

BENCHMARKING HIGH SCHOOL START TIMES

Prepared for Lake Washington School District

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In the following report, Hanover Research benchmarks district practices regarding high school start times, examining the relationship between adolescent sleep and student achievement, as well as the successes and challenges faced by six districts that have transitioned to later start times.



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TABLE OF CONTENTS

Executive Summary and Key Findings	3
Introduction	3
Key Findings	3
Section I: School Start Times and Student Achievement	5
High School Start Times and Sleep	5
Academic Impact	7
Health Benefits	8
Implementation	9
Section II: District Profiles	13
South Washington County Schools (MN)	13
Santa Rosa County School District (FL)	15
Academy District 20 (CO).....	17
Albany Unified School District (CA).....	19
Glens Falls City School District (NY)	20
North Andover Public Schools (MA)	22

EXECUTIVE SUMMARY AND KEY FINDINGS

INTRODUCTION

High school start times have become a widely debated and researched issue in public education, as districts strive to balance a need for increased instructional minutes with developmentally appropriate expectations for school schedules. The recent change in state legislation in Washington has created an increased need for innovative school scheduling to provide students with additional course hours. In response, districts are evaluating the possibility of expanding the school day, and must review research on changing school start times.

In this report, Hanover Research benchmarks practices surrounding high school start times for Lake Washington School District. The report is organized as follows:

- **Section I** details the relationship between adolescent sleep patterns and high school start times, with a focus on the impact of school start times on academic outcomes and student health. Challenges in implementation of later high school start times are also discussed.
- **Section II** benchmarks district practices in implementation of later high school start times through in-depth interviews with administrators from exemplary districts identified by the literature.

KEY FINDINGS

- **Despite overwhelming research that early school start times can be detrimental to student achievement and health, a majority (60%) of the nearly 19,000 high schools in the United States still have start times at 8:00 a.m. or earlier.** As of 2012, the average start time for public high schools was 7:59 a.m., with nearly 10 percent of schools beginning before 7:30 a.m. Just 3.8 percent of American high schools start school after 9:00 a.m.
- **The average American high school student is sleep-deprived, with early school start times being a major contributor to sleep loss.** Sleep deprivation can cause negative effects on school performance. It is important for adolescents to get a full night of sleep, as sleep has profound impacts on student learning, memory, and academic performance. Sleep has been shown to increase student focus, improve impulse control, and sharpen procedural and declarative memory in school.
- **Numerous studies have identified a relationship between later high school start times and improved academic performance.** Since the 1990s, a wealth of research on school start times in the United States and abroad has shown that later start times are positively correlated with improved student GPA, grades, ability to concentrate, and tardiness frequency. However, it is important to emphasize that even with a later start time, schools should ensure that their first period class is delivering impactful content, or students are more at risk of being disengaged.

- **Later high school start times have health and safety benefits.** Students in schools that have shifted school start times exhibit more positive indicators of mental and physical health, including less daytime sleepiness, weekly caffeine consumption, and lower risk of depressive behavior. Regarding safety, later school start times can help prevent high school students from drowsy driving, which can be nearly as dangerous as driving while intoxicated.
- **The districts profiled in this report had various motivations for changing their school start times, most of which were related to parent and administrator concerns about student sleep and stress or budgetary constraints at the district level.** In some districts, parents initially introduced concerns to the board of education, and in others, principals, assistant superintendents, and superintendents presented research on the benefits of sleep on student health and academic performance. In one district, Santa Rosa County, the decision for a later school start time was made because the district was in poor financial condition, and switching to a tiered busing system provided a significant cost savings.
- **All interviewed district administrators mentioned community input as a crucial part of their decision-making process.** No matter the initial impetus for the change, all districts created ad hoc committees to examine the benefits and disadvantages of switching to a later school start time. Some schools also held parent nights and released newsletters to communicate the importance of sleep and later school start times to families.
- **The primary challenge that districts faced in implementing later school start times was accommodating extracurricular activities, particularly athletics.** Some districts moved athletic practice and school clubs meeting before school, or created optional zero periods for electives. After-school activities proved more challenging, with the majority of interviewed administrators reporting issues with students missing class time to travel to athletic competitions at the end of the school day. Districts that were in athletic divisions whose competitor schools did not have late release times were particularly affected.
- **Despite initial concerns about transportation and the accommodation of extracurricular activities, many profiled districts report some academic improvements for students, as well as that their students were more engaged during the early periods of the day.** In two academic studies of two examined districts, positive academic outcomes include decreased course failure, decreased absenteeism, improved state test scores, and improved PLAN scores.

SECTION I: SCHOOL START TIMES AND STUDENT ACHIEVEMENT

In this section, Hanover Research describes the relationship between high school start times and sleep, emphasizing the necessity of later start times for adolescents. Hanover Research then outlines the specific academic and health benefits associated with later school start times. Last, challenges for implementation of a later school start time are discussed.

HIGH SCHOOL START TIMES AND SLEEP

Numerous studies attest that the average adolescent in the United States is chronically sleep-deprived and pathologically sleepy. As a result, many high school students are at risk of negative academic and health outcomes associated with insufficient sleep.¹ While the lifestyle choices of students, including academic demands required outside of school time, play a role in student sleep patterns, the vast majority of research on the relationship between high school start times and sleep concludes that early school start times (before 8:00 a.m.) are a key contributor to sleep loss in high school students.² Research strongly suggests that high schools should avoid moving their start times forward to accommodate additional classes. Adolescents typically have difficulty falling asleep before 11:00 p.m., and should wake up around 8:00 a.m. to get the necessary amount of sleep.³ As such, the American Academy of Pediatrics recommends that high schools avoid scheduling classes before 8:30 a.m.⁴

Despite overwhelming evidence that early start times can be detrimental for student achievement and health, a majority (60%) of the nearly 19,000 high schools in the United States still have start times at 8:00 a.m. or earlier.⁵ As of 2012, the average start time for public high schools was 7:59 a.m., with nearly 10 percent of schools beginning before 7:30 a.m. The distribution of high school start times in the U.S. is presented in Figure 1.1.

¹ The Children's National Medical Center's Blueprint for Change Team. "School Start Time Change: An In-Depth Examination of School Districts in the United States." April 15, 2014.

<http://www.fcps.edu/supt/update/1415/Blueprint-Change-School-Start-Time-Change-ReportFinal4-14-14.pdf>

² [1] Hansen, M. et al. "The Impact of School Daily Schedule on Adolescent Sleep." *Pediatrics*, 115:6, 2005.

<https://teensneedsleep.files.wordpress.com/2011/04/hansen-et-al-the-impact-of-daily-school-schedule-on-adolescent-sleep.pdf>

[2] Carrell, S.E., T. Maghakian, and J.E. West. "A's from Zzzz's? The Causal Effect of School Start Time on the Academic Achievement of Adolescents." *American Economic Journal: Economic Policy*, 3:3, 2011.

<http://www.ingentaconnect.com/content/aea/aejep/2011/00000003/00000003/art00003> [3] Hinrichs, P. "When the Bell Tolls: The Effects of School Starting Times on Academic Achievement." *Education*, 6:4, 2011.

http://www.mitpressjournals.org/doi/abs/10.1162/EDFP_a_00045

³ Boergers, J., C.G. Gable, and J.A. Owens. "Later School Time Is Associated with Improved Sleep and Daytime Functioning in Adolescents." *Journal of Developmental and Behavioral Pediatrics*, 25:1, 2013.

<http://www.gwern.net/docs/melatonin/2014-boergers.pdf>

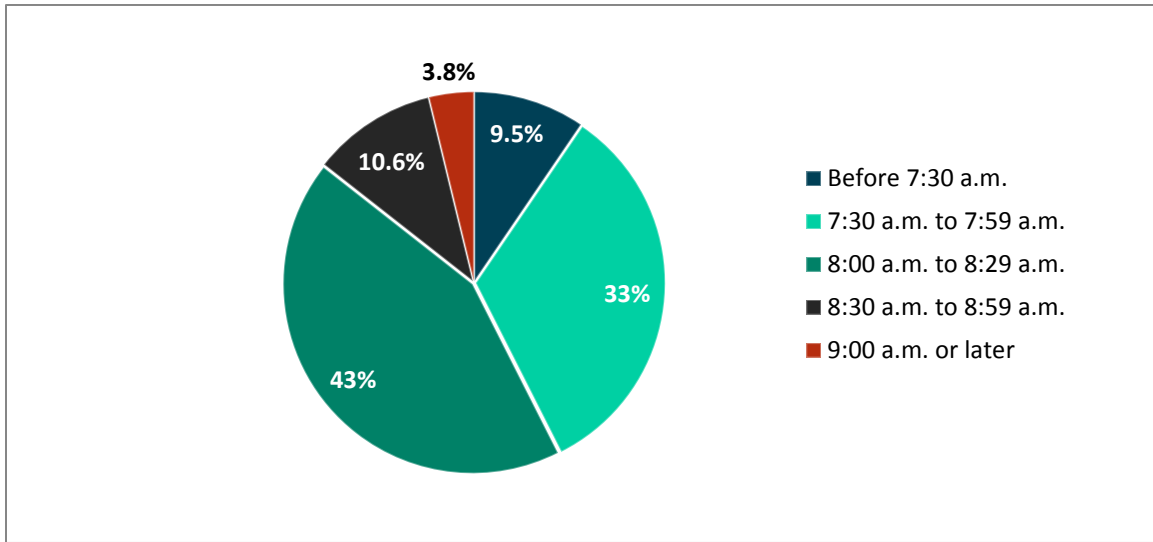
⁴ American Academy of Pediatrics. "School Start Times for Adolescents." *Pediatrics*, August 25, 2014.

<http://pediatrics.aappublications.org/content/early/2014/08/19/peds.2014-1697.full.pdf+html>

⁵ "Average Start Time for Public High Schools and Percentage Distribution of Start Times in Public High Schools, by Selected School Characteristics: 2011–12." National Center for Education Statistics, 2012.

https://nces.ed.gov/surveys/sass/tables/sass1112_201381_s1n.asp

Figure 1.1: Distribution of High School Start Times in the United States



Source: National Center for Education Statistics ⁶

The distribution of school start times shown in Figure 1.1 can largely be attributed to “adult” considerations including school budgets, transportation logistics, parent work schedules, athletics, staff commute times, and community use of facilities. These considerations have historically overtaken concerns about the sleeping needs and circadian rhythms of adolescents.⁷ However, there are a few notable exceptions to this pattern. For example, Loudon County Public Schools in Virginia has operated the same bell schedule since 1954, with high schools beginning at 9:00 a.m. The district’s middle and high school schedules are adjusted accordingly, with middle schools beginning at 8:30 a.m. and elementary schools at 7:50 a.m. Other large districts with high school start times after 9:00 a.m. include Dallas ISD and Austin ISD, which adjusted their schedules in the 1990s.⁸

In fact, since the 1990s, approximately 70 districts in the United States, representing about 1,000 schools, have successfully implemented a delay in high school start times. A 2014 report by the Children’s National Medical Center’s Blueprint for Change Team identified 37 school districts that delayed start times for high school students between 1996 and 2014 (See Section II for select profiles of these districts). According to case studies of these schools, as well as interviews with key stakeholders, these districts made the transition to later start times based on the association between benefits of sleep and school performance.⁹ Smart School Start, a group that advocates for later school start times, compiled a list of the benefits that sleep has on school performance, which is outlined in Figure 1.2 on the following page.

⁶ Ibid.

⁷ The Children’s National Medical Center’s Blueprint for Change Team, Op. cit., pp. 3–4.

⁸ Ibid., p. 4.

⁹ Ibid., pp. 2-3.

Figure 1.2: Benefits of Sleep for School Performance

LEARNING	MEMORY	ACADEMIC MEASURES
<ul style="list-style-type: none"> ▪ Sharpens attention ▪ Increases ability to focus ▪ Improves impulse control ▪ Increases attention ▪ Enhances critical thinking ▪ Stimulates creativity ▪ Improves cognitive task performance 	<ul style="list-style-type: none"> ▪ Procedural memory improvements for particular actions, e.g. piano, football plays, and baseball signs. ▪ Declarative memory improvements in recall of facts and explicit knowledge 	<ul style="list-style-type: none"> ▪ Higher grades ▪ Higher standardized test scores ▪ Higher school attendance ▪ Decreased tardiness ▪ Increased self- and teacher reported academic performance ▪ Improved graduation rates

Source: Smart School Start¹⁰

ACADEMIC IMPACT

As evidenced by Figure 1.2, the benefits of sleep on school performance are primarily academic in nature. Many studies have revealed a relationship between delayed high school start times and improved academic outcomes. This subsection presents a review of key research surrounding the academic impact of delayed school start times. For example, a 2012 *Education Next* study examined student achievement in 14 North Carolina schools that delayed their start times from 7:30 a.m. to 8:30 a.m. Students in these schools earned significantly higher scores on standardized reading and math tests. Additionally, standardized test scores increased by an average of 2.2 percentile points in math and 1.5 percentile points in reading after their start times were delayed. The improvements were more pronounced for older students and students in lower achievement bands.¹¹ Similarly, a 2011 study from the Minneapolis-St. Paul metropolitan area from 1992-2002 found a statistically significant impact of delayed start times on ACT scores across demographic groups.¹²

In a 2003 review of studies on sleeping/waking patterns, school start times, and classroom performance by Wolfson and Carskadon presented an overview of findings specifically related to academic benefits.¹³ The following is a summary of studies from this review that are relevant to high school students and later start times:¹⁴

- **Link and Ancoli-Israel (2003):** In this study, the sleep and grades of 150 high school students were tracked. *Students with higher GPAs reported later school rise times,*

¹⁰ "Academics." Smart School Start. <http://www.smartschoolstart.org/academic-and-athletic-performance/>

¹¹ Edwards, F. "Do Schools Begin Too Early?" *Education Next*, 12:3, 2012. https://porterewhs.pbworks.com/w/file/fetch/89857220/HS%20Do%20Schools%20Begin%20Too%20Early_%20-%20Education%20Next%20_%20Education%20Next.pdf

¹² Hinrichs, Op. cit.

¹³ Wolfson, A. and M. Carskadon. "Understanding Adolescents' Sleep Patterns and School Performance: A Critical Appraisal." *Sleep Medicine Reviews*, 7:6, 2003. p. 491. http://www.sleepforscience.org/stuff/contentmgr/files/52a3d7d8fccfd8d14eb35108b5ef8f67/pdf/wolfson_carskadonsmr2003.pdf

¹⁴ Bullets adapted from: Ibid.

earlier rise times on weekends, shorter sleep latencies, and fewer school day naps. The study included a comparison of sleep habits for students with GPAs greater than 3.5 and less than 3.5. The students with lower GPAs reported signs of daytime sleepiness (falling asleep or fighting to stay awake while commuting to school) more frequently. Additionally, students who reported better grades slept longer on school nights (7.4 hours vs. 7 hours).¹⁵

- **Hofman and Steenhof (1997):** Hofman and Steenhof surveyed 600 Dutch high school students about sleep habits, sleep quality, and school performance. Using a multiple regression analysis, these investigators found an association of better school performance with more time in bed, better sleep quality, and less lag time between sleeps.¹⁶
- **Epstein et. al. (1995):** This study examined the school start times, sleep habits, and performance of a large number of Israeli children and teenagers (n=6,495), 3,122 of which were high school students. The researchers reported that there was a significant correlation between sleep time and ability to concentrate, tendency to doze off during class, and frequency of school tardiness.¹⁷
- **Epstein et. al. (1998):** A second study by Epstein's team measured school start times ranging from 7:10 a.m. to 8:30 a.m. The researchers directly compared students whose schools started at 7:15 a.m. or earlier at least two days a week with those who started regularly at 8:00 a.m. Mean total sleep times for the students at the school in the group that began earlier were significantly shorter. Average school night sleep for the students with an early start time was 8.7 hours, as opposed to the group that began later, which averaged 9 hours. *The broad conclusion of the study was that early start times negatively influence sleep, thus impacting daytime functioning at school.*¹⁸

HEALTH BENEFITS

In addition to the academic benefits outlined in the previous subsection, adjusting school times to accommodate adolescents' circadian rhythms has many health and safety benefits. A later school time can promote both mental and physical health. For example, a study in a selective boarding school by Boergers et. al. showed that a shift from an 8:00 a.m. to 8:25 a.m. start time allowed students to obtain an average of 29 more minutes of sleep each night. When school started later, students reported significantly less daytime sleepiness and

¹⁵ Link, S. and S. Ancoli-Israel. "Sleep and the Teenager." *Sleep Research*, 24a, 1995.
http://www.sleepforscience.org/stuff/contentmgr/files/52a3d7d8fccfd8d14eb35108b5ef8f67/pdf/wolfson_carsk_adonsmr2003.pdf

¹⁶ Hofman, W. and L. Steenhof. "Sleep Characteristics of Dutch Adolescents Are Related to School Performance." *Sleep Wake Research*, 8, 1997.
http://www.researchgate.net/publication/267785416_Sleep_characteristics_of_Dutch_adolescents_are_related_to_school_performance

¹⁷ Epstein, R., N. Chillag, and P. Lavie. "Sleep Habits of Children and Adolescents in Israel: The Influence of Starting Time on Schools." *Sleep Research*, 24a, 1995.

¹⁸ Epstein, R., N. Chillag, and P. Lavie. "Starting Times of School: Effects of Daytime Functioning of Fifth-Grade Children in Israel." *Sleep*, 21, 1998.

weekly caffeine consumption. They also had significantly lower scores on a scale that measured depressed mood.¹⁹ In terms of physical health, students reap the benefits of additional minutes of sleep. Losing sleep, especially in adolescence, can exert a serious effect on hormones, changing the way students eat, metabolize food, and store fat. Fat storage, especially early in life, can set students up for long-term health consequences such as diabetes, obesity, and cardiovascular disease.²⁰

Later high school start times also promote safety, particularly for students who drive to school. A 2014 study by the Center for Applied Research and Educational Improvement (CAREI) at the University of Minnesota's College of Education and Human Development surveyed the sleep habits of high school students in a sample of Minnesota, Colorado, and Wyoming school districts with delayed start times. They found similar academic benefits to the previously mentioned studies, and additionally identified substantial reductions in car crashes involving high-school aged drivers after start times were delayed, with total reductions ranging from 6 to 75 percent.²¹ This finding corroborates a report by the American Automobile Association Foundation for traffic safety, which found that even after brief sleep deprivation (18 hours), teens can exhibit impairment similar to drivers who have a Blood Alcohol Concentration (B.A.C.) of .05-0.8.²²

IMPLEMENTATION

With the literature showing strong support for later school start times, Hanover turns to a discussion of implementation. There are various challenges to implementing a later school start time, mostly involving the "adult" concerns outlined at the beginning of Section I. As outlined in Figure 1.3 on the following page, the major challenges to implementation that districts have historically faced include: *financial cost, loss of community support, impact on parent work schedules, limitations on student after-school employment, financial cost incurred by families, changes in traffic patterns, reduction of student involvement in extracurricular activities, negative impact on teacher schedules, and concerns for elementary students.*

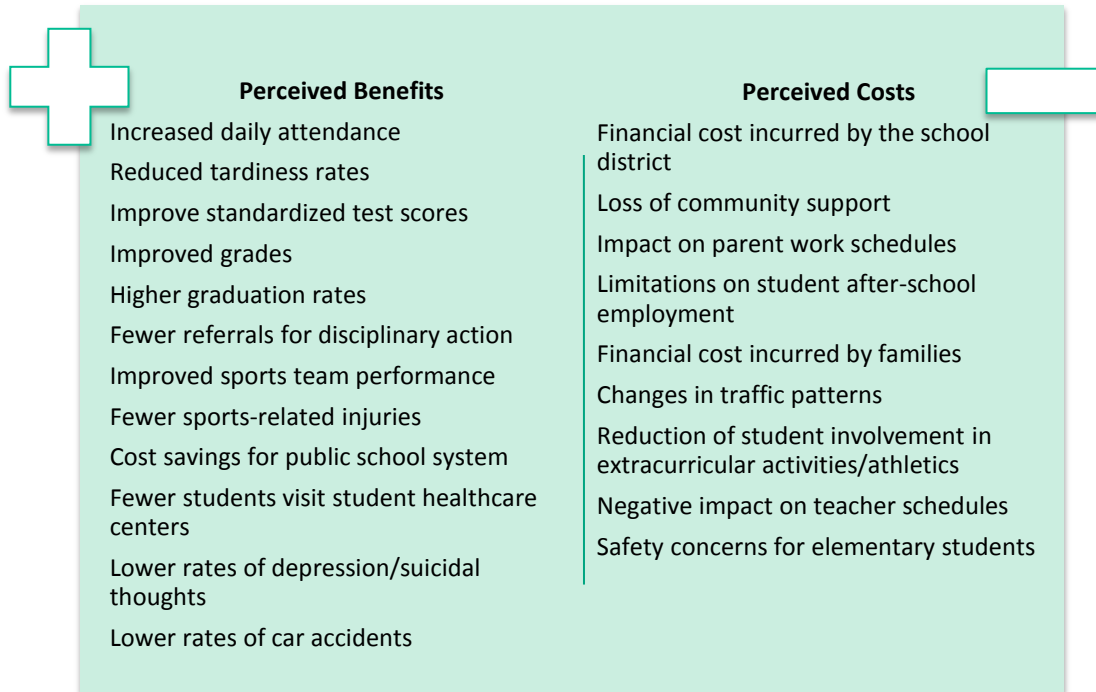
¹⁹ Boergers, Gable, and Owens, Op. cit.

²⁰ "Physical Health." Smart School Start. <http://www.smartschoolstart.org/physical-health/>

²¹ Wahlstrom, K. et al. "Examining the Impact of Later High School Start Times on the Health and Academic Performance of High School Students: A Multi-Site Study." 2014.
<http://conservancy.umn.edu/bitstream/handle/11299/162769/Impact?sequence=1>

²² "Drowsy Driving." Smart School Start. <http://www.smartschoolstart.org/drowsy-driving/>

Figure 1.3: Perceived Benefits and Costs of School Start Time Change



Source: Children’s National Medical Center’s Blueprint for Change Team²³

However, these concerns are not insurmountable. It is important to note that the perceived challenges outlined above do not necessarily align with the concerns that districts have in practice. Because there are many perceived benefits of a later high school start time, districts have circumvented many of these perceived costs or issues in creative ways. The top identified challenges that districts faced when changing school start times include:²⁴

- Traffic flow at school;
- Changes in parents’ work schedules;
- After-school extracurricular program attendance;
- Changes in teachers’ work schedules; and,
- Before-school athletics practice schedules.

Despite implementation challenges, districts have successfully overcome public anxieties regarding schedule changes. Two prominent strategies have been used by districts to help transition to a later start time: **1) involving community members in decision-making through high school start time task forces, and 2) thoughtful decisions about bell change implementation.**

²³ The Children’s National Medical Center’s Blueprint for Change Team, Op. cit., p. 14.

²⁴ Bullets sourced verbatim from: Ibid., p. 13.

A number of districts have gained community support for later school start times by creating a task force with representatives from diverse stakeholder groups. Task forces should include teachers, administrators, parents, school principals, transportation representatives, and communications officers. A prominent example of a task force is the High School Start-Time Committee, a collaborative effort between the Mercer Island School District and Bellevue School District in Washington.²⁵ The committee, which met over the course of six months from December 2014 to June 2015, developed key recommendations for the district with the support of two teachers, two administrators, four parents, a school principal, a transportation representative, and the superintendents of both districts. Two communications officers, a facilitator, and a recorder were also present.²⁶

Beyond key stakeholder involvement, districts should make conscious choices about the strategies they use in bell change implementation. In order to adopt a later school schedule in high schools, many districts have adopted multi-tiered bus schedules, where school start times and bus schedules are staggered. In districts where busing is already multi-tiered, districts can use other creative strategies such as flipping high school and elementary bus schedules. This strategy is intuitive because it capitalizes on younger children’s tendency to sleep and wake earlier than older children. By starting elementary school significantly earlier than high school to allow for adequate transportation time, districts can both align their school schedules with student sleep patterns as well as promote cost savings on transportation. Other transportation strategies include encouraging car pools and the use of public transportation, and allowing middle and high school students to ride on the same buses.²⁷ Figure 1.4 below outlines several of these strategies to overcome the challenges of changing bell schedules and later high school start times.

Figure 1.4: Overview of School Bell Change Strategies

STRATEGY	DESCRIPTION
Slide	<ul style="list-style-type: none"> ▪ Moving all elementary, middle, and high school bell times later
Modified slide	<ul style="list-style-type: none"> ▪ Moving elementary and high school later, with middle school earlier
Flip	<ul style="list-style-type: none"> ▪ Exchanging elementary and high school bell times
Ancillary strategies	<ul style="list-style-type: none"> ▪ Creation of a “zero” period; ▪ Flexible scheduling based on student preference; and, ▪ Bus sharing between middle and high school students.

Source: The Children’s National Medical Center’s Blueprint for Change Team²⁸

A second main concern is the adaptation of a later school schedule to pre-existing athletic programs, which often hold practices before and after school hours. While community

²⁵ “High School Start-Time Committee.” Mercer Island School District: Superintendent Services. <http://www.mercerislandschools.org/Page/11363>

²⁶ Mercer Island Public Schools. “High School Start-Time Committee.” 2014. <http://www.mercerislandschools.org/cms/lib3/WA01001855/Centricity/Domain/40/High%20School%20Start.pdf>

²⁷ The Children’s National Medical Center’s Blueprint for Change Team, Op. cit., p. 27.

²⁸ Content adapted from: Ibid.

members are typically very concerned at the prospect of a schedule change, these concerns do not usually materialize, as districts are able to change policies to include early dismissals on game days or create more flexible instruction time. In all of the districts surveyed by the 2014 study from the Children’s National Medical Center’s Blueprint for Change Team, no districts reported having to cancel or significantly change any of their athletic programs. In some districts, students actually participated more in athletic activities after the high school start times were delayed. Prominent examples of this trend include districts in Edina, MN; Wilton, CT; and Seattle, WA.²⁹

²⁹ Ibid., p. 27.

SECTION II: DISTRICT PROFILES

This section profiles six districts that have transitioned to later school times. Interviews were conducted with administrators at South Washington County Schools (MN), Santa Rosa County School District (FL), Academy District 20 (CO), Albany Unified School District (CA), Glens Falls City School District (NY), and North Andover Public Schools (MA).

SOUTH WASHINGTON COUNTY SCHOOLS (MN)

South Washington County Schools is a large, suburban district outside of St. Paul, Minnesota. The district serves 17,700 students in 16 elementary schools, four middle schools and three high schools.³⁰ In 2009, the district’s three high schools changed their start times from 7:30 a.m. to 8:35 a.m. The newer school schedule with later start times is presented in Figure 2.1.

Figure 2.1: South Washington County High School Bell Schedules

EAST RIDGE HIGH SCHOOL		PARK HIGH SCHOOL		WOODBURY HIGH SCHOOL	
0	7:35-8:25	0	7:30-8:15	1	8:35-9:28
1	8:35-9:35	1	8:35-9:30		Announcements 9:28-9:34
2	9:41-10:35	2	9:35-10:26	2	9:40-10:33
3	10:41-11:36	3	10:31-11:22	3	10:39-11:32
4	<p>A Lunch Class (Per. 3) 10:41-11:06 AM Lunch 11:06-11:36 AM Class (Per. 3) 11:41 -12:09 PM Class (Per. 4) 12:14-1:06PM</p> <p>Hour 4 all others 11:36-1:06 PM</p> <p>B Lunch Lunch 11:36-12:06 PM Class 12:12-1:06 PM</p> <p>C Lunch Class 11:41-12:06 PM Lunch 12:06-12:36 PM Class 12:36-1:06 PM</p> <p>D Lunch Class 11:41-12:36 PM Lunch 12:36-1:06 PM</p>	Wolf Pack Hour	11:22-12:22	4	<p>A Lunch Lunch 11:32 a.m.–12:02 p.m. Class 12:08–1:07 p.m.</p> <p>B Lunch Class 11:38–11:54 a.m. Lunch 11:54 a.m.–12:24 p.m. Class 12:24–1:07 p.m.</p> <p>C Lunch Class 11:38 a.m.–12:16 p.m. Lunch 12:16–12:46 p.m. Class 12:46–1:07 p.m.</p> <p>D Lunch Class 11:38 a.m.–12:37 p.m. Lunch 12:37–1:07 PM</p>
5	1:12-2:05	4	12:22-1:13	5	1:13-2:06 p.m.
6	2:11-3:05	5	1:18-2:09	6	2:12-3:05 p.m.
		6	2:14-3:05		

Source: [1] East Ridge High School [2] Park High School [3] Woodbury High School³¹

³⁰ South Washington County Schools. “District 833 Profile: 2015-2016.” 2015. http://www.sowashco.org/files/about-us/District833Profile_1516.pdf

³¹ East Ridge High School. “East Ridge High School Daily Schedule 2014-2015.” 2014. http://erhs.sowashco.org/sites/erhs.sowashco.org/files/files/2014_15_Bell_Schedule_2.pdf [2] Park High School.

South Washington County Schools adjusted its start time in response to growth in the student population. In 2009, the district built East Ridge High School to accommodate growing student enrollment numbers, and thus had to change district boundaries. During this overhaul, district administrators examined the research regarding students and sleep that was conducted by the University of Minnesota, and they decided to incorporate a later start time into their district plan. District Superintendent Keith Jacobus explains that,

School Schedules:

- Elementary School: 7:55 a.m.-2:25 p.m.; 8:40 a.m.-3:10 p.m.; and 9:20 a.m.-3:50 a.m.
- Middle School: 7:55 a.m.-2:55 p.m.
- High School: 8:35 a.m.-3:05 p.m.

“The U of M has been a leader at looking at adolescent sleep patterns. We had schools within the city that had made the change to a later start time, and the research is really well-documented about adolescent sleep patterns and this issue in the teen years. They really have a low level of melatonin, and that’s why they go to sleep later and later.”³²

Jacobus elaborates on the importance of sleep for the district’s students:

“I hear comments like ‘I had to wake up early when I was a kid’ but it is really not about that. We know that the U of M study that followed up, our kids are now getting an average of eight hours a night of sleep and have lower rates of depression, better academic achievement, better outcomes in attendance, so we feel that it is not that they cannot get up early, we just prime them and set them up to have a good learning experience from the start of the day.”

Adjusting the district’s three high schools to a later start time had consequences for the district’s elementary and middle school start times. As all three levels of schooling share the same buses, elementary and middle school start times also had to be adjusted. The changes now include elementary start times at 7:55, 8:40, or 9:20, and middle school start times at 7:55, in order to allow for a tiered busing system. While the district has always operated using tiered busing, the new schedule required some adjustments, and Jacobus noted that there were challenges in ensuring that buses had enough turnaround time when the change was first implemented.

Jacobus also notes that the district did not facet community pushback about the decision to transition to a later school start time; he recalls that community members were more upset about the changing district boundaries. “Because we were making a lot of significant changes at the same time, we had the new school opening, we had boundaries changing, there was a lot of change, we had a very extensive process,” explains Jacobus. “To make a change, there is a lot of work at the district with large committees and public meetings to help understand the research behind the change, why we wanted to make it, and to help them understand it.”

“Bell Schedules: Park High School.” 2015. <http://psh.sowashco.org/students/bell-schedules> [2] Woodbury High School. “Bell Schedule: Woodbury High School.” 2015. <http://whs.sowashco.org/about-us/bell-schedule>

³² Jacobus, K. South Washington County Schools Superintendent. Phone interview, September 22, 2015.

Two of the three district high schools now offer a zero period to accommodate additional electives or activities. While these periods are optional, they allow students to participate in extended elective options.

Another concern was loss of class time due to athletics. However, Jacobus indicates that he did not face many challenges once the new schedules were in place. While he understands that some athletic events have to occur earlier in the afternoon to take advantage of daylight, he also argues that extending athletic start times from 4:00 p.m. to 5:00 p.m. would allow additional time after school for students, and would likely be more convenient for working parents. Jacobus suggests working with other schools and districts in the same conference to change the start time of athletic events.

Despite this slight challenge, the anecdotal and quantitative results of this change in the district are positive. Jacobus reports that, "Our principals say our kids are ready to learn as they start first period." He reports that, "They come, and a number of kids come early to school and they have a chance to socialize and finish their homework and visit teachers, and when the bell comes, they are ready to go. Prior to that, there was quietness, with kids kind of slogging through the morning, but that is all anecdotal." Furthermore, a study conducted by the University of Minnesota found the following quantitative benefits in South Washington County's later school start time: an increase in state test scores, positive outcomes on subtests, and improved scores on PLAN tests. Jacobus explains that, "We want to make sure we can maximize learning for kids coming in, and we send them out of high school in a much better space rather than being sleep-deprived and just trying to survive the high school years. I am very proud of our district."

SANTA ROSA COUNTY SCHOOL DISTRICT (FL)

Santa Rosa County School District is a large district in Florida that serves over 25,000 students.³³ The district includes 18 elementary schools, eight middle schools, and seven high schools. Select high schools in the district adjusted their start times in 2009 in response to financial pressures. One of these high schools is Gulf Breeze High School, which serves more than 1,500 students.³⁴ Hanover Research interviewed Gulf Breeze High School's Principal, Jason Weeks.³⁵ The high school's current schedule is presented in Figure 2.2 on the following page.

³³ "Total Enrollment for Santa Rosa 2012-2013." National Center for Education Statistics. <https://nces.ed.gov/ccd/elsi/quickFacts.aspx>

³⁴ "Florida School Performance Grade and Annual Measurable Objectives." No Child Left Behind School Public Accountability Reports. http://doeweb-prd.doe.state.fl.us/eds/nclbspar/year1314/nclb1314.cfm?dist_schl=57_103

³⁵ Weeks, J. Gulf Breeze High School Principal. Phone Interview, September 16, 2015.

Figure 2.2: Gulf Breeze High School Bell Schedule

PERIOD	TIME
1 st	9:15-10:05
ITV	10:05-10:10
2 nd	10:15-11:05
3 rd	11:10-12:00
4 th	12:05-1:25
5 th	1:30-2:20
6 th	2:25-3:15

Source: Santa Rosa Country School District³⁶

Gulf Breeze High School adjusted the high school start time to 9:15 a.m. for the 2011-2012 academic year as a cost-saving measure. “The district went through a system of cost saving measures because our financial condition ratio was becoming unhealthy,” explains Weeks, “So we started looking for ways to save as much money as possible. One of the options that we had was to switch to three-tiered bus system.”

Having a three-tiered bus schedule, in which the district uses the same buses for all three school levels at staggered times, saved the district an estimated \$2.5 million when it was implemented. Only the larger high schools in the district made this change, as it was impractical for the two rural high schools in the county to do so as well. Both of the rural high schools’ start times remain between 7:00 a.m. and 7:30 a.m.

School Schedules:

- Elementary School: 8:25 a.m. -2:31 p.m.
- Middle School: 7:30 a.m.-1:36 p.m.
- High School: 9:15 a.m.-3:21 p.m.

The high schools were chosen to be later than the elementary and middle schools, based on district administrators’ review of the research stating that the benefits of later school start times have the most impact for older students, as opposed to those in elementary and middle schools. The elementary and middle school start times vary, but generally speaking, the transition caused middle school students to be released earlier. A small number of middle schools moved into the first tier of busing, and were therefore released from school at 1:30 p.m. as opposed to 3:00 p.m. or 3:15 p.m. as they had been in previous years. With such a dramatic change in times at all levels of schooling, Weeks indicates that there was a great deal of skepticism from the community. He emphasized that the decision was made from a financial standpoint as opposed to an academic one.

Since changing the high school start time, Weeks notes that there have been distinct advantages and disadvantages:

³⁶ Santa Rosa County School District. “GBHS Bell Schedule.” <https://www.santarosa.k12.fl.us/accreditation/std1/1-2.pdf>

“Some of the advantages are also the disadvantages... But for students who participate in extracurricular activities, that later start time gives them an opportunity to get needed rest, because whether or not we were on the tiered system or not, if you play a sport...those kids are getting home at 9:30 p.m., 10:00 p.m., and they have an hour’s worth of homework. So they get 6 or 7 hours of sleep, and a lot of times they are not even getting that much. So the later start time gives them an opportunity to do it.”

Weeks added that before-school tutoring sessions and extracurricular activities have become more common since implementing the later start time. A majority of the high school clubs now meet in the morning before school as well.

Like other examined high schools, athletic schedules have been a barrier to implementation. Weeks explains that the new release time, 3:20 p.m., means that students are likely not starting practices until 4:15 p.m., which is especially problematic during Daylight Savings Time. When students have to travel for games, they are released earlier from school. Despite these challenges, Weeks argues that, “For the most part, it has worked out pretty well. Would schools like the autonomy to start when they wanted to? Absolutely. We would. We obviously don’t have that option, but it works.”

ACADEMY DISTRICT 20 (CO)

Academy District 20 is a large district serving students in the northern portion of Colorado Springs. As of the 2012-2013 school year, the district enrolled nearly 24,000 students in 21 elementary schools, eight middle schools, and seven high schools.³⁷ In 2012, the district transitioned six of its seven high schools (excluding the district’s alternative school) from a 7:15 a.m. start time to 7:45 am. Now in the fourth year of implementation, Assistant Superintendent Karin Reynolds explains that the district has had a smooth transition due to the district’s preparation strategies.³⁸

Reynolds stated that members of the community had been in discussion about the research supporting later school start times for many years, but that the district decided to move forward in 2012:

School Schedules:

- Elementary School: 8:45 a.m.-3:45 p.m.
- Middle School: 7:55 a.m.-2:55 p.m.
- High School: 7:45 a.m.-2:45 p.m.

“We did a lot of work up front with different groups getting together. We have what we call stakeholder groups where we presented our plans and rationale. And our stakeholder groups, like we our Parent Sounding Board, which represents parents from every school in the district, there’s about 34 or 35 of them. They knew it was coming and brought it back to their teams. Our District Accountability Team knew it was coming, and again...This was an easy change because we didn’t make any other changes. We have a philosophy in our district: ‘no surprises.’ We probably really

³⁷ “Total Enrollment for Academy School District 20.” National Center for Education Statistics, 2013. <https://nces.ed.gov/ccd/elsi/quickFacts.aspx>

³⁸ Reynolds, K. Academy District 20 Assistant Superintendent. Phone interview, September 30, 2015.

overcommunicate with our community so they know what's coming. It's important to us."

Because the district front-loaded their planning, parents and teachers did not feel surprised when the changes were implemented. Reynolds noted that they do not receive complaints about extracurriculars, as the schools now end only one half hour later than they did previously. While Reynolds recognizes that the research supports a later start time than 7:45 a.m., she explains that the district could not accommodate later start times given the district's extracurricular schedule and needing daylight for many after-school activities.

Reynolds notes that the new bus schedules have been effective in supporting the 7:45 a.m. start time for the high schools. Before the transition, the high schools in the districts all started at different times, but now they universally begin at 7:45 a.m. This allows the busing system to run on a three-tier system, with the high schools as the first pick up and drop off, followed by middle school, followed by elementary school. Reynolds believes that this new three-tiered system has helped the district's transportation become more consistent. She also notes that the district plans their busing schedules around the "feeder" schools to the high schools, syncing the schedules of the elementary and middle schools with their corresponding expected high school.

Results of the later school start time have been overwhelmingly positive, if not formally quantified. Reynolds admits that the district needs to improve their data measurement for the evaluation of the impact of the new school start times, but that both principals and teachers have supported the change. "Anecdotally, we have better tardy rates, and principals were reporting tardy rates were better at the high school. The teachers say that, in general, they feel like students are more engaged than they would be at 7:15 a.m. in the morning." For more information about the district's scheduling practices, see Figure 2.3, which includes the school schedule for Liberty High School, one of the district's seven schools. Liberty High School uses an alternating block schedule, Blue days include Blocks B1-B4, and Red days include Blocks R1-R4.

Figure 2.3: Liberty High School Schedule

BLUE/RED DAY		ASSEMBLY DAY	
7:45- 9:15	Block B1/R1	7:45-9:10	Block B1/R1
9:25-10:55	Block B2/R2	9:15-9:55	Assembly
		10:00-11:20	Block B2/R2
11:00-11:25	Lunch	11:25-11:50	Lunch
11:35-1:10	Block B3/R3	12:00-1:20	Block B3/B4
OR		OR	
11:00-11:45	3A	11:25-11:50	3A
	Lunch	12:10-12:35	Lunch
	3B	12:40-1:20	3B
1:15-2:45	Block B4/R4	1:25-2:45	Block B4/R4

Source: Academy School District 20³⁹

ALBANY UNIFIED SCHOOL DISTRICT (CA)

Albany Unified School District in Albany, California is a small district that serves 3,804 students in four elementary schools, one middle school, and two high schools.⁴⁰ The district changed the start time of Albany High School, which serves 1,231 students, over the course of two years. In 2012-2013, the school shifted its schedule back 20 minutes, from 7:40 a.m. to 8:00 a.m., and in the following year (2013-2014) to 8:10 a.m. Albany High School Assistant Principal Tami Benau explained that the incremental change was intentional, in order to give families time to adjust.⁴¹ Figure 2.4 below outlines the high school’s current schedule.

Figure 2.4: Albany High School Bell Schedule

MONDAY		TUESDAY/THURSDAY BLOCK A		WEDNESDAY/FRIDAY BLOCK B	
1 st	8:10-9:01	1 st	8:10-9:44	2 nd	8:10-9:44
2 nd	9:06-9:57	3 rd	9:49-11:23	Advisory	9:49-10:29
3 rd	10:02-10:53			Break	10:29-10:39
Break	10:53-11:03	Break	11:23-11:33	4 th	10:44-12:18
4 th	11:08-11:59	5 th	11:38-1:12		
5 th	12:04-12:55			6 th	1:12-1:57
Lunch	12:55-1:40	7 th	2:02-3:36		
6 th	1:45-2:36				
7 th	2:41-3:32				

Source: Albany High School⁴²

³⁹ “Schedules.” Academy School District 20: Liberty High School, 2015. p. 20. <http://www.asd20.org/Schools/lhs/Info/Schedule/Pages/default.aspx>

⁴⁰ “Total Enrollment for Albany City Unified.” National Center for Education Statistics, 2013. <https://nces.ed.gov/ccd/elsi/quickFacts.aspx>

⁴¹ Benau, T. Albany High School Assistant Principal. Phone interview, September 16, 2015.

⁴² “Albany High School Parent/Student Handbooks.” 2015. <http://ahs.ausdk12.org/about/parent-student-handbooks>

The decision to start school later was driven by the high school, not by the district. Albany High School had undergone an evaluation of student stress in 2010-2011 called Challenge Success, which revealed that the 7:40 a.m. start time was too early for most students. In response, Albany High School held parent education meetings about stress, including seminars about sleep and homework, during the following two years. The school's Instructional Improvement Council (IIC), which included parents, students, and teachers, decided to move forward with the later start time plan. The IIC spent the year conducting focus groups with students and parents about what the positives and negatives of a later school time would be, and the final decision was made.

School Schedules:

- Elementary School: 8:30 a.m.-3:05 p.m.
- Middle School: 8:00 a.m.-3:03 p.m.
- High School: 8:10 a.m.-3:32 p.m.

There were some initial concerns about the later start times, but Benau notes that they were largely unfounded. Although parents were worried that the later start time would interfere with extracurricular activities, this proved to not be an issue. "People realized it was [not] that challenging," explained Benau. "Everyone was making it to their activities in time. Really it's been very quiet in the last year. It really has not been an issue." Benau added that their peer districts also had later school release times for high schools, between 3:30 p.m. and 4:00 p.m., so Albany High School was not an outlier in their athletics division. She noted that there was a change in game times in their league to accommodate the later school times of all schools, not just Albany. Concerns about traffic patterns were also unsubstantiated. Parents were worried that having a similar start time to Albany Middle School would create traffic congestion, but it was not problematic.

Benau stated that the change to the later start time has been overwhelmingly positive for Albany High School. In conjunction with other policies, including a uniform homework policy, providing more interventions for students, and expanding the online learning program, Benau credits the later school start time as part of the school's positive culture. She explains that, "Overall, I think anecdotally we feel students are less stressed because we've had a variety of approaches. It would be hard to list any one thing as attributing to our positive school culture, and our California Healthy Kids Survey we give every two years was very positive in terms of stress... That data is very positive."

GLENS FALLS CITY SCHOOL DISTRICT (NY)

Glens Falls City School District, in Glens Falls, NY serves just over 2,000 students in three elementary schools, one middle school, and one high school.⁴³ The three levels of schooling start and end at similar times, and the high school made the transition from a 7:45 a.m. start time to an 8:26 a.m. start time during the 2011-2012 academic year. Glens Falls High School Principal Mark Stratton was interviewed regarding the district's transition. Figure 2.5 outlines the district's high school schedule.

⁴³ "Total Enrollment for Glens Falls City School District." National Center for Education Statistics, 2013. <https://nces.ed.gov/ccd/elsi/quickFacts.aspx>

Glen Falls High School’s decision to move to a later start time was purely ideological. Stratton explains that, “We thought the decision was going to be good for students, for our kids.” In planning for the transition, the school spent over one year reviewing the research on high school start times and sleep patterns for adolescent children, which included guest speakers for teachers and administrators. Stratton notes that the district did their “due diligence” in preparing proposals for the board of education and the community and students, and ensured that the later school time was in the best interest of the students.

School Schedules:

- Elementary School: 8:30 a.m.-2:45 p.m.
- Middle School: 8:28 a.m.-3:03 p.m.
- High School: 8:26 a.m.-3:03 p.m.

Figure 2.5: Glens Falls High School Bell Schedule

PERIOD	TIME
Homeroom	8:26-8:32
1 st	8:35-9:15
2 nd	9:18-9:58
3 rd	10:01-10:41
4 th	10:45-11:25
5 th	11:29-12:09
6 th	12:13-12:53
7 th	12:57-1:37
8 th	1:40-2:20
9 th	2:23-3:03

Like other districts profiled in this section, Glens Falls faced challenges with transportation and athletics. With respect to transportation, the City of Glens Falls and the Glens Falls Transportation Council partnered with Glens Falls School District to conduct a comprehensive evaluation of school traffic patterns before and after implementation of the later school start time. Initially, parents were concerned that making standard drop-off times at all levels of schooling in the district would cause traffic jams. However, since the new school start time was implemented, drivers noted fewer traffic jams and quicker drop-off processes.⁴⁴ Concerns about athletic competitions were also largely unrealized. Athletic Director Arthur Corlew worked collaboratively with other athletic directors and principals in the district’s athletic conference to communicate the school’s commitment to later start times. While the other schools’ administrators were skeptical, Stratton indicates that the time change had a “minimal if any impact at all with the scheduling [of games].”⁴⁵

One unique feature of the district’s transition to a later school time was its involvement in a university sleep study. In conjunction with their school start time change, Glens Falls partnered with a research team from Saint Lawrence University to conduct a longitudinal study of how school start time changes affect academic achievement and the overall health

⁴⁴ “High School Start Time News from Glens Falls City Schools.” Glens Falls City Schools. 2013. www.gfsd.org

⁴⁵ Stratton, M. Glens Falls City School District Principal. Phone interview, September 17, 2015.

of students. The study was not mandatory, but included nearly all students in Grades 8-12. Students in the study answered questionnaires that asked about sleep times, mood, caffeine intake, and personal preference to stay up late or wake up early. The results of the survey are compelling for the positive impacts of later start times, and include:⁴⁶

- Glens Falls students receive an average of 20 more minutes of sleep per day than they were previously with the early school start time (7 hours, 17 minutes before compared to 7 hours, 37 minutes after).
- Reported rise times are now 7:00 a.m., and reported average bed time is 10:45 p.m.
- Students report a higher quality of sleep. The sleep quality index, which operates on a scale of 0-20, with lower scores indicating better sleep, improved from 9.6 for 6.3.
- The percentage of students who were late to school decreased from 9.7 percent during the 2011-2012 year to 6.8 percent in 2012-2013.
- The number of students failing courses decreased from 13.6 percent to 8.6 percent.
- Absenteeism decreased slightly, from 10.3 percent to 10 percent.
- Fewer study participants were referred to the school counseling office for depression screening.

NORTH ANDOVER PUBLIC SCHOOLS (MA)

North Andover Public Schools in North Andover, Massachusetts, transitioned to later high school start times in 2009. The district includes an early childhood center, five elementary schools, one middle school, and one high school, serving 4,766 students.⁴⁷ Hanover spoke with North Andover Principal Carla Scuzzarella regarding this change in the district.⁴⁸ High school start times in the district were moved from 7:15 a.m. to 7:43 a.m. in 2009 in conjunction with the development of a new school schedule. That year, the district made two other major changes to its schedule: switching from a full-year schedule to trimesters, and transitioning to block scheduling from traditional-length class periods.

School Schedules:

- Elementary School: 8:25 a.m.-3:00 p.m.
- Middle School: 7:40 a.m.-2:20 p.m.
- High School: 7:43 am-2:15 p.m.

North Andover High School now has 72-minute blocks, and the classes rotate so that students see their teachers at different times each week. Classes run from 7:43 a.m. to 2:15 p.m. The start time was adjusted in tandem with these other changes after the district assistant superintendent reviewed research on later high school start times and created an ad-hoc committee on start times. The committee presented their findings to the school community, parents, and the community at-large. With input from stakeholders, the district ultimately

⁴⁶ "High School Start Time News from Glens Falls City Schools," Op. cit.

⁴⁷ "Total Enrollment for North Andover 2012-2013." National Center for Education Statistics, 2013. <https://nces.ed.gov/ccd/elsi/quickFacts.aspx>

⁴⁸ Scuzzarella, C. North Andover High School Principal. Phone Interview, September 15, 2015.

made the decision that the high school should begin at 7:43 a.m. Figure 2.6 details the high school’s current schedule.

Figure 2.6 North Andover High School Bell Schedule

NON-ADVISORY DAYS			
Block	Time	Cafeteria Time	Class Time During Lunch
A	7:43-8:56		
B	9:01-10:14		
C	10:19-11:32		
D & Lunch	11:36-12:57	1 st Lunch 11:36-12:01 2 nd Lunch 12:04-12:29 3 rd Lunch 12:32-12:57	12:04-12:57 11:36-12:04 & 12:32-12:57 11:36-12:29
E	1:02-2:15		

ADVISORY DAYS			
Block	Time	Cafeteria Time	Class Time During Lunch
A	7:43-8:41		
B	8:46-9:44		
Advisory	9:49-10:44		
C	10:49-11:47		
D & Lunch	11:51-1:12	1 st Lunch 11:51-12:16 2 nd Lunch 12:19-12:44 3 rd Lunch 12:47-1:12	12:19-1:12 11:51-12:19 & 12:47-1:12 11:51-12:44
E	1:17-2:15		

Source: North Andover High School⁴⁹

Scuzzarella recognizes that the start time of North Andover High School is still early, and wishes that school could start at 8:00 a.m. or 8:15 a.m. However, he indicated that for their community, it was not feasible. Further delaying the high school start time would mean that the elementary and high school schedules would have to be flipped, which parents did not support. Elementary school parents were concerned about their children getting home in the afternoon before older children would be out of school. In some cases, the older child is the one who retrieves younger siblings from the bus stop, and if that became impossible, parents would face increased childcare costs. As such, North Andover adopted the “slide” strategy when they implemented the later school start times, shifting all school start times back slightly. To accommodate the slide, high school and middle school students ride the bus concurrently, with elementary school students picked up later.

Since changing the school start time, Scuzzarella has seen positive changes in student engagement patterns. He reports that students are more engaged during first period, and explains that:

“I will definitely tell you that my teachers notice and what we all notice is that [students are] more awake in that first period class. After 6:30 a.m., we have breakfast. If [students] get dropped off and they are bus students, there is still

⁴⁹ “Policies and Forms: North Andover Public Schools.” North Andover Public Schools, 2015. http://www.northandoverpublicschools.com/nahs/nahs_policies_and_forms.cfm

probably 20 minutes before class starts. They can grab something to eat, socialize. Whereas at 7:15 a.m. they were getting dropped off five seconds before school started practically, and they were just dead...That was big.”

Scuzarella explains that there is a strong consensus among the teachers that students are functioning better in their early classes than before the transition when school began at 7:15 a.m.

The biggest challenge that North Andover High School faced in adjusting their school start time was the accommodation of extracurricular activities. Particularly in the athletic program, Scuzarella had to ensure that the other schools in their leagues were amenable to their students arriving slightly later to games. Later school release times meant that North Andover students would often arrive to games just before 4:00 p.m., which was especially important during the months when the sun sets earlier. At schools without lights, athletic games run a higher risk of cancellation due to darkness. However, Scuzarella said that this did not prove to be very problematic, and most of the initial concerns that students and parents had about the later start time, including the accommodation of student employment after-school, worked themselves out.

Overall, Scuzarella notes that the biggest adjustment for students and families was the adjustment of the student’s day with respect to their extracurricular activities and homework. She explains that students are “starting later, therefore they are getting home later, and drama and music, they of course practice as long as some of our athletic teams, so now they are getting home, eating late, starting their homework late. Teenagers do not go to bed any earlier just because we start later. They stay up later.” To mediate this problem, Scuzarella encouraged parents to not allow their students to stay up past 11:00 p.m. doing homework, but she admits that there is not an easy way to enforce these types of rules.

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