewed in slightly more depth given that it may be helpful to consider the potential academic impacts when a delay "worked" and better understand the contexts of that change. Practically, it may also be useful to report on "success stories" so that interested educational administrators can reach out to those districts to learn more.

Overall, the extant research on school delays suffers from many limitations. For example, as Biller et al. (2002) noted, the effect of delayed school start time may differ depending on the period examined. This was found in Bastian and Fuller's (2022) article in which impacts were detected on first period grades but not on student grades overall. Yet, few researchers have examined grades by course period. Walhstrom and colleagues have also made an interesting point regarding studies that use SAT or ACT scores as the outcome measure, noting that this approach is problematic because students who take the SAT or ACT "are likely to be academically successful no matter what the local policy is about the starting time of the school day" (Walhstrom, 2002, p. 12). In addition, as Wahlstrom et al. (2014) discussed, any effects of delayed school start times on SAT or ACT scores may be "washed out" given that these

assessments are typically administered in the morning, when high schoolers who have adjusted to a delayed schedule may not show optimal performance. In general, there is a need for more research studies on the impact of school delays that use experimental designs/randomized control trials and studies that follow students across years given that effects of delayed school start times may accumulate over time. There are also few studies that examine impacts of school time changes on elementary and middle school students. In addition, few researchers provide much detail or have investigated the process by which schools and districts have transitioned to delay start times, information that will be explored in the next section of this paper and that would be important in helping researchers understand the conditions of positive change as well as in helping educators effectively navigate this change. As Marx et al. (2017) concluded from their review of the literature, the current lack of information about “process,” would make it difficult for policymakers “to apply this evidence to future decisions” (p. 46).

Practical Concerns in Delaying School Start Times for Adolescents & Lessons Learned

Increasingly, schools across the US and internationally have begun implementing programs to address insufficient sleep, especially among adolescents. For example, both California and Florida have passed legislation mandating that public middle schools start no earlier than 8:00 a.m. and high schools start no earlier than 8:30 a.m. (Luna, 2019; Povich, 2023). If schools or districts decide to delay start times, there are a variety of practical considerations and concerns they should be ready to address as such changes can create situations where parents are outraged and schools feel pitted against each other. Thus, this section is intended to explore some of those issues and lessons learned by educational administrators and researchers around changing school start times.

What start time is ideal? Wahlstrom (2012) found that high schools that start at 8:30 AM or later allow for more than 60% of students to sleep at least eight hours of sleep per night. Similarly, the American Association of Pediatrics (2014) recommends that middle and high schools should start schools no earlier than 8:30 am. Kelley et al. (2017) who studied the shift to a 10 am start time, noted that “[t]he national US recommendation that middle and high schools should start after 8:30 a.m. is a clearly justified positive step, although the evidence in this study suggests a much later start of 10 a.m...brings additional benefits” and noted that “a post-9:00 a.m. school start strategy is one with few costs and many potential benefits which start to accrue, quite literally, overnight.” (pp. 7-8)

Will teenagers actually sleep more? As Danner and Phillips (2008) noted, “it is sometimes argued that starting high schools later will simply result in adolescents staying up even later, with no net gain in sleep” (p. 533). However, the research is pretty clear on this matter - when schools are delayed, adolescents do sleep more; generally in the range of 25-77 minutes per night (Alfonsi et al., 2020). In Danner and Phillips’ (2008) study, when a one-hour delay was implemented, average nightly sleep increased by 12 - 30 minutes (depending on grade level) and catch-up sleep on weekends decreased. Wahlstrom (2002) also found that high schoolers did not shift their bedtime when later start times were implemented and ultimately got about an extra hour of sleep. As she explained, “[t]his finding makes sense from a biological perspective,

as it is likely that nighttime circadian rhythms were contributing to feelings of sleepiness around 11 p.m, regardless of what time the students woke up in the morning” (p. 12).

What can be done about young children catching early buses? When school start times are delayed for high school students, due to limited busses, it often means that elementary school students must have earlier start time. Thus, student safety when catching the bus (especially when it may be dark outside) is one of the primary concerns of parents when elementary school start times are moved earlier. To address this issue, some strategies that have been used include rearranging bus routes to reduce students’ walk to their stops, providing reflectors for student backpacks and apparel, installing bus lighting that shines in two directions for students getting on and off the bus, adding more blinking “STOP” arms on buses, and working with the city to add more street lights and sidewalks, where needed (Dreilinger, 2019). As another novel idea, St. Paul has been working with their city’s public transit system in order to provide passes so that high school students could use public buses to get to school, eliminating impacts on elementary and middle school schedules (Dreilinger, 2019).

What are districts doing about lack of childcare? Lack of childcare is also a concern among parents, especially those of elementary aged students who may be getting home earlier and possibly earlier than an older sibling who they may currently rely upon to provide some supervision. One way to address this concern is to offer more afterschool programming. For example, Fort Wayne expanded their fee-based after school program after moving up elementary school start times and St. Paul is working with community partners to offer their after school programming for elementary students for free (Derilinger, 2019).

How can the impact on after-school activities be minimized? Delaying high school start times (and thus, end times) may affect after school activities. In particular, athletes may have to miss later afternoon classes in order to participate in intramural sports (given that other schools may still be on earlier schedules). For this reason, although most students liked the time delay, some student athletes in Wahlstrom’s (2002) study reported they would prefer being able to engage in sports earlier in the afternoon or not having to miss their last class period in order to play; though participation rates in afterschool activities were unchanged. Similarly, a few coaches interviewed in Wahlstrom’s study were also “outspoken about their dislike,” though most were supportive given the positive changes amongst students they had observed (p. 16). Jacob and Rockoff (2011) proposed several strategies to address concerns about student athletics including ensuring any study halls occur as the last period for athletes, exempting athletes from physical education requirements and thus, freeing up a class period, installing lights on athletic fields, and changing high school start times regionally (rather than by school or district).

Parents are also often concerned that a later dismissal time may negatively impact high school students’ ability to work after school or participate in cooperative field placements. Though few researchers have addressed the issue, Wahlstrom (2002) found there was no negative impact on student employment because employers typically did not need additional staff until 4:00 PM or later.

What recommendations have been offered regarding how to “roll out” changes in school start times? Given the many practical ways in which changing school start times may affect parents, students, and community stakeholders (including organizations that use school athletic fields or provide after-school activities like public libraries); ensuring effective communication around any substantial changes is critical. As Derilinger (2019) reports, the lack of effective communication around changes to school start times likely led to former Boston superintendent, Tommy Chang’s resignation in 2017. Parents felt they were not listened to after voicing their concerns on district surveys and instead felt that “their lives were being ruined by an algorithm...from MIT” (Derilinger, 2019, para. 28) which presumably refers to the work by Bertismas, Delarue, and Martin (2019) who designed a formula to optimize school bus times known as the Biobjective Routing Decomposition (BiRD) model. The five districts studied by Wahlstrom et al. (2014) were able to avoid any “organized effort to defeat the start time delay” by holding numerous public sessions across about a year (p. 51).

If changes are to be made to the school start day, impacted families should receive ample information, opportunities to share concerns (prior to implementation and throughout the implementation process), and notice (Derilinger, 2019). Some information that may be shared with stakeholders includes research on adolescent sleep patterns, adverse outcomes associated with insufficient sleep, and findings from previous studies on start time delays. As Wahlstrom (2002) noted, “without first impartially sharing and discussing the complete array of findings [with parents, it] will almost certainly lead to their disapproval of the idea” (p. 19). These actions may partly explain why 92% of surveyed parents in Wahlstrom’s (2002) study approved of the change.

Sharing information about any potential cost savings may also be helpful. For example, in Kanawha County, the modified schedules required fewer buses to cover the district’s rural areas and in Ft. Wayne, the change allowed the district to move to a “from a two- to a three-tier bus timetable” (Derilinger, 2019). Jacob and Rockoff (2011) conducted an economic cost-benefit analysis on delaying middle and high schools and “conservatively estimate[d] that the ratio of benefits to costs is 9 to 1” (p. 2). Similarly, Hafner et al. (2017) concluded that based on the benefits to academic performance and reduced car accidents, delaying high school start times nationally could add \$83 billion to the economy over a decade.

In addition to considering the financial costs or savings to changing school start times, conducting a pilot before making such a shift district-wide is recommended. For example, a six-week pilot was conducted in the school studied by Kelley et al. (2017). Jacob and Rockoff (2011) emphasize that “it is critical that the district use the opportunity to carefully study the impact of the schedule change. Piloting of later start times should be done first in those areas with the highest expected net benefit... [including] those that currently do not use a tiered busing system and those with more disadvantaged students for whom the benefits will be greater” (p. 11). A pilot may also be useful for studying impacts on traffic patterns, which has been reported to be parents’ primary concern (Owens et al., 2014b).

Clearly, school and district administrators will play a substantial role in communicating with families about any changes to school bell times. However, as Owens (2014b) noted, the school board is also “vital in communicating to the broader public both the justification (e.g., health and safety benefits)...and the message that any challenges can be...overcome” p.196). Owens and colleagues also recommend that teachers, health professionals such as school nurses, and counselors should be educated about the research around adolescent sleep and school start times in order to help inform the public.

In addition to ensuring adequate planning and effective communication around any school start time changes, some districts have also implemented more choices for students and their families. For example, Owens et al. (2014b) reported that, among the districts they studied that delayed high school start times, two implemented a “zero period (i.e., a class offered before the start of the school day” and another district implemented flexible scheduling (p. 194). Similarly, Derlinger (2019) reported that St. Paul school district provided an opt-out by ensuring that each attendance zone included at least one elementary school with a later start time.

What impact might changes to start times have on teachers? Few studies have examined teacher perspectives around school start times or the impact that changes have on them and, to the authors knowledge, no studies to date have examined teacher retention after changes to school start times. However, Wahlstrom (2002) conducted several surveys and focus groups with hundreds of high school teachers and found that they believed school should start between 8 and 8:30 am to maximize learning. Wahlstrom also found that over half of teachers who had experienced a delay in school start time reported that students were more alert in the morning and less likely to sleep at their desk. From their review of the literature, Marx et al. (2017) noted that a common unintended consequence of delaying start times was that teachers were not able to attend professional development activities, requiring schools to hire additional substitutes.

In addition to sharing information about the rationale behind any school start time changes with parents, it may also be helpful to provide teachers with information about the rationale behind the changes and any possible positive impacts. For example, in Kelley et al.’s (2017) study, changes to schedules resulted in teachers avoiding driving during rush hour and being able to take their young children to school in the morning before having to be at work. Though not a focus of the extant literature, it may help facilitate a smoother transition, if administrators share information with bus drivers (who may be substantially impacted if their workload or route complexity increases) in advance of any changes.

What other practices can be implemented to amplify potential positive impacts of changing school start times? As the American Academy of Pediatrics (2014) discussed, “delaying school start times alone is less likely to have a significant effect without concomitant attention to other contributing and potentially remediable factors, such as excessive demands on students’ time because of homework, extracurricular activities, after-school employment, social networking, and electronic media use.” (p. 6). In addition to considering changes to policies and practices that might reduce these “excessive demands,” in order to maximize the impacts of changes to school start times, Alfonsi et al. (2020) suggested districts should

consider simultaneously implementing sleep hygiene programs that raise student awareness about sleep routines, caffeine use, avoiding stimulation at night, etc.

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